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Study of the integrated pest management practices against bitter gourd fruit fly in district Jaunpur (U.P.) India

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Abstract
The present study was conducted to assess the Study of the Integrated Pest Management practices against bitter gourd fruit fly in District Jaunpur (U.P.) India. The demonstration was conducted at farmers fields in two village viz. Alhadiya and Meerganj of the district Jaunpur (U.P.) during Kharif season 2016 and 2017. Technological gap between recommended practice and actual farmers practice was observed that respondents were small holding (0.5 to 1.25 ha). Out of 100 farmers10 were selected randomly for field experiments. The treatment was growing of maize as border crop + Installation of cue-lure with Novaluron (4:1) + Spraying of NSKE 5% + Spraying of Flubendiamid 39.35 EC @ 0.3 ml/ lit of water. Overall technology gap of 41.60% was recorded whereas 43.29% gap in overall IPM practices observed. The marketable yield were recorded significantly higher in IPM plot 21.36 tone and 22.24 tone ha^{-1} as compared to farmer practice 14.03tone and 14.92tone ha^{-1} during kharif 2016 and 2017. The loss of yield due to fruit fly were higher in control plot. The population of fruit fly was recorded lower in IPM plot (1.83 and 1.78 larvae/plant) than control plot (5.12 and 4.92 larvae/plant). Benefit cost ratio of 7.96 and 8.18 was calculated in IPM bitter gourd in Kharif 2016 and 2017 season respectively in comparison to control plot.

Keywords: Integrated pest management (IPM), fruit fly, bitter gourd, marketable yield, gross margin

Introduction
Bitter gourd is a popular and demanded vegetable among cucurbits grown in India. Bitter gourd (*Momordica charantia* L.) 2n=22 is an annual climber vine. It is monoecious and highly cross pollinated due to a high degree of heterozygosity (Singh *et al*., 2013) [10]. Fruits are considered as a rich source of vitamins and minerals and are rich in vitamin C (88 mg/100 g) (Akter and Rahman 2010) [1]. In terms of nutritive value, bitter gourd ranks first among cucurbits, being rich in iron, phosphorus and ascorbic acid (Awasthi & Jaiswal, 1986) [4]. A substance with clinical properties of insulin has been isolated from bitter gourd fruits and hence is recommended for consumption to diabetic patients (Kedar & Chakraborti, 1982) [6]. Bitter gourd has good export potential and its share in export of green vegetable is to the extent of 20 per cent (Anonymous, 1992) [3]. Insect pests are a major constraint for increasing the production and productivity of this crop. Bitter gourds are attacked by several insect pests, among them the fruit fly is one of the most destructive insect-pests (Panday *et al.*, 2008) [7]. Melon fruit flies (Diptera: Tephritidae: Dacinae) are economically important pests of the cucurbits and are geographically distributed throughout the tropics and subtropics of the world (Chinajariyawong *et al*., 2003) [5], especially in most countries of South East Asia (Allwood *et al.*, 1999) [2]. The melon fly, *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae) prefers tender fruits to lay eggs 2 to 4 mm deep in the fruit pulp. The maggots feed inside the developing fruit leading to rotting and premature fall. The crop loss due to melon fly varied from 30 - 100% depending upon the season. (Panday *et al.*, 2009) [7]. Integrated pest management (IPM), includes a combination of chemical, biological and cultural control tactics (Sarfaraz *et al.*, 2002) [9], with insecticides still to continue as an important component of such strategies. Therefore, in the present study, efforts will be made to evolve IPM modules, using minimum chemical insecticides and utilizing pesticide alternates like bio-agents and plant products.

Materials and Methods
The demonstration on Integrated Pest Management was conducted at farmers fields in two village viz. Alhadiya and Meerganj of the district Jaunpur (U.P.) during Kharif season 2016 and 2017, which located between 25.46^0 N latitude 82.44^0 E longitude.

The annual average rain fall recorded during study period was 986.00 mm, while maximum temperature was (46 ºC) in month of May and minimum (5.4 ºC) in month of January. Before conducting the demonstrative experiment, technological gap between recommended practice and actual farmers practice were studied by group discussion and questionnaire method. It was observed that respondents were small holding (0.5 to 1.25 ha). Out of 100 farmers10 were selected randomly for field experiments. The technology gap in use of practice were calculated by dividing the subs tract of recommended (kg ha^{-1}) and practice applied (kg ha^{-1}) and multiplying with 100. The mean technological gap of farmers was calculated by dividing total gap for all practices with number of practice considered and multiplying with 100. Integrated Pest Management technology applied in the treatment was growing of maize as border crop + Installation of cue-lure with Novaluron (4:1) + Spraying of NSKE 5% + Spraying of Flubendiamid 39.35 EC @ 0.3 ml/ lit of water. Before sowing, the seed was soaked in water with 25 ppm NA and 25 ppm boron. From recommended fertilizers (70:25:25) the full quantity of FYM (20 t ha^{-1}), phosphorus, potash and half dose of nitrogen were applied in basal and remaining half was used at 30 days after sowing. The treated bitter gourd seed was sown in pits (30 X 30 X 30cm) during month of June 2016 and 2017. The spacing was 120 X 90 cm. and the plot size was 400m^2 for both treatment and farmer practice.

Observation of vine length (cm), No. of branches/vine and days to first female flower appearance was determined *in situ* from five randomly sampled and tagged plants per plot. Matured fruits were harvested at 3 days interval for assessment of number of fruits per plant, average fruit weight, and marketable yield. Fruit yield per hectare was obtained through conversion of the net plot yield. The data on larvae (maggot) per plant was recorded at 10 days interval and percent fruit damage was calculated on the basis of total number of healthy fruit and infested ones. The data collected were subjected to analysis of variance (Steel and Torrie, 1987) [12]. Economic parameters such as cost of cultivation, net return and benefit cost ratio (BCR) were calculated by considering all inputs and outputs.

Result and Discussion

The mean technology gap in bitter gourd was recorded. (Table 1). The data were revealed that the bitter gourd growers of area did not adopt recommended practices. Overall technology gap of 41.60% was recorded whereas 43.29% gap in overall IPM practices observed. It was observed that 55.12% respondents did not adopt pit size for sowing of seed in field and it was also noticed that 51.18% responded not adopt the recommended dose of chemical fertilizers. Only 27.73% responded soaking of seed in solution of NAA and boron and 29.73% responded somehow managed to apply FYM in their field. The majority of farmers adopted high yielding bitter gourd variety, spacing and intercultural operations recommended for the commercial cultivation of bitter gourd. However, lack of knowledge and unavailability of inputs was the major reasons for non adoption of biofertilizers in growing bitter gourd crop. Rangnath *et al*. (2015) [11] also study the integrated approach to manage melon fruit fly *Bactrocera cucurbitae* (C.) in bitter gourd.

Table 1: Mean technology gap among the bitter guard growing farmers of Jaunpur, India

Attributes	Recommended technology	Mean technological gap (%)
Variety	Priya	17.32
Pit size	30X30X30 cm	55.12
Plant spacing	120 X 90 cm row and plant	13.17
Application of FYM	20 t ha^{-1}	70.27
Application of recommended fertilizers	70:25:25 (N:P:K)	51.18
Soaking of seed	25 ppm NA and 25 ppm boron	72.27
Application of IPM practices	a. Growing of maize as border crop	42.57
	b. Installation of cue-lure with Novaluron (4:1)	22.12
	c. Spraying of NSKE 5%	41.17
	d. Spraying of Flubendiamide 39.35 EC @ 0.3 ml/ lit of water.	67.31
Mean gap	Overall IPM practices	43.29
Intercultural practices	Irrigation, weeding, earthening etc.	5.14
Total gap	Overall mean gap in technology	41.60

n = 100

Integrated Pest Management with recommended dose of fertilizers significantly increased the vine length, number of branches/vine and average fruit weight as compared to control (Table 2). The number of fruits was recorded almost same during both years. Plant growth of control plot was reduced due to imbalance use fertilizers and no use suitable plant protection measures.

The marketable yield were recorded significantly higher in IPM plot (21.36 tone and 22.24 tone ha^{-1}) as compared to farmer practice (14.03tone and 14.92tone ha^{-1}) during kharif 2016 and 2017 (Table 3). The loss of yield was due to inferior and damaged fruits due to fruit fly were higher in control plot. The loss observed was 28.80% and 25.86% in both years respectively in IPM crop as compared to control plot where the loss recorded was 53.23% and 50.26%. The data on fruit damage at the time of harvesting and yield showed that the IPM plot was superior with less fruit damage 7.57% and 6.15% as compared to control 39.46% and 36.16% in both seasons respectively. The population of fruit fly was also observed lower in IPM plot (1.83 and 1.78 larvae/plant) than control plot (5.12 and 4.92 larvae/plant). The injudicious application of chemical fertilizers might be the causes of higher pest infestation in paddy because these plants noticed more succulent which attracted maximum pest (Vastrad and Nayak, 2011) [13].

Table 2: Effect of IPM practice on Growth and yield attributes of bitter gourd

Year/ Season	Treatments	Vine length(cm)	No of branches/vine	Days to first female flower appearance	Weight/ fruit (g)	No of fruits plant[1]
2016, kharif	Farmers practice	302.5	11.0	51.0	65.2	18.3
	Recommended practice	537.0	17.0	38.3	102.4	32.2
	CD P =0.05	75.16	4.30	5.91	27.46	11.52
2017, kharif	Farmers practice	306.0	12.0	54.6	49.5	20.0
	Recommended practice	541.4	20.0	40.0	104.0	37.4
	CD P =0.05	69.03	5.13	6.54	26.30	11.85

Table 3: Yield and yield loss, Population of larvae and Per cent fruit damage in IPM and control plot of bitter gourd.

Year/ Season	Treatments	Marketable yield (t. ha^{-1})	Yield loss (%)	Population of larvae/plant	% Fruit damage
2016, kharif	Farmers practice	14.03	53.23	5.12	39.46
	Recommended practice	21.36	28.80	1.83	7.57
	CD P =0.05	4.58	11.23	2.10	22.62
2017, kharif	Farmers practice	14.92	50.26	4.92	36.16
	Recommended practice	22.24	25.86	1.78	6.15
	CD P =0.05	4.06	9.61	2.30	22.14

Table 4: Economic performance of bitter gourd crop with recommended and farmer practices

Year/ Season	Treatments	Cost of cultivation (Rs. Ha^{-1})	Net return (Rs. Ha^{-1})	Benefit Cost Ratio
2016, kharif	Farmers practice	64417.00	328423.00	5.09
	Recommended practice	66725.00	531355.00	7.96
2017, kharif	Farmers practice	65015.00	352745.00	5.42
	Recommended practice	67817.00	554903.00	8.18

The highest gross return and benefit cost ratio was obtained by application of recommended practices. Benefit cost ratio of 7.96 and 8.18 was calculated in IPM bitter gourd in Kharif 2016 and 2017 season respectively in comparison to control plot which rendered 5.09 and 5.42 benefit cost ratio in respective season and year (Table 4). The higher net return was obtained in IPM plot due to lower loss in yield caused by fruit fly compared to control plot. The trial could convenience most of the bitter gourd grower to use IPM technology on account of its obvious advantages and effective management of fruit fly.

References

1. Akter P, Rahman MA. Effect of foliar application of IAA and GA3 on sex expression, yield attributes and yield of bitter gourd (*Momordica charantia* L). Chittagong University Journal of Biological Sciences. 2010; 5:55-62.
2. Allwood AJ, Chinajariyawong A, Drew RAI, Hamacek EL, Hancock DL, Hengsawad C *et al*. Host plant records for fruit flies (Diptera: Tephritidae) in Southeast Asia. The Raffles Bulletin of Zoology. 1999; 7:1-92.
3. Anonymous. Report on infrastructure for export of agricultural commodities and processed food (p. 44). Govt. of India, Planning commission (Agriculture Division), Yojana Bhawan, New Delhi, 1992.
4. Awasthi CP, Jaiswal RC. Biochemical composition and nutritional quality of fruits of bitter gourd grown in Uttar Pradesh. Progressive Horticulture. 1986; 18:265-269.
5. Chinajariyawong A, Kritsaneepaiboon S, Drew RAI. Efficacy of protein bait sprays in controlling fruit flies (Diptera: Tephritidae) infesting angled luffa and bitter gourd in Thailand. The Raffles Bulletin of Zoology.2003; 51(1):7-15.
6. Kedar P, Chakraborti CH. Effect of bitter gourd and glibenclamide in streptozotocin induced diabetes Mellitus. Indian Journal of Experimental Biology. 1982; 28:232-235.
7. Panday AK, Nath P, Rai AB. Efficacy of some eco-friendly insecticides, poisons baits and their combinations against bitter gourd infestation by melon fruit fly (*Bactrocera cucurbitae* Coquillet). Vegetable Science. 2008; 35(2):152-155.
8. Panday AK, Nath P, Rai AB, Kumar A. Screening of some bitter gourd varieties/germplasms on the basis of some biological and biometrical parameters of melon fruit fly (*Bactrocera cucurbitae* Coquillet) Vegetable Science. 2009; 36(3):399-400.
9. Sarfaraz A, Ansari SH, Porchezhian E. Antifungal activity of alcoholic extracts of *Ziziphus vulgaris* and *Acacia concinna*. Hamdard Medicus. Bait Al-Hikmah, Karachi, Pakistan, 2002, 14-15, 42-45.
10. Singh B, Singh AK, Kumar S. Genetic Divergence Studies in Bitter Gourd (*Momordica charantia* L.). Academic Journal of Plant Sciences. 2013; 6(2):89-91.
11. Rangnath HR, Krishna Kumar NK, Krishnamoorthy PN, Saroja S, Shivaram K. An integrated approach to manage melon fruit fly *Bactrocera cucurbitae* (C.) in bitter gourd. Pest management in Horticultural Ecosystems. 2015; 21(1):27-30.
12. Steel RGD, Torria JM. Principles and procedures of statistics. McGraw hill book Co. International New York, 1987, 276.
13. Vastrad AS, Nayak GV. Influence of fertilizer on the incidence of insect pests in paddy. Karnataka J Agriculture Sciences. 2011; 24(2):241-243.