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Identification of Aphid Species (Hemiptera: Aphididae) on Maize (*Zea mays* L.) in Lamongan District

Annida Nur Rifatus Sholikha [1], Dita Megasari [1*], Wiwin Windriyanti [1]

[1] Agrotechnology, Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Jl. Rungkut Madya Gunung Anyar, Surabaya 602942, Indonesia
* Correspondence: dita.megasari.agrotek@upnjatim.ac.id

Abstract

Background: Aphids are a significant pest in cultivated plants. One crop that is susceptible to aphid infestation is corn. Aphids can cause damage to plants and become vectors of plant viruses. Information on the presence and species of aphids on corn plants in Lamongan Regency has never been reported. The purpose of this study was to determine the species of aphids that attack corn plants in Lamongan Regency. **Methods:** This research was conducted from May 2024 to July 2024 in 9 maize fields in Lamongan Regency. The method used in this study was the survey method. Corn plants were randomly selected, and sampling was done once in each field. Samples obtained were identified at the Plant Pests and Diseases Laboratory of the UPN "Veteran" Jawa Timur. **Results:** The aphids identified from 9 fields in Lamongan District consisted of 2 species belonging to the order Hemiptera family Aphididae subfamily Aphidinae and tribe Aphidini. **Conclusions:** 2 species of aphids were found in 9 corn fields, namely the species *R. maidis* and *H. setariae*. The population of *R. maidis* was found in greater numbers than that of *H. setariae*.

Keywords: Aphid; Identification; Species; Zea mays.

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Introduction

Aphids are an important pest of cultivated plants. Of the approximately 4000 known aphid species, about 250 are pests (Vilcinskas, 2016). Aphids are small, soft-bodied foragers that use their needle-like mouthparts to penetrate plant tissues and access the sugar-rich fluids in plants (Brozek et al., 2015). Aphids also affect host physiology to alter the source-sink relationship, thereby affecting plant growth and development (Twayana et al., 2022). One crop that is susceptible to aphid infestation is corn. Aphids can cause damage to plants by sucking the fluids from leaves, shoots, flower stalks, and other parts, causing nutrient loss to the plant as well as damage to cells and tissues. Aphids produce honeydew or sweet liquid, which results in the covering of the leaf surface and inhibits the photosynthesis process (Fadhilah & Asri, 2019).

Aphids are also vectors of plant viruses and have the potential to transmit viruses persistently and non-persistently. Aphids transmit more than 200 species of non-persistent plant viruses, and more than 20 different aphid species are capable of transmitting maize dwarf mosaic virus among the Hemiptera order (Kannan et al., 2018). The presence of aphids on corn plants can disrupt the process of corn growth and production. The results of research reported by Hawiyah et al. (2022), showed that the intensity of aphid attack on corn plants with synthetic pesticide control gave the lowest average attack intensity of 4.17% - 8.33% with a total population of aphids between 77 - 580 tails, while the control treatment reached 90% with a total population of aphids 361 - 6,666 tails.

One aphid species can host more than 400 species from 40 families (Bass et al., 2014).

Many aphid species are found on plants that are not their actual hosts (Maharani et al., 2018). Aphids that attack corn plants were reported by Sari et al. (2020), namely *R. maidis* Fitch, and *Myzus persicae* found in Solok City. *R. maidis* was also reported in Ciwaringin Village, Lemahabang District, Karawang Regency (Hawiyah et al., 2022). One species of aphids was found in Sukorambi Village, Sukorambi District, Jember Regency, namely *R. maidis* (Syabrina, 2023). Aphids (*R. maidis*) were also found in Sutugede Village, West Bogor Subdistrict, Bogor City, starting to be found on corn plants from the age of 2 weeks to 10 weeks (Hasanah, 2010).

Information on the presence and types of aphids on corn plants in Lamongan Regency has never been reported. Lamongan Regency is one of the five largest corn-producing areas in East Java, with a production of 383,267 tons in 2018 (BPS, 2019). Therefore, research is needed to obtain information on the presence and types of aphids that attack corn plants in Lamongan Regency. This study aims to determine the species of aphids that attack corn plants in Lamongan Regency. This study aims to gather information on new types of aphids that attack corn plants. Farmers can use this information as a basis for developing pest control strategies.

Methods

Location and Time

The research was conducted from May 2024 to July 2024 in 9 maize fields in Lamongan District. The selected fields were located in 3 sub-districts, each with three villages. The research was conducted in a representative region with a large maize-growing area (maize production center) (Megasari, 2021). The first location chosen was Solokuro Subdistrict in Dadapan Village (6°56'16"S 112°18'00" E), Tebluru Village (6°56'57"S 112°19'29"E), and Tenggulun Village (6°57'09"S 112°20'22"E). The second location is Paciran Subdistrict, which is located in Sendangagung Village (6°54'25"S 112°21'17" E), Kranji Village (6°53'07"S 112°22'48"E), and Sumurgayam Village (6°54'11"S 112°19'23"E). At the same time, the third location is Laren Subdistrict, which is located in Bulu Brangsi Village (6°58'59"S 112°21'22" E), Brangsi (6°57'36.0"S 112°22'05.0" E), and Gampang Sejati Village (6°57'06.0"S 112°17'54.0" E). Samples that had been obtained were then identified at the Plant Health Laboratory, Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" Jawa Timur.

Sampling

Samples of aphids were taken directly with the help of a fine brush on corn plants in Lamongan Regency. The method used in this sampling was the survey method on corn fields with a minimum land area of 250m^2. Aphids were collected from all parts of the maize plant, such as leaves, flowers, stems, and cobs. The sample that has been obtained is put into a tube containing 70% alcohol. The aphid samples were then taken to the Plant Health Laboratory, Faculty of Agriculture, UPN "Veteran" Jawa Timur, for microscope preparation. Damage symptoms were observed at the time of sampling.

Preparation of Aphid Microscope Preparations

Preparation of aphid microscope preparations involves inserting aphid specimens into a beaker containing 90% alcohol, which is then boiled for 1-2 minutes. The specimen is then transferred into a beaker containing 10% KOH and cooked for 3-5 minutes. The aphid specimens were rinsed using distilled water by soaking for 5 minutes with five repetitions (Barantan, 2015). The transparent aphid specimens were then placed on an object glass and identified to species level.

Identification of Aphids

The identification process of aphids is carried out by observing the morphological parts of aphids, which include color, antenna shape, antenna tubercles, sifunkuli, and cauda. Identification of aphids is done under a digital microscope. The identification of aphids is

based on the book "Borror and Delong's Introduction to the Study of Insects, 7th Edition" by Charles A. Triplehorn & Norman F. Johnson, and the book "Aphids on Agricultural Crops and Weeds in West Java Description, Morphology, and Identification" by Yani Mahari and Purnama Hidayat in 2021.

Result

Identification of Aphids

Maize plant morphology affects the preference of aphids that attack maize plants. Some aphids infest certain parts of their host. Parts of the host plant that are favored by aphids are the youngest leaves that have not yet opened or just opened (Suparman et al., 2011). The presence of primary compounds and secondary metabolites contained in the host plant can be a limiting factor for insect pests to eat the plant tissue. Generally, aphids have specific hosts (monophagous), but several species are generalists (polyphagous) (Wahyuni et al., 2023).

Aphids on maize plants in Lamongan District were found in all phases of maize plant growth, but more in the generative phase. Aphids were found in the form of colonies in large numbers or in small numbers of 5-10 individuals per point. The aphids observed were adult aphid imago caught by observing the color of the aphids, and aphid characters such as antennal tubercles, cornicles, and caudae.

The aphids found in these nine fields belong to the Family Aphididae, Order Hemiptera. Aphids are characterized by their oval shape and have cornicles and caudae. Cornicles can release alarm pheromones that function in defense against predators. Cornicles can secrete fluids containing chemicals to protect themselves from predators. The cauda serves to manage honeydew. Based on the book "Borror and Delong's Introduction to the Study of Insects, 7th Edition" by Charles A. Triplehorn & Norman F. Johnson, the character in this order is the mouth part with a sucking, stabbing type. This part consists of four piercing stylets (mandibles and maxillae) enclosed in a slender and flexible sheath (labium) that is segmented. The family Aphididae can be recognized by its pear-like shape, a pair of cornicles at the posterior end of the abdomen, and long antennae. The cornicles emerge from the dorsal side of the fifth or sixth abdominal segment. The venation and relative size of the fore and hind wings recognize aphids in the winged form. The wings are generally located vertically above the body (Triplehorn & Johnson, 2005).

Aphids in this study found two species belonging to the Subfamily Aphidinae, Tribe Aphidini. Subfamily Aphidinae is characterized by the length of the terminal processus longer than the base of the antennae, the siphunkuli are usually tubular, the cauda is tongue-shaped, sometimes short and wide, and not prominent. Tribe Aphidini is characterized by the absence of secondary rhinaria on the aptera, underdeveloped or absent antennae tubercles, and the absence of a thick black spot on the back in the alata (Maharani et al., 2018).

The aphid species found were *Rhopalosiphum maidis* and Hysteroneura setariae. Of the two species found, *R. maidis* was the most dominant species. The low number of aphid species found indicates that the diversity of aphids on corn plants in the Lamongan Regency area is low due to the uniformity of the farmland ecosystem.

Rhopalosiphum maidis

Rhopalosiphum maidis has the common name Corn leaf aphid. This species was found in all corn fields in Lamongan Regency. *Rhopalosiphum maidis* is found on the flowers, leaves, and stems of corn plants. According to Maharani & Hidayat (2021), *Rhopalosiphum maidis* is oligophagous, which includes insects that live and eat on several species in one family. *Rhopalosiphum maidis* is found throughout the world, especially in temperate and tropical regions. This species is often found on maize crops, but can also attack other crops such as sorghum. The classification of *R. maidis* is as follows:

Kingdom : Animalia
Class : Insecta
Order : Hemiptera

Family : Aphididae
Genus : Rhopalosiphum
Species : *Rhopaloshipum maidis* (Miner, 2014).

The species *R. maidis* has an olive green to grayish green body. It has an oval body shape (Figure 1a). The antennal tubercles of *R. maidis* are not prominent or developed (Figure 1b). The antenna has six segments (Figure 1c). The sifunculi and cauda are dark in colour, the cornicles are not longer than the cauda (Figure 1d). This identification is based on the identification key in the book "Aphids on Agricultural Crops and Weeds in West Java Description, Morphology, and Identification" by Yani Mahari and Purnama Hidayat in 2021. This is in accordance with Hawiyah (2022), namely that the imago is green and its body shape is elongated. It has six antenna segments. The antenna tubercles are not developed, have dark cornicles, and are longer than the cauda. The shape of the cornicles is tubular or cylindrical and widens at the base. The distance between the two cornicles is the same length or longer. The cauda of *R. maidis* is dark in color and has a dark femur.

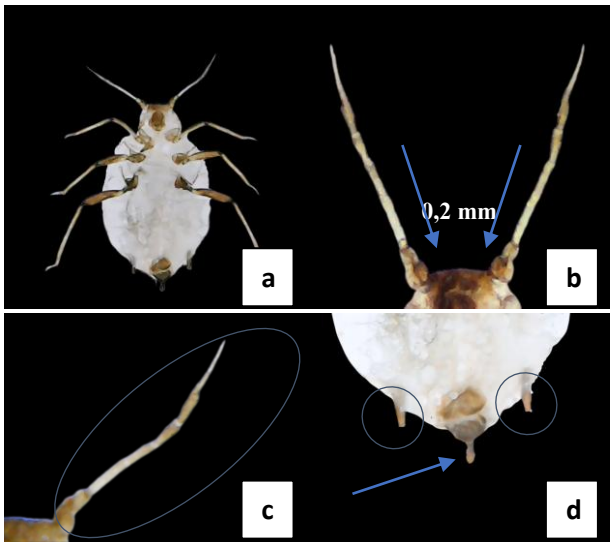

Figure 1. *Rhopalosiphum maidis*. (a) Imago *R. maidis*; (b) Tubercle antenna; (c) Antenna; (d) Sifunculi and cauda

Hysteroneura setariae

H. setariae has the common name Rusty plum aphid. This species was only found in corn fields in Gampang Sejati Village, Laren Subdistrict. This species is found in winged form (alata) on the leaves of corn plants. According to Maharani & Hidayat (2021), this aphid is oligophagous, found on the leaves and stems of rice (*Oryza sativa*), corn (*Zea mays*), and *Panicum* sp. The classification of *Hysteroneura setariae* is as follows:

Kingdom : Animalia
Class : Insecta
Order : Hemiptera
Family : Aphididae
Genus : Hysteroneura
Species : *Hysteroneura setariae* (Myers et al., 2024).

The winged imago of *Hysteroneura setariae* is reddish brown. It has four wings (Figure 2a). Antennal tubercles not clearly visible or not higher than the center of the head (Figure 2b). Six antenna segments with terminal extension (Figure 2c). The terminal extension is five times longer than the base of the last antenna segment. The sifunculi are dark brown and tubular. The cauda is long and very pale (Figure 2d). This identification is based on the

identification key in the book "Aphids on Agricultural Crops and Weeds in West Java Description, Morphology, and Identification" by Yani Mahari and Purnama Hidayat in 2021. This is in accordance with Nasruddin (2013), *H. setariae* has a small and brown body with dark siphunculi and an unusually long and pale cauda. The third and fourth antennal segments are pale to colorless, but the distal segment is dark to black. The proximal and distal parts of the tibia are pale to colorless and dark to black. The alate hindwings are unusual with one oblique vein.

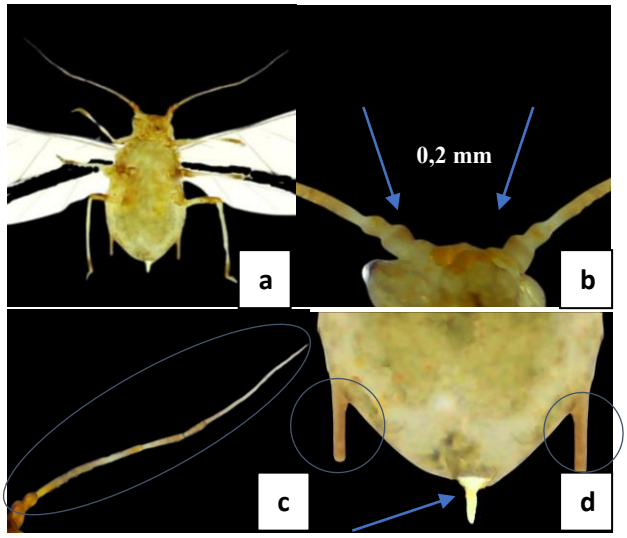

Figure 2. *Hysteroneura setariae* (a) Imago *H. setariae*; (b) Tubercle antenna; (c) Antenna (d) Sifunculi and cauda

Symptoms of Aphid on Maize Plants

Aphids attack maize plants directly by sucking plant juices by poking their stylets into the leaves. Damage from aphids can cause stunted plant growth, wilting, yellowing of leaves, curling of leaves, or dropping of leaves. Aphids on maize in Lamongan District were found from the vegetative phase at the age of 30 hst to the generative phase at the age of 65 hst. Aphids in this study were found on flowers, leaves, and stems. However, most aphids were found on the flowers. According to Irsan et al. (2023), Aphids colonize flowers because flowers can provide an easily accessible and rich food source, namely sugar-containing plant sap found in newly growing plant parts or reproductive plant parts.

The symptom caused by this aphid attack is the presence of sooty dew. Sooty dew in the study was found on the flowers, leaves, and stems of corn plants (Figure 3). Sooty dew arises from honey dew or honeydew produced by aphids, which is then covered by black mold (Putri et al., 2023). Sooty dew is formed due to a symbiotic mutualism between aphids and ants. This occurs because aphids produce honeydew excretions that are rich in amino acids and become a source of food for ants (Maharani et al., 2020). According to Mou et al. (2023), Aphid honeydew, which is a digestive waste product, deposited on the leaf surface, facilitates fungal growth and negatively affects the photosynthetic ability of plants. This certainly causes indirect losses.

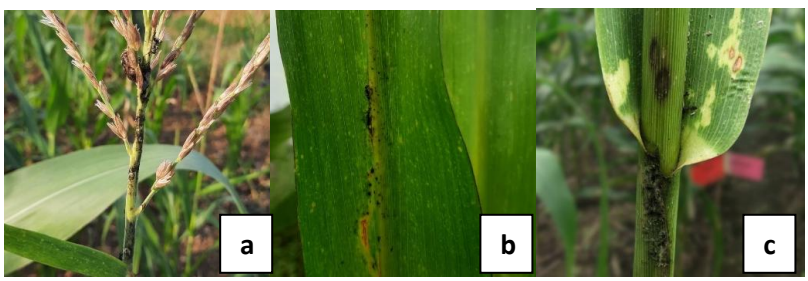

Figure 3. Sooty dew symptoms (a) on corn plant flowers; (b) on corn plant leaves; (c) On corn plant stems

Conclusions

Based on the results of research on the Identification of Aphid Species (Hemiptera: Aphididae) on Maize Plants (*Zea mays* L.) in Lamongan Regency, it can be concluded that the aphid species found on nine fields in Lamongan Regency are two species, namely *Rhopalosiphum maidis* and *Hysteroneura setariae*. Suggestions for future research include more in-depth studies on the bioecology and distribution patterns of aphids on maize plants. All information about aphids can be used to design effective control methods.

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Declaration statement

The authors report no potential conflict of interest.

References

Bass C, Puinean AM, Zimmer CT, Denholm I, Field LM, Foster SP, Gutbrod O, Nauen R, Slater R, Williamson MS. (2014). The Evolution of Insecticide Resistance in the Peach Potato Aphid, *Myzus persicae*. *Insect Biochem Mol Biol*, 51, 41-51. https://doi.org/10.1016/j.ibmb.2014.05.003

[Barantan] Badan Karantina Pertanian. (2015). Pedoman Mengoleksi dan Pelestarian Serta Kurasi Serangga & Arthropoda Lainnya. *Badan Karantina Pertanian*. Kementrian Pertanian

[BPS] Badan Pusat Statistik. (2019). *Produksi jagung dan kedelai di Provinsi Jawa Timur menurut Kabupaten/Kota (ton), 2018*. Badan Pusat Statistik Jawa Timur

Brozek J, Mroz E, Wylezek D, Depa L, Wegierek P. (2015). The Structure of Extremely Long Mouthparts in the Aphid Genus Stomaphis Walker (Hemiptera: *Sternorrhyncha: Aphididae*). *Zoomorphology, 134*(3), 431- 45. https://doi.org/10.1007/s00435-015-0266-7

Fadhilah, L. N., & Asri, M. T. (2019). Keefektifan Tiga Jenis Cendawan Entomopatogen terhadap Serangga Kutu Daun Aphis Gossypii (Hemiptera: Aphididae) pada Tanaman Cabai. *Lentera BIO (Berkala Ilmiah Biologi), 8*(1), 56–61. http://ejournal.unesa.ac.id/index.php/lenterabio

Hasanah, H. A. (2010). Perkembangan Populasi Kutu Daun *Rhopalosiphum maidis* Fitch (Hemiptera: Aphididae) dan Musuh Alaminya pada Tanaman Jagung Manis (*Zea mays saccharata Sturt*).

Hawiyah, A. N., Afifah, L., Abadi, S., Priyo Prabowo, D., Irfan, B., & Widiawan, A. B. (2022). Identifikasi dan Pengaruh Pengendalian Hama Kutu Daun *Rhopalosiphum maidis* Fitch (Hemiptera: Aphididae) pada Pertanaman Jagung. *Jurnal Agrotech*, 12(2), 79–86. https://doi.org/10.31970/agrotech.v12i2.98

Irsan, C., Aggraini, E., Ramadhani, W. (2023). Species of Aphids Found in Ornamental and Wild Plants in Pagar Alam District, South Sumatra, Indonesia. *Biodiversitas, 24*(12), 6602-6612. https://doi.org/10.13057/biodiv/d241222

Kannan, M., Ismail, I., & Bunawan, H. (2018). Maize Dwarf Mosaic Virus: From Genome to Disease Management. *Viruses*, *10*(9), 492. https://doi.org/10.3390/v10090492

Maharani Y, Hidayat P, Rauf A, Maryana N. 2018. Short Communication: New records of aphid species subfamily Aphidinae (Hemiptera: Aphididae) in West Java, Indonesia. *Biodiversitas, 19*(2), 460-65. https://doi.org/10.13057/biodiv/d190219

Maharani, Y., & Hidayat, P. (2021). *Kutudaun pada Pertanaman Pertanian dan Gulma di Jawa Barat* (1st ed.). IPB Press.

Maharani, Y., Maryana, N., Rauf, A., & Hidayat, P. (2020). Insect Parasitoid and Ant Associated on Aphids (Aphididae) Colonies on Plants in West Java. *Cropsaver*, 3(2), 59-67. https://doi.org/10.24198/cropsaver.v3i2.30645

Megasari, D. & Khoiri, S. (2021). Tingkat Serangan Ulat Grayak Tentara Spodoptera frugiperda J. E. Smith (Lepidoptera: Noctuidae) pada Pertanaman Jagung di Kabupaten Tuban, Jawa Timur, Indonesia. *Agrovigor: Jurnal Agroekoteknolog,i 14*(1): 1–5. https://doi.org/10.21107/agrovigor.v14i1.9492

Miner, A. (2014). "*Rhopalosiphum maidis*" (Online), Animal Diversity Web. Accessed August 28, 2024, at https://animaldiversity.org/accounts/Rhopal osiphum_maidis/

Mou, D. F., Kundu, P., Pingault, L., Puri, H., Shinde, S., Louis, J. (2023). Monocot Crop–Aphid Interactions: Plant Resilience and Aphid Adaptation. *Current Opinion in Insect Science*, 57. https://doi.org/10.1016/j.cois.2023.101038

Myers, P., R. Espinosa, CS Parr, T. Jones, GS Hammond, and TA Dewey. (2024). The Animal Diversity Web (online). Retrieved on: https://animaldiversity.org

Nasruddin, A. (2013). First Record of Hysteroneura setariae (Hemiptera: Aphididae) on Rice in South Sulawesi Province of Indonesia. *Florida Entomologist 96*(2), 647-648. https://doi.org/10.1653/024.096.0237

Putri, A., Yunus, M., & Hasriyanty. 2023. Preferensi kutu daun *Aphis gossypii* Glover (Hemiptera:Aphididae) pada Beberapa Jenis Tanaman Inang. *Jurnal Agrotekbis*. *11*(6): 1472–1478. https://doi.org/10.22487/agrotekbis.v11i6.2004

Sari, S. P., Suliansyah, I., Nelly, N., & Hamid, H. (2020). Identifikasi Hama Kutudaun (hemiptera: aphididae) pada Tanaman Jagung Hibrida (*Zea mays* L.) di Kabupaten Solok Sumatera Barat. *Jurnal Sains Agro*, 5(2). https://doi.org/10.36355/jsa.v5i2.466

Suparman, Nurhayati, & Setyawati, A. 2011. Preferensi dan Kecocokan Inang *Pentalonia nigronervosa* Coquerel (Hemiptera: Aphididae) terhadap Berbagai Varietas Pisang. *Jurnal Entomologi Indonesia 8*(2): 73–84. https://doi.org/10.5994/jei.8.2.73-84

Syabrina, A. A. B. 2023. *Inventarisasi Jenis-Jenis Kutudaun yang Berasosiasi Dengan Tanaman Jagung (Zea mays) di Desa Sukorambi, Kecamatan Sukorambi, Kabupaten Jember.* Universitas Negeri Jember.

Triplehorn, C. A., & Johnson, N. F. 2005. *Borror and Delong's Introduction to the Study of Insects, 7th edition*. Peter Marshall.

Twayana, M., Girija, A. M., Mohan, V., Shah, Jyoti. (2022). Phloem: At the Center of Action in Plant Defense Against Aphids. *Journal of Plant Physiology*. 273. https://doi.org/10.1016/j.jplph.2022.153695

Vilcinskas, A. Biology and Ecology of Aphids. (2021). CRC Press.

Wahyuni, W., Hasnah, H., & Susanna, S. 2023. Beberapa Aspek Biologi dari *Spodoptera litura fabricius* pada Pakan yang Berbeda. *Jurnal Ilmiah Mahasiswa Pertanian*. *8*(4).