AGARICUS: Advances Agriculture Science & Farming
Vol. 3 No. 1 June 2023, Page. 55-59
E-ISSN: 2797-0884

Insect Biodiversity in Corn Plants of Jago 20 Variety in Jombang Regency

Mohamad Nasirudin[1*], Yessita Puspaningrum[2]
[1*]**Agroecotechnology Departement, KH.A. Wahab Hasbullah University**
[2]**Agriculture Product Technology Departement, KH.A. Wahab Hasbullah University**

*Email: nasirudinmohamad@unwaha.ac.id

ABSTRACT
This study aims to determine the biodiversity or diversity of insects in corn plants in the generative phase. This type of research is quantitative descriptive. The study was conducted in systematic and non-systematic land. Sampling of insects in corn plantations in the morning (yellow trap and blue trap), and in the morning, afternoon, and evening (observation). The number of insects obtained was calculated for diversity (H '), dominance (C), and important value index (INP). In systematic land, the H' value of insects was 2.71 while for non-systematic land it was 2.68. The data shows that the insect diversity index is moderate. The dominance index (C) in systematic corn fields in the generative phase of systematic land was 0.074 while in non-systematic land it was 0.072, meaning that both lands showed a low dominance index. In systematic land, the Muscidae family showed an INP of 20.46, for non-systematic land the highest IVI was shown by the Coccinelidae family with a value of 21.42. Generative phase corn fields that use systematic treatment show higher insect diversity compared to generative phase corn fields that use non-systematic treatment.
***Keywords**: Synthetic inorganic, corn, insect diversity.*

INTRODUCTION
Corn (*Zea mays* L.) is one of the most important crops and is widely planted by farmers in Indonesia, besides being the second staple food source after rice, corn is also used as a source of animal feed and industrial raw materials such as paper coating materials (Salelua and Maryam, 2018). According to data from the National Central Statistics Agency (BPS) in 2020 which was calculated using land units, namely quintals per hectare, the average national corn crop productivity reached 54.74 Ku/Ha, while in 2021 it increased by 2.35 Ku/Ha to 57.09 Ku/Ha in the form of dry kernels without cobs, skins and stalks. Despite the increase in 2021, the government is still importing to meet domestic needs (Putra and Surianto, 2021).

All processes of activities carried out by humans will certainly encounter a problem, one of which is pest attacks. Corn plants are one of the plants that can be attacked from the vegetative phase to the generative phase so that they are very threatening than the results when entering the harvest period (Waliha et al., 2021). Most farmers, especially in Jombang Regency, do not yet understand the corn farming system in the current global era, so it can be said that the quality of human resources for farmers is still limited (Report on the Implementation of Regional Government of Jombang Regency, East Java, 2022). Climate change which has a significant impact on the agricultural ecosystem plus the continuous use of synthetic inorganic materials also makes conditions worse (Pratama et al., 2021). In the world of insects, there are many types of insects that have different characteristics, shapes, and behaviors in the environment (Elisabeth et al., 2021). Likewise, humans also have different characteristics and forms in each individual. Often, these characteristics and forms reflect an attitude, as a result, unconsciously, these actions can change the behavior of insects over a certain period of time, which will have an impact on changes in the environmental ecosystem, especially the agricultural environment, because insects are very sensitive to environmental changes (Taradipha et al., 2018).

In fact, not all insects are destructive (herbivorous), some act as predators, pollinators, parasitoids, and decomposers (Elisabeth et al., 2021). It is estimated that differences in the treatment of an agricultural ecosystem can affect insect diversity in terms of number and role which ultimately threatens plant productivity. Based on all the descriptions above, it is necessary

to conduct research on insect diversity in the generative phase of corn plants in a synthetic inorganic farming system, so that farmers can find out what types of insects dominate the corn agricultural land.

METHOD

This study identified the diversity of insects in corn fields in the generative phase that were attracted to yellow and blue colors during direct observation at the research location. The research location was in Tambakrejo Village, Jombang District, Jombang Regency. This research was conducted in systematic and non-systematic fields, from October 1 to October 11, 2023. The tools used in this study were pest traps with colored bottles that had been given glue and snap nets. Data collection by observation was carried out six times and three times in one day, starting at 05:00, 12:00 and 16:30 WIB. Data collection from traps was carried out once in one day, namely every 05:30 WIB.

Trapped insects are grouped based on their role in the ecosystem including herbivores, predators, parasitoids, pollinators, and decomposers. This type of research is quantitative descriptive, namely by taking samples of corn plant insects in the morning (yellow trap and blue trap) and in the morning, afternoon, and evening (snap net). This is done to determine the diversity of insect species attracted to the blue trap, yellow trap, and snap net. The number of insects caught in each observation is calculated by the diversity value indicating each observation using the Shannon Wiener index formula (H '), Dominance (C), and Importance Value Index (INP).

Insect diversity index (H) from Shannon-Wheiner
Diversity index (H')

$$H' = -\sum -\left(\frac{ni}{N}\left(ln\frac{ni}{N}\right)\right)$$

Description: H': Shannon Wiener Diversity Index
ni: Proportion of species to total species
N: Total number of individuals of all species (Tustiyani et al., 2020)

Dominance index

$$C = \sum \left(\frac{ni}{N}\right)^2$$

Description: C: Simpson Dominance Index
ni: Total number of individuals of a species
N: Total number of all species (Tustiyani et al., 2020)

Importance Value Index (INP)

$$INP = KR + FR$$

Description: KR: Relative density
FR: Relative frequency (Putra et al., 2021)

RESULT AND DISCUSSION

The results of the number of insects trapped based on the role (Figure 1) in each field showed different results. This is due to several factors such as weather conditions or traps covered by leaves carried by the wind, automatically reducing sunlight, resulting in the trap not being able to reflect the refraction of light waves perfectly. Light intensity greatly affects the insects themselves (Faradila et al., 2020). The high and low number of insects caught is influenced by the age of the plant and environmental factors. If the age of the plant gets older, the population and composition of insects will decrease, so that many insects move to new habitats or die if they fail to adapt and an environment that is less supportive such as reduced food or wild plants can cause the insect population in the agricultural environment to decrease (Kurniawan and Soesilohadi, 2020). Insects have a certain temperature range to be able to live or adapt. Soil humidity, air, and the ecosystem where insects live are important factors that will affect the distribution, behavior and development of insect life.

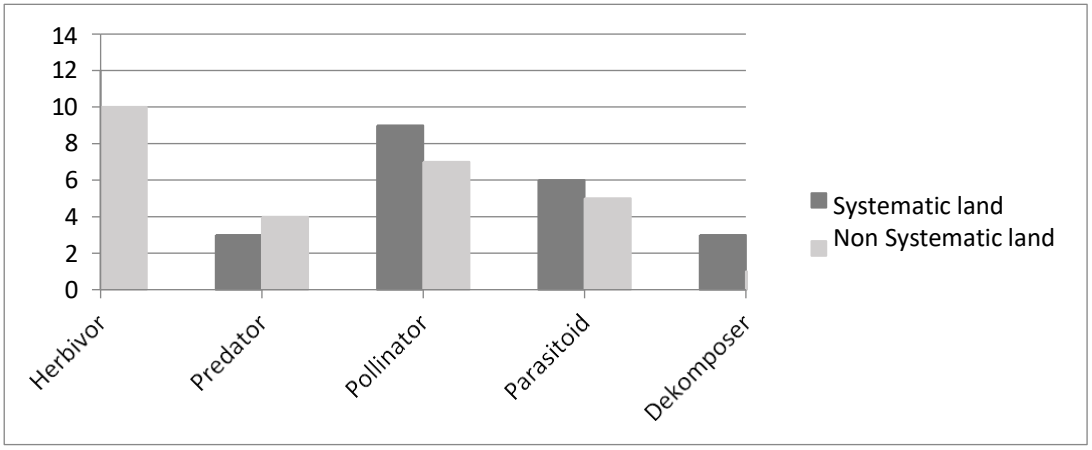

Figure 1. Results of calculating the number of insects based on their role in systematic and non-systematic land.

Diversity Index (H'), Dominance Index (C) and Importance Value Index (IVI) of Insects on the role of synthetic inorganic corn

Diversity Index (H')

The diversity index is a mathematical description to state the number of species in a community in an environment (Manopo et al., 2021). The diversity index is identical to the stability of the environmental ecosystem. So by doing mathematical calculations, farmers can detect disturbances in the environment, especially the agricultural environment (Purwati et al., 2021).

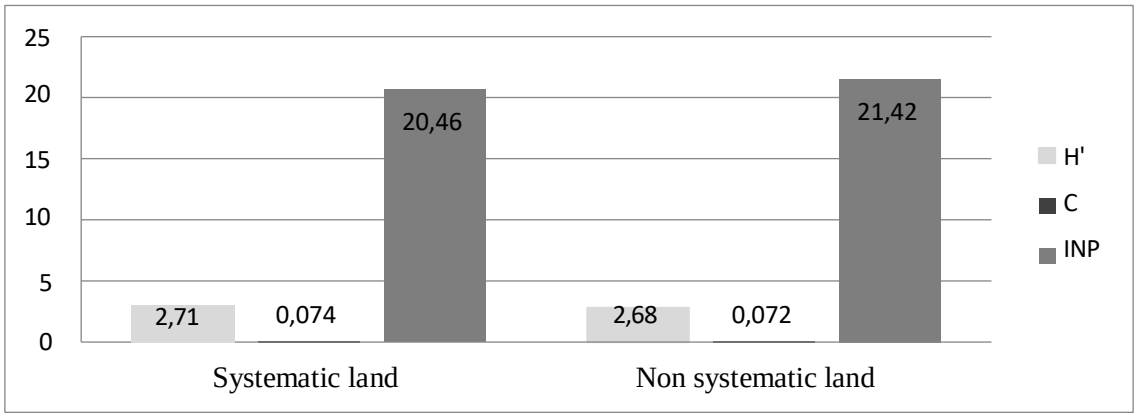

Figure 2. Results of diversity calculations based on index formulas on systematic and non-systematic land

From the results of observations and calculations according to the diversity index formula (H ') (Figure 2) there is a generative phase land of synthetic inorganic systems in Tambakrejo Village, Jombang District, Jombang Regency, on systematic land is H 'of 2.71 while for non-systematic land shows H 'of 2.68 the data shows the insect diversity index is in moderate condition, however on systematic land tends to show higher diversity figures. The abundance of insect populations depends on the availability and variability of resources in each habitat. These resources can be in the form of food, shelter or growing places (Saslidar et al., 2022).

Dominance Index (C)

Based on the processed data (Figure 2), the dominance index (C) in the generative phase of the synthetic inorganic system corn field in Tambakrejo Village, Jombang District, Jombang Regency, on systematic land is 0.074 and on non-systematic land is 0.072, which means that both lands show a low dominance index. This is in accordance with the literature of Tustiyani et al., 2020, which states that a low dominance index value indicates a low dominance concentration (no individuals dominate), conversely a high dominance index value indicates a high concentration (some dominate). In the world of insects, many things can affect the life of insects, one of which is in terms of quantity, environmental factors greatly affect the life of insects, including air humidity, air temperature, food availability, rainfall,

light and soil moisture (Paliama et al., 2022).

Importance Value Index (INP)

Importance Value Index (INP) (Figure 2) is known in systematic land, the Muscidae Family shows the highest ranking with an INP of 20.69, this is in line with the phenomenon that occurs in the land, it is known that there are many rat carcasses found in the land, the impact of controlling rat pests by poisoning and leaving them to die scattered by farmers. While the lowest INP value is shown by three families, namely Scarabidae, Chrysomelidae, and Otitidae, each family getting an INP value of 2.12. For non-systematic land, the highest INP is shown by the Coccinelidae family with a value of 21.53, the existence of the Coccinelidae family is greatly influenced by environmental conditions. It is known that non-systematic land has very minimal plant density and wild plant density so that it has an environmental hue with high temperatures. The Coccinelidae family can reproduce optimally at high temperatures (Pratiwi et al., 2023). The lowest value is shown by the families Blatidae, Noctuidae, Histeridae, Meloidae and Asilidae with a value of 2.63.

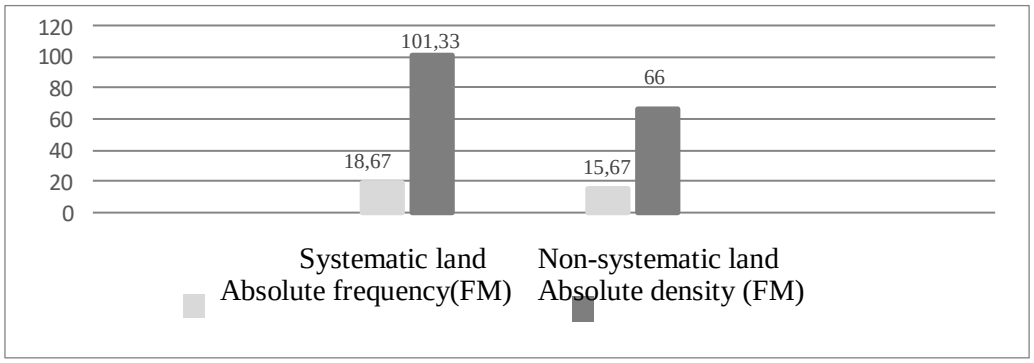

Figure 3. Results of absolute density and absolute frequency values on systematic and non-systematic land.

Meanwhile, the results of the KM value of systematic land obtained a value of 101.33 and FM of 18.67 and for non-systematic land obtained a lower value, namely KM of 66 and FM of 15.67 (Figure 3). Absolute density is a calculation parameter to determine insects found in a place purely. While absolute frequency is a calculation parameter for insects to determine the high or low level of insect presence in a place purely (Iftitahsari et al, 2019).

Seen from the results of the calculation of the diversity index (H'), dominance (C), and important value index (INP), it can be estimated that the quantity level and daily activity level of insects in systematic corn fields tend to be higher than insect activity in non-systematic fields. Biotic and abiotic influences, especially farmers who are the main figures in their respective corn fields, greatly influence the behavior of insects and their daily existence (Gunarno, 2021).

CONCLUSIONS

Based on the calculations and discussions above, it can be concluded that both lands (systematic and non-systematic) have a low level of dominance. In the sense that there are no insects that dominate both lands, so the condition of the land is still relatively stable. However, when viewed from the Dominance Index (C) value, land that is treated systematically (C = 0.089) tends to show higher nominal results when compared to non-systematic land (C = 0.081). This means that land that is treated systematically produces more diverse and stable insects than land that is treated non-systematically.

REFERENCES

Badan Pusat Statistik. 2021. Analisis Produktivitas Jagung dan Kedelai di Indonesia. Jakarta. P xxii + 110.

Elisabeth, D., Hidayat, J. W., dan Tarwotjo, U. 2021. Kelimpahan dan Keanekaragaman Serangga pada Sawah Organik dan Konvensional di Sekitar Rawa Pening. J. Akademika Biologi. 10(1): 17-23.

Faradila, A., Nukman, N., Pratami, G. D., dan Tugiyono. 2020. Keberadaan Serangga Malam Berdasarkan Efek Warna Lampu di Kebun Raya Liwa. J. Bioma. 22(2): 130-135.

Gunarno. 2021. Perbandingan Indeks Keanekaragaman Serangga di Wilayah Ekosistem Hutan Penyangga Taman Nasional Gunung Leuser Bukit Lawang. J. Analisa Pemikiran Insan Cendikia (APIC).

4(2): 72-84.

Iftitahsari, T., Siregar, A. Z., dan Painem, M. I. 2019. Indeks Kerapatan Mutlak, Kerapatan Relatif, Frekuensi Mutlak dan Frekuensi Relatif Serangga pada Tanaman Padi (Oryza sativa. L) Fase Vegetatif dan Fase Generatif di Pecut, Sumatra Utara. J. Agroekoteknologi FP USU. 7(2): 472-481. Kurniawan, B., dan Soesilahadi, RC. H. 2020. Keanekaragaman dan Kelimpahan Serangga Pada Perkebunan Apel (Malus sylvestris L.) Konvensional di Kota Batu Jawa Timur. J. Of Tropical

Biology. 8(3):194-201.

Laporan Penyelenggaraan Pemerintah daerah (LPPD) Kabupaten Nganjuk Jawa Timur. 2022.

Manopo, M., Rante, C. S., Engka, R. A. G., dan Ogie, T. B. 2021. Jenis dan Populasi Serangga Hama pada Pertanaman Padi Sawah (Oryza sativa L.) di Desa Mogoyunggung Kecamatan Dumoga Timur Kabupaten Bolaang Mongondow. J. Agroekoteknologi Terapan. 2(2): 34-48.

Paliama, H. G., Latumahina, F. S., dan Wattimena. C. M. A. 2022. Keanekaragaman Serangga dalam Kawasan Hutan Mangrove Di Desa Ihamahu. J. tengkawang. 12(1): 94-104.

Pratama, R. A., Sativa, N., dan Kamaludin. 2021. Pengaruh Jenis Warna dan Ketinggian Perangkap terhadap Jenis Serangga pada Tanaman Kentang Solonum tuberosum L. J. AgroTatanen. 3(2): 7- 12

Pratiwi, L., Anggraeni., dan Apriyadi, R. 2023. Keanekaragaman Coccinellid Predator sebagai Musuh Alami Hama Kutu-Kutuan pada Ekosistem Pertanaman Cabai Merah di Kecamatan Merawang, Kabupaten Bangka. J. Sumberdaya Hayati. 9(3): 119-124

Purwati, S., Masitah., Budiarti, S., dan Aprilia, Y. 2021. Keanekaragaman Jenis Ikan di Sungai Lempake Tepian di Kecamatan Sungai Pinang Samarinda. J. Ilmiah Biosmart. 1(1): 12-24.

Putra, A. I. D, dan Surianto, M. A. 2021. Analisis Penerapan Operasional Prosedur Budidaya untuk Pengendalian Kualitas Hasil Jagung. iE : J. Inspirasi Ekonomi. 3(4): 2503-3123.

Putra, I. L. I., Setiawan, H., Suprihatini, N. (2021). Keanekaragaman Jenis Semut (Hymenopterad: Formicidae) Di Sekitar Kampus 4 Universitas Ahmad Dahlan Yogyakarta. 14(02): 20-30.

Salelua, S. A., dan Maryam, S. 2018. Potensi Dan Prospek Perkembangan Produksi Jagung (Zea mays L.) di Kota Samarinda. J. Agribisnis Komun Pertan. 1,(1): 47-53.

Saslidar, M., Rusdy, A., dan Hasnah, H. 2022. Biodiversitas Serangga pada Budidaya Tanaman Nilam dengan Pola Tanam Monokultur dan Polikultur. J. Ilmiah Mahasiswa Pertanian. 7(3): 540-550.

Taradipha, M. R. R., Rushayati, S. B., dan Haneda, N. F. 2018. Karakteristik Lingkungan Terhadap Komunitas Serangga. J. Of Natural Resources And Environmental Management. 9(2): 394-404.

Tustiyani, I., Utami, V. F., dan Tauhid, A. 2020. Identifikasi Keanekaragaman dan Dominasi Serangga pada Tanaman Bunga Matahari (Helianthus annuus L.). Agritrop. 18(1): 88-97.

Waliha, L., Pamekas, T., dan Takrib, M. 2021. Keanekaragaman Serangga Hama yang Menyerang Tanaman Jagung di Musi Rawas Utara Sumatera Selatan. Prosiding Semnas Bio 2021. 01. 21-28.