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Virus Diseases of Cucurbits in Gaziantep-Turkey

Mehmet Ozaslan, Turkan Aytekin, Berna Bas, I. Halil Kilic, I. Didem Afacan and D.S. Dag
Department of Biology, University of Gaziantep, 27310 Sahinbey Gaziantep, Turkiye

Abstract: Cucurbit growing is affected negatively due to diseases caused by cucurbit viruses. In order to prevent this damage cucurbit viruses were identified by serologically. Due to this study, it is usually difficult to give definitive diagnosis based on symptoms but occasionally symptoms; are curling, wrinkling, spot mosaics, yellowing, shape deformation on leaves, smaller leaves than normal, buff-colored mosaics, observed on younger leaves of cucurbits and stunting, distortion and fruit deformation on the plants. After this, samples collected and taken to laboratory to determine the virus which caused this symptoms and DAS-ELISA tests were performed to determine CMV (*Cucumber mosaic virus*), CABYV (*Cucurbit aphid borne yellow mosaic virus*), ZYMV (*Zucchini yellow mosaic virus*), ToMV (*Tomato mosaic virus*), PMMV (*Pepper mild mottle virus*), PVX (*Potato X virus*), PVY (*Potato Y virus*) on the samples collected during July-August in 2004. At the end of this test out of 56 samples, 10 were found to be infected with one or more virus. As a result of this study 20 samples were infected by CMV and 22 samples were infected by ZYMV and 3 samples were infected by PVY.

Key words: Cucurbits, PVY, ZYMV, CMV, PMMV

INTRODUCTION

Viral diseases have caused significant economical losses. Approximately more than 35 viruses from Cucurbitaceae family were isolated^[1]. It was determined that these viruses cause complex and dynamical varying problems^[2]. The Southeastern Anatolia region has been presented a location which its agricultural potential was raised about growing variety cultured plants due to developed economical and ecological conditions.

Turkey is one of the nationalities which is grown vegetables belong to Cucurbitaceae family. Therefore, total cucurbit production was determined 7.617.000 tone in 1998 in Turkey. Especially virus diseases have a significant importance compared to other diseases (bacteria, fungus etc.) in cucurbit^[3-5].

Cucurbit has a significant role on diet because of its ingredient of vitamin and other dietary substances (Vitamin B, C, niacin, protein, lipid, carbohydrate, Ca, Fe, P). Watermelon has less calorie but high dietary value. In previous studies, it was determined that lycopene which is found a high rate in watermelon has an antioxidant activity. In cucurbit, watermelon and melon, Vitamin A and C is found high rates. However, it was determined that lycopene-p carotene in watermelon proves to protect body.

There are many of factors that decrease quantity and quality of cucurbit producing as well as in other crops.

The most important restrictive factors include plant disease and pests, but plant virus diseases are economically important since yet there are no efficient chemical treatments that protect plants from virus infection. Besides viruses, are cellular pathogens, have the ability for attacking to cause infection on the all living (biotic) organisms which are used as vector for transmitting.

Although symptoms induced by these viruses vary depending on the host, environmental conditions and individual virus infecting plant, the most common symptoms exhibited of this viruses are necrotic spots, streaking, ring spots, stunting, wilting, etc. Symptoms of virus-infected plants may resemble fungal and bacterial diseases or environmental stresses hence they are confused with plants affected by herbicide or air pollution damage, mineral deficiencies and other plant diseases. So, disease of viruses often is misleading, if it is diagnosed on the basis of physical symptoms alone. Positive identification of viruses requires reliable methodologies. The Enzyme-linked Immunosorbent Assay (ELISA) has been very popular for detection of viruses in plant materials since it was introduced to plant virology by Clark and Adams^[6]. Due to its adaptability, sensitivity and time- and labor-saving and reasonable in cost of reagents, ELISA is used in a wide range of diagnosis of viruses, especially to assay a lot of samples in a relatively short period of time.

From indirect" ELISA procedures, DAS-ELISA, in practice, is highly strain specific and requires each detecting antibody to be conjugated to an enzyme. Up to now, no yet virus diseases of cucurbit have been investigated in Gaziantep province dwelled on Southeastern Anatolia and is one of the leading producers of cucurbit in Turkey. In this research we have studied that diseases of cucurbit damaged by viral agents is determined using serological methodologies.

MATERIALS AND METHODS

Infected plant samples showing symptoms of leaf deformation, mosaic, wilting, leaf curling, vein banding, dwarfing, local necrotic lesions, fruit deformation were collected from yards in 7 locations of Nizip, in 10 locations of Sahinbey, in 3 locations of Sehitkamil, in 4 locations of Oguzeli, in 2 locations of Karkamis, in 3 locations of Araban and in 4 locations of Nurdagi districts at Gaziantep province. The samples put into plastic bags were labeled and brought to the laboratory by placing on ice bucket then kept -20°C freezer until using.

Detection of viruses by DAS-ELISA: Antisera of the suspected samples tested using DAS-ELISA method were purchased from SIGMA Company^[6]. Antisera were consisted of ZYMV, CABYV, CMV, ToMV, PVX, PVY and PMMV. Related chemicals of ELISA were provided from Molecular Biology, Laboratory of Biology, Department of Gaziantep University.

The leaves of infected young plants were grounded in the extraction buffer (Phosphate Buffered Saline (PBS) pH 7.0). Each sample (1 g in 10 mL extraction buffer) were filtered by double layer gauze then tested by DAS-ELISA in duplicate. Absorbance values were measured at 405 nm on ELISA reader (EL 800 bioelisa Reader biokit). While negative controls were included healthy samples, twice the mean value of healthy specimen were estimated as positive control.

RESULTS

In villages of Gaziantep which are grown cucurbit, variety kinds of symptoms were observed in plants with virus. Appearance of symptoms on plant leaves varies due to virus types. The most common symptoms for plants are as followed; leaf deformation, being folded on leaves, splitting on leaf vessels, leaf paling, leaf form disorders, green-yellow mosaic colour, being mosaic on leaves, plant mosaics and plant dwarfish .

The viruses and their rates in samples that were from the cucurbit grown areas of the Gaziantep province were determined by DAS-ELISA. In tests results, CMV, ZYMV and PVY were determined, on the other hand CABYV, ToMV, PMMV and PVX weren't determined in this region (Fig. 1-3). As shown Table 1, 40% ZMYV, 36% CMV and 5% PVY were found. It was found that 22 samples were ZYMV (+), 20 samples were CMV (+) and 3 samples were PVY(+) of the 56 test plants. Negative results were obtained against the other anti-serum or these results were accepted to be able to neglected.

Eight samples were *Cucurbita* sp. (*Cucurbita pepo*, *C. maxima*) and 4 samples were *Cucumis* sp. (*Cucumis sativus* L.) of 12 test plants with viruses in the Nizip, Gaziantep province. In the Sehitkamil province, 4 samples were *Cucurbita* sp. were determined. In the Sahinbey province, 8 samples were *Cucurbita* sp., 4 samples were *Cucumis melo* L. and 3 samples were *Cucumis sativus* L. of 15 Cucurbit plants. In Karkamis, 7 sampleas were *Cucumis sativus* L. In Oguzeli, 4 *Cucurbita* sp., 3 *Cucumis* sp., 2 *Citrullus vulgaris* L. of 9 samples were tested. In Araban, 3 *Cucurbita* sp., 1 *Citrullus* sp. and In Nurdagi, 4 Cucurbita sp., 1 *Citrullus* sp. were tested.

DISCUSSION

Viral diseases existence and spreading and harmful host-virus-vector relation show alteration in years as well in seasons. For this reasons, firstly determination of

Table 1: Statistical results of determined viruses in surveyed area

Surveyed district	Total sample	Infected sample	Detected viruses							
			ZYMV	%	CMV	%	PVY	%	ZYM V+CMV	%
Sehitkamil	4	4	2	50	2	50	-	-	2	50
Sahinbey	15	13	7	46	6	40	-	-	4	26
Nizip	12	10	3	25	5	41	2	16	2	16
Karkamis	7	4	2	28	2	28	-	-	-	-
Oguzeli	9	8	4	44	3	33	1	11	1	11
Araban	4	3	2	50	1	25	-	-	-	-
Nurdagi	5	3	2	40	1	20	-	-	1	20
Total	56	45	22	40	20	36	3	5	10	18



Fig. 1: Symptoms of CMV on the leaves of melon and squash



Fig. 2: Symptoms of ZYMV on the leaves of cucumber and watermelon



Fig. 3: Symptoms of PVY on the leaves of cucumber

viruses in cultured plants is needed for decrease damage of viral diseases and develop control strategies. In this study 39.2% ZYMV-area, 35.7% CMV-area and 5.3% PVY-area were determined in this region. Similarly study was performed on 165 Cucurbit in Samsun province by Sevik and Arh-Sokmen^[7] 53.9% WMV (*Watermelon mosaic*

virus), 38.8% ZYMV and 20.6% CMV of 165 samples were determined.

ZYMV that causes a significant economical loss in Cucurbit spreads the most by aphid but non-persistent efficiently worldwide^[8] Cucumber mosaic virus has a wide host range of over 700 species of plants. CMV is primarily spread by aphids that can acquire the virus in as little as 5 to 10 sec. Aphids then move the virus from plant to plant for a few hours. CMV is also spread mechanically in the plant sap when cuttings are taken from infected stock plants. CMV is also both seed and pollen transmitted in petunia where symptoms develop in very young plants.

Once the virus is detected in the field, the major control method is to immediately eradicate plant materials which indicate symptoms. The viruses are usually introduced into a field by either infected seeds or especially aphid vectors from infected plants on nearby fields. A significant part of *Cucurbit* production in Turkey is performed in Gaziantep province, however it is expected an increase of 8-10 times more when constructions and operations of barrages complex that is being built in vicinity of Gaziantep province is completed. GAP

(Giiney-Dogu Anadolu Projesi = Southeastern Anatolia Project) increased water use in agriculture and thus caused dispersion of various vector insects particularly aphids in the region, as a result, it is considered that viruses will infest in very large areas in the longer term if the spread of insect are not restricted by practically application of insecticides.

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