EVALUATION OF SOME CUCURBIT ACCESSIONS COLLECTED FROM NORTHERN CYPRUS FOR RESISTANCE TO ZUCCHINI YELLOW MOSAIC VIRUS (ZYMV)

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ABSTRACT

Seeds of 38 cucurbit, 19 melon and 8 watermelon accessions were taken from the genbank of European University of Lefke, Faculty of Agricultural Sciences and Technologies. There are total 65 accessions collected from different ecological region of Northern Cyprus. Furthermore, evaluation studies of these materials have started. In the present study 38 cucurbit, 19 melon and 8 watermelon accessions, sampled from this germplasm, were tested for resistance to zucchini yellow mosaic virus (ZYMV). Seeding performed into violas with 5 replications and after germination of the genotypes, virus inoculation performed by soft scorching ped method to the cotyledons. Two weeks after inoculation, plants were transferred to the field of Faculty of Agricultural Sciences and Technologies. One week after transplanting, virus symptoms appeared. To categorize plants, 0-9 scale was used and plants were grouped as tolerant, resistant and sensitive. According to the results, No ZYMV was determined on one cucurbit (KAB 03) accession and one melon (KAV 20) accession which may be resistant against to ZYMV.

KEYWORDS:
Cucurbits, germplasm, Virus

INTRODUCTION

Cucurbits, melon and watermelon are economically important species of the Cucurbitaceae family which are used as nourishment by human beings. According to Food and Agriculture Organization (FAO), cucurbit production was 26.486.616 tones [1]. Turkish Republic of Northern Cyprus (TRNC) covers 329.890 ha area where around 56.71% is suited for agriculture.

Viruses are especially important pathogens throughout the world. Researchers reported 32 viruses and virus-like diseases at Cucurbitaceae species. Zucchini Yellow Mosaic Virus (ZYMV) is highly treating Cucurbitaceae species and causing highly economic yield reductions [2]. ZYMV firstly observed in a cucurbit field in Italy in 1973. After that, this virus reported in more than 50 countries [3, 4, 5, 6, 7]. ZYMV also reported in many African countries, such as: Albania, Tunisia, Morocco, Egypt and Madagascar [8].

ZYMV can be transmitted non-persistently by aphids like other potyviruses [9, 10]. M. persicae and Aphis gossypii are two most important vectors of ZYMV [5, 11, 12]. Other important vectors of ZYMV are: Macrosiphum euphorbiae, Aphis citricola, Aphis craccivora, Aphis spiraeæcola and Acrhythosiphonpissum [13].

Cultural management strategies, chemical control (of vectors), physical control, biotechnological methods and quarantine are most important control measures of plant viruses. Especially Systemic Acquired Resistance (SAR) is becoming an important control measure against funguses and bacteria. Therefore, it becomes an important management strategy for viruses as well. Most successful results obtained by the usage of weak strain (ZYMV-WK) in cross protection studies [14]. Using of resistant varieties, adjustment of planting date, management of vectors, eradication of disease sources and quarantine methods are very important for virus management [15].

This study conducted to evaluate some cucurbit genotypes against Zucchini Yellow Mosaic Virus (ZYMV) which is becoming a very important disease in Turkish Republic of Northern Cyprus. For this reason, serological (ELISA) and molecular (RT-PCR) studies conducted.

MATERIALS AND METHODS

susceptible genotypes were also tested as control. Resistant genotype of cucurbit was ‘Otto Hybrid’ from Alata Horticultural Research Institute and sensitive genotype of cucurbit was ‘Karamut’. ZYMV inoculation source [ZYMV-AD (Gen Bank: JF317296.1 NCBI)] of present study was taken from the Adana Biological Control Research Institute which is serologically and biologically characterized. Virus isolates were mechanically inoculated to the cotyledons at the first true leaf stage of the plant by rubbing Carbendazim-dusted with extracts from 1 g of infected plant material prepared in 0.02 M phosphate buffer and containing 0.1% 2-mercaptoethanol (pH: 7.0) and added activated carbon. After inoculation cotyledons were washed using tap water. Plants were left to grow in 16 h light 8 h dark at 25 °C temperature conditions. Presence or absence of virus symptoms was scored for each test plant 3 weeks after inoculation. The accessions, developed visual symptom, were recorded as susceptible and symptomless plants resistant. Scoring was performed according to the 0-9 scale then symptomless plants were controlled by ELISA test to confirm resistance. Another material of present study was the violas with 45 cells each which are used to sow seeds inside. Plate and antiserum are used for the DAS ELISA tests. ZYMV were obtained from Policlonal Atiserum AGDIA and PCR mix was taken from Femermites. Primers (250 bp), which are unique to coat protein of ZYMV [ZYMV-F1 ACTGGCAGCATACATCAAGC, ZYMV-R1 CTTGGCCAGCTACTAGTTTTC] obtained from Iontek.

First ZYMV symptoms were observed 3 weeks after transferring genotypes to the field. Genotypes which did not show symptom and/or the symptoms were not obvious (or uncertain) were subjected to ELISA tests.

### RESULTS AND DISCUSSION

In this study, sixty five accessions including cucurbits, melon and watermelon were evaluated for resistance to ZYMV. Results of resistance are summarized in Table 1.

The studies were continued with 38 cucurbit genotypes. According to the results total 25 samples with no symptom and/or uncertain symptoms were subjected to ELISA and RT-PCR tests. Also, 25 of the 38 tested genotypes showed ZYMV symptoms at 405 wavelengths where only ‘KAB 03’ did not show ZYMV symptoms. After mechanical inoculation, only 1 sample from 5 replications showed ZYMV symptom on ‘KAB 03’ genotype. The rest 4 samples of KAB 03 were analyzed 2 times and no ZYMV symptoms observed. These genotypes were sowed again to verify results and mechanical inoculations were performed again.

In conclusion, no ZYMV symptoms were observed on those genotypes again in ELISA tests and KAB 03 were determined as tolerant against ZYMV. After the mechanical inoculation on 38 genotypes almost all of the cucurbits (37/38) genotypes were determined as sensitive to ZYMV.

In conclusion, according to the results of present study one cucurbit (KAB 03) genotype and one melon (KAV 20) accessions of 65 tested accessions were determined as resistant against ZYMV. Similar study was conducted by Ekbiç et al. [16] and they reported that 4 out of 67 genotypes, which were collected from the different ecological regions of Turkey, were resistant against ZYMV. Another study carried by Fidan et al. [17] where same methods were used and 2 melon genotypes from the gen bank of BATEM (Bati Akdeniz Agricultural Research Institute) were determined as resistant to ZYMV after DAS-ELISA test. Nacar et al. [18] conducted a study over cucurbit genotypes to evaluate resistance against ZYMV and they indicated that 21 days after mechanical inoculation, another inoculation is needed to obtain correct results.

As a result of this study, one cucurbit genotype (KAB 03) and one melon genotype (KAV 20) thought to be resistant, are suggested for serological and molecular studies for the further studies. Cucurbit germplasm collected from Northern Cyprus also will be evaluated for other virus and other diseases.

### TABLE 1

Results of mechanical inoculation of 65 accessions tested with ZYMV

<table>
<thead>
<tr>
<th>Virus Tested</th>
<th>Accessions</th>
<th>Susceptible</th>
<th>Resistant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZYMV</td>
<td>Cucurbit</td>
<td>38/37</td>
<td>1/1</td>
<td>38/1</td>
</tr>
<tr>
<td></td>
<td>Melon</td>
<td>19/18</td>
<td>1/1</td>
<td>19/1</td>
</tr>
<tr>
<td></td>
<td>Watermelon</td>
<td>8/8</td>
<td>0/0</td>
<td>8/0</td>
</tr>
</tbody>
</table>
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REFERENCES


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