BIOLOGICAL INTERACTIONS BETWEEN PATHOGENS AND LEAFHOPPERS INFESTING SUGAR BEET PLANTS IN EGYPT

By

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ABSTRACT

Heba Essam Ibrahim Abd-El-Aziz: Biological Interactions Between Pathogens and Leafhoppers Infesting Sugar Beet Plants in Egypt.

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Sugar beet (*Beta vulgaris*) L. is considered the second sugar crop for sugar production especially in Egypt. This plant is subjected to infestation of several insect pests causing considerable damage specially Leafhoppers that can transmit phytopathogens like virus and Phytoplasma. The present work aimed to survey and identify different leafhopper species infesting sugar beet plant also detection and molecular identification of Pathogens associated with sugar beet that transmitted by leafhopper in Egypt.

Nine leafhopper species belonging to two subfamilies and five genera were found on sugar beet plants at different governorates in Egypt throughout 2017 to 2020. The surveyed species were *Hebata (Alboneurasca) decipiens, Hebata (Signatasca) distinguenda, Jacobiasca lybica, Eupteryx cypria, Balclutha frontalis, Balclutha incisa, Aconurella prolixa, Exitianus pondus* and *Psammotettix striatus.*

Taxonomical revision and Morphological diagnostic characters of some leafhoppers infesting sugar beet plant in Egypt were described for each collected species.

Population fluctuations of the most common species of leafhoppers, i.e. *H. decipiens* was conducted on sugar beet plant at Giza Governorate and the results revealed that *H. decipiens* had two peaks of activity during season 2020 on sugar beet plants. The first one was occurred at the 4th week of April. The second peak was occurred at the 1st week of June. At Qalyubyia Governorate *H. decipiens* recorded also two peaks of activity during season 2018/ 2019 at Kaha region. The first one occurred at the 3rd week of January while, the second peak was occurred at the 1st week of February. Again during season 2019/ 2020 *H. decipiens* recorded two peaks

of activity the first one was occurred at the 2nd week of January. The second peak was occurred at 1st week of February.

Survey of phytopathogens in both leafhoppers and sugar beet plant was conducted at different sugar beet fields in five Governorate (Giza, Qalyubyia, Sharqia, Fayoum and Kafr El-sheikh) throughout the period from 2017 until 2020 in Egypt.

The detection Relationship between the *Hebata* (*Alboneurasca*) *decipiens* and both virus and phytoplasma was studied. The results showed that the presence of Geminivirus (Tomato Yellow leaf curl virus (TYLCV)) in both *H. decipiens* and sugar beet plant but did not transmitted by *H. decipiens*.

Phytoplasma disease was detected and isolated by nested PCR from naturally infected sugar beet plants during survey in different Governorates. Results proved that Phytoplasma was transmitted successfully from naturally infected to healthy sugar beet plants by *H. decipiens*. The phytoplasma was detected by 16SrRNA gene amplified by nested-PCR assay and direct sequenced using specific primer pairs. Phylogenetic tree was done based on obtained sequences data. Results were confirmed the presence of phytoplasma in sugar beet plant for the first time in Egypt. The isolate was submitted to the gene bank under accession number of OP032749.

The efficacy of Sivanto prime insecticide was studied in molting of leafhopper *Hebata decipiens* nymphs. According to the low concentrations of LC_{50} (0.369) and the LC_{90} (2.005) values after 72 hours, sivanto prime insecticide proved to be very potent on the nymphs of leafhopper.

Keywords: leafhoppers, Cicadellidae, Hemiptera, Auchenorrhyncha Geminivirus, phytoplasma and Sugar beet

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