

Corn Leaf Aphid, *Rhopalosiphum Maidis* (Fitch) in Maize

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SUMMARY

The maize aphid, *Rhopalosiphum maidis* (Fitch) is the most dreaded insect, infesting the maize crop right from tasseling stage to maturity. It is a significant agricultural polyphagous, multivoltine pest and one of the most severe pests of maize. Although it has Asian origins, it may found in all tropics and temperate regions of the planet. It is found in maize, barley, oats and occasionally in wheat. In maize aphid a sexual viviparous parthenogenic reproduction has been commonly noted. By parthenogenesis, adult females give birth to live infants. Each instar of its four nymphal stages, which last two to three days depending on the temperature, around seven to ten days pass from birth to maturity.

INTRODUCTION

Maize, *Zea mays* L. originated in Mexico, is a member of the Poaceae family. It is a crop with a wide range of adaptability and a high potential output (Tali *et al.*, 2018). It is the most significant cereal crop, grown all over the world and has the biggest production of any grain. Due to its numerous uses, maize is frequently referred to as the "Queen of Cereals" (Tali *et al.*, 2018). Maize grain contains protein (10 %), oil (4 %), carbohydrates (70 %), fat (5 to 7 %), fibers (5 to 7 %) and minerals (2%) (Tali *et al.*, 2018). Because the maize crop has lush growth, soft, succulent foliage, an endless supply of food, space, and shelters, it attracts a large number of insect pests. Among them, *R. maidis* is a significant pest of maize that can cause substantial damage to crops through sap feeding and the transmission of plant viruses. So, it is needed to understanding the character and behavior of maize aphids for effective management.

Origin

It has Asian origins, it may found in all tropics and temperate regions of the planet (Hill, 1987; Blackman and Eastop, 2000 and Kuo *et al.*, 2006). Infestation of the aphids on maize crop was observed from month of December to March.

Host Plants

It is found in barley, oats, maize and occasionally in wheat. It's most common wild host is Jhonson grass. Both are connected to orchards and fields of cereal. Two weeds, *Chromolaena odorata* and *Cynodon dactylon*, served as alternate food sources.

Life Cycle

By parthenogenesis, the pest gave birth directly to the young nymphs (viviparous). There were four nymphal instars and the adults were produced from the final nymphal instar. The instars were determined from the exuviae casted off at each moulting. Each instar lasts for two to three days depending on the temperature and require seven to ten days to attained maturity (Kuo *et al.*, 2006). The nymphs are smaller and without wings than the wingless adult but otherwise similar (Carena and Glogoza, 2004). The oval, slow moving, 2.5 mm long, often pale bluish-green adult has black antennae, legs, and tube like structure (cornicles) in addition to its soft body.

Nature of Damage

Aphid caused mechanical as well as chemical damage to the maize plant. By feeding, spreading viral disease and producing honeydew, this pest damages in different stages of crop growth. It infests seedlings, leaves in whorls, and inflorescences of plants. The nymphs and adults consumed the sap of leaves, which caused them to turn yellow and eventually dry.

Honeydew Production:

The sucking cell sap by sharp needle like stylet into cell that result into stunted growth of plant and secreting honeydew like sweet sugary substance by nymphs and adults which gives the plant sticky appearance, while also luring black ants. Honeydew serve as a medium for black sooty mould and disturbs normal

photosynthesis of plants through causes inflorescences to be sterilised and leaves to become malformed, while also luring black ants (Tali *et al.*, 2018).



First instar



Second instar



Third instar



Fourth instar



Apterate adult



Alate adult

Fig 1: Different life stages of corn leaf aphid, *R. maidis*

Virus Transmission: Maize aphids are known vectors for several plant viruses, which can exacerbate crop losses. It spreads 10 viral diseases including the barley yellow dwarf virus, sweet potato feathery mottle virus, millet red leaf virus, sugarcane mosaic virus or sugarcane yellow leaf virus, potato virus, onion yellow dwarf virus and maize chlorotic dwarf virus (MCDV) and is a significant vector for many harmful pathogenic plant viruses (Kuo *et al.*, 2006). It is widely acknowledged that the maize dwarf mosaic virus is mostly spread by corn leaf aphids under field conditions (Carena and Glogoza, 2004). The infested plants develop slowly. If there was a serious injury, the main shoot died and produced late tillers with earheads devoid of grains. Aphid saliva affected water uptake, transmission, gas exchange and produced intercellular changes. As aphid population increased, the older leaves became wilted and brownish colour found on younger leaves. The pest also significantly reduced the production of fodder as well as grains.

Management Practices

Cultural Practices: Crop rotation, maintaining healthy plant vigor and monitoring for aphid populations can help manage infestations. Encouraging natural predators can also be beneficial.

Biopesticidal Control: Spraying of *Lecanicillium lecanii* 1.15% WP 40 ml/10 litre, *Metarhizium anisopliae* 1.15% WP 40 ml/10 litre and *Beauveria bassiana* 5% WP 40 ml/10 litre have been shown to effectively reduce maize aphid populations.

Chemical Control: Various insecticides, such as I tolfe nypyrad 0.03 % 20 ml/10 litre of water and flonicamid 0.015 % 3 ml/10 litre of water were found most effective in reducing incidence of aphid and increase crop yields.



a: Infestation of corn leaf aphid, *R. maidis* on maize tassel



b: Honeydew secreted by corn leaf aphid, *R. maidis* on maize
Fig 2: Damage caused by corn leaf aphid, *R. maidis* on maize

CONCLUSION

The maize aphid is a critical pest that can significantly impact maize production. Understanding the biology and behaviour of maize aphids can use in plan effective management strategies to minimize damage and ensure healthy crop yields.

REFERENCES

- Blackman, R., & Eastop, V. (2000). *Aphids on the World's Crops: An Identification and Information Guide*. (2nd ed.). John Wiley & Sons, Chichester, p. 414.
- Carena, M. J., & Glogoza, P. (2004). Resistance of maize to the corn leaf aphid: A review. *Maydica*, 49: 241- 254.
- Hill, D. S. (1987). Agricultural insect pests of temperate regions and their control. *New Zealand Journal of Experimental Agriculture*, 16(2): 193-198.
- Kuo, M. H., Chiu, M. C., & Perng, J. J. (2006). Temperature effects on life history traits of the corn leaf aphid, *Rhopalosiphum maidis* (Hemiptera: Aphididae) on corn in Taiwan. *Applied Entomology and Zoology*, 41: 171-177.
- Tali, M. K., Chhangani, G., Vyas, A., & Reddy, K. V. N. (2018b). Predator prey relationship in different maize based planting pattern. *International Journal Current Microbiology and Applied Sciences*, 7(8): 3007-3011.