Best Practices for Natural Farming

Developed by

Andhra Pradesh Community Managed Natural Farming (APCNF)

and

SAMETI, Gujarat

CONTENTS

Andhra Pradesh Community Managed Natural Farming (APCNF) HANDBOOK on Package of Practices (PoPs)

Gujarat Natural Farming Package and Practcices for different Crops

PART-A: Crop models A+ Grade models, reference plots and model plots (90% completed)

Crop Geometry, spacing, live mulch - principles
SRI (and line sowing)

1. SRI PADDY

i. Important features of SRI:

- SRI is not a variety or hybrid – It is a method of cultivation
- Low seed requirement - Only 2 Kg/ Acre
- Low water requirement – Alternate wetting and drying
- Transplantation of tender / young seedlings
- Transplanting at wider space - 25cmX25cm
- Incorporating weeds into the soil while weeding
- Raising Nursery: The nursery bed can be raised in a 48 sq. yard plot for transplantation in one acre. A bed width of 4 ft. is ideal and length can be decided by the farmer depending on the situation. As the roots of the 8-12 days seedlings grow up to 3 inches depth it is necessary to prepare a raised bed of 5-6 inches height. The nursery bed can be prepared with application of FYM and soil alternately in four layers.
- 1st Layer: 1 inch thick well decomposed FYM
- 2nd layer: 11/2 Inch soil
- 3rd layer: 1 inch thick well decomposed FYM
- 4th Layer: 21/2 Inch soil
- All these layers should be mixed well, as the FYM helps in easy penetration of roots. To prevent soil erosion, the bed on all sides should be made secure with wooden reapers/ planks or paddy straw rope or anything of that sort. To drain excess water appropriate channels should be provided on all sides.

ii. Seed Preparation and broadcasting:

Soak the seeds for 12hrs in Water. Drain the water and transfer wet seed into a gunny bag. Leave it for 24hrs. White root called radicle breaks open the outer coat and start emerging out of the seed at this stage the sprouted seed is taken to the nursery bed for sowing. To ensure uniform broadcasting, divide the whole seed lot into 4 parts and broadcast four times thinly spread over the bed. Spread well decomposed FYM or Paddy straw over the sown seed thinly. The seeds or not to be directly exposed to sun. Straw can be removed once the seeds germinate. Depending on the require1ment, watering should be done daily twice (morning and evening)

iii. Preparation of main field:

Field should be evenly levelled and there should not be standing water in the field during transplantation. In the SRI method, seedlings are widely spaced (10 x10 inch or 25 x 25cm) and only one seedling is transplanted per hill (3-4 seedlings per hill in conventional system). SRI

method can accommodate only 16 hills /sq. metre as against 33-40 hills/ square meter in conventional method. Markers need to be run over the prepared field lengthwise and width wise. Transplanting at the marked intersection gives the required 25 x 25 cm spacing.

iv. Transplantation

Young, 8-12 days old seedlings are transplanted in the SRI method. Care should be taken to see that the plant does not experience shock during transplanting. In the SRI method, a metal sheet is inserted 4-5 inches below the seedbed and the seedlings along with soil are lifted without any disturbance to their roots. Transplanting should be done as quickly as possible, preferably within half an hour to minimize trauma to the roots. Single seedlings with seed and soil are transplanted by using index finger and thumb and gently placing them at the intersection of markings. Light irrigation should be given on the next day of transplantation.

v. Irrigation and Water Management

In SRI, irrigation is given to wet the soil, just enough to saturate the soil with moisture. Subsequent irrigation is suggested when the soil develops fine cracks. Irrigation interval depends on soil type and weather conditions. This method helps in better growth and spread of roots. Regular wetting and drying of soil results in increased microbial activity in the soil and easy availability of nutrients to plants.

vi. Weed management

Absence of standing water provides a congenial environment for weeds to proliferate in SRI. If these weeds are incorporated into the soil, they serve as green manure. First weeding should be done 10-12 days after transplanting. Later, depending on the need, weeding can be done once every 10 days. Different models of manually operated weeders are being developed for effective weed management in SRI. Weeds can be incorporated by moving the weeder between the rows.

2. Saguna Rice Technology (SRT) with Natural Farming

i. Introduction

Saguna Rice Technique is a unique new method of cultivation the rice and related rotation crops without ploughing, puddling and transplanting (rice) on permanent raised beds. This is a zero till, Conservation Agriculture (CA) type of cultivation method evolved at Saguna Baug, Neral, Dist. Raigad, Maharashtra, India.

SRT can be defined as "a Conservation Agriculture (CA), Zero Till method of farming which is climate-smart and essentially a regenerative agricultural practice". In SRT, the atrocity of tillage on land is not caused, soil erosion is completely restricted, natural production of earthworms is witnessed, an increase of at least 0.5% organic carbon per year per hectare in the soil is ensured, considerable increase in the fertility and productivity of the land is ensured, and most importantly, adds amazing happiness and confidence in the farmer, making him ready for the future. For not having to do puddling, transplanting and hand hoeing, save 30% to 40% cost of production & not requiring transplanting saves 50% treacherous labour.

Loss of valuable silt (about 20%) during puddling can be prevented thus more fertile land can be handed over to next generation.

Leaves of rice plants on SRT beds seem to be broader and head more upwards to sunlight than their counterparts in conventional method. They are likely to produce more biomass, means higher yield. The organic carbon content of soil improved, which resulted in fertility improvement and hence more yield year on year.

The water holding capacity of soil improves and thus erosion reduces and hence fertile soil is saved. The overall environment is improved and the indicators of which like existence of a butterfly nest, arrival of some new bird species, occurrence of earthworms in field for natural tilling etc.

ii. Importance of SRT

- Ample oxygen supply to root zone
- Optimum moisture condition
- Reduces treacherous labor by 50%
- Reduction in cost of production by 40%
- Prevent fertility loss during puddling
- Stops emission of greenhouse gasses
- Not dependant on erratic behavior of rain

iii. Principles of SRT

- SRT insists that all roots and small portion of stem should be left in the beds for slow rotting.
- Weeds are to be controlled with manual labor. No ploughing, puddling and hoeing is to be done to control weeds.
- This system will get the crop ready for harvesting 8 to 10 days earlier.
- Take this into consideration while choosing a variety to avoid getting harvesting caught in receding rain.

iv. SRT Techniques:

Preparation of Beds

In this method we have to till the soil and make the raised beds only once. The same permanent beds will be used again and again to grow various rotation crops after rice in Kharif season. Till the soil with rotavator or power tiller to make it workable.

Use tractor drawn BED MAKER or any other method to open furrows at marked lines and make raised beds.

The best time to make these beds is immediately after kharif paddy harvesting, is in October. Good ploughing and tilling are done with available residual moisture or by giving irrigation. Added desirable and / or available quantity of any organic manure. Finally tilled it with rotavator or power tiller to make it workable. Drawn parallel lines with help of rope and lime or wood ash at 136 cm i.e 4.5 feet apart.

Making holes with iron forma

The SRT iron forma (the tool will be better soon) facilitates planting of crop in predetermined distances enabling precise plant population per unit area. Absence of puddling and transplanting of rice makes it possible for "Not dependent on erratic behavior of rain." This means 'No more waiting for Rain God to shower just optimum rain for best transplanting operation'. Similarly, if rain vanishes for few days during crop season it doesn't lead to cracking of land or 'crop kill' immediately.

Made depressions / holes with SRT iron forma on the raised beds. Apply Ghanjeevamrutham to the seed beds. Irrigated plot with best possible available method. The crop is ready for harvest till 3rd or 4th week of February.

Seed sowing

Approximately 3–4 days before rain begins, make holes on beds by SRT iron forma and put 3 to 4 treated rice seeds in each hole, press it with a mixture of Ghanajeevamrutham and good soil.

Gap Filling

At about 4 leaf stage carryout gap filling by using extra seedlings from nearby hills.

Weed control

In natural farming, spraying of herbicides is prohibited. To prevent weed growth mulching is recommended. Intercrops with leafy vegetables will become a live mulch and also a source for extra income.

Apply Drava Jeevamrutham frequently (15-20 days interval).

Pest and Disease Management

Concoctions, botanicals and other inputs can be used as per ZBNF recommendations.

While harvesting the crop leave 6 inches of stem and part of leaves on the beds. Allow them to decompose naturally, before going for the next crop and these crop residues also act as mulch material for the next crop. Need to plant the next crop in between the stubbles of paddy without tilling.

Relay crops (Vegetables or Pulses)

Summer moong beans are to be planted after the winter crop on the same beds between 25th February to 10th March. SRT iron forma. Same raised beds are to be used again without any ploughing or puddling or transplanting for next Kharif rice crop.

Due to Zero Till SRT, taking 2nd crop after main rice crop in Kharif season is becoming stress free activity for many farmers now. Farmers can able to take more than 20 number of crops ranges from okra, coriander, Fenugreek, brinjal, bitter gourd, dolichus beans , cabbage, tomato, lablab beans, Peas, gram, groundnut, cow pea , moong bean , to maize, water melon, wheat, maize, etc.

As per Natural farming practices, poly cropping systems with pulses, cereals, vegetables and oil seeds may be followed for better results.

v. Advantages of SRT

- For not having to do puddling, transplanting and hand hoeing, save 30% to 40% cost of production & not requiring transplanting saves 50% treacherous labor.
- Loss of valuable silt (about 20%) during puddling can be prevented thus more fertile land can be handed over to the next generation.
- Leaves of rice plants on SRT beds seem to be more broader and head more upwards to sunlight than their counterparts in conventional methods. They are likely to produce more biomass, which means higher yield.
- SRT has the ability to bring "Vigorous Uniformity" and higher yields in all soil types even in degraded soils and socio-economic groups. For example, a very new farmer and well established awarded farmer and agricultural universities will attain about the same higher yield per unit area.
- Hand hoeing is strictly avoided in SRT. Once again this reduces hard work and loosening of top soil making it vulnerable for washing away.
- SRT insists keeping of roots of previous crop in the raised bed. The root network prevents soil from cracking and makes it spongier. The same roots become a valuable source of organic carbon which is uniformly distributed and oxygen pathways to the root zone of the next crop.
- The traumatic shock caused to the rice seedlings during transplanting is avoided in SRT. This reduces the possibility of pest & disease problems.
- Rice crop gets ready 8-10 days earlier. Also, it saves time required for soil tilling between two crops. This leaves valuable 10–15 days of crop season for the farmer enabling him to take more than one crop in the same plot in a year.
- SRT is feasible for organic farming methods.
- Due to excessive water in low-lying plots, removal of harvested paddy from the plot for drying can be avoided with SRT raised beds.
- During milling of paddy, SRT will yield higher percentage recovery of grains.
- Non-use of heavy agricultural machinery for tilling in the field will prevent compaction & formation of hard pan of lower strata of soil enabling better percolation of water into dipper soil & permanent establishment of earthworms.
- It is possible to get high returns (more than ₹ 5,00,000 per hectare per annum) with crop rotation such as Basmati Rice (PS-5) in Kharif, leafy vegetables in Rabbi, Bold Groundnut (W-66) in Summer, while improving health of the soil.

vi. Impact of SRT

Impact of Farmer

- Farmers become more confident about their profession
- Lost dignity towards farming is regained through various systematic procedures carried out in SRT
- Farmers have gain independence from the problem of labor shortage.
- Impact of Soil
- Fragrance of soil improved in the process of keeping roots beneath earth's surface

- Soil becomes more productive
- Water holding capacity of soil has been drastically improved

Impact of Nature

- Presence of earthworm in farms attracts some of the rare species of birds, so it improves the ecosystem
- Ground water level increases
- Reduction in methane gas generation
- It reduces water, fertilizers & other chemical requirements.

3. Guli Ragi

Guli Ragi Model

Guli method is a method of cultivating by planting seeds in the middle of the pit. Guli raagi is a special method but it is not a special seed. In this method, boxes are drawn in the shape of squares and holes are dug at the junction of the four lines and the seedling is planted in it. This method is also known as 'SRI Ragi method' as it is similar to the SRI rice method. These methods are subject to the principles of nature farming. That is, farming is done with natural methods without artificial fertilizers and pesticides. With this method the Finger millet plants get more tillers, the hills grow bushy and the roots go deeper so that the plants grow healthier and have more tillers. Therefore, this method gives 3-5 times higher yields than the conventional farming method.

By this method Guli raagi can be grown in rainfed areas, shallow soils and sandy soils. Currently cultivated in Northern districts of Andhra Pradesh like East Godavari, Visakhapatnam, Vizianagaram and Srikakulam. Tribals in the agency areas in particular are following this method nicely.

i. Main principles

- Only young seedlings should be planted
- Plant to plant and row to row distance must be equal.
- In order to get more tillers, the young plants should be pressed with a stick.
- In order for the hills to grow into a bush, they should be left space between the plants and plants should get adequate sunlight and wind.
- In order for the roots to go deep into the bush, the soil should be mulched frequently by intercropping.
- Alternate wetting should be given if necessary
- The botanicals may be used for plant protection if necessary.

ii. Important Cultivation Methods:

- Most results are obtained if different management practices are implemented for short-term types and long-term types.

Seed Selection

- Pedda chodi (long duration, approximately 120-150 days harvest period) and Chinna chodi (short duration variety, about 100 days harvest period) varieties are more popular in tribal areas. Apart from these, there are other varieties of Sri Chaitanya, Champavati, Godavari, Bharati and Hima.

Seed treatment

- 300 to 400 grams per acre of quality seeds should be selected. These
- Seed should be treated with Bheejamrutham before sowing.
- Seedling preparation
- A 40 sq. Ft. (4 x 10 ft. Size) nursery bed should be made by mixing clay, sand and type-2 compost in equal layers. Or four nursery beds can be made to measure 4 x 4 × 1 feet. It provides enough seedlings per acre. Care should be taken to keep the nursery in the shade. The seeds can be laid in thin rows. After sowing, a thin mulching should be applied. Spray dravajeevamrutham on the raised beds during the growing stages.

Main farm preparation

- Approximately 500Kg / acre of Type-2 Ghanajeevamrutham should be applied before ploughing. The soil should not be mixed.

Molding

- Molds with ropes or markers so that there is a distance of 1 foot between rows and between plant to plant Should be planted (some can be planted 9 x 9 inches or even 10 x 10 inches apart). The seedling should be planted where the two lines meet. This equal distance on both sides makes it easier for intercultivation or lift the bicycle weeder.

Transplanting

- Planting of 12-21 days old seedlings gives good results. The seedlings in the seed bed should be removed with a little clay and iron sheets without damaging the separation system. Dry and spray 400 kg Type-1 solid manure per acre in the field before planting. The fiber should be cleaned once again with sterilizer. Make a small hole at the junction of the two lines and add a little solid biodegradable seedling (two bulbs) and then bury the hole. Or you can tie ropes on both sides and plant them with your finger where they meet (although the soil should be soft). Half a ton of Type-2 solid biofertilizer should be applied 30 days after planting.

Lifting the stalk

- Lifting the stalk with the help of oxen or by hand 2-3 times during the period of 20 to 15 days after planting. Some are kicked in the legs. Peel a squash, grate it and squeeze the juice. This process causes the dividing tissue of the tender plant to bulge under pressure.

Intercropping

- should be done three times for weeding and mulching the soil. Internal work should be done within 15 days, 30 days and 45 days (within 15 days) of planting. This can be done with the help of oxen (lamb or hoe) or with the help of a bicycle weeder. Spray 200 liters of liquid manure per acre on the ground (until the plant buds are wet) each time the intruder is done. Intercropping returns to the soil and the names grow firmly and the plants grow vegetatively.

Crop diversity

- Some intercrops can be planted along with pea. A suitable place for picking non-stick logs can be allotted to copper plants and legumes and other small grains can be planted in the middle. However, when copper is planted as a single crop, the ecosystem is more conducive to the development of ball plants, perennial vegetables and legumes on the ridges around it.

4. 5-layer

The concept of 5-Layer Model is built based on the natural forests which have various layers of trees living together without competing for sunlight, nutrients and water. In the forests, the five layers naturally exist with big trees, medium trees, Bushes, Small plants, Creepers and Tubers.

Based on the plants' photosynthesis capacity, entire vegetation is divided into three groups viz.

1). Highly photosynthetic plants

2) Mild photosynthetic plants and

3) Photo sensitive plants

i. Highly Photosynthetic plants

Highly photosynthetic vegetation requires intensive sunlight for their photosynthesis. The full intensity of solar light is between 8000 to 12000 foot-candles.

In this group all big trees and huge trees are present which include Mango, Tamarind, Cashew, Sapota, Coconut, Teak, Jackfruit, Bel, Jamun, oil palm, date, Rubber (Monocot crops like Gramineae family viz Sugarcane, Paddy, Maize, Millets and Grasses are also included in this group). They can manufacture food 10 hours per day. But high photosynthesis occurs during 10.30 am to 3.30 pm. Under the shadow they cannot prepare food. Under such conditions, stomata of leaves are closed by guard cell. Even dancing shadow is not enough to prepare food.

ii. Mild Photosynthetic plants

All types of medium trees, bushes, all types of pulses, oil seeds, vegetables, flower crops are part of this group. These plants manage with dancing shadow. The leaves of medium trees, bushes, and plants that fall under this category require the solar energy between 5000 to

7000 foot-candles (medium intensity sunlight). Naturally, in the rainy season, clouds create dancing shadow. In the winter, intensity of sunlight is less. So, we need to arrange shade

vegetation to cover these crops from higher sunlight during summer season.

iii. Photosensitive plants

All types of spices, ginger, turmeric, black pepper, beetle wine, and tubers are grouped under this category. The leaves of these plants do not require full sunlight or dancing shadow, they grow well under the shadow. The leaves utilize 3700 to 5000 foot-candles of sunlight. Considering the family's food and nutritional security as well as economic point of view 5-Layer model has been designed with the inclusion of Big Trees, Medium trees, Bushes, Small plants, Creepers and Tubers. The basic units of any 5-Layer Model is; 36' X 36' models - Coconut group/ mango group of 36' X 36'. Few medium trees are; nutmeg, orange, desi drumstick, sweet orange, lemon, kin now, guava, amla, apple, cocoa, areca nut, papaya, cloves, and other medium trees. Bushes are; custard apple, banana, drumstick, pomegranate, curry leaf, cinnamon and other small bushes.

Instructions:

The plot planned for 5-Layer Model may be over laid with 365 DGC for enhancement of soil fertility, and carbon sequestration. All around the plot trenches, in between conservation furrow, swales across the slope and farm pond at bottom of slope to harvest rainwater is ideal species and spacious as indicated in the above diagram.

This can be combined with overall watershed planning. Some components can be done in convergence with MGNREGA. Lot of higher end experiment are planned with National & International scientific organizations which are appended with wide annexure 3

5. Surya Mandal

Surya Mandal

Nutrition Garden is a low cost, scientific model of kitchen/homestead garden with a variety of nutritious vegetables, fruits and medicinal plants produced throughout the year organically thus ensuring nutritional security of marginal farming families in rural areas.

Objectives

Eradicate Malnutrition and achieve the goal of nutritional self-sufficiency, *"Nutrition for all"*

Bringing the agricultural crop diversity at household level to reduce the ecological footprint and food mile

To have vegetables grown with ZBNF practices in the backyard itself

Design principles

- Optimization of available resources
- Optimization of backyard/front yard space/School ground
- Maximum harvesting of sunlight

- In situ fertility management
- Best use of waste water
- Multi- tier farming
- Crop Rotation

Outcomes from nutrigarden

- Nutritional Security by addressing malnutrition in rural areas
- Production of 1 kg/day vegetable & Fruits throughout the year
- Self-reliance in crop production and management
- Balanced nutritious food produced and consumed throughout the year
- Indigenous seed varieties of different vegetable crops are conserved
- Improves cash flow of small and marginal farmers due to reduced amount spent towards purchase of vegetables and medicine
- Opportunity to make a difference in the resource poor areas across the country

Layout process

- Take a site of about 900 Soft. where a circle of radius 15 ft is possible to be drawn in the centre.
- Put a stump in the centre of this plot and take a rope/measuring tape of 15 ft length around.
- Make a circle with this rope with the stump as the centre. The radius of a NG is 15' (15 ft).
- Mark this circle with dry ash or lime
- Make a few additional circles with radius at 3 ft (pit), at 4.5 ft (Inner circle), at 6 ft (pathway), at 9 ft (Middle circle), at 10.5 ft (pathway) and at 15ft (outer circle)
- The outermost circle can be divided into 7 equal parts by measuring 13.5 ft of perimeter in each part
- Draw a straight line from one of the joining points of two such parts to the circle of 4.5 ft radius
- Make one line each on both sides of this straight line by of 1.5 ft creates pathway. Follow the same procedure to draw
- A Saucer shaped pit of 2 ft depth of 3 ft radius is dug at the centre in of the suggested site
- This pit is filled up with biodegradable kitchen waste, farm waste etc and is drenched with Amrut Jal for making the compost for fertility management in NG beds
- Beds should be prepared at a height of 1ft with equal proportion of FYM and Soil
- After the bed preparation the entire bed should be drenched with Amrut Jal
- After the 24 Hour of drenching seed sowing and planting should be accomplished of desired crop as per choice and taste

Material Required

- FYM/Compost
- Soil, Seed/Plants

- Amrut Jal, Biomass
- Biopesticides

Design component:

- A grade model plots, Model plots, reference plots, etc.

PART-B: Approved Crop Package of Practices (PoPs)

CROP WISE APCNF MODEL PROTOCOLS / PACKAGE OF PRACTICES (POPs) OF MAJOR (AGRICULTURE/ HORTICULTURE) CROPS FOR THE YEAR-2021-22

All the core practices of BJM, GJM & DJM are to be followed mandatorily and their respective quantities can be enhanced and should not be reduced. E.g.- Split doses (soil, foliar) & respective quantities may be increased.

1. Agriculture-Field crops:

i. Paddy (Kharif)

- Before kharif, raising of Pre-Monsoon Dry Sowing (PMDS) with 18 varieties of crops, sown in May and continued up to July 2nd week (appx.75 days) to get a good crop stand and biomass. By practicing PMDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables, can be used for self-consumption, some biomass may be used as fodder or may be used as Mulch / incorporated in to the soil before kharif plantation.

Seed and seedling treatment with Bheejamrutham (BJM)

- @5 litres/ 25- 30 kg seed respectively, it stimulates & catalyses soil biology and protects from seed/soil born pests and diseases.
- Promote Line sowing, Drum Seeder planting, SRI (System of Rice Intensification) in irrigated paddy and Direct seeding (Line) in rainfed paddy which allows minimal disturbance to the soil.

Ghanajeevamrutham (GJM).

- Type-2 GJM at 1000-1500kg/acre, during last ploughing/Puddling and ii). Type-1 GJM at 400kg/acre in two equal splits at 20 DAT,40DAT at 20 days interval.

Dravajeevamrutham (DJM)

- Soil application: 800ltrs/acre, four times, at 35DAT, 50 DAT,65 DAT, 80DAT @200lit Each ii). Foliar application: 50 litres DJM in 100 litres of water each spray, four times, at 25DAT,45DAT,55DAT,70DAT @200 litres each.

Application of Azolla

- at 10-15 Kgs/Acre after 7 DAT which fixes nitrogen, reduces weed development, acts as living organic mulch (reduces irrigation frequency by reducing evaporation loss of water) and some biomass can be incorporated.

All the non-negotiables

- (Clipping of leaf tips, Alleys, Border/Bund/Peripheral plantation- Marigold/Red gram/Maize/Vegetables and Glyricidia /Sesbania, Yellow sticky traps, Pheromone traps- for Yellow Stem Borer, Bird perches and Light traps) must be practiced.

Growth promoters

- Panchagavya- 4lts/acre, 1 time-at tillering Stage ii). Egg amino acid- 200ml in 100lits of water/ acre, 1 time- at Panicle initiation stage. iii). Sapthadhanyakura tonic- 250ml in 100lits of water,1 time-at Milking and grain filling stage to boost both quality and quantity of yields.

Suggested 365 DGC in paddy under different situations

- Canal situation (Delta): a) PMDS-Kharif Paddy-RDS (Rabi Dry Sowing)-Rabi Paddy
- Bore wells and Uplands: a) PMDS-Kharif Paddy-RDS-Rabi Paddy; b) PMDS-Kharif Paddy-RDS-Rabi Pulses/other crops
- Under borewells, adjust the kharif sowings so that the harvest's may be complete by October end or by 1st FN of Nov and then take up Rabi dry sowings, raise RDS up to 25-50 days, so that there may be good growth for incorporation.

All DPMs should promote high end models in paddy fields

- i.e., IFS Model, raising of Horticulture plants (like Fruit trees, Vegetables and Flower crops) after widening of Paddy bunds and initiate, 5 Layer model (50'X50' model) (in 5-6 cents area) in one corner of paddy field after raising dedicated corner area to 5 feet height and SRT (Saguna Rice Technology) where ever possible.

ii. Paddy (Rabi)

- After kharif, raising of Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and Leafy vegetables), sown as relay crop in November 2nd week and continued up to December 2nd week (appx.30 days) to get a good crop stand and biomass. The essential principle is to have 365 days green cover and to see that the soil is not kept barren.

Seed and seedling treatment with Bheejamrutham (BJM)

- To avoid weedicide application, promote Line sowing, Drum Seeder planting, SRI (System of Rice Intensification) in irrigated paddy and Direct seeding (Line) in rainfed paddy which allows minimal disturbance to the soil.
- Facilitating placement of paddy weeders, manual and power driven at CHC (Custom Hiring Centre)/NPM shops is very crucial.

Ghanajeevamrutham (GJM)

- Type-2 GJM at 1000-1500kg/acre, during last ploughing/Puddling and ii). Type-1 GJM at 400kg/acre in two equal splits at 20 DAT, 40DAT at 20 days interval.

Dravajeevamrutham (DJM)

- i)Soil application: 2000 litres /acre, 10 times @ 200lt each time, starting from 10 DAT (Days of Transplantation) with 10 days interval.
- ii) Foliar application:4 times, at 25DAT (15 litres of DJM in 100 litres of water)
- 45DAT (20 litres of DJM in 150 litres of water)
- 55DAT (30 litres of DJM in 150 litres of water)
- 70DAT (50 litres of DJM in 150 litres of water)

Application of Azolla

- 4 Kgs/Acre after 7 DAT which fixes nitrogen, reduces weed growth, acts as living organic mulch (reduces irrigation frequency by reducing evaporation loss of water) and some biomass can be incorporated.

S2S kit- All the non-negotiables must be mandatorily practiced

- Clipping of leaf tips
- Seedling treatment with BJM
- Alleys- Provide 30 cms alley for every 2 mts
- Azolla mother pit
- Border/Bund/Peripheral-plantation-Marigold/Redgram/Maize/Vegetables and Glyricidia /Sesbania.
- Yellow sticky traps-20-25/Acre
- Pheromone traps-for Yellow Stem Borer and Leaf folder-8/acre at 20-30 DAT
- Bird perches-10-15/Acre
- Light trap: 1/acre

Growth promoters

- Panchagavya- 4lts/acre, 2 time-at tillering stage and 70 DAT ii). Egg amino acid- 200ml in 100lits of water/ acre, 1 time- at Panicle initiation stage. iii). Sapthadhanyakura tonic-700 grams of paste in 100lits of water,1 time-at Milking and grain filling stage to boost both quality and quantity of yields.

Suggested 365 DGC in paddy under different situations

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- Bore wells and Uplands: a) PMDS-Kharif Paddy-RDS-Rabi Paddy; b) PMDS-Kharif Paddy-RDS-Rabi Pulses/other crops.
- Under borewells, adjust the Rabi sowings in a way so that the kharif harvest's may be completed by 1st FN of Nov and then take up Rabi dry sowings; raise RDS up to 25-30 days, so that there may be good growth for incorporation at the time of transplantation. Transplantation around 15th January will avoid cool winter temperatures and helps in good growth due to increased microbial activity also.

Promote high end models in paddy fields

- i.e., IFS Model and SRT wherever possible.

Non pesticide management practices for pest and disease management in paddy crop

S.No	Name of the item	Prophylactic/ Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Yellow Stem Borer	I. Clipping of Leaf tips during transplantation ii. Release of Trichogramma egg parasite	I. Erecting of 8 pheromone traps of yellow stem borer / acre ii. Erecting of Light trap 1/ acre	i. Spraying of 5% NSKE (5 kg neem seed in 100 lit water) or Neemastram during Initial stage ii.Spraying of Agnastram during Tillering and Boot leaf stage - 3 litres in 100 litres of water
2	Leaf Folder (moth)	Dragging of twisted rope	i. Erecting of Light trap 1/acre ii. Erecting of 8 pheromone traps of Leaf folder / acre	5% NSKE/Neemastram during initial stage
3	Brown Plant Hopper	i. Formation of Alleys 30 CMS at 2 every 2 meters apart ii.Erecting of White/ Yellow sticky traps 20-25/acre	Erection of 1 Light trap/acre	Spraying of Ipomea Leaf Extract (Thootikaada Kashayam) 5- 6 litres in 100 litres of water by mixing with detergent and direct spray solution to base of tillers i.e at irrigation water level.
4	Gall Midge	-	Erection of 1 Light trap/acre	Spraying of Agnastram-5lts in 200lit water/acre
5	Rice Hispa	Clipping of leaf tips while transplanting	-	i. Neemastram at early stages ii. Brahmastram during later stages - 6lts in 100lit water/acre

6	Mite	I. Planting of Marigold plants on Bunds ii.Predators: Anthocorid bugs, mirid bugs, syrphid/hover flies, green lacewings, predatory mites, predatory coccinellids, staphylinid beetle, predatory cecidomyiid fly, predatory gall midge, predatory thrips etc.	-	i.Neemastram at early stages ii.Sprayingof Dung+Urine+Asfoetida solution - 5 lit solution in 100 lit water/acre
7	Green Leafhoppers	Yellow sticky traps 20-25/acre	Erection of 1 Light trap/acre	Spraying of Vavilaku Kashayam - 5 litres in 100 litres of water/acre.
II. Major Diseases				
8	Rice Blast	i. Seed treatment with Bheejamrutham	-	i)Spraying of Maredu Patra + Tulasi kashayam - 6 lit in 100 lit water or ii)Cow Dung+Urine+Asfoetida solution - 5 lit in 100 lit water or iii)Sour Buttermilk Solution - 6 lit in 100 lit water
9	Sheath Blight	Avoid excess water in the field	-	i)Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or ii)Sour Buttermilk solution - 6 lit in 100 lit water
11	Bacterial Leaf Blight	Avoid Planting under shade	-	i)Dry ginger+Milk extract - 6 lit in 200 lit water ii)Dung+Urine+ asfoetida solution - 6 lit in 100 lit water
12	False smut	Early transplantation	-	Spray Dung+Urine+Asfoetida solution - 5 lit in 100 lit water

13	Stem Rot	Avoid poor drainage	-	Seed and Seedling treatment
14	Tungro Virus (Transmitted by Green leaf hopper)		Erection of 1 Light trap/acre	Spraying of 5% NSKE - 5kg neem seed kernel in 100 lit waters

iii. Groundnut (Kharif)

- Before growing Groundnut crop, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops, sown in April/May (one week before harvest of preceding Rabi crop) and continued up to July 2nd week i.e., till sowing of Groundnut to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.
- It is crucial to enhance the inter-crop and poly crop combinations in Groundnut cropping system. For inter crops, Pulses-Red gram, Field bean, Cluster bean etc., Tuber crops, Oil seed like Caster, Vegetables-Tomato/Brinjal/Chilli, Leafy vegetables, other millets and any other crop locally grown must be integral part of Groundnut cropping system.

Seed treatment with Beejaraksha/Bheejamrutham.
Ghanajeevamrutham (GJM)

- Type-1: 400 kgs or if it is Type-2:1000-1500kg/acre at the time of last ploughing.

Dravajeevamrutham (DJM)

- i) Soil application: 800lits/ acre @ 200lit each starting from 20 (Days After Sowing) DAS, 35DAS, 50 DAS and 65 DAS ii) Foliar application:5 lit of DJM in 100 lit of water at 27 DAS followed by 42 DAS (10 in 100 lit), 57 DAS (15 in 125 lit) and 72 DAS (20 in 150 lit) each starting from Peg formation stage.

Growth promoters

- Panchagavya- 4lts in 100 lit of water/acre around 50 DAS

S2S kit- All the non-negotiables must be mandatorily practiced

- Inter crops
- Groundnut: Red gram/Cow pea/Sunflower in 5:1 or 7:1 ratio (Inter crops- 2kgs) {For third year PMDS Farmers, the additional inter crops can be; Field bean (0.1kgs), Leafy Vegetables (0.25 kg) cluster bean(0.1kg) and Okra/Sesamum (0.15 kg) each}
- Border crop: Jowar/Bajra/Maize (1-2 KGs) in 4 rows
- Trap Crops: Marigold (50grams) and Castor (250 grams).
- Yellow and Blue sticky traps: 20-25/acre
- Pheromone traps (Spodoptera): Each @8/acre at 20-30 DAS

- Delta Traps (Leaf minor): 5/acre at 20-30 DAS
- Bird perches: 10-15/ acre
- Light Traps: 1/ acre.
- The Pheromone/Delta traps should be installed prior to pest infestation (for example Leaf minor – before the pest infestation) rather than installing the traps after the infestation starts in the field.
- S2S kit for Groundnut crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.
- 365 DGC: Immediately after harvesting of Groundnut crop in November sow with a minimum of 9 varieties of crops, as Rabi dry Sowing (RDS) or continue the 365 DGC with other group of crops (Poly crops).

Standard Non pesticide management practices for pest and disease management in Groundnut crop

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Red hairy caterpillar (incidence: after germination of the crop)	i. Trap crops - Maize, Jowar ii.Light traps (soon after sowing.) iii.In endemic areas make trenches around the field and filling with Calotropis (Jilledu) leaves and branches.	Pheromone traps @ 8/per Acre	Spraying of Green Chilli and Garlic concoction (Pachi mirchi vellulli kashayam)
2	White grub (incidence: from sowing to 50DAS)	Neem cake - 200kg/acre	Remove damaged plants along with grubs and destroy.	Neem cake - 200kg per acre at last ploughing. It can be mixed with Type- II Ghana jeevamrutham and apply.
3	Thrips (incidence: from 10DAS to 45DAS)	Trap crop – Marigold	i.Blue sticky traps 25-30/Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs	i.Neemastram, spray when incidence is low 200 litres/acre ii.5% NSKE (Vepaginjala kashayam) spray when incidence is moderate.

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
4	Leaf Minor (incidence: 20DAS to 50DAS)	-	Delta trap @5/acre	In extreme case where monitoring with Deltraps could not happen, with severe infestation drag the thorny bush to open the leaf webs and then spray Brahmastram.
5	Aphids (incidence: from 20DAS to 50DAS)	i.Trap Crop-Cowpea ii. Maize/Jowar as border crop	i.25-30 Yellow sticky traps ii. Watch for beneficiary insects viz Lady bird beetles, dragon flies and Lace wing bugs	Spray Neemastram@200 lit/acre when incidence is low and spray Datura (ummetha kashayam) leaf extract + with detergent powder when incidence is moderate to severe
6	Jassid (incidence: throughout the crop period)	-	i.25-30 Yellow sticky traps ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs	i.5%NSKE (Vepaginjala kashayam) when incidence is low (need based) ii.Tobacco decoction(Pogaku Kashayam) when incidence is moderate to severe
7	Tobacco caterpillar (incidence: 45 DAS to till the crop harvest)	i.Erect Bird perches @15/acre ii. Spray 5 % NSKE to destroy eggs and first and 2nd instar larvae	i.Pheromone traps @8/ acre ii. Light traps 1/acre iii. Trap crop-Castor	i.Spray SPNV (200 LE) in 100 lit of water at early stages of pest ii.Spray Bramhastram at later stages
II. Major Diseases				
8	Bud necrosis (Viral disease transmitted by Thrips, (incidence at early stages i.e. 25 DAS to 50DAS)	i.Timely control of sucking pests with neemastram/Vitex leaf extract ii. Inter crops with Onion and Mari gold and Coriander	i.Erect Blue sticky traps-15-20 per Acre ii. Watch for benificiary insects for Thrips viz	i. Dry ginger milk solution spray ii.Spray Cowdung+Urine+Asfoetida solution (Peda mutram inguva dravanam) at later stages

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
9	Tikka leaf spot (incidence at 40 DAS to till crop harvest)	-	-	i.Spraying of Sour buttermilk at early stages ii. Spray Cowdung+Urine+Asfoetida solution (Peda mutram inguva dravanam) at moderate stage
10	Dry root rot (incidence before 45 DAS)	i.Add T. virial 2 kgs/acre while application of Type-I Ghana jeevamrutham as pocket method of application ii. Seed treatment with Beejaraksha/Beejamrutam and iii.Trap Crop-Marigold	-	i.Neem cake application - 200kg/acre at last ploughing ii.Spraying of sour Buttermilk

iv. Cotton (kharif):

- Before growing Cotton crop, raising of Pre-Monsoon Dry Sowing (PMDS) with 18 varieties of crops, sown in May and continued up to July 2nd week (appx.75 days) to get a good crop stand and biomass. By practicing PMDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables, can be used for self-consumption, some biomass may be used as fodder or may be used as Mulch / incorporated in to the soil.
- It is important to promote non-Bt seeds in Cotton as much as possible.
- Seed treatment with: i) Bheejamrutham (BJM) – 0.5lit/acre ii) Trichoderma viridi – 7 gm/kg, it stimulates and catalyses soil biology and protect from seed/soil born pests/diseases.

Ghanajeevamrutham (GJM)

- i). Type-2: 1000-1500kg/acre at the time of last ploughing and ii). Type-1:800kg/ acre @400kg/acre at the time of sowing (pocket application) and 400kg/acre after one month of sowing (pocket application).

Dravajeevamrutham (DJM)

- i)Soil application:1000lits/ acre @200 lits/acre each @ 5 times, at 25 days intervals starting from 30DAS ii). Foliar application: 600lits/acre @ 200lits/ acre each for 3 times, At the time of flowering and boll formation stages and Whenever water stress/ drought prevailed

Growth promoters:

- Panchagavya- 4lts/acre in 100 lts of water at 2 times (Flowering stage and Boll formation stage) ii). Egg amino acid- 200-250ml in 100lits of water/ acre at 2 times (30 DAS and 45 DAS) iii). Sapthadhanyakura tonic- 700gms in 200lits of water at 2 times (Boll maturity stage)

All the non-negotiables must be mandatorily practiced

Inter crops

- Cotton: Red gram 5:1, cotton: Black gram 1:1. After the first weeding (25 DAS) leafy vegetables and tuber crops (onion, carrot, Beetroot etc may be introduced). After 45 DAS of cotton, dibble cucurbits- Ridge guard and Bottle Guard in entire crop.
- Border crop: 4 rows of Jowar/Maize/Bajra, before 25 Days of Cotton sowing.
- Trap Crops: 6-7 Castor plants and 300-400 Marigold (Marigold and Castor with in the row along with Cotton)
- Yellow, white and Blue sticky traps: 30-40/acre install immediately after 10 DAS.
- Pheromone traps (Pink Bollworm/ Helicoverpa/ Spodoptera) : Each @8/acre at 20-30 DAS.
- Bird perches: 10-15/ acre at 20-30 DAS.
- Light Traps: 1/ acre.
- The Pheromone traps should be insect specific and should be installed prior to pest infestation (for example pink Boll worm – in the beginning of the pest infestation) rather than installing the traps after the infestation starts in the field.

Introduction of Multilayer crops

- Inter-crops and Poly crops in Cotton crop are mandatory and document the income from main crop and other crops as well
- Leafy vegetables, Tuber crops, millets, oil seeds, creepers must be integral part of Cotton cropping system.
- 365 DGC: PMDS-Cotton-RDS, 7 days before last picking of cotton for RDS.

Standard Non pesticide management practices for pest and disease management in Cotton crop

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
Major Pest				

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
1	Jassids (Amrasca devastans)	i)Spray Neemastram @200litre/acre ii)5% NSKE iii) Raising of inter crops and border crops-promotes beneficial insects iv) Border crops with 4 rows of Jowar/Maize	i)White/Yellow sticky traps @30-40/acre ii) ETL-2 nymphs/adults per leaf	Vitex (vavilaku) kashayam
2	Cotton aphids (Aphis gossypii)	i)Spray Neemastram @200litre/acre ii)5% NSKE iii) Raising of inter crops and border crops-promotes beneficial insects iv) Border crops with 4 rows of Jowar/Maize	i)White/Yellow sticky traps @30-40/acre ii) ETL-10-15 % affected plants	Datura leaf extract and 1.5 kg surf powder in 200 lits of water
3	Thrips (Thrips tabaci)	i)Spray Neemastram @200litre/acre ii)5% NSKE iii) Raising of inter crops-promotes beneficial insects iv) Border crops with 4 rows of Jowar/Maize	i)Blue sticky traps @30-40/acre ii) ETL-10thrips (nymphs/adults) per leaf	Vitex (vavilaku) kashayam and Agnasthram
4	Whitefly (Bemisia tabaci)	i)Spray Neemastram @200litre/acre ii)5% NSKE iii) Raising of inter crops and border crops-promotes beneficial insects iv) Border crops with 4 rows of Jowar/Maize	i)Erection of 15 yellow sticky traps30-40/acre ii) ETL- Adults-6/leaf iii) Nymphs-20/leaf	Vitex (vavilaku) kashayam

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
5	Mealy bugs (Maconellicoccus hirstus)	i)Spray Neemastram @200litre/acre ii)5% NSKE	i) ETL-20 affected plants with one fully affected branch ii) Presence of ants	i)Apply Acacia Arabica (Babul) extract. (Collect 3 Kgs of babul (Thumma chakka) tree bark, soak it in 10 litres of water for 24 hours and filter the solution. Add 0.5kg of boiled starch powder and mix in 100 litres of water and spray for one acre ii) Spray Datura leaf Extract iii) spray Matti draavanam (20kgs of soil dissolved in 200 lits of water for 12 hours filter and spray)
6	Red cotton bug (Dysdercus cingulatus)	-	-	i)Spray Neemastram @200litre/acre ii)5% NSKE
7	American Boll Worm (Helicoverpa armegira)	i) Spray Neemastram as prophylactic spray ii) First spray 5% Neem seed kernel extract	Install pheromone traps @8/ acre for monitoring adult moths' activity. Replace the lures with fresh lures after every 2-3 weeks ETL- 5% flowers or 1 larva per plant	i) First spray 5% Neem Seed Kernel Extract followed by Second spray after 7 days Agnasthram (3.5 litres extract in 100 litres of water) ii) Spray HNPV (200 LE) in 100 litres of water per acre
8	Tobacco Cutworm (Spodeptera litura)	i) Spray Neemastram@200litre/acre ii) Trap crops @50 plants of Castor	i) Pheromone traps 4-5/acre can be installed for monitoring cutworm activity Replace the lures with fresh lures after every 20–25-day interval. ii) Bird perches @10/acre should be	Chilli, Garlic Extract

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
			erected for facilitating field visits of predatory birds iii) Release Trychogramma parasite eggs 50000 per acre iv) ETL for fruit borer is 8-10 moths/day/trap.	
9	Pink bollworm (Pectonofera gossypiella)	i) Crop rotation ii) Effected flowers/bolls are to be destroyed ii) At a time sowing iv) 5% NSKE at flowering and boll formation stage	i)Pheromone traps 8/acre can be installed for monitoring activity Replace the lures with fresh lures after every 20–25-day interval. ii) Bird perches@10/acre should be erected for facilitating field visits of predatory birds iii) ETL - presence of 2 larvae in 20 observed bolls.	i)Release Trychogramma parasite eggs 50000 per acre ii) Agnastram
Major Diseases				
10	Root rot (Rhizoctonia bataticola/ Rhizoctonia solani)	i)Raise PMDS before cotton crop ii) Apply Neem cake @200kgs/acre iii) Seed treatment with Trichoderma viridi @10gram/kg seed iv) Mixing 2kg Trichoderma viridi with 100kgs Ghanajewamrutham-	-	Sour Butter milk and cow dung + urine +A asafoetida solution

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		Type2 and Pocket application		
11	Fusarium Wilt (Fugerium oxysporum F.SP. vasinfectum)	i)PMDS ii) Neem cake @200kgs/acre iii) Drench with Trichoderma viridi @2kg in 200 lits of water. iv) Mixing 2kg Trichoderma viridi for 100kgs Type II ghanajewamrutham and Pocket application	-	Mix 2 kg of Trichoderma Viridi in 200 litres of water and spray or drench at the base of the plant.
12	Alternaria leafblight (Verticelium dhaleai)	-	-	Sour Butter milk and cow dung + urine +Asafoetida solution
13	Bacterial Blight (Xanthomonas oxynopodis P. Malvesiarum)	Seed treatment with T. viridi @10gm/kg seed or 10gm, Pseudomonas per kg seed	-	Dry Ginger + milk extract and Dung + Urine + Asafoetida Solution
14	Cotton Rust (Facospora gossipie)	-	-	Cow dung + Urine +Asafoetida solution

v. Red gram (Kharif)

- Before growing red gram crop, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,) sown in April/May (one week before harvest of preceding Rabi crop) and continued up to July 1st week i.e., till sowing of red gram to get a good

crop stand and biomass. The essential principle is to have 365 days green cover and to see that the soil is not kept barren.

- It is crucial to enhance the inter-crop and poly crop combinations in red gram cropping system. For inter crops, Millets, Castor, Tuber vegetables (Carrot and Radish) and creeper vegetables (Cucumber, Bottle gourd and Ridge gourd) must be integral part of red gram crop cropping system, which are discussed in detail subsequently; and document the income from main crop and other crops as well.

Seed treatment with Bheejamrutham
Ghanajeevamrutham (GJM)

- Type-2: 1000-1500kg/acre at the time of last ploughing (or) Type-1:400kg/ acre @200kg/acre at the time of last ploughing and 200kg/acre after 20 DAS (Days After Sowing).

Dravajeevamrutham (DJM)

- Foliar application: 3 times during dry spell in the crop period at 15 days interval
- 1st spray-5 litres of DJM in 100 litres of water
- 2nd spray-10 litres of DJM in 100 litres of water and
- 3rd spray-20 litres of DJM in 150 litres of water

Growth promoters

- i)Panchagavya:4 lts in 100 litres of water/acre for 1 time at flowering stage (October/November). ii) Saptadhanyakura tonic: 700gms of paste in 200 litres of water at pod development stage (December/January).

S2S Kit- All the non-negotiables must be mandatorily practiced

- Inter crops: Red gram and Bajra in 1:2 ratio (in light soils), Red gram Bajra and Jowar, Maize in 1:4 ratio (in heavy soils), Red gram and Groundnut 1:5 or 1:7, Red gram and Cotton 1:5, Red gram and Millets 1:4. In all the cases grow Tubers (Carrot and Radish), Creeper vegetables in red gram rows and leafy vegetables in inter rows as live mulch to prevent weed growth. Bajra (approx.1kg) Maize, Jowar (2 kgs) 2:1, Add Tuber crops (approx.0.150 Kg) and creeper vegetables(approx.0.1kg) (in red gram rows) + Leafy vegetables (approx. 0.250kgs).
- Border crops: Jowar /Maize/Bajra (2Kgs) in 3-4 Rows
- Trap crops- Castor (250 grams) and Marigold (50 grams)
- Yellow and Blue sticky traps: 30-40/acre
- Pheromone traps (Helicoverpa): Each @8/acre at 20-30 DAS
- Bird perches: 10-15/ acre
- Light Traps: 1/ acre.
- The pheromone traps should be installed prior to pest infestation (for example Helicoverpa – in the beginning of the pest infestation). It should not be done after the infestation starts in the field.

- S2S kits (including Sticky traps, Pheromone traps, Seed/Seedlings of Inter crops/Trap/Border crops, Light traps etc.,) of red gram crop should be planned and placed at NPM shop/FPO/VO etc. before crop season and DPM should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in red gram crop

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Gram pod borer (Helicoverpa)	1)Growing of Trap crops like Marigold, Sorghum, Lablab, Pea, Chillies, Groundnut, Okra, Maize, Tomato etc 2)Parasitoids: Trichogramma spp., Tetrastichus spp., Chelonus spp., Telenomus spp, Bracon spp. etc	1)ETL-2-3 eggs/ 5 twigs and 1 larvae/ 2 plants at vegetative stage and 1 larvae/plant at flowering stage of the crop. 5-10 per cent pod damage. 2) Installation of Pheromone traps 8 per acre. 3) Watch for beneficiary insects viz LBB, Syrphid flies, Lace wings etc.,	Spray Bramhastram-5lts in 200lit water/acre (or) Spray Dasaparini kashayam 6 litres in 200 litres water
2	Spotted pod borer	1)Parasitoids: Trichogramma spp., Tetrastichus spp., Chelonus spp., Telenomus spp, Bracon spp. etc. 2) Trap Crops-Beans, Peas, Castor, Groundnut, Cowpea, Sesame, Green gram and Black gram.	1)ETL:5 larvae/10 plants. 2) Watch for beneficiary insects viz Lacewing bug, Ladybird beetle, Spider, Red ant, Dragon fly, Robber fly, Reduviid bug, Praying mantid etc.,	1) Spray NSKE-10 lit in 200 lit water-Early stages 2)Spray Agnastram-5lts in 200lit water/acre-Moderate to Severe stage
3	Red gram pod fly	1) Parasitoids: Euderus lividus, Eurytoma spp., Senegalella spp., Ormyrus orientalis etc. 2) Growing of Trap crop- Bhendi	1)ETL -5 larvae/10 plants. 2) Watch for beneficiary insects vizSpiders, Reduviidbug, Robberfly, Dragonfly etc.	1)Spray NSKE- 10 lit in 200 lit waters

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
4	Leaf Webber	Growing of Trap crops such as Marigold, Castor etc.	ETL -5 larvae/ 10 plants.	1)Spray 5%NSKE - Early stages2.Spray Chilli garlic extract- Moderate to Severe stages
5	Plume moth	1) Conserve larval parasitoids, ApantelesPaludicolae, Diadegma sp. 2) Growing of Trap crops- Lablab, Niger and Horse gram	1)Installation of Bird perches @ 20/acre. 2)1 Light trap/5 acre	1)Neemastram at early stages 2) Brahmastram during later stages (6 lts in 100 lit water/acre) at Moderate to Severe stages
6	Aphids	Parasitic wasps also attack aphids.	1)Installation of Yellow sticky traps @ 30-40 per acre 2)Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE and detergent solution.
II. Major Diseases				
7	Fusarium wilt	1) Use of Resistant varieties 2) Crop rotation		1)Soil Drenching with Trichoderma viridi 2 kg in 200 litres of water. 2) Spray 1 litre of Ginger Milk in 200 litres of water or Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or Sour Buttermilk solution - 6 lit in 100 lit water
8	Dry root rot	1) Choose resistant cultivars. 2)Seed can be treated effectively with hot water	-	1) Soil Drenching with Trichoderma viridi 2 kg in 200 litres of water 2) Spray Cow dung + urine+ Asafoetida solution 5 litres in 200 litres of water.

S.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
9	Powdery mildew	1) Use of Resistant varieties 2) Crop rotation		Spraying of Sour Buttermilk solution - 6 lit in 100 lit water (or) Turmeric kashayam 5 litres in 100 litres water.
10	Sterility mosaic Virus- (Transmitted by Eriophyid mite)	1) Use of Resistant varieties 2) Crop rotation	Effective monitoring of Eriophyid mite with yellow sticky traps	Refer to mite control measures in paddy crop

vi. Black gram/Green gram, Jowar, Gingelly and Minor Millets- Korra, Sama:

- Before growing of other crops like Black gram/Green gram, Jowar, Gingelly and Minor Millets- Korra, Sama etc., depending of the season, raising of Pre-Monsoon Dry Sowing (PMDS)/Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May or relay in Oct/Nov till sowing of other field crops to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/RDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

The other POPs, crops wise are detailed below

Sl. No	Name of the item	Black Gram/ Green Gram	Jowar	Gingelly	Minor Millets- Korra/Sama
1	Seed treatment	Beejamrutam	Beejamrutam	Beejamrutam	Beejamrutam

Sl. No	Name of the item	Black Gram/ Green Gram	Jowar	Gingelly	Minor Millets-Korra/Sama
2	Ghanaje evamrut ham	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham (or) ii.Apply @ 400 KG/Acre of Ghanajeevamrutham-I at the time of sowing	i. During last plough-1.5 MT of Type-II Ghana Jeevamrutham (or) ii.Apply @ 400 KG/Acre of Ghanajeevamrutham-I at the time of sowing	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutha m (or) ii.Apply @ 400 KG/Acre of Ghanajeevamr utham-I at the time of sowing	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham (or) ii.Apply 400 KG/Acre of Ghanajeevamru tham-I at the time of sowing
3	Dravaje evamrut ham-Foliar	Spraying of Ghanajeevamrutham @ 200 litters per acre at every 15 days interval, 3times at 15DAT,30DAT and 45 DAS	Spraying of Dhravajeevamrutham @ 200 litters per acre at every 15 days interval,4 times at 15DAT,30DAT 45 DAS and 60DAS	Spraying of Dhravajeevam rutham @ 200 litters per acre at every 15 days interval, 4 times at 15DAT,30DAT 45 DAS and 60DAS	Spraying of Dhravajeevamr utham @ 200 litters per acre at every 15 days interval, 3 times at 15DAT,30DAT and 45 DAS
4	Growth promot ers	Egg Amino Acid-250ml in 100 litres of water per acre at 40DAS	Egg Amino Acid-250ml in 100 litres of water per acre at Milky grain stage	Egg Amino Acid-250ml in 100 litres of water per acre at 40DAS	-
5	S2S kit-Non negotia bles				
	i. Inter crops	Black gram /Green gram with red gram at 4:1 Ratio or 2:1 with Cotton and add Leafy vegetables like Gongura and Totakura at the time of sowing (or) around 25 days after 1st weeding	Sorghum with Red gram at 4:1 ratio or Sorghum with cow pea at 2:1 ratio or Sorghum with Groundnut at 2:4 ratio or Sorghum with Soyabean at 4:2 ratio or	Gingelly with Red gram 5:1 and add leafy vegetables and creeper vegetable like cucumber at the time of sowing (or) around 25	Koraa/Sama with Red gram 5:1 and add Leafy vegetables like Gongura and Totakura at the time of sowing (or) around 25 days after 1st weeding

Sl. No	Name of the item	Black Gram/ Green Gram	Jowar	Gingelly	Minor Millets-Korra/Sama
			Sorghum with Black gram at 2:1 ratio or Sorghum with Field bean at 2:1 ratio or Sorghum with Red gram at 4: 1 and sow Black gram, Cow pea orgreen gram inter rows between Sorghum. Add leafy vegetables and creeper vegetable like cucumber at the time of sowing (or) around 25 days after 1st weeding	days after 1st weeding	
	ii. Border crop	3-4 rows of Maize/Jowar/Bajra.	3-4 rows of Maize.	3-4 rows of Maize/Jowar/ Bajra.	3-4 rows of Maize/Jowar/Bajra.
	iii. Trap Crops	Castor, Marigold	Castor, Marigold	Castor, Marigold	Castor, Marigold
	iv.Yellow sticky traps	10-15 per Acre	If incidence is low to moderate install sticky traps	10-15 per Acre	-
	v. Pheromone traps	Gram pod borer	If attack is above ETL install pheromone traps for Jowar stem borer	-	-
	vi. Bird perches	10-15 Acre	-	10-15 Acre	-
	vii. Light Traps	1/Acre	-	1/Acre	-
6	365 DGC	PMDS-B.G/G.G-Bengal gram/Magi Jowar/Vegetables-Dry sowing	PMDS-Jowar-Bengal gram/Vegetables-Dry sowing	Rabi Paddy-Gingelly-PMDS-Kharif crop	PMDS-Minor Millets-Vegetables-Dry sowing

The Pheromone traps should be installed prior to pest infestation (for example Helicoverpa /Spodoptera/Jowar stem borer – before the pest infestation) rather than installing the traps after the infestation starts in the field.

S2S kits for above all crops should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Black gram/Green gram, Jowar, Gingelly and Minor Millets- Korra

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
1.Black gram/Green gram				
I. Major Pests				
1	Flea Beetles	i)Raising of inter crops and border crops-promotes beneficial insects ii) Border crops with 3-4 rows of Jowar/Maize	White/Yellow sticky traps @10-15/acre	i)Spray Neemastram @200litre/acre or ii)5% NSKE
2	Thrips	Refer to thrips in Groundnut crop	Refer to thrips in Groundnut crop	Refer to thrips in Groundnut crop
3	White fly	i) Raising of inter crops and border crops-promotes beneficial insects ii) Border crops with 4 rows of Jowar/Maize	Erection of Yellow sticky traps 10-15/acre	i)Spray Neemastram @200litre/acre ii)5% NSKE iii)Vitex (vavilaku) kashayam
4	Tobacco caterpillar	i.Adopt crop rotation ii. Trap crop: Castor iii. Border crop: Maize, Sorghum vi.1 light trap /acre v.Bird perches @8-10/acre.	i.Pheromone traps @ 8-10 /acre. ii.Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early stage Neemastram-200lt/acre. Ii.Spraying of Agnastram- 4 lts in 100 ltrs of water/acre (or) at advance instar stages iii. Spray Garlic chilli extract.
5	Spotted pod borer	1)Parasitoids: Trichogramma spp., Tetrastichus spp., Chelonus spp., Telenomus spp, Bracon spp. etc. 2) Trap Crops-Beans, Peas, Castor, Groundnut, Cowpea, Sesame.	Watch for beneficiary insects viz Lacewing bug, Ladybird beetle, Spider, Red ant, Dragon fly, Robber fly, Reduviid bug, Praying mantid etc.,	i) Spray NSKE-10 lit in 200 lit water-Early stages ii)Spray Agnastram-5lts in 200lit water/acre- Moderate to Severe stage
6	Stem/shoot fly		Watch for beneficiary insects viz Spiders, Reduviid bug, Robber fly, Dragonfly etc.	i)Spray NSKE- 10 lit in 200 lit waters ii)Spray Agnastram-5lts in 200lit

				water/acre- Moderate to Severe stage
7	Aphids	Parasitic wasps also attack aphids.	i)Installation of Yellow sticky traps @ 10-15 per acre ii)Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE and detergent solution.
II. Major Diseases				
1	Powdery mildew	i) Use of Resistant varieties ii) Crop rotation	-	Spraying of Sour Buttermilk solution - 6 lit in 100 lit water (or) Turmeric kashayam 5 litres in 100 litres water.
2	Cercospora /korenospora /Anthracnose leaf spot	-	-	Sour Butter milk and cow dung + urine +Asafoetida solution
3	Bacterial blight	Seed treatment with Beejamrutam/T. viridi @10gm/kg seed or 10gm, Pseudomonas per kg seed	-	Dry Ginger + milk extract and Dung + Urine + Asafoetida Solution
4	Cuscuta parasitic plant – Dodder	-	-	Collection and destruction of Cuscuta infected plants
5	Rust	-	-	Cow dung + Urine +Asafoetida solution
6	Wilt	i) Use of Resistant varieties ii) Crop rotation	-	i)Soil Drenching with Trichoderma viridi 2 kg in 200 litres of water. ii) Spray 1 litre of Ginger + Milk in 200 litres of water or Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or Sour Buttermilk solution - 6 lit in 100 lit water

7	Yellow Vein Mosaic Virus (Gemini virus) Transmitted by White flies	i) Removal and destruction of effected plants ii) Avoid mixing of Pillipesara in Navadhanya as it hosts virus iii. Growing resistant varieties	i)Installation of Yellow sticky traps @ 10-15 per acre ii)Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages to control White fly.
8	Leaf curl Virus (Transmitted by Thrips)	i) Removal and destruction of effected plants ii) Avoid moisture stress during crop growth	i)Installation of Blue sticky traps @ 10-15 per acre ii)Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages to control Thrips.
9	Sithaphal leaf or Bobbara tegulu (Virus)- (Transmitted by Aphids)	i) Seed treatment with Beejamrutam ii) Avoid collecting seed from effected plants	i)Installation of Yellow sticky traps @ 10-15 per acre ii)Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	Spray cow dung + urine+ Asafoetida solution 5 litres in 200 litres of water before flowering, followed by 5% NSKE to control Aphids.
2.Jowar				
I. Major Pests				
1	Shoot fly	i)Seed treatment with Beejamrutam ii)High Seed rate iii)Early Sowing iv) Select resistant varieties		Spray Neemashtram or NSKE-5% Spray Agneyastram
2	Stem Borer	i.Egg parasitoid: Trichogramma chilonis ii. Larval parasitoid: Cotesia flavipes	Chrysoperla carnea, Coccinellid, Spider, Ear wig, Dragon fly, Preying mantid, Pentatomid bug, Reduviid bug, Robber fly, Rove beetles, Wasp, King crow @ 2:1 ratio	Spraying of Agnastram - 3 litres in 100 litres of water
3	Fall army worm (F.A.W)	i.Erect bird perches @10/acre ii. Trichogramma pretiosum @ 16,000/acre	i.Plant Napier grass along the border as trap crop to trap FAW ii. Install 8 pheromone traps/acre	i.Application of sand or Mud slurry into whorl of Maize plants ii.5%NSKE/Neemastram during intial stage @ twice a week.

				iii.Spray Agniastram if pest is severe
II. Major Diseases				
4	Charcoal rot	i.Crop rotation ii. Application of Trichoderma viridi along with Type-II GJM iii. Avoid the water stress condition at the time of flowering by applying dry mulch and Inter crops	-	Spray Dung+Urine+Asfoetida solution - 5 lit in 100 lit water
5	Grain molds	i. Seed treatment with Bheejamrutham ii.Crop rotation	-	Spray Dung+Urine+Asfoetida solution - 5 lit in 100 lit water Spray sour buttermilk 6 lt in 100 lit water
3.Gingelly				
Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1.	Sucking Pests (Thrips/Mites/Hoppers)	Grow Marigold as Trap crop (200nos/acre)	i. Yellow/Blue sticky traps @10-15/Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
2.	Leaf Webber and capsule borer	i)Collect and destroy the larvae from the leaf webs during the initial stages of plant growth. ii) Erect bird perches @ 10-15/ Acre to facilitate predation of larvae	Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	i)Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages. ii)Spraying of Agnastram - 3 litres in 100 litres of water

3.	Gall fly and Bud fly	Clipping of the galls, picking and burning the shed buds.	-	i)Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages. ii) Spraying of Agnastram - 3 litres in 100 litres of water
4.	Bihar Hairy Catter piller	i)Collect and destroy infested plant parts, egg masses and young larvae during gregarious phase. ii)Erect bird perches @ 10-15/acre to facilitate predation of larvae.	Install one light trap per Acre to catch the adults	i) Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages. ii)Use Bacillus thuringiensis var. kurstaki @ 1 g/l iii) Spraying of Agnastram - 3 litres in 100 litres of water
II. Major Diseases				
5	Damping off	i.Quality seed to be used. ii.Avoid shady places for nursery establishment. Iii.Use recommended seed rate and raised beds. vi.Avoid flooding type of irrigation and maintain optimum moisture level in nursery	-	i.Drenching of sour butter milk 6lit/100 lit water/spraying of Dung urine+Asafoetida solution ii.Use of Type-2 Ghanajevamrutham 1 kg+10g Trichoderma horizianum per application in 1 SQMT of nursery area.
6	Dry Root rot	Crop rotations of up to 5-7 years to reduce levels of fungi in the soil	-	Drenching with Trichoderma viridi-2kgs in 200 lit of water
7	Leaf spot	i. Before planting, try to ensure that seeds are disease free ii. If soil is too wet, improving soil drainage can be very useful to prevent further development and spread of the disease		Spraying of sour Buttermilk solution - 6 lit in 100 lit waters

8	Powdery mildew	Removal and destruction of heavily infested old/lower leaves		Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and spray sour butter milk (6 lit in 100 lit of water)
9	Phyllody transmitted by light brown coloured hopper	Remove and destroy infected plants	Yellow/Blue sticky traps @10-15/Acre	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages to control light brown coloured hopper.
4.Korra				
Sl. no	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Pink stem borer/Stem borer	Release of Trichogramma egg parasite- Tricho cards to be pinned under side of leaf. This practise till natural ecosystem is restored	i)8 pheromone traps per acre if attack is above ETL ii) Light trap with the onset of monsoon at 6PM -9PM.	As a last resort- spraying of 5% NSKE/ Neemastram followed by Brahmastram on 10th day Agnastram if damage is high
2	Grass hoppers	-	-	i) Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
3	Army warms	i)Collect and destroy infested plant parts, egg masses and young larvae during gregarious phase. ii)Erect bird perches @ 10-15/acre to facilitate predation of larvae. iii) Install one light trap per Acre to catch the adults	Light trap with the onset of monsoon at 6PM -9PM	i) Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages. ii)Use Bacillus thuringiensis var. kurstaki @ 1 g/l iii) Spraying of Agnastram - 3 litres in 100 litres of water

II. Major Diseases				
4	Rust	-	Observe blasts spots on weeds that are acting as source plants (hosts) on field bunds.	Spraying of Dung urine+Asafoetida solution
5	Blast	i.Seed treatment with Beejamrutham ii. Growing resistant varieties.	Observe blasts spots on weeds that are acting as source plants (hosts) on field bunds.	Spraying of Dung urine+Asafoetida solution
6	Green Ear Disease or Downy Mildew or Crazy Top	i.Provide good drainage in the low-lying lands ii. Proper crop rotation methods (365 DGC) iii)Rouging of infected plants	-	i.Sour butter milk follwed by peda muthram and inguva kashayam ii.Dry ginger milk extract

vii. Finger millet (Ragi):

Before growing Finger millet (Ragi) crop, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, other millets, Vegetables and leafy vegetables), sown in April/May (one week before harvest of preceding Rabi crop) and continued up to July 2nd week i.e. till transplanting of Finger millet to get a good crop stand and biomass. The essential principle is to have 365 days green cover and to see that the soil is not kept barren.

It is crucial to enhance the inter-crop and poly crop combinations in Finger millet cropping system. For inter crops, Pulses like Black gram/Cowpea/Rajma and Leafy vegetables (like Indian sorrel- Gongura and Amaranthus) and any other crop locally grown must be integral part of Finger millet cropping system.

Seed and Seedling treatment with Beejamrutham (BJM)

- Raising of nursery and Age of seedlings: Nursery should be raised on beds (preferably, each bed -10ftx4ftx0.5ft height) and 14-21 days.
- Method of transplanting: Line planting with a spacing of, row to row 30 cms and plant to plant 25cms.

Ghanajeevamrutham (GJM)

- i). Type-2: 1000-1500kg/acre at the time of last ploughing (or) ii). Type-1 @ 400kg/ acre, 200kg at the time of planting and 200kg after first weeding @15 DAT (Days after Transplantation)
- Planking (Dragging with wooden log) :3 times, after transplantation starting from 15DAT with 15 days interval. It stimulates a greater number of tillers.

Weed management (where no mulching or intercropping is practised)

- 2-3 times, i) Manual weeding ii) Cycle weeder or iii) Harrowing with bullocks. First weeding at 15DAT followed by 22 DAT and 30 DAT respectively.

Dravajeevamrutham (DJM)

- Soil application:3 times, starting from at 15DAT, at 15 days interval @200lit each
- Foliar application: 3 times, starting from 15 DAT and at 7 days interval
- 1st spray-5 litres of DJM in 100 ltrs of water
- 2nd spray-10 litres of DJM in 100 ltrs of water and
- 3rd spray-20 litres of DJM in 150 ltrs of water.

Growth promoters

- i). Panchagavya- 4lts/acre in 100 lts of water, 1 time at 45DAT ii). Sapthadhanyakura tonic- 700gms of paste in 200lits of water,1 time at the time of grain filling.

S2S kit-All the non-negotiables must be mandatorily practiced

- Inter crops: 6:2 (Ragi: Pulses), Pulses like Green gram/Cowpea/Rajma(2kgs)/Leafy vegetables like Indian sorrel and Amaranthus (0.5Kg)
- Border crop: 3-4 rows of Jowar/Maize/Bajra (2Kgs)
- Trap Crops: Castor (100 grams) and Marigold (50 Grams)
- Yellow sticky traps: 20-25/acre, install immediately after 10 DAT.
- Pheromone traps (Ragi Stem Borer): Each @8/acre at 20-30 DAT.
- Bird perches: 10-15/ acre at 20 DAT.
- Light Traps: 1/ acre
- S2S kits (including Sticky traps, Pheromone traps, Seed/Seedlings of Inter/Trap/Border crops, Light trap etc.,) of Finger millet crop should be planned and placed at NPM shop/FPO/VO etc. before crop season and DPM should monitor regularly during crop period.
- 365 DGC: a) Chinna chodi: PMDS-sown one week before harvest of preceding crop (April-May/June)-Chinna chodi (May/June – Aug/Sep)- Pulses (Rajma)/ Oil seeds (Niger) (Sep-Dec)- Based on residual moisture drought resistant vegetable creepers like cucumber etc., can be grown (Dec-March). b) Pedda chodi: PMDS (April-May/June)-Pedda chodi (June-Nov/Dec)-Pulses/vegetables (Jan-April).

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				

1	Ragi Pink Stem Borer	i.Light trap with the onset of monsoon at 6PM -9PM. ii.Release of Trichogramma egg parasite-Tricho cards to be pinned under side of leaf. This practise till natural ecosystem is restored)	5 pheromone traps per acre	As a last resort- spraying of 5% NSKE/ Neemastram followed by Brahmastram on 10th day Agnastram if damage is high
2	Aphids	Common predators of aphids include lady bird beetles (LBB), syrphid flies and lace wings. Parasitic wasps also attack aphid. Sow border crops, that attract natural enemies.	i.Install yellow sticky traps @8-10/acre ii.Watch for beneficiary insects viz LBB, Syrphid flies, Lace wings etc.,	Spray Neemastram + Detergent powder
II. Major Diseases				
3	Blast	i.Seed treatment with Beejamrutham ii. Growing resistant varieties like Ratnagiri, Srichaitanya, and Bharathi varieties. iii.Non-use of Nitrogenous or any chemical fertilizer will, however avoid occurrence of Blast.	Observe blasts spots on weeds that are acting as hosts on field bunds.	Spray Maredupathra kashayam and peda muthram and inguva dravanam

4	Green Ear Disease or Downy Mildew or Crazy Top	i.Provide good drainage in the low lands ii. Proper crop rotation methods (365 DGC) iii)Rouging of infected plants	-	i.Sour butter milk follwed by peda muthram and inguva kashayam ii.Dry ginger milk extract

Standard Non pesticide management practices for pest and disease management in Finger millet (Ragi) crop

viii. Sugarcane:

Before growing Sugarcane crop, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,) sown in April/May and continued up to July 1st week i.e. till planting of Sugarcane to get a good crop stand and biomass. The essential principle is to have 365 days green cover and to see that the soil is not kept barren.

It is crucial to enhance the inter-crop and poly crop combinations in wider row spaced Sugarcane cropping system in initial 2-6 months. After planting, Intercropping with Pulses (Green gram, Black gram, Cow pea, etc.,) Vegetables (French bean, Cluster bean, Chillies, Cabbage and Cauliflower) Creeper vegetables and leafy vegetables must be integral part. Intercropping of Navadhanya after planting and incorporation of the same on the 45th day during partial earthing up helps to increase the soil fertility. Income from main crop and other crops must be documented

Set (Seed) treatment

- Dip the sets with Pseudomonas solution @ 7grams/ litre of water followed by Bheejamrutham (BJM) for 15 minutes
- Spacing for Planting: i) Row to row 3-4 feet, Plant to Plant 2 feet ii) Row to row 5 feet, Plant to Plant 1 feet. iii) Row to row 8 feet, Plant to Plant 1 feet. Both ii and iii are best suited for intercrops and poly crops and which gives more net returns.

Ghanajeevamrutham (GJM):

- Type-2: Apply 1500-2000kg/acre at the time of last ploughing (along with Type-2 GJM add @ 2 kg of PSB (Phosphorus Solubilizing Bacteria) + 2 Kg of Azospirillum mixed for every 200 kg of Type-2 GJM) and 200 kgs Neem cake and
- Type-1: 750 kg/acre; 250kg - At the time of sowing and 250 kg -At 45 DAP (Days After Planting) at partial earthing up and 3rd dose at 2nd earthing up @ 90 DAP.

Dravajeevamrutham (DJM)

- i) Soil Application: 15 times @ 200lit each, at 15 DAPS, 30 DAP, 60 DAP, 75 DAP, and 105 DAP, 120 DAP, 135 DAP, 150 DAP, 180 DAP, 195 DAP, 210 DAP, 225 DAP, 240 DAP, 255DAP and 270 DAP

- ii) Foliar application: 6 times at 25 days interval,
- 1st spray-15 litres DJM in 200 litres of water @ 40 DAP
- 2nd spray-20 litres DJM in 200 ltrs of water @65 DAP
- 3rd spray-25 litres DJM in 200 ltrs of water @90 DAP
- 4th spray 30 litres DJM in 200 ltrs of water @115 DAP
- 5th spray 40 litres DJM in 200 ltrs of water @140 DAP and
- 6th spray 50 litres DJM in 200 ltrs of water @165 DAP

Growth promoters

- Egg Amino Acid: 3 times, 250ml in 100lits of water/ acre at 75 DAP, 100 DAP and 125 DAP.

Cultural practices:

- Hoeing and weeding at 20th DAP and 40th to 50th DAP
- Trash Mulching
- Earthing up- Partial earthing up at 50th DAP, Final earthing up at 90th DAP
- DE trashing at 120 DAP and 180 DAP
- Trash twist propping at 180 DAP.
- S2S kit-All the non-negotiables must be mandatorily practiced
- i Inter crops: Pulses- Green gram, Black gram, Cow pea, etc., Vegetables-French bean, Cluster bean, Chillies, Cabbage and Cauliflower, Creeper vegetables and leafy vegetables.
- ii. Border crops: Sesbania
- iv. Yellow sticky traps: 20-25/acre
- v. Pheromone traps:
- a) Keep pheromone traps for Early Shoot borer @ 8/acre up to 4 months from the date of planting.
- b) Keep pheromone traps for Internodal borer @ 8/acre in 4th and 5th months and
- c) Keep pheromone traps for Top Shoot borer@ 8/acre from 6th month onwards.
- vi. Bird perches: 10 -15/acre up to 3 months
- vii. Light Trap: 1/ acre.
- S2S kits (including Sticky traps, Pheromone traps, Seed/Seedlings of Inter/Trap/Border crops, Light traps etc.,) of Sugarcane crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Sugarcane crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Early Shoot Borer	i) Grow resistant varieties like CO 312, CO 421, CO 661, CO 917 and CO 853 ii) Early planting during December – January escapes the early shoot borer incidence. iii) Intercropping with Navadhanya promotes beneficial insects vi) Trash mulching, 3 days after planting. v) Partial earthing up on 45 days after planting reduces the incidence vi) Remove and destroy dead hearts	i)ETL: 15% dead heart ii) Install pheromone traps @ 8 / acre and change the lure once in 30 days iii) Light trap with the onset of monsoon at 6PM - 9PM.	i)Spraying of 5% NSKE with detergent ii) Spraying of Agnastram - 3 litres in 100 litres of water 2 times at 7 days interval
2	Internodal Borer	i) Grow resistant varieties like CO 975, COJ 46 and CO 7304. ii) Select pest free setts for planting. iii) Collect and destroy the eggs periodically. vi) Detrash the crop on 150th and 210th day of planting. v) Intercropping with Navadhanya promotes beneficial insects vi) Release Egg parasitoid- Trichogramma chilonis	i) Install pheromone traps @ 8 / acre and change the lure once in 30 days ii) Light trap with the onset of monsoon at 6PM -9PM.	i)Spraying of 5% NSKE with detergent ii)Spraying of Agnastram - 3 litres in 100 litres of water 2 times at 7 days interval
3	Top shoot Borer	i) Grow resistant variety CO 419, CO 745 and CO 6516 and tolerant varieties Co 859, Co 1158 and Co 7224. ii) Earthing up followed by trash mulching iii) Avoid Maize and Sorghum as intercrops	i) Install pheromone traps @ 8 / acre and change the lure once in 30 days ii) Light trap with the onset of monsoon at 6PM -9PM.	Spraying of Agnastram - 3 litres in 100 litres of water 2 times at 7 days interval

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		vi) Prefer paired row system for planting v) Remove the dead heart plants and destroy them vi) Collect and destroy the egg masses.		
4	White flies	i) Avoid water stagnation and provide proper drainage facilities ii) Detrashing of cane at the 5th and 7 th month iii) Ensure adequate irrigation which facilitates the soil moisture and reduces the multiplication.	Keep 20-25 Yellow sticky traps per acre.	i) 5% NSKE/Neemastram with detergent powder during initial stage and Vitex leaf decoction at severe infection ii) Spray Ipomea leaf extract. (Grind 10 kg leaves and boil in 15 litres of water. Cool the content and filter the content. Mix it in 200 litres of water add 100 gr of soap powder, 10 litres of cow urine and spray) iii) Spray Metarhizium anisopliae (biopesticide @ 1 kg /acre, mixed in 200 litres of water) to control the pest effectively.
5	Woolly Aphid	i) Paired row system of planting. ii) wrapping of canes all along the rows. iii) Infested canes should not be used as seed material for planting	i) Encourage natural predators by planting inter crops ii) Spray Pathogens like Metarhizium anisopliae, Verticillium lecanii and Beauveria bassiana iii) Keep 20-25 Yellow sticky traps per acre.	i) 5% NSKE / Neemastram with detergent powder during initial stage and ii) Vitex leaf decoction at severe infection iii)Spraying of Datura Leaf Extract
6	Mealybug	i) Use resistant varieties like CO 439, CO 443, CO 720, CO 730 and CO 7704 ii) Drain excess water from the field.		i)5% NSKE/Neemastram with detergent powder during initial stage and ii) Vitex leaf decoction at severe infection

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		iii) Detrash the crop on 150 and 210 DAP		iii) Spraying of Mattidravanam @20kg of subsoil at 2 feet depth in 200 litres of water.
7	Sugarcane Hopper (Pyrilla)	Removal and destruction of the white coloured puffy pyrilla egg masses or egg- bearing sugarcane leaves themselves at regular intervals.	Alternatively, the egg masses may be kept in old cloth bags and suspended at different places in the field to! facilitate selective emergence of adult egg parasitoids while trapping neonate nymphs.	i)Spray Ipomea leaf extract (Grind 10 kg leaves and boil in 15 litres of water. Cool the content and filter the content. Mix it in 200 litres of water add 100 gr of soap powder, 10 litres of cow urine and spray) ii) Spray Metarhizium anisopliae (biopesticide @ 1 kg /acre, mixed in 200 litres of water) to control the pest effectively.
II. Major Diseases				
8	Red rot	i)Select sets for planting from healthy plants in a disease- free area. ii) Set treatment with Bheejamrutham and pseudomonas iii) The red rot affected field must be rotated with rice for one season and other crops for two seasons. iv) Growing of recommended resistant and moderately resistant varieties viz., Co86032, Co 86249, Cosi 95071, CoG 93076, CoC22, CoSi6 and CoG5 v)If the disease is noticed in the field, the leaves and canes should be collected and destroyed by burning.		Spray Dung+Urine+Asfoetida solution - 5 lit in 100 lit water Spray sour buttermilk 6 lt in 100 lit water

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
9	Smut	i) Set treatment with Bheejamrutham and pseudomonas ii)Growing of resistant and moderately resistant varieties viz., Co 86249, CoG 93076, CoC 22, CoSi 6 and CoG 5 iii) Discourage ratooning of the diseased crops having more than 10 per cent infection iv) red gram can be grown as a companion crop between rows of sugarcane, and the secondary spread of the disease is substantially reduced. v) Rouging of smut whips with gunny bags/polythene bag and Sets should be dipped in boiling water (around 52 degree C) for 20 mints before planting and diseased clumps must be uprooted and burnt.		Spray Dung+Urine+Asfoetida solution - 5 lit in 100 lit water

ix. Maize:

It is crucial to enhance the inter-crop and poly crop combinations in Maize cropping system. Intercropping with Pulses (Green gram, Black gram, Cow pea etc.,) Tuber vegetables (Radish), Vegetable and Creeper vegetables must be integral part. Income from main crop and other crops must be documented.

Seed treatment with Bheejamrutham (BJM)
Ghanajeevamrutham (GJM)

- i) Type-2: 1500-2000 kg/acre at the time of last ploughing and ii) Type-1: 400kg/acre; 200kg - At the time of sowing and 200 kg -At 20 DAS (Days After Sowing).

Dravajeevamrutham (DJM):

- Soil Application: 9 times @ 200lit each, at 10 DAS, 14 DAS,35 DAS,49 DAS,56 DAS,70 DAS,77DAS and 84 DAS.
- Foliar application: 2 times, 1st spray-15 litres DJM in 200 litres of water at 28 DAS and 2nd spray-20 litres DJM in 200 litres of water at 42 DAS i.e., at Tasselling & Silking stage

Growth promoters

- i) Egg Amino Acid: 250ml in 100lits of water/ acre once at 42 DAS. ii) Panchagavya: 4lts/acre in 100 litres water at Silking stage i.e., 70 DAS

S2S kit-All the non-negotiables must be mandatorily practiced

- Inter crops: Pulses- Green gram, Black gram, Cowpea (2 Kgs) Vegetables (Radish-150 grams)
- Border crops: Jowar/Bajra-3 rows (2 Kgs)
- Yellow sticky traps: 30-40/acre
- Pheromone traps (Stem borer&F.A. W): Each @8/acre at 15-20 DAS
- Bird perches: 10 -15/acre (up to before cob development)
- Light Trap: 1/ acre.
- The pheromone traps should be installed prior to pest infestation (for example; Stem borer/ Fall Army Worm-F.A. W). It should not be done after the infestation starts in the field.
- S2S kits (including Sticky traps, Pheromone traps, Seed/Seedlings of Inter/Trap/Border crops, Light traps etc.,) of Maize crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.
- 365 Days Green Cover in Maize: PMDS-Kharif-RDS-Rabi Maize
- 7days before the harvest of kharif paddy around October/November take up sowing of a minimum 9 types of seeds (Dry sowing) as relay crop, allow them to grow for 45-60days.
- If the farmer wants to feed the harvested fodder to the cattle, the farmer can graze or use as cattle feed. Leafy vegetables and creeper vegetables can be harvested for house hold consumption.
- And then take up Maize Rabi crop in zero tillage method, as it is a common practice in some Maize growing areas of East, West Godavari, Krishna and Guntur Districts.
- Apply 1.5-2 tonnes of Type-2 GJM as basal application at the time of sowing.
- Apply 200 kgs Type-1 GJM twice, one at the time of sowing and 2nd at 21 DAS
- Then take up sowing of green gram/Black gram as inter crop in 1:1 (Maize: BG/GG) ratio along with Maize crop. Care should be taken, that the residual PMDS crops growth should not hinder the germination, early growth and development of Maize crop.
- Apply DJM 9 times @ 200lit each, at 10 DAS, 14 DAS,35 DAS,49 DAS,56 DAS,70 DAS,77DAS and 84 DAS with irrigation water.

- Spraying of Panchagavya or Sapthadanyankura kashayam at silking stage and milky grain stage of Maize will increase both quality and yield.
- After practicing all non-negotiables, use of botanical extracts may be used as last resort for pest and disease control.
- The Maize (Rabi) crop will be harvested in the month of March, before 15 days of harvest of Maize crop take up sowing of a minimum 9 types of seeds (Gingelly and Cucumber should to be included) as dry sowing to continue 365DGC practice.
- It will be continued up to April or May, at that time, all leafy and creeper vegetables can be harvested, even Millets and Gingelly will give some yield, finally take up PMDS in April/May/June before kharif season.

Standard Non pesticide management practices for pest and disease management in Maize crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/ curative method.	Curative / Reactive method.
I. Major Pests				
1	Pink stem borer	1.Egg parasitoid: Trichogramma chilonis 2. Larval parasitoid : Cotesia flavipes	Chrysoperla carnea, Coccinellid, Spider, Ear wig, Dragon fly, Preying mantid, Pentatomid bug, Reduviid bug, Robber fly, Rove beetles, Wasp, King crow @ 2:1 ratio	Spraying of Agnastram - 3 litres in 100 litres of water
2	Fall army worm (F.A.W)	1.Erect bird perches @10/acre 2. Trichogramma pretiosum @ 16,000/acre	1.Erect 1 light trap/acre. 3.Plant Napier grass along the border as trap crop to trap FAW 2. Install 8 pheromone traps/acre	1.Application of sand or Mud slurry into whorl of Maize plants 2.5%NSKE/Neemastram during intial stage @ twice a week 3. Spray Agniastram if pest is severe
3	Aphids	1.Removal of infested shoots. 2. Conservation of natural enemies such Lady Bird Beetles, chrysoperla and syrphids that are found to feed on the aphids	Predatory Coccinellids, Anthocorid bugs, mired bugs, syrphid/hover flies, green lace wigs, spiders, wasps, rove beetles.	5% NSKE/Neemastram with detergent powder during initial stage and Vitex leaf decoction at severe infection
II. Major Diseases				

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/ curative method.	Curative / Reactive method.
4	Charcoal rot	1.Crop rotation 2. Application of Trichoderma viridi along with Type 2 GJM .3. Avoid the water stress condition at the time of flowering by applying dry mulch and Inter crops	-	Spray Dung+Urine+Asfoetida solution - 5 lit in 100 lit water
5	Leaf and Sheath blight	Refer to sheath blight in paddy	-	Refer to sheath blight in paddy

x. Bengal gram:

365 Days Green Cover in Bengal gram

- Prior to Bengal gram (June-Oct) sowing of PMDS seeds (with a minimum 9 varieties of crops), Red gram: Millets: Pulses: Red gram in 1:4:8:14 ratio (Red gram 1st row, Maize 4 rows-2nd row, 5th row, 8th row and 11th row – Kora / Bajra/ Jowar) and Pulses-8 rows (Green gram/Black gram) 3rd,4th,6th ,7th, 9th ,10th, 12th,13th rows and 14th row red gram) is a sustainable suggestive practice in all Bengal gram growing areas across the state.
- All crops can be harvested except red gram. After harvest of green gram and Black gram, sow Cluster bean, Indian red sorrel (Gongora) and other leafy vegetables in rows so that leafy vegetables can be harvested before sowing of Bengal gram.
- The harvested crop residues can be used for Mulch material. Prepare the land in between red gram rows with rotovator and sow Bengal gram (Oct/Nov) seed mixed with 250-500gms each of Mustard and Sesame in between red gram rows.
- In Feb-4th week to March-1st week, sow Rabi Dry Sowing as relay cropping with a minimum of 9 varieties.
- It is crucial to enhance the inter-crop and poly crop combinations in Bengal gram cropping system, inter crops, Coriander, Maize/Jowar/Sun flower and Mustard. Tuber vegetables and creeper vegetables on borders may be integral part of Bengal gram and document the income from main crop and other crops as well.

Seed treatment with Bheejamrutham
Ghanajeevamrutham (GJM)

- Type-2: 1000-1500kg/acre at the time of last ploughing (or) Type-1: 250kg/acre 125kg - At the time of sowing and 125 kg -At 30 DAS (Days after Sowing)

Dravajeevamrutham (DJM)

- Foliar application: 2 times, 1st spray-5 litres of DJM in 100 litres of water and 2nd spray-10 litres of DJM in 150 litres of water at 30 DAS and 45 DAS respectively.

Growth promoters

- i) Panchagavya: 4 litres in 100 litres water, 1 time at the time of flowering ii) Saptadhanyakura tonic: 700gms of paste in 200 lts of water, 1 time at pod filling stage.

S2S kit-All the non-negotiables must be mandatorily practised

- i. Inter crops a) Bengal gram in paired row planting with one or two rows of Coriander (2Kgs), b) Bengal gram can also be intercropped with Maize/Jowar/Sun flower (1Kg) in black cotton soils and c) Bengal gram with Mustard (1.5 Kg) (4:1) is also a good combination.
- ii. Border crops: Jowar /Maize/Bajra (2kgs) in 3-4 Rows
- iii.Trap crops- Marigold-300 no's and Castor 4 to 5 no's /acre
- iv. Yellow and Blue sticky traps: 30-40/acre
- v. Pheromone traps (Helicoverpa): Each @8/acre at 20-30 DAS
- vi. Bird perches: 10-15/ acre.
- Light Traps: 1/ acre.
- The pheromone traps should be installed prior to pest infestation (for example Helicoverpa – in the beginning of the pest infestation). It should not be done after the infestation starts in the field.
- S2S kits (including Sticky traps, Pheromone traps, Seed/Seedlings of Inter crop/Trap/Border crops, Light traps etc.,) of Bengal gram crop should be planned and placed at NPM shop/FPO/VO etc. before crop season and DPM should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Maize crop

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Gram pod borer (Helicoverpa)	1)Inter cropping with Coriander, Mustard, Sunflower or Maize and Border crop Maize. 2) Release of Egg parasitoids Trichogramma pretiosum @ 50000 adults	1)ETL: 2 early instar larvae/plant or 5-8 eggs/plant. 2)Erecting of bird perches 15 per acre. 3) Install pheromone traps @ 8 per acre.	1)Spray 5% NSKE and after 7 days spray Bramhastram 2) Spray Agnastram- 5lts in 200lit water/acre 3) Apply Ha NPV @ 250 LE/ ha at 10-15 days interval.

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
2	S Semi looper	1)Early sowing, short duration varieties. 2)Grow tall sorghum as companion crop to serve as biological bird perches. 3)Releasing of Trichogramma chlionis (i.e. Tricho cards) at weekly intervals for 4 times.	-	1)5%NSKE/Neemastram during initial stage (or) Spray Dasaparini kashayam 6 litres in 200 litres of water at later stages. 2)Spray, Agnastram- 5lts in 200lit water/acre
3	Cut worm	1)Adapt crop rotation 2) Early sowing 3) Intercropping with Mustard reduces infestation. 3)Grow Marigold as trap crop on bunds	Installation of Pheromone traps @ 8 per acre	1)Spray Neemastram at early stages 2) Spray chilli garlic extract at later stages
II. Major Diseases				
4	Wilt	Grow resistant varieties	-	1)Dung+Urine+ Asafoetida solution - 6 lit in 100 lit water 2) Sour Buttermilk solution - 6 lit in 100 lit water 3) Mix 2kg of Trichoderma viridi in 200 litres of water and pour at the plant base
5	Rust	-	-	1)Dung+Urine+ Asafoetida solution - 6 lit in 100 lit water or 2) Dry ginger (200gms) milk (5 litres) concoction

2. Horticulture-Vegetable crops:

i. Chilli

Before growing Chilli crop, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May (one week before final picking of Chilli crop) and continued up to July 2nd week i.e., till sowing of Chilli crop to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

It is crucial to enhance the inter-crop and poly crop combinations in Chilli crop cropping system. For inter crops, Onion, Red gram, Tuber vegetables, Leafy vegetables and creeper vegetables must be integral part of Chilli. The income from main crop and the other crops should be documented.

Seed and seedling treatment with Bheejamrutham.

- Ghanajeevamrutham (GJM): Type-2+Neem cake+ Trichoderma Viridae: @ 1000-1500 Kgs + 200kgs + 4kgs respectively at the time of last ploughing and GJM-Type-1: 500kg/acre, 2 times @ 250kgs at the time of transplantation and @ 250 Kgs at 45 DAT (Days after transplantation) by placement method.

Dravajeevamrutham (DJM):

- Soil application: 7times @ 200lit each starting from 40DAT, 60DAT, 90DAT, 120DAT, 140DAT, 150DAT, and 160DAT.
- Foliar application: 7 times at 15DAT (5 lit of DJM in 100 lit of water)
- AT (5 lit of DJM in 100 lit of water)
- 50DAT (10 lit of DJM in 125 lit of water)
- 75DAT (10 lit of DJM in 125 lit of water)
- 105DAT (15 lit of DJM in 150 lit of water)
- 115DAT (30 lit of DJM in 150 lit of water) and
- 130 DAT (30 lit of DJM in 150 lit of water).

Growth promoters.

- Panchagavya- 4lts in 100 lit of water/acre each time, 4 times, starting from flowering stage i.e., 25DAT,50DAT,75DAT and 115 DAT ii. Egg Amino Acid- 200-250 ml in 100lits of water/ acre, 2 times at 130 DAT and 150 DAT.

S2S kit- All the non-negotiables must be mandatorily practiced

- Inter crops: Tubers and other vegetables (Onion, Radish, and Leafy vegetables including Coriander etc.,), 50-100g of each in between 2 chilli plants along with Marigold seedlings.
- Border crop: Jowar/Bajra/Maize (1-2 KGs) in 4 rows
- Trap Crops: Marigold (50grams) for Helicoverpa and Castor (250 grams) for Spodoptera.
- Yellow and Blue sticky traps: 20-25/acre at 10 DAT
- Pheromone traps (Helicoverpa/Spodoptera): Each @8/acre at 20-30 DAT
- Bird perches: 10-15/ acre
- Light Traps: 1/ acre.
- The Pheromone traps should be installed prior to pest infestation (for example Helicoverpa/Spodoptera– before the pest infestation) rather than installing the traps after the infestation starts in the field.

S2S kit for Chilli crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.

365 DGC: Immediately after harvesting of Chilli crop in March and sow a minimum of 9 types of seeds as PMDS or continue the 365 DGC with other group of crops (Poly crops).

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Chilli thrips (incidence: throughout the crop period)	Grow Marigold as Trap crop (200nos/acre) and Radish and coriander as inter crops	i. Blue sticky traps @25-30/Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
2	Yellow mite (incidence: throughout the crop period)	Grow Marigold as Trap crop (200nos/acre) and Radish and coriander as inter crops	I. Yellow sticky traps @20-25/Acre ii. Watch for beneficiary insects viz Predatory mite and lace wing bug etc.,	i Spraying of Neemastram-200 lit/acre at early stages ii Spray Dung+Urine+Asfoetida solution - 5 lit in 100 lit water (Note: Direct spray solution towards lower side of leaves)
3	Aphid (incidence: throughout the crop period)	Border crop: Maize, Sorghum (3-4 lines) and Inter crop with Marigold	i.Yellow sticky traps @20-25/Acre ii. Watch for beneficiary insects viz Lady bird beetles, Damsel fly and Lace wing bugs etc.,	Spraying of Neemasthram + Detergent powder
4	Gram caterpiller (Helicoverpa) (incidence: Flowering and Fruiting stage)	i.Trap crop: Marigold ii. Border crop: Maize, Sorghum (3-4 lines) iii. 1 light trap /acre iv. Bird perches @ 8-10/acre.	i. Pheromone traps @ 8-10 /acre. ii. Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early instar stages Neemastram 200lts/acre. ii. Spraying of Agnastram- 5 lts in 200lit water/acre at advance instar stages

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
5	Tobacco caterpillar (incidence: Main field to harvest)	i.Adopt crop rotation ii. Early sowing.iii. Trap crop: Castor iii. Border crop: Maize, Sorghum vi.1 light trap /acre v.Bird perches @8-10/acre.	i.Pheromone traps @ 8-10 /acre. ii.Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early stage Neemastram-200lt/acre. Ii.Spraying of Agnastram- 4 lts in 100 ltrs of water/acre (or) at advance instar stages iii. Spray Garlic chilli extract.
II. Major Diseases				
6	Damping off (incidence: Nursery stage)	i.Quality seed to be used. ii.Avoid shady places for nursery establishment. Iii.Use recommended seed rate and raised beds. vi.Avoid flooding type of irrigation and maintain optimum moisture level in nursery		i.Drenching of sour butter milk 6lit/100 lit water/spraying of Dung urine+Asafoetida solution ii.Use of Type-2 Ghanajevamrutham 1 kg+10g Trichoderma horizianum per application in 1 SQMT of nursery area.
7	Fruit rot and Die Back (incidence: Flowering and Fruiting)	i.Before planting, try to ensure that seeds are disease free i.e., soil is too wet, improving soil drainage can be very useful to prevent further development and spread of the disease	Early removal of affected plants will control the spread of the diseases.	i.Dry ginger+Milk extract - 6 lit in 200 lit water at the time of fruit ripening stage followed by ii. Dung+Urine+ asafoetida solution - 6 lit in 100 lit water
8	Powdery mildew (incidence: during winter period)	Removal and destruction of heavily infested old/lower leaves		Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and spray sour butter milk (6 lit in 100 lit of water)

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
9	Cercospora leaf spot (incidence: throughout the crop period)	i.Before planting, try to ensure that seeds are disease free ii.If soil is too wet, improving soil drainage can be very useful to prevent further development and spread of the disease		Spraying of sour Buttermilk solution - 6 lit in 100 lit waters
10	Fusarium wilt (incidence: initial stages of Flowering)	i.Using of desi varieties of seeds ii.Crop rotations of up to 5-7 years to reduce levels of fungi in the soil	_	Drenching with Trichoderma viridi-2kgs in 200 lit of water
11	Leaf curl virus (Transmitted by White flies and Thrips) (incidence: throughout the crop period)	i.The infected plants should be uprooted and buried to avoid further spread of infection. ii. Encourange Poly cropping in chilli crop. iii. Selection of healthy and disease - free seed. vi. Raise 2-3 rows of Maize or Sorghum as border crop to restrict the spread of vectors. v.Nursery beds should be covered with nylon net or mulch with straw to protect the seedlings from viral infection.	i.Yellow sticky traps @30-40 per Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of 5% NSKE – (5kg neem seeds in 100 lit water) before infestation, vitex leaf extract after thrips infestation

ii. Tomato:

Before growing of Tomato crop depending of the season, raising of Pre-Monsoon Dry Sowing (PMDS)/Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May or relay in Oct/Nov till sowing of Tomato crop to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/RDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

It is crucial to enhance more inter-crop and poly crop combinations in Tomato crop cropping system to escape from the market glut, include as many intercrops like, Onion, Tuber vegetables- Carrot, Radish, Flower crops - Marigold, Leafy vegetables and Creeper vegetables – Ridge Gourd, Bottle Gourd. Tomato + Black gram/Cowpea (4:1) may also followed. The income from main crop and the other crops should be documented.

Seed and seedling treatment with Beejamrutham.
Ghanajeevamrutham (GJM)

Type-2+Neem cake+ Trichoderma Viride: @ 1000-1500 Kgs + 200kgs + 4kgs respectively at the time of last ploughing and GJM-Type-1: 400kg/acre, 2 times @ 200kgs at the time of transplantation and @ 200 Kgs at 45 DAT (Days after transplantation) by placement method.

Dravajeevamrutham (DJM):

- Soil application:
- 4 times @ 200lit each starting from
- 30DAT,60DAT,90DAT and 120DAT.
- Foliar application:
- 5 times at 15DAT (5 lit of DJM in 100 lit of water)
- 50DAT (10 lit of DJM in 125 lit of water)
- 75DAT (10 lit of DJM in 125 lit of water)
- 105DAT (15 lit of DJM in 150 lit of water) and
- 115DAT (30 lit of DJM in 150 lit of water)

Growth promoters

- i. Panchagavya (It controls Sucking pests also besides Growth promoter)- 4lts in 100 lit of water/acre each time, 2 times, starting from flowering stage i.e., 50DAT and 75DAT and ii. Egg Amino Acid- 250 ml in 100lits of water/ acre, 2 times at 90 DAT and 120 DAT.

S2S kit- All the non-negotiables must be mandatorily practiced

- i. Tomato + Leafy Vegetables (Coriander/ Amaranthus /Palak/ Methi) + Onion (in between two tomato plants one Onion plant / Tomato + Black gram/Cowpea (4:1)
- ii. Border crop: Jowar/Bajra/Maize (1-2 KGs) in 4 rows
- iii. Trap Crops: Marigold (50grams) for Helicoverpa and Castor (250 grams) for Spodoptera.

- iv. Yellow and Blue sticky traps: 20-25/acre at 10 DAT
- v. Pheromone traps (Helicoverpa/Spodoptera): @8/acre at 20-30 DAT
- vi. Bird perches: 10-15/ acre
- Light Trap: 1/ acre.
- The Pheromone traps should be installed prior to pest infestation (for example Helicoverpa/Spodoptera) rather than installing the traps after the infestation starts in the field.
- S2S kit for Tomato crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.
- 365 DGC: Immediately after harvesting of Tomato crop in April / May, sow a minimum of 9 types of seeds as PMDS or continue the 365 DGC with other group of crops (Poly crops)

Standard Non pesticide management practices for pest and disease management in Tomato crop

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Fruit borer (Gram pod borer)	i. Border crop: Maize, Sorghum (3-4 lines) iii. 1 light trap /acre iv. Bird perches @ 8-10/acre. ii. Trap crop: a. Grow simultaneously 40 days old American tall marigold and 25 days old tomato seedling at 1:4 rows b. Hand picking and destruction larvae from the marigold flowers iii. Spraying of Neemastram-200 lit/acre iv. Bird perches 10-15 /acre	i. Erecting of pheromone traps @ 8/acre ii. Erecting of Light trap 1/acre iii. Releasing Trichogramma Brasiliense @1,00,000 Parasitiod eggs per/acre as Trichocords iv)Application HaNPV @250LE.	i. Spraying of 5% NSKE during Initial stage ii. After 7 days spray Brahmastram (3.5 litres extract in 100 liters of water iii. If incidence is more spray Agnasthram

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
2	Tobacco caterpillar	i. Border crop: Maize, Sorghum (3-4 lines) iii. 1 light trap /acre iv. Bird perches @ 8-10/acre. ii. Trap crop: Castor can be grown as a trap crop along the field border to attract the egg laying female adult moths (collect and destroy the laid egg masses and gregarious neonates) iii. Spraying of Neemastram-200 lit/acre	i. Erecting of Light trap 1/acre ii. Install pheromone traps @ 8/acre for monitoring adult moth activity. Replace the lures with fresh lures after every 2-3 weeks	i. Dip gunny bags into jaggery solution and torn into small pieces and keep them in field in the evening all caterpillars will be attracted there and kill them in the morning. ii. Spraying of 5% NSKE during Initial stage iii. After 7 days spray Brahmastram (3.5 litres extract in 100 liters of water iv. Spray garlic chilly extract in the evening.
3	Leaf miner	Removal and destruction of heavily infested old/lower leaves fallowed by application of neemasthram	i.Lady bird beetle can feed sucking pests ii. White/yellow sticky traps 10-15 /acre iii. Erect @ 8 delta traps per/acre	Initial stage (eggs and 1st instar larvae): spraying of 5% NSKE or Neemasthram 10kg and chilly garlic extract in advanced stages
4	Whitefly	Border crop: Maize, Sorghum (3-4 lines)	i. yellow sticky traps (20-25) ii. Setting up light traps for collecting adults @1/acre	Spraying of Vitex negundo (vavilaku kashayam) leaf extract 100lit/1acre
II. Major Diseases				

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
5	Damping off	i. Quality seed to be used. ii. Avoid shady places for nursery establishment. iii. Use recommended seed rate and raised beds. vi. Avoid flooding type of irrigation and maintain optimum moisture level in nursery	-	i. Drenching of sour butter milk 6lit/100 lit water/spraying of Dung urine+Asafoetida solution ii. Use of Type-2 Ghanajevamrutham 1 kg+10g Trichoderma horizianum per application in 1 SQMT of nursery area.
6	Powdery mildew	Removal and destruction of heavily infested old/lower leaves	-	Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and spray sour butter milk (6 lit in 100 lit of water)
7	Bacterial Fruit and Leaf spot:	i. Before planting, try to ensure that seeds are disease free ii. Seed treatment with Beejamrutham iii. If soil is too wet, improving soil drainage can be very useful to prevent further development and spread of the disease	-	i.Spraying of Dung+Urine+Asfoetida solution - 5 lit solution in 100 lit water/acre ii. Spray sour butter milk 6 lit/100 lit of water

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
8	Leaf curl virus (Transmitted by White flies and Thrips)	i. The infected plants should be uprooted and buried to avoid further spread of infection. ii. Encourage Poly cropping in Tomato crop. iii. Selection of healthy and disease - free seed. vi. Raise 3-4 rows of Maize or Sorghum as border crop to restrict the spread of vectors. v. Nursery beds should be covered with mulch (with straw) to protect the seedlings from viral infection.	i. Yellow /Blue sticky traps @20-25 per Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of 5% NSKE – (5kg neem seeds in 100 lit water) before infestation, vitex leaf extract

iii. Brinjal:

Before growing of Brinjal crop depending of the season, raising of Pre-Monsoon Dry Sowing (PMDS)/Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May or relay in Oct/Nov till sowing of Brinjal crop to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/RDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

It is crucial to enhance the inter-crop and poly crop combinations in Brinjal crop cropping system, Include as many intercrops like Coriander or Fennel (2:1), Brinjal + Leafy vegetables (live mulch) + Creepers (as live mulch), Brinjal + Cowpea (2: 1) and Brinjal + Onion/ Garlic (within the row, between two brinjal plants). The income from main crop and the other crops should be documented.

Seed and seedling treatment with Bheejamrutham and Trichoderma virid

- @ 4 g/kg or Pseudomonas fluorescens @7g/kg of seed.

Ghanajeevamrutham (GJM)

Type-2+Neem cake+ Trichoderma Viridae: @ 1000-1500 Kgs + 200kgs + 4kgs respectively at the time of last ploughing and GJM-Type-1: 400kg/acre, 2 times @ 200kgs at the time of transplantation and @ 200 Kgs at 45 DAT (Days after transplantation) by placement method.

Dravajeevamrutham (DJM)

- Soil application:
- 4 times @ 200lit each starting from
- 30DAT,60DAT, 90DAT, 120DAT.
- Foliar application:
- 5 times at 15DAT (5 lit of DJM in 100 lit of water)
- 50DAT (10 lit of DJM in 125 lit of water)
- 75DAT (20 lit of DJM in 125 lit of water)
- 105DAT (25 lit of DJM in 150 lit of water)
- 115DAT (30 lit of DJM in 150 lit of water)

Growth promoters

- i. Panchagavya (It controls Sucking pests also besides Growth promoter)- 4lts in 100 lit of water/acre each time, 2 times, starting from flowering stage i.e., 50DAT and 75DAT respectively.
- ii. Spray Egg Amino Acid-250ml in 100 ltr of water each time, 2 times, i.e., 90DAT and 120 DAT.

S2S kit- All the non-negotiables must be mandatorily practiced

- Inter crops: Coriander or Fennel (2:1), Brinjal + Leafy vegetables (live mulch) + Creepers (as live mulch), Brinjal + Cowpea (2: 1) and Brinjal + Onion/ Garlic (within the row, between two brinjal plants) Brinjal + Leafy Vegetables (Coriander or Fennel) + Onion/Garlic (in between two Brinjal plants one Onion plant. 2) Brinjal + Cowpea (2:1)
- Border crop: Jowar/Bajra/Maize (1-2 KGs) in 4 rows
- Trap Crops: Marigold (50grams) for Helicoverpa and Castor (250 grams) for Spodoptera.
- Yellow and Blue sticky traps: 20-25/acre at 10 DAT
- Pheromone traps (Brinjal Fruit & shoot borer): Each @8/acre at 20-30 DAT
- Bird perches: 10-15/ acre
- Light Traps: 1/ acre.
- The Pheromone traps should be installed prior to pest infestation (for example Brinjal fruit and shoot borer) rather than installing the traps after the infestation starts in the field.
- S2S kit for Brinjal crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.

- 365 DGC: Immediately after harvesting of Brinjal crop in April/May and sow a minimum of 9 types of seeds as PMDS or continue the 365 DGC with other group of crops (Poly crops).

Standard non pesticide management practices for pest and disease management in Brinjal crop

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Fruit and Shoot Borer	i) Raise 3-4 rows of Maize/Jowar/Bajra as border crops ii) Transplant 200 to 300 plants of Marigold per acre as trap crop iii) Transplant 5 to 6 castor plants as trap crop iv) Intercropping of brinjal (2rows) with coriander (1row) or fennel (1row). v)Weekly clipping and destruction of infested shoots and fruits throughout the crop period	i)Install pheromone traps @8/acre for monitoring and 10/acre for mass trapping at 10 m distance from 20DAT. The pheromone lure should be changed at regular interval. ii) Release Trichogramma chilonis at 20,000/acre/week commencing from 21days after transplanting.	i) Spray NSKE 5% at the time of flowering and continue at 10 days interval ii) Spray Agnastram if infestation is more
2	Jassids	i) Raise Maize or Jowar as Border crop ii)200 Marigold plant per acre as Trap crop	i) Arrange 20 to 25 white and yellow sticky traps per acre	i) Spray NSKE 5% or Neemastram followed by Vavilaku Botanical Extract ii). Spray Dasaparni Kashayam
3	Epilachna Beetles	i) Pick up the insects by hand and destroy ii)Spray NSKE 5% or Neemastram for every 5 days for 3 times	-	i)Spraying of mixture of Neem oil @5% + Meta rhizium. Anisopliae @5g/litre (1:1 ratio) ii) Spray Brahmastram if Infestation is high

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
				iii) Spray Nalleru kashayam (3kgs of naleeru + 3kgs of tamarind leaves+ 500 gms of soap nut+ 300gms of inguva grind and ferment in 10 lts of urine for 10 days. Then take 3 litres of decoction and mix in 100 lits of water and spray)
4	White Fly	i) Plant 200 to 300 Marigold plants per acre as trap ii) Grow Maize or Jowar as border crop	20 to 25 yellow sticky traps per acre	Spray Neemastram or 5% NSKE followed by vavilaku botanical extract
5	Spider Mite	i) Plant 200 Marigold plants per acre ii) Removal and destruction of infested leaves during dry period iii) Removal and destruction of ratoon crops, weeds (Parthenium etc.,) from the main field	20 to 25 yellow sticky traps per acre	i) Apply NSKE 5% or Neemastram ii) Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water
II. Major Diseases				
6	Little leaf of Brinjal (it is caused by phyto / Myco plasma and transmitted by insect vector leaf hoppers)	i)Uproot the affected plants and burn them ii) Raise 3 to 4 rows of Maize or Jowar or Bajra as Border crop	Arrange 25 to 30 yellow sticky traps per acre	i) Spray Neemastram or 5% NSKE followed by vavilaku botanical extract ii) Spray Nalleru kashayam

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
7	Powdery mildew	Removal and destruction of heavily infested old/lower leaves	-	i) Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and ii) Spray sour butter milk (6 lit in 100 lit of water)

iv. Bhendi (okra) (Ladies Finger):

Before growing of Bhendi crop depending of the season, raising of Pre-Monsoon Dry Sowing (PMDS)/Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May or relay in July/Aug and Jan/Feb till sowing of Bhendi crop to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/RDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

It is crucial to enhance the inter-crop and poly crop combinations in Bhendi (Okra) crop cropping system, Include as many intercrops like Coriander or Fennel (2:1), Bhendi + Leafy vegetables (live mulch) + Creepers (as live mulch), Bhendi + Cowpea (2: 1) and Bhendi + Onion/ Garlic (within the row, between two Bhendi plants). The income from main crop and the other crops should be documented.

Seed treatment with Beejamrutham and Trichoderma viride

- @ 4 g/kg or Pseudomonas fluorescens@10g/kg of seed.

Ghanajeevamrutham (GJM)

Type-2+Neem cake+ Trichoderma Viridae: @ 1000-1500 Kgs + 200kgs + 4kgs respectively at the time of last ploughing and GJM-Type-1: 400kg/acre, 2 times @ 200kgs at the time of sowing and @ 200 Kgs at 45 DAS (Days After Sowing) by placement method.

Dravajeevamrutham (DJM)

- i)Soil application:
- 3 times @ 200lit each starting from
- 30DAS, 60DAS, 90DAS.
- ii)Foliar application :
- 4 times at 15 DAS (5 lit of DJM in 100 lit of water)
- 45 DAS (10 lit of DJM in 125 lit of water)

- 75 DAS (20 lit of DJM in 125 lit of water)
- 105 DAS (25 lit of DJM in 150 lit of water).

Growth promoters

- Panchagavya (It controls Sucking pests also besides Growth promoter)- 4lts in 100 lit of water/acre each time, 2 times, starting from flowering stage i.e., 40 DAS and 65 DAS (or) Spray Egg Amino Acid-250ml in 100 ltr of water each time, 2 times, i.e., 40 DAS and 65 DAS.

S2S kit- All the non-negotiables must be mandatorily practiced.

- i. Inter crops: Coriander (2:1), Bhendi + Leafy vegetables (live mulch) + Creepers (as live mulch), Bhendi + Cowpea (2: 1) and Bhendi + Onion/ Garlic (within the row, between two Bhendi plants) Bhendi + Leafy Vegetables (Coriander)+ Onion/Garlic (in between two Bhendi plants one Onion plant. 2) Bhendi + Cowpea (2:1).
- ii. Border crop: Jowar/Bajra/Maize (1-2 KGs) in 4 rows.
- iii. Trap Crops: Marigold (50grams) for nematodes and Castor (250 grams) for Spodoptera.
- iv. Yellow sticky traps: 20-25/acre at 10 DAS.
- v. Pheromone traps (Bhendi Fruit & shoot borer): Each @8/acre at 20-30 DAS.
- vi. Bird perches: 10-15/ acre.
- vii. Light Traps: 1/ acre.
- The Pheromone traps should be installed prior to pest infestation (for example Bhendi fruit and shoot borer– before the pest infestation) rather than installing the traps after the infestation starts in the field.
- S2S kit for Bhendi crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.
- 365 DGC: Immediately after harvesting of Bhendi crop in April/May and sow a minimum of 9 types of seeds as PMDS or continue the 365 DGC with other group of crops (Poly crops).

Standard Non pesticide management practices for pest and disease management in Bhendi (Okra) crop

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
1	Fruit and Shoot Borer (Earias Sps.)	i. Raise 3-4 rows of Maize/Jowar/Bajra as border crops. ii. Weekly clipping and destruction of infested shoots and fruits throughout the crop period	i. Install pheromone traps @8/acre for monitoring and 10/acre for mass trapping at 10 m distance from 20DAT. The pheromone lure should be changed at regular interval. ii. Release Trichogramma chilonis at 20,000/acre/week commencing from 21days after sowing.	i.Spray NSKE 5% at the time of flowering and continue at 10 days interval ii. Spray Agnastram / Dasaparni Kashayam if infestation is more
2	Fruit borer (Helicoverpa)	i. Trap crop: Marigold ii. Border crop: Maize, Sorghum (3-4 lines) iii. 1 light trap /acreiv. Bird perches @ 8-10/acre.	i. Pheromone traps @ 8 /acre. ii. Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Trycho card)/acre/week	i. At early instar stages Neemastram 200lts/acre ii. Spraying of Agnastram-5 lts in 200lit water/acre at advance instar stages followed by Dasaparni Kashayam
3	White Fly (Transmits Yellow vein Mosaic Virus)	i. Plant 200 to 300 Marigold plants per acre as trap ii) Grow Maize or Jowar as border crop	20 to 25 yellow sticky traps per acre	Spray Neemastram or 5% NSKE followed by vavilaku botanical extract
4	Leaf hoppers	i. Raise Maize or Jowar as Border crop ii)200 Marigold plant per acre as Trap crop	Arrange 20 to 25 white and yellow sticky traps per acre	i. Spray NSKE 5% or Neemastram followed by Vavilaku Botanical Extract ii. Spray Dasaparni Kashayam
5	Aphids	Border crop: Maize, Sorghum (3-4 lines) and Inter crop with Marigold	i. yellow sticky traps @20-25/Acre ii. Watch for beneficiary insects viz Lady bird	Spraying of Neemasthram + Detergent powder

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
			beetles, Damsel fly and Lace wing bugs etc.	
6	Spider Mite	Refer to spider mite in Brinjal crop		Refer to spider mite in Brinjal crop
II. Major Diseases				
7	Yellow vein Mosaic Virus (transmitted by insect vector white fly)	i. Uproot the affected plants and bury them ii. Raise 3 to 4 rows of Maize or Jowar or Bajra as Border crop	Arrange 20 to 25 yellow sticky traps per acre	Spray Neemastram or 5% NSKE followed by vavilaku botanical extract
8	Powdery mildew	Removal and destruction of heavily infested old/lower leaves	-	i.Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and ii.Spray sour butter milk (6 lit in 100 lit of water)

v. Cabbage and Cauliflower (Cole crops)

- Before growing of Cole crops-Cabbage and Cauliflower depending on the season, raising of Pre-Monsoon Dry Sowing (PMDS)/Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May or relay in Oct/Nov till sowing of Cole crops to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/RDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

The other POPs are detailed below

Sl. No	Name of the item	Cabbage/Cauliflower
1	Seed/Seedling treatment	i. Seed treatment: Beejamrutam (after treatment 30 minutes shade drying) followed by Trichoderma viride @ 10 g / kg seed ii. Seedlings are to be

Sl. No	Name of the item	Cabbage/Cauliflower
		dipped in Beejamrutam for 30 min followed by Trichoderma viride @ 10 g / lit water.
2	Nursery raising	i. Application of GJM type-2, along with Trichoderma viridae and Neem cake, 50Kg,1.25 kg and 10 Kg respectively in nursery area is sufficient for 1 acre. ii. Raised nursery beds (15 cm ht,1.2 m width and convenient length. iii. Mulching: With Paddy straw/Sugarcane trash iv. Erection of Yellow sticky plates-3 nos in nursery area to control sucking pests in nursery itself v. Pheromone trap-1 for Diamond Back Moth (DBM)
3	Ghanajeevamrutham	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham+100 Kg Neem cake ii. Apply @ 400 KG/Acre of Ghanajeevamrutham-I +200 Kg/acre- Neem cake at the time of planting.
4	Dravajeevamrutham	i. Soil application:6 times, starting from 15 DAT,30DAT,45 DAT,60 DAT, 75 DAT and 90 DAT, 15 days interval @ 200lit per acre, each up to head maturity stage. ii. Foliar application: Spraying of Dhravajeevamrutham @ 200 litres per acre, 3times at 20DAT,40DAT and 70 DAT
5	Growth promoters	i. Egg Amino Acid-250ml in 100 litres of water per acre at before Head formation stage ii. Panchagavya- 4lts in 100 lit of water/acre at Head development stage
6	S2S kit - Non negotiables	
	i. Inter crops	Cabbage/Cauliflower can be intercropped with Tubers/bulb: Radish, Beetroot and Onion; Leafy Vegetables: Palak, Methi; Legumes: Peas and Beans; Oil seed: Mustard (4:1); Cereals: Maize etc.,
	ii. Border crop	3-4 rows of Maize
	iii. Trap Crops	I. Growing of Mustard as trap crop for Diamond Back Moth. ii. Marigold and Castor- for Helicoverpa and Spodoptera respectively
	iv. Yellow sticky traps	20-25 per Acre
	v. Pheromone traps	Diamond Back Moth/Gram pod borer/Spodoptera @ 8/Acre each
	vi. Bird perches	10-15 Acre
	vii. Light Trap	1/Acre
7	365 DGC	PMDS-Kharif field crops/ vegetables (poly crops) like Tomato, Brinjal-RDS-Rabi/Cabbage and Cauliflower-Summer Vegetables/Gingelly (poly crops) etc.,

The Pheromone traps should be installed prior to pest infestation (for example: Diamond Back Moth / Helicoverpa /Spodoptera) rather than installing the traps after the infestation starts in the field.

S2S kits for above crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMU should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Cabbage and Cauliflower

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Diamond Back Moth (DBM)	installation of light trap @ 1/ acre for DBM. Adults are attracted to light trap and fall in water bucket. Within 3-4 days most of the adults get killed.	i. Erection of Pheromone traps@ 8 per acre ii. Growing of Mustard as trap crop (4:1)	i. Spray NSKE 5% at primordia formation (18-25 DAP-head initiation stage - most critical stage) for DBM control. Repeat, if DBM is >1 / plant at 10-15 days interval. Maximum of 3-4 NSKE sprays in one crop season are required. When NSKE are sprayed, thorough coverage of the entire plant surface is must. Use sticker with spray. This will control aphids as well as tobacco caterpillar. ii. Spray Bacillus thuringiensis kurstaki 5 WP (Bt) @ 3 g / litre if DBM is present @ 1 larva / leaf iii. Spraying of Agnastram- 4 lts in 100 ltrs of water/acre (or) at advance instar stages Spray Garlic chilli extract.
2	Tobacco caterpillar	i. Adopt crop rotation ii. Trap crop: Castor iii. Border crop: Maize iv.1 light trap /acre v. Bird perches @8-10/acre.	I. Pheromone traps @ 8 /acre. ii. Release of Egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early stage Neemastram-200lt/acre. ii.Spraying of Agnastram- 4 lts in 100 ltrs of water/acre (or) at advance instar stages Spray Garlic chilli extract.

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
3	Cabbage butter fly	i. Adopt crop rotation	i. Watch for beneficiary insects viz Lacewing bug, Ladybird beetle, Spider, Red ant, Dragon fly, Robber fly, Reduviid bug, Praying mantid etc., ii. 1 light trap /acre iii. Growing of Mustard as trap crop (4:1)	i.Spray NSKE-10 lit in 200 lit water-Early stages ii.Spray Agnastram- 5lts in 200lit water/acre-Moderate to Severe stage
4	Cabbage aphid	Parasitic wasps also attack aphids.	i. Installation of Yellow sticky traps @ 20-25 per acre ii. Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE and detergent solution.
II. Major Diseases				
5	Damping off	i. Quality seed to be used. ii. Avoid shady places for nursery establishment. iii. Use recommended seed rate and raised beds. vi. Avoid flooding type of irrigation and maintain optimum moisture level in nursery	-	i. Drenching of Trichoderma viride-10 grams/litre ii. Spraying of sour butter milk 6lit/100 lit water/spraying (or) Dung urine + Asafoetida solution
6	Downey mildew	Removal and destruction of heavily infested old/lower leaves	-	Spraying of sour butter milk 6lit/100 lit water/spraying (or) Dung urine + Asafoetida solution
7	Bacterial black rot	Seed treatment with Beejamrutam /T. viridi @10gm / kg seed	-	Dry Ginger + milk extract and Dung + Urine + Asafoetida Solution

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
8	Alternaria leaf spot	-	-	Sour Butter milk and cow dung + urine +Asafoetida solution

vi. Ridge gourd, Bottle gourd, Bitter gourd, Snake gourd and Cucumber (Cucurbitaceous Vegetables)

Before growing of cucurbit crops-Ridge gourd, Bottle gourd, Bitter gourd, Snake gourd and Cucumber, depending of the season, raising of PMDS/Dry Sowing (DS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May or relay in Nov/Dec till sowing of cucurbit crops to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/DS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

The other POPs, crops wise are detailed below

Sl. No	Name of the item	Ridge gourd	Bottle gourd	Bitter gourd	Snake gourd	Cucumber
1	Seed treatment	Beejamrutam followed by Trichoderma @ 7 g / kg seed	i. Beejamrutam followed by Trichoderma @ 7 g / kg seed.	i. Beejamrutam followed by Trichoderma @ 7 g / kg seed. ii.Soak seeds in water for 24 hours before sowing to break the dormancy and to quicken the germination. iii. Soak seeds in Luke warm water for 30 minutes before sowing. This helps in the softening of the hard seed coat.	Beejamrutam followed by Trichoderma @ 7 g / kg seed	Beejamrutam followed by Trichoderma @ 7 g / kg seed

Sl. No	Name of the item	Ridge gourd	Bottle gourd	Bitter gourd	Snake gourd	Cucumber
2	Ghanaje evamrut ham	i. During last plough-1.0 MT of Type-II Ghana Jeevamruth am+200 Kg Neem cake ii.Apply @ 100 KG/Acre of Ghanajeeva mrutham-I at the time of sowing and 100 kg at 25 DAS as pocket application	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham +200 Kg Neem cake ii.Apply @ 100 KG/Acre of Ghanajeevamru tham-I at the time of sowing and 100 kg at 25 DAS as pocket application	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham+ 200 Kg Neem cake ii.Apply @ 100 KG/Acre of Ghanajeevamru tham-I at the time of sowing and 100 kg at 25 DAS as pocket application	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutha m+200 Kg Neem cake ii.Apply @ 100 KG/Acre of Ghanajeeva mrutham-I at the time of sowing and 100 kg at 25 DAS as pocket application	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutha m+200 Kg Neem cake (or) ii.Apply @ 100 KG/Acre of Ghanajeeva mrutham-I at the time of sowing and 100 kg at 25 DAS as pocket application
3	Dravaje evamrut ham	i. Soil application:5 times @ 15 days interval @ 200lit each per acre, starting from 20DAS,35DA S,50DAS, 65 DAS and 80DAS ii.Foliar application: Spraying of Dhravajeeva mrutham @ 200 litres per acre at every 20 days interval, 4times at 30DAS,55DAS,75 DAS and 95 DAS	i. Soil application:5ti mes @ 15 days interval @ 200lit each per acre, starting from 20DAS,35DAS,5 0DAS, 65 DAS and 80DAS ii.Foliar application: Spraying of Dhravajeevamr utham @ 200 litres per acre at every 20 days interval, 4times at 30DAS,55DAS,7 5 DAS and 95 DAS	i. Soil application:5tim es @ 15 days interval @ 200lit each per acre, starting from 20DAS,35DAS,5 0DAS, 65 DAS and 80DAS ii.Foliar application: Spraying of Dhravajeevamru tham @ 200 litres per acre at every 20 days interval, 4times at 30DAS,55DAS,7 5 DAS and 95 DAS	i. Soil application:5 times @ 15 days interval @ 200lit each per acre, starting from 20DAS,35DA S,50DAS, 65 DAS and 80DAS ii.Foliar application: Spraying of Dhravajeeva mrutham @ 200 litres per acre at every 20 days interval, 4times at 30DAS,55DA S,75 DAS and 95 DAS	i. Soil application:5 times @ 15 days interval @ 200lit each per acre, starting from 20DAS,35DA S,50DAS, 65 DAS and 80DAS ii.Foliar application: Spraying of Dhravajeeva mrutham @ 200 litres per acre at every 20 days interval, 4times at 30DAS,55DA S,75 DAS and 95 DAS

Sl. No	Name of the item	Ridge gourd	Bottle gourd	Bitter gourd	Snake gourd	Cucumber
4	Growth promoters	Panchagavya- 2 times, @4lts in 100 lit of water/acre before flowering and Fruit development stages	Panchagavya- 2 times, @4lts in 100 lit of water/acre before flowering and Fruit development stages	Panchagavya- 2 times, @4lts in 100 lit of water/acre before flowering and Fruit development stages	Panchagavya - 2 times, @4lts in 100 lit of water/acre before flowering and Fruit development stages	Panchagavya - 2 times, @4lts in 100 lit of water/acre before flowering and Fruit development stages
5	Growing on Pandals is preferred to get quality Gourds	yes	yes	yes	yes	-
6	S2S kit- Non negotiables					
	i. Inter crops	It also grown on pandals apart from ground, it can inter cropped with leafy vegetables, tuber vegetables	It also grown on pandals apart from ground, it can inter cropped with leafy vegetables, tuber vegetables	It also grown on pandals apart from ground, it can inter cropped with leafy vegetables, tuber vegetables	It also grown on pandals apart from ground, it can inter cropped with leafy vegetables, tuber vegetables	i. Can be grown as inter crop in Cotton, Red gram, Maize as vegetable and live mulch
	ii. Border crop	3-4 rows of Jowar/Bajra/ Maize	3-4 rows of Jowar/Bajra/Maize	3-4 rows of Jowar/Bajra/Maize	3-4 rows of Jowar/Bajra/ Maize	3-4 rows of Jowar/Bajra
	iii. Yellow sticky traps	20-25 per Acre	20-25 per Acre	20-25 per Acre	20-25 per Acre	20-25 per Acre
	iv. Melon fruit fly trap	@8 per Acre	@8 per Acre	@8 per Acre	@8 per Acre	@8 per Acre
	v. Light Traps	1/Acre	1/Acre	1/Acre	1/Acre	1/Acre

Sl. No	Name of the item	Ridge gourd	Bottle gourd	Bitter gourd	Snake gourd	Cucumber
7	365 DGC	PMDS-Kharif field crops/ vegetables like Tomato, Brinjal Poly cropping system) - RDS-Cabbage/Cauliflower-Cucurbits (poly cropping system)	PMDS-Kharif field crops/ vegetables like Tomato, Brinjal Poly cropping system) -RDS-Cabbage/Cauliflower-Cucurbits (poly cropping system)	PMDS-Kharif field crops/ vegetables like Tomato, Brinjal Poly cropping system) -RDS-Cabbage/Cauliflower-Cucurbits (poly cropping system)	PMDS-Kharif field crops/ vegetables like Tomato, Brinjal Poly cropping system) - RDS-Cabbage/Cauliflower-Cucurbits (poly cropping system)	PMDS-Kharif field crops/ vegetables like Tomato, Brinjal Poly cropping system) - RDS-Cabbage/Cauliflower-Cucurbits(poly cropping system)

3. S2S kits for above all crops should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Cucurbitaceous Vegetables-Ridge gourd, Bottle gourd, Bitter gourd, Snake gourd and Cucumber

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Aphids	Border crop: Maize/ Sorghum (3-4 lines)	Yellow sticky traps (20-25)	Spraying of 5% NSKE or Neemasthram with Detergent powder
2	Fruit fly	i. Growing of Resistant varieties ii. Raking of soil for exposing fruit fly pupae to sunlight and predatory fauna. iii. Collection and bury of fruit fly infected fruits periodically	i. Monitor the activity of flies with Fruit fly trap @8 per acre ii. Install yellow sticky traps 20-25 per Acre	i.Spraying of 5% NSKE or Neemasthram ii.Spraying Dasaparni Kashayam
3	Cucumber moth	i. Adopt crop rotation ii. Border crop: Jowar/Bajra/Maize iii. Bird perches @8-10/acre.	1 light trap /acre	i. Two sprays of Bacillus thuriengiensis @ 2g / litre for protection against cucumber moth on

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
				bitter gourd. ii. At early stage Neemastram-200lt/acre. Ii.Spraying of Agnastram- 4 lts in 100 ltrs of water/acre (or) at advance instar stages iii. Spray Garlic chilli extract.
4	Red pumpkin beetle	-	-	i.Spray NSKE 5% ii.Garlic chilli extract
5	White fly	Border crop: Maize, Sorghum (3-4 lines)	i. yellow sticky traps (20-25) ii. Setting up light traps for collecting adults @1/acre	Spraying of Vitex negundo (vavilaku kashayam) leaf extract 100lit/1acre
6	Leaf miner	Removal and destruction of heavily infested old/lower leaves fallowed by application of neemasthram.	i.Lady bird beetle can feed sucking pests ii. White/yellow sticky traps 20-25 /acre iii. Erect @ 8 delta traps per/acre	Initial stage (eggs and 1st instar larvae): spraying of 5% NSKE or Neemasthram 10kg and chilly garlic extract in advanced stages
II. Major Diseases				
7	Damping off	i. Quality seed to be used. ii. Avoid shady places for nursery establishment iii. Use recommended seed rate and raised beds.vi. Avoid flooding type of irrigation and maintain optimum moisture level	-	i. Spraying of sour butter milk 6lit/100 lit water ii.Spraying of Dung urine+Asafoetida solution iii.Use of Type-2 Ghanajeevamrutham +Trichoderma horizianum

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
8	Downey mildew	i. Removal and destruction of heavily infested old/lower leaves ii. Preferably grow cucumber on bamboo support or trellis or in green houses can reduce downy mildew with reduced leaf wetness and free air flow.	-	Spraying of Sour Buttermilk solution - 6 lit in 100 lit water (or) Dung urine+ Asafoetida solution
9	Powdery mildew	Removal and destruction of heavily infested old/lower leaves	-	Spraying of Sour Buttermilk solution - 6 lit in 100 lit water (or) Dung urine+Asafoetida solution
10	Fusarium wilt	Use pathogen free seeds Remove and destroy the infected plants and plant debris Adopt crop rotation Avoid water stagnation and maintain proper drainage Use resistant varieties Mix 2 kg of Trichoderma viridi in 200 litres of water and spray or pour at the base of the plant.	-	i. Spraying of sour butter milk 6lit/100 lit water/ ii.Spraying of Dung urine+Asafoetida solution iii. Use of Type-2 Ghanajevamrutham +Trichoderma horizianum
11	Anthracnose	Seed treatment with effective strain of Trichoderma @ 7 g / kg of seed	-	i.Spraying of sour butter milk 6lit/100 lit water ii.Spraying of Dung urine+Asafoetida solution
12	Cucumber Mosaic Virus	i. Raise 4 rows of barrier crops such as Maize or sorghum ii.Avoid planting Tomatoes next to Cucurbits, Spinach, or other vegetables and flowers susceptible to these diseases iii. Control of aphids will help reduce the incidence of cucumber mosaic.	Yellow sticky traps 20-25 /acre	Spraying of 5% NSKE – (5kg neem seeds in 100 lit water); before infestation spray vitex leaf extract.

vii. Broad bean (Dolichos), French bean and Cluster bean (Leguminacious Vegetables):

Before growing of Leguminacious Vegetables -Broad bean (Dolichos), French bean and Cluster bean, depending of the season, raising of PMDS/Dry Sowing (DS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May or relay in Nov/Dec till sowing of Leguminacious Vegetables -Broad bean (Dolichos), French bean and Cluster bean to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/DS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

The other POPs, crop wise are detailed below

Sl. No	Name of the item	Broad bean (Dolichos) - Bush type	French bean	Cluster bean
1	Seed treatment	Beejamrutham followed by *Trichoderma* @ 8 g / kg seed and Rhizobium 250 grams/acre using rice gruel as binder.	Beejamrutham followed by *Trichoderma* @ 8 g / kg seed and Rhizobium 250 grams/acre using rice gruel as binder.	Beejamrutham followed by *Trichoderma* @ 8 g / kg seed and Rhizobium 250 grams/acre using rice gruel as binder.
2	Ghanajeeva mrutham	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham+100 Kg Neem cake (or) ii. Apply @ 200 KG/Acre of Ghanajeevamrutham-I +100 Kg/acre- Neem cake at the time of sowing and 200 kg at 30 DAS as pocket application	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham+100 Kg Neem cake (or) ii. Apply @ 200 KG/Acre of Ghanajeevamrutham-I +100 Kg/acre- Neem cake at the time of sowing and 200 kg at 30 DAS as pocket application	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham+100 Kg Neem cake (or) ii. Apply @ 200 KG/Acre of Ghanajeevamrutham-I +100 Kg/acre- Neem cake at the time of sowing and 200 kg at 30 DAS as pocket application
3	Dravajeeva mrutham	i. Soil application:4 times, each 200 litres/Acre at 15	i. Soil application:4 times, each 200 litres/Acre at 15	i. Soil application:4 times, each 200 litres/Acre at 15

Sl. No	Name of the item	Broad bean (Dolichos) - Bush type	French bean	Cluster bean
		DAS,45DAS, 60DAS and 75DAS ii. Foliar application:4 times@ 200 litres per acre at 25DAS,50DAS, 70 DAS and 85DAS	DAS,45DAS, 60DAS and 75DAS ii. Foliar application:4 times@ 200 litres per acre at 25DAS,50DAS, 70 DAS and 85DAS	DAS,45DAS, 60DAS and 75DAS ii. Foliar application:4 times@ 200 litres per acre at 25DAS,50DAS, 70 DAS and 85DAS
4	Growth promoters	Panchagavya-2 times, 4lts in 100 lit of water/acre at Flowering and pod development	Panchagavya-2 times, 4lts in 100 lit of water/acre at Flowering and pod development	Panchagavya-2 times, 4lts in 100 lit of water/acre at Flowering and pod development
5	S2S kit-Non negotiables			
	i. Inter crops	Tubers, Leafy vegetables, Mari Gold and Castor	Tubers, Leafy vegetables, Mari Gold and Castor	Tubers, Leafy vegetables, Mari Gold and Castor
	ii. Border crop	3-4 rows of Maize/Jowar/Bajra	3-4 rows of Maize/Jowar/Bajra	3-4 rows of Maize/Jowar/Bajra
	iii. Yellow/Blue sticky traps	20-25 per Acre	20-25 per Acre	20-25 per Acre
	iv. Pheromone traps for Maruca pod borer and Helicoverpa	@8 per Acre each	@8 per Acre each	-
	v. Bird perches	10-15 Acre	10-15 Acre	10-15 Acre

Sl. No	Name of the item	Broad bean (Dolichos) - Bush type	French bean	Cluster bean
	vi. Light Traps	1/Acre	1/Acre	1/Acre
7	365 DGC	PMDS-Dolichos with poly cropping-RDS-Vegetables with poly crops	PMDS- French bean with poly cropping-RDS-Vegetables with poly crops	PMDS-Cluster bean with poly cropping-RDS-Vegetables with poly crops

3. S2S kits for above all crops should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Leg minacious Vegetables -Broad bean (Dolichos), French bean and Cluster bean

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Aphids	Parasitic wasps also attack aphids.	i. Installation of Yellow sticky traps @ 20-25 per acre ii. Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE and detergent solution.
2	Thrips	Avoid growing / choosing of inter crops like Chilli and Onion	Refer to thrips in Groundnut crop	Refer to thrips in Groundnut crop
3	Fruit borer-Maruca and Helicoverpa	i. Parasitoids: Trichogramma spp., Tetrastichus spp., Chelonus spp., Telenomus spp, Bracon spp. etc. ii. Trap crops-Castor, Cowpea, Sesame, Green gram and Black gram.	i. Pheromone @ 8 per Acre for Helicoverpa ii. Watch for beneficiary insects viz Lacewing bug, Ladybird beetle, Spider, Red ant, Dragon fly, Robber fly, Reduviid bug, Praying mantid etc.,	i. Spray NSKE-10 lit in 200 lit water-Early stages ii. Spray Agnastram- 5lts in 200lit water/acre- Moderate to Severe stage
4	Flea beetles	-	-	i. Spray 5%NSKE -Early stages ii. Spray Chilli garlic extract-Moderate to Severe stage

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
II. Major Diseases				
5	Powdery mildew	Removal and burry of heavily infested old/lower leaves	-	Spraying of Sour Buttermilk solution with 100 grams Asafoetida - 6 lit in 100 lit water (or) Cow dung + urine +Asafoetida solution.
6	Root rot	i. Seed treatment with Beejamrutham followed by Trichoderma viride @ 8grms/Kg seed ii. Collect seeds from disease free plants iii. Remove and destroy the infected plants and plant debris iv. Adopt crop rotation v. Avoid water stagnation and provide proper drainage vi. Use resistant varieties	-	Mix 2 kg of Trichoderma viridi in 200 litres of water and drench at the base of the plant.
7	Leaf spot	-	-	Sour Butter milk and cow dung + urine +Asafoetida solution
8	Virus complex-Yellow Vein Mosaic Virus	i. Raise 4 rows of barrier/border crops such as Maize/Sorghum/Bajra ii. Avoid planting Tomatoes next to Cucurbits, Spinach and other Vegetables and Flowers susceptible to these virus diseases	Installation of Yellow sticky traps @ 20-25 per acre	Initial stages NSKE 5% or Neemastram and Datura leaf extract

Sl. No	Name of the item	Coriander (Kothi Meera)	Fenugreek (Menthi kura)	Palak (Pala kura)	Amaranthus (Thota kura)	Indian sorrel (Gongura) and Sorrel (Chukka kura) leaf
1	Seed treatment	Beejamrutham followed by Trichoderma viride @ 7 g/kg of seed	Beejamrutham followed by Trichoderma viride @ 7 g/kg of seed	To improve germination, soak seed in water overnight before sowing followed by Beejamrutham and Trichoderma viride @ 7 g/kg of seed	Beejamrutham followed by Trichoderma viride @ 7 g/kg of seed	Beejamrutam followed by Trichoderma viride @ 7 g/kg of seed
2	Ghanajeevamrutham	i. During last plough-500 Kg of Type-II Ghana Jeevamrutham (or) ii.Apply @ 200 KG/Acre of Ghanajeevamrutham-I at the time of sowing and 100 Kg/acre at 30DAS	. During last plough-500 Kg of Type-II Ghana Jeevamrutham (or) ii.Apply @ 200 KG/Acre of Ghanajeevamrutham-I at the time of sowing and 100 Kg/acre at 30DAS	. During last plough-500 Kg of Type-II Ghana Jeevamrutham (or) ii.Apply @ 200 KG/Acre of Ghanajeevamrutham-I at the time of sowing and 100 Kg/acre at 30DAS	. During last plough-500 Kg of Type-II Ghana Jeevamrutham (or) ii.Apply @ 200 KG/Acre of Ghanajeevamrutham-I at the time of sowing and 100 Kg/acre at 30DAS	. During last plough-500 Kg of Type-II Ghana Jeevamrutham (or) ii.Apply @ 200 KG/Acre of Ghanajeevamrutham-I at the time of sowing and 100 Kg/acre at 30DAS
3	Dravajeevamrutham-Foliar	3 times @ i.10DAS-10 litres of DJM in 100 litres of water, ii.25DAS-15 litres of DJM in 100 litres of water and iii.40DAS-15 litres of DJM in 100 litres of water	3 times @ i.10DAS-10 litres of DJM in 100 litres of water, ii.25DAS-15 litres of DJM in 100 litres of water and iii.40DAS-15 litres of DJM in 100 litres of water	3 times @ i.10DAS-10 litres of DJM in 100 litres of water, ii.25DAS-15 litres of DJM in 100 litres of water and iii.40DAS-15 litres of DJM in 100 litres of water	3 times @ i.10DAS-10 litres of DJM in 100 litres of water, ii.25DAS-15 litres of DJM in 100 litres of water and iii.40DAS-15 litres of DJM in 100 litres of water	3 times @ i.10DAS-10 litres of DJM in 100 litres of water, ii.25DAS-15 litres of DJM in 100 litres of water and iii.40DAS-15 litres of DJM in 100 litres of water
4	S2S kit-Non negotiables					
	i. Inter crops	Leafy vegetables are most important integral part of	Leafy vegetables are most important integral part of	Leafy vegetables are most important	Leafy vegetables are most important	Indian sorrel can be intercropped with cotton, Red gram,

		APCNF crop ecosystems. The Coriander crop may be intercropped with Bengal gram (4:1). In orchards also	APCNF crop ecosystems. In orchards also	integral part of APCNF crop ecosystems. In orchards also	integral part of APCNF crop ecosystems. In orchards also	Millets, Ground nut,Tomato/Brinjal and orchards
	ii. Border crop	3-4 rows of Maize/Jowar/Bajra.	3-4 rows of Maize/Jowar/Bajra.	3-4 rows of Maize/Jowar/ Bajra.	3-4 rows of Maize/Jowar/Bajra.	3-4 rows of Maize/Jowar/Bajra.
	iii. Trap Crops	Marigold and Castor	Marigold and Castor	Marigold and Castor	Marigold and Castor	Marigold and Castor
	iv. Yellow sticky traps	20-25 per Acre	20-25 per Acre	20-25 per Acre	20-25 per Acre	20-25 per Acre
	v. Pheromone traps	Spodoptera @8/acre	Spodoptera @8/acre	Spodoptera @8/acre	Spodoptera @8/acre	Spodoptera @8/acre
	vi. Bird perches	10-15 /Acre	10-15/ Acre	10-15 /Acre	10-15 /Acre	-
	vii. Light Traps	1/Acre	1/Acre	1/Acre	1/Acre	-
6	365 DGC	PMDS followed by Coriander and other leafy vegetables RDS followed by vegetables with poly crops	PMDS followed by Fenugreek and other leafy vegetables RDS followed by vegetables with poly crops	PMDS followed by Palak and other leafy vegetables RDS followed by vegetables with poly crops	PMDS followed by Amaranthus and other leafy vegetables RDS followed by vegetables with poly crops	PMDS followed by Indian sorrel/sorrel and other leafy vegetables RDS followed by vegetables with poly crops

viii. Coriander, Fenugreek, Palak, Amarathus, Indian sorrel (Gongura) and Sorrel (Chukka kura)- Leafy vegetables:

Before growing of Leafy vegetables, depending of the season, raising of Pre-Monsoon Dry Sowing (PMDS)/Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May or relay in Oct/Nov till sowing of Leafy vegetables to get a good crop stand and biomass. The greater the

seed diversity, the better the results will be. By practicing PMDS/RDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

The crop wise POPs are detailed below

S2S kits for above all crops should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Leafy Vegetables-Coriander, Fenugreek, Palak, Amaranthus and Indian sorrel/Sorrel

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
1.Coriander				
I. Major Pests				
1	Aphids	Parasitic wasps also attack aphids.	i. Installation of Yellow sticky traps @ 20-25 per acre ii. Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE and detergent solution.
2	Mites	Refer to mite in Paddy crop	Refer to mite in Paddy crop	Refer to mite in Paddy crop
3	Thrips	Refer to thrips in Groundnut crop	Refer to thrips in Groundnut crop	Refer to thrips in Groundnut crop
4	Spodoptera	i. Adopt crop rotation ii. Early sowing iii. Trap crop: Castor iii. Border crop: Maize, Sorghum vi. 1 light trap /acre v. Bird perches @10-15/acre.	i. Pheromone traps @ 8/acre. ii. Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early stage Neemastram-200lt/acre. ii. Spraying of Brahmastram- 4 lts in 100 ltrs of water/acre (or) at advance instar stages iii. Spray Garlic chilli extract.
II. Major Diseases				
5	Powdery mildew	i. Use of Resistant varieties ii. Crop rotation	-	Spraying of Sour Buttermilk solution - 6 lit in 100 lit water (or) Dung+Urine+Asfoetida solution - 6 lit in 100 lit water

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
6	Wilt	i. Use of Resistant varieties ii. Crop rotation		i. Soil Drenching with Trichoderma viridi 2 kg in 200 litres of water. ii. Spray 1 litre of Ginger + Milk in 200 litres of water or Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or Sour Buttermilk solution - 6 lit in 100 lit water
7	Grain mould	i. Seed treatment with Beejamrutham ii. Crop rotation	-	Spraying of Dung+Urine+Asfoetida solution - 6 lit in 100 lit water
2.Palak/Fenugreek/Indian Sorrel/Sorrel				
I. Major Pests				
Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
1.	Aphids	Parasitic wasps also attack aphids.	i. Installation of Yellow sticky traps @ 10-15 per acre ii. Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE and detergent solution.
2.	Leaf eating caterpillars	i. Erect bird perches @ 10-15/acre to facilitate predation of larvae. ii. Install one light trap per Acre to catch the adults	i.Light trap with the onset of monsoon at 6PM -9PM ii. Install pheromone traps @8/ acre for spodoptera	i. Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages. ii. Spraying of Garlic chilli extract - 4 litres in 100 litres of water
II. Major Diseases				
3	Leaf spot	i. Before planting, try to ensure that seeds are disease free ii. If soil is too wet, improving soil drainage	-	Spraying of sour Buttermilk solution - 6 lit in 100 lit water

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		can be very useful to prevent further development and spread of the disease		
4	Damping off	i. Quality seed to be used. ii. Use recommended seed rate and raised beds. iii. Avoid flooding type of irrigation and maintain optimum moisture level.	-	i. Spraying of sour butter milk 6lit/100 lit water/spraying of Dung + urine+Asafoetida solution ii. Use of Type-2 Ghanajevamrutham 1 kg+10g Trichoderma horizianum per application in 1 SQMT
3.Amaranthus				
I. Major Pests				
Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
1	Leaf eating caterpillars	i. Erect bird perches @ 10-15/acre to facilitate predation of larvae. ii. Install one light trap per Acre to catch the adults	i.Light trap with the onset of monsoon at 6PM -9PM ii. Install pheromone traps @8/ acre for spodoptera	i. Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages. ii. Spraying of Garlic chilli extract - 4 litres in 100 litres of water
2	Amaranthus weevil	-	-	i. Spray Garlic chilli extract
II. Major Diseases				
3	Leaf blight	i. Before planting, try to ensure that seeds are disease free ii. Sow resistant green amaranth variety, CO-1 during rainy season iii. Avoid splash irrigation iv. If soil is too wet, improving soil drainage can be very useful to prevent further	-	i. Spraying of sour butter milk 6lit/100 lit water (or) spraying of Dung +urine+Asafoetida solution ii. Use of Type-2 Ghanajevamrutham along with Trichoderma horizianum

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		development and spread of the disease		
4	White Rust	-	Observe blasts spots on weeds that are acting as source plants (hosts) on field bunds.	Spraying of Dung + urine + Asafoetida solution

ix. Turmeric:

- Before growing of Turmeric crop depending of the season, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April till sowing of Turmeric to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.
- Turmeric crop can with stand shade, hence it is grown as inter crop in Fruit orchards, Coconut/Oil palm plantations. Maize and Turmeric (1:2-Turmeric: Maize) is a preferred inter crop combination and vegetables like Chillies, Onion, Brinjal may be planted as mixed crop with in the row of Turmeric. Elephant foot yam, Colocasia and Red gram can be raised as border crop in Turmeric. In case where nematode is a problem, raise Turmeric crop along with Mari gold. The income from main crop and the other crops should be documented.

Rhizome treatment with Beejamrutham followed by Trichoderma viride

- @7grams / Litre of water for 20 mints and shade dry.

Ghanajeevamrutham (GJM)

- Type-2+Neem cake+ Trichoderma Viride+ Pseudomonas: @ 2000-2500 Kgs + 300kgs + 4kgs +2 kgs respectively at the time of last ploughing and GJM-Type-1: 800kg/acre, 2 times @ 400kgs at the time of planting and @ 400 Kgs at 60 DAS (Days After Sowing) by placement method.

Dravajeevamrutham (DJM)

- Soil application: @ 20 days interval
- 11 times @ 200lit/ acre each time, starting from 75DAS, 95DAS, 115DAS, 135DAS, 155DAS, 175DAS, 195DAS, 215DAS, 235DAS, 255DAS and 275DAS
- Foliar application:
- 13 times at 20 Days interval
- 45DAS (5 lit of DJM in 125 lit of water)

- 65DAS (10 lit of DJM in 125 lit of water)
- 85DAS (15 lit of DJM in 150 lit of water)
- 105DAS (30 lit of DJM in 150 lit of water)
- 125DAS (30 lit of DJM in 150 lit of water)
- 145DAS (30 lit of DJM in 150 lit of water)
- 165DAS (30 lit of DJM in 150 lit of water)
- 185DAS (30 lit of DJM in 150 lit of water)
- 205DAS (30 lit of DJM in 150 lit of water)
- 225DAS (30 lit of DJM in 150 lit of water)
- 245DAS (30 lit of DJM in 150 lit of water)
- 265DAS (30 lit of DJM in 150 lit of water) and
- 285DAS (30 lit of DJM in 150 lit of water)

Growth promoters

- Panchagavya (It controls sucking pests also besides Growth promoter)- 3 times, 4lts in 100 lit of water/acre each time, starting from 120 DAS, 150DAS and 180DAS
- Important operations in Turmeric cultivation:
- Planting: Raised beds/Ridge and Furrow-Clay soils; Broad bed and Furrow-Loamy soils
- Provide good drainage to avoid Rhizome rot
- Use of large quantity of Type-2 GJM, increases both quality and quantity of rhizome
- More frequent irrigations are needed at Rhizome maturity stage
- Crop rotation with Gingelly, Sunflower and Bajra (poly cropping systems) for every 2 years
- S2S kit- All the non-negotiables must be mandatorily practiced.
- As inter crop in Fruit Orchards-Coconut /oil palm plantations etc.
- Border crop: Castor and Red gram
- Trap Crops: Chilli, Onion, Marigold-Nematodes.
- Blue sticky traps: 20-25/acre.
- Bird perches: 10-15/ acre.
- Light Traps: 1/ acre.
- S2S kit for Turmeric crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.
- 365 DGC: PMDS-Immediately after harvesting of Turmeric crop (depending upon duration of crop) in March and sow a minimum of 9 types of seed in line sowing including Gingelly/Sunflower/Bajra with poly cropping system and then PMDS.

Standard Non pesticide management practices for pest and disease management in Turmeric crop

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Shoot borer	i.Seed treatment with Beejamrutham ii. Removing stubbles of the previous crops completely	The presence of a bore-hole on the pseudo stem through which frass is extruded and the withered central shoot is a characteristic symptom of pest infestation.	Spraying of the Agnasthram
2	Turmeric Thrips	Refer to thrips in Groundnut crop	Refer to thrips in Groundnut crop	Refer to thrips in Groundnut crop
II. Major Diseases				
3	Rhizome Rot	i. Seed treatment with Beejamrutham and Trichoderma viride ii. Crop rotations with Maize, and Soyabean iii. Grow on raised beds iii. Good drainage facility Should be provided iv. Use of Neem cake along with T viridae-2 kg		Neem Powder mixed with the water and drench on the beds
4	Leaf Blotch	i. Seed treatment with Beejamrutham ii. Infected and dried leaves should be collected and bury. iii. Proper spacing should be maintained iv. Selection of the healthy rhizome for sowing purpose.	-	i. Cow dung +Cow Urine + Asafoetida Solution used for this ii. Dry Zinger and milk solution

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
5	Leaf Spot	i. Infected and dried leaves should be collected and buried. ii. Proper spacing should be maintained. iii. Selection of the healthy rhizome for sowing purpose		i. Spray Cow dung +Cow Urine +Asafoetida Solution ii. Sour butter milk solution
6	Leaf Blight	i. Infected and dried leaves should be collected and buried. ii. Proper spacing should be maintained. Poly cropping will reduce the infestation		i. Spray Cow dung +Cow Urine +Asafoetida Solution ii. Dry Zinger and milk solution

x. Curry leaf:

Before growing of Curry leaf, raising of Pre-Monsoon Dry Sowing (PMDS)/Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May continue up to planting Curry leaf to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/RDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

The crop POPs to be followed are detailed below

Sl. No	Name of the item	Curry leaf
1	Seed treatment	Beejamrutam followed by Trichoderma viride @ 7 g/kg of seed
2	Ghanajeevamrutham	i) Type-2: Apply 5 Kgs and 1/2 kg Neem cake /pit at the time of planting ii) Type-1: 1 kg/pit; 1Kg - At the time of planting and 1kg -At 45-50 DAP (Days After Planting).

3	Dravajeevamrutham-Foliar	i) Soil Application: 9 times @ 200lit each, at 30 DAP 60 DAP, 90 DAP, 120 DAP, 150 DAP, 180DAP, 210 DAP and 240 DAP and 270 DAP. After taking 1st crop, prune the trees and follows the same schedule for 2nd and 3rd year. ii) Foliar application: 7 times at 15 days interval, for quality leaf production
4	Growth promoters	Spray Egg Amino Acid (250ml in 100 litres of water per acre), 3times at 65 DAP, 155DAP and 245 DAP.
5	S2S kit- Non negotiables	
	i. Inter crops	It can be inter cropped in orchards like Mango, Coconut etc.,
	ii. Border crop	Sesbania and Moringa
	iii. Trap Crops	Marigold and Castor
	iv. Yellow sticky traps	20-25 per Acre
	v. Pheromone traps	For Spodoptera @8 per Acre
	vi. Light Traps	1/Acre
6	365 DGC	PMDS-Curry leaf

Other important agronomic practices:

Avoid growing in black cotton soils, where there is a problem of water logging. Follow ridge and furrow method or Drip for irrigation.

Raise nursery on raised beds, select 3-6 months aged plants for planting in main field from nursery.

Mulching: Mulching in nursery and main field, to conserve the soil moisture and to control the weeds. Crop residues like straw, cotton stalks, leaves, saw dust and coir dust etc., can be applied in tree basins and in interspaces between trees. Mulching adds humus to the soil, keeps soil cool in day and warm at night hours.

Apply Bio fertilizers like Azospirillum-0.8kg/Acre, Phosphor bacteria 0.8 kg/Acre

Double the doses of GJM after Pruning (for ratoon crop)

After attaining 1 m height, the terminal bud is cut off to encourage basal branching. In total 5-6 branches are maintained per bush.

Ten to twelve months after planting, the first harvest starts and from 2nd year onwards, leaf can be harvested for every 3-4 months.

S2S kits for above all crops should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPM should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Curry leaf crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
1	Leaf eating caterpillar (Citrus butter fly)	i. Collect and destroy infested plant parts, egg masses and young larvae during gregarious phase. ii.Parasitoids: Trichogramma spp. (egg), Telenomus sp (egg), Distatrix papilionis (larval), Brachymeria spp. (larval), Pteromalus spp. (pupal) etc. iii.Predators: Chrysoperla carnea, coccinellids, King crow, common mynah, wasp, dragonfly, spider, robber fly, reduviid bug, praying mantis, fire ants, big eyed bugs (Geocoris sp), pentatomid bug (Eocanthecona furcellata), earwigs, ground beetles, rove beetles etc.	i. Erecting of Light trap 1/acre ii. Pheromone traps 8/acre	i. Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages. ii. Spraying of Agnastram - 3 litres in 100 litres of water
2	Aphids	Parasitic wasps also attack aphids	i. Installation of Yellow sticky traps @ 20-25 per acre ii. Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE and detergent solution.
3	Psyllid-Jumping plant lice	i.Parasitoids: Tamarixia radiata (nymphal), Diaphorencyrtus aligarhensis (nymhal) etc. ii.Predators: Predatory wasps, lady beetles, lacewings, syrphid fly larvae etc.	Erection of Yellow sticky traps @20-25 per acre	i.Spraying of 5% NSKE/Neemastram/Neem oil-15000 PPM ii. Due to Psyllid attack Sooty mould will develop to control spray Cow dung, urine, asafoetida solution.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
4	Scale	Predators: Predatory wasps, lacewings, ladybugs, ants and mites etc.	i. Installation of Yellow sticky traps @ 10-15 per acre ii. Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE and detergent solution.
5	Mealy bug	Predators: Predatory wasps, syrphid/hover flies, ladybugs or mealybug destroyers (Coccinellid, Cryptolaemus montrouzieri) etc.	Presence of ants	i)Apply Acacia Arabica (Babul) extract. (Collect 3 Kgs of babul (Thumma chakka) tree bark, soak it in 10 litres of water for 24 hours and filter the solution. Add 0.5kg of boiled starch powder and mix in 100 litres of water and spray for one acre ii) Spray Datura leaf Extract iii) Spray Matti draavanam (20kgs of soil dissolved in 200 lits of water for 12 hours filter and spray)
II. Major Disease				
6	Leaf spot	i. Before planting, try to ensure that seeds are disease free ii. If soil is too wet, improving soil drainage can be very useful to prevent further development and spread of the disease	-	i.Spraying of sour Buttermilk solution - 6 lit in 100 lit water ii. Spray Cow dung, urine, asafoetida solution

xi. Drumstick:

- Before growing Drumstick crop, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,) sown in April/May and continued up to July/September i.e

till planting of Drumstick to get a good crop stand and biomass. The essential principle is to have 365 days green cover and to see that the soil is not kept barren.

- It is crucial to enhance the inter-crop and poly crop combinations in initial 2-3 months in Drumstick cropping system. Moringa is a fast-growing tree, drought tolerant, easily adapted to varied Agro ecosystems and poly crop farming systems.
- Intercropping of Navadhanya after planting of Drumstick and incorporation of the same on the 30-45th day helps to increase the soil fertility.
- After planting, intercropping with Cotton (it is being practiced in Guntur district), Pulses -Green gram, Black gram, Cereals-Bajra, Jowar, Oil seeds-Sesamum, Sunflower, Ground nut, Flower Crop-Marigold, Leafy vegetables, Vegetables-Cluster bean, Onion, Chillies, Tomato, Tuber vegetables like Turmeric, Ginger and Creeper vegetables must be integral part in Drumstick cropping system.
- Moringa trees are planted in gardens that can also provide support for climbing vegetables such as Bitter gourd, Snake gourd, Ridge gourd, and pole Beans.
- Alley cropping is the practice of growing food crops in alleys between hedge rows of trees or shrubs which are regularly coppiced or severely pruned. This agroforestry technique is used with annual moringa (PKM-1). The pruning's are placed on soil as a mulch around food crops, providing valuable nutrients on decomposition.
- It can be inter cropped with orchard crops up to 3-4 years

Seed/Seedling treatment

- The seed/seedlings are to be treated with Pseudomonas solution @ 7grams/ litre of water (or) with Azospirillum @ 200 g/kg of seeds followed by Beejamrutam (BJM) for 30 minutes before sowing/planting.

Ghanajeevamrutham (GJM):

- Type-2: Apply 3 Kgs and 1/2 kg Neem cake /pit at the time of planting
- Type-1: a) 1 kg/pit; 1Kg - At the time of planting and 1kg -At 45-50 DAP (Days After Planting).
- b) 2kg/plant every time at 90 DAP,120 DAP, 150 DAP,180 DAP and 210 DAP
- Dravajeevamrutham (DJM):
- Soil Application: 9 times @ 200lit each, at 15 DAP, 30 DAP, 60 DAP, 95 DAP, 125 DAP, 155 DAP, 185DAP, 215 DAP, 245 DAP. After taking 1st crop, prune the trees and follows the same schedule for 2nd and 3rd year.
- Foliar application: 7 times at 30 days interval,
- 1st spray-15 litres DJM in 200 ltrs of water @ 45 DAP
- 2nd spray-20 litres DJM in 200 ltrs of water @75 DAP
- 3rd spray-25 litres DJM in 200 ltrs of water @105 DAP
- 4th spray 30 litres DJM in 200 ltrs of water @135 DAP
- 5th spray 40 litres DJM in 200 ltrs of water @165 DAP
- 6th spray 50 litres DJM in 200 ltrs of water @195 DAP
- 7th spray 50 litres DJM in 200 ltrs of water @225 DAP

Growth promoters

- i) Egg Amino Acid: Spray 250 ml in 100 litres of water 4-5 months of DAP (before flowering stage)
- ii)Panchagavya: (4lts/acre in 100 litres water), 2 times, 1st spray at 6-7 months of planting (at flowering) and 2nd spray at fruits development stage.
- Other important agronomic practices:
- Broad bed and furrow system or Drip irrigation system

Mulching

- Mulching is a field practice to conserve the soil moisture and to control the weeds. Crop residues like straw, cotton stalks, leaves, saw dust and coir dust etc., can be applied in tree basins and in interspaces between trees. Mulching adds humus to the soil, keeps soil cool in day and warm at night hours.
- For better yields, apply Bio fertilizers like Azospirillum-0.8kg/Acre, Phospho bacteria 0.8 kg/Acre and VAM Fungi 1.6 kg/ acre at planting along with GJM
- Leafy vegetables and sweet potato can be grown as cover crop to smother weed growth.
- The field should be irrigated once in a week up to three months and once in ten days thereafter. Water stagnation should be avoided. There will be flower drop when the soil is too dry or too wet. Hence optimum moisture should be maintained.
- Double the doses of GJM after Pruning (for ratoon crop)
- Ratoon crops can be taken for 3 years without reduction in quality

S2S kit-All the non-negotiables must be mandatorily practiced

- Inter crops: Pulses, Leafy vegetables, Vegetables-Cluster bean etc., tuber vegetables like Onion, Garlic, Turmeric, Ginger, Creeper vegetables like Bottle gourd and sweet potato may be planted.
- Border crops: Casuarina, Sesbania
- Yellow sticky traps: 20-25/acre
- Light Trap: 1/ acre.
- S2S kits (including Sticky traps, Seed/Seedlings of Inter/Trap/Border crops, Light traps etc.,) of Drumstick crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Drumstick crop

Sl.No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Leaf eating cater pillars/Hairy Caterpillars	i. Collect and destroy silken webs and caterpillars in the initial stages of infestation. ii. Initial planting, Provision for stake arrangement/Bird perches for birds above the height of the moringa crop in field enabling the birds to visit and prey them iii. Spiders are found inhabiting in large numbers on new flush which exert natural control on the increasing population iv. Collect and destroy egg masses and caterpillars	i. Set up light trap @ 1/acre	i.Spraying of NSKE 5% / Neemasthram with detergent solution ii.Spraying of Agniastram
2	Bud worm	i. Rake around trees to expose, kill and bury pupae ii. Collect and destroy damaged buds along with caterpillar and bury	Set up light trap @ 1/acre	i.Spraying of NSKE 5% / Neemasthram with detergent solution ii.Spraying of Agniastram
3	Bud midge	i. Rake around trees to expose and kill pupae ii. Collect and destroy damaged buds along with caterpillar	Set up light trap @ 1/acre	i.Spraying of NSKE 5% / Neemasthram with detergent solution ii.Spraying of Agniastram
4	Fruit fly/Pod fly	i. Effected fruits should be collected and destroyed. ii. Rake and earthing up the soil below the tree and drench with neemasthram 10lt per tree	Monitor the activity of flies with Fruit fly trap @8 per acre	Spraying Dasaparni Kashayam
II. Major Diseases				
5	Leaf spot	-	-	i. Spray Sour butter milk 6lit-100lit water/acre ii. Spraying of Dung+Urine+Asfoetida solution - 5 lit solution in 100 lit water/acre

Sl.No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
6	Root rot and wilt	i. Seeds should be planted in disease and nematode free soil ii. Beejamrutham seedling/seed treatment iii. Avoid direct stem contact of irrigation water iv. The infected plants should be removed and buried. v. Adopt crop rotation	-	i. Application of Neem cake along with Ghanajeevamrutham ii. Drenching of Trichoderma viridi

xii. Onion

- Before growing of Onion crop depending of the season, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in March/April till sowing of Onion crop to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop
- Onion crop is grown as inter crop in alleys of young fruit orchards, Coconut/Oil palm plantations and as one of the main bulb crops in different poly cropping systems of leafy vegetable-Coriander, vegetables-Cabbage, Cauliflower, Chillies, Brinjal etc., Fruit crop - Banana, Cotton. Also grown on borders of bunds in many cropping systems. General cropping systems are Maize-Potato-Onion, Tomato-Onion. The income from main crop and the other crops should be documented.

Nursery management:

- Raised nursery beds (15 cm ht,1.2 m width and convenient length.
- Application of GJM type-2 along with Trichoderma viridae, 20 kgs and 1.25 kg /SQMT in nursery area respectively and drenching later with Trichoderma viridae-8 grams/litre of water.
- Mulching: With Paddy straw/Sugarcane trash
- Providing shade for nursery
- Erection of 3-4 no's yellow/blue sticky traps in nursery area to control sucking pests in nursery itself

Seed/seed ling treatment with Beejamrutam (BJM)

- along with Azospirillum-400 grams/kg seed using rice gruel as adhesive.

Ghanajeevamrutham (GJM)

- i) Type-2: 1000-1500 kg/acre+ Neem cake-200 kgs/Acre at the time of last ploughing and ii) Type-1: 400kg/acre; 200kg - At the time of transplanting and 200 kg -At 20 DAT (Days After Transplanting).

Dravajeevamrutham (DJM)

- Soil Application: 5 times at 15 days interval @ 200lit each up to bulb maturity Starting from 15 DAT,30DAT,45DAT,60DAT and 75DAT
- Foliar application: 4 times, 1st spray-15 litres DJM in 200 ltrs of water at 25 DAT, 2nd spray-20 litres DJM in 200 ltrs of water at 40 DAT and 3rd spray-25 litres DJM in 200 ltrs of water at 55 DAT and 4th spray at 75DAT-25 litres DJM in 200 ltrs of water.

Growth promoters

- Panchagavya: 4lts/acre in 100 litres water at 65 DAT @ Bulb development stage

S2S kit-All the non-negotiables must be mandatorily practiced.

- Inter crops: Coriander, Cotton, Chillies, Tomato etc.,
- Border crops: Maize/Jowar/Bajra-3 rows
- Yellow/Blue sticky traps: 20-25/acre
- Trap crop: Marigold, Castor
- Pheromone traps (Spodoptera): Each @8/acre at 15-20 DAS
- Bird perches: 10 -15/acre
- Light Trap: 1/ acre.
- The pheromone traps should be installed prior to pest infestation (for example; Spodoptera). It should not be done after the infestation starts in the field.
- S2S kits (including Sticky traps, Pheromone traps, Seed/Seedlings of Inter/Trap/Border crops, Light traps etc.,) of Onion crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.
- 365 Days Green Cover in Onion: PMDS-Kharif with poly crops -RDS-Rabi Onion with poly crops -Summer Tomato/Brinjal with poly crops.

Standard Non pesticide management practices for pest and disease management in Onion crop

Sl.No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Onion Thrips	i. Avoid successive ii. Planting of Onion and other host crops. iii. Avoid Water stress condition	Blue sticky traps @20-25 Acre ETL of 30 thrips / plant	5% NSKE or Neemastram 200 litre/acre, Vitex leaf extract

Sl.No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
2	Onion Maggot	i. Crop rotation ii. Avoid close plantation		Spraying of Agnastram - 3 litres in 100 litres of water
3	Bulb mite	Refer to mite in Paddy crop	Refer to mite in Paddy crop	Refer to mite in Paddy crop
4	Red spider Mite	i. Wash the plants for every 30 days with Water spray ii. Refer to mite in Paddy crop	Refer to mite in Paddy crop	Refer to mite in Paddy crop
5	Tobacco caterpillar	i. Border crop: Maize, Sorghum (3-4 lines) ii. Bird perches @ 8-10/acre. ii. Trap crop: Castor can be grown as a trap crop along the field border to attract the egg laying female adult moths (collect and destroy the laid egg masses and gregarious neonates) iii. Spraying of Neemastram- 200 lit/acre	i. Erecting of Light trap 1/acre ii. Install pheromone traps @ 8/acre for monitoring adult moth activity. Replace the lures with fresh lures after every 2-3 weeks	i. Dip gunny bags into jaggery solution and torn into small pieces and keep them in field in the evening all caterpillars will be attracted there and kill them in the morning. ii. Spraying of 5% NSKE during Initial stage iii. After 7 days spray Brahmastram (3.5 liters extract in 100 liters of water iv. Spray garlic chilly extract in the evening.
II. Major Diseases				
6	Damping off	i. Avoid excessive moisture in the field ii. Destroy the infected plants iii. Application of Trichoderma viridi along with Type 2 GJM	-	I. Application of Trichoderma viridi 5gm/lit Water and drench ii. Spray sour buttermilk 6 lt in 100 lit of water
7	Purple blotch	i. Healthy bulbs should be used (Seed purpose) ii. Crop rotation should be followed	-	Sour buttermilk and Spray Wild tulasi leaf extract + Datura leaf extract

Sl.No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
8	Stemphylium Blight	i. Healthy bulbs should be used ii. Crop rotation should be followed iii. After flowering use of Pseudomonas, T. viridae 5gm/1 Lit water per spraying is preferred.	-	Sour buttermilk and Spray Wild Tulasi leaf extract + Datura leaf extract
9	Onion Yellow dwarf (transmitted by Mites and Thrips)	i. Healthy bulbs should be used. ii. Timely control of the vector (Mites and Thrips) population.	Use Yellow/ Blue Sticky traps 20-25/acre	i.Spray Wild Tulasi leaf extract + Datura leaf extract Spray ii. Dung+Urine+Asfoetida solution - 5 lit in 100 lit water
10	Iris Yellow spot virus	i. Crop rotation ii. Crop stress should be avoided iii. Timely management of Vectors	Use Yellow/ Blue Sticky traps 20-25/acre	i.Spray Wild Tulasi leaf extract + Datura leaf extract Spray ii. Dung+Urine+Asfoetida solution - 5 lit in 100 lit water

xiii. Watermelon and Muskmelon:

Before growing of Water melon and Musk melon depending on the season, raising of Pre-Monsoon Dry Sowing (PMDS), Kharif crop and Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in April/May or relay in Nov/Dec till sowing of Water melon and Musk melon crops to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/RDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

The other POPs are detailed below

Sl.No	Name of the item	Water melon and Musk melon
1	Seed treatment	Beejamrutam (after treatment 30 minutes shade drying) followed by Trichoderma viride @ 7g / kg seed
2	Ghanajeevamrutham	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham+100 Kg Neem cake ii. Apply @ 400 KG/Acre of Ghanajeevamrutham at the time of sowing.

Sl.No	Name of the item	Water melon and Musk melon
3	Dravajeevamrutham	i. Soil application:5 times, starting from 15 DAS,30DAS,45 DAS,60 DAS and 75 DAS 15 days interval @ 200lit per acre, each up to Fruit development stage. ii. Foliar application: Spraying of Dhravajeevamrutham @ 200 litres per acre, 4times at 20DAS, 40 DAS and 70 DAS
4	Growth promoters	i. Egg Amino Acid-250ml in 100 litres of water per acre at 25 DAS ii. Panchagavya- 4lts in 100 lit of water/acre at Flowering 50 DAS stage iii. Panchagavya- 4lts in 100 lit of water/acre at 80 DAS, fruit development stage
5	S2S kit - Non negotiables	
	i. Inter crops	Can be intercropped in orchards like Mango, Coconut, Acid lime etc., Leafy Vegetables: Palak, Methi etc.,
	ii. Border crop	3-4 rows of Jowar/Bajra/Maize
	iii. Trap Crops	Marigold and Castor- for Helicoverpa and Spodoptera respectively
	iv.Yellow sticky traps	20-25 per Acre
	v. Pheromone traps	Gram pod borer/Spodoptera @ 8/Acre each and melon fly @4/Acre
	vi. Bird perches	10-15 Acre
	vii. Light Trap	1/Acre
6	365 DGC	PMDS-Kharif field crops/ vegetables (poly crops) like Tomato, Brinjal-RDS-Rabi/Cabbage and Cauliflower-Summer Water melon and Musk melon (poly crops) etc.,

The Pheromone traps should be installed prior to pest infestation (for example: Helicoverpa /Spodoptera and Melon fly) rather than installing the traps after the infestation starts in the field.

Other important agronomic practices

Raise beds of 1.2 m width and 30cm height for sowing

Apply Azospirillum and Phosphobacteria @ 1kg/Acre and Pseudomonas @ 1 kg/Acre along with Type-I, GJM-400 kg.

Mulching

it is a field practice to conserve the soil moisture and to control the weeds. Crop residues like straw, Ground nut husk, Cotton stalks, leaves, and coir dust etc., Mulching adds humus to the soil, keeps soil cool in day and warm at night hours.

Maintain optimum soil moisture, irrigation after a long dry spell results in cracking of fruits.

Pruning

i) Remove any dead, diseased, yellowing or infested leaves or shoots at the joint where they are connected to the main stem ii). Remove deformed and blossom-end rot fruits iii). Maintain 2-3 vines and remove extra vines iv). If market demands larger melons leave 3- 4 well shaped melons per plant.

S2S kits for above crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMU should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Watermelon/Muskmelon

Sl.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Red pumpkin Beetle	i.Parasitoids: Braconid wasp, tachinid fly Predators: ii. Pennsylvania leather wing beetle, ground beetle, spider, earwig etc.	-	i. Spray NSKE 5% with detergent solution ii. Garlic chilli extract
2	Fruit fly	i. Raking of soil during fruiting time and after the harvest to expose pupae to the predators and sunlight. ii. Collection and bury of fruit fly infected fruits periodically iii.Parasitoid: Opius fletcheri iv.Predators: Ants, dragon fly, spider, robber fly	i. Monitor the activity of flies with Fruit fly trap @4 per acre ii. Install yellow sticky traps 20-25 per Acre	i.Spraying of 5% NSKE or Neemasthram ii.Spraying Dasaparni Kashayam
3	Spodoptera	i. Adopt crop rotation ii. Early sowing. Trap crop: Castor iii. Border crop: Maize, Sorghum vi.1 light trap /acre v.Bird perches @8/acre.	i.Pheromone traps @ 8 /acre. ii.Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week.	i. At early stage Neemastram-200lt/acre. Ii.Spraying of Agnastram-4 lts in 100 ltrs of water/acre (or) at advance instar stages iii. Spray Garlic chilli extract.
4	Helicoverpa	I. Adopt crop rotation ii. Early sowing iii. Trap crop: Marigold iii. Border crop: Maize, Sorghum vi.1 light trap /acre v.Bird perches @8/acre.	i.Pheromone traps @ 8 /acre. ii.Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early stage Neemastram-200lt/acre.i.Spraying of Agnastram- 4 lts in 100 ltrs of water/acre (or) at advance instar stages iii. Spray Garlic chilli extract.
5	Thrips	Refer to thrips in Groundnut crop	-	Refer to thrips in Groundnut crop

Sl.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
6	Aphids	Parasitic wasps also attack aphids.	i. Installation of Yellow sticky traps @ 20-25 per acre ii. Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE with detergent solution.
7	Serpentine Leaf Minor	i. Removal and destruction of heavily infested old/lower leaves fallowed by application of neemasthram. ii.Parasitoids: Gronotoma micromorpha (larva and pupa), Diglyphus sp (larva), Halticoptera circulus and Opius sp (pupal) Chrysophrys sp, Neochrysocharis Formosa. iii.Predators: Lacewings, ladybird beetle, spiders, red ants, dragonfly, robber fly, praying mantis etc.	i. Lady bird beetle can feed sucking pests ii. White/yellow sticky traps 20-25 /acre iii. Erect @ 8 delta traps per/acre	Initial stage (eggs and 1st instar larvae): spraying of 5% NSKE or Neemasthram 10kg and chilly garlic extract in advanced stages
8	Red spider mite	Refer to mites in Paddy crop	Refer to mites in Paddy crop	Refer to mites in Paddy crop
9	White fly	Border crop: Maize, Sorghum (3-4 lines)	i. yellow sticky traps (20-25) ii. Setting up light traps for collecting adults @1/acre	Spraying of Vitex negundo (vavilaku kashayam) leaf extract 100lit/1acre
II. Major Diseases				
10	Powdery mildew	Removal and destruction of heavily infested old/lower leaves	-	Spraying of Sour Buttermilk solution - 6 lit in 100 lit water (or) Dung urine+Asafoetida solution
11	Downey mildew	Removal and destruction of heavily infested old/lower leaves	-	Spraying of sour butter milk 6lit/100 lit water/spraying (or) Dung urine + Asafoetida solution

Sl.No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
12	Anthracnose	Seed treatment with effective strain of Trichoderma @ 7 g / kg of seed	-	i.Spraying of sour butter milk 6lit/100 lit water ii.Spraying of Dung urine+Asafoetida solution
13	Fusarium wilt	i. Use pathogen free seeds ii.Adopt crop rotation iii.Avoid water stagnation and maintain proper drainage vi.Use resistant varieties v.Mix 2 kg of Trichoderma viridi in 200 litres of water and spray or pour at the base of the plant.	-	i. Spraying of sour butter milk 6lit/100 lit water/ ii.Spraying of Dung urine+Asafoetida solution iii. Use of Type-2 Ghanajevamrutham +Trichoderma horizianum.
14	Bud necrosis virus disease	i. Maintaining a clean buffer zone free of weeds of at least 25 m between a virus source and a susceptible crop can considerably reduce virus levels. ii.Control the thrips as given above in thrips management.	Blue sticky traps 20-25 /acre	Spraying of 5% NSKE with detergent– (5kg neem seeds in 100 lit water); before infestation spray vitex leaf extract.
15	Cucumber Mosaic Virus	i. Raise 4 rows of barrier crop such as maize/sorghum/bajra. ii.Avoid planting tomatoes next to cucurbits, spinach, or other vegetables and flowers susceptible to these diseases. iii.Control of aphid vectors as given in aphid management.	Yellow sticky traps 20-25 /acre	Spraying of 5% NSKE with detergent – (5kg neem seeds in 100 lit water); before infestation spray vitex leaf extract.

xiv. Elephant foot yam and Colocasia:

Before growing of Elephant foot yam and Colocasia depending on the season, raising of Pre-Monsoon Dry Sowing (PMDS)/Rabi Dry Sowing (RDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in

April/May or Oct/Nov till sowing of Elephant foot yam and Colocasia crops to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS/RDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop.

The other POPs are detailed below

Sl. No	Name of the item	Elephant foot yam	Colocasia
1	Seed Tubers treatment	Beejamrutam (after treatment 30 minutes shade drying) followed by Trichoderma viride @ 10 g / kg seed	Beejamrutam (after treatment 30 minutes shade drying) followed by Trichoderma viride @ 10 g / kg seed
2	Ghanajeevamrutham	i. During last plough-1.5 MT of Type-II Ghana Jeevamrutham+100 Kg Neem cake ii. Apply @ 400 KG/Acre of Ghanajeevamrutham-I +100 Kg/acre- Neem cake at the time of sowing.	i. During last plough-1.0 MT of Type-II Ghana Jeevamrutham+100 Kg Neem cake ii. Apply @ 200 Kg/Acre of Ghanajeevamrutham-I at the time of sowing.
3	Dravajeevamrutham	i. Soil application:10 times, starting from 30DAS,45 DAS,60 DAS, 75 DAS, 90 DAS,105 DAS,120DAS,135DAS and 150DAS at 15 days interval @ 200lit per acre, each up to Tuber development stage. ii. Foliar application: Spraying of Dhravajeevamrutham @ 200 litres per acre, 4times at 40DAS, 70 DAS,100 DAS and 130 DAS	i. Soil application:6 times, starting from 15 DAS,30DAS,45 DAS,60 DAS, 75 DAS and 90 DAS, at 15 days interval @ 200lit per acre, each up to Tuber development stage. ii. Foliar application: Spraying of Dhravajeevamrutham @ 200 litres per acre, at 15 days interval starting from 40 DAS
4	Growth promoters	i. Egg Amino Acid-250ml in 100 litres of water per acre at 25 DAS ii. Panchagavya- 4lts in 100 lit of water/acre at 65 DAS stage iii. Panchagavya- 4lts in 100 lit of water/acre at 125 DAS	i. Egg Amino Acid-250ml in 100 litres of water per acre at 35 DAS ii. Panchagavya- 4lts in 100 lit of water/acre at 85 DAS at Tubers development stage
5	S2S kit-Non negotiables		
	i. Inter crops	can be intercropped with Leafy Vegetables: Palak, Methi; Legumes: Black gram/Green gram; Oil Seeds-Gingelly and in Banana orchards	can be intercropped with Leafy Vegetables: Palak, Methi; Legumes: Black gram/Green gram; Oil Seeds-Gingelly and in Banana orchards
	ii. Border crop	3-4 rows of Jowar/Bajra/Maize	3-4 rows of Jowar/Bajra/Maize
	iii. Yellow sticky traps	20-25 per Acre	20-25 per Acre

Sl. No	Name of the item	Elephant foot yam	Colocasia
	iv. Bird perches	10-15 Acre	10-15 Acre
	pheromone traps for Spodoptera	@ 8 per Acre	@ 8 per Acre
	vi. Light Trap	1/Acre	1/Acre
6	365 DGC	PMDS-Kharif, Elephant foot yam + vegetables (poly crops) like Tomato, Brinjal-RDS-Rabi/Cabbage and Cauliflower-Summer Vegetables/Gingelly (poly crops) etc.,	PMDS-Kharif, Colocasia + vegetables (poly crops) like Tomato, Brinjal-RDS-Rabi/Cabbage and Cauliflower-Summer Vegetables/Gingelly (poly crops) etc.,

Other important agronomic practices

Mulching is a field practice to conserve the soil moisture and to control the weeds. Crop residues like straw, cotton stalks, leaves, saw dust and coir dust etc., can be applied in tree basins and in interspaces between trees. Mulching adds humus to the soil, keeps soil cool in day and warm at night hours.

Maintain optimum soil moisture, avoid water logging at Tuber maturity for better quality

S2S kits for above crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMU should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Elephant Foot Yam and Colocasia

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Mite	Refer to mites in Paddy crop	Refer to mites in Paddy crop	Refer to mites in Paddy crop
2	Spodoptera	i. Adopt crop rotation ii. Early sowing Trap crop: Castor iii. Border crop: Maize, Sorghum vi.1 light trap /acre v.Bird perches @8-10/acre.	i.Pheromone traps @ 8-10 /acre. ii.Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early stage Neemastram-200lt/acre. Ii.Spraying of Agnastram- 4 lts in 100 ltrs of water/acre (or) at advance instar stages iii. Spray Garlic chilli extract.

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
4	Aphid	Parasitic wasps also attack aphids.	i. Installation of Yellow sticky traps @ 20-25 per acre ii. Watch for beneficiary insects viz LBB, Syrphid flies, lace wing bugs etc	5% NSKE with detergent solution.
5	Leaf eating cater pillars	i. Adopt crop rotation ii. Border crop: Jowar/Bajra/Maize iii. Bird perches @8-10/acre.	1 light trap /acre	i. Two sprays of Bacillus thuriengiensis @ 2g / litre for protection against cucumber moth. ii. At early stage Neemastram-200lt/acre. iii.Spraying of Agnastram- 4 lts in 100 ltrs of water/acre (or) at advance instar stages iv. Spray Garlic chilli extract.
II. Major Diseases				
6	Leaf sopt	Seed treatment with effective strain of Trichoderma @ 10 g / kg of seed	-	i.Spraying of sour butter milk 6lit/100 lit water ii.Spraying of Dung urine+Asafoetida solution
7	Stem Rot	Use pathogen free seeds Adopt crop rotation Avoid water stagnation and maintain proper drainage Use resistant varieties Mix 2 kg of Trichoderma viridi in 200 litres of water and spray or pour at the base of the plant.	-	i. Spraying of sour butter milk 6lit/100 lit water/ ii.Spraying of Dung urine+Asafoetida solution iii. Use of Type-2 Ghanajevamrutham +Trichoderma horizianum
8	Mosaic Virus	Raise 4 rows of barrier crop such as maize/sorghum/bajra. • Avoid planting tomatoes next to	Yellow sticky traps 20-25 /acre	Spraying of 5% NSKE – (5kg neem seeds in 100 lit water); before infestation spray vitex leaf extract.

Sl. No	Name of the item	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		cucurbits, spinach, or other vegetables and flowers susceptible to these diseases. • Control of aphid vectors as given in aphid management.		

3. Horticulture-Fruits/Plantations :

i. Mango

- Grafts/Sapling treatment: Beejamrutham and Trichoderma viridi-7g/lt of water
- APCNF farmers of Mango, who plan for raising of new plantations, must start with PMDS then followed by planting of high yielding grafts of Mango varieties for better establishment and growth of Mango.
- Pre-Monsoon Dry Sowing (PMDS) should be continued up to 5 years old Mango orchards with succeeding inter crops. In case of 5years and above old plantations, the inter row space can be utilised for PMDS followed by inter crops so as to cover 365 DGC.
- Inter crops (up to 5 years old Mango orchards) like Millets, Pulses, Vegetables, Leafy vegetables and Creeper vegetables like Pumpkin and Bottle Gourd can be grown between two rows of Mango trees and plant filler fruit trees like Papaya, Drumstick, Fig etc., In case of 5years and above old plantations- In shady areas Tuber crops like Turmeric, Ginger, Carrot, Beet root, Onion, Radish etc., and Leafy vegetables, can be raised. Raising of Poly crops/Inter crops in between rows in areas with sunlight, must be integral part in Mango cropping system. Income from main crop and other crops must be documented.

Canopy management

- Canopy management in young trees: -Training the plant during juvenile phase is important to get a strong frame.
- Allow the grafts to grow to a height of one metre from ground (Single stem)
- Head back the graft at 60-70cm from the ground during Oct-Nov to induce primary branches (make a smooth cut with sharp secateur)
- Heading back results in the formation of new primary branches (3-7) during March-April. Prune the excess branches and allow 3 to 4 in all the directions.
- Prune primary branches at 60-70cm height to induce new secondary shoots (7-10 month after the first cut preferably during Oct-Nov)

- Thin the excessive secondary shoots retaining 2-3 shoots per primary branch.
- Tertiary branches (2 to3) can be obtained by pruning the secondary branches at 60-70cm height.
- Canopy management in bearing trees: - Mango trees are terminal bearers, i.e., they flower from the ends of the branches and will only flower on mature wood (six weeks or older). There are two periods when pruning can be taken up.
- First pruning after harvest: First pruning should be done immediately after harvest and should be completed by the end of June/July. It includes
- Skirting: Removal of low hanging branches. It facilitates better nutrient/cultural management and controlling of weeds.
- Opening up: Removal of branches inside the tree i.e cross over or clutter up the centre of the tree. One or two uprightly growing branches from centre of the tree are to be removed to reduce tree height so as to allow the light inside the canopy for better photosynthesis. In the bearing mango tree, not more than 25 per cent biomass should be removed at a time, otherwise it results in excessive vegetative growth with reduced flowering shoots.
- Hygiene: Removal of any diseased or dead branches in the tree, which could be a source of infection.
- Second pruning-pre flowering: May be taken up in the middle of December and, if the time is right, it is not to be followed by a floral flush rather than a vegetative flush. This should be completed in a short period not exceeding one to two weeks.
- Skirting: Lower hanging branches which could cause fruit to drag on the ground are to be removed.
- Opening up: Twigs and disorderly branches inside the tree are to be removed to have an open canopy. which can facilitate more light into the tree and improving fruit colour.
- Tip pruning: It is a useful practice where the trees have had a vegetative flush just prior to flowering. The young flushes are cut back to mature wood; the resulting flush may result into a floral one. Tip pruning will also reduce tree size.
- Hygiene: Any diseased or dead branches should be removed before flowering.

Ghanajeevamrutham (GJM)

- Type-1 or Type-2:10-20 kg/tree during June/July and October/ November moths in tree ring basins depending upon age of the orchard.

Dravajeevamrutham (DJM)

- Soil Application:3-5 litres of DJM must be applied in ring basin at 1-5 years aged plantation at 15 days interval, where as in plantations of 5 and above year old, 5-10 litres at 30 days interval.
- Foliar application: 2 times, 1st spray-15 litres DJM in 200 ltrs of water at before flowering (Dec/Jan) and 2nd spray-30 litres DJM in 200 ltrs of water after fruit set stage to marble stage (Feb/March)

Growth promoters

- Panchagavya: 2 times (4lts/acre in 100 litres water) 1st spray at 2nd fortnight of December (before flowering) and 2nd spray at fruit development stage (March/April).

S2S kit-All the non-negotiables must be mandatorily practiced

- Inter crops: Millets, Pulses, Leafy vegetables, Tuber vegetables, Vegetable and Creeper vegetables like Pumpkin and Bottle Gourd, filler fruit trees like Papaya, Drumstick, Fig etc.,
- Wind breaks: Susbenia / Glyricidea-3 rows
- Yellow/blue sticky traps: 20-25 traps/acre
- Pheromone traps (For Fruit fly): Each @8/acre
- Light Trap: 1/ acre.
- S2S kits (including Sticky traps, Pheromone traps, Seed/Seedlings of Inter/Border crops, Light traps etc.,) of Mango crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period

Standard Non pesticide management practices for pest and disease management in Mango crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Mango leaf hopper	Avoid close planting, as the incidence very severe in overcrowded orchards.	i. Observe presence of hoppers on main stem and branches ii. Severely affected parts of inflorescence and leaves are covered with honeydew and sooty mould. iii. Erection of the Yellow sticky traps 20-25 per Acre	i. Panicle initiation stage-spraying of 5% NSKE extract ii. Spraying of cow dung urine and Hing solution iii. Flowering and fruit setting stage -Spraying of Agnastram - 3 litres in 100 litres of water
2	Mealybug	i. Practice 365 DGC ii. Mulching in tree basins iii. Spraying of 5% NSKE around the tree trunk	Poly cropping will encourage multiplication of natural predators	i. Nalleru Kashayam 3Lt /100 lt water ii. Spraying of Agnastram - 3 litres in 100 litres of water. iii. Effective control of sooty mould spray 2 % starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
3	Leaf Webber	Pruning of overcrowded branches and proper orchard management	Encourage the activity of predators, carabid beetle Parena lacticincta, Reduvid, Oecama sp	i. Remove and destroy the webbed leaves along with larvae and pupae. ii. Spraying of Agnastram - 3 litres in 100 litres of water. iii. Spraying of Dashaparni kashayam
4	Thrips	-	Erection of the Blue sticky traps 20 to 25 per Acre	i. Spray 5% NSKE ii. Dasaparni kashayam
5	Mango Stem Borer	i. Orchard must be with 365 DGC ii. Maintain healthy orchard by destroying affected branches along with grubs and pupae. iii. Paint the stem up to 1mt hight with Neem paste	First identify the stemborer that the frass (Excreta) coming out the stem, then insert a iron wire and drag the caterpillar out and seal the cavity with neem paste.	Block the tunnel hole by cleaning and fill with chilli garlic paste and seal them with clay.
6	Fruit fly	i. Effected fruits should be collected and destroyed. ii. Rake up the soil below the tree and drench with neemasthram 10lt per tree	Monitor the activity of flies with Fruit fly trap @8 per acre	Spraying Dasaparni Kashayam
II. Major Diseases				
7	Powdery mildew	-	-	i. Sour buttermilk solution 6lt in 100 lt of water. ii. Spray Cowdung+Urine+Asfoetida solution 5lt in 100lt water
8	Anthracnose	-	-	i. Sour buttermilk solution 6lt in 100 lt of water ii. Spraying of Cow dung, urine and Asafoetida solution

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
9	Mango malformation	i. Disease free planting material be used for planting. ii. Regular pruning of malformed panicles and parts along with affected shoots.	-	Spraying of 5% NSKE before 9 AM - 5 kg neem seed in 100 lit water
10	Dieback / Gummosis	i. Use of disease-free grafts. ii. Pruning of infected branches. iii. Application of cowdung/neem paste on pruned ends.		Spray Cowdung+Urine+Asfoetida solution

ii. Cashew:

- APCNF farmers of Cashew nut, who plan for raising of new plantations, must start with PMDS then followed by planting of high yielding grafts of BPP (Bapatla) varieties for better establishment and growth of cashew nut.
- Pre-Monsoon Dry Sowing (PMDS) should be continued up to 3 years old Cashew nut with succeeding inter crops. In case of 5years old and above plantations the inter row, space can be utilised for PMDS followed by inter crops so as to cover 365 DGC.
- Inter crops like Pineapple, Turmeric, Ginger, Millets, Pulses, Leafy vegetables, Tuber vegetables (Radish), Vegetable and Creeper vegetables can be grown between two rows of Cashew trees up to first 5 years period. Raising of Poly crops/Inter crops in between rows must be integral part in Cashew cropping system. Income from main crop and other crops must be documented.

Canopy management

- The cashew grafts should be allowed to grow by maintaining single stem up to 0.75 m to 1 m height by removing of lower side shoots/ branches.
- Side shoots below the graft union should be removed periodically. The lower branches should also be removed so that a clear trunk up to a height of 0.75 to 1 m may be attained after 4-5 years of planting. De-topping may also be done at 2-3 years at a height of half of the spacing (during May-June).
- The flower panicles emerging later in the season need to be removed during the first two years of growth of the graft to facilitate proper vegetative growth and there by

achieving proper height and good canopy. The plants are to be allowed to flower and fruit from 3-4 years onwards.

Ghanajeevamrutham (GJM)

- Type-1 or Type-2:10-20 kg/tree during October and December moths in tree ring basins depending upon age of the orchard.

Dravajeevamrutham (DJM):

- Soil Application:5-10 litres of DJM must be applied in ring basin at 3-4 years and above aged plantation, where as in plantations of 1- 3-year-old plantations, 3-5 litres at 15 days interval.
- Foliar application: 2 times, 1st spray-15 litres DJM in 200 ltrs of water at before flowering and 2nd spray-30 litres DJM in 200 ltrs of water at nut development stage

Growth promoters

- Panchagavya: 3 times (4lts/acre in 100 litres water) 1st spray at 2nd fortnight of December (before flowering) and 2nd spray at flower initiation and 3rd spray at nut development stage.

S2S kit-All the non-negotiables must be mandatorily practiced

- Inter crops: Pineapple, Millets, Pulses, Leafy vegetables, Tuber vegetables, Vegetable and Creeper vegetables
- Wind breaks: Susbenia-3 rows (2 Kgs)
- Yellow/blue sticky traps: 4-5 traps/acre
- Pheromone traps (For Tea mosquito bug): Each @4-5/acre
- Trap crop : Jafra (Bixa orellana)
- Light Trap: 1/ acre.
- S2S kits (including Sticky traps, Pheromone traps, Seed/Seedlings of Inter/Border crops, Trap crop, Light traps etc.,) of Cashew nut crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Cashew nut crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
1	Tea mosquito Bug	1.Avoid close planting, as the incidence very severe in overcrowded orchards. 2. If it is not 365 DGC plants like, Moringa, Cocoa, Guava act as alternate hosts. Hence, follow PMDS/inter crops/RDS leading to 365 DGC	1. Removal of affected shoots 2. Install Pheromone traps 3.Trap crop: Jafra	1.Panicle initiation stage-Spraying of 5% NSKE or Neemastram during Initial stage 2. Flowering and fruit setting stage Spraying of Agnastram 3 litres in 100 litres of water.
2	Mealy bug	1.Remove weeds like Gurrapu katilaku-(Clerodendrum inflortunatum) and other infected weeds during June-July. 2.Application of Neem cake @ 2-3 Kgs per plant during November-December 3. Before hatching of eggs, spraying of 5% NSKE around the tree trunk	Poly cropping will encourage multiplication of natural predators	1.Nalleru Kashayam 3Lt /100 lt water 2. Spraying of Agnastram - 3 litres in 100 litres of water. 3.Effective control of sooty mould spray 2 % starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray
3	Shoot and blossom Webber	Pruning of overcrowded branches	Poly cropping will encourage multiplication of natural predators	1.Remove and destroy the webbed leaves along with larva and pupa. 2.Spraying of Agnastram - 3 litres in 100 litres of water. 3.Spraying of dashaparni kashayam
4	Thrips	-	Erection of the Blue sticky traps	5% NSKE and Bhrammasthram 4lt/100lt water
5	Stemborer	1.Orchard must be with 365 DGC 2. Maintain healthy orchard by destroying affected branches along with grubs and pupae. 3.Watch stem borer incident in alternate hosts around the vicinity of cashew nut orchards. 4. Paint the stem up to 1mt hight with Neem paste	First identify the stemborer that the frass (Excreta) coming out the stem, then insert a iron wire and drag the caterpillar out and seal the cavity with neem paste.	Block the tunnel hole by cleaning and fill with chilli garlic paste and seal them with clay.
II. Major Diseases				

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
6	Powdery mildew	-	-	1.Sour buttermilk solution 6lt in 100 lt of water. 2. Spray Cowdung+Urine+Asfoetida solution 5lt in 100lt water
7	Anthracnose	-	-	1. Sour buttermilk solution 6lt in 100 lt of water 2.Spraying of Cow dung, urine and Asafoetida solution
8	Inflorescence blight	-	-	Spraying of sour buttermilk solution 6lt in 100lt of water

iii. Coconut

- APCNF farmers of Coconut crop, who plan for raising of new plantations, must start with PMDS then followed by planting of high yielding varieties for better establishment and growth of Coconut trees.
- Pre-Monsoon Dry Sowing (PMDS) should be raised before planting new orchards. Year after year maintain 365 DGC through PMDS/ inter crops.
- Coconut is the best tree crop, where integrated farming systems can be obtained by merging with 2 or 3 combinations i.e., Poly crops/Inter crops/Apiculture/Fodder crops /Multilayer horticulture crops/ Grazing of Sheep/Cattle in coconut cropping system. This type of integrated farming systems supports better lively hoods in coconut cropping system.
- Inter crops like Millets-Ragi, Pulses like-Black gram, green gram and Cowpea, Oil Seeds-Ground nut, Gingelly, Fodder crops -Stylosanthes hamata, Fodder-Jowar/Maize, Tuber/Rhizome vegetables Colocasia, Elephant foot yam, Ginger, Turmeric, Radish etc.,), Vegetables- Cauliflower, Cabbage, Leafy vegetables and Creeper vegetables can be grown between two rows of Coconut trees up to first 5 years period.
- In Above 20 years coconut orchards perennial crops like Banana (Don't take Banana as intercrop where Rugose Spiralling White fly is a problem), Cocoa, Pepper; Papaya, Pine apple, Cinnamon and flower crop like Heli conium used for decorations can be raised as multilayer/inter crops.

Sapling treatment: Beejamrutham

- Mulching: -It is practised, in order to conserve soil moisture in the coconut plantation. The best time for mulching is before the end of the monsoon and before the top soil dries up.
- Fallen Coconut leaves: For mulching, cut coconut leaves into two or three pieces. To cover 2 m radius of coconut basin, 15 to 25 fallen coconut leaves are required to spread in 2-3 layers.
- Composted coir pith: 10 Cm thickness (approximately 50 kg/palm) around coconut basin is also ideal method to conserve moisture.
- Husk burial: Burial of husk in trenches in between the rows of palms, in linear trenches of 1.5 to 2 m wide and about 0.3 to 0.5m deep between rows of palms., with concave side of husk facing upwards and each layer is to be covered with soil.

Ghanajeevamrutham (GJM)

- Type-II, 10 kg per plant+ 1kg neem cake + 10gms T. viridi and Type-I, 5 kg/tree (two times) during June/July and October/ November moths in tree ring basins depending upon age of the orchard.

Dravajeevamrutham (DJM)

- Soil Application:10 litres of DJM must be applied in ring basin at 3-4 years and above aged plantation, where as in plantations of 1- 3-year-old plantations, 5 litres at 15 days interval.
- Foliar application up to 5 years old: 12 times in a year @25-50 litres of DJM in 200 ltrs of water at every month.

Growth promoters

- Sapthadhankuram: 1 time (700 grams of paste in 100 litres of water) at Flowering stage.
- Panchagavya: 1 time (4lts/acre in 100 litres water) to control Button (fruit) drop.
- Egg Amino Acid: 1-time 250ml in 100 lts of water at fruit development stage.
- S2S kit-All the non-negotiables must be mandatorily practiced
- Inter crops: Millets, Pulses, Oil seeds, Leafy vegetables, Tuber vegetables, Vegetable and Creeper vegetables etc., multilayer intercrops- Cocoa, Banana, Cinnamon and Pepper.
- Wind breaks/Border crop: Glyricicdia, Sesbania, Casuarina and Drumstick
- Yellow sticky traps: 10-15 traps/acre to manage Rugose spiralling White fly.
- Bucket Pheromone traps (For Rhinoceros beetle/Red palm weevil): Each @2/acre.
- Light Trap: 1/ acre.
- S2S kits (including Sticky traps, Bucket Pheromone traps, Seedlings of Inter/ Border crop, Light traps etc.,) of coconut crop should be planned and placed at NPM shop/FPO/VO etc., during crop season and DPMs should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Coconut crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Rhinoceros Beetle	1.Collect and destroy the various bio stages of the beetle at FYM pit 2. Incorporate entomopathogen ie., fungus Metarrhizium anisopliae in manure pits to check the perpetuation of the pest 3. For seedlings Apply 3 naphthalene balls/palm weighing 3.5 g each at the base of inter space in leaf sheath in the 3 inner most leaves of the crown once in 45 days	Install pheromone (Bucket trap) trap 2/Acre and kill beetles	1. Apply mixture of either neem cake + sand (1:2) @150 g/palm or Neem seed kernel powder + sand (1:2) @150 g per palm in the base of the 3 inner most leaves in the crown.
2	Red palm weevil	1. Remove and bury all wilting or damaged palms in coconut gardens to prevent further perpetuation of the pest. 2. Avoid cutting of green leaves. If needed, they should be cut about 4 feet away from the stem.	1.Install pheromone (Bucket trap) trap 2/Acre and kill weevils 2. Erection of Log traps @ 30 nos per acre (Weevils are trapped and destroyed using split logs of coconut/oil palm or petioles-50 cm long treated with attractants such as coconut toddy, macerated grapes, cashew apple, pineapple and molasses.)	1. Fill the crown and the axils of the top most three leaves with a mixture of fine sand and neem seed powder or neem seed kernel powder (2:1) once in three months to prevent the attack of Rhinoceros beetle damage in which the Red palm weevil lays eggs.
3	Black headed caterpillar	Release of larval parasitoids viz Bethylid, Braconid and Ichneumonid and Pupal parasitoids viz Eulophid and chalcid, periodically from January, to check the build-up	_	Root feeding for the control of coconut Black headed caterpillar.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		of the pest during summer. Among the larval parasitoids, bethylid Goniozus nephantidis is the most effective in controlling the pest. The optimum level of release is 1:8 of pest-parasitoid ratio. The parasitoid should be released @1200/acre under the coconut trees when the pest is in the 2nd or 3rd instar larval stage. Parasitoids should not be released in the crown region since they will be killed by predators like spiders and reduviid bugs. The Predators and Parasites are available at HRS, Ambajipet, East Godavari.		
4	Rugose Spiralling White fly	Mother solution is available with Indian Institute of Oil palm Research Station, Pedavegi, West Godavari. Alternate hosts like Banana and Guava should not be raised as Intercrop	1. Yellow/White sticky traps 20-25/acre 2. Erection of 1 Light trap/acre 3. Severely affected parts and leaves are covered with honeydew and sooty mould.	1.Spraying of NSKE 5% or Neemasthram -200 litres/acre 2. Isaria fumorosoria (Isaria) 1lit for 200 lit of water solution+4kg jaggery+4kg starch, keep it for 4 days then take 5ml solution and add 1 litre water + 10 gms of detergent iii. Effective control of sooty mould spray 2 % starch solution + 'Matti 'dravanam 20kg soil mixed in 200lts of water filter and spray- Mother solution is available with Indian Institute of Oil palm Research Station, Pedavegi, West Godavari.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
5	Coconut Eriophyid mite	1.Grow intercrop (sun hemp) 2. Shelter belt/Wind break with Casuarina/Sesbania all-round the Coconut Garden to check further entry	1.Collect and bury all the fallen buttons of the affected palm. 2. Providing adequate irrigation. 3. Entomo fungal pathogen Hirsutella thompsonii and Verticillium lecanii are reported to be promising in managing the mites.	1.Spraying of 5% NSKE before 9 AM - 5 kg neem seed in 100 lit water 2. Dung urine and Asafoetida solution
II. Major Diseases				
6	Basal stem Rot (Ganoderma spp)	Drip or basin method of irrigation, Frequent watering or irrigation especially during summer months. While irrigation, care should be taken to avoid flow of water from diseases trees to other healthy trees. Avoid injury or damage to roots and pruning and cutting of the roots.	1. Sowing of indicator plants (Red gram and Bengal gram) in the orchard. Red gram plants show bark splitting symptom as the identification mark for basal stem rot disease. Bengal gram plants shows withering, yellowing and drying of lower set of leaves followed by upper leaves as the identification mark of basal stem rot	Removing the Ganoderma (affected portion) with sharp knife and apply cow dung + urine+ Asafoetida pastes on the damaged portion.
7	Stem bleeding disease	Avoid injury or damage to roots and pruning and cutting of the roots.	-	1.Apply Trichoderma viride paste on the diseased portion of the tree. 2. Spray cow dung + urine+ Asafoetida solution 5 litres in 200 litres of water.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
8	Bud rot	1.Seedling/Sapling treatment with Bheejamrutham 2. Recommended spacing should be followed. 3. Provide better drainage facilities. 4. Trees dried due to bud rot should be removed and bury	-	1.Dry ginger+Milk extract - 6 lit in 200 lit water 2. Dung Urine+ asafoetida solution - 6 lit in 100 lit waters. 3. Pseudomonas florescence's talc powder in crown (1–5-year-old 5-10gms/plant, more than 10 year - 75 - 200 gms). 4. Spraying of Pseudomonas florescence's -5gms /litre on effected plants 5.100 gms T. viridi+ 5 kg Neem cake along with 100 Kg Type-II GJM

iv. Oil palm

- APCNF farmers of Oil palm, who plan for raising of new plantations, must start with PMDS then followed by planting of high yielding Tenera hybrid for better establishment and growth of Oil palm trees.
- Inter crops like Maize, Pulses-Black gram, green gram and Cowpea, Oil Seeds-Ground nut, Tuber/Rhizome vegetables Colocasia, Elephant foot yam, Ginger, Turmeric etc., Vegetables- Cauliflower, Cabbage, Chilli, Leafy vegetables and Creeper vegetables can be grown between two rows of Oil palm trees up to first 3 years period. Border crops like Sesbania, Drumstick and Creeper vegetables like Pumpkin may be grown.
- In Above 10-12 years Oil palm orchards perennial crops like Cocoa, Pepper; Ornamental Flower crop like Heli conium (Peacock's beak), Ginger Lilly can be raised as multi layered inter crops.
- Sapling treatment: Beejamrutham

Cultural practices

- Basin Management: During first year, basins of 1-m radius, second year 2- m radius, and the third year 3-m radius are to be taken around the palm by removing the soil from inside so that the soil will not accumulate at the collar region.
- Mulching

- It is practised, in order to conserve soil moisture in the Oil palm plantation. Mulching can be done with dried leaves, male inflorescence, empty fruit bunches in the palm basin and coconut husk
- Ablation: The removal of male and female flowers produced in the early stages of plantation up to 3 years which enables the plant to gain adequate stem girth, vigour and develop adequate root system.
- Pollination: Oil palm is a highly cross-pollinated crop. Wind and insects assist pollination, but wind pollination is not adequate. Effective pollinating insects like *Elaeidobius kamerunicus* (African Oil palm weevil) helps good pollination. Release of this weevil after 2-1/2 year of planting is advisable. If the plants are not having good girth and vigour, release the weevils after 3 years.
- Leaf pruning: Need based leaf pruning and retain minimum of 35 leaves per palm to get maximum production.

Ghanajeevamrutham (GJM)

- Type-II, 15 kg per plant+ 1kg neem cake + 10gms T. viridi and Type-I, 5 kg/tree two times in a year during June/July and October/ November months in tree ring basins depending upon age of the orchard.

Dravajeevamrutham (DJM)

- Soil Application:15-20 litres of DJM must be applied in ring basin at 3-4 years and above aged plantation, where as in plantations of 1- 3-year-old plantations, 10-15 litres at 15 days interval.
- Foliar application: up to 3 years plantation foliar application is preferable for 12 times a year @25 -50 litres of DJM in 200 ltrs of water at every month.
- Growth promoters:
- Sapthadhankuram: 1 time (700 grams of paste in 100 litres of water) at Flowering stage from 3rd year onwards.
- Egg Amino Acid:1 time (250ml in 100 litres of water) before initiation of inflorescence.
- Panchagavya: 1 time (4lts/acre in 100 litres of water) at fruit development stage.

S2S kit-All the non-negotiables must be mandatorily practiced

- Inter crops: Millets, Pulses, Oil seeds, Leafy vegetables, Tuber vegetables, Vegetable and Creeper vegetables etc.,
- Wind breaks/Border crop: Sesbenia, Casuarina, Glyricidia and Drumstick.
- Yellow sticky traps: 10-15 traps/acre to manage Rugos spirling White fly.
- Bucket Pheromone traps (For Rhinoceros beetle): Each @2/acre
- Light Trap: 1/ acre.
- S2S kits (including Sticky traps, Bucket Pheromone traps, Seedlings of Inter/Border crop, Light traps etc.,) of Oil palm crop should be planned and placed at NPM shop/FPO/VO etc., during crop season and DPMs should monitor regularly during crop period.

Standard non pesticide management practices for pest and disease management in Oil palm crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Rhinoceros Beetle	i. Collect and destroy the various bio stages of the beetle at FYM pit (Breeding place) ii. Incorporate entomopathogen ie., Fungus Metarrhizium anisopliae in manure pits to check the perpetuation of the pest iii. For seedlings Apply 3 naphthalene balls/palm weighing 3.5 g each at the base of inter space in leaf sheath in the 3 inner most leaves of the crown once in 45 days	Install pheromone (Bucket trap) trap 2/Acre and kill beetles	Apply mixture of neem seed powder (Neem cake) + sand (1:2) @150 g/palm in the base of the 3 inner most leaves in the crown.
2	Leaf web worm	-	-	i. Spraying of Neemasthram -200 litres/acre ii. Spraying of Agniastram
3	Bag worm	-	-	i. Spraying of neemasthram -200 litres/acre ii. Spraying of Dasaparni
4	Rugose Spiralling White fly	Mother solution is available with Indian Institute of Oil palm Research, Pedavegi, West Godavari.	i. Yellow/White sticky traps 20-25/acre ii. Erection of 1 Light trap/acre iii. Severely affected parts and leaves are covered with honeydew and sooty mould.	i. Spraying of NSKE -5% ii. Isaria fumorosoria (Isaria) 1lit for 200 lit of water solution+4kg jaggery+4kg starch, keep it for 4 days then take 5ml solution and add 1 litre water + 10 gms of detergent iii. Effective control of sooty mould spray 2 %

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
				starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray- Mother solution is available with Indian Institute of Oil palm Research, Pedavegi, West Godavari.
II. Major Diseases				
5	Basal stem Rot (Ganoderma spp)	Drip or basin method of irrigation Frequent watering or irrigation especially during summer months. While irrigation, care should be taken to avoid flow of water from diseases trees to other healthy trees. Avoid injury or damage to roots and pruning and cutting of the roots.	Sowing of indicator plants (Red gram and Bengal gram) in the basins of the plant. Red gram plants show bark splitting symptom as the identification mark for basal stem rot disease. Bengal gram plants shows withering, yellowing and drying of lower set of leaves followed by upper leaves as the identification mark of basal stem rot	Remove the Ganoderma (affected portion) with sharp knife and apply cow dung + urine+ Asafoetida pastes on the damaged portion.
6	Bunch rot/Fruit rot	Avoid injury or damage to roots and pruning and cutting of the roots.	-	i. Spraying of sour butter milk ii. Spray cow dung + urine+ Asafoetida solution 5 litres in 200 litres of water.
7	Bud rot	i. Seedling treatment with Bheejamrutham ii. Recommended spacing should be followed. iii. Provide better drainage facilities. iv. Trees dried due to bud rot should be removed and bury.	-	I. Dry ginger Milk extract - 6 lit in 200 lit water ii. Dung Urine+ asafoetida solution - 6 lit in 100 lit water. iii. Pseudomonas florescence talc powder in crown (1–5-year-old 5-10gms/plant, more than 10 year - 75 -200 gms).

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
				iv. Spraying of Pseudomonas florescence -5gms /litre on effected plants apply 100 gms T. viridi+ 5 kg Neem cake along with 100 Kg Type-II GJM

v. Papaya

Before growing Papaya crop, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,) sown in April/May and continued up to October 1st week i.e., till planting of Papaya to get a good crop stand and biomass. The essential principle is to have 365 days green cover and to see that the soil is not kept barren.

It is crucial to enhance the inter-crop and poly crop combinations in initial 2-3 months Papaya cropping system. After planting, intercropping with Pulses-Green gram, Black gram, Flower Crop-Marigold, Leafy vegetables, Vegetables-Cluster bean, Tomato etc., at later stages Tuber vegetables like Turmeric, Ginger and Creeper vegetables must be integral part. Intercropping of Navadhanya after planting of Papaya and incorporation of the same on the 30-45th day helps to increase the soil fertility. Income from main crop and other crops must be documented.

Seedling treatment

The seedlings are to be treated with Pseudomonas solution @ 7grams/ litre of water followed by Beejamrutam (BJM) for 30 minutes before planting.

Ghanajeevamrutham (GJM)

Type-2: Apply 10-15 Kgs and 1 kg Neem cake /pit at the time of planting.

Type-1: a. 2 kg/pit; 1Kg - At the time of planting and 1kg -At 45-50 DAP (Days After Planting).

5kg/plant every time at the time of earthing up at 90 DAP and 150 DAP

Dravajeevamrutham (DJM)

Soil Application: 9 times @ 200lit each, at 15 DAP, 30 DAP, 60 DAP, 120 DAP, 180 DAP, 210 DAP, 240 DAP, 255 DAP and 270 DAP.

Foliar application: 7 times at 30 days interval,

1st spray-15 litres DJM in 200 ltrs of water @ 45 DAP

2nd spray-20 litres DJM in 200 ltrs of water @75 DAP

3rd spray-25 litres DJM in 200 ltrs of water @105 DAP

4th spray 30 litres DJM in 200 ltrs of water @135 DAP

5th spray 40 litres DJM in 200 ltrs of water @165 DAP

6th spray 50 litres DJM in 200 ltrs of water @195 DAP

7th spray 50 litres DJM in 200 ltrs of water @225 DAP

Growth promoters: i) Egg Amino Acid: Spray 250 ml in 100 litres of water 6-7 months of D.A.P (before flowering stage).

ii)Panchagavya: (4lts/acre in 100 litres water), 2 times, 1st spray at, at 8-9 months of DAP (at flowering) and 2nd spray at fruit development stage.

Cultural practices

Weeding at 30th day, 60th and 90th DAP

Mulching: Use of paddy straw and Papaya dried leaves as a mulch material (around 12-13 kg/plant). Increases the bunch weight and conserve of soil moisture.

Earthing up at 90 DAP

S2S kit-All the non-negotiables must be mandatorily practiced.

Inter crops: Pulses, Leafy vegetables, Vegetables-Cluster bean etc., at later stages Tuber vegetables like Turmeric, Ginger, Creeper vegetables like Bottle Gourd may be planted.

Border crops: Sesbania, Glyricedia etc.,

Yellow sticky traps: 20-25/acre

Light Trap: 1/ acre.

S2S kits (including Sticky traps, Seed/Seedlings of Inter/Trap/Border crops, Light traps etc.,) of Papaya crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard non pesticide management practices for pest and disease management in Papaya crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
1	Aphids	Use healthy and pest free seedlings	i. yellow sticky plates 20-25/acre ii. Lady bird beetle act as predator for aphids.	Spraying of NSKE 5% / Neemastrham with 0.25 Kg surf powder or soap nut water in 200 lit of water.
2	Red spider mite	Refer to mites in Paddy crop	Refer to mites in Paddy crop	Refer to mites in Paddy crop
3	Nematodes	i. Crop rotation with non- host crops ii. Grow Marigold as repellent and trap crop in the inter space iii. Avoid planting nematode infected seedlings iv. Application of Neem cake 1kg/plant	-	Use of Neem cake @ 1 kg/ plant along with anyone of the bioagents like Trichoderma viride/ Paecilomyces lilacinus/ Pseudomonas fluorescens @ 20 g/ plant
4	Fruit fly	i. Effected fruits should be collected and destroyed. ii. Earthing up the soil below the tree and drench with neemasthram 10lt per tree	Monitor the activity of flies with Fruit fly trap @8 per acre	Spraying Dasaparni Kashayam
II. Major Diseases				
6	Papaya Mosaic and leaf curl virus- Transmitted by White flies	i. Use Disease free planting material ii. Rouging of diseased plants	Yellow sticky plates 20-25/acre	i. Timely control of white flies by spraying vitex negundo (vavilaku kashayam) leaf extract ii. Based on severity spray Dasaparni Kashayam/Nalleru Kashayam.
7	Papaya Ring Spot Virus- Transmitted by Aphids	i. Use Disease free planting material ii. Rouging of diseased plants	i. yellow sticky plates 20-25/acre ii. Lady bug beetle act as predator for aphid	i. Timely control of Aphids by spraying vitex negundo (vavilaku kashayam) leaf extract ii. Based on severity spray Dasaparni Kashayam/Nalleru Kashayam.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
8	Anthracnose	-	-	i. Spray Sour butter milk 6lit-100lit water/acre ii. Spraying of Dung+Urine+Asfoetida solution - 5 lit solution in 100 lit water/acre
9	Powdery mildew	Removal and destruction of heavily infested leaves		Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and spray sour butter milk (6 lit in 100 lit of water)
10	Stem rot/Root rot and wilt	i. Beejamrutham seedling treatment before planting for 30 mts (minutes) ii. Grow resistant cultivars iii. Avoid direct stem contact of irrigation water		i. Application of neem cake along with Ghanajevamrutham iii. Drenching of Trichoderma viridi

vi. Pomegranate

APCNF farmers of Pomegranate, who plan for raising of new plantations, must start with PMDS then followed by planting of high yielding varieties for better establishment and growth of Pomegranate.

Pre-Monsoon Dry Sowing (PMDS) should be raised before planting new orchards. Year after year maintain 365 DGC through PMDS/ inter crops.

Inter crops like Pulses, Vegetables, Leafy vegetables, Tuber and Creeper vegetables can be grown between two rows of Pomegranate plants up to pre bearing period. Even in fruit crops like Sapota, Mango, etc., Pomegranate can be included as filler fruit plant.

Training

Multi stem training system

Within 2 years after planting, in multi-stem training system, 3-4 strong stems with 6-8 strong fruiting branches (thick ones) may be allowed to produce good quality fruits from 4th year.

Single stem training System: Single trunk up to 30 cm (stem) with 3-4 main branches (limbs) in vase shape training up to 3.5-4 m.

Pruning in Pomegranate

In general, 3-4 growth flushes in a year are noticed. Each new flush is added onto the previous growth flush, resulting in a drift of the young bearing wood to the outsides of the tree canopy.

Over the time, large trees with increased shading inside the canopy are formed which allow most of the fruits appear on the top and outside.

Pomegranate bears fruits on both older woods (2-3 years old and older) as well on current season's growth.

Pruning should be done in such a way that it encourages fruiting on older branches/shoots.

The axillary or terminal bearing of fruits many a times is governed by the pruning practice.

The fruits appearing on strong bearing branches tend to produce larger fruits.

Strong scaffold branches tend to transportation water and nutrients more efficiently throughout the growing season.

Main pruning

Main pruning just after harvest (deep/heavy pruning up to 60-75 cm, removal of criss-cross and diseases branches followed by application of Type-I/Type-II GJM.

Light (upper 10-25 cm) pruning at flower regulation (this pruning is done after stress period, before or after defoliation, promotes flower initiation).

Tip pruning: Tip pruning is done in pre bearing trees (1-2 years old)

Shoot pinching: - Pinching or light cutting back of shoots

Skirting: - Removal of the lower tree branches to promote air circulation.

Topping: -Practiced in low productive old orchards (more than 10 years old) for rejuvenation.

Ghanajeevamrutham (GJM): Type-II, 5-10 kg/tree and Type-I, 2kg/tree, two times during Jan/Feb and Sep/Oct months at the base of the plant.

Dravajeevamrutham (DJM)

Soil Application (through drip / apply at the base of the plant):3-4 litres of DJM must be applied in 3 years and above aged plantation, where as in plantations of 1- 2-year-old plantations, 2 litres at 15 days interval.

Foliar application: 6 times at monthly intervals for two flowering seasons i.e. Ambe bahar (Rainy season crop) and Hasta bahar (Winter season crop).

1st spray-15 litres DJM in 200 ltrs of water in the month of Jan-Feb (Ambe bahar-Flower initiation) and

2nd spray-30 litres DJM in 200 ltrs of water in the month of March-April (Ambe bahar-Fruit set)

3rd spray- 40 litres DJM in 200 ltrs of water in the month of May-June (Ambe bahar-Fruit development)

4th spray-15 litres DJM in 200 ltrs of water in the month of Sep-Oct (Hastha bahar-Flower initiation)

5th spray-30 litres DJM in 200 ltrs of water in the month of Nov-Dec (Hastha bahar -Fruit set)

6th spray- 40 litres DJM in 200 ltrs of water in the month of Jan-Feb (Hastha bahar-Fruit development)

Growth promoters Panchagavya: For each cropping season, 2 times (4lts/acre in 100 litres water) 1st spray at before flowering and 2nd spray at fruit set and fruit development stage.

S2S kit-All the non-negotiables must be mandatorily practiced

Inter crops: Pulses, Leafy vegetables, Vegetable and Creeper vegetables

Wind breaks/Border crop: Sesbania, Glyricidia and Drumstick

Yellow/blue sticky traps: 20-25 traps/acre

Light Trap: 1/ Acre

S2S kits (including Sticky traps, Seeds/Seedlings of Inter/Border crop, Light traps etc.,) of Pomegranate crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Fruit Borer	i. Maintain adequate aeration by proper training and pruning ii. Pomegranate should not be cultivated close to guava as this is the most preferred host of this pest. iii. Collect and destroy the infested fruits regularly. iv. Clip off calyx cup immediately after pollination followed by two applications of Neemasthrama / NSKE 5% v. Before fruits getting matured bag the fruits with the butter paper for export purpose	i. Light trap 1 per acre ii. Detect early infestation by periodic monitoring.	i. Spraying of Agnastram - 3 litres in 100 litres of water. ii. Spraying of dashaparni kashayam
2	Thrips	Avoid growing / choosing of inter crops like Chilli and Onion	Use of Blue sticky traps @ 2 trap / plants.	i. Initial stages NSKE 5% or Neemastram ii. Spraying of dashaparni kashayam

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
3	Bark eating caterpillar	i. Avoiding overcrowding of trees. ii. Clean the webs around the affected portion and seal with mud.	-	Spraying of Brahmaasthram
4	Whitefly	i. Maintain adequate aeration by proper Proper training and pruning ii. Removal of host plants	i. yellow sticky traps @ 1 per plant ii. Erection of 1 Light trap/acre	I. Initial stages - Neemasthram At the later stages - Agnasthram ii.Effective control of sooty mould spray 2 % starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray
II. Major Diseases				
5	Bacterial Blight	i. Select disease free planting material. ii. Orchard sanitation and irrigation should be done properly iii. Irrigation water should not touch stem to avoid the bacteria transmission	-	i. NSKE 5% and Dry Ginger+Milk extract - 6 lit in 200 lit water ii. Dung Urine+ Asafoetida solution - 6 lit in 100 lit waters
7	Anthracnose leaf and fruit spot	The diseased fruits and twigs should be pruned and destroyed.	-	Spraying sour butter milk followed by Dry Zinger + Milk
8	Fruit cracking and splitting (Boron Deficiency)	i. Cultivation of tolerant varieties ii. From fruit setting to maturity, with adequate quantity of water is given at regular intervals. iii. Practice Mulching	-	i. Tamarind leaves + Calotropis leaves + Raviee (Peepal) 2 kgs each, should be grinded and should be soaked in the starch solution (Rice ganji) and kept aside for 12 hours and this solution should be mixed with 100 ltrs of water and sprayed to avoid the micro

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
				nutrient Deficiencies ii. Tonic/ Panchagavya should be sprayed at the time of the flowering stage sand fruit enlargement stage.

vii. Acid lime

APCNF farmers of Acid lime crop, who plan for raising of new plantations, must start with PMDS then followed by planting of high yielding clones/varieties of Acid lime crop for better soil health, establishment and growth of Acid lime plants. PMDS should be continued up to 3 years with succeeding inter crops. In case of 5years and above plantations the inter row, space can be utilised for PMDS followed by inter crops so as to cover 365 DGC.

Inter spaces can be exploited for growing inter crops and poly crops successfully. Initial years i.e., 1st -3rd years, legumes like green gram, Black gram & Groundnut and leguminous cover crop like Horse gram can be grown, in addition to field crops, some short duration, less exhaustive and dwarf filler fruit crops like Pineapple, Papaya, Guava, Fig etc., also be grown. In above 4 years old orchards, the partial shade loving crops like Ginger, Turmeric, Colocasia, Creeper cucurbit vegetables etc., can also be grown between two rows of Acid lime plants. Plant border plants like Drumstick, Sesbania and Curry leaf around orchard.

Canopy management

Pruning in senile and over grown orchards

Citrus trees are perennial and evergreen in nature. If neglected, trees can grow very tall and large. Proper pruning of such trees promotes desired yields.

Controls pests and diseases by providing ample light and aeration. Pruning is must in senile and grown-up large trees to increase production and quality fruit.

Pruning also improves the efficiency of water use, in turn, this increases the yield and quality of the fruit.

Pruning promotes new growth and rejuvenate the plant.

During pruning, spread of trees (North X South) and (East X West) can be reduced by 0.5M to 1M in each tree. Generally, 18-20 years old over senile trees have canopy of 49-50 CUM that can be reduced to 36-37 CUM.

The over grown Acid lime tree is given round dome shape, as much as by removing the branches touching to ground are to be pruned from all sides, bottom and top of the tree.

When and how to prune:

Pruning is done with objective of giving shape to the canopy over the period of 1-2 years and there after it is a maintenance pruning every year.

Pruning is done immediately after harvest of the crop and when there is no fruit on the tree.

Pruning can also initiate in dry period like March-April, never prune wet climate/rainy season.

During early phase of monsoon (July-August), tress have active growth and put forth vegetative shoots and flowering. Pruning should not be done during active growth.

While pruning, care shall be taken that limbs, scaffold branches and secondary branches of the tree are well distributed in given spacing.

The top scaffold branch should be pruned first, followed by the second and finally tertiary branches.

Never remove more than 20-25% of the total shoots at a time.

The side shoots rising from the main trunk and the waterspouts developing from internal branches should be removed regularly.

Diseased as well as heavily-infested branches should be removed.

Application of Ghanajeevamrutham (type-1 and type-2) and soil application of Dravajeevamrutam must be in double ring basins formed up to drip line in 4 years old and above aged plantation, where as in plantations of 1–3-year-old plantations, should be applied in basins.

Apply 1st dose of GJM type-1 or type-2 @ 5-10 kg per plant during December-January (prior to main flowering) and 2nd dose of GJM type-1 or type-2 @ 5-10 Kg during June-July (during fruit development) along with mulch.

In Citrus cultivation, nematodes are major problem in some areas to counter this problem, farmers are to be encouraged to grow Marri gold as trap crop in basins and judicious application of Neem cake @ 2-5 kgs depending on age per tree is suggestive.

Double ring method of irrigation is suggestive to avoid excess moisture at base of main trunk and root zone, which leads to development most of the fungal diseases such as Gummosis etc.,

Mulching of tree basins is very necessary to check weed growth, conserve soil moisture, hinder soil temperature fluctuations and activate the microbial development they're by increases soil fertility. Live mulch can be grown with Horse gram, Green gram, Stylo hamata (Fodder crop) etc.,

Most of the Acid lime orchards are grown in poor drained, less fertile, calcareous soils, resulting in showing of frequent micronutrient deficiencies in orchards, hence foliar spraying

of DJM and other growth promoters preferably Sapthadhanyankura dravanam etc., are recommended.

Dravajeevamrutham (DJM)

Soil Application:5-10 litres of DJM must be applied in double ring basin in 4-5 years and above aged plantation, where as in plantations of 1- 4-year-old, 3-5 litres at 15 days interval.

Foliar application: 2 times, 1st spray-15 litres DJM in 200 ltrs of water at before flowering and 2nd spray-30 litres DJM in 200 ltrs of water after fruit set to fruit development for better fruit quality and yield.

1st spraying of Sapthadhanyankura @ 20 days before flowering could leads good flower induction, 2nd and 3rd sprayings of Panchagavya/Egg amino acid at fruit set and fruit development stages, increases both quality and fruit yield of Acid lime.

S2S kit-All the non-negotiables must be mandatorily practiced

Inter crops: green gram, Black gram & Groundnut and leguminous cover crops like Horse gram.

Border Plants: Sesbania, Drumstick, Curry leaf

Yellow/blue sticky traps: 10-15 traps/acre

Trap crop: Plant Marigold in tree basins - Nematodes/Tomato- To attract the adult fruit sucking moth respectively.

Light Trap: 1/ acre.

S2S kits (including Sticky traps, Seed/Seedlings of Inter/Border crops, Trap crop, Light traps etc.,) of Acid lime crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard non pesticide management practices for pest and disease management in Acid lime crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Citrus Aphids	-	i. Lace wings, a number of coccinellid (e.g., lady beetles) and syrphid predators, parasites, and fungal diseases usually keep aphid numbers below damaging levels ii. Erection of Yellow sticky traps @ 20-25 per acre	i. Spraying of 5% NSKE (5 kg neem seed kernel in 100 lit water) or Neemastram during initial stage ii. Effective control of sooty mould spray 2 % Starch solution + Matti dravanam 20kg soil mixed in 200lts of water, filter and spray

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
2	Citrus Butterfly	Hand picks the larvae and destroy	i. Erecting of Light trap 1/acre ii. Pheromone traps 8/acre	i. Spraying of 5% NSKE/Neemastram during initial stage ii. Spray Brahmastram at advanced stage
3	Citrus psyllid	-	Erection of Yellow sticky traps @20-25 per acre	Spraying of 5% NSKE/Neemastram
4	Citrus leaf miner	Avoid pruning live branches more than once a year, so that the cycles of flushing are uniform and short.	Citrus leaf miners are killed by various parasites and predators, including tiny nonstinging, naturally occurring wasps such as Cirrospilus etc.,	i. Spraying of 5% NSKE (5 kg neem seed in 100 lit water) or ii. Spraying of Agnastram 3 lit in 100 lit water/acre
II. Major Diseases				
5	Gummosis	i. Injuries to crown roots or base of stem during cultural operations should be avoided. ii.Apply Neem paste up to 2 feet from ground level.	-	If lesion has girdled less than ½" the girth, remove the diseased bark with a knife along with ½" of uninvaded bark and apply Neem paste up to 2 feet from ground level.
6	Canker	i. Select resistant varieties like Balaji etc., ii. Prune badly infected twigs before the onset of monsoon		i. Apply 3 to 5 kg Neem cake per tree ii. Spray NSKE 5% iii. Spray Dung+Urine+Asfoetida solution - 5 lit in 100 lit water

viii. Banana

Before growing Banana crop, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,) sown in April/May and continued up to August 1st week i.e., till planting of Banana to get a good crop stand and biomass. The essential principle is to have 365 days green cover and to see that the soil is not kept barren.

It is crucial to enhance the inter-crop and poly crop combinations in initial 2-3 months Banana cropping system. After planting, Intercropping with Pulses (Green gram, Black gram), Flower Crop-Marigold, Leafy vegetables, Vegetables-Cluster bean, Tomato etc., at later stages shade

tolerant tuber vegetables like Turmeric, Elephant foot yam, Colocasia, Ginger and Creeper vegetables in borders, must be integral part. Inter row planting of Navadhanya after planting of Banana and incorporation of the same on the 30-45th day helps to conserve soil moisture, reduce weed growth, reduce number of irrigations and increase the soil fertility. Income from main crop and other crops must be documented.

Rhizome (Sword sucker) treatment: The roots and base of the planting material (Sword suckers with well-developed rhizome, conical or spherical in shape having actively growing conical bud and weighing approximately 450-700 gm) may be removed. The suckers are dipped with Pseudomonas solution @ 7grams/ litre of water followed by Beejamrutam (BJM) for 30 minutes.

Spacing for Planting: i) Row to row- 6ft, Plant to Plant- 6ft ii) Row to row-6ft, Plant to Plant-5ft (Dwarf varieties).

Ghanajeevamrutham (GJM)

Type-2: Apply 5-10 Kgs /pit at the time of planting and in pits along with Type-2 GJM add @ 0.5 kg of PSB (Phosphorus Solubilising Bacteria) + 0.5 Kg of Azospirillum and 1 Kg Neem cake per pit.

Type-1: 1 kg/pit; 0.5Kg - At the time of planting and 0.5 kg -At 40-50 DAP (Days After Planting).

Dravajeevamrutham (DJM)

Soil Application: 11 times @ 200lit each, at 15 DAP, 30 DAP, 60 DAP, 90 DAP, 120 DAP, 150 DAP, 180 DAP, 210 DAP, 240 DAP, 255 DAP, 270 DAP.

Foliar application: 7 times at 30 days interval,

1st spray-15 litres DJM in 200 ltrs of water @ 45 DAP

2nd spray-20 litres DJM in 200 ltrs of water @75 DAP

3rd spray-25 litres DJM in 200 ltrs of water @105 DAP

4th spray 30 litres DJM in 200 ltrs of water @135 DAP

5th spray 40 litres DJM in 200 ltrs of water @165 DAP

6th spray 50 litres DJM in 200 ltrs of water @195 DAP

7th spray 50 litres DJM in 200 ltrs of water @225 DAP

Growth promoters: Panchagavya: (4lts/acre in 100 litres water), 3 times, 1st spray at 5-6 months of DAP (before flowering),2nd spray at 7-8 months of DAP (at flowering) and 3rd application after removal of male bud from bunch (5 lts/acre in 100 litres of water) @250ml in each polythene cover and tie to the bunch before Fruits maturity in a bunch.

Cultural practices

Weeding at 30th day, 60th, 90th DAP and 120th DAP

DE suckering up to 7-8th months

Removal of dry leaves (Green leaves should not be removed)

Mulching: Use of Paddy straw and Banana dried leaves as a mulch material (around 12-13 kg/plant). Increases the bunch weight and conserve of soil moisture.

Earthing up at 3-4 months of DAP.

Propping at 7-8 months of DAP: Bamboo poles or Eucalyptus poles are used for giving support to the Banana plant.

DE handling of false hands of bunch: Some incomplete hands in a bunch which are not fit for quality produce should be removed soon after bloom. This helps in improving the weight of other hands, finger size and improved skin: pulp ratio to meet the export standards

Covering of Bunch: Covering bunch using dried leaves of the plant is economical and prevents bunch from direct exposure to sunlight and also enhances the quality of fruit. But in rainy season this practice should be avoided.

S2S kit-All the non-negotiables must be mandatorily practiced

Inter crops: Leafy vegetables, Vegetables-Cluster bean, Tomato etc., at later stages tuber vegetables like Turmeric, Elephant foot yam Colocasia, Ginger, Creeper vegetables like Bottle Gourd and Flower Crop-Marigold may be planted.

Border crops: Sesbania

Yellow sticky traps: 20-25/acre

Light Trap: 1/ acre.

S2S kits (including Sticky traps, Seed/Seedlings of Inter/Trap/Border crops, Light traps etc.,) of Banana crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard non pesticide management practices for pest and disease management in Banana crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Aphids	Use healthy and Aphid free suckers	i. Yellow and white sticky plates 25-30/acre ii. Conserve Lady bird beetles, which act as predator for Aphids	Spryaing of Neemastram with 0.25 Kg surf powder in 200 lit of water.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
2	Burrowing Nematode	i. Crop rotation with non-host crops ii. Grow Marigold as repellent and trap crop in the inter space iii. Avoid taking sword suckers from nematode infected plants iv. Application of Neem cake 200kg/acre	-	Use of neem cake @ 500g/ plant along with anyone of the bioagents like Trichoderma viride/ Paecilomyces lilacinus/ Pseudomonas fluorescens @ 20 g/ plant
3	Rhizome Weevil	i. Select healthy suckers ii. Do not take regular crop in the same field to avoid initial infestation iii. Ensure clean cultivation iv. Removal of pseudo stems below ground level v. Trimming the rhizome at planting		Apply Neem cake @1-2 kg per plant
II. Major Diseases				
4	Sigatoka leaf spot	i. While planting optimum/recommended spacing (6x6 feet), must be followed ii. No dried leaves should be hanging around the plant iii. No stagnation of water in the field iv. DE suckering of new banana plants around mother plant.		i. Spray Sour butter milk 12lit-200lit water/acre ii. Spraying of Dung+Urine+Asfoetida solution - 5 lit solution in 100 lit water/acre iii. Panchagavya spray
5	Banana bract mosaic virus	i. Use disease free planting material ii. Rouging of diseased plants	Yellow and white sticky plates 20-25/acre	Timely control of sucking pests by spraying vitex negundo (vavilaku kashayam) leaf extract
6	Anthracnose	i. Harvest bunches at correct stage of maturity ii. When all the hands are opened, the distal bud should be removed to prevent infection.	-	i. Spray Sour butter milk 6lit-100lit water/acre ii. Spraying of Dung+Urine+Asfoetida solution - 5 lit solution in 100 lit water/acre

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		iii Transported bunches should be stored carefully at 14°c without causing any bruises.		
7	Panama wilt	i. Use disease free suckers and dip in Beejamrutham before planting for 30 mints ii. Grow wilt resistant cultivars in endemic areas and avoid susceptible varieties like Tella chekkara keli, Amruthapani etc., iii. Clean cultivation.	-	i. Growing of resistant varieties ii. Soak suckers with Beejamrutham for 30 minutes before planting iii. Application of Neem cake along with Ghanajevamrutham iv. Drenching of Trichoderma viride
8	Banana bunchy top virus (BBTV)	i. Use of virus free planting material ii. Practice clean cultivation iii. Avoid Banana cultivation in Sugarcane and Cucurbitaceous areas as Sugarcane mosaic virus or Cucurbit mosaic virus can easily spread to Banana iv. Timely control of Aphids	i.Lady bug beetle act as predator for aphid ii. Yellow and white sticky plates 20-25/acre	i. Soak suckers with Beejamrutham for 30 min before planting ii. For Aphid control spraying of vitex negundo (vavilaku kashayam) leaf extract

ix. Guava

APCNF farmers of Guava, who plan for raising of new plantations, must start with PMDS then followed by planting of high yielding grafts/varieties for better establishment and growth of Guava.

Pre-Monsoon Dry Sowing (PMDS) should be raised before planting new orchards. Year after year maintain 365 DGC through PMDS/ inter crops.

Inter crops like, Millets, Pulses, Rhizome/Tuber vegetables (Turmeric, Ginger, Radish etc.,), Vegetables, Leafy vegetables and Creeper vegetables can be grown between two rows of Guava crop up to first 5 years period. Raising of Poly crops/Inter crops in between rows must be integral part in Guava cropping system. Income from main crop and other crops must be documented.

Training and Pruning

Training Guava trees, to provide strong framework and scaffold of branches suitable for bearing heavy crop is found to improve yield and fruit quality.

Open centre system of training is found good wherein plants are headed back at 1 m height from where four primary shoots are retained for initial framework.

These shoots are allowed to grow for 3-4 months and are subsequently pruned by cutting 1/3rd to ½ of their length for inducing multiple shoots from the buds below the cut ends.

After making the initial framework, two side shoots can be permitted to grow and subsequent doubling of selected branches is continued.

As flowers are borne on current season's shoots, a light annual pruning of tip 10-12 cm of past season's growth is helpful to encourage new shoots after harvest.

Suckers coming from the basal portion of the trunk and sides of the framework should be pruned back annually. All dead, diseased, crowded and dried shoots should also be removed

Ghanajeevamrutham (GJM): Type-I, 2kg/tree or Type-II, 5-10 kg/tree during June/July and October/ November moths in tree ring basins depending upon age of the orchard.

Dravajeevamrutham (DJM)

Soil Application:5 litres of DJM must be applied in ring basin at 3-4 years and above aged plantation, where as in plantations of 1- 3-year-old plantations, 2 litres at 15 days interval.

Foliar application: 4 times at 3 months interval

1st spray-15 litres DJM in 200 ltrs of water in the month of June,

2nd spray-30 litres DJM in 200 ltrs of water in the month of September,

3rd spray- 40 litres DJM in 200 ltrs of water in the month of December and

4th spray- 40 litres DJM in 200 ltrs of water in the month of March.

Growth promoters

Panchagavya: 2 times (4lts/acre in 100 litres water) 1st spray at before flowering and 2nd spray at after fruit set and fruit development stage.

S2S kit-All the non-negotiables must be mandatorily practiced

Inter crops: Pulses, Leafy vegetables, Tuber vegetables, Vegetable and Creeper vegetables

Wind breaks/Border crop: Glyricidia, Sesbania and Drumstick

Yellow/blue sticky traps: 20-25 traps/acre

Pheromone traps (For Melon fly/ Fruit flies): Each @8/acre

Light Trap: 1/ acre.

S2S kits (including Sticky traps, Pheromone traps, Seedlings of Inter/Border crop, Light traps etc.,) of Guava crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Guava crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Fruit fly	i. Effected fruits should be collected and destroyed. ii. Rake up the soil below the tree and drench with Neemasthram 10lt per tree	Monitor the activity of flies with Fruit fly trap @8 per acre	Spraying Dasaparni Kashayam
2	Tea mosquito bug	i. Avoid close planting, as the incidence very severe in overcrowded orchards. ii. If it is not 365 DGC plants like, Moringa, Cocoa act as alternate hosts. Hence, follow PMDS/inter crops/RDS leading to 365 DGC	i. Removal of affected shoots ii. Install Pheromone traps @8 per acre iii. Trap crop: Jafra	i. new flushes-Spraying of 5% NSKE or Neemastram ii. Later stages spraying of Agnastram - 3 litres in 100 litres of water.
3	Pomegranate butter fly	i. Detect early infestation by periodic monitoring. ii. Keeping basin clean. iii. Maintain adequate aeration by proper training and pruning iv. Pomegranate should not be cultivated close to guava as this is the most preferred host of this pest. v. Collect and destroy the infested fruits regularly.	i.Light trap 1 per acre ii. Early detection by obser	i. Remove and destroy the webbed leaves along with larva and pupa. ii. Spraying of Agnastram - 3 litres in 100 litres of water. iii. Spraying of dashaparni kashayam
4	Mealybug	i. Practice 365 DGC ii. Mulching iii. Spraying of 5% NSKE around the tree trunk	Poly cropping will encourage multiplication of natural predators	i.Nalleru Kashayam 3Lt /100 lt water ii. Spraying of Agnastram - 3 litres in 100 litres of water. iii. For effective control of sooty mould spray 2 %

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
				starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray
5	Spiralling White fly		i. Yellow/White sticky traps 20-25/acre ii. Erection of 1 Light trap/acre iii. Severely affected parts and leaves are covered with honeydew and sooty mould.	i. Spraying of Neemasthram -200 litres/acre ii. Isaria fumorosoria (Isaria)1lit for 200 lit of water solution +surf powder 0.50 kg. iii. Effective control of sooty mould spray 2 % starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray
II. Major Diseases				
6	Fruit canker/Fruit rot	i. Prune and destroy the dead twigs and fruits. ii. Avoid unnecessarily dense plant canopy. iii. Prune old and non-productive branch which may serve as potential source of infection iv. For managing fruit rot disease, good field sanitation required		i. NSKE 5% and Dry Ginger Milk extract - 6 lit in 200 lit water ii. Dung Urine+ asafoetida solution - 6 lit in 100 lit water
7	Wilt	i. Wilted trees should be uprooted ii. Roots of plants should not be damaged while planting. iii. Maintain proper tree vigour by timely and adequately manuring, inter-culture and irrigation	-	I. Soil Drenching with Trichoderma viridi-2 kg in 200 litres of water. ii. Spray 1 litre of Ginger + Milk in 200 litres of water or Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		iv. Biologically Guava wilt can be managed by Trichoderma spp., Aspergillus Niger- AN27 v. Inter cropping with Marigold, Turmeric vi. Application of 1-2 kgs Neem cake per plant		Sour Buttermilk solution - 6 lit in 100 lit water

4. Horticulture-Flowers

i. Rose

Rose usually dislikes humid climate, but can tolerate high temperature. At a temperature below 10° C flowering is affected and blind shoots and bull heads are developed. Rose plant should receive 8 hours exposure to sun rays. Shady area is not at all suitable for rose cultivation.

APCNF farmers of Rose crop, who plan for raising of new plantations, must start with Pre-Monsoon Dry Sowing (PMDS) then followed by planting of high yielding varieties or for better establishment and growth of Rose plant along with poly crops.

Mulching

It is particularly very much important in arid and semi-arid areas, where water becomes scarce during summer, for conservation of soil moisture around the root zone of the plants and to facilitate gradual supply of nutrients to the plants. This technique is very simple. Mulch material like straw, dried leaves, grass clippings or other wastes like leaf-mould are spread around the root of the plants with a radius of 1 to 2 feet and 3-4 inches thickness.

Inter crops like Leafy vegetables, Creeper vegetables can be grown between two rows of Rose plants up to pre flowering period.

Pruning in Rose

Pruning is to produce the required number of new shoots because rose bears flowers terminally on current season wood.

The best time of pruning is the period when the activity of rose plant is least and the plant is dormant to near dormant stage.

Three to four months after planting the rose plant is first pruned.

Four branches placed in four directions are chosen and these are pruned back to an outer bud leaving two to four buds on the stump.

All other branches are thinned out.

If the plant has only one or two weak shoots, they are to be cut back to two or three buds.

The first fortnight of October is usually considered to be the best time for pruning. Some hybrid T's (varieties) requires severe pruning.

In 'T' roses strong shoots are pruned to 2/3 of their length.

Too many shoots on plants will reduce the size and quantity of flowering. Limiting the number of flowers promotes good flower size.

Depending on the variety and severity of pruning roses takes about 35 to 60 days from pruning to flowering.

Stock sprouts should be frequently removed very often, off shoots or suckers from the root-stock stem come up at the base of the plantlets or below the grafted point which, if allows to grow by mistake, will retard the growth of the grafted part ultimately leading to its death. The off-shoot of the root-stock part will be seven leaved and odd pinnate which is to be pinched off as soon as it comes up. Such unwanted suckers should be removed by nail pinching or by a sharp knife.

Ghanajeevamrutham (GJM)

Type-II, For new plantations @ 2 kg/pit (Azoatobactor-2kg, Azospirillam-2kg and Trichoderma viride-2kg for every 100 kg of Type-II), at the time of planting. For existing garden (1- to 2-year-old), apply 2kg GJM Type-II mixture/ plant and Type-I, 1kg/plant during July-Aug. At the time of flowering in old plantations: Type-I, 1kg/plant, two times, 1st time during October just before pruning and 2nd time at flower initiation stage.

Dravajeevamrutham (DJM)

Soil Application (through drip / apply at the base of the plant):3-4 litres of DJM must be applied in 2 years and above aged plantation at monthly intervals, where as in plantations of 1-year-old, 2 litres at 15 days interval.

Foliar application: 5 times at 30 days intervals

1st spray-15 litres DJM in 200 ltrs of water in the month of June-

2nd spray-30 litres DJM in 200 ltrs of water in the month of July-

3rd spray- 40 litres DJM in 200 ltrs of water in the month of Aug

4th spray-15 litres DJM in 200 ltrs of water in the month of Sep-Before pruning

5th spray-30 litres DJM in 200 ltrs of water in the month of Oct-1st week i.e after pruning

Growth promoters: Panchagavya: For each cropping season, 2 times (4lts/acre in 100 litres water) 1st spray 10days before pruning and 2nd spray at flower bud initiation stage.

S2S kit-All the non-negotiables must be mandatorily practiced

Inter crops: Leafy vegetables, Vegetable and Creeper vegetables

Wind breaks/Border crop: Maize/Bajra/Jowar-3 rows

Yellow/blue sticky traps: 20-25 traps/acre

Light Trap: 1/ Acre

S2S kits (including Sticky traps, Seeds/Seedlings of Inter/Border crop, Light traps etc.,) of Rose crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Aphids	Border crop: Maize, Sorghum (3-4 lines) and Inter crop with Marigold	i.Yellow sticky traps @20-25/Acre ii. Watch for beneficiary insects viz Lady bird beetles, Damsel fly and Lace wing bugs etc.,	Spraying of Neemasthram + Detergent powder
2	Thrips	Grow Marigold as Trap crop (200nos/acre) and Radish and coriander as inter crops	i. Blue sticky traps @25-30/Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
3	Red scale		i. Rub off the scales with cotton soaked in kerosene ii.Cut and burry the affected branches	i) Spray NSKE 5% or Neemastram followed by Vavilaku Botanical Extract ii). Spray Dasaparni Kashayam
4	Mealybug	i. Practice 365 DGC ii. Mulching iii. Spraying of 5% NSKE around the tree trunk	Poly cropping will encourage multiplication of natural predators	i.Nalleru Kashayam 3Lt /100 lt water ii. Spraying of Agnastram - 3 litres in 100 litres of water. iii. For effective control of sooty mould spray 2 % starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
5	Helicoverpa armigera	i.Trap crop: Marigold ii. Border crop: Maize, Sorghum (3-4 lines) iii. 1 light trap /acre iv. Bird perches @ 8-10/acre.	i. Pheromone traps @ 8-10 /acre. ii. Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early instar stages Neemastram 200lts/acre. ii. Spraying of Agnastram- 5 lts in 200lit water/acre at advance instar stages
6	Spodoptera litura	I. Adopt crop rotation ii. Early sowing iii. Trap crop: Castor iii. Border crop: Maize, Sorghum vi.1 light trap /acre v.Bird perches @8-10/acre.	i.Pheromone traps @ 8-10 /acre. ii.Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early stage Neemastram-200lt/acre. Ii.Spraying of Agnastram-4 lts in 100 ltrs of water/acre (or) at advance instar stages iii. Spray Garlic chilli extract.
7	Mite	Refer to mites in Paddy crop	Refer to mites in Paddy crop	Refer to mites in Paddy crop
II. Major Diseases				
8	Powdery mildew	Removal and destruction of heavily infested old/lower leaves	-	Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and spray sour butter milk (6 lit in 100 lit of water)
9	Black spot	i.Before planting, try to ensure that seeds are disease free ii.If soil is too wet, improving soil drainage can be very useful to prevent further development and spread of the disease	-	Spraying of sour Buttermilk solution - 6 lit in 100 lit water
10	Rust	i.Before planting, try to ensure that seeds are disease free	-	Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and spray sour

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		ii.If soil is too wet, improving soil drainage can be very useful to prevent further development and spread of the disease		butter milk (6 lit in 100 lit of water)
11	Die-back	The affected stem or branch is cut 2-3 inches below the effected part and a cap of fresh cow-dung mixed with Copper Sulphate or Bordeaux paste alone is put over the cut wound. Over watering, particularly in coastal areas, should be avoided. It is also advisable to procure buddings from reliable nurseries only.	-	Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and spray sour butter milk (6 lit in 100 lit of water)

ii. Jasmine

Jasmine is a tropical flower crop and grows well in moderate humid conditions. It comes well in low rainfall areas. As the clay content increases in the soil, the plant tend to go vegetative there by reduced flowering.

APCNF farmers of Jasmine crop, who plan for raising of new plantations, must start with Pre-Monsoon Dry Sowing (PMDS) then followed by planting of high yielding varieties or for better establishment and growth of Jasmine plants.

Mulching

It is particularly very much important in arid and semi-arid areas, where water becomes scarce during summer, for conservation of soil moisture around the root zone of the plants and to facilitate gradual supply of nutrients to the plants. This technique is very simple. Mulch material like straw, dried leaves, grass clippings, or other wastes like leaf-mould are spread around the root of the plants with a radius of 1 to 2 feet and 3-4 inches thickness.

Inter crops like Leafy vegetables, Creeper vegetables can be grown between two rows of Jasmine plants up to pre flowering period.

Pruning in Jasmine

The pruning of jasmine is an important operation. With the approaching of winter, the bushes start to shed the leaves. To promote good flowering, water is withheld in the 2nd fortnight of November and allow plant to rest and shed the leaves or the plants are defoliated manually.

Defoliation can also be achieved by allowing sheep to eat leaves and twigs, by this practice, not only saves labour costs but also improves the soil fertility by sheep castings.

The pruning is usually done after 2 years of its planting and followed in the month of December to January in *Jasminum sambac*- "Gundumalli" while it is done in February –March *Jasminum auriculatum*- "Virajaji". Pruning in *Jasminum multiflorum*-"Kakada malli" is done in August –September.

Generally pruning is done by trimming all branches up to 45 to 50 cm from ground level. Before pruning irrigation is to be withheld and all the dried and diseased twigs are to be removed. After pruning, the leaves are also to be removed and irrigated lightly till flower buds appear.

Profuse watering is done at regular intervals after the appearance of flower

Ghanajeevamrutham (GJM) Type-II, For new plantations @ 2 kg/pit (Azoatobactor-2kg, Azospirillam-2kg and Trichoderma viride-2kg for every 100 kg of Type-II), at the time of planting. For old plantations apply Type –II mixture during June-July and Dec-Jan @ 2 kg mixture/plant each time (Azoatobactor-2kg, Azospirillam-2kg and Trichoderma viride-2kg and Neem cake-5kg for every 100 kg of Type-II, GJM) and Type-I, 1kg/plant, two times.

Dravajeevamrutham (DJM)

Soil Application (through drip / apply at the base of the plant):5 litres of DJM must be applied in 3 years and above aged plantation at monthly intervals, where as in plantations of 1-2year-old plantations, 2 litres at 15 days interval.

Foliar application: 5 times at monthly intervals

1st spray-15 litres DJM in 200 ltrs of water in the month of June-

2nd spray-30 litres DJM in 200 ltrs of water in the month of July-

3rd spray- 40 litres DJM in 200 ltrs of water in the month of Aug

4th spray-15 litres DJM in 200 ltrs of water in the month of Dec-Before pruning

5th spray-30 litres DJM in 200 ltrs of water in the month of Jan-1st week i.e after pruning

Growth promoters: Panchagavya: For each cropping season, 2 times (4lts/acre in 100 litres water) 1st spray 10days before pruning and 2nd spray at flower bud initiation stage.

S2S kit-All the non-negotiables must be mandatorily practiced

Inter crops: Leafy vegetables, Vegetable and Creeper vegetables

Wind breaks/Border crop: Maize/Bajra/Jowar-3 rows

Yellow/blue sticky traps: 20-25 traps/acre

Light Trap: 1/ Acre

S2S kits (including Sticky traps, Seeds/Seedlings of Inter/Border crop, Light traps etc.,) of Pomegranate crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Jasmine crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Budworm and shoot borer	i. Proper pruning and hygienic maintenance of bushes ii. Collect and destroy the damaged buds with larvae	Use light trap to attract and kill the adult moths	i. At early instar stages Neemastram 200lts/acre. ii. Spraying of Agnastram- 5 lts in 200lit water/acre at advance instar stages
2	Red spider mite/ Jasmine eriophyid mite	Refer to mites in Paddy crop	Refer to mites in Paddy crop	Refer to mites in Paddy crop
3	Jasmine midge	Collect and destroy the infested flowers along with life stages of insects		Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages. Spray Dasaparni kashayam
4	Leaf web worm	i. Proper pruning and hygienic maintenance of bushes. Collect and destroy the damaged leaves along with larvae	Use light trap to attract and kill the adult moths	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
5	Flower Thrips	Grow Marigold as Trap crop (200nos/acre)	i. Blue sticky traps @20-25/Acre. ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
II. Major Diseases				

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
6	Root rot and wilt	i. Wilted/rotted plants should be uprooted ii. Roots of plants should not be damaged while planting. iii. Maintain proper tree vigour by timely and adequately manuring, inter-culture and irrigation iv. Biologically wilt can be managed by Trichoderma spp., Aspergillus niger- AN27 v. Inter cropping with Marigold, Turmeric vi. Application of 1-2 kgs Neem cake per plant	-	I. Soil Drenching with Trichoderma viridi-2 kg in 200 litres of water. ii. Spray 1 litre of Ginger + Milk in 200 litres of water or Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or Sour Buttermilk solution - 6 lit in 100 lit water
7	Leaf blight	-	-	i.Spraying of sour Buttermilk solution - 6 lit in 100 lit water ii.Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and spray sour butter milk (6 lit in 100 lit of water)
8	Rust	i.Before planting, try to ensure that seeds are disease free ii.If soil is too wet, improving soil drainage can be very useful to prevent further	-	i.Spraying of sour Buttermilk solution - 6 lit in 100 lit water ii.Spray Dung+Urine+Asafoetida solution - 5 lit in 100 lit water, and spray sour

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		development and spread of the disease		butter milk (6 lit in 100 lit of water)

iii. Marigold

Before growing of Marigold crop depending of the season, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in March/April till sowing of Marigold crop to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS, the farmers harvest some portion of the different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop

Marigold crop is grown as inter crop in alleys of young fruit orchards, Coconut/Oil palm plantations and as one of the main flower crop in different poly cropping systems of leafy vegetable, vegetables-Cabbage, Cauliflower, Chillies, Tomato, Brinjal etc., Cotton, Fruit crop - Banana. Also grown on borders of bunds in many cropping systems. The income from main crop and the other crops should be documented.

Nursery management

Raised nursery beds (15 cm ht,1.2 m width and convenient length). Seeds can be sown on nursery beds in lines in shallow furrows.

Application of GJM type-2 along with Trichoderma viridae, 20 kgs and 1.25 kg /SQMT in nursery area respectively and drenching later with Trichoderma viridae-8 grams/litre of water.

Mulching: With Paddy straw/Sugarcane trash

Providing shade for nursery

During winter, beds should be covered with a layer of straw to accelerate germination process. However, the straw should be removed as soon as these seedlings are visible above the soil.

Erection of 3-4 no's yellow/blue sticky traps in nursery area to control sucking pests in nursery itself

Seed/seed ling treatment with Beejamrutam (BJM), along with Azospirillum-400 grams/kg seed using rice gruel as adhesive.

Ghanajeevamrutham (GJM)

i) Type-2: 1000-1500 kg/acre+ Neem cake-200 kgs/Acre at the time of last ploughing and ii) Type-1: 200kg/acre; 100kg - At the time of transplanting and 100 kg -At 20 DAT (Days After Transplanting).

Dravajeevamrutham (DJM)

Soil Application: 5 times at 15 days interval @ 200lit each up to flower buds' initiation from 15 DAT, 30DAT, 45DAT, 60DAT and 75DAT

Foliar application: 4 times, 1st spray-15 litres DJM in 200 ltrs of water at 25 DAT, 2nd spray-20 litres DJM in 200 ltrs of water at 40 DAT and 3rd spray-25 litres DJM in 200 ltrs of water at 55 DAT and 4th spray at 80DAT-25 litres DJM in 200 ltrs of water.

Growth promoters: Panchagavya: 4lts/acre in 100 litres water at 30 DAT @ before flower bud initiation stage.

Pinching:

In tall cultivars of African marigold, plants first grow upwards to their final height and later on produce a terminal flower.

After the formation of terminal flower bud, axillary branches develop which also bear flower.

However, if the apical portion of shoot is removed early, large number of axillary shoots arise resulting in well-shaped bushy plant bearing a greater number of uniform sized flowers.

It is observed that pinching at 40 days after transplanting enhances flower yield. However, Giant double African yellow and orange do not require pinching as the plants are bushy and branching type.

S2S kit-All the non-negotiables must be mandatorily practiced.

Inter crops: Leafy vegetables, Vegetables, Cotton, Chillies, Tomato etc.,

Border crops: Maize/Jowar/Bajra-3 rows

Yellow/Blue sticky traps: 20-25/acre

Trap crop (Spodoptera): Castor

Pheromone traps (Helicoverpa): Each @8/acre at 15-20 DAS

Bird perches: 10 -15/acre

Light Trap: 1/ acre.

The pheromone traps should be installed prior to pest infestation (for example; Helicoverpa). It should not be done after the infestation starts in the field.

S2S kits (including Sticky traps, Pheromone traps, Seed/Seedlings of Inter/Trap/Border crops, Light traps etc.,) of Marigold crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

365 Days Green Cover in Marigold: PMDS-Kharif with poly crops -RDS-Rabi Marigold with poly crops -Summer Tomato/Brinjal with poly crops.

Standard Non pesticide management practices for pest and disease management in Marigold crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Mealybug	i. Practice 365 DGC ii. Mulching iii. Spraying of 5% NSKE around the tree trunk	Poly cropping will encourage multiplication of natural predators	i.Nalleru Kashayam 3Lt /100 lt water ii. Spraying of Agnastram - 3 litres in 100 litres of water. iii. For effective control of sooty mould spray 2 % starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray
2	Red spider mite		Refer to mites in Paddy crop	Refer to mites in Paddy crop
3	Bud Borers/Caterpilers-Helicoverpa	I. Border crop: Maize, Sorghum (3-4 lines) ii. 1 light trap /acre iii. Bird perches @ 8-10/acre.	i. Pheromone traps @ 8-10 /acre. ii. Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early instar stages Neemastram 200lts/acre. ii. Spraying of Agnastram- 5 lts in 200lit water/acre at advance instar stages
4	Thrips		i. Blue sticky traps @25-30/Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
5	Leaf miner	Removal and destruction of heavily infested old/lower leaves fallowed by application of neemasthram.	I. Lady bird beetle can feed sucking pests ii. White/yellow sticky traps 10-15 /acre iii. Erect @ 8 delta traps per/acre	Initial stage (eggs and 1st instar larvae): spraying of 5% NSKE or Neemasthram 10kg and chilly garlic extract in advanced stages
II. Major Diseases				

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
6	Root rot	i. Wilted/rotted plants should be uprooted ii. Roots of plants should not be damaged while planting. iii. Maintain proper tree vigour by timely and adequately manuring, inter-culture and irrigation iv. Biologically wilt can be managed by Trichoderma spp., Aspergillus niger-AN27 v. Inter cropping with Marigold, Turmeric vi. Application of 1-2 kgs Neem cake per plant	-	I. Soil Drenching with Trichoderma viridi-2 kg in 200 litres of water. ii. Spray 1 litre of Ginger + Milk in 200 litres of water or Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or Sour Buttermilk solution - 6 lit in 100 lit water

iv. Tuberose

APCNF farmers of Tuberose crop, who plan for raising of new plantations, must start with Pre-Monsoon Dry Sowing (PMDS) then followed by planting of high yielding varieties or for better establishment and growth of Tuberose plants.

Mulching

It is particularly very much important in arid and semi-arid areas, where water becomes scarce during summer, for conservation of soil moisture around the root zone of the plants and to facilitate gradual supply of nutrients to the plants. This technique is very simple. Mulch material like straw, dried leaves, grass clippings or other wastes like leaf-mould are spread around the root of the plants, 3-4 inches thickness.

Inter crops like Leafy vegetables, Creeper vegetables can be grown between two rows of Tuberose plants up to pre flowering period. Can be raised as inter crop in orchards.

Ghanajeevamrutham (GJM)

i) Type-2: 1000-1500 kg/acre+ Neem cake-200 kgs/Acre at the time of last ploughing and ii) Type-1: 200kg/acre; 100kg - At the time of planting and 100 kg -At 20 DAP (Days After Planting).

Farm Yard Manure (FYM) should not be applied, as it is. It must be treated with DJM for conversion to Type-2 GJM and then only applied.

Dravajeevamrutham (DJM)

i) Soil Application: 5 times at 15 days interval @ 200lit each up to flower buds' initiation from 15 DAT, 30DAT, 45DAT, 60DAT and 75DAT.

Foliar application: 4 times, 1st spray-15 litres DJM in 200 ltrs of water at 25 DAT, 2nd spray-20 litres DJM in 200 ltrs of water at 40 DAT and 3rd spray-25 litres DJM in 200 ltrs of water at 55 DAT and 4th spray at 80DAT-25 litres DJM in 200 ltrs of water.

Growth promoters

Panchagavya:1 time (4lts/acre in 100 litres water) at flower bud initiation stage.

S2S kit-All the non-negotiables must be mandatorily practiced

Inter crops: Leafy vegetables and Creeper vegetables

Wind breaks/Border crop: Maize/Bajra/Jowar-3 rows

Yellow/blue sticky traps: 20-25 traps/acre

Light Trap: 1/ Acre

9. S2S kits (including Sticky traps, Seeds/Seedlings of Inter/Border crop, Light traps etc.,) of Tuberose crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Tuberose crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Thrips		i. Blue sticky traps @20-25/Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
2	Aphids	Border crop: Maize, Sorghum (3-4 lines) and Inter crop with Marigold	i.Yellow sticky traps @20-25/Acre ii. Watch for beneficiary insects viz Lady bird beetles, Damsel fly and Lace wing bugs etc.,	Spraying of Neemasthram + Detergent powder

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
3	Root knot nematode	i. Crop rotation with non- host crops ii. Grow Marigold as repellent and trap crop in the inter space iii. Avoid taking seed material from nematode infected plants iv. Application of Neem cake 200kg/acre	-	Use of neem cake @ 500g/ plant along with anyone of the bioagents like Trichoderma viride/ Paecilomyces lilacinus/ Pseudomonas fluorescens @ 20 g/ plant
II. Major Diseases				
4	Basal rot or stem rot	i. Wilted/rotted plants should be uprooted ii. Roots of plants should not be damaged while planting. iii. Maintain proper tree vigour by timely and adequately manuring, inter-culture and irrigation iv. Biologically wilt can be managed by Trichoderma spp., Aspergillus niger-AN27 v. Inter cropping with Marigold, Turmeric vi. Application of 1-2 kgs Neem cake per plant	-	I. Soil Drenching with Trichoderma viridi-2 kg in 200 litres of water. ii. Spray 1 litre of Ginger + Milk in 200 litres of water or Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or Sour Buttermilk solution - 6 lit in 100 lit water
5	Flower and bud rot	i. Use disease free seed material and dip in Beejamrutham before planting for 30 mints ii. Grow wilt resistant cultivars in endemic	-	i. Growing of resistant varieties ii.Soil Drenching with Trichoderma viridi-2 kg in 200 litres of water. iii. Spray 1 litre of Ginger + Milk in 200 litres of water or

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		areas iii. Clean cultivation.		Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or Sour Buttermilk solution - 6 lit in 100 lit water

v. Crossandra

APCNF farmers of Crossandra crop, who plan for raising of new plantations, must start with Pre-Monsoon Dry Sowing (PMDS) then followed by planting of high yielding varieties or for better establishment and growth of Crossandra plants.

Nursery management

i. Raised nursery beds (15 cm ht,1.2 m width and convenient length). Seeds can be sown on nursery beds in lines in shallow furrows.

ii. Select seed material (cuttings) from nematode free plants/soil.

iii. The seeds loose viability very soon and hence only freshly extracted seeds should be used. If cuttings used, should be transplanted when sufficient roots have developed.

iv. Application of GJM type-2, Trichoderma viridae and Neem cake 20 kgs, 1.25 and 250 grams/SQMT respectively in nursery area and drenching later with Trichoderma viridae-8 grams/litre of water to control damping off.

v. Mulching: With Paddy straw/Sugarcane trash

vi. Providing shade for nursery

vii. During winter beds should be covered with a layer of straw to accelerate germination process. However, the straw should be removed as soon as these seedlings are visible above the soil.

viii. Erection of 3-4 no's yellow/blue sticky traps in nursery area to control sucking pests in nursery itself.

Mulching

It is particularly very much important in arid and semi-arid areas, where water becomes scarce during summer, for conservation of soil moisture around the root zone of the plants and to facilitate gradual supply of nutrients to the plants. This technique is very simple. Mulch material like straw, dried leaves, grass clippings or other wastes like leaf-mould are spread around the root of the plants with a radius of 1 to 2 feet and 3-4 inches thickness.

Inter crops like Leafy vegetables, Creeper vegetables can be grown between two rows of Crossandra plants up to pre flowering period.

Ghanajeevamrutham (GJM)

Type-II, 1 MT/acre at the time of last ploughing i.e. during June-July (Azoatobactor-2kg, Azospirillam-2kg and Trichoderma viride-2kg and Neem cake-5kg for every 1000 kg of GJM Type-II). Subsequent Top dressing as pocket application with Type-1 GJM 2 times in a year @ 400Kg per acre during June-July and October-November

Dravajeevamrutham (DJM)

Soil Application (through drip / apply at the base of the plant): @ 200 litres per acre at 15 days interval.

Foliar application: 30 days interval @ 200 litres per acre.

Growth promoters: Panchagavya: For each cropping season, 1 time (4lts/acre in 100 litres water) before flower spike initiation.

S2S kit-All the non-negotiables must be mandatorily practiced

Inter crops: Leafy vegetables and other Vegetables.

Wind breaks/Border crop: Maize/Bajra/Jowar-3 rows

Yellow/blue sticky traps: 20-25 traps/acre

Light Trap: 1/ Acre

9. S2S kits (including Sticky traps, Seeds/Seedlings of Inter/Border crop, Light traps etc.,) of Crossandra crop should be planned and placed at NPM shop/FPO/VO etc., before crop season and DPMs should monitor regularly during crop period.

Standard Non pesticide management practices for pest and disease management in Crossandra crop

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Thrips	-	i. Blue sticky traps @20-25/Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
2	Mealy bug	i. Practice 365 DGC ii. Mulching iii. Spraying of 5% NSKE	Poly cropping will encourage multiplication of natural predators	i.Nalleru Kashayam 3Lt /100 lt water ii. Spraying of Agnastram - 3 litres in 100 litres of water.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
				iii. For effective control of sooty mould spray 2 % starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray
3	White fly	i. Plant 200 to 300 Marigold plants per acre as trap ii) Grow Maize or Jowar as border crop	20 to 25 yellow sticky traps per acre	Spray Neemastram or 5% NSKE followed by vavilaku botanical extract
4	Nematodes	i. Crop rotation with non- host crops ii. Grow Marigold as repellent and trap crop in the inter space iii. Avoid taking sword suckers from nematode infected plants iv. Application of Neem cake 200kg/acre	-	Use of neem cake @ 500g/ plant along with anyone of the bioagents like Trichoderma viride/ Paecilomyces lilacinus/ Pseudomonas fluorescens @ 20 g/ plant
II. Major Diseases				
5	Wilt	i. Use disease free seedlings and dip in Beejamrutham before planting for 30 mints ii. Grow wilt resistant cultivars iii. Clean cultivation.	-	i. Growing of resistant varieties ii. Soak suckers with Beejamrutham for 30 minutes before planting iii. Application of Neem cake along with Ghanajevamrutham iv. Drenching of Trichoderma viride

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
6	Foot and root Rot	i. Wilted/rotted plants should be uprooted ii. Roots of plants should not be damaged while planting. iii. Maintain proper tree vigour by timely and adequately manuring, inter-culture and irrigation iv. Biologically wilt can be managed by Trichoderma spp., Aspergillus niger-AN27 v. Inter cropping with Marigold, Turmeric vi. Application of 1-2 kgs Neem cake per plant	-	I. Soil Drenching with Trichoderma viridi-2 kg in 200 litres of water. ii. Spray 1 litre of Ginger + Milk in 200 litres of water or Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or Sour Buttermilk solution - 6 lit in 100 lit water
7	Flower blight (Alternaria sps)	I. No dried leaves should be hanging around the plant iii. No stagnation of water in the field	-	i. Spray Sour butter milk 12lit-200lit water/acre ii. Spraying of Dung+Urine+Asfoetida solution - 5 lit solution in 100 lit water/acre iii. Panchagavya spray

vi. Chrysanthemum

Before growing of Chrysanthemum crop depending of the season, raising of Pre-Monsoon Dry Sowing (PMDS) with a minimum of 9 varieties of crops (comprising of Pulses, Oil seeds, Millets, Vegetables and leafy vegetables etc.,), sown in March/April till sowing of Chrysanthemum crop to get a good crop stand and biomass. The greater the seed diversity, the better the results will be. By practicing PMDS, the farmers harvest some portion of the

different group of crops/ vegetables / leafy vegetables for self-consumption. Some biomass may be used as fodder or may be used as mulch or integrated into main crop

Chrysanthemum is a short-day plant and for vegetative growth it requires long day conditions with bright sunlight and high temperatures ranging from 20 to 27 °C. For bud formation and flowering it requires short day and low temperatures ranging from 10 to 27 °C. It is highly sensitive to waterlogged conditions.

Chrysanthemum crop is grown as inter crop in young fruit orchards, Coconut/Oil palm etc., plantations and as the main flower crop in different poly cropping systems of leafy vegetable, vegetables-Cabbage, Cauliflower, Chillies, Brinjal etc., Fruit crop - Banana. The income from main crop and the other crops should be documented.

Nursery management

Raised nursery beds (15 cm ht,1.2 m width and convenient length) for rooting terminal cuttings of 5-7 CMs length from healthy stock plants

Application of GJM type-2 along with Trichoderma viridae, 20 kgs and 1.25 kg /SQMT in nursery area respectively and drenching later with Trichoderma viridae-8 grams/litre of water.

Mulching: With Paddy straw/Sugarcane trash

Providing shade for nursery

Erection of 3-4 no's yellow/blue sticky traps in nursery area to control sucking pests in nursery itself

Seed ling treatment with Beejamrutam (BJM), along with Azospirillum-400 grams/kg seed using rice gruel as adhesive.

Ghanajeevamrutham (GJM)

i) Type-2: 1000-1500 kg/acre+ Neem cake-200 kgs/Acre at the time of last ploughing and ii) Type-1: 400kg/acre; 200kg - At the time of transplanting and 200 kg -At 20 DAT (Days After Transplanting).

Dravajeevamrutham (DJM)

Soil Application: 5 times at 15 days interval @ 200lit each up to flower buds' initiation from 15 DAT, 30DAT, 45DAT, 60DAT and 75DAT

Foliar application: 4 times, 1st spray-15 litres DJM in 200 ltrs of water at 25 DAT, 2nd spray-20 litres DJM in 200 ltrs of water at 40 DAT and 3rd spray-25 litres DJM in 200 ltrs of water at 55 DAT and 4th spray at 80DAT-25 litres DJM in 200 ltrs of water.

Growth promoters: Panchagavya: 4lts/acre in 100 litres water at 30 DAT @ before flower bud initiation stage.

5. Other Horticultural cultural operations

Staking

It is necessary for tall growing varieties

Pinching

The terminal buds are removed at 4weeks after planting to induce more side shoots. This may be repeated on lateral shoots after 7 weeks of planting or 100 days before full bloom.

Desuckering

Remove the side suckers periodically

S2S kit-All the non-negotiables must be mandatorily practiced.

Inter crops: Leafy vegetables, Vegetables, Chillies, Tomato etc.,

Border crops: Maize/Jowar/Bajra-3 rows

Yellow/Blue sticky traps: 20-25/acre

Trap crop (Helicoverpa): Marigold

Pheromone traps (Helicoverpa): Each @8/acre at 15-20 DAP

Bird perches: 10 -15/acre

Light Trap: 1/ acre.

The pheromone traps should be installed prior to pest infestation (for example; Helicoverpa). It should not be done after the infestation starts in the field.

365 Days Green Cover in Chrysanthemum: PMDS- Chrysanthemum with poly crops -Summer Tomato/Brinjal with poly crops.

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
I. Major Pests				
1	Thrips	Grow Marigold as Trap crop (200nos/acre) and Radish and coriander as inter crops	i. Blue sticky traps @20-25/Acre ii. Watch for beneficiary insects viz Lady bird beetles and Lace wing bugs etc.,	Spraying of Neemastram during Initial stage and 5% NSKE (5 kg neem seed in 100 lit water) at later stages.
2	Aphids	Border crop: Maize, Sorghum (3-4 lines) and Inter crop with Marigold	i.Yellow sticky traps @20-25/Acre ii. Watch for beneficiary insects viz Lady bird beetles, Damsel fly and Lace wing bugs etc.,	Spraying of Neemasthram + Detergent powder

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
3	Leaf eating caterpillars	i. Trap crop: Marigold ii. Border crop: Maize, Sorghum (3-4 lines) iii. 1 light trap /acre iv. Bird perches @ 8-10/acre.	i. Pheromone traps @ 8-10 /acre. ii. Release of egg parasitoid Trichogramma @ 50,000 adults (in the form of Tricho card)/acre/week	i. At early instar stages Neemastram 200lts/acre. ii. Spraying of Agnastram- 5 lts in 200lit water/acre at advance instar stages
4	Mealybug	i. Practice 365 DGC ii. Mulching iii. Spraying of 5% NSKE around the tree trunk	Poly cropping will encourage multiplication of natural predators	i.Nalleru Kashayam 3Lt /100 lt water ii. Spraying of Agnastram - 3 litres in 100 litres of water. iii. For effective control of sooty mould spray 2 % starch solution + Matti dravanam 20kg soil mixed in 200lts of water filter and spray
II. Major Diseases				
5	Root rot	i. Wilted/rotted plants should be uprooted ii. Roots of plants should not be damaged while planting. iii. Maintain proper tree vigour by timely and adequately manuring, inter-culture and irrigation iv. Biologically wilt can be managed by Trichoderma spp., Aspergillus niger- AN27 v. Inter cropping with Marigold, Turmeric vi. Application of 1-2 kgs Neem cake per plant	-	i. Soil Drenching with Trichoderma viridi-2 kg in 200 litres of water. ii. Spray 1 litre of Ginger + Milk in 200 litres of water or Dung+Urine+Asfoetida solution - 6 lit in 100 lit water or Sour Buttermilk solution - 6 lit in 100 lit water
6	Leaf spot	i.Before planting, try to ensure that seeds are disease free	-	Spraying of sour Buttermilk solution - 6 lit in 100 lit waters

Sl. No	Name of the Pest/Disease	Prophylactic / Preventive Methods/ non-negotiables	Monitoring method for decision-making on use of reactive/curative method.	Curative / Reactive method
		ii.If soil is too wet, improving soil drainage can be very useful to prevent further development and spread of the disease		

Gujarat Natural Farming Package and Practices for different crops

Package of practice of Cotton in Natural Farming

Land Preparation:-

- 100 kg decomposed farm yard manure mixed with 100 kg of Ghan Jivamrut per acre should be applied in the soil before sowing of seeds

Varieties/Spacing:-

- Deshi, Improved and Hybrid varieties are grown
- Spacing between to row is vary from 90 to 120 X 30 to 45 cm
- Seed rate of Deshi Hybrid is 8 to 10 Kg / ha and 2 to 2.5 Kg/ Ha for Hybrid and BT varieties

Seed Treatment:-

- Seeds should be treated with Bijamrut for controlling soil borne and seed borne diseases like anthracnose, black arm of cotton , root rot and seedling rot

Sowing Time:-

- Monsoon- June to July

Jivamrut Application:-

- After seed sowing 200 litres of Jivamrut per acre should be given in soil with irrigation water. 200 litres of Jivamrut per acre should be given with irrigation water at an interval of 15 days in a month.

Jivamrut / Saptdhanyankur Spray:-

1) 1st spray, after one month of planting 5 liter Jivamrut mixed with 100 liter of water.
2) 2nd spray, after 21 days of first spray 7.5 litre Jivamrut mixed with 120 litre of water.
3) 3rd spray, after 21 days of first spray 10 litre Jivamrut mixed with 150 litre of water.
4) 4th spray, after 21 days of first spray 15 litre Jivamrut mixed with 150 litre of water.
5) 5th spray, after 21 days of first spray 3 litre sour butter milk mixed with 100 litre of water.
6) 6th spray, after 21 days of first spray 15 litre Jivamrut mixed with 150 litre of water.

Intercropping:-

- castor, maize, marigold, sesamum, green gram, soya bean, muth bean etc. sown as an intercrop

Mulching:-

- After sowing of seeds, plant residue is used as mulching

Crop Protection Measures:-

- If any eggs/larva of insect seen on the leaves then spraying of mixed with 3 litre of Bramhastra and 3 liter of Agniatra in 200 litre of water.
- Control of sucking pests:- spraying of 200 lit. nemastra per acre.
- Control of Nematode:- Spraying of Bramastra @ 3 ltr/100 ltr of water.
- Control of fungus/virus:- spraying of 3-4 days old butter milk mixed with 100 litre of water.

- Control of Pink boll worm and jassid :- 5 to 7 litter bhramsatra in 200 liters water
- Control of Caterpillar: - Agniastra 7.5 lit. + 250 lit. of water

Harvesting Stages:-

- Picking of cotton should be done in the morning because due to humidity there is no sticking of dried leaves and other trash.
- Hand picking is best and suitable way of harvesting cotton at regular intervals.
- Picks the cotton crop about 3 to 4 times per seasons at regular interval to get more and more production.

Package of practice of Paddy in Natural Farming

Nursery Land Preparation:

Paddy Nursery:

- Proper land preparation and levelling of land. Collect paddy debars in corner of field. Before last ploughing add Ghanjivamrut 10 kg per Gutha in the soil and irrigate field. seed treatment with Bijamrut and sowing in row

Spraying

- **1st Spraying :** before sowing (10 litre water+ 200 ml filtered Jivamrut)
- **2nd Spraying :** after First Spraying (10 litre water+ 500 ml filtered Jivamrut)
- **3rd Spraying :** After 5 Days of sowing (10 litre water+ 200 ml filtered Jivamrut) when you spraying doping down Jivamrut on the soil

Land Preparation

- Before last ploughing add 200 kg Ghanjivamrut uniformly in to the field and irrigate field. Then also add 200 liter Jivamrut solution in to the soil and mix it well and puddle the field

Transplanting System:

- Here nurseries are raised well in advance to produce the seedlings. Before sowing dip seedling in to Bijamrut solution and later transplanting will done. Planting should be done in such a way that weeding is easy

Weed Management:

- Dicotyledonous plants decompose easily in paddy field, but monocotyledonous plants cannot decompose easily in submerge paddy field. So, whenever it appear, collect and destruct in to the field

Varieties

- Early:- 60 to 90 days maturity Varieties- IR-28,GNRH-2, Mahisagar
- Medium-Late:-120 days maturity Varieties- masuri, indrani , rajbhog, krisna kamod etc.
- Late:-135 and above days maturity Varieties- lalakada, Black rice, Brown rice, ambamor, dhudhmalai etc.

Seed Rate: Seed rates of 60-90 kg/ha

Spacing: Inter-row spacing of 20 cm and intra-row spacing of 10-15 cm is being followed.

Nutrient Management:

- Drop down Jivamrut 200 lit / acre through irrigation after sowing at every 15 days interval.
- Spraying of jivamrut must be done in moon light days

Spraying of jivamrut: in one acre planting area spray 200 ltr jivamrut filtered by cotton cloth

1st	After one month of sowing	100 lit water+ 5 lit Jivamrut

2nd	After 15 days of 1st spraying	150 lit water+ 10 lit filtered Jivamrut
3rd	After 15 days of 2nd spraying	150 lit water+ 15 lit filtered Jivamrut
4th	After 15 days of 3rd spraying	200 lit water+ 15 lit filtered Jivamrut
5th	After 15 days of 4th spraying	200 lit water+ 20 lit filtered Jivamrut
6th	Milking stage of crop	Sapt dhanyakuran ark/acre or 200lt water+ 5 lit sour Buttermilk

Crop Protection Measures:-

- When black and red spots start appearing on the plants apply 200 liter water + 5 liter butter milk (3 day old sour butter milk)+ 15 liter jivamrit
- For the control of Sucking pests, Leaf roller caterpillar, Army Warm spraying of Neemashtra 5 ltr. /200ltr watrer, Agniastra 8 ltr/200ltr water, Bhrahmashtra 8 ltr/200 ltr water and Dashparni ark 8 ltr/200ltr water on one acre

Package of practice of Ground Nut in Natural Farming

Land Preparation:-

- Well decomposed FYM @ 250 Kg + Ghan Jivamrut 250 Kg per hectare should be applied and incorporated in the soil at the time of field preparation.
- Apply organic manures mainly FYM/compost and green leaf manures 15 days before sowing.

Varieties and Seed rate:-

- Bunch type – GG-2, GG-5, GG-7, TG-26, TG-37-A, GJG-9 (120kg/ha)-60 cm
- Semi Spreading type – GG-20, GJG-22 (100kg/ha)-45 cm
- Spreading type – GAUG-10, GG-11, GG-12, GG-13, JGJ-HPS-1, GJG-17(80kg/ha)-30cm

Spacing and distance:-

- A soil preparation depth of 15 - 20 cm is generally considered for groundnut cultivation.
- These plant spacing are easily accommodated on 1.2 m wide broad beds with 30 cm furrows on either side of the bed.
- Four rows of groundnut at 30 cm spacing is recommended per bed.

Seed treatment:-

- Seeds should be treated with Bijamrut for controlling soil borne diseases like root rot and seedling rot and collar rot.
- Treatment should be given at previous night and treated seeds should be spread and dried over night and used for sowing in next day morning
- Before sowing soak the seeds in cow urine @ 25% solution, which will improves the germination and induce drought/hardiness.

Sowing Time:-

- Early sowing (Last week of May to First week of June)
- Timely sowing (15-30 June as per suitable rainfall)
- Summer - 15th Jan to 15th Feb

Sowing Methods:-

- 100 kg decomposed farm yard manure mixed with 100 kg of Ghan Jivamrut should be applied in the soil before sowing of seeds. After sowing mulching should be done with crop residue 200 ltr Jivamrut should be given in soil in every 15 days interval.

Irrigation Management:-

- Irrigation should be given at the following critical growth stages.
- 1st irrigation, 4 - 5 days after sowing, 20 days after sowing, at flowering give two irrigations.
- At pegging stage give one or two irrigations. In pod development stage, 2 - 3 irrigations depending on the soil type
- After sowing give first two irrigations with 500 lit. Jivamrut with water

Jivamrut Spray:-

- 12.5 lit. jivamrut + 250 lit. of water at 30 DAS
- 19 lit. jivamrut + 300 lit. of water at 51 DAS
- 25 lit. jivamrut + 375 lit. of water at 72 DAS
- 37.5 lit. jivamrut + 375 lit. of water at 83 DAS
- 7.5 lit. Sour Buttermilk + 250 lit. of water at 104 DAS

Mix / Inter Cropping:-

- Ground Nut + Cotton, Ground Nut + Castor, Ground Nut + Sesamum

Crop Protection Measure:-

- If any eggs/larva of insect seen on the leaves then spraying of mixed with 3 liter of Bramhastra and 3 liter of Agniatra in 200 liter of water.
- Control of sucking pests:- spraying of 200 ltr Neemastra per acre.
- Control of Nematode:- Spraying of Bramastra @ 3 ltr/100 ltr of water.
- Control of fungus/virus:- spraying of 3-4 days old butter milk mixed with 100 litre of water.

Harvesting Stage:-

- 90 to 120 Days After Sowing

Package of practice of Castor in Natural Farming

Land Preparation:-

- Ghan Jivamrut 250 Kg per hectare should be applied and incorporated in the soil at the time of field preparation.

Varieties:-

- GCH-1,2,3,4,5 and 7 varieties should be select for castor in Gujarat

Spacing:-

- Spacing in low fertile soil - 90 cm x 60 cm under rainfed and 90 cm x 20 cm under irrigated conditions (North Gujarat) and in fertile soil - 120 x 60 cm.
- The seeds may be sown at a 8 cm depth behind the plough or planter.
- Seed rate is 8 to 10 kg/ha

Seed treatment:-

- Seeds should be treated with Bijamrut for controlling seed and soil borne diseases

Sowing Time:-

- Timely sowing (Around 15 Aug. best time for sowing)

Irrigation Management:-

- Castor being a deep-rooted crop can extract water from considerable depth in the soil. Irrigations may thus be relatively heavy and less frequent. For higher yields, wherever, possible 2-3 heavy irrigations may be given.
- Under irrigated conditions, 3-4 irrigations at an interval of 15 to 20 days should be given after cessation of monsoon

Jivamrut Application:-

- After sowing 200 lit. Jivamrut per acre with first irrigation after that every month 200 ltr Jivamrut is given to every irrigation.

Jivamrut Spray:-

- Jivamrut should be sprayed every 25 days after one month of sowing

Mix / Inter Cropping:-

- Castor + Sun flower (1 : 2)
- Castor + Soybean (1 : 1)
- Castor + Cluster bean (2 : 1)

Mulching:-

- Mulching is done in castor by crop residue

Crop Protection Measure:-

- Initially, spray of Neem oil or Nimastra should be done for control of sucking pests like thrips and white fly @ 200 lit. per acre.
- For caterpillars and insects, Dashparniark/ Agniastra should be sprayed as recommended dose@ 7.5 lit. + 250 lit. of water
- The use of sour buttermilk or Sunthastra for fungal diseases in castor gives best results @ 7.5 lit. Sour Buttermilk + 250 lit. of water

Package of practice of Maize in Natural Farming

Land Preparation:-

- 200 Kg. Ghan Jivamrut per hectare should be applied and incorporated in the soil at the time of field preparation.

Varieties:-

- Gujarat maize -2, Gujarat maize -4,narmada moti,ganga safed-2, etc

Spacing:- 60 cm X 20 cm.

Seed Rate:- 15 to 20 kg per hectare

Seed treatment:-

- Seeds are treated with Bijamrut for controlling soil borne diseases and healthy growth.
- Treatment is given at previous night and treated seeds are kept overnight period and used for sowing in next day morning.

Sowing Time:-

- Kharif season crop: Seed is sown in the month of June/July.
- Rabi season crop: Seed is sown in October / November.

Irrigation:-

- The Kharif crop requires irrigation only when there is an extended period of water stress.
- However, the Rabi crop needs frequent irrigation at intervals of 15-20 days.

Use of Jivamrut in Soil:-

- 200 litres of Jivamrut per acre with irrigation water after planting. Then After 200 litres of Jivamrut are given with irrigation water two times in a month.

Spraying Schedule of Jivamrut:-

1) 1st Spray after one month of planting, 5 lit. Jivamrut mixed with 100 lit. of water.
2) 2nd spray after 21 days of first spray, 7.5 lit. Jivamrut mixed with 120 lit. of water.
3) 3rd spray after 21 days of Second spray, 10 lit. Jivamrut mixed with 150 lit. of water.
4) 4th spray after 21 days of Third spray, 15 lit. Jivamrut mixed with 150 lit. of water.
5) 5th spray after 21 days of Fourth spray, 3 lit. sour butter milk mixed with 100 lit. of water

Mix / Inter Cropping:-

- As per Agro climatic zone inter cropping is to be done, Maize-Pigeon Pea 1:1 or Maize-Castor 2:2 or Maize-Groundnut.

Crop Protection Measure:-

1) For control of sucking pests:- Spraying of Neemastra 200 ltr per acre.

2) For control of worm:- Spraying of Brahmastra @ 3 lit./100 lit. of Water.
3) For control of shoot borer & fruit fly:- Spraying of Agnisastra @3 lit /100 lit. of water.
4) For control of fungus/virus:- Spraying of 3-4 days old 3 lit Butter milk by mixed with 100 litre of Water.

Package of practice of Wheat in Natural Farming

Land Preparation:-

- With available FYM, Ghan Jivamrut 250 Kg per hectare should be applied and incorporated in the soil at the time of field preparation.

Varieties:-

- Timely sowing : Lok – 1, GW-366, GW-322, GW-496, GW-451, GW-503, GW-190, GW-273
- Limited irrigation – GW-1139, GW-1255, HI-8489

Seed Rate & Seed treatment:-

- 125 kg seed per hectare required for regular sowing and 125-150 kg seeds for late sowing
- Seeds should be treated with Bijamrut for controlling soil borne diseases like root rot and seedling rots.
- Treatment should be given at previous night and treated seeds should be dried over night period and used for sowing in next day morning.

Sowing Time:-

- Early sowing (1st week of Nov.)
- Timely sowing (10-15 Nov)
- Late sowing (25 Nov. to 15 Dec.)

Spacing and distance:-

- Row to row – 25cm
- Plant to plant – 5cm

Irrigation Schedule:-

- First irrigation 20-25 days after sowing (Crown root initiation stage).
- Second Irrigation 40-45 days after sowing (tillering stage).
- Third Irrigation 70-75 days after sowing (late jointing stage).
- Fourth Irrigation 90-95 days of sowing (flowering stage).
- Fifth Irrigation after 110-115 days of sowing (dough stage)

Use of Jivamrut in Soil:-

- 200 litres of Jivamrut should be given in soil with irrigation water after planting for one acre land. 200 litres of Jivamrut should be given with irrigation water two times in a month.

Spraying Schedule of Jivamrut:-

- 12.5 lit. jivamrut + 250 lit. of water 30 DAS
- 19 lit. jivamrut + 300 lit. of water 51 DAS
- 25 lit. jivamrut + 375 lit. of water 72 DAS
- 37.5 lit. jivamrut + 375 lit. of water 83 DAS
- 7.5 lit. Sour Buttermilk + 250 lit. of water 104 DAS

Mix / Inter Cropping:-

- Red Gram, Maize, marigold, sesamum, etc. sown as intercrop.

Crop Protection Measure :-

- Sucking pest – 7.5 lit. neemastra+ 250 lit. water
- Nematode- Bhrahmastra 7.5 lit. + 250 lit. of water
- Caterpillar –Agniastra 7.5 lit. + 250 lit. of water
- Fungus & Viruses - 7.5 lit. Sour Buttermilk + 250 lit. of water

Package of practice of Gram in Natural Farming

Land Preparation:-

- Farmers are generally prepared land in case of normal monsoon; the land should be prepared with 1-2 cross harrowing. This may help in conservation of moisture in the soil. If monsoon receives late, the land is prepared with one ploughing. In winter farm is totally filled with flood for a 2 or 3 months, in this period farmers add about 200 to 500 ltr/acre "JIVAMRUT". If farm is not filled with flood then they use about 200 to 400 kg/acre "GHAN-JIVAMRUT".

Selection of Variety, Spacing & Seed rate:-

- Gujarat desi CHANA-3 and Gujarat desi CHANA-5 varieties have a higher productivity. It shows moderate tolerance to diseases and pests which is popular among farmers. Therefore farmers prefer these varieties in natural farming.

Variety	Spacing(cm)	Seed rate(Kg/ha)
Gujarat chana-1	45 cm	70-90Kg/ha
Gujarat chana-2	30-45 cm	80-100 Kg/ha
Gujarat chana-3	10-15 cm	100 Kg/ha
Gujarat chana-5	45 cm	60 Kg/ha

Seed treatment:-

- Seeds are treated with Bijamrut for controlling soil borne diseases like root rot and seedling rots.
- Treatment is given at previous night and treated seeds are dried overnight period and used for sowing in natural farming.

Sowing Time:-

- Timely Sowing -15 Oct to 15 Nov.

Irrigation Management:-

- There is no need of irrigation because of field is fully filled with water in whole monsoon season

Use of Jivamrut in Soil:-

- 200 litres of Jivamrut is given in soil with irrigation water after sowing for one acre land. 200 litres of Jivamrut are given with irrigation water two times in a month.

Spraying Schedule of Jivamrut:- (per acre)

- 12.5 lit. jivamrut + 250 lit. of water at 30 DAS
- 19 lit. jivamrut + 300 lit. of water at 51 DAS

- 25 lit. jivamrut + 375 lit. of water at 72 DAS
- 7.5 lit. Sour Buttermilk + 250 lit. of water at 104 DAS

Crop Protection Measure:-

- 21 Days after showing spray "AGNIASHTRA" 4-5ltr/acre to protect the crop from larva. Mostly attack of aphid, sucking pest, gram stainers is easily controlled with the Dashparni Ark, bramhastra, agniastra, Nimastra etc.

- There is no major disease identified in the crop. Even though bacterialblight, fusariumwilt and root rot are easily controlled with sunthastra and castor cake.

Package of practice of Cumin in Natural Farming

Land Preparation:-

- Seedbed preparation is done after harvesting of kharif groundnut. Deep ploughing isn't carried out, as cumin is shallow rooted crop.
- Cumin is a medium duration crop, before time of sowing apply 250-300kg/acre Ghanjivamrut with Neem Cake

Selection of Variety:-

- Maturity days- 90-100 : Gujarat 4 variety mostly cultivated in the State.

Spacing :-

- Broadcasting Method is used for showing

Seed rate:-

- 15 to 16 Kg/ha

Seed treatment:-

- Seeds are treated with bijamrut and dried in shade for 3-4 hours before sowing. Sowing is done with the help of seed-cum-fertilizer drill

Sowing Time:-

- Timely Sowing -1 to 15 Nov.

Irrigation Management:-

- 1st : At the next day after sowing
- 2nd : At the 7day after sowing
- 3rd : After 1 month irrigation is given along with 200liter of jivamrut
- 4th : Flowering stage in 45 days to give saptdhnya ark to improve the quality and size of the seeds.
- 5th : Next 65 days after sowing +200ltr Jivamrut

Jivamrut Spray:-

- At the time of 3rd irrigation, jivamrut is sprayed in concentration of 1 L. jivamrut + 15 L. water. Subsequently sprays of jivamrut is done every 15 days afterwards (3-4 times till crop period ends).

Crop Protection Measure:-

- For termite Control – dhatura 1 kg + aakda 1 kg + 30 ltr cow dung slury + 1 kg besan flour + 2 to 3 kg sajiv mati apply with irrigation

- Alterneria blight – disease spreading control by uses 7 to 10 days old butter milk
- Spray cow urine, neem oil, neemastra and Dashparni ark for pest.
- old buttermilk, sunthastra used as fungicide

Package of practice of Potato in Natural Farming

Land Preparation:-

- 100 kg decomposed farm yard manure mixed with 100 kg of Ghan jeevamrut is applied in the soil before planting of potato.

Selection of Variety, Spacing & Seed rate:-

- Varieties : Kufri phokhraj, Kufri Badshah, Kufri Jyoti
- Seed Rate: 1.5 to 2.5 tons per hectare.
- Spacing: A row to row distance of 45 to 60 cm and plant to plant 15 to 20 cm should be maintained

Seed treatment:-

- Potatoes are propagated vegetative from tubers, either whole or cut into pieces. Many diseases are carried by seed potatoes and disastrous results may follow the use of diseased seed. So, seed are treated with Bijamrut

Sowing Time:-

- To secure high yields, it is essential to plant the potatoes at the optimum time. The best time of planting is when the maximum and minimum temperature is from 30 C to 32 C and 18 to 20 C respectively.
    - Early crop – 25th September to 10th October
    - Main crop – 15th October to 25th October
    - Timely Sowing -15 Oct to 15 Nov.

Irrigation Schedule:-

- Potato crop is very much responsive to good water management and removal of excess water is essential.
- Irrigation may be moderate because in natural farming, due to soil moisture conservation

Jivamrut Application:-

- 200 ltr jeevamrut is given in soil in every 15 days interval with irrigation.

Spraying Schedule:-

1) 1st spray, after one month of planting, 5 liter jeevamrut mixed with 100 liter of water.
2) 2nd spray, after 35 days of planting, 10 liter neem oil mixed with 100 liter of water.
3) 3rd spray, after 40 days of planting, 10 liter jeevamrut mixed with 150 litre of water.

4) 4th spray, after 43 days of planting, of 10 litre sour butter milk mixed with 100 litre of water.
5) 5th spray, after 50 days of planting, of 10 litre bramastra and 10 litre agniaastra mixed with 200 litre of water.
6) 6th spray, after 65 days of planting, of 20 litre jeevamrut mixed with 200 litre of water.
7) 7th spray, after 70 days of planting, 10 litre sour butter milk mixed with 100 litre of water.

Mulching:-

- After planting, mulching should be done with crop residues.

Crop Protection Measure :-

- Sucking pest – 7.5 lit. neemastra+ 250 lit. water
- Nematode- Bhrahmastra 7.5 lit. + 250 lit. of water
- Caterpillar –Agniastra 7.5 lit. + 250 lit. of water
- Fungus & Viruses - 7.5 lit. Butter milk + 250 lit. of water

Harvesting time:-

- 110 days after planting

Package of practice of Turmeric in Natural Farming

Land Preparation & Planting Method:-

- Farmers are generally prepared land with plough with 6 to 7 inch depth followed by leveller and bund former
- Beds are prepared at 4 fits distance. Turmeric is planted in two lines. plant to plant distance is 3 inch. The turmeric planting is done in a drumstick as a mixed crop
- 5 to 6 tons of Ghan Jivramrut per hectare + 2 to 3 ton of castor cake per hectare is mixed well into soil at the time of land preparation.

Selection of seeds:-

- There are so many varieties are available for the turmeric. Variety selection largely depends on many factors like availability of seed, end use i.e. either value edition into powder, tablet, curcumin oil extract or direct selling to the market. At present famous varieties among farmer are Salom, Pratibha and Rajapuri.

Spacing and distance:-

- *Flat Beds:* Used under rainfed conditions where soils are light. Flat beds 1 m in width and-of suitable length varying according to the slope of land are prepared.
- *Ridges and Furrows:* Under irrigated-conditions where the land is leveled or plain and soils are heavy, planting is clone on ridges and furrows, opened at 75 cm distance and haying 3-3.5 m length. Broad ridges should having 90 -100 cm width and 3 – 6 m length depending on the slope.

Seed Rate & Seed treatment:-

- Approximate 2500 to 2800 kg per hectare well grown mother rhizomes are required for sowing.
- Seeds are treated with Bijamrut for controlling soil borne diseases

Sowing time:-

- Ideal time for sowing is after 20th May to 15th June, depends on the water availability and moisture condition of the field

Irrigation Schedule:-

- It is a long term crop that's why its required frequent irrigation at the interval of 7 to 16 days.
- By drip irrigation system at 10 days intervals till June

Spraying Schedule of Jivamrut:-

- 1st : 5 Litre Jeevamrut mixed with 100 litres of water and then spraying at 15 days after planting.
- 2nd : 20 litre Jeevamrut mixed with 150 litres of water and then spraying at 21 days after fist spray
- 3rd : 20 litre Jeevamrut mixed with 200 litres of water and then spraying at 21 days after second spray
- 4th : 5 litre sour Butter milk mixed with 200 litres of water and then spraying at 21 days after third spray.

- 5th: 20 litre Jeevamrut mixed with 200 litres of water and then spraying at 21 days after fourth spray.
- 6th : 20 litre Jeevamrut mixed with 200 litres of water and then spraying at 21 days after fifth spray.

Mix / Inter Cropping:-

- Pulses, onion, garlic, etc. should be grown as companion crops.

Crop Protection Measure:-

- Mostly attack of Shoot borer, Thrips and Rhizome Scale are prevail into the area. It is easily control with the Dashparni Ark, Nimastra etc. in natural farming system.

Package of practice of Onion in Natural Farming

Land Preparation:-

- Apply 100 kg of ghanjivamrit and 100 kg of FYM per one acre of land for better crop growth.

Seed Rate, Selection and Treatment:-

- Seed rate varies from 8 to 10 kg/ha
- Selection of seed is also important. Seeds should be free from damage of disease as well as pest.
- Seed treatment with beejamrit which provides protection of seed from pathogen and insect pest and leads to better germination, growth and vigor.

Sowing, transplanting and harvesting timings:-

Season	Time of seed sowing / nursery	Time of transplanting	Time of harvesting
- Early Kharif	Feb.-Mar.	April-May	Aug.-Sept.
- Kharif	May-June	July-Aug.	Oct.-Dec.
- Late Kharif	Aug.-Sept.	Oct.-Nov.	Jan.-Mar.
- Rabi	Oct.-Nov.	Dec.-Jan	Apr.-May

Method of Sowing:-

- The seed generally sown in raised nursery bed. The surface of beds should be smooth and well levelled
- Raising seedlings and transplanting is the most common method practiced for irrigated crop as it results in high yield and large size bulbs.
- In plains, seeds are sown during October-November for a rabi crop.
- In hills, seeds are sown from March to June. Seeds are first sown in well prepared nursery beds of 90-120 cm width, 7.5-10.0 cm height and convenient length. Ratio between nursery area and main field is about 1:20. Seedlings of 15 cm height and 0.8 cm neck diameter are ideal for transplanting and this is achieved in 8 weeks. However, it varies from 6-10 weeks depending on soil, climate and receipt of rain. There is a practice of topping seedlings at the time of transplanting if seedlings are over-grown

Spacing and distance:-

- When the seedlings are 6 to 8 weeks old, transplant at a distance of 10 X 10 cm or 15 x 10 cm in the prepared bed.

Irrigation Schedule :-

- Onion is mainly grown as a irrigated crop in the State. Frequency of irrigation depends on soil and climatic conditions. Requirement of water varies with stages of crop. It requires less water immediately after establishment of seedlings and consumption goes on increasing with maximum requirement before maturity, around 3 months after transplanting, and thereafter it is reduced. So farmers irrigate the crop at 13-15 days interval during early stage followed by subsequent irrigations at 7-10 days interval

Nutrient Management:-

- Ghanjivamrit at the time of sowing or preparation of soil by spreading 200 kg of ghanjivamrit in all over a field of one hectare. During flowering stage apply 100 kg of ghanjivamrit in one hectare.

Mix / Inter Cropping:-

- Intercropping is not possible as onions are planted at short distances but rotation and mixed cropping in onion crop should be carried out by following the vegetable crops such as cauliflower, tomato and potato, which require large quantities of organic manures.
- During the initial five months after planting sugarcane, onion is grown as an inter-crop.

Schedule of Jivamrit application for nutrient management:

Spraying	Time of Spraying	Dose
First spray	After one month of sowing	5 lit. of jivamrit in 100 lit. of water
Second spray	15 Days after first spray	10 lit. of jivamrit in 150 lit. of water
Third Spray	15 Days after second spray	15 lit. of jivamrit in 150 lit. of water
Fourth Spray	15 Days after third spray	15 lit. of jivamrit in 200 lit. of water
Fifth Spray	15 Days after fourth spray	20 lit. of jivamrit in 200 lit. of water
Sixth Spray	15 Days after fifth spray	Saptdhanyankur ark or 5 lit of 3 day old buttermilk in 200 lit of water

Crop Protection Measure:-

- For the control of insect pest farmer use different plant based formulation available with them Neemastra formulation is used to manage sucking insect ex. aphid, thrips and whitefly initially.
- Various other formulation like Agniastra, Brahmastra and Dashparni Ark are used for the control of other major pest.

- For the control of various fungus causing disease like purple blotch, Alterneria leaf spot, powdery mildew, downy mildew, collar rot, etc. spraying of jeevamrit, Sunthastra, and 10 days old buttermilk, etc. is a common practice in natural farming.

Package of practice of Sugarcane in Natural Farming

Land Preparation:-

- Land is ploughed before planting. 400 lit. Jeevamrut with water is applied and 400 Kg Ghan Jeevamrut is added in the soil.

Planting time:-

- 10th August to 10th November

Seed rate:- 20.5 quintals per Acre.

Seed Treatment: - To dip sugarcane nodes in bijamurt for a 10 minutes.

Planting Methods:-

- Before planting of Sugarcane any pulse crops are grown. Beds are prepare at 4 fits distance. Sugarcane planted in two lines. Between two line of sugarcane vegetables and one line of pulse crops are sown as intercrop.

Irrigation Schedule:-

- Irrigation is given in each bed up to 3 months and after 3 months irrigation is given in alternate bed.

Spraying Schedule (per acre):-

1) 5 Litre Jeevamrut mixed with 100 litres of water at one month after planting.
2) 20 litre Jeevamrut mixed with 150 litres of water at 21 days after 1st spray.
3) 20 litre Jeevamrut mixed with 200 litres of water at 21 days after 2rd spray.
4) 5 litre sour Butter milk mixed with 200 litres of water at 21 days after 3rd spray.
5) 20 litre Jeevamrut mixed with 200 litres of water at 21 days after 4th spray.
6) 20 litre Jeevamrut mixed with 200 litres of water at 21 days after 5th spray.

Intercropping:-

- Pulses, onion, garlic, turmeric etc. are grown as companion crops.

Crop Protection Measure:-

- If any eggs/larva of insect seen on the leaves, spraying mixture of with 3 lit. Bramhastra + 3 lit. Agniatra in 200 lit. of water.
- If attack of any fungus observed, spraying of mixture of 3 lit. sour butter milk in 150 lit. of water.

Package of practice of Banana in Natural Farming

Land Preparation:-

- At the time of land preparation 200 kg Ghanjivamrit is applied thoroughly mixed with soil.

Selection of plants:-

- Kevandish –Small size variety called elaichi banana also
- Robstra- Medium height G-9 Bajrangi etc
- Deshi- It grows high –create family (suckers) and very sweet in taste
- 400 to 500 gm weight rhizomes of banana are selected for planting

Seed treatment:-

- Rhizomes are dipped in to Beejamrut culture and then sown in the pit

Planting Time:-

- Mainly Banana is planted in June to August.

Spacing:- 6 X 6 feet

Planting Method:-

- Bijamrut treatment by dipping sucker of banana in bijamrut and treated sucker are kept in shadow for 24 hour for drying. Dug the pit at 6x6 feet row spacing. The pits are prepared 1.5x1.5x1.5 feet and fill it with soil and 150 gm ghanjivamrut. After drying, suckers are planted in the prepared pit and light irrigation applied.

Irrigation Schedule:-

- After planting irrigation is given in all furrows. After 3 months, water is given in alternate furrows with jeevamrut. New shoots araising from rhizoms are cut and kept on the soil as mulching

Spraying Schedule of Jivamrut:-

- In one acre planting area spray 200 ltr jivamrut which is filtered by cotton cloth
- **At initial stage :**

1st	After one month of sowing	100 lt water+ 5 ltr Jivamrut
2nd	21 days after 1st spraying	150 lt water+ 10 ltr Jivamrut
3rd	21 days after 2nd spraying	200 lt water+ 20 ltr Jivamrut
4th	21 days after 3rd spraying	200 lt water+5 ltr sour Buttermilk+ 15 lt Jivamrut
5th	1 month after 4th spraying	200 lt water+ 20 ltr Jivamrut at fruit setting stage
6th	Milking stage of crop	Sapt dhanyakuran ark + 5 ltr sour Buttermilk in 200 ltr. water

- **After Fruit Setting**

1st	15 days after fruit setting	200 lt water+ 10 ltr Jivamrut on leaves and fruits

2nd	15 days after 1st spraying	200 gm rice powder, 200 gm powder of white/black in 5 ltr water boil until half of the water evaporate and let it cool at room temperature, add 200 ltr water and 500 gm jaggery, filtered by cotton cloth and spray immediately
3rd	15 days after 2nd spraying	200 lt water+ 15 ltr Jivamrut
4th	15 days after 3rd spraying	Sapt dhanyakuran ark without adding water
5th	15 days after 4th spraying	200 lt water+ 20 ltr Jivamrut
6th	15 days after 5th spraying	200 lt water+ 2 ltr coconut water/ Sapt dhanyakuran ark without adding water
7th	15 days after 6th spraying	200lt water+ 5 ltr sour Buttermilk
8th	15 days after 7th spraying	Sapt dhanyakuran ark

Mix / Inter Cropping:-

- Marigold, onion, cluster bean and vegetables are planted as intercrops. jeevamrut is given with irrigation water at 15 days interval.

Nutrient Management:-

- Cluster bean gives N from air till fourth month to banana and chilli, after four months, pigeon pea will continuously provide nitrogen. Marigold will protect the banana plant from nematode. Honey bee will attract beneficial farm insect. which will protect the plant from insect and also useful in pollination.
- Production of more humas in banana crop due to do mulching. Which helps to grow banana stem and also increase fruit yield.
- Stems are kept as such after harvesting, and mulching by cutting its leaves. when the side suckers grow the plant juice will transfer from mother plant to suckers which help to grow fast. After second year all the side suckers are removed by leaving two side suckers of opposite direction. So, that way banana produces fruits for number of years without planting new plant. When new banana leaves produce, the oldest leaves turn yellow and fall down which provide nitrogen, phosphorus, potassium and magnesium to the roots of mother plant. They also provide calcium, iron, manganese, boron and zinc

Crop Protection Measures:-

- There is no any pest and disease are observed in the crop in natural farming so no need to spray neematra, agniashtra etc.

Package of practice of Mango in Natural Farming

Preparation of Land:-

- Usual ploughing, harrowing and leveling as well as preparation of irrigation channels. Square system of planting is most convenient for mango cultivation.

Selection of seedlings:-

- Selection of good and healthy plants, getting of native mango stones and grafting of Kesar mango stalks on it.

Planting Time:-

- According to the natural method, mango is planted in the month of July - September. At that time, the soil is fertile due to high moisture content and micro-organisms in the soil

PLANTING:-

Systems of planting:

- The systems in vogue are the 1. Square 2. Rectangular 3.Quincunx 4. Hexagonal and 5. Contour. Square system is the most common in mango. The planting distance will vary with the vigour of the cultivar and the location ranging between 12x12 fit.

Preparation of Pits and Planting:-

- Digging a pit at a distance of 12 to 15 feet in the mango orchard and Jivamrut, Ghan Jivamrut are given in it.
- Planting distance will vary according to vigor of variety and type of soil.
- Pits of 1.5×1.5×0.5 feet are dug during summer (two months before monsoon). Kept open under the sun. Pits are filled with Ghan jivamrut of ¼ of pit+ 0.5 ltr jivamrut. Before planting graft/seed are treated with Bijamrut.
- Planting is done during the rainy season when the soil in the pits has already settled. While planting earth ball should not be break and graft union remains well above the ground level. The planting is preferably done during cloudy weather and in the evening. The plants are irrigated immediately after planting. Mix cropping with drum stack, pomegranate etc., provide sufficient sun light and nutrient for the mango plantation.

Irrigation Schedule:-

- Irrigation in Mango orchard at an interval of 30 days in winter and 15 days in summer. If drip irrigation is done, give 20 litres in winter and 20 litres in summer at an interval of a day. In summer cover dry leaves around the trunk so that moisture is retained. Two to three irrigations in the month of March / April is required.
- It is a long duration crop that's why its required frequent irrigation at the interval of 7 to 16 days according to the soil condition.
- By drip irrigation system give irrigation at 10 days intervals till June.

Mix / Inter Cropping:-

- Initially fenugreek, chickpeas, vegetables are planted around the plant trunk as intercrops.
- Green turmeric is planted after thickening of aging as turmeric turn the soil green and provide good amount of nitrogen.

Fertilizer Management:-

- Spraying of jivamrut on the day of Poonam, the plant absorbs more nutrients.

The fertilizers schedule for mango for different ages is as follows

Age of the tree	**Jivamrut** liter / tree	**Ghan Jivamrut** kg / tree
First Year	1	1
Second Year	2	2
Third Year	3	3
Forth Year	4	4
Fifth Year	5	5
Sixth Year	6	6
Seventh Year	7	7
Eighth Year	8	8
Ninth Year	9	9
Tenth Year	10	10

Fertilizers are applied through placement in circular trenches around the trunk of tree.

Crop Protection Measures:-

- Use Brahmastra, Agniastra, Sunthastra, Khati Chhas etc. according to the pest & disease found in mango crop.
- Spoiled or bird-eaten mangoes are kept in a 500 liter tank of water for 6 months and then spraying provide natural hormones.
- To prevent falling of flowers, add HING in buttermilk and use after 10 days.
- Mango is prone to damage by a large number of pests, diseases and disorders. The most important of the recommended and common control measures are summarized below.
- **Mango Hopper**: Two sprays of Agniastra (in panicles crisis and on the size of fruit peas),
- **Mili Bug**: Spraying Nimastra in November
  Grease 400 gauge and 20 cm wide polythene strips near and around the trunk at 15 days intervals as control is required.
- **Powdery mildew**: Two to three sprays of sour buttermilk or sunthastra in 10-15 days.

- **Anthracnose**: Two sprays of Dasparniark at fortnightly intervals.
- **Fruit drops**: Regular irrigation during fruit development for timely and effective control

Package of practice of Vegetables in Natural Farming

Land Preparation:-

- For Green manuring, leguminous crops like Dhaincha,Sunhemp, etc. are grown, spray 200 litres of Jivamrut with irrigation water.

Seed Treatment:-

- Seeds are treated with Bijamrut culture for 7 hrs and then drying in shadow before sowing.

Planting Methods:-

- If inter-cropping, spacing between two plants are 2 ft. and raised bed prepared at 4 ft.
- If intra-cropping, spacing between plants are 2.5 ft. and raised bed prepared at 5 ft. and Jivamrut is applied on raised bed.
- Decomposed FYM mixed with 25 kgs Ghan Jivamrut is applied in the field.
- Brinjal,Chilly,Tomato,Cucumber,Bottle gourd,Bitter gourd,Water melon,Musk melon etc. seeds are treated with Bijamrut and sown on two sides of bed slops.
- Cluster bean, Marigold is in sown on both side of raised bed at lower sides.

Use of Jivamrut in Soil:-

- 200 litres of Jivamrut should be given in soil with irrigation water after planting. 200 litres of Jivamrut should be given with irrigation water at an interval of 15 days in a month. 6 times Jivamrut require for Vegetable crops with irrigation Water.Spray 10 % Deshi Cow Urine if crop became yellow.

Spraying Schedule of Jivamrut:-

- 1st Spray after one month of planting 5 lit. Jivamrut mixed with 100 lit. of water.
- 2nd spray after 21 days of First spray 7.5 lit. Jivamrut mixed with 120 lit. of water.
- 3rd spray after 21 days of Second spray 10 lit. Jivamrut mixed with 150 lit. of water.
- 4th spray after 21 days of Third spray 15 lit. Jivamrut mixed with 150 lit. of water.
- 5th spray,after 21 days of Fourth spray 3 lit. Sour Butter Milk mixed with 100 lit. of water.
- 6th spray, after 21 days of first spray 15 lit. Jivamrut mixed with 150 lit. of water.

Crop Protection Measures :-

- Control of Sucking Pests:- spraying of Neemastra 200 liter per acre of land
- Control of Worm:- Spraying of Brahmastra @ 3 ltr/100 ltr of water.
- Control of Shoot borer & Fruit fly:- spraying of Agnisastra @3 lit./100 lit. of water.
- Control of Fungus/Virus:- spraying of 3-4 days old butter milk mixed with 100 litre of water.