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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 spiraecola* and *Acyrthosiphonpissum* [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

In the study totally 65 accessions including cucurbit ('KAB 01', 'KAB 02', 'KAB 03', 'KAB 04', 'KAB 05', 'KAB 06', 'KAB 09', 'KAB 11', 'KAB 12', 'KAB 17', 'KAB 20', 'KAB 24', 'KAB 25', 'KAB 26', 'KAB 27', 'KAB 29', 'KAB 30', 'KAB

33', 'KAB 35', 'KAB 42', 'KAB 43', 'KAB 44', 'KAB 46', 'KAB 50', 'KAB 54', 'KAB 55', 'KAB 56', 'KAB 60', 'KAB 63', 'KAB 67', 'KAB 73', 'KAB 75', 'KAB 76', 'KAB 77', 'KAB 78', 'KAB 81', 'KAB 83', 'KAB 86'), melon ('KAV 01', 'KAV 02', 'KAV 03', 'KAV 04', 'KAV 05', 'KAV 06', 'KAV 07', 'KAV 08', 'KAV 09', 'KAV 10', 'KAV 12', 'KAV 13', 'KAV 14', 'KAV 16', 'KAV 17', 'KAV 18', 'KAV 19', 'KAV 20', 'KAV 21') and watermelon ('KAR 01', 'KAR 03', 'KAR 04', 'KAR 05', 'KAR 12', 'KAR 14', 'KAR 17', 'KAR 18') were evaluated for resistance to ZYMV. 38 cucurbit, 19 melon and 8 watermelon accessions were taken to evaluate from the Gen Bank of European University of Lefke, Faculty of Agricultural Sciences and Technologies collected under a TUBITAK project. On the other hand, resistant and sensitive 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 Carborundum-dusted with extracts from 1g 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 1-9 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 Fermantas. Primers (250 bp), which are unique to coat protein of ZYMV [ZYMV-F1 ACTGGCACGAT ACCTACAAGC, ZYMV-R1 CTTGGCAGCTACTACTGTTTTC] 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 showed 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 (Batı 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

		Number of Virus Tested Accessions		
Virus Tested	Accessions	Susceptible	Resistant	Total
ZYMV	Cucurbit	38/37	1/1	38/1
	Melon	19/18	1/1	19/1
	Watermelon	8/8	0/0	8/0

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