(Biological and Molecular studies on banana bunchy top virus in Egypt)

By

Hadeer Hanady Amr Ali

A thesis submitted in partial fulfillment

Of

The requirement for the degree of

Master

In

Agricultural Sciences

Department of Plant pathology

Faculty of Agriculture

FAYOUM UNIVERSITY

Egypt

2025

(Biological and Molecular studies on banana bunchy top virus in Egypt)

By

Hadeer Hanady Amr Ali

B. Sc. (Agric. Sci. plant pathology)

Fac. of Agric., Fayoum Univ., 2019

Prof. Dr. Mohamed Ahmed Ali Hassan

Prof. of Plant pathology, Faculty of Agriculture – Fayoum university

Signature…….

Dr. Hesham Mohammed Ahmed

Researcher, Dept. of National Research center.

Signature…….

Dr. Ahmed El- Nabawy El- Nabawy El- Shorbagy

Researcher, Virus and Phytoplasma Dept.- Plant Path. Agric. Res., Center.

Signature…….

ABSTRACT

Banana bunchy top disease (BBTD) that caused by banana bunchy top virus (BBTV) is considered the most common disease affecting banana in Egypt. The samples were collected from four different governorates (Behira, Qalubia, Bane Sweif and Giza). Polymerase chain reaction (PCR) was used for detection and analyses the genome of BBTV using specific primer. The virus was detected by PCR using back-to-back primer pairs specific for DNA-S (coat protein) approximately 747bp. Examination of ultrathin sections by transmission electron microscopy revealed changes in the chloroplast, cytoplasm and in nucleus compare to healthy cells. BBTV causes severe economic losses in banana crop. Recently, nanotechnology was used to generate resistance against plant viruses. The main purpose of this study was to use Chitosan nanoparticles and Zinc oxide nanoparticles as antiviral agents against BBTV. Three different concentrations of Chi-NPs (50, 100 and 200 mg/l) and Zno-NPs (10, 20 and 40 mg/l). were applied by adding to the MS media in tissue culture. In addition, photopigments, Peroxidase, polyphenol oxidase, total phenolic, total oxidant, total soluble sugar, Protein and Malondialdehyde were determined in un treated infected control (+ ve) and infected plants which treated with Chi-NPs and Zno-NPs compared with the healthy control plants (- ve). In the current study, it was observed that banana plants infected with BBTV and treated with Chi-NPs and ZnO-NPs. have not shown any external symptoms and detected with ELISA. The results of detection recorded significantly viral inhibition. Biochemical contents in infected banana plants showed that the results recorded an increase in polyphenol oxidase and peroxidase and total oxidant activity in banana trees infected with BBTV in free medium and which treated with Chitosan nanoparticles compared to healthy control. Evaluation of total phenols, Total soluble sugar, Protein and

Malondialdehyde were carried out in infected samples and others were treated with chitosan nanoparticles. The results Showed that total phenolic, Protein, TSS and MDA were significantly increased in infected samples compared to healthy control samples. It was observed that infected plants had the highest reduction in chlorophyll a and b and carotenoids.

Keywords: Banana bunchy top virus (BBTV); PCR; ELISA; Chitosan Nanoparticles; Zinc Oxide Nanoparticles; Tissue culture.