FARMING SITUTION BASED EXTENSION

Introduction:

A major challenge in Indian agricultural development in the present decade and beyond lies in the effective involvement of farmers in the extension and research programs. The continued stress is more on developing procedures or methods that encourages farmer's participation in planning and management of above programs. The top down approach in vogue in planning and implementation of programmes and projects by and large has not resulted in desired effects. Such developmental approaches many a times stem from planners who are not familiar with situations at the gross root level. In the planning process formulation of proposals often take place with little or no consultation with the people for whom the planned activities are intended. Farmers do not adopt many new ideas largely because they do not take into account all the factors influencing the farmer's decision to accept an innovation. Appropriate recommendations specific to crop situation can be developed by involving farmers in the whole process of technology development. This requires major changes in the attitudes, approach and role of researchers and extensionists. As such an approach which provides active participation of farmer - researcher and extensionist in developing a modified / fine tuned technological recommendations specific to crop situation has been attempted through "Sitution Specific Extension Strategies.

Evolution of concept:

In the past several attempts were made in classifying climates and the agro-climates. Earlier attempts in classifying the agro-climatic regions were centered round the parameters like average rainfall or temperature that influences the crops / vegetation in abundance (Burgos, 1958, Trewartha, 1968). Thornthwaite's (1948) classification concentrates more on climatic factors that affects plant growth throughout the growing season. FAO recognized the major climates by super imposing isolines of growing periods at 30 days interval on to major climates, agro-climatic zones were defined. The growing periods calculated on the basis of mean daily temperatures (T), precipitation (P) and potential evapo-transpiration (PET). FAO considers an agro climatic zone as a level unit defined in terms of major climate and growing period, which is climatically suitable for certain range of crops and cultivars.

Planning commission has identified 15 resource development regions in the country, aimed at the regionalization of the Indian agricultural economy and to organize agricultural planning systems for 15 agro-climatic regions so identified and to develop policies for faster agricultural development on regional basis. The emphasis was made more on specific characteristics of prevailing agro-ecological parameters like soil topography, climate and water resources.

Approach and analysis of NARP Concept:

Under the National Agricultural research project (NARP) the country was divided into 126 agro-climatic zones for 17 states and 6 union territories of north eastern hill regions. The concept of zoning was mainly based on ecological land classification,

recognizing various components like soils, climate, topography, vegetation etc. as major influencing factors. The zones were selected as contiguous areas within the state boundary and to the possible extent zones have homogenous physical characteristics such as topography, rainfall, soils etc. Each agro-climatic zone was upgraded with a Zonal Research Station (ZRS) for conducting research and generating technologies for that zone. The emphasis was on analysis of agro-ecological conditions and develop balanced and coherent research programmes directed squarely to the major problems limiting the agricultural growth in the zone. Through this process technologies are being evolved separately for each of the major commodities namely different agricultural crops, horticultural crops, live stocks etc. Package of practices for respective commodities are specific to the zone which are able to take care in a better way the requirements of the zone as compared to conventional approach in which generalized package of the commodity evolved for the whole state.

However, even within a NARP zone each commodity is grown / managed under a number of situations. The production problem related to that commodity varies from situation to situation. The common package evolved even at the zonal level is not ideally suited for different situations of the concerned commodity, likewise extension needs for improving the productivity of that commodity also varies considerably from situation to situation with a given NARP zone. Hence there is a need to carry out situation oriented research and extension programmes. The first step in this direction is to identify the farming situations under which each commodity is grown / managed in the zone. There could be two possible options to do the above job.

Farming Situation Based Research and Extension:

Under this option the entire area of the NARP zone is divided into number of situations based upon important factors namely variation in rainfall, soil type and source of irrigation. Variation in soil type in terms of structure, texture, soil depth, soil reaction, drainage, landscape and variation in moisture regime linked with both rainfall and irrigation are the major considerations in delineating situations. Based on this factors different farming situations are mapped in each NARP zone. As an example in southern Telengana zone a total of 18 farming situations have been identified keeping in view the variability in above factors (appendix-I).

Crop / Enterprise Based Research and Extension:

While applying this concept of farming situation at the field level we have to proceed with one commodity at a time. It has been observed that each commodity is grown under a number of farming situations in a zone. The factors which determine the farming situation of a commodity includes not only the three fixed variables indicated above (rainfall, soil and irrigation) but also includes some of the flexible variables namely time of sowing, previous crop, source of irrigation, soil borne problems etc. These additional flexible variables also require situation specific approach with regard to development of technological package or extension of new technologies. When such factors are taken into account even a single village or even a single farmer may have more than one situation of a given commodity. It may however be mentioned a particular crop available with different farmers or different village within a NARP zone may still require a uniform technology and hence would not create a unmanageable circumstances.

In the light of the above mentioned facts MANAGE initiated a specific method "Situation Specific Extension Strategies" for participatory planning of extension activities. In this method the crop / commodity situation in which it is grown is taken as the basis for resynthesising the blanket technological recommendations rather than an area as a whole. The crop situations are delineated with the agronomic factors like sowing time, previous crop, source of irrigation (canal, tank, well) soil borne problems etc. The variations in these micro level agronomical factors leads to different crop culture and demands for a modified / refined technological package rather than a standardized technological package. The main features of this approach are as follows:

- ***Analysis of major situations of a crop (within a given agro-climatic zone)***
- ***Re-synthesis of the technological package of the crop (under each crop situation) through a joint effort of researchers, extensionists and farmers***
- ***Assessment of gap in the adoption of technology and using it as the basis for working out the required extension strategy***

Analysis of crop / enterprise situations:

The difference in the crop situations is not due to micro-level variability in rainfall, soil type, etc., but mainly due to agronomic factors related to the crop namely, sowing time, previous crop, source of irrigation (in case of irrigated crops), location specific problem, etc.

In southern Telengana Zone (of Andhra Pradesh) rabi groundnut is grown under 6 different situations (Table 1A&B) and castor is grown under 5 different situations (Table-2).

Table 1 A : Type of situations of rabi groundnut crop in Nalgonda District (Andhra Pradesh)

Previous crop	Farming situations /source of irrigation			
	Well	Canal	Tank	Residual moisture
Paddy	1	2	-	-
Non-paddy	3	4	5	6

Table 1B : Area under different situations of rabi groundnut crop in Nalgonda District(AndhraPradesh)

Sl.No.	Farming situation	Area (ha)
1.	Paddy under well	15000
2.	Paddy under canal	5,000
3.	Non-paddy under well	10000
4.	Non-paddy under canal	12500
5.	Non-paddy under tank	5000
6.	Non-paddy under residual moisture	2500
	TOTAL	50000

Table 2 : Type of situation in castor crop in Mahaboobnagar district (Andhra Pradesh)

Sowing time	Rainfed condition			Irrigated condition
	Normal field	RHC endemic field	Root-wilt endemic field	
Early		1	-	-
Normal	2	-	4	5
Late		3	-	-

The field studies have revealed that production problems differ significantly from situation to situation. But at present there is only one generalized technology for each of these crops. This raises a series of questions.

- How can a single 'package' be relevant for all the crop situations of a particular crop (within a NARP zone)

- Does it mean we need to have 6 different technology packages of rabi groundnut and 5 different technology packages of kharif castor in Southern Telangana zone?
- Can we afford to initiate 6 separate research programs for rabi groundnut and 5 for castor in the above zone of Andhra Pradesh.
- If not do we have the responsibility of refining the technology to the extension functionaries or the farmers -community themselves.
- Lack of relevance of the generalized technology to the real crop-culture condition has been a serious concern of the research managers. This has led to a number of new concepts and research methods which require participation of farmer as a co-

research worker rather than a mere beneficiary. The following observations shall illustrate the significance of above point.

- The technology package must be evolved jointly by the scientists, farmers and extension persons *(Krishna Murthy and Venkateswarlu 1978).*

- "A farmer is the best agronomist for the situation under which he/she is working" (*Appa Rao 1985)* The possibility of developing technologies at research stations which can diffuse widely in dry regions is remote" (*Gupta 1989)*

- Agricultural research can be done in laboratories and experimental fields but agricultural technologies can be developed only in farmer fields. Since technology has both economic and ecological dimensions, technologies have to be location specific to be ecologically, economically and culturally sustainable" *(Swaminathan 1989).*

Such observations have been made by various persons all over the world which have led to the evolution of farmer participatory research methods. The recent reviews and analysis on this aspect (*Chambers et al. 1989*) *Farrington and martin 1988, Marrill Sands 1989; Biggs 1988*) have clearly brought out that these methods are complementary to the conventional research methods and can greatly enhance the efficiency of the technology generation process provided they are properly institutionalized.

Re-synthesis of technological package:

If farming situations are to be identified through the fixed variables as in option-I, it would be essential to carry out decentralized on-station research in each of the concerned situations. Such a step in many locations does not appear to be feasible, due to resource constraints. Hence there is a need to initiate an alternate participatory process involving the concerned scientists, experience extensionists and innovative farmers, through which the available package of technology could be resynthesized to meet the situation specific requirements. The alternate process is essentially based on the information about the suitability of each component in the generalized package for the crop situation, indigenous technical knowledge of the farmers and specific production problems for the concerned crop situation.

Based on the above information the original package of practices is thus resynthesized through elimination or addition of certain components. The resynthesised package may then be tested in farmers fields under specific situations for validation and final recommendations. This participatory process of resynthesising the technologies, thus not only make use of original findings emerging from on-station research at NARP zonal level but also make use of indigenous innovations of farmers and field experiences of extensionists.

Under this approach one can easily work with larger number of situations arising on account of fixed variables but also flexible variables. To illustrate an example, the

resynthesised package for six different crops situations of rabi groundnut in southern telegana zone have been given in table-3 and for 5 different crop situations of castor have been given in table-4.

Table 4 : **Specific technological packages for different farming situations of castor in Ranga Reddy district (AP) during 1992.**

S. N	Item	Technology package for different situations*				
		1	2	3	4	5
1.	Sowing time	End of May	End of June	End of July	End of June	End of June
2.	Variety	Aruna	GCH-1	Aruna	48-1	Gauch-1
3.	Seed rate (kg/ha)	10	5	10	10	5
4.	Seed method	Row planting	Square system	Row planting	Row planting	Square system
5.	Spacing (cm)	60 x 20	60 x 20	60 x 20	60 x 20	90 x 90
6.	Fertilizer (k/ha)					
	Basal / dressing					
	- N	18	18	28	18	18
	- P_2O_5	46	46	28	46	46
	Top dressing (N)	20	2		20	40

7.	Method of fertilization	Furrow	Pocketing	Furrow	Furrow	Pocketing
		placement	Method	placement	placement	method
8.	Pest/disease control					
	RHC	Bon fire	-	Bon fire	-	-
		Vegetative		Vegetative		
		trap		trap		
	Semilooper	Broad cast	Broad cast	-	Broad cast	Broad cast
		cooked rice	cooked rice		cooked rice	cooked rice
	Bihar hairy caterpillar	-	-	Hand picking	-	
	Root wilt	-	-	-	1.Tolerant	1.Tolerant
					variety	Hybrid
					2. Longer	2. Longer
					rotation	rotation
					3.Avoid	3.Avoid
					FYM	FYM

- Refer table 2 regarding details of crop situations

GAP ANALYSIS FOR PLANNING OF EXTENSION STRATEGY:

Under the top-down approach, recommended package of practices is considered as the ultimate basis for technical planning of demonstrations and training programmess. It has been observed that in many cases yield under the demonstration plots has not been found to be significantly higher than the yield of plots which are outside the demonstration plots. This kind of experience has often created an impression that the improved technology does not appear to be promising under the farmers' field condition.

A critical analysis of the situation has, however, revealed that 70-80 percent of the inputs used in the demonstration plots are similar to those which are used by farmers outside the demonstration plots. This partly explains the reasons for lack of desired results from the demonstration plots. Similarly in the training programme there has often been a tendency (on the part of the trainers) to talk about the full package of technology of a given crop without any consideration to the existing level of its adoption by participating farmers. Such a situation creates disinterest among trainees / farmers since a part of the technical content is already known is being practiced by them.

Needless to mention, participatory approach for planning of extension strategy is crucial to overcome the above limitations. Under this approach 'gap in adoption' (rather than improved technological package) becomes the ultimate basis for planning of extension strategy. The details regarding the application of above approach has been

discussed below :

Situation based participatory extension methods:

The extension programme can broadly be divided into the following two groups:

- *The development programmes eg.,NWDPRA, NOP, NPP etc.*
- *General extension progamme eg.T&V etc.*
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PILOT DEVELOPMENT PROGRAMMES:

In case of pilot development programmes lot of funds are available for conducting demonstration on new technology. The level of supervision and monitoring in such programmes is also high. The results of the demonstration are regularly compared with the existing practices of the farmers so that subsequent steps could be taken for promoting the new technology through the general extension programme. Under such programmes budget utilization is considered to be one of the crucial parameter during the regular reviewing and monitoring. Hence planning for budget utilization becomes a part and parcel of the technical planning. The main features of the farmer participatory planning of extension programmes for pilot project are as follows:

- *Identification of gap in adoption (i.e. difference between existing practices and recommended practices)*

- *Assessment of total cost required for filling the above gap*
- *Analysis of critical inputs and critical practices (out of the gap in adoption) through proper prioritization of items. Normally the following three criteria are used for prioritizing the items out of the gap in adoption.*
- *Availability of the budget*
- *Availability of required input*
- *Relative profitability of different components in the gap*

A specific example for identification of critical inputs / practices with respect to demonstration on rabi groundnut under NOP in Nalgonda district of Andhra Pradesh has been given in Table 5. In this particular case the gap in adoption consists of technological items like variety , fertilizer, herbicide etc. The total cost required for filling the gap worked out to Rs.1900 per ha. Keeping in view the available budget of Rs.1200 per ha. for the demonstration programme under NOP and also other factors mentioned above, the prioritization of technological items was done. The resultant items out of the gap in adoption have been divided into the following two categories :

Critical inputs : *It consists of those components of technological package which require cash investment and which are not being currently adopted by the farmers (table-5)*

Critical practices : *It consists of those improved cultural practices which are not being followed by farmers and which can normally be implemented through the family labour*

or draft power.

In the participatory approach for planning of extension strategy, the cost required for adoption of different items under improved technology is shared by the farmers and the host institution. Farmers contribute towards full cost of some of the improved inputs (which are adopted by them during last year) whereas host institution contribute only for critical inputs which are completely new for these farmers. The investment by host institution towards critical inputs is however conditional in the sense that it shall be made only when farmers implement the required 'critical practices' at their own level.

Such an approach allows the institutional investment only for new inputs (critical inputs) and hence, it is likely to either provide a significant increase in yield as compared to outside plots or provide the required feed-back about the technological constraints. The linking of critical practices (as a prerequisite to the investment on critical inputs) shall help in minimizing the attraction of farmers towards subsidized inputs in the demonstration programme.

General Extension Programmes :

In the above programme (particularly under T & V set up) there are no funds for conducting demonstrations. However, limited funds are available for organizing adaptive trials. Frequent visits and contacts with farmers are however made to train them about new technologies. Hence, for this kind of extension programme, the following three categories of information are needed :

- What is the size of gap?

- Why the above gap is existing?

- What specific actions should be taken to bridge the gap?

What is the size of gap:

The gap in adoption refers to the difference between improved practices and existing practices of the farmers. This gap obviously varies considerably with time and space depending upon the existing level of adoption by the farmers. Different crop situations within a given situation may also have different size of gap. Some of the situations may have large gap (Table 6) whereas others may have negligible gap as was found in case of kharif sunflower in Kurnool District of Andhra pradesh (Table 7). The gap may also vary from farmer to farmer within a given village. Hence some kind of generalization may be required while describing the size of gap. For the sake of simplicity any item which adopted by more than 30 percent farmers may be considered as the existing practice. In case there are striking differences from farmer to farmer, a separate categorization may be done on the basis of type of farmers (small, medium, large etc.) for the analysis of gap.

Why the gap is existing:

After analyzing the gap in adoption, it is essential to find out from the concerned farmers the specific reasons for the gap so that appropriate follow-up action could be taken. Normally the gap could be due to any one of the following reasons:

- Lack of awareness, knowledge or skill
- Lack of conviction or motivation
- Fear of loss
- Lack of resources (finance), or availability of inputs etc.

The details about preliminary analysis of reasons for adoption gap in case of rabi groundnut in Nalgonda District (A.P.) are given in Table 8.

What to do for overcoming the gap:

Gap in adoption would be bridged efficiently if appropriate extension strategy is worked out for each component of the gap. The specific reasons for the gap shall provide a lead to choose appropriate steps. Mass media approach may be needed for cases where lack of awareness is the main reason; skill oriented training programme may be needed if gap is due to lack of a particular skill : adaptive trial or demonstration maybe needed depending upon whether the farmer has lack of conviction or fear of loss. In some cases exposure visits to other farmers' fields (where successful adoption is being done) shall be required if motivation is missing; obviously none of the above extension methods shall help if lack of resource / input is main reason for the gap. A typical example of the above approach has been given in table 8. Under this approach major emphasis is laid on using an appropriate extension strategy for each item (under the gap in adoption).

Table 5: Critical inputs for large size demonstrations on rabi g.'nut under NOP in Nalgonda District (AP) during 1991-92 Cropsituation1

Previous crop : Paddy, Source of irrigation :Well, Sowing time:Early December

SN	Item	Existing practices	Recommended practices	Cost (Rs/ha)	
				Gap in adoption	Critical inputs/ practices
1.	Land preparation	Flat bed	Raised bed	240	120
2.	Variety	TMV-2	JL-24	FULL	-
3.	Seed rate pods (kg/ha)	170	230	900	450
4.	Seed treatment	NIL	Dilthane M-45	50	50
5.	Fertilizer (k/ha)				
	- P_2O_5	DAP-125	SSP 375	160	160
	- K_2O	MOP-40	MOP-50	20	20
	- N	NIL	Urea 40	130	-
	-Zns504	NIL	5	50	50
6.	Gypsum	NIL	250	100	100
7.	Pest/disease control				
	-Leaf webber/aphids	1 spray	1 spray	-	-
	-Spodoptera (lt//ha)	1 spray	Monocrotophos	-	-
	Heliothis		0.75 lit.		
	-Leaf spot	Nil	Nil		
8.	Herbicide (lt/ha)	Nil	Butachlore	250	250
			2.0 lit.		

9.	Any other	-	-	-	-
	TOTAL			1900	1200

Item No.1 is a critical practice as it can be done through family labour & bullocks whereas rest of the items are critical inputs.

Table 6: Critical inputs for large size demonstrations on rabi g.nut under NOP in Nalgonda District (AP) during 1991-92 Crop situation : 3

Previous crop : Non-Paddy Source of irrigation : Well Sowing time : Early December

SN	Item	Existing practices	Recommended practices	Cost (Rs/ha)	
				Gap in adoption	Critical inputs/ practices
1.	Land preparation	Flat bed	Raised bed	250	100
2.	Variety	TMV-2	JL-24	FULL	-
3.	Seed rate pods (kg/ha)	170	230	900	400
4.	Seed treatment (gm/ha)	NIL	Dilthane M-45	50	50
			(500 gms)		
5.	Fertilizer (k/ha)				
	- P_2O_5	DAP-125	SSP 375	160	80
	- K_2O	MOP-40	MOP-50	20	20

	- N	NIL	Urea 40	130	-
	-Zns504	NIL	5	50	50
6.	Gypsum	NIL	250	100	100
7.	Pest/disease control				
	-Leaf webber/aphids	1 spray	1 spray	-	-
	-Spodoptera	1 spray	1 spray	-	-
	Heliothis				
	-Leaf spot	Nil	Dithane M-45	300	300
			(2 kg)		
			Bavistine		
			(0.5 kg)		
8.	Herbicide (lt/ha)	Nil	Butachlore	250	100
			2.0 lit.		
9.	Any other	-	-	-	-
	TOTAL			2210	1200

Table 7: **Critical inputs for large size demonstrations on Kharif Sunflower under NOP in Kurnool District (AP)**

Crop situation : Rainfed Ayacut area, Sowing time : June-July Type of land : Black soils Irrigated / Rainfed : Rainfed

S	Item	Existing	Recommended	Cost (Rs/ha)		Critical
N		practices	practices	Gap in	Critical inputs/	practice
				adoption	practices	
A.	Inputs					

1.	Variety	MSFH-17	MSFH-17	-	-	
		MSFH-1	MSFH-1			
2.	Seed rate (kg/ha)	7.5	5.0	-	-	
3.	Seed treatment	NIL	Capton/Thiram	50	50	
4.	Fertilizer use Basal (k/ha)					
	-N	20-35	30	-	-	
	- P	20-57	30	-	-	
	-K	37	30	-	-	
	Topdress					
	- N	57	30	-	-	
5.	Pest/disease control					
	Heliothis	BHC-dust	Hand picking	-	-	
			with thorn			
	- Alternaria	Nil	Bavistin spray	200	200	
			(once in 3-4 yrs)			
B.	Practices		0.75 lit.			
1.	Sowing time	June-July	June-July	-		
2.	Method of sowing	Seed drill	Seed drill with	-	-	
		(goru)	para	50	-	Yes
3.	Method of fertlizer use					

	Basal Topdress	Broadcast	placement with seed drill	-	-	Yes
4.	Row spacing (cm)	30x15	45x30	-	-	Yes
5.	Cropping system	Mono cropping	Mono cropping	-	-	-
	TOTAL			300	250	

CONCLUSION:

The concept of crop situation based extension has been experimented by MANAGE since 1992-93 in different crops in different agro ecological situations in the country namely groundnut, sunflower, castor, paddy, wheat, mustard, cotton etc. in the states of Andhra Pradesh, Haryana, Gujarat, Orissa, Tamilnadu, Maharashtra, Uttar Pradesh, Bihar, Himachal Pradesh etc. This concept can be usefully applied in narrowing down the gap in adoption by re-synthesizing the standardized recommendations emanated from university research by involving farmers, extensionists and researchers. As such a crop specific and farmer driven technological recommendation can be developed, besides an extension strategy to bridge the knowledge and skill gap can also be framed thus making the job of extension worker more easy and meaningful. However, it is still necessary to devise ways whereby the focus can be on farming system as a whole rather than a crop in re-synthesizing and formulization of system specific technologies.

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