Short Communications

Indian Journal of Agricultural Sciences **88** (1): 157–8, January 2018/Short Communication

Biodiversity of insect pests and natural enemies affiliated with wheat (*Triticum aestivum*) ecosystem in Haryana

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Received: 06 May 2017; Accepted: 29 August 2017

Key words: Biodiversity, Haryana, Insect-pests, Natural enemies, Wheat

Wheat (*Triticum aestivum* L.) is an important staple food crop of Haryana and the total production in 2011-12 was 183.40 lakh metric tonnes from an area of 2490 ha (Anonymous 2015). Among the many biotic constraints hampering the production of wheat, insect pests cause considerable damage. Twenty four species of insect pests have been reported as attacking wheat crop in India (Singh 1998).

A field trial was conducted in Research farm at Institute of Pesticide Formulation Technology, Gurgaon, Haryana during *rabi* season of 2014-15 to observe, identify and to document the pests and natural enemies associated with wheat as it gives an additive advantage over pests by adopting preventive measures and timely implementation of management tactics. Observations were made from an ecological plot size 4 × 5 m^2, which was replicated three times.

Insect pests and natural enemies were collected once in fifteen days adopting standard methods, viz. insect net, pitfall traps and rubbish traps. Insect pests and natural enemies collected were preserved and were identified at Division of Entomology, Indian Agricultural Research Institute, New Delhi and at National Bureau of Agriculturally Important Insects, Bengaluru.

A total of thirteen (13) insect species were identified of which seven (7) were pests and six (6) were natural enemies. The insects identified were grouped under six (6) orders and nine (9) different families. The insect pests included subterranean termite; *Odontotermes obesus* (Rambur) (Termitidae: Isoptera), ants; *Camponotus* spp., *Aphaenogaster* spp. (Formicidae: Hymenoptera), army worm; *Mythimna separata* (Noctuidae: Lepidoptera), aphid; *Macrosiphum miscanthi* (Aphididae:Hemiptera), pink stem borer; *Sesamia inferens* (Noctuidae:Lepidoptera) and shoot fly; *Atherigona soccata* (Diptera). The natural enemies recorded were coccinellids like *Coccinella septumpunctata, Menochilus sexmaculatus* and *Hippodamia variegata* (Coccinellidae: Coleoptera), *Cotesia* spp., (Braconidae: Hymenoptera), hoverfly; *Episyrphus balteatus* (Syrphidae: Diptera) and ground beetle; *Abacetus* spp. (Carabidae: Coleoptera).

Root feeding termites and ants were observed throughout the cropping season whereas wheat shoot fly and pink stem borer infestation were observed during the seedling stage. Aphids were observed in large numbers during the milk stage. Army worm damage was observed during the tillering period. Coccinellids of different species and hoverflies thrived in large numbers during the post winter season (March-April). *Cotesia* spp. parasitized army worms were collected from field and identified post emergence. Ground beetles were trapped using rubbish traps and they were abundant during the whole cropping period.

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Table 1 Insect pests recorded in wheat ecosystem

Common name	Scientific name	Family	Order	Feeding site
Subterranean termite	*Odontotermes obesus* (Rambur)	Termitidae	Isoptera	Root and Shoot
Carpenter ant	*Camponotus* spp.	Formicidae	Hymenoptera	Roots
Sugar ant	*Aphaenogaster* spp.	Formicidae	Hymenoptera	Roots
Army worm	*Mythimna separata* (Walker)	Noctuidae	Lepidoptera	Leaves
Pink stem borer	*Sesamia inferens* (Walker)	Noctuidae	Lepidoptera	Shoot
Shoot fly	*Atherigona soccata* (Rondani)	Muscidae	Diptera	Shoot
Aphid	*Macrosiphum miscanthi* (Tak.)	Aphididae	Hemiptera	Leaves

Table 2 Natural enemies recorded in wheat ecosystem

Common name	Scientific name	Family	Order	Host
Seven spotted lady bug	*Coccinella septumpunctata* (L.)	Coccinellidae	Coleoptera	Aphids
Lady beetle	*Menochilus sexmaculatus* (F.)	Coccinellidae	Coleoptera	Aphids
Black spotted lady beetle	*Hippodamia variegata* (Goeze)	Coccinellidae	Coleoptera	Aphids
Cotesia wasp	*Cotesia* spp.	Braconidae	Hymenoptera	Army worm
Marmalade fly	*Episyrphus balteatus* (De geer)	Syrphidae	Diptera	Aphids
Ground beetle	*Abacetus* spp.	Carabidae	Coleoptera	Polyphagous

This study falls in line with the works of Chambers *et al*. (1985), Chillar *et al*. (2006), Moschini *et al.* (2012), Sattar and Saliha (2001), Singh (1986), Shaw and Huddleston (1991), Wade and Norman (1998) who described these insect pests and natural enemies in wheat at different stages of the crop.

SUMMARY

This study gave an outline on the major insect pests and the natural enemies associated with wheat. Insect pests and natural enemies in wheat vary from place to place and there are many other insect pests and natural enemies which are associated with wheat ecosystem than those documented during this study. So, further research with in-depth study is recommended so that the role of natural enemies in suppressing the pest population will be helpful for integrated pest management in the wheat ecosystem.

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