Proceeding International Conference on Religion, Science and Education (2022) **1**, 589-593

Identification of Insect Pests of Green Eggplant (*Solanum melongena* L) in Generative Phase at Agricultural Zone of Pandak, Bantul, Yogyakarta

Sri Rahayu
Alumni of Biology Education, State Islamic University of Sunan Kalijaga Yogyakarta.

Corresponding author
sri.rahayu527@gmail.com

Abstract: Eggplant (Solanum melongena L) is a commodity that has good prospects for development. The obstacle in increasing eggplant production in Indonesia is the attack of pests and mites. The purpose of this study was to determine the species of insect pests that attack green eggplant in the generative phase. Observations were made on all green eggplant plants in a 150 m2 field area. Calculation using the Diversity Index (H'). The results in this study showed that the total insects found were 10 species from 8 families. The species of insects are Epilachna sp., Paracoccus marginatus, Empoasca sp., Atractomorpha crenulata, Cassida circumdata, Stenocatantops angustifrons, Oxya japonica, Phlaeoba fumosa, Bemisia tabaci, and Bactrocera dorsalis. Value (H') = 0.56. This value belongs to the low category. The value of the dominance index of Bemisia tabaci is 1,41 so the insect dominates other species of insects.

Keywords: eggplant, green eggplant, generative phase, insect pest.

Introduction

Eggplant (*Solanum melongena L*) is a commodity that has good prospects for development and is generally consumed by the public in fresh or processed form. Eggplant plants can be cultivated in almost all regions of Indonesia (Bahar, *et., al.,* 2009). Eggplant plants are easy to adapt to rainfall and high temperatures and have high productivity in hot and wet environments (Hanson, *et. al.,* 2006). Like most plants, eggplant growth is divided into vegetative and generative phases. The generative growth is characterized by the appearance of flowers and followed by the formation of fruit.

The obstacle in increasing eggplant production in Indonesia is the attack of pests and mites (Srinivasan, 2009). Pests can attack in the vegetative and generative periods. Eggplant fruit that is attacked by pests can experience a decrease in nutritional content and consumer attractiveness. So pest attacks in the generative phase need to be considered.

Research on types of insect pests on purple eggplant plants in the generative phase has been carried out, but on green eggplant has never been done. So it is necessary to do further research.

This study aims to identify the types of insect pests that attack green eggplant in the generative phase. The benefit of this research is knowing the types of insect pests that attack green eggplant in the generative phase so that appropriate steps can be taken in pest control

Methods

The research was carried out in October 2021 in the Pandak Bantul Agricultural Zone, Yogyakarta. The tools used in this research are collection bottles, insect nets, yellow pan traps, and cameras. The materials used in this study were insects, label paper, insect determination key book, and stationery.

ISSN 2829-3355 | EISSN 2828-8467

Observations were made on all green eggplant plants in a 250 m² agricultural zone. Samplings of insect species were done using yellow pan trap, sweep net, direct observation of insects colonized leaves and collection of nymphs for insect pests.

Measurement of insect diversity was calculated using Shannon's index diversity and Dominance index

$$H' = -\sum_{i=1}^{s}(pi)(ln\ pi)$$

$$H' = -\sum(ni/N\ ln\ ni/N)$$

Description:
H': Shannon-Wiener diversity index
s: Number of species
pi: Proportion of total samples belonging to species i

If H'< 1 = low diversity, 1 < H'< 3 = medium diversity, H' > 3 = high diversity (Magurran, 1988)

Furthermore, the dominance index analysis is carried out to determine the species that dominate a community. The formula is as follows:

$$D = \sum(ni/N)2$$

Description:
D: Simpsons dominance index
Ni: number of individuals of type i
N: total number of individuals
S: number of species
(Krebs, 2009).

Results and Discussion

The results showed that 10 species of insect pests attacked green eggplant (*Solanum melongena* L) in the generative phase, which was classified into 4 orders and 8 families. Of the 10 species found, *Bemisia tabaci* was the most commonly found, with 1.182 individuals (Table 1).

Bemisia tabaci is a very common species of whitefly. The adult whitefly is very small: about 1 mm long, silvery-white in color, and with wings of a waxy texture. It is found often on the underside of the foliage where it sucks the plant sap. Direct crop damage occurs when whiteflies suck juices from the plant. With high populations, plants may wilt, turn yellow and die. Whiteflies also excrete honeydew, a sweet sticky fluid that may cover the leaves completely. (FAO, 2003). While indirect damage, *Bemisia tabaci* is being geminivirus vector (Byrne and Bellows 1990).

Table 1. Species of insect pests found and calculation of dominance index (D).

Order	Family	Genus	Species	Total (ni)	D
Coleoptera	Coccinellidae	*Epilachna*	*Epilachna sp.*	362	0,43
Hemiptera	Pseudococcida	*Paracoccus*	*Paracoccus marginatus*	16	0,02
Hemiptera	Cicadellidae	*Empoasca*	*Empoasca sp.*	51	0,06
Orthoptera	Pyrgomorphidae	*Atractomorpha*	*Atractomorpha crenulata*	34	0.04
Coleoptera	Chrysomelidae	Cassida	*Cassida circumdata*	7	0,01
Orthoptera	Acrididae	*Stenocatantops*	*Stenocatantops angustifrons*	22	0,03
Orthoptera	Acrididae	*Oxya*	*Oxya japonica*	5	0,01
Orthoptera	Acrididae	*Phaeloba*	*Phlaeoba fumosa*	2	0,00
Hemiptera	Aleyrodidae	*Bemisia*	*Bemisia tabaci*	1182	1,41
Diptera	Tephritidae	*Bactrocera*	*Bactrocera dorsalis*	92	0,11

The second most abundant insect found was *Epilachna sp*. thatins as many as 362 individuals. *Epilachna sp*. has spots on the elytra and spread from Southeast Asia to South Asia and Australia. This pest is polyphagous and its main host plants are cucumber, tomato, potato, kidney bean, and eggplant (Srinivasan, 2009). Symptoms of this insect attack are bite marks on the lower leaf

surface. If a heavy attack can damage all leaf tissue and leave the leaf bones (Firdaus dan Susilawati, 2012).

The fourth most common pest was *Bactrocera dorsalis*. This insect has the characteristics of a blackhead. With black thoracic scutum. The abdomen is orange terga III-V with a narrow medial longitudinal dark band and thin black markings on the periphery. The wings are transparent with a thin black band at the edges. The wings are transparent with a black band on the costa band right at R_{2+3} (Rahmanda, 2017). This fruit fly usually attacks the thin fruit, has soft flesh. Symptoms of this attack on rotting fruit flesh and there are hundreds of larvae. This fruit fly attack is often found on almost ripe fruit. Early symptoms are indicated by the appearance of small black spots from the ovipositor puncture. Furthermore, due to pest activity in the fruit, the stains develop into widespread. The fly larvae eat the flesh of the fruit so that the fruit rots before it ripens. The most damaging fruit fly stage is the larval stage (Suputa et al. 2006).

The fifth most common pest was *Empoasca sp*. These insects are very small, their movements are very agile, especially when disturbed. This pest sucks the plant sap which causes the plant to become weak. Symptoms of the attack appear spots on the leaves, especially on the upper leaf surface. The host range is very wide, especially cucumbers, eggplants, tomatoes, and so on.

The sixth most common pest was *Atractomorpha crenulata*. This insect belongs to the order Orthoptera, family Pyrgomorphidae, genus Atractomorpha. The morphology of this insect is a green body, slender, short (<20 mm), a conical head, the length rarely exceeds the pronotum, the fastigium is the same as the eye length (Rahayu, 2017). This grasshopper has the ability of body color polymorphism, namely the ability to change its body color from green to brown if the environmental temperature is higher, especially during the long dry season (Mista, 2017). The habitat of *Atractomorpha crenulata* is in agricultural land and grasslands (Roonwal, 1977). Symptoms of this insect attack are the leaves becoming torn and having large holes.

The next species found was *Stenocatantops angustifrons*. Insects found are still in the form of a nymph stage. This insect belongs to the order Orthoptera, family Acrididae, genus Stenocatantops. The morphological characteristics of the body are brown, have fast flight behaviour, and long flight distances. There is a dark stripe on the outer femur (Rahayu, 2017). Symptoms of attack shown by *Stenocatantops angustifrons* are like those of grasshopper attacks in general, namely leaves with large holes.

The next species is *Paracoccus marginatus*. There were 16 individuals (D= 0.02). It is a highly polyphagous insect pest that can damage large numbers of tropical and subtropical fruits, vegetables, and ornamental plants (Miller and Miller, 2002). During the rainy season, the population of *P. marginatus* especially the crawlers decreased drastically because heavy rain washed the insects off the plants (Mani, et., al., 2012)

The next insect pest is *Cassida circumdata*. According to Millar et al. (2003), the tortoise beetle leaves circular or irregular marks on the leaf surface to remove most of the leaf surface until only leaf veins remain.

The next insect is *Oxya japonica*. Only 5 individuals of *Oxya japonica* were found (D: 0.01) (Table 1). Based on the results of research by Tajamul, et al., (2016) the adult *Oxya japonica* population in the May-July range only increased, from the original number 0. The peak of the *Oxya japonica* population was in August-September, wherein that month environmental conditions such as temperature, humidity and food are very supportive (Sands, 2014). This grasshopper is a major pest on rice plants so it is rarely found in eggplant.

The least insect pests found were *Phlaeoba fumosa*, as many as 2 individuals (D=0,0). The host plant for the grasshopper *Phlaeoba fumosa* is grass (Hsiao et al., 2017) so very few are found in eggplant plants.

Based on the results of the analysis using the Shannon-Whinner index, insect pests on green eggplant in Pandak Bantul Yogyakarta have a value of H' = 0.56. This value belongs to the low category. Species diversity is strongly influenced by temperature, rainfall, humidity, soil type and

vegetation type (Rahayu, 2017). The low diversity of insects is possible because of the limited types of vegetation in the rice fields. Planting eggplant using plastic mulch. So that grass/other vegetation only grows in planting holes and between beds that are not covered with plastic. In addition, the owner of the fields regularly cleans the grass once a week.

The dominance index describes the presence or absence of species that dominate other species. The dominance index value ranges from 0-1 (Yuliana et al., 2012). If the dominance index value is close to or is 1, then the area is dominated by certain species and vice versa. The calculation results show that the *Bemisia tabacci* dominance index is in the range of 1, so that the insect dominates other species of insects. (Table 1) so that the insect dominates other types of insects.

Conclusion

The results in this study showed that the total insects found were 10 species from 8 families. The species of insects are *Epilachna sp., Paracoccus marginatus, Empoasca sp., Atractomorpha crenulata, Cassida circumdata, Stenocatantops angustifrons, Oxya japonica, Phlaeoba fumosa, Bemisia tabaci and Bactrocera dorsalis.* Value (H') = 0.56. This value belongs to the low category. The value of the dominance index of *Bemisia tabaci* is in the range of 1, so that the insect dominates other species of insects.

References

Bahar, Y.H., Ani Andayani, et all. 2009. Departemen Pertanian Direktorat Jenderal Hortikultura Direktorat Budidaya Tanaman Sayuran dan Biofarmaka, Jakarta

Byrne, D.N. and T.S. Bellows. 1990. Whitefly biology. Ann. Rev. Entomol. 36: 431-457

FAO (Food and Agriculture Organization of the United Nations). 2003. *Eggplant Integrated Pest Management an Ecological Guide.*

Firdaus dan Endang Susilowati. 2012. *Teknologi Budidaya Terung dalam Pot.* BPTT Jambi, Jambi

Hanson, P.M., Ray-Yu Yang, Samson C.S.T, Dolores L, Liwayway E, Tung-Ching L. 2006. Diversity in Eggplant (*Solanum melongena*) for Superoxide Scavenging Activity, Total Phenolics, and Ascorbic Acid. *Journal of Food Composition and Analysis*. **19**: 594–600

Hsiao, T. F., Yang, J. T dan Chen, M. Y. 2017. Grasshopper Mandibles Functional Morphology Adaptation to Food Plants (Orthoptera: Caelifera) from the Subtropical Forest Ecosystem, Central Taiwan. *Advances in Entomology*. 40-53

Magurran, A. E. 1988. *Ecological Diversity and Its Measurement*. Chapman and Hill, London

Mani, M., C. Shivaraju and A. N. Shylesha. 2012. Paracoccus marginatus, an invasive mealybug of papaya and its biological control – An overview. *Journal of Biological Control*, **26** (3): 201–216

Millar, J.G., T.D. Paine., K.A. Campbell, R.W. Garrison, dan S.H. Dreistadt. 2003. Eucalyptus Tortoise Beetle, Integrated Pest Management f.r Home Gardeners and Landscape Professionals. Davis: UC Statewide IPM Program, University of California.

Miller DR, Miller GL. 2002. Redescription of Paracoccus marginatus Williams, D. J. and Granara de Willink, (Homoptera:Coccoidea: Pseudococcidae), including descriptions of the immature stages and adult male. Proc Ent Soc Washington 104 (1): 1–23.

Mista. 2017. Keanekaragaman Serangga (*Insecta)* Pada sekitar Perkebunan Cabai Merah (*Capsicum annum L.)* di Desa Lubuk Lancang pada Pengajarnya di SMA 9 Palembang. (Skripsi), Universitas Muhammadiyah Palembang, Palembang

Rahayu, S. 2017. *Ensiklopedia Keanekaragaman Belalang di Tahura Bunder.* Yogyakarta

Rahayu, S. 2017. Ensiklopedia Keanekaragaman Belalang (*Acrididae)* Taman Hutan Raya Bunder Gunungkidul Sebagai Sumber Belajar Biologi. (Skripsi), Universitas Islam Negeri Sunan Kalijaga, Yogyakarta

Rahmanda, E. 2017. *Identifikasi Spesies Lalat Buah Genus Bactrocera* (Diptera: Tephritidae) pada Komoditas Cabai (*Capsicum sp.)* Pasar Bandar Lampung. (Skripsi). Universitas Islam Negeri Raden Intan, Lampung

Roonwal, M.L. 1977. Field Observations on Green-Brown Polymorphism in Grasshoppers (Acridoidea), and Its Biological Significance. *Proc. Indian Natn. Sci. Acad.* **43(4):** 145-158

Sands, V E. 2014. Population Cytology of Malaysian Species of Oxya (Acrididae: Oxyinae). *International Journal of Cytology, Cytosystematics and Cytogenetics.* **40:**25-42

Srinivasan, R. 2009. *Insect and Mite pest on Eggplant: A Field Guide for Identification and Management.* Penerjemah: Ahsol Hasyim, Wiwin Setiawati, Liferdi Lukman dan Abdi Hudayya. Suputa, Cahyanti, Kustaryati A, Railan M, Issusilaningtyas & Taufiq A.2006. Pedoman Identifikasi Lalat Buah (Diptera: Tephritidae). Yogyakarta: UGM.

Tajamul, M., Ahmad, S.T., Tak, I., dan Shafi, J. Seasonal Variation in the Population of Rice Grasshopper, *Oxya japonica* (Orthoptera: Acrididae) in the Agricultural Zones of Kashmir Valley. *Global Journal of Life and Biological Research.* **2(3):** 4-6

Yuliana, Adiwilaga, E.M., Harris, E., dan ratiwi, N. T.M. 2012. Hubungan antara Kemelimpahan Fitoplankton dengan Parameter Fisik Kimiawi Perairan di Teluk Jakarta. *Jurnal Akuatika.* **3(2):** 169-179