ECONOMIC ANALYSIS OF INTEGRATED PEST MANAGEMENT TECHNOLOY IN REDGRAM

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Redgram which is also known as arhar or tur is one of the major pulse crop of tropics and sub-tropics. India accounts for 90 per cent of its world output with an area of 3.73 million hectares and production of 2.19 million tonnes with an average productivity of 618 kg per ha. (Singhal, 1995). In Karnataka, it is largely grown in the northern parts of the state especially in Gulbarga, which is called as " Redgram bowl of Karnataka". Gulbarga district occupies an area of 1,66,954 (40%) hectares with a production of 56,940 (47.23%) tonnes (1993-94). But productivity at 359 kgs/ha, is very low compared to the state and national averages of 395 and 587 kg per ha, respectively (Anonymous 1995a and 1995b).

The lower productivity of redgram in Karnataka state in general and Gulbarga district in particular is attributed to many factors, among which the incidence of pests is predominant. In india, redgram is prone to attack by more than 200 species of insect-pests among which the pod borer (Helicoverpa armigera) causes enormous losses. The losses have been estimated to vary from 46.6 to 63.6 per cent (Anonymous 1978).

For the last few decades, the indiscriminate use of pesticides lead to a series of consequences like pest resistance, pest resurgence, outbreak of secondary pests, harmful residues, imbalance in the natural eco-system, higher production costs, etc. Thus, cultivation of redgram depends to a large extent on the management of pests which account for a major share in the total cost of cultivation. This has initiated a complete change in the strategy of pest control, wherein more emphasis is required to be given for the concept known as Intergated Pest Management (IPM).

Keeping these in view, an attempt was made to study the economics of integrated pest management (IPM) in redgram in Gulbarga district during the agriculture year 1996-97.

METHODOLOGY

Gulbarga district of Karnataka state was selected for the study since it ranked first in the area under redgram in the state. Further, the fact that Integrated Pest Management Demonstration-cum-Farmers Field school (IPMD and FFS) on redgram crop was in operation in this district since 1994-95 was another consideration for the selection of this district. Similarly, Chitapur, Sedam and Gulbarga talukas were selected for the study in view of their highest area under the crop. Three villages from each selected taluka were chosen for the study based on the highest area and operation of demonstrations on IPM. From the villages thus chosen, a total of 75 farmers (25 farmers from each taluka) were chosen at random from among those undergone demonstrations and adopted IPM in redgram. An equal number of farmers (75) who have not adopted IPM technology from these villages were also selected. Thus, 75 each of IPM farmers and Non IPM farmers constituted the sample size of 150 farmers.

The required data were collected through personal interview method with the help of a structured and pre-tested schedule. The data pertained to the agricultural year 1995-96.

RESULTS AND DISCUSSION

It was observed that the IPM farmers used both human and bullock labour in relatively higher quantities than that of Non-IPM farmers (Table1). As such, the per hectare total labour cost incurred by the IPM farmers (Rs. 3,630.57) was higher than that of Non-IPM farmers (about Rs. 3,200.76) (Table 2). Thus, labour cost comprised about 50% of total operational cost of IPM farmers and about 44.5% of Non-IPM category of farmers. This was mainly due to intensive cultivation and adoption of recommended practices by the IPM farmers. Similar findings for cotton crop were reported by Sripad Vishweshwara (1994).

It is interesting to note that the IPM farmers have used more of manures (2.26 tractor load/ha) and fertilizers while, Non-IPM farmers used more of the plant protection chemicals (Table 1). Since, the IPM farmers had been exposed to demonstrations, the extent of use of inputs were as per recommendations, whereas, the Non-IPM farmers have used more of nitrogen and less of phosphorous and potash and thereby, resulting in an imbalanced use of chemical fertilizers.

Similarly, through the indiscriminate use of chemical pesticides, the Non-IPM farmers have incurred relatively higher cost on plant protection measures (Table 2). In the case of IPM farmers, even though the use of chemical pesticides dominated (62.87), the material costs was lower than the Non-IPM farmers, where it was 73% of the material cost. Among the Non-chemical pesticide materials, the expenditure on (NPV) Nuclear Polyhedroses Virus (30.59%) formed the major expenditure followed by pheromone traps/neem extracts and formulations (17.62%), chrysoperla larvae (14.70%) and so on (see Table 3). Therefore, in order to reduce the cost on plant protection measures the use of non-chemical pesticides needs to be increased. Further, the production and distribution infra structure should be developed to provide adequate quantity of biological agents as well as Non-chemical pesticide materials.

The cost of cultivation as per the farm management cost concepts (Table 4), in general, were relatively higher for IPM farmers, compared to Non-IPM farmers. However, the magnitude of incomes were higher in the case of IPM farmers compared to the Non- IPM farmers. The farm business income which is the profit over cost- A_1 or A_2 (as the case may be) on IPM farms (Rs. 12,303.45/ha) was relatively higher (19.45 per cent) than Non-IPM farmers (Rs.10,299.85/ha). The income to the family labour in redgram cultivation in the case of the farmer was Rs. 6,053.41 per hectare which was higher by 49.47 per cent over the Non-IPM group (4,049.85/ha). Similarly, the net income obtained by the IPM group of farmers (Rs.5,362.42/ha) was considerably higher (57.64%) than that of Non-IPM group of farmers (Rs. 3,401.56/ha). The benefit - cost ratio in the former case (1.44) was marginally higher than that of the latter. Thus, the returns as well as the benefit cost ratio have clearly indicated that the cultivation of redgram, with the adoption of IPM technology, was profitable. The higher yields as well as returns to IPM farmers were a o reported by Battur et al. (1989), Ramamoorthy (1990), Patil (1992) and Sripad Vishwesh ar (1994).

Table 1 : Pattern of Input Use and Output of Redgram on IPM and Non-IPM Farms.

(Per hectare)

Sr. No.	Items	Units	IPM Farmer	Non-IPM Farmer
1.	Human labour	Mandays	68.18	52.60
2.	Bullock labour	Pairdays	11.48	9.42
3.	Seeds	Kg.	11.06	11.28
4.	Manure	Tractor load	2.26	1.21
5.	Fertilizers			
	a. Nitrogen	Kg.	31.97	79.18
	b. Phosphorus	Kg.	18.65	8.12
	c. Potash	Kg.	13.64	13.56
6.	Plant Protection Chemicale			
	a. Liquids	Litres	2.00	5.50
	b. Dust	Kg.	50.00	200.00
	c. Light traps	Number	4.00	--
	d. Pheromone traps	"	6.00	--
	e. Erect Bird perches	"	2.00	--
	f. Chrysoperla larvae	"	5.00	--
	g. NPV	Le.	200.00	--
	h. Neem Seed extract and formulation	Litres	1.50	--
7.	Yield			
	a. Main product	Qtls	9.60	8.36
	b. By-product.			
	- stalk	Cart load	3.42	6.89
	- Pod husk	Jalagi	5.95	8.87

Note : NPV = Nuclear Polyhedroses Virus
Le = Larval eqivalent

Table 2 : Operational Cost of Redgram on IPM and Non-IPM Farms.

(Rs./ha)

Sr. No.	Cost Items	IPM Farms		Non-IPM Farms	
		Rupees	% age	Rupees	% age
1.	Material cost :				
	Seeds	271.53	7.40	279.52	6.99
	Manures	523.19	14.27	370.98	9.28
	Fertilizers	566.27	15.46	424.71	10.64
	P.P.Chemicals	2304.61	62.87	2921.79	73.09
		3665.60 (50.23)	100.00	3997.00 (55.46)	100.00
2.	Labour Cost :				
	Land preparation	771.19	21.24	710.42	22.14
	FYM application	118.49	3.26	71.89	2.24
	Sowing	267.87	7.39	274.11	8.54
	Fertilizer application	96.68	2.66	85.10	2.65
	P. P. Chemical application	281.83	7.76	347.83	10.84
	Weeding and hoeing	860.95	23.71	801.45	24.97
	Harvesting	460.06	12.67	358.82	11.18
	Threshing	396.19	10.92	317.56	9.89
	Winnowing, bagging, etc.	377.31	10.39	242.44	7.55
		3630.57 (49.77)	100.00	3209.62 (44.54)	100.00
	Total Cost	7296.21 (100.00)		7206.62 (100.00)	
3.	Returns :				
	Yield (Q)	9.60		8.36	
	Rate (Rs/Q)	1800.00		1800.00	
	By-product	124.30		201.91	
	Gross returns	17404.30		15249.91	
	Net returns	10108.09		7840.10	

Note : Figures in the parantheses indicate percentage to total cost.

Table 3 : Distribution of Plant Protection Cost on Chemical and Non-chemical Pesticides under IPM.

(Per hectare)

Sr. No.	Items	Unit	Qty.	Cost	
				Rupees	% age
1.	Light traps	Number	4	80.00	9.41
2.	Pheromone traps	"	6	150.00	17.65
3.	Erect bird perches	"	2	85.00	10.00
4.	Chrysoperla larvae	"	5	125.00	14.70
5.	NPV	Le.	200	260.00	30.59
6.	Neem seed extract and formulation	Litres	1.5	150.00	17.65
Total Non-chemical pesticides				850.00 (36.88)	100.00
7.	Chemical pesticides	--	--	1454.61 (61.12)	
	Total Cost			2304.61 (100.00)	

Note : 1. NPV = Nuclear Polyhedrosis Virus
2. Le = Larval equivalent
3. Figures in parentheses are percentages.

Table 4 : Farm Management Cost and Return Concepts in Redgram Production.

Sr. No.	Items	IPM farmers	Non-IPM farmers
A.	Cost of cultivation		
	1. Cost - A1	5100.85	4629.79
	2. Cost - A2	5100.85	4950.06
	3. Cost - B	11350.89	11200.06
	4. Cost - C	12041.88	11848.35
B.	Returns Over		
	1. Cost - A1 / A2 (Farm Business Income)	12303.45 (19.45)	10299.85
	2. Cost - B (Family Labour Income)	6053.41 (49.47)	4049.85
	3. Cost - C (Net Income)	5362.42 (57.64)	3401.56
C.	Benefit Cost Ratio (Over Cost - C)	1.44	1.28

Note : Figures in parentheses indicate percentage increase over Non-IPM farmer.

CONCLUSIONS

An economic analysis of IPM technology in redgram at the farmers fields indicated that the group of farmers who used the technology employed more of human and bullock labour, manures and fertilizers and less of chemical pesticides, whereas the farmers without the technology used more of chemical pesticides and imbalanced nutrients. IPM farmers obtained higher yields and net returns inspite of incurring relatively higher cost over Non-IPM farmers. It is, therefore, suggested that necessary measures should be taken to popularise the adoption of IPM technology.

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