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STATUS OF ARTHROPOD PESTS INFESTING DIFFERENT ORNAMENTAL PLANTS OF BANGLADESH

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ABSTRACT

The study was conducted at Gazipur, Jessore, Narsingdi, Satkhira and Cox's Bazar in Bangladesh to know the arthropod pests infesting on the ornamental plants viz., rose, China rose, tuberose, gladiolus, thuja, ixora, marigold, chrysanthemum, cosmos and dahlia. A total of 51 insect and 4 mite species were identified as arthropod pests to the selected ornamental plants. The highest percentage of arthropods caused damage (23%) on rose and the lowest damage level (3%) was found on ixora. Abundance of the major and minor pests was 16% and 84%, respectively. The arthropod pests were under 10 taxonomic Orders and the Order Hemiptera showed the highest abundance (31%). Rose plants were attacked by 13 insect pests and single mite species of which thrips, aphid, bud worm and red spider mite were found as major pests. China rose was infested by 12 species of arthropods and all of their status were minor pests. Six species of arthropods caused damage to tuberose, among them aphid and bud borer were found as major pests. Gladiolus and thuja were infested by 5 and 4 species of arthropods and their major pests were thrips and bag worm, respectively. Scale insect and aphid were found as the minor pests of ixora. Five species of arthropods infested on marigold and the occurrence of aphid and mealy bug were major pests. Chrysanthemum and cosmos were infested by 5 and 2 species of arthropods, respectively and which were identified as minor pests. Four species of arthropods attacked dahlia, and mealy bug was found as major pest.

Keywords: Survey, insects, major pest, minor pest, ornamental plants

Introduction

Bangladesh has favorable climatic condition for ornamental crop production and there is ample opportunity for increasing the profit from flower production due to increase of the demand. As a high value of agricultural corps, farmers and traders are showing keen interest in floriculture and flower business in Bangladesh. Hence, commercial floriculture has a remarkable positive impact on increasing total household income. About 5,000 resilient farmers are growing flower and foliage in the country and 80,000-90,000 people are directly or indirectly involved in floriculture business (Chowdhury 2010).

Insect and mite infestation is one of the important obstacles of ornamental crop production. Sixty five insect species cause damage to different ornamental plants in Himachal Pradesh, India (Pal and Sarkar 2009), but such information is scanty in Bangladesh. Ali *et al.* (2016) reported that a total of 16 insect pests and 1 mite pest cause damage to flowers in Bangladesh of which aphid, thrips and two-spotted spider mite are more damaging than others.

Pest species abundance and infestation differ from place to place with the variation in the agro-climatic conditions of the locality. Information on pest complex in a specific agro-ecosystem is very much essential in developing pest management strategies, which would be economically feasible and sound. With this aim the study was conducted to identify the insects and mites cause infestation on various ornamental plants through survey at different locations in Bangladesh.

Materials and Methods

Study locations and farmer selection: Ornamental plant producing farmers were selected from Jhikargacha Uapzila of Jessore, Raipura Uapzila of Narsingdi, Chokoria Uapzila of Cox's Bazar and Sadar Uapzila of Satkhira. Ornamental plants were also cultivated in Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur. Three farmers from each location were brought under this study for cultivation and data collection on arthropod pests.

Study materials: Ornamental plants like rose, china-rose, tuberose, gladiolus, thuja, ixora, marigold, chrysanthemum, cosmos and dahlia were selected for cultivation in the experimental sites.

Pest collection and identification: The cultivated ornamental plants in the study locations were surveyed fortnightly intervals to observe the incidence of the insect and mite pests. Pocket lens (10×), microscope, sweep nets, yellow sticky traps, malaise traps, glass vials and polythene bags were used for collection, observation, identification and preservation of arthropod pests. Some pests were identified on the field and the unknown species were killed and brought from the experiment fields to the Entomology Laboratory of Bangabandhu Sheikh Mujibur Rahman Agricultural University and preserved in refrigerator in the laboratory. Then these were mounted on points and dried, and identified by profiling their characteristics, taxonomic keys, comparing with pictures and laboratory specimens. Information of the arthropod pests, explored from the field survey and identification were compiled and presented for taxonomic profiling (common name, scientific name, Family and Order).

Pest characterization: Categorization of the pests as major and minor was done on the basis of the mode of occurrence and frequency, farmers' perception or the level of infestation. Arthropods those caused 10% or above infestation were termed as major pests.

Results and Discussion

A total of 51 insect and 4 mite species were identified as the pests of the studied ornamental plants. Among the pest species, 23% attacked on rose followed by china-rose (21%) and the lowest percentage (3%) infested on ixora (Figure 1). The major and minor pest species occupied 16% and 84% of their abundance, respectively (Figure 2). The arthropod pest species belonged to 10 taxonomic Orders and the Order Hemiptera occupied the highest abundance (31%) followed by Lepidoptera (26%), Coleoptera (16%), Diptera (5%), Acari (5%) and each of the other 4 Orders had 2% abundance (Figure 3).

Abundance, distribution and infestation of arthropod species depend on the availability of host species, ambient climatic condition and adopted pest management tactics. Cultivation of ornamental plants in Bangladesh is being commercialized and grown up very rapidly. Farmers are introducing propagating materials from abroad and

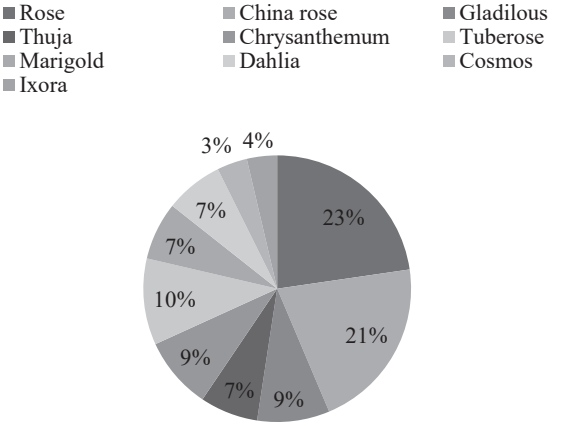


Figure 1. Arthropod species (%) belonged to different ornamental plants found in the study locations.

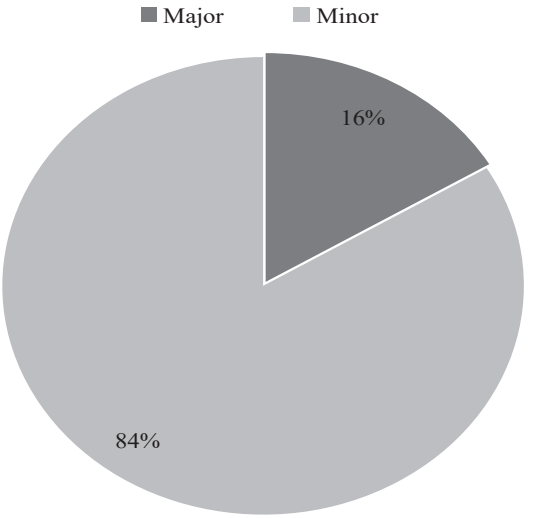


Figure 2. Major and minor arthropod pest species (%) belonged to different ornamental plants found in the study locations.

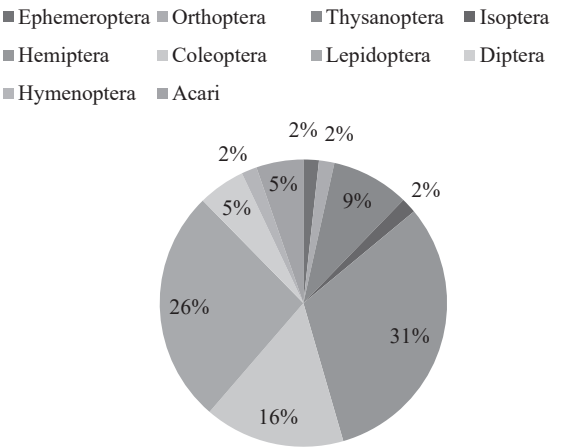


Figure 3. Arthropods (%) belonged to different taxonomic Orders found on the ornamental plants in the study locations.

transferring from one region to another region. Therefore, new pests are emerging and moving in different locations of the country. On the contrary, subtropical climate of this country favors reproduction and development of the insect and mite species. That is why, many insect and mite species have appeared threat to ornamental pests in Bangladesh. Joshi and Kumar (2012) reported that comparatively higher temperature and lower relative humidity increased hopper population. The present study revealed that the insects belongs to the Order Hemiptera were most abundant and this finding showed agreement with the study by Pal and Sarkar (2009) who reported that the Hemipteran species were most abundant on ornamental plants in India. Jaskiewicz (1997) reported that high temperature (30°C), heavy rainfall and strong winds resulted lower abundance of aphid on rose.

In a total 14 arthropod species were identified as pests of rose of which 13 species were insect and one species was mite (Table 1). Among the pests, three species were identified as major and others were in minor category. The major pests attacked in rose were thrips, aphid and red spider mite.

In a total 12 arthropod species infested china-rose of which 11 species were insects and one species was mite (Table 2). All the species were found as minor pests. A total of 6 arthropod species were identified as pest of tuberose of which 5 species were insects and one species was mite (Table 3). Among the arthropods, aphid and bud borer were identified as major and others were minor pests.

In a total 5 arthropod species infested gladiolus of which 4 species were insects and one species was mite (Table 4). Among the arthropods, thrips was identified as major and others were minor pests. Thuja plants were infested by 4 insect species and among them, bag worm was found as the major pest (Table 4). A total of 2 insect species infested ixora and all were found as minor pests (Table 4). Pal and Sarkar (2009) also identified bagworm as a pest of ornamental plants in India.

Table 1.Taxonomic profile and status of the pests of rose

Pests of rose	Taxonomic profile	Status
Thrips	*Rhipiphorothrips cruentatus* (Thysanoptera: Thripidae)	Major
Aphid	*Macrosiphum rosae* (Hemiptera: Aphididae)	Major
Rose scale	*Lindingaspis rossi* (Hemiptera: Diaspididae)	Minor
Leaf hopper	*Edwardsiana rosae* (Hemiptera: Cicadellidae)	Minor
Chafer beetle	*Oxycetonia versicolor* (Coleoptera: Scarabeidae)	Minor
Spotted cucumber beetle	*Diabrotica undecimpunctata* (Coleoptera: Chrysomelidae)	Minor
Rose curculio	*Merhynchites bicolor* (Coleoptera: Attelabidae)	Minor
Rose bud worm	*Helicoverpa virescens* (Lepidoptera: Noctuidae)	Major
Hairy caterpillar	*Orgyia posticus* (Lepidoptera: Lymantriidae)	Minor
Castor semilooper	*Achaea janata* (Lepidoptera: Erebidae)	Minor
Leaf folder	*Acleris extensana* (Lepidoptera: Tortricidae)	Minor
Rose midge	*Dasineura rhodophaga* (Diptera: Cecidomyiidae)	Minor
Leaf cutting bee	*Megachile anthracina* (Hymenoptera: Megachilidae)	Minor
Red spider mite	*Tetranychus cinnabarinus* (Acari: Tetranychidae)	Major

Table 2. Taxonomic profile and status of the pests of china rose

Pests	Taxonomic profile	Status
Thrips	*Thrips hawaiienis* (Thysanoptera: Thripidae)	Minor
Aphid	*Aphis gossypii* (Hemiptera: Aphididae)	Minor
White fly	*Aleurodicus dugesii* (Hemiptera: Aleurodidae)	Minor
Dusky cotton bug	*Oxycarenus laetus* (Hemiptera: Lygaeidae)	Minor
Hollyhock tinged bug	*Urentius euonymus* (Hemiptera: Tingidae)	Minor
Lace wing bug	*Cadmilos retiarius* (Hemiptera:Tingidae)	Minor
Banded blister beetle	*Mylabris phalerata* (Coleoptera: Meloidae)	Minor
Castor hairy caterpillar	*Euproctis lunata* (Lepidoptera: Erebidae)	Minor
Ak butter fly	*Danais chrysippus* (Lepidoptera: Nymphalidae)	Minor
Lily moth	*Polytela gloriosae* (Lepidoptera: Noctuidae)	Minor
Gerbera leaf miner	*Liriomyza trifolii* (Diptera : Agromyzidae)	Minor
Red spider mite	*Tetranychus tumidus* (Acari: Tetranychidae)	Major

Table 3. Taxonomic profile and status of the pests of tuberose

Pests	Taxonomic profile	Status
Grasshopper	*Atracttomoroha crenulata* (Orthoptera: Tettigoniidae)	Minor
Aphid	*Aphis craccivora* (Hemiptera: Aphididae)	Major
Weevil	*Myllocerus sp*. (Coleoptera: Cucurlionidae)	Minor
Bud borer	*Helicoverpa armigera* (Lepidoptera: Noctuidae)	Major
Hairy caterpillar	*Spilosoma oblique* (Lepidoptera: Erebidae)	Minor
Red spider mite	*Tetranychus urticae* (Acari: Tetranychidae)	Minor

Table 4. Taxonomic profile and status of the pests of gladiolus, thuja and ixora

Plant	Pests	Taxonomic profile	Status
Gladiolus	Thrips	*Teniothrips simplex* (Thysanoptera: Thripidae)	Major
	Mealy bug	*Ferrisia virgata* (Hemiptera: Pseudococcidae)	Minor
	Cutworms	*Agrotis segetum* (Lepidoptera: Noctuidae)	Minor
	Leaf eating caterpillar	*Spodoptera litura* (Lepidoptera: Noctuidae)	Minor
	Bulb mite	*Rhyzoglyphus sp.* (Acari: Tetranychidae)	Minor
Thuja	Shield backed bug	*Scutelera nobelis* (Hemiptera: Scutelleridae)	Minor
	Cedar bark weevil	*Phloeosinus sp*. (Coleoptera: Curculionidae)	Minor
	Bark weevil	*Otiorhynchus rugosostriatus* (Coleoptera: Curculionidae)	Minor
	Bag worm	*Thyridopteryx ephemeraeformis* (Lepidoptera: Psychidae)	Major
Ixora	Scale insect	*Coccus viridis* (Hemiptera: Coccidae)	Minor
	Aphid	*Aphis gossypii* (Hemiptera: Aphididae)	Minor

Table 5. Taxonomic profile and status of the pests of marigold, chrysanthemum, cosmos and dahlia

Plant	Pests	Taxonomic profile	Status
Marigold	Ear wig	*Forficula oricularia* (Dermaptera: Forficulidae)	Minor
	Aphid	*Neotoxoptera oliveri* (Hemiptera: Aphididae)	Major
	Mealy bug	*Planococcus citri* (Hemiptera: Pseudococcidae)	Major
	White fly	*Trialeurodes vopororioum* (Hemiptera: Aleurodidae)	Minor
	Leaf miner	*Liriomyza frifolii (Diptera: Agromyzidae)*	Minor
Chrysanthemum	Termite	*Microtermes obesi* (Isoptera: Termitidae)	Minor
	Thrips	*Frankiniella sp.* (Thysanoptera: Thripidae)	Minor
	Aphid	*Macrosiphoniella sanborni* (Hemiptera: Aphididae)	Minor
	Bud borer	*Helicoverpa armigera* (Lepidoptera: Noctuidae)	Minor
	Hairy caterpillar	*Spilosoma oblique* (Lepidoptera: Erebidae)	Minor
Cosmos	Thrips	*Microcephalothrips abdominalis* (Thysanoptera: Thripidae)	Minor
	Aphid	*Aphis spiraecola* (Hemiptera: Aphididae)	Minor
Dahlia	True bug	*Acanthocephala thomasi* (Hemiptera: Coreidae)	Minor
	Mealy bug	*Plannococcus citri* (Hemiptera: Pseudococcidae)	Major
	Leaf beetle	*Labidomera clivicollos* (Coleoptera: Chrysomelidae)	Minor
	Weevil	*Otiorhynchus sulcatus* (Coleoptera: Cucurlionidae)	Minor

Arthropod species caused infestation on marigold, chrysanthemum, cosmos and dahlia are presented in table 5. Results showed that marigold was infested by 5 insect species of which aphid and mealy bug were found as major pests. Five insect species caused damage to chrysanthemum and all were minor pests. Thrips and aphid were found as minor pests of cosmos. Dahlia was infested by 4 insect species of which mealy bug was found as major pest. Ganai and Khaliq (2017) reported that nine insect species and one mite species attacked marigold in the Jammu of India. Pal and Sarkar (2009) studied the insect pest of gladiolus in India and reported that the gram pod borer *Helicoverpa armigera* was the most important insect inflicted serious damage. They also reported that the green semilooper *Plusia orichalcea* caused damage to gladiolus by feeding on the leaves. Sohi

and Singh (1996) reported that *H. armigera* and *T. urticae* were economically important pests of chrysanthemum in India. According to Rami *et al.* (2004) *Macrosiphoniella sanborni* is one of the serious pests of chrysanthemum. The thrips (*Taeniothrips simplex*) has been reported as a major pest of gladiolus in Himachal Pradesh, India (Pal and Sarkar 2009). Mealy bug species were found to attack ixora and China rose and they caused defoliation (Amin *et al.* 2018).

Information on pest complex in a specific agro-ecosystem is very essential in devising pest management strategies which would not only be economically feasible but also ecologically sound. This study provides information on the insect and mite pests of different ornamental pants and their pest status that could be helpful to growers for taking management decision.

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References

Ali MR, Chowdhury MSU, Karim MA, Hossain MMA and Mustafi BAA. 2016. Pest risk analysis of cut flower and foliage in Bangladesh. Strengthening Phytosanitary Capacity in Bangladesh Project. Khamarbari, Farmgate, Dhaka-1205.

Amin MR, Rahman H and Islam A. 2018. Arthropod pests infesting ornamental plants in Bangladesh and their management (in Bangla). Department of Entomology, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur. Bangladesh.

Chowdhury SZ. 2010. Produce more fruits and vegetables instead of rice. The Daily Independent. February 11, Dhaka, Bangladesh.

Ganai S and Khaliq N. 2017. Effect of abiotic factors on the populations of pod borer, *Helicoverpa armigera* (Hubner) on marigold, *Tagetes erecta* in Jammu, India. International Journal of Current Microbiology and Applied Sciences, *6:*181-185.

Jaskiewicz B. 1997. Species composition and dynamics of the aphid occurrence on selected decorative shrubs in the years 1973-1993. Rozprawy Naukowe AR in Lublin. 183: 1-93.

Joshi PC and Kumar S. 2012. Effect of some meteorological factors on seasonal abundance of *Idioscopus nitidulus* (Walker) (Hemiptera: Cicadellidae) in mango orchards of Haridwar (India). New York Science Journal, *5:* 101-103.

Pal S and Sarkar I. 2009. Pests infesting ornamental plants in hilly region of West Bengal. Journal of Plant Protection Science, *1:* 98-101.

Rami RPV, Janakiram T and Rao TM. 2004. Screening of chrysanthemum germplasm for resistance to two spotted spider mite, *Tetranychus urticae* Koch and bud borer, *Helicoverpa armigera.* Journal of Ornamental Horticulture, *7:* 80-84.

Sohi AS and Singh D. 1995. Insect Pests of Ornamental Plants. In: Advances in Horticulture (Eds. Chadha KL and Bhattacharjee SK). Malhotra Publishing House, New Delhi 110005, India. p. 913.