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Ravi venkanna Babu M
RA, Horticulture, KrishiVigyan Kendra, Darsi, Prakasam, Andhra Pradesh, India

Jahnavi M
SMS, Crop Protection, Krishi Vigyan Kendra, Darsi, Prakasam, Andhra Pradesh, India

Prasada Rao GMV
Programme, Coordinator, Krishi Vigyan Kendra, Darsi, Prakasam, Andhra Pradesh, India

Varaprasada Rao CH
Senior Scientist, DAATTC, Darsi, Prakasam, Andhra Pradesh, India

Corresponding Author:
Ravi venkanna Babu M
RA, Horticulture, KrishiVigyan Kendra, Darsi, Prakasam, Andhra Pradesh, India

Evaluation of integrated crop management in chilli of Prakasam district, A.P.

Ravi Venkanna Babu M, Jahnavi M, Prasada Rao GMV and Varaprasada Rao CH

Abstract
The study on evaluation of integrated crop management in chilli of Prakasam District, Andhra Pradesh was carried out during *Kharif* 2017-18, 2018-19 and 2019-20 in chilli farmers fields of Prakasam district. The experiment was carried out in 4.0 ha each with active participation of farmers with an objective to assess the integrated management module for enhancing the productivity and profitability. Mean of Gemini virus incidence in IPM module and farmer practice was 18.9 and 28.6 percent respectively. Mean yield of ICM module was 85.83 q ha-1 with net returns and C: B ratio of 573666.6 Rs ha-1 and 1:2.75, respectively. Whereas, farmer practice recorded mean yield of 78.86 q ha-1 with net returns and C: B ratio of Rs ha-1 and 1:2.34, respectively.

Keywords: Chilli, viral diseases, integrated management

1. Introduction
Chilli (*Capsicum annuum* L.) is an important spice grown for its fruits, which are used in green as well as ripe dried form for its pungency. It is richest sources of vitamin C and A (Howard, 2000) [3]. In India chilli is cultivated in all the states including Andhra 1ndian1, Karnataka, Maharastra, Orissa, Rajasthan, Tamil nadu, West 1ndian and Punjab over an area of 804790 hectares with total production of 1276300 metric 1 ndia of dry chilli with productivity of 1.5 metric 1 ndia per hectare. Andhra 1 ndian 1 alone contributes 46 per cent of total chilli production of India. India contributes one-fourth of the total quantity of chilli exported in the world. Chilli is known to be affected by forty five viruses. Twenty four of them have been reported to occur naturally and rest can infect on artificial inoculation. Among the twenty four viruses reported to occur naturally on chilli, eleven viruses have been reported from India, viz., cucumber mosaic virus, tobacco leaf curl virus, 1ndian chilli mosaic virus, potato virus Y, potato virus X, tobacco ring spot virus, pepper mottle virus and pepper vein bending virus, chilli leaf curl virus, tomato leafcurl virus, capsicum chlorosis virus. Among all, the chilli leaf curl virus is the most destructive virus in terms of incidence and yield loss. In severe cases 100 per cent losses of marketable fruit have been reported. To manage this, generally farmers use huge amount of pesticides indiscriminately without any proper diagnosis which results into development of resistance and resurgence of the pests as well as environment pollution. The potential solution is to manage the viral diseases by integrated pest management approach. Out of various viral diseases; damping off in nursery stage and fruit rot are the major diseases causing severe yield losses. Adoption of ICM practices by improving production practices and plant protection practices enhances the productivity and profitability. Keeping the above problem in view the demonstration on evaluation of ICM module in chilli of Prakasam district was conducted during 2017-18, 2018-19 and 2019-20.

2. Materials and Method
1. Place of study: Chendalur village during 2017-18 Aravalapadu village during 2018-19, PRC Thanda village during 2019-20
2. Area- 4.0 ha each year
3. No. of farmers- 10 each year
4. Design front line demonstration in farmers' fields in 4 ha each year
5. Treatments:

TO1-Farmers practice
Indiscriminate spraying of different insecticide mixture like diafenthiuron, fipronil, synthetic pyrethroids at different crop stages)

TO2- ICM module
1. Soil Test Based Fertilizer application.
2. Application of Neem cake @ 200 kg per acre during last ploughing
3. Micro nutrient application (Foliar spray): Formula-4 @ 5 g/l of water (30 DAS, 50 DAS and 70 DAS).
4. Spraying of Neem oil @ 5ml/lit of water at 15 days interval from vegetative stage to flowering stage.
5. Installation of Yellow and Blue sticky traps 20 No. /acre and Pheromone trap 4 No./acre.
6. Trap crops: Marigold and chilli (1:16) ratio.
7. Spraying of thiamethoxam 25% WG@ 60g/ac
8. Spraying with diafenthiuron 50% WP @ 250 g/acre against thrips

Plot wise data was recorded in ICM module and farmers practice plots. The percentage of disease incidence was calculated on the basis of total number of healthy plants and infested ones. Information of yield and economic evaluation in terms of net profit earned and cost benefit ratio was recorded.

3. Results and Discussion

Table 1: Per cent disease incidence in chilli

Year	IPM module	Farmer practice
	Per cent of Gemini virus Incidence	Per cent of Gemini virus incidence
2017-18	22	34
2018-19	19.7	25
2019-20	15	27
Mean	18.9	28.6

During the period wise report incidence of Gemini virus was observed and incidence of peanut bud necrosis virus and cucumber mosaic virus was not observed. Per cent Gemini virus incidence was presented in the table 1. Mean incidence of 18.9 was recorded in IPM module over 28.6 per cent in farmers practice.
Sanat *et al.*, 2014 [6] reported that the symptomological study among nine locations revealed that the incriminating (Leaf curl virus) disease incidence was 11.4 % to 55.90 %.
Similarly, Khaire (2017) [4] reported that the treatment acetamiprid 20%SP @0.004 per cent recorded minimum of 1.38 mean whiteflies/3 leaves/plant which was at par with treatments spinosad 45% SC @ 0.016 per cent (1.39), diafenthiuron 50%WP @ 0.06 per cent (1.53).

Table 2: Impact of demonstration on yield and economics of chilli

Year	Yield (q ha-1)	Cost of Cultivation (Rs ha-1)			Gross returns (Rs ha-1)		Net returns (Rs ha-1)		C: B ratio	
	ICM module	Farmer practice	IPM module	Farr practic e	IPM module	Farer practice	IPM module	Farmer practi ce	IPM modu le	Farme r practic e
2017-18	85	76.5	300000	335000	722500	650250	422500	315250	1:2.4	1:1.9
2018-19	95	87.5	305000	325000	836000	770000	531000	445000	1:2.7	1:2.3
2019-20	77.5	72.5	356250	370500	1123750	1051250	767500	680750	1:3.15	1: 2.83
Mean	85.83	78.86	320416.6	343500	894083.3	823833.3	573666.6	480333.3	1:2.75	1:2.34

3.1 Yield
Data presented in Table 2 revealed that under ICM module, yield was found to be higher than farmers practice during the years 2017-2018, 2018-19 and 2019-20. The ICM module recorded yield of 85, 95 and 77.5q ha-1 during 2017-2018, 2018-19 and 2019-20, respectively with mean of 85.83 q ha-1. Whereas, farmer practice recorded yield of 76.5, 87.5 and 72.5 q ha-1 during 2017-2018, 2018-19 and 2019-20., respectively with mean of 78.8 q ha-1.

3.2 Economics
Perusal of the data presented in the table 2 revealed that gross returns, net returns and C: B ratio were higher in ICM module over farmers practice. Gross returns of ICM module were 722500, 836000 and 1123750 Rs ha-1 during 2017-2018, 2018-19 and 2019-20, respectively with mean of 894083.3 Rs ha-1. Whereas, in farmer practice, gross returns were 650250, 770000 and 1051250 Rs ha-1 during 2017-2018, 2018-19 and 2019-20, respectively with mean of 823833.3 Rs ha-1. Net returns of ICM module were 422500, 531000 and 767500 Rs ha-1 during 2017-2018, 2018-19 and 2019-20, respectively with mean of 573666.6 Rs ha-1. C: B ratio of ICM module was 1:2.4, 1: 2.7 and 1:3.15 during 2017-2018, 2018-19 and 2019-20, respectively with mean of 1:2.75. Net returns in farmer practice were 315250, 445000 and 680750 Rs ha-1 during 2017-2018, 2018-19 and 2019-20, respectively with mean of 480333.3 Rs ha-1 and C: B ratio were 1:1.9, 1:2.3 and 1:2.8 during 2017-2018, 2018-19 and 2019-20, respectively with mean of 1:2.34. Thus, favorable cost benefit ratio and higher net returns in ICM module proved the economic viability of the assessed technology and convinced the farmers on the utility of technology provided at real farming situation. Similar results were also reported by Hiremath and Nagaraju (2009) [2]. Similarly, Yadav (2017) [7] reported that the 26 % more yield (116q/ha) in ICM technology as compared to farmers practice (92 q/ha).

4. Conclusion
The integrated management practices were found effective over farmer's practice of indiscriminate use of pesticides.

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