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Biological control of earhead caterpillar, *Helicoverpea armigera* Hubner in sorghum

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A B S T R A C T

A field experiment was conducted with biopesticides viz., *Nomurae rileyi* (Farlow) Samson and NPV of *Helicoverpa armigera* (HNPV) and compared with chemical control with Melathian 5% @ 30 kg.ha^{-1} for the management of ear head caterpillar *(H. armigera)* in sorghum ecosystem of University of Agricultural Sciences, Dharwad. The mycoinsecticide *N. rileyi* was highly infective at both the dosages 1x10^8 conidia per litre & 2x10^8 conidia per litre against *H. armigera* as compared to Ha NPV 250 LE per hectare and chemical control in mitigating the pest population as well as in obtaining the higher yield.

Introduction

Helicoverpa armigera Hubner (Lepidoptera; Noctuidae) is one of the serious polyphagous pest attacking more than 180 plants in India. The caterpillar cause major damage to the crops as it attacks reproductive parts and growing tips. The management of *H. armigera* is very difficult in many crops, including cotton, pigeonpea, sorghum and relies heavily on the use of chemical insecticides (Romeis *et al.*1999). Indiscriminate use of chemical insecticides has led to the development of high levels of resistance to major groups of insecticides (Armes *et al.* 1996). The scientists all over the world are now diverting their attention to develop safe and more permanent method of pest control. In this direction, biological control is one of the best options as it is ecofriendly and can be integrated with other pest management strategies. The management of *H. armigera* through conservation and augmentation of natural enemies, classical biological control, and the use of microbial insecticides has been reviewed (*King and Coleman 1989*). Though parasitoids and predators have been reported on this pest but their practical utility has not seen the light of day because of the constraints in mass production, storage and availability to the farmers on time. The efficacy of fungal pathogen, *Nomuraea rileyi* (Farlow) Samson has been proven against *H. armigera* by number of workers in groundnut, soyabean and cotton ecosystems (Patil, 2000; Hegde, 2001 and Ramegowda, 2005). Since *N. rileyi* is facultative fungi, they can be easily multiplied on rice or sorghum grains under laboratory condition and can be utilized in the management of this polyphagous pest. Moreover application of chemical insecticides in sorghum against *H. armigera* is difficult task because of toxic nature of the chemical to the applicator and tall nature of the crop. The present recommendation depends heavily on insecticide. Hence, the insect pathogens were tried under field conditions.

Material and Methods

The field experiment was conducted during *kharif* for two years (2002 to 2004) at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad. The sorghum variety CSH-9 was raised and protected for all the pests except *H. armigera*. The experiment comprised of four treatments and five replications. Each treatment was laid out in plot size of 4x4.95 sq.m. The different treatments consisted of spray of *N. rileyi* at 1x10^8 conidia/L, *N. rileyi* at 2x10^8 conidia/L, HaNPV 250 LE/ha and chemical control i.e., Malathion 5%dust at 30kg.ha^{-1}. The efficacy of fungal pathogen was tested in two doses as stated above and compared with HaNPV and chemical control.

The above treatments were imposed only once at the occurrence of pest at the time of ear head emergence. The observations were made on the number of larvae per plant a day before and 10 days after application. The data on yield was noted from each of the treatment and subjected to statistical analysis and finally cost benefit ratio was worked out.

Results and Discussion

The results presented in the table 1 indicated that there was no significant difference among the treatments indicating uniformity in pest pressure during both the years before imposing the treatments. During 2002-03, significantly least number of *H. armigera l*arvae (0.68 larvae/plant.) was recorded in *N. rileyi* ($2x10^8$ conidia/L) treatment. However, this was found to be at par with lower dose of *N. rileyi* at $1x10^8$ conidia/L and Malathion 5%). But both the treatments differed significantly and found superior to HaNPV (250 $LEha^{-1}$).

Spray of *N.rileyi* at $2x10^8$ Conidia/L continued its supremacy by recording minimum of 0.48 larvae/plant. during 2003-04. Whereas *N. rileyi* spray ($1x10^8$ conidia/L) was found at par (0.57 larvae/plant) with N. rileyi at $2x10^8$ Conidia/L. and Malathion 5% (0.71larvae/plant.). However, lower dose of *N. rileyi* was found at par with HaNPV (250$LEha^{-1}$) but found inferior to Malathion. The mean of two years results also indicated similar trend. This was also reflected in terms of yield. The maximum of 25.12 $q.ha^{-1}$ was obtained in *N. rileyi* (2x10 conidia/L) spray and was found on par with *N. rileyi* at $1x10^8$ conidia/L (25.10 $q.ha^{-1}$) and Malathion (24.90 $q.ha^{-1}$) and differed significantly from HaNPV (23.52$q.ha^{-1}$). A similar trend was observed during 2003-04. The pooled analysis over two years indicated that both the doses of *N. rileyi* spray was found superior in obtaining higher yields of 19.13 and 18.62 $q.ha^{-1}$, respectively.

The maximum cost benefit ratio of 1:32.49 was obtained with *N. rileyi* at 1.10^8 conidia /L (1:27.49). Though Malathion was quite effective in checking larvae population of *H. armigera* but cost benefit ratio was 1:12.34. Hence, spray of *N. rileyi* at $1x10^8$ conidia/L was found effective in checking the incidence of *H. armigera* and obtaining higher yield with maximum cost benefit ratio. This can be effectively used in the places like transitional zones where humidity is high and temperature is low. Similar results were also obtained in soybean and groundnut by Patil (2000) and in cotton by Hegde (2001) and Ramegowda (2005)

Literature Cited

Armes NJ DR Jadhav KR DeSouza. 1996 A survey of insecticide resistance In *Helicoverpa armigera* in the Indian subcontinent. *Bulletin of Entomological Research* **86**:499-514

Hegde R. 2001 Exploitation of *Nomurae rileyi* (Farlow) Samson against important Lepidopterous pests of potato, cotton and chickpea. Ph.D.Thesis University of Agricultural Sciences, Dharwad, India, 161pp.

King EG Coleman RJ. 1989 Potential for biological control of *Heliothis* species. *Annual Review of Entomology* **34**:53-75

Patil RK. 2001 Ecofriendly approaches for the management of *Spodoptera litura (*Fabricius) in groundnut. Ph.D.Thesis University of Agricultural Sciences, Dharwad 157pp.

Romeis JT Shanower G Zebitz CPW. 1999 *Trichogramma* egg parasitism of *Helicoverpa armigera* on pigeonpea and sorghum in southern India, *Entomologia Experimentalis et Applicata* **90**:59-81

Ramegowda GK. 2005 Epizootiology and utilization of *Nomurae rileyi* (Farlow) Samson in pest suppression. *Ph.D.Thesis* University of Agricultural Sciences, Dharwad, India, 113pp.

Table1

Management of *Helicoverpa armigera* by *Nomuraea rileyi*

Treatment	No. of larvae / plant					Yield $q.ha^{-1}$			B:C ratio
	Before spray		After spray						
	2002-03	2003-04	2002-03	2003-04	Mean	2002-03	2003-04	Mean	
1. Spray *N. rileyi* @ $1.0x10^8$conidia/L	2.05a	1.75a	0.69c	0.57bc	0.63	25.14a	12.10b	18.62	32.49
2. Spray *N. rileyi* @ $2x10^8$conidia/L	2.08a	1.77a	0.68c	0.48c	0.58	25.12a	13.14b	19.13	27.49
3. HaNPV (250 LE/ha)	2.06a	1.75a	0.80b	0.69b	0.75	23.52b	11.91b	17.72	6.50
4. Malathion (5%)@30kg/ha	2.01a	1.74a	0.71c	0.54c	0.63	24.90a	12.61b	18.76	12.34

* Means followed by same alphabet do not differ significantly (0.05) by DMRT