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VIRAL INFECTION OF TOMATO PLANT IRRIGATED BY SEWAGE EFFLUENT BY

By

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ABSTRACT

Tomato plant (Lycopersiocon esculentum) planted in a greenhouse and irrigated by sewage effluent, were treated by several treatment including; irrigation, atomization and inoculation. The height and weight of sewage irrigated plants were less than those irrigated by tap water/ The treated plants showed a symptoms of viral infection. Identification of the infected virus showed that, the virus belonged to tomato Mosoic virus (To MV). Two viral isolates were tested by grafting transmasion, host range, physical properties, serological reaction as well as two isolates belonged to To MV.

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INTRODUCTION

The utilization of treated in irrigation, due to lack in water resources, has been increased in the past 20 years. Walker (1977- stated that, subsurface applications of sewage effluent (without sprinklers) is a riable method for irrigation of selected ornamental plant. However, kourik (1990) reported that, improper application of sewage can spread parasites bacteria and viruses. The present investigation deals to study the prevalence of tomato plant vriuses as a result of irrigation, atomization and inoculation on tomato by the sewage effluent resultant from Zenin Treatment Plant.

MATERIAL AND METHODS

1. Sterilized clay loam soil was distributed in pottery pots (20 cm diameter and height) and 40 day old seedlings of tomato plant,variety Castle Rock, were transplanted at the rate of two plants/pot. The experiment comprised the following treatments:1) irrigation with tap water (Control) 2) irrigation with sewage effluent, 3) atomization of plant leaves daily with sewage effluent, 3) atomization of plant leaves daily with sewage effluent, 3) atomization of plant leaves daily with sewage effluent, 4) mechanical inoculation of plant leaves by dusting with carbondum (600 mesh) to facilitate the entrance of the virus then rubbing the leavs with the effluent followed by a rapid rinsing in tap water. Each treatment was replicated four times and pots were kept in an insect proof greenhouse. At harvest (95 days) representative samples of plants were examine for morphological studies which

includes the determinatipon of symptoms of viral infection on leav, plant height and fruit eweight.

2. Grafting Transmission

The infected plant was grafted with healthy plant and tied with polyethlene scions. This plant was kept under cage for 10 days. The symptoms appeared on healthy plants were recorded.

3. Light Microscopic Examination

Light microscopic observations were carried out on epidermal strips removed with forceps from the lower surface of the plants. The infected wicotiana tabacum C.V. white burley and capsicum annum used for detecting the inclusion bodies of tobacco mosaic virus (TMV) of the isolates strains were taken among three different periods of developing of the disease. Every 15 days observation under the light microscope was made for detecting the development of the inclusion bodies in the stage.

4- Serrological Reaction

Slide Agglutination Test

The infected sap of the viral trains were used to examine the virus against to MV antisera (Danish Government institute of seed patrhology for developing countries, copenhagen. Denmark). Drop of each healthy and infected juice was mixed with a drop of the investigated strains. The same technique was followed using healthy

and infeced juice with normal serum to act as a control. The slides were placed in vitro at the room temprature for 20 minutes. The solids were viewed and result was recorded.

5- Single and double Infection on some Morphological Characters of Tomato Plants

Twenty four tomato seedlings (Castle Rock) in the six weeks old were inoculated with isolate II. Ten days later the same plants were inoculated with isolate I. Another twenty four plants were incoculated with mixture of isolate I and II. Twenty four plants were used for isolate I alone and another twenty four plants for inoculating with isolate II alone. The symptoms and plants height were recorded.

RESULTS AND DISCUSSION

The effect of sewage effluent can be illustrated from Table 1. From this table it can be observed that, the least height in vegetative stage was recorded in sewage effluent irrigated plants. On the other hand it is obvious that the maximum height was during the fruiting stage in the control plants. Statistical analysis showed that, there were highly significant differences between irrigated, otomized inoculated tomato plants. In addition, there were highly significant differences in vegetative and fruiting stages than that in flowering stages. Also, there was highly significant difference in fruit weight between the treated plant and the untreated one.

Table 2 showed that, there were significant differences in plant height betweeen healthy seedling and those inoculated with one or both isolates. No significant differences were detected between plants inoculated with isolate I or II. From this table it is obvious that, infection with isolate I and II subsequently showed a slight increase in plant height than that with isolate II only. In addition, the severity of symptoms on the leaves is illustrated in table 2.

In the recent years, plant viruses have been detected in rivers and drain water by several investigators (Tomlinson et al., 1983, Tomlinson and Faithful, 1984; koeing and Leismann, 1985; koening 1986 and Stace- Smith, 1989). In addition, in a survey for a plant virus in water draining forests stoods in Germany, viruses of different taxonomic groups were recorded from more than 50% of water samples tested. Also Tombusviruses have been detected frequently in river water throughout the world (Tomlinson and Faithful, 1984 and Buttner et al, 1987).

The present investigation arrowed to the probability of transmission of hazardous plant viruses to the plant when irrigated by treated sewage. Thus, the irrigation by sewage should be used only for non-vegetables planbts.

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Table (1): The Effect of using sewage effluent on tomato plant height among different growth stages and friut weight

Treatments	Mean tength of tomato plants(cm)			Mean average of fruit weight(g)
	Vegetative stage	Flowering stage	Fruiting stage	
Irrigation with sewage	18.175	34.450	34.725	98.900
Atomizing with sewage	25.053	27.800	36.100	95.175
Inculation with sewage	21.630	24.775	34.250	103.925
Control	34.225	44.800	63.625	131.200

Table (2): The effect of single and double infection by isolate I and II of the plant height and symptoms on the leavs

Designation	Average of plant height (cm)	Symptoms appeared on the leaves
Isolate I	17.85	Severe mosaic,stunting and distortion
Isolate II	19.68	Chlorotic spots,mild mosaic
Isolate I+II*	15.90	Severe mosaic,stunting,distortion and chlorotic spots converted to necrotic spots and the end of the symptoms
Isolate II+I**	22.13	Stunting, distortion and severe mosaic
Uninoculated plant (Control)	64.30	No symptoms on the leaves

* Mixture inoculation from isolate I and II

** Second inoculation was carried out one week after the first inoculation

الاصابة الفيروسية لنبات الطماطم المروى بمياه المجارى المعالجه

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أجريت تجربه زراعة تحت ظروف الصوب استخدمت فيها مياه الصرف الصحى المعالجه وذلك فى عدة محاولات تمت زراعتها بالطماطم حيث أمكن التعرف على إصابة النباتات بمرض فيروس التبرتش أمكن الحصول على عزلنين باستخدام طرق التطعيم، المدى العوائلى، الصفات الطبيعية، التفاعلات السيرولوجيه والحقن المشترك والتى أكدت انتماء كلا العزلتين إلى فيروس موزيك الطماطم.