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SUCCESSION OF INSECT MITE PESTS AND ITS NATURAL ENEMIES OF ROSE IN JASHORE, BANGLADESH

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ABSTRACT

In Bangladesh about 51 insect species attack roses like thrips, aphid, mealy bug, whitefly, mites etc. Which causes damage to rose plant and reduce the quality of flower. Most of the major and minor pests appeared in rose plant at the flowering stage with the maximum infestation. Fourteen species of insect pests belonging to 6 orders and 12 families were found to infest at different growth stages of rose. This experiment was carried out on insect pests of different growth stages attacking at rose at Godkhali, Jhikorgacha and Regional Agricultural Research Station (RARS), Jashore during November 2020 to June 2022. The rose variety namely, Jashore local was used. Among the insects, only four (4) namely, Aphid (*Macrosiphum rosae*), thrips (*Rhipiphorothrips cruentatus*), Rose bud borer (*Helicoverpa virescens*) and red spider mite (*Tetranychus cinnabarinus*) were recorded as the major pests while the rests were of minor importance on the basis of their population densities per plant, nature and extent of damage and flower yield reduction. Nine species of natural enemies belonging to 6 orders and 7 families were found to predate on different insect pests of roses and recorded in rose flower in the experimental rose garden. The population density per plant of major insects namely, aphid, thrips, rose bud borer and red mite was 25.75, 9.35, 1.25 and 12.65 per plant, respectively in 2021 and those of the insects was 27.45, 10.55, 1.75 and 14.55 plant^{-1}, respectively recorded in 2022 in rose flower.

Key words: Aphid, thrips, rose bud borer, red mite, natural enemies, damage.

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INTRODUCTION

Commercial floriculture has a remarkable positive impact on increasing household income of farmers and traders in Bangladesh. The farmers are showing keen interest in floriculture and flower business as a high value agricultural corps for favorable climatic condition in this country. At present, flower is cultivating commercially in 26 districts out of 64 of Bangladesh and estimating area is 10,000 hectares where, about 15,000 resilient farmers are growing flower and foliage in the country and 180,000-190,000 people are directly involved in floriculture business and about 1.5 to 2 million people are earning their livelihood through this sector (Khan 2024, BBS 2024, Heuvel *et al.* 2023, Tazuddin 2020). Rose (*Rosa species*), a universally celebrated flower, has been used as a garden plant since the dawn of civilization. Rose is a symbol of perfection, elegance, romance and love (Haye and Amy 2020). Rose was called "The Queen of Flowers" firstly by Greek poetess in her "Ode to the Rose" (Muhammad *et al.* 1996). It is used in different type of personal, social, and official marriage ceremony, national days, official inaugurations. Gadkhali, Jhikorgacha, Jashore is the most important commercial flower growing areas in Bangladesh. Farmers of these areas grow different types of flowers including rose. Several insects and mite pests were found to attack and considerable losses during rose cultivation in different region of 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 scientifically sound (Islam *et al*. 2019, Handayati and Sihombing 2017). But in Bangladesh, very little information is available about the insects and mite in roses. For successful production it is important to document the insect-mite pests their damage severity and natural enemies in relation to the different growth stages of the crop. The present study was undertaken to record the succession of the insect-mite pests and their natural enemies of rose in Jashore.

Therefore, it is urgent needed to know insect pest and their infestation status in roses for adopting appropriate control measure. In Bangladesh, check list of insect pests and natural enemies of rose and their damage severity in this region

are scanty. Therefore, the present study was undertaken to record the insect pest complex and its natural enemies, pest status, nature and extent of damage and the time of appearance of the pests in relation to the different growth stages of the crop.

MATERIALS AND METHODS

The research and survey works were conducted in the rose garden of Regional Agricultural Research Station (RARS), Jashore and farmers cultivated rose garden, Godhkhali, Jhikorgacha, Jashore during November 2020 to June 2022. The rose garden area was 30 m × 20 m at RARS, Jashore and 50 m × 50 m farmers cultivated rose garden in Godkhali. Local variety was used in this experiment. Irrigation, weeding and other intercultural operations were done as and when necessary, by the farmers. But no insecticide or plant protection measures were taken during the study. Observations on the population of different insect pests were recorded from seedling to flowering stages. Data on different species of insects and their natural enemies were recorded by visual observations from randomly selected 10 plants replicated 3 times at each location during 8:00-10:00 AM and 4:00-5:00 PM. Some insects and their natural enemies were collected by sweeping nets on the standing rose plant at different stages. Slugs and leaf roller insects were recorded from the standing plants following in-situ counting. Thrips and mite population was collected from the flowers and leaves by shaking on the white paper and counted with the help of hand lens and magnifying glass. One way to detect them is to hold a piece of white paper under a branch and then tap the branch sharply.

Relative population of insect was counted as suggested by Choudhury *et al*. (2016). Some immature insects (Larvae, nymphs etc.) and natural enemies were collected and preserved in the vials containing 75% ethyl alcohol. The collected insects were also reared in the laboratory at an ambient temperature (24-34°C) in cages for proper identification. The insect was categorized as major and minor on the basis of their population density per plant, nature and extent of damage. The time of severe attack was noted on the basis of degree of infestation observed in each week. The insect pests were also grouped as stem feeders, leaf feeders, leaf roller,

sap sucker and borer on the basis of their feeding behaviour. Recorded data were put and compiled and analysed by using R Software (4.4.0). Weather data of the study period was also recorded and presented in Figs. 1 and 2.

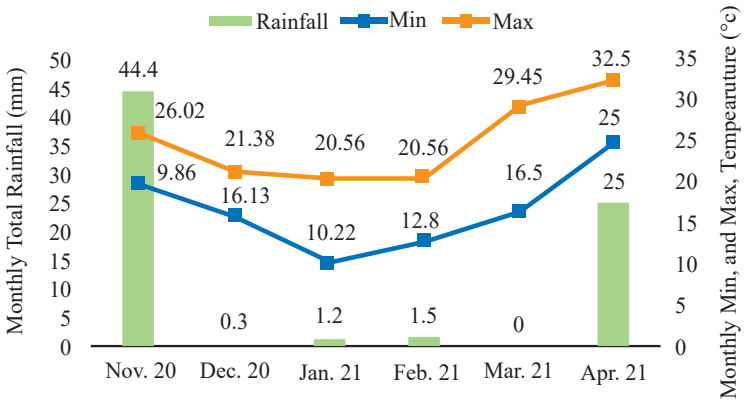


Fig. 1. Weather data during November 2020 to April 2021

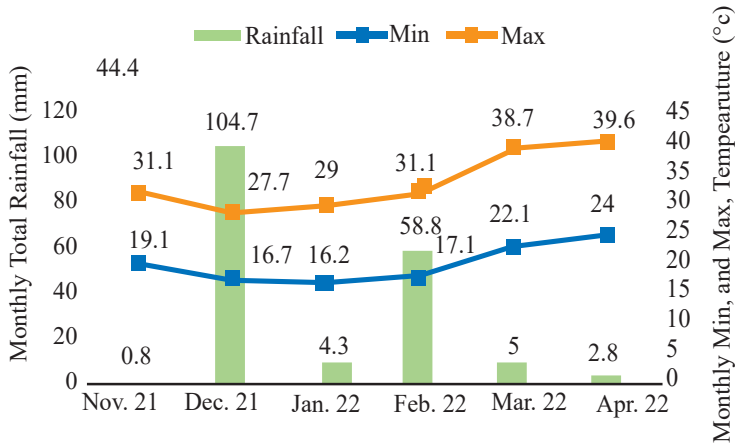


Fig. 2. Weather data during November 2021 to April 2022

RESULTS AND DISCUSSION

Pest complex of rose: List of the major and minor insect pests attacking in rose plant are presented in Table 1. Fourteen species of insect pests belonging to 6 orders and 12 families were found to infest at different growth stages of rose plant at Godkhali, Jhikorgacha and Regional Agricultural Research Station (RARS),

Jashore, Bangladesh during November 2020 to June 2022. Among the insects, only four (4) namely, aphid, thrips, rose bud borer, and red spider mite were recorded as the major pests, while the rests were of minor importance on the basis of their population densities per plant, nature and extent of damage and flower yield reduction. Nine (9) species of natural enemies belonging to 6 orders and 7 families were found predating on different insect pests of roses and recorded on rose flower in the experimental rose garden (Table 2). The most abundant natural enemies were lady bird beetle, coccinellid beetles, spider spp., mantids, rove beetle, syrphid fly and black ant. They were found to predate small insect pests namely, aphid, jassid, leafhoppers, white flies, thrips and mite etc. The population density per plant of major insects namely, aphid, thrips, rose bud borer and red mite was 25.75, 9.35, 1.25 and 12.65, respectively recorded in 2021 and those of the insects were 27.45, 10.55, 1.75 and 14.55, respectively recorded in 2022 in rose flower. The variation of insect population in 2021 and 2022 in rose plant may be due to variation of weather parameters of two years (Figs. 3 and 4). On the basis of feeding behavior and nature of damage, 6 insect species were grouped as sap sucker, 6 as leaf eater, one as bud borer, and one as leaf roller (Table 3).

In Bangladesh, the insect pests of rose were recorded by several scientists. Ali *et al*. (2016), Amin *et al*. (2018), Islam *et al.* (2019) reported fourteen (14) species of insect and mite pests attacked rose at different regions of Bangladesh which were almost similar with the present records. But rose slug, flea beetle and whitefly were listed in this study which was not recorded by Islam *et al*. (2019). Ali *et al*. (2016) reported 10 species of insect pests attacking rose which were also similar with the present finding. Fifty-one florivary insect species have been identified to attack flowers (Ortiz *et al.* 2023). Mehroz *et al.* (2019) reported that 24 and 36 insect species were found infesting ornamental crops in South Asia.

The population density of natural enemies was presented in Table 4. Black ant was present in rose with maximum number ranging from 12-13.67 per plant. The population of ladybird beetle species *Micraspis discolor, Coccinela transversalis*, *Menochilus sexmaculatus* and spider, *Argiope luzona* ranged from 7.45-8.65, 3.54-3.98, 4.34-4.75 and 2.24-2.74 per plant, respectively recorded in the experimental rose field of Jashore district (Table 4).

Succession of the insect pests and natural enemies: Succession of insect and mite pests of roses at different growth stages during November, 2020 to May, 2022 in the commercial rose garden, Godkhali, Jhikorgacha and experimental field at RARS, Jashore were presented in Fig. 3. Results revealed that aphids, beetles, leafhoppers, grasshoppers, whiteflies and jassids were noticed on the rose plant during November-December at the early vegetative stage and continued their infestation up to April to May at flowering stage. Leaf roller, spider mite, borer, scale and slugs were found to infest the rose plant during January-February at the vegetative stage of the crop and continued up to April-May at flowering stage in both two years. Thrips was noticed during February-March at the flower initiation stage and continued up to April to May at the late flowering stage of the crop. The appearances and succession of the insect pests on rose showed that different pest species occurred in an overlapping manner and the plant was under the continuous attack of one or more pests. Most of the major and minor pests appeared on the rose crop during January to March at the vegetative and flowering (30-65 DAP) stages and the maximum infestation occurred during flowering stage. Similarly, most of the natural enemies present on the rose crop during January to March at flowering stage and continued their predation (Fig. 4).

Many insects and mite pest species have appeared in ornamental plants in Bangladesh due to favorable climatic condition. Humane *et al.* (2023) reported that comparatively higher temperature and lower relative humidity increased hopper population. The present study revealed that the insects belong to the Order Hemiptera were most abundant and this finding showed agreement with the study of Uddin *et al.* (2024) who reported that the Hemiptera species were most abundant on ornamental plants in South-Asia. Amin *et al.* (2020) reported that high temperature (30°C), heavy rainfall and strong winds resulted lower abundance of aphid on rose.

The appearances and succession of the insect pests and natural enemies on rose crop showed that different pest species occurred in an overlapping manner and the plant was under the continuous attack of one or more pests. Most of the

major and minor pests appeared at the flowering stage and the maximum infestation occurred at this stage. Although most of the insects recorded from rose crop during the study period have been considered as minor, it is not unlikely that any one of the minor insects may attain the status of a major pest depending upon the environment, changing climatic conditions and cropping pattern. The research results accumulated here gives additional information on the insect pests and natural enemies of rose would add the previous reports in Bangladesh. The present information on the status and diversity of the insect and mite pests and natural enemies in rose ecosystems in Bangladesh will help formulate the priority research strategies by researchers or academicians. The knowledge on biodiversity in rose ecosystems will also help the extension workers in deciding the suitable management strategies.

Table 1. List of insect and mite pests attacked in roses at Godkhali and RARS, Jashore, during 2020-2022

Sl.	Insect pest	Scientific name	Family	Order	Status
1	Aphids	*Macrosiphum rosae*	Aphididae	Hemiptera	Major
2	Thrips	*Rhipiphorothrips cruentatus*	Thripidae	Thysanoptera	Major
3	Chafer beetle	*Oxycetonia versicolor*	Scarabeidae	Coleoptera	Minor
4	Flea beetle	*Aphthona flava*	Chrysomelidae	Coleoptera	Minor
5	Fuller rose beetle	*Naupactus godmani*	Chrysomelidae	Coleoptera	Minor
6	Leaf roller	*Eublema olivacea*	Noctuidae	Lepidoptra	Minor
7	Leaf hoppers	*Edwardsiana rosae*	Cicadelidae	Hemiptera	Minor
8	Red spider mite	*Tetranychus cinnabarinus*	Tetranychidae	Acari	Major
9	Grass hopper	*Attractomorpha crenulata*	Tettigonidae	Orthoptera	Minor
10	Whiteflies	*Aleurocan thus woglumi*	Aleyrodidae	Hemiptera	Minor
11	Rose bud borer	*Helicoverpa virescens*	Noctuidae	Lepidoptra	Major
12	Rose scale	*Lindingaspis rossi*	Diaspididae	Hemiptera	Minor
13	Jassid	*Amrasca davastans*	Cicadelidae	Hemiptera	Minor
14	Rose slugs/ Rose sawflies	*Cladius diffromis*	Tenthidinidae	Hymenoptera	Minor

Table 2. List of natural enemies of the insect and mite pests attacking roses at Godkhali and RARS, Jashore, during 2020 and 2022

Sl.	Insect pest	Scientific name	Family	Order	Status
1	Black ant	*Lasius niger*	Formicidae	Hymenoptera	Predator
2	Ladybird beetle	*Micraspis discolor*	Coccinelidae	Coleoptera	Predator
3	Coccinellid beetle	*Coccinela transversalis*	Coccinelidae	Coleoptera	Predator
4	Ladybird beetle	*Menochilus sexmaculatus*	Coccinelidae	Coleoptera	Predator
5	Lace wing	*Chrysopa* sp.	Chrysopidae	Neuroptera	Predator
6	Mantid	*Mantis religiosa*	Mantidae	Mantodea	Predator
7	Rove beetle	*Auguste lameere*	Styphilinidae	Coleoptera	Predator
8	Syrphid fly	*Syrphus* sp.	Syrphidae	Diptera	Predator
9	Spider	*Argiope luzona*	Argiopidae	Acarina	Predator

Table 3. Population density and nature of damage of insect and mite pests attacking roses at Godkhali and RARS, Jashore, during 2020 and 2022.

Sl.	Name of the insect	Scientific name	Population/ plant/leaf/ flower 2021	Population/ plant/leaf/ flower 2022	Nature of damage
1	Aphids	*Macrosiphum rosae*	25.75	27.45	Sap sucker
2	Thrips	*Rhipiphorothrips cruentatus*	9.35	10.55	Eater and sucker
3	Chafer beetle	*Oxycetonia versicolor*	1.5	1.75	Leaf eater
4	Flea beetle	*Aphthona flava*	4.25	5.35	Leaf eater
5	Fuller rose beetle	*Naupactus godmani*	1.45	2.25	Leaf eater
6	Leaf roller	*Eublema olivacea*	2.50	2.74	leaf roller
7	Leaf hoppers	*Edwardsiana rosae*	15.28	18.25	Sap sucker
8	Red spider mite	*Tetranychus cinnabarinus*	12.65	14.55	Sap sucker
9	Grass hopper	*Attractomorpha crenulata*	1.25	1.55	Leaf eater
10	Whiteflies	*Aleurocan thus woglumi*	8.45	9.35	Sap sucker
11	Rose bud borer	*Helicoverpa virescens*	1.25	1.75	Bud borer
12	Rose scale	*Lindingaspis rossi*	5.64	5.74	Leaf eater
13	Jassid	*Amrasca davastans*	5.85	6.75	Sap sucker
14	Rose slugs/ Rose sawflies	*Cladius diffromis*	4.25	5.15	Leaf eater

Table 4. Population density of natural enemies of insect and mite pests attacking roses at Godkhali and RARS, Jashore, during 2020 and 2022

Sl.	Name of the natural enemies	Scientific name	Population/plant /flower 2021	Population/plant /flower 2022
1	Black Ant	*Lasius niger*	12.35	13.67
2	Ladybird beetle	*Micraspis discolor*	7.45	8.65
3	Ladybird beetle	*Coccinela transversalis*	3.54	3.98
4	Ladybird beetle	*Menochilus sexmaculatus*	4.34	4.75
5	Lace wing	*Chrysopa* sp.	2.65	3.25
6	Mantid	*Mantis religiosa*	2.14	2.54
7	Rove beetle	*Auguste lameere*	4.68	5.64
8	Syrphid fly	*Syrphus* sp.	4.27	4.86
9	Spider	*Argiope luzona*	2.24	2.74

Fig. 3. Succession of insect and mite pests of roses with different growth stages during November, 2020 to May, 2022 in the commercial rose garden, Godkhali, Jhikorgacha and experimental field at RARS, Jashore. The duration of occurrence of each species on the rose is shown by horizontal lines.

Sl.	Name of the natural enemies	Scientific name	Duration (Months) Nov. --- Dec. --- Jan. --- Feb. --- March --April Growth stages Early vegetative / Vegetative / Flowering / Late flowering
1	Aphids	*Macrosiphum rosae*	
2	Thrips	*Rhipiphorothrips cruentatus*	
3	Chafer beetle	*Oxycetonia versicolor*	
4	Flea beetle	*Aphthona flava*	
5	Fuller rose beetle	*Naupactus godmani*	
6	Leaf roller	*Eublema olivacea*	
7	Leaf hoppers	*Edwardsiana rosae*	
8	Red spider mite	*Tetranychus cinnabarinus*	

Sl.	Name of the natural enemies	Scientific name	Duration (Months) Nov. --- Dec. --- Jan. --- Feb. --- March --April Growth stages Early vegetative	Vegetative	Flowering	Late flowering
9	Grass hopper	*Attractomorpha crenulata*				
10	Whiteflies	*Aleurocan thus woglumi*				
11	Rose borer	*Helicoverpa virescens*				
12	Rose scale	*Lindingaspis rossi*				
13	Jassid	*Amrasca davastans*				
14	Rose slugs/ Rose sawflies	*Cladius diffromis*				

Fig. 4. Succession of natural enemies of roses with different growth stages during November, 2020 to May, 2022 in the commercial rose garden, Godkhali, Jhikorgacha and experimental field at RARS, Jashore. The duration of occurrence of each species on the rose is shown by horizontal lines.

Sl.	Name of the natural enemies	Scientific name	Duration (Months) Nov. -- Dec. -- Jan. -- Feb. -- March --April Growth stages Early vegetative	Vegetative	Flowering	Late flowering
1	Black Ant	*Lasius niger*				
2	Lady bird beetle	*Micraspis discolor*				
3	Coccinelid beetle	*Coccinela transversalis*				
4	Coccinelid beetle	*Menochilus sexmaculatus*				
5	Lace wing	*Chrysopa* sp.				
6	Mantid	*Mantis religiosa*				
7	Rove beetle	*Auguste lameere*				
8	Syrphid fly	*Syrphus* sp.				
9	Spider	*Argiope luzona*				

The duration of occurrence of each species on the rose is shown by horizontal lines.

CONCLUSION

Results revealed that at 14 species of insect pest belong to six orders and twelve families were found to attack local roses in Godkhali, Jhikorgacha of Jashore region. Among them aphid (*Macrosiphum rosae*) and thrips (*Rhipiphorothrips cruentatus*) were identified as major pest and another ten species were identified as minor pest of roses. Also, nine species of natural enemies were recorded on the same location and same period of the time that is November 2020 to May 2022.

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Conflict of interest

The authors declare no conflicts of interest regarding the publication of this paper.

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