

Arthropods associated with ashwagandha, (*Withania somnifera* Dunal) in semi arid region of Gujarat

Ashwagandha (*Withania somnifera* Dunal) known as Indian ginseng is a Solanaceous erect, evergreen, tomentose shrub found in Central Indian States of Madhya Pradesh, Rajasthan, parts of Punjab, Himachal Pradesh and Uttar Pradesh. The roots, leaves and seeds of ashwagandha have medicinal properties owing to the presence of several alkaloids and withanolids. Its roots are alternative, aphrodisiac, abortifacient, tonic and deabsturent, leaves used in fever, painful swellings and sore eyes, fruits are diuretic and seeds are diuretic and hypnotic (Sangwan *et al.*, 2004). Conservation and protection of such herbs is a formidable task as several biotic factors affect their physiology and photochemical profile alongwith yield. Information on associated fauna and their succession in the crop plays important role in planning pest management program. Thus, a study was conducted in cultivated ashwagandha to record associated arthropods along with their sequence of occurrence in the crop.

The field survey was conducted during 2007-08 and 2008-09 at Central Research Farm, Directorate of Medicinal and Aromatic Plants Research, Boriavi, Anand (Gujarat). The crop was cultivated in mid of August (*i.e.* late *kharif*) in 30 plots of 4x5 m² size with 45x30 cm spacing. Recommended package of practices were followed to raise the crop. Observation on occurrence and infestation of different pests on the crop were taken at 15 days interval by selecting 05 plants randomly from 10 randomly selected plots. Thus, a total of 50 plants were sampled for recording the associated arthropods. The whole plant was thoroughly examined for pest infestation till the harvest of the crop. Observations on population dynamics of important pests and natural enemies were recorded following standard methodology.

The insect species were categorized as major and minor pests on the basis of their mean level of incidence in both the years of study. The insect pests, which infest the crop continuously throughout cropping season and pests that appeared for few weeks but assumed severe form were considered as major pests. The pests which occurred intermittently and population never become high were categorized as minor pests. Further, if more than 50% plants were found infested, the infestation was rated severe and infestation upto 25% was rated less severe.

Twenty six species of phytophagous arthropods (Table 1) belonging to Hemiptera (09), Homoptera (05), Coleoptera (03), Lepidoptera (03), Orthoptera (03), Diptera (02) & Acari (01) were recorded on ashwagandha. Based on their feeding habit these have been categorized as sap suckers (15), defoliators (09), borer and miner (02). Mathur and Srivastava (1967) recorded 04 species of pests on ashwagandha from Jammu and Kashmir, Nagraja and Reddy (1985) recorded 11 species of insect and 01 species of mite pests infesting ashwagandha from Karnataka and Ramanna *et al.* (2010) reported 11 species of phytophagous insects on ashwagandha from Bangalore. In the present finding Hadda beetle (*Epilachna vigintioctopunctata*) and mealy bug (*Phenococcussolanopsis*) were the predominant insects reported during September-December and September-February, respectively. These along with red spider mite were the major

pests in the crop. Ramanna *et al.* (2010), were also found had a beetle as predominant species during September-December. Both adult and grubs of the hadda beetle were found feeding the parenchymatous tissues on both the surface of the leaves and in severe condition the leaves got completely skeletonised, which ultimately resulted in defoliation of plants. Several authors have reported hadda beetle as the major pest of ashwagandha from various parts of the country namely, Mathur and Srivastava (1967) from Jammu and Kashmir, Nagraja and Reddy (1985), Kumar (2007), Venkatesha (2006), Ramanna *et al.* (2010) from Bangalore, Karnataka, Konar and Mohasin (2002) from West Bengal and Manjoo and Swaminathan (2007) from Udaipur, Rajasthan. The colonies of mealy bugs were found concentrated on the lower surface of the leaves and growing shoot. The nature of damage mainly involved the de-sapping form growing shoot and leaves which, resulted into distortion in leaves and wilting of top portion of plant. Bhagat (2004) reported the infestations of mango mealy bug (*Drosicha mangiferae*) on ashwagandha from February to May in Jammu & Kashmir and Ramanna *et al.*, (2010) reported the incidence of *Ferrisia viragata* on ashwagandha in Bangalore. *Tetranychus urticae* was observed to infest leaves of ashwagandha during 3rd week of October to November. Concentration of mites was more on underside of the leaves. The infested plot was looking, as if burnt. Growth of plants was also stunted. Infestation of mite on ashwagandha was reported by Mathur and Srivastava (1967) from Jammu and Kashmir and Ramanna *et al.* (2010) from Bangalore. Aphids (*Aphis gossypii*) were observed on whole plant of ashwagandha with more concentration on leaves during January-February. In severe conditions the whole plant gave smoky appearance due to secondary infestation of sooty mould. Ramanna *et al.*, (2010) in Bangalore condition reported the infestation of aphids on ashwagandha from August-March. An unidentified species of a dipteran berry borer was recorded from berries of ashwagandha during December to 2nd week of February. No seeds were recovered from infested berries. Besides, a large number of pests of minor significance were also recorded. Among the sucking pests, complex of Jassids (*Amrasca biguttula biguttula*, *Nephotettix virescens*, *Aconurella prolixa*, *Balclutha incisa*, *Balclutha saltuella*) on leaves, true bugs (*Graptostethus servus*, *Spilostethus pandurus*, *Aspongopus janus*, *Nezara viridula*) on flower buds and fruits and tree hoppers (*Otinotus oneratus*, *Leptocentrus staurus*, *Tricentrus* sp.) on apical shoot of ashwagandha were observed during 2nd week of November to 1st week of January. Whereas, defoliating insects of order Coleoptera (*Cyrtoszemiadipar*, *Corynode speregrinus*) Lepidoptera (*Helicoverpa* sp. Hairy caterpillars, *Hyposidra successaria*) and Orthoptera (Long horned grasshopper, *Crotogonus trachypterus*, *Acrida exaltata*) were seen associated during early crop growth stages (1st week of September-October). Infestation of hadda beetle, mite, mealybug and aphid were uniform and severe, whereas, that of jassids, true bugs, tree hoppers, Lepidopterans etc. were sporadic and less severe.

Table 1. Pest complex recorded on ashwagandha

Common name	Scientific name	Family	Order	Pest status
Sap Suckers				
Mealy bugs	<i>Phenacoccus solenopsis</i>	Pseudococcidae	Homoptera	Major, Regular, Polyphagus
Aphids	<i>Aphis gossypii</i>	Aphididae	Homoptera	Minor, Seasonal, Polyphagus
Tree hopper	<i>Otinotus oneratus</i>	Membracidae	Homoptera	Minor, Seasonal, Polyphagus
	<i>Leptocentrus taurus</i>			
	<i>Tricentrus</i> sp.			
	<i>Amrasca biguttula biguttula</i>			
Jassids	<i>Nephotettix virescens</i>	Cicadellidae	Hemiptera	Minor, Seasonal, Polyphagus
	<i>Aconurella prolixa</i>			
	<i>Balclutha incisa</i>			
	<i>Balclutha saltuella</i>			
Seed bug	<i>Graptostethus servus</i>	Lygaeidae	Hemiptera	Minor, Seasonal, Polyphagus
	<i>Spilostethus pandurus</i>			
Stink bug	<i>Aspongopus janus</i>	Pentatomidae	Hemiptera	Minor, Seasonal, Polyphagus
	<i>Nezara viridula</i>			
Red Spider mite	<i>Tetranychu surticae</i>	Tetranychidae	Acrai	Major, Seasonal, Polyphagus
Defoliator				
Epilachna beetle	<i>Epilachna</i> (= <i>Henosepilachna</i>) <i>vigintioctopuntata</i>	Coccinellidae	Coleoptera	Major, Seasonal, Oligophagus
Snout beetle	<i>Cyrtozemia dispar</i>	Curculionidae	Coleoptera	Minor, Seasonal, Polyphagus
Metallic blue colour beetle	<i>Corynodes peregrinus</i>	Chrysomelidae	Coleoptera	Minor, Occasional, Polyphagus
Leaf eating caterpillar	<i>Helicoverpa</i> Sp.	Noctuidae	Lepidoptera	Minor, Occasional, Polyphagus
Hairy caterpillars	-	Arctiidae	Lepidoptera	Minor, Occasional, Polyphagus
Semi looper	<i>Hyposidra successaria</i>	Geometridae	Lepidoptera	Minor, Occasional, Polyphagus
Grass hopper	<i>Crotogonus trachypterus</i>	Acrididae	Orthoptera	Minor, Sporadic, Polyphagus
	<i>Acrida exaltata</i>			
Long horned grasshopper	-	Tettigoniidae	Orthoptera	Minor, Sporadic, Polyphagus
Borer & Miner				
Berry borer	-	-	Diptera	Minor, Seasonal, Polyphagus
Leaf miner	-	Agromyzidae	Diptera	Minor, Seasonal, Polyphagus

However, presence of these pest arthropods caused up to 20% reduction in root yield.

In all 26 phytophagous species of arthropods viz., sap suckers (15), defoliators (09), borer & miner (02) were recorded on ashwagandha. Infestation of hadda beetle, mite, mealybug and aphid were uniform and severe, whereas, that of jassids, true bugs, tree hoppers, Lepidopterans etc. were sporadic and

less severe. However, presence of these pest arthropods caused significant reduction in root yield.

Acknowledgement

The author is thankful to Director, Directorate of Medicinal and Aromatic Plants Research, Boriavi, Anand for providing facilities for conducting the studies.

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(Received: February, 2013 ; Accepted: November, 2013)

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