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EVALUATION OF INTEGRATED PEST MANAGEMENT MODULE AGAINST MAJOR PESTS OF RAINFED PIGEON PEA

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ABSTRACT

Experiments on evaluation of redgram (pigeonpea) Integrated Pest Management (IPM) module in comparison with the farmers' practice were conducted at National Pulses Research Centre (NPRC), Tamil Nadu Agricultural University, Vamban as well as in farmer's field with variety Vamban 2 during *kharif* 2004 and 2005. Adoption of IPM module consisting of the components *viz.*, intercropping with groundnut, setting up of pheromone traps against *Helicoverpa armigera*, erection of bird perches, application of Neem Seed Kernel Extract (NSKE), spraying of *Ha*NPV and need based spraying of insecticides registered reduced pod borer damage (31.5 – 35.67%), pod wasp damage (3.33 – 4.67%), pod fly seed damage (5.00% - 6.00%) and pod bug damage (5.67% - 8.67%) as against the farmer's practice of dusting with lindane 1.3D @ 25kg/ha at peak flowering, which recorded higher pod borer damage (48.67 – 54.67%), pod wasp damage (6.33 – 8.33%), pod fly seed damage (6.66 – 8.67%) and pod bug damage (5.66 – 13.33%). The grain yield (714 – 801 kg/ha) and Benefit: Cost (2.41 – 2.79) were also higher in IPM plots compared to farmer's practice.

INTRODUCTION

Pigeonpea is one of the most important pulse crops in India. However, its productivity is far below the potential yield. The constraint for the low yield is the heavy infestation of an array of pest complex (Dar *et al.*, 2005). Pod borers are the key impediments for the low productivity in India. The borers together damage 57% pods and 35% seeds incurring yield loss of 28% (Sahoo, 1998). Among these, spotted pod borer, *Maruca vitrata* Geyer., Gram pod borer, *Helicoverpa armigera* Hubner, blue butterfly, *Lampides boeticus*. (L), plume moth, *Exelastis atomosa* Walshingham, pod bug, *Clavigralla gibbosa* Spinola, pod fly, *Melanagromyza obtusa* Malloch and pod wasp, *Tanaostigmodes cajaninae* Lasalle are considered important in causing economic losses to the farmers (Reddy *et al.*, 1998). Farmers rely only on synthetic insecticides to manage these insect pests leading to increased risk of environmental contamination, loss of biodiversity and insecticides induced resurgence and resistance in insect pests (Srinivasa Rao and Dharma Reddy, 2003). In recent years, Integrated Pest Management (IPM) is the only key strategy to reduce the load of toxic chemical pesticides in the environment. Keeping these in view, the present investigations were carried out to evaluate the IPM module against the pests of pigeonpea under ICAR – AICRP (Pigeonpea) programme.

MATERIAL AND METHODS

The experiments on IPM module evaluation were conducted with the following treatments during *Kharif*, 2004 (2 trials) and *Kharif*, 2005 (2 trials) both at research station (NPRC, Vamban) and farmers' field at Venkitakulam of Pudukkottai District, Tamil Nadu under rainfed conditions. IPM module I included intercropping with groundnut, setting up of pheromone traps against *Helicoverpa armigera* @ 12/ha at the time of flowering, erection of bird perches @ 50/ha using 'T' shaped poles, application of Neem Seed Kernel Extract (NSKE) 5.0 per cent at flowering phase, spraying of *Ha*NPV @ 250 LE/ha on early instar larvae, need based application of insecticides *viz.*, endosulfan (0.07%) at podding phase against pod borer complex. Module II included farmer's practice e.g. dusting of lindane 1.3D 25 kg/ha once at peak flowering or pod initiation. The trials were carried out in an area of 0.2 ha for each treatment with the variety Vamban 2. In

TABLE 1: Evaluation of IPM module in Pigeonpea (*Kharif*, 2004)

Sl. No.	Details	On-Station Trial		On-Farm Trial	
		IPM	Farmers' practice	IPM	Farmers' practice
1.	Pod damage (%) by				
	Maruca vitrata	13.33	20.00	14.00	23.33
	Helicoverpa armigera	10.00	13.33	8.50	12.66
	Lampides boeticus	4.00	4.67	3.66	5.33
	Exelastis atomosa	2.67	4.67	3.00	3.66
	Cumulative pod borer damage (%)	35.33	50.67	31.50	52.66
2.	Pod wasp damage (%)	3.67	6.33	3.33	7.33
3.	Podfly seed damage (%)	5.33	8.00	6.00	6.66
4.	Pod bug damage (%)	5.67	6.50	6.33	5.66
5.	Grain yield (kg/ha)	728	463	801	562
6.	Cost : Benefit	1:2.58	1:1.84	1:2.79	1:2.35

IPM plot, the biopesticides/insecticides were imposed based on need by regular monitoring of the insect population/damage. Observations on pod damage by lepidopteran borers were made from the pods collected from ten randomly selected plants in each of the five microplots within a treatment plot. Pod damage by pod wasp and seed damage by pod bug and pod fly were also assessed from these pods. Finally grain yield and Benefit cost ratio (B/C) were worked out at harvest.

RESULTS AND DISCUSSION

All the four species of lepidopteran pod borers have been recorded in the experimental plots though *M. vitrata* and *H. armigera* were the major pod borers. Similarly the damage by other pod damaging insect pests *viz.*, pod wasp, pod fly and pod bug were also observed in all the experimental locations. The results of the IPM module evaluation experiments conducted during *Kharif*, 2004 and 2005 revealed that the cumulative pod borer damage was minimum in IPM plots compared to plots with farmers' practice both in on-station and on-farm trials. During *Kharif*, 2004 in both the on-station and on-farm trials the per cent cumulative pod borer damage was minimum in IPM plots which recorded 35.33 and 31.50 per cent as against 50.67 and 52.66 in farmers' practice plots respectively. The grain yield was also high in IPM plots *viz.*, 728 and 801 kg/ha, respectively in on-station and on-farm trials compared to 463 and 562 kg/ha in farmers' practice. The cost, benefit ratio was also maximum in IPM plots *viz.*, 1:2.58 and 1:2.79 compared to 1:1.84 and 1:2.35 in farmers' practice (Table 1).

The results of the *Kharif*, 2005 trials also reflected the same trend. The damage by lepidopteran pod borers was more pronounced compared to other pod damaging pests. The cumulative pod borer damage was high in farmers' practice plot 48.67 (on-station trial) and 54.67 (on-farm trial) as against 32.00 and 35.67 per cent in IPM imposed plots, respectively. The grain yield was maximum in IPM plot *i.e.* 714 (on-station) and 776 kg/ha (on – farm) with cost: benefit of 1:2.41 and 1:2.53, respectively compared to 475 and 513 kg/ha with the cost benefit of 1:1.92 and 1:2.10, respectively in farmers' practice (Table 2).

The two years' results confirmed the worthiness of adoption of IPM module in terms of reduced pod borer damage and high economic returns. The effectiveness of the IPM module in the present investigations is in conformity with the findings of Srinivasa Rao and Dharma Reddy (2003). Application of *Ha*NPV @ 250 LE ha^{-1} reduced both *Helicoverpa armigera* larval population and pod damage in pigeonpea (Rao and Virupakshaiah, 1990; Sarode and Sonalkar, 2001). The effectiveness of NSKE as a component of IPM was also reported by several

TABLE 2: Evaluation of IPM module in Pigeonpea (*Kharif*, 2005)

Sl. No.	Details	On-Station Trial		On-Farm Trial	
		IPM	Farmers' practice	IPM	Farmers' practice
1.	Pod damage (%) by				
	Maruca vitrata	11.33	18.00	13.00	22.00
	Helicoverpa armigera	8.33	10.67	9.33	12.33
	Lampides boeticus	2.33	3.67	3.00	4.67
	Exelastis atomosa	2.67	4.33	3.67	4.33
	Cumulative pod borer damage (%)	32.00	48.67	35.67	54.67
2.	Pod wasp damage (%)	4.67	8.33	4.67	7.33
3.	Pod fly seed damage (%)	5.00	7.67	6.00	8.67
4.	Pod bug damage (%)	6.33	10.67	8.67	13.33
5.	Grain yield (kg/ha)	714	475	776	513
6.	Cost : Benefit	1:2.41	1:1.92	1:2.53	1:2.10

workers. Borkar *et al* (1996) reported that NSKE 5% was effective against *M. obtusa*. Sarode *et al* (1997) observed that the combination of NPV and NSKE was more effective in the control of *H. armigera* and the combination was superior to individual applications. Bird perches also played a major role in reducing the pod damage in the present investigations and it was also reported by Bhagwat (1997). Srinivasa Rao and Dharma Reddy (2003) recorded higher grain yields from the IPM modules in pigeonpea and CBR of 1:9. Similarly Singh *et al* (2003) and Gajendran *et al* (2006) observed more CB ratio in IPM fields than in farmers' practice.

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