e-ISSN : 2347 - 9671 p- ISSN : 2349 - 0187

Impact Factor : 0.998

EPRA INTERNATIONAL JOURNAL OF ECONOMIC AND BUSINESS REVIEW

www . epratrust.com

December 2014 Vol - 2 Issue- 12

AN ECONOMIC ANALYSIS OF INTEGRATED PEST MANAGEMENT IN GRAPE IN BIJAPUR DISTRICT

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ABSTRACT

The study was conducted in Bijapur District of Karnataka, a sample size of 30 (IPM) and 30 (Non-IPM) farmers were selected using grape sampling method and data was elicited for the agriculture year 2013-14.Through survey method, estimated the per hectare cost of cultivation in IPM farmers category at cost A, B and C as Rs 2, 94,743.03, Rs 2, 53,664 and Rs 5, 48,407 respectively. In case of non-IPM farmer's, it was estimated to be, Rs 2, 80,962.84, Rs 2, 50,892 and Rs 5, 33,855 respectively. The Net Return per hectare of grape in IPM farmers was Rs 68,378.73 as against non-IPM farmer's Rs 55,545.50 and net additional benefits from IPM was Rs 12,833.24 per hectare. The B: C ratio in IPM farmers was higher 1.81 as compared to non-IPM farmers 1.75

The financial feasibility analysis on investment in IPM and Non –IPM farming practice of Grape Orchard had indicated that the investment on Grape cultivation is financially feasible and economically viable, as the NPV for IPM and Non –IPM farmers of Grape was Rs 9, 90,871.65 and Rs 9, 33,238.74 at 12 per cent rate of interest. Benefit-cost ratio was found to be 1.81 and 1.75 in case of IPM and Non –IPM farmers of grape. The internal rate of returns was 51% in IPM farmers and 54% in Non –IPM farmers of grape.

The payback period was 4.31 and 5.09 years in case of IPM and Non –IPM farmers of grape. The different IPM components and their extent of adoption by IPM farmers was cultural components accounted to 93.33% , Mechanical components 68.48% and plant protection chemical components 70.52%. Major reasons for non-adoption of IPM farmers were low adoption by neighborhood farmers.

KEYWORDS: *Integrated Pest Management (IPM), Grape, Financial feasibility, technology.*

INTRODUCTION

Grape (*Vitis vinifera L.*) is basically a sub- tropical crop belonging to the Vitaceae family, originated in Western Asia and Europe. It was introduced to India by the Persian invaders in 1300 AD. Grape is a non-climatric fruit that grows on the perennial and deciduous woody climbing vine. It is widely grown in temperate zone, which has acclimatized to sub-tropical and tropical agro climatic conditions prevailing as in the Indian sub-continent. The major grape growing states in India are Maharashtra (76.51%), Karnataka (16.75%), Tamil Nadu (2.27%), Mizoram (2.02%), Andhra Pradesh (1.34%) and Punjab (0.4%) and amounting to nearly 90 per cent of the total production. However, in India, grapes are cultivated for their excellence also under tropical conditions with an area of 117.63 thousand ha and total production of 2,483.09 thousand tons and productivity of 22.87 tons/ ha. Because of special arbour training systems provided for grape cultivation in India, productivity is highest among the grape growing countries of the world. Karnataka occupies second position next to Maharashtra in cultivation and production of grapes in India. In 2013, Karnataka contributed to about 16.75 per cent of the total Indian grape harvest area (19,700ha), production (3, 20,900 MT) with productivity 17.1 tones/ha. In 2012-13, Bijapur district contributed an area of 8532 ha, production 1, 26,120 tons, with average productivity 15 tons/ha.In the recent past, efforts have been made to increase the production of Grapes by developing large number of high yielding, good quality and disease resistant varieties and other required cultivation packages. The critical inputs *viz.*, fertilizer, if applied in excess, makes the plants to become succulent and thus, attracts more of pests. To minimize the pest incidence, farmers resort to usage of synthetic chemical pesticides and their indiscriminate use is creating many problems like pest resurgence, resistance of pest species, destruction of natural enemies, more so beneficial insects. In this situation there is a need to minimize the chemical inputs and save environmental damage, thus integrated pest management (IPM) approach has been globally accepted for achieving sustainability in Fruit production. The initial attempts were made in the year1992 to harmonize the IPM package of practices of various crops, subsequently concerted efforts were made in 1998, 2001 and 2002 to update and developed the IPM package of practices for all agricultural crops. Presently IPM package of practices for 51 crops have been finalized to manage the pests and diseases to minimize the over use of chemical pesticides. With this background, in the light of these aspects the present study was purposively undertaken the study in Bijapur district. The overall objective of the study was to identify and compare the IPM and non-IPM method adopted and practiced by the farmers and to determine the profitability of IPM technology, which produces the maximum favorable impact on socio-economic condition of the farmers.

OBJECTIVES

1. To estimate the cost and returns structures of the IPM and non-IPM practicing farmers of Grape.
2. To analyze the financial feasibility of investment in grape cultivation under IPM and non-IPM farm practices.
3. To document the extent of adoption and reasons for non-adoption of IPM practices.

METHODOLOGY

For evaluating the specific objectives designed for the study, required primary data were collected from the randomly selected sample farmers by personal interview method with the help of pre-tested and structured schedule. The data collected from the farmers pertained to the agricultural year 2013-2014, which includes, general characteristics of cultivation related to IPM and non-IPM practices, general information, size of land holdings, cropping pattern followed, inputs used, input prices, output obtained and opinions about extent of adoption of IPM practices, reasons for non-adoption of IPM practices of the sample farmers. For analysis of data, Net Present value (NPV), Benefit cost ratio (B: C ratio), Payback period and tabular analysis were employed to arrive at meaningful conclusions.

RESULT AND DISCUSSION

The economic aspects of grape such as cost of cultivation, returns from a hectare of grape were worked out for the farmers who had adopted IPM and non-IPM practices during the year 2013-14 in (table-1). Among the two categories of the farmers, the higher amount of Rs 5, 48,407 was incurred as cost 'C' by the IPM farmers while it was observed that Rs 53385 for non-IPM farmers. The gross returns for IPM farmers were observed that higher (Rs 6, 16,786.14) as compared to non-IPM farmers (Rs 5, 89,400). Similarly the net returns realized by IPM farmers were also higher (Rs68,378.73), than that of non-IPM farmers (Rs 55, 545.50). In order to realize the higher amount of gross returns the IPM farmers had incurred the amount of Rs 14,552.90 per hectare as an additional cost. As a result of this, the IPM farmers had realized an increase of Rs 27,386.14 and Rs 12,833.24 in additional returns and net returns over non-IPM farmers respectively. Further, the higher benefit cost ratio 1.81 was observed with respect to IPM farmers and relatively lower benefit cost ratio of 1.75 was observed for non-IPM farmers.

To evaluate the financial feasibility of investment of grape orchard is analyzed with the help of criteria such as, Net present value, Benefit cost ratio, internal rate of returns and Payback period of the IPM and Non-IPM farmers were presented in (table-2). The NPV for IPM and Non –IPM farmers of grape was Rs 9,90,871.65 and Rs 9, 33,238.74 at 12 per cent rate of interest. The Benefit-cost ratio was found to be 1.81 and 1.75 in case of IPM and Non – IPM farmers of grape. The internal rate of returns was 51 per cent in IPM farmers and 54 per cent in Non –IPM farmers of grape. The payback period was 4.31 and 5.09 years in case of IPM and Non –IPM farmers of grape.

The different kinds of components concerned to the IPM farmers are presented in Table 3. It was observed that, to achieve the IPM goals on an average 93.33 per cent of the total farmers had conveniently followed cultural practices, which was followed by the use of mechanical and plant protection chemical components accounting to 68.48 per cent and 70.518 per cent respectively. Among the cultural components to control insect pests in grape cultivation all the farmers (100%) had followed

April pruning and thinning of berries taken annually. On the other hand under mechanical components 76.00 per cent and 82.78 per cent of the total IPM farmers had remove the loose bark after April pruning helps in removing the egg masses and Make a hole to remove grub by piercing with barbed wire or (put aluminium phosphide tablet) and kill. 46.66 per cent Light trap helps in attracting the beetles so collect and kill.

In addition to that, the IPM farmers had also resorted to bio agents and botanicals namely Trichoderma, Beauveria bassiana, Verticillium lecani and Neem seed kernal extract (NSKE) whose share in the total sample was observed to be 65 per cent, 55.93 per cent and 46.66 per cent respectively. However, 100 per cent of the total IPM farmers indicated that their choice to follow the use of recommended synthetic chemicals are to protect grape crop from the insect pests.

The information on the reasons for non-adoption of IPM practices was collected, analyzed and the results are presented in (table-4) of the total non-IPM farmer's maximum of 83.33 per cent indicated that low adoption by neighborhood farmers was the major reason for non-adoption of IPM practices in the study area. In addition to this, 80.00 per cent, 73.33 per cent, 56.66 per cent, 60.00 per cent and 50.00 per cent of the total non-IPM farmers had expressed that they were aware about the IPM practices but not confirmed, easily non availability of IPM inputs, IPM practices are difficult to adopt, not belief in IPM practices and non-availability of quality IPM inputs as other important reasons for non-adoption of IPM practices respectively. Further, 26.66 per cent of non-IPM farmers had clearly mentioned that they were not aware of IPM practices to be followed in grape cultivation.

The opinion expressed by the IPM farmers on the impact of IPM practices followed in grape cultivation was collected and presented in (table-5) It was observed from the table that, under economic impact created due to the IPM practices 33.33 per cent of the total IPM farmers had reduced the expenditure on synthetic plant protection activities and 20.00 per cent of the total IPM farmers also indicated realization of the higher output price for their grape. While 40.00 per cent of the IPM farmers with the reduction in the number of sprays of synthetic chemicals succeeded in avoiding the interference in the environmental activities. This category (26.66) of the farmers also indicated their opinion about positive impact of IPM practices on soico economic aspects, which was due to the creation of employment opportunities at farm level. Similarly, 23.33 per cent IPM farmers felt that there is positive impact on health due to lesser pesticide residues and limited synthetic chemical sprays in grape.

CONCLUSION

Grape (*Vitis vinifera L.*) is basically a sub- tropical crop belonging to the Vitaceae family, originated in Western Asia and Europe. It is widely grown in temperate zone, which has acclimatized to sub-tropical and tropical agro climatic conditions of the Indian sub-continent. The predominance of pests resulted in indiscriminate use of pesticides, which has led to a series of consequences like pest resistance, pest resurgence, outbreak of secondary pests, harmful residuals and higher production costs in grape. Thus, cultivation of grape depends mainly on the pest management which took a major share in the total cost of cultivation. This has initiated a change in the strategy of pest control, where as more emphasis is given to keep pest population below economic threshold level, through adoption of IPM technology.

The education level of the farmers played a crucial role in adopting the IPM technology and reducing the costs on pesticides and creating awareness about its ill effects of pesticides. Hence, there is need to educate the farming community to adopt IPM technology faster. And the extent of adoption of bio agents and botanicals was found to be low and which has a positive impact on yield and ecosystem. Hence, an extensive training on IPM technology needs to be arranged and there supplied inputs should be at subsidized prices in the local market. Around 26.66 per cent of the farmers had a positive impact on socio-economic aspects by way of creating employment opportunities and reducing the health hazardous. Hence, IPM technology needs to be encouraged in a massive scale.

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APPENDIX

Table: 1. Cost and Returns Structure of IPM and non-IPM farmers (Rs/hectare)

SI.NO	Particulars	IPM farmers n=30	Non -IPM farmers n=30
I	**Costs**		
	Cost 'A'	**294743.03**	**280962.84**
	Cost 'B'	253664	250892
	Cost 'C'	**548407**	**531855**
II	**Returns**		
	Gross returns	616786.14	589400
	Net returns	55545.50	68378.73
III	**Additional cost over non-IPM**	14552.90	-
IV	**Additional returns over non-IPM**	27386.14	-
V	**Net additional benefits from IPM**	12833.24	-

Note: Cost 'A'=Establishment cost of Grape orchard

Cost: 'B'= Sum of average annual cost

Cost: 'C'= Cost 'A'+ Cost: 'B'

Table: 2.Financial feasibility of investment made in Grape cultivation

SI.NO	Particulars	Value	
		IPM farmers n=30	**Non -IPM farmers n=30**
1	Net Present Value (@ 12%)	Rs 9,90,871.65	Rs 9,33,238.74
2	Benefit cost ratio (@ 12%)	1.81	1.75
3	Payback Period	4.31	5.09
4	Internal rate of returns(IRR)	51%	54%

Table: 3. Different IPM practices and their extent of adoption by IPM farmers

Sl. No	Particulars	No. of farmers n=30	Percentage
I	**Cultural practices**		
A	Summer ploughing	24	80
B	Pruning	30	100
C	Thinning	30	100
	Sub Total	**84**	**93.33**
II	**Mechanical practices**		
	a) Removing the loose bark	22.8	76
	b) Make a hole and Put Aluminium phosphide tablet	24.83	82.78
	C) Light trap	14	46.66
	Sub Total	**61.63**	**68.48**
III	**Plant protection chemicals**		
1	**Bio agents and botanicals**		
	Tricoderma harzianum	19.5	65
	Beauveria bassiana	16.78	55.93
	Verticillium lecani	14	46.66
	NSKE	25.5	85
2	**Synthetic chemicals**		
	Chemical pesticides recommended	30	100
	Sub Total	**105.78**	**70.518**

- Figures in Percentage in above table indicate percentage to respective total

Table: 4. Reasons for non-adoption of IPM practices by non-IPM farmers

Sl.No	Particulars	No. of farmers n=30	Percentage
1	Easily non availability of IPM inputs	22	73.33
2	Low adoption by neighborhood farmers	25	83.33
3	IPM practices are difficult to adopt	17	56.66
4	Non-availability of quality of IPM inputs	15	50.00
5	Aware about IPM	24	80.00
6	Not belief in IPM practices	18	60.00
7	Not aware of IPM practices	08	26.66

- Figures in Percentage in above table indicate percentage to respective total

Table.5. Farmers opinion about the impact of IPM practices

Sl.No	Particulars	No. of farmers n=30
1	Economic impact	
	a. In terms of labour saving on spraying	10 (33.33)
	b. Higher output price	6 (20)
2	Environmental impact in terms of no. of sprays	12 (40)
3	Health component	7 (23.33)
4	Socio-economic impact in terms of creation of employment opportunities at farm level	8 (26.66)

- Figures in Percentage in above table indicate percentage to respective total