EVALUATION OF THE EFFECT OF AN ORGANIC BIOSTIMULANT ON ZYMV TRANSMISSION AND INFECTION IN *Cucurbita pepo* L.

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INTRODUCTION

Biostimulants are fertilizers whose function is to stimulate the nutrition processes by improving plant and/or rhizosphere characteristics. Their role in plant protection against both abiotic and biotic stresses has also been assessed. This study aims at evaluating the potential effects of biostimulant treatments on cucurbits infected with zucchini yellow mosaic virus (ZYMV), an aphid-transmissible potyvirus that affects several crops and weeds worldwide .

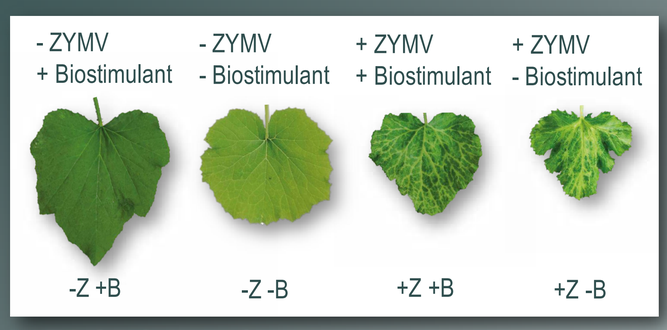
MATERIALS & METHODS

Both foliar and root treatments with a biostimulant containing alfalfa, brown algae, and molasses extracts were performed on healthy and ZYMV - infected zucchini plants (*Cucurbita pepo* L.). ZYMV titre and expression level of seven defence genes from systemic acquired resistance (SAR), one from pattern-triggered immunity (PTI) and three from oxidative stress pathway were quantified in both treated and untreated plants using qPCR. Viral symptoms and plant growth parameters (number of leaves, flowers and fruits) were also recorded. Several factors involved in the tri-trophic interaction among zucchini, ZYMV, and the aphid vector *Myzus persicae* were evaluated, by means of volatile organic compound (VOC) analysis and aphid choice and performance experiments.

RESULTS

Zucchini - ZYMV

After biostimulant treatment, both healthy and ZYMV-infected plants showed an increased production of leaves, flowers, fruits and biomass. Biostimulant treatment did not affect the severity of ZYMV symptoms on the plants.



RATE OF SYMPTOM SEVERITY



LEAF, FLOWER AND FRUIT PRODUCTION



BIOMASS PRODUCTION

EVALUATION OF PLANT FITNESS

PLANT DEFENCE RESPONSE & VIRUS TITER

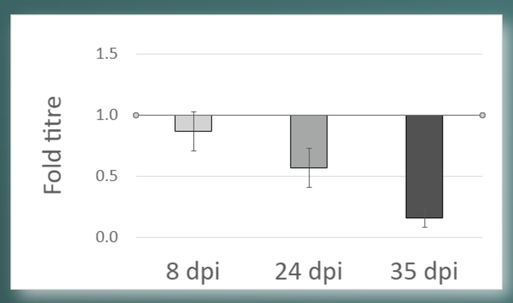
SAR
PAL, PR1, PR2, ICS1 NPR1, GST, SABP2

Oxidative stress
POD, SOD, CAT

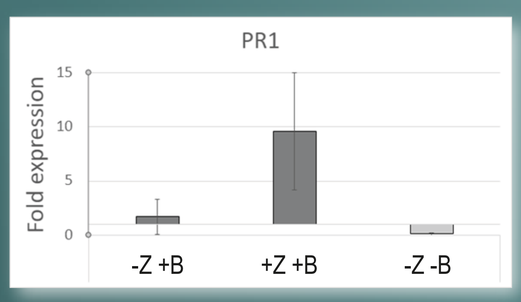
PTI
WRKY29



PLANT DEFENCE SYSTEM



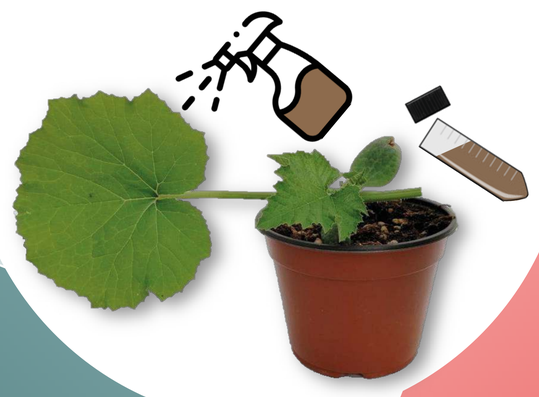
Relative quantification of viral titre in −Z +B samples (TaqMan RT-qPCR)



Relative quantification of gene expression

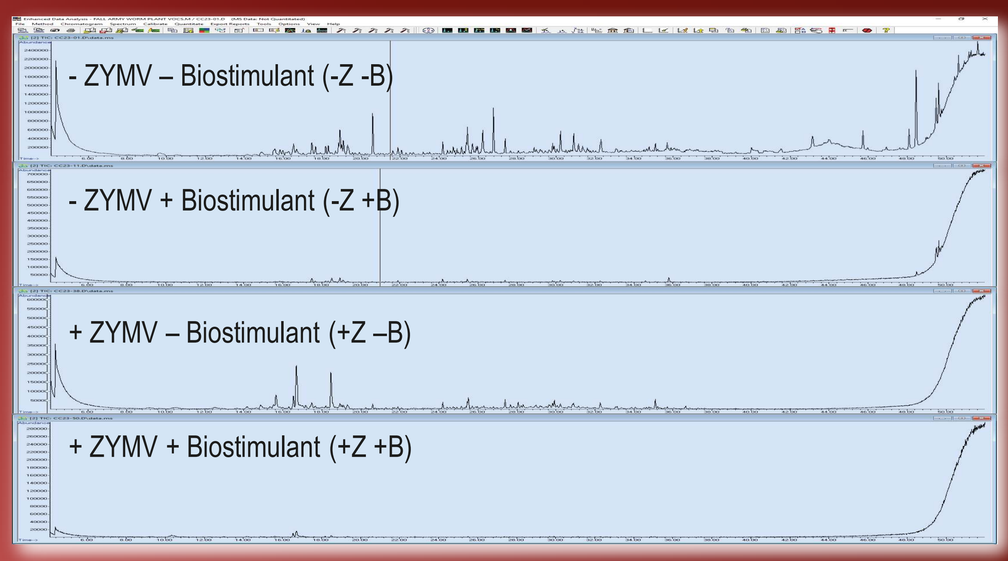
ZYMV titre was reduced in biostimulant treated plants compared to untreated plants and an upregulation of plant defence genes was observed.

FOLIAR AND ROOT TREATMENTS



Zucchini – ZYMV – *Myzus persicae*

VOCs produced by plants and studies on the effect of VOCs on aphid choice using olfactometer are ongoing

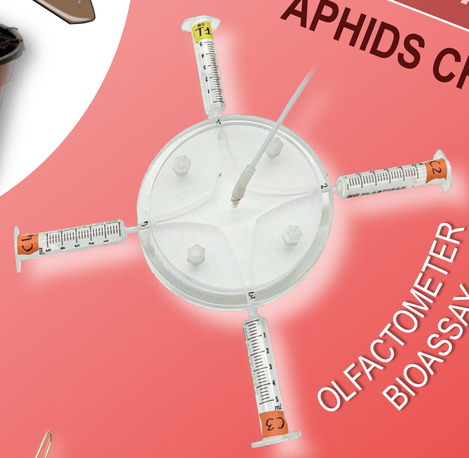


VOLATILE ORGANIC COMPOUND (VOC) ANALYSIS



VOCs COLLECTION

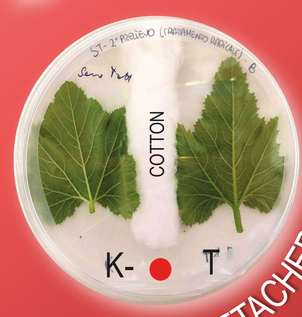
APHIDS CHOICE AND PERFORMANCE TESTS



OLFACTOMETER BIOASSAY



CLIP CAGES



DETACHED LEAVES



Percentage of aphids found on the leaves after 24 hr of challenging

Preliminary results showed that aphids were less likely to choose biostimulant treated plants, both in healthy or ZYMV-infected conditions

CONCLUSIONS AND FUTURE PROSPECTIVES

The positive effects of the tested biostimulant on both fitness and defence system of the zucchini plants were assessed. Preliminary results of choice and performance tests suggested an increased repellency against aphids in plants treated with biostimulants, both in healthy and ZYMV-infected conditions but more tests are needed. In the frame of envisaged integrated pest management to reduce the use of synthetic pesticides, these biostimulant treatments can represent an environmental-friendly approach for the concurrent control of ZYMV and aphid vectors in *C. pepo* crops.