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CONTENTS

VOLUME 1 NUMBER 1 OCT. 1971

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J. Turkish Phytopath. Vol.: I, Num : 1 — 1971

Die Entwicklung der Phytopathologie in der Türkei

Prof. Dr. İbrahim KARACA

Es ist nicht so alt, dass die Phytopathologie in der Türkei als Beruf anerkannt ist. Am Anfang dieses Jahrhunderts wurden die ersten phytopathologischen Vorlesungen an einer landwirtshaftlichen Hochschule gehalten. Sie war die erste landwirtschaftliche Hochschule in der Türkei und in Halkalı gegründet. Der Lehrer hiess Ali Riza Erten. In dieser Zeit wurden nur die Vorlesungen gehalten aber nicht geforscht.

Erstemal wurden die Forschungen über Phytopathologie im Institut für Pflanzenschutz angefangen, das in Bornova gegründet war und vom Landwirtschaftsministerium abhängig ist. Dieses Institut, das in einem kleinen Gebäude und mit einigen wissenschaftlichen Personal eröffnet wurde, hat heute grosse, moderne Gebäude und viele wissen schaftlichen Angestellten mehr als fünfzig. In diesem Institut haben viele deutsche Forscher wie Dr. Schwarz und Dr. Bremer gearbeitet.

Ein ähnliches Institut wurde später im Jahre 1934 in Ankara gegründet. Auch dieses Institut hat heute grosse Gebäude und mehr als fünfzig wissenschaftlichen Angestellten. Die Phytopathologen Dr. Bremer und Prof. D. Gassner und der Entomologe Prof. Dr. Bodenheimer waren in diesem Institut jahrelang tätig.

Es gibt heute 6 solche Institute in folgenden Städte: Ankara, Bornova (İzmir), Erenköy (İstanbul), Adana, Diyarbakır und Samsun. In Ankara ist noch ein Forschungsinstitut für Bekämpfungsmittel und Geräte vorhanden.

An den Üniversitäten ist erstes Institut für Phytopathologie im jahre 1947 an Ankara Universität gegründet. Der erste Direktor dieses Instituts hiess Prof. Dr. Selâhattin Kuntay (Phytopathologe). In diesem Institut haben viele Phytopathologen mit Namen genannt Dr. M. Özkan, Prof. Dr. K. Lohwag (aus Wien) und Prof. Dr. W. W. Ray (aus Nebraska) haben Phytopathologischen Vorlesungen gehalten. Prof. Dr. B. Alkan war jahrelang als Direktor in diesem Institut tätig. Die jetzige Direktorin heisst Prof. Dr. Z. Düzgüneş.

Im jahre 1957 wurde noch ein Institut für Phytopathologie an der Ege Universität in İzmir errichtet (Direktor, Prof. Dr. I. Karaca), Dieses Institut ist mit Gewächshäu-

sern, Versuchsfeldern, Bibliothek, Klimaräumen und mit modernen Laboratorien und Einrichtungen in einem neuen und modernen Gebäude tatig.

Est gibt noch ein Institut für Pflanzenschutz an der Atatürk Universität in Erzurum. Der Direktor von diesem Institut ist Prof. Dr.H. Yüksel (Nematologe) und die Arbeiten über Nematoden und Unkräuter sind sehr fortschrittlich.

Es sind auch Phytopathologen im Forschungsinstitut für Zuckerrübe tätig. In diesem Institut, das sehr grosse und viele Gewächshauser hat, wird über Zuckerrübe und ihre Krankheiten gearbeitet.

Ausserdem gibt es phytopathologischen Abteilungen in den Forschungsinstituten, die sich in verschhiedenen Kreisen von der Türkei befinden und von Landwirtschaftsministerium abhängig sind.

Noch eins ist in İstanbul Institut für Tabakforschung. Man wird sich hier mit Tabakbau, Tabakzüchtung und Tabakkrankheiten beschäftigt.

Ungefähr 120 Phytopathologen arbeiten in diesen Instituten. Sie sind nur in der Forschung tätig. Ausserdem gibt es Phytopathologen, die sich im pflanzenschutzdienst beschäftigen.

Bis heute sind 500-600 phytopathologische Bücher und Artikel in der Türkei erschienen.

Ein Teil von den Forschern haben Magisterprüfung (Master of science) oder Dissertationen in Europa oder in Amerika angefertigt. Es gibt von denen welche als Dozenten und Professoren an den Universitäten tätig sind.

Es ist sichtbar, dass in der Türkei über Phytpathologie ein grosses Potential gibt, und die Zahl der Puplikationen ist auch nicht wenig Ein grosser Teil von denen sind nicht so wissenschaftliçh wertvoll, wie die in Europa und Amerika publiziert werden. Die Gründe sind folgende :

1. Die türkische Phytopathologen haben wenige Möglichkeiten im Berufsleben um weiter zu kommen.

2. Die Leiter geben wenige Mühe um die Instituten zu ausstatten und die finanziellen Quellen zu finden.

3. Es gibt keinen Kraft in der Türkei, der die Forschung fördert.

In der Forschung ist Projekt-Basis angenommen, Projekte werden während und nach der Laufzeit von manchen Organen kontroliert. Das ist eine gute Methode. Aber die meisten von Projekte bestehen aus Survey von verschiedenen Krankheiten und Versuche von Pflanzenschutzmittelanwendung. Es gibt gar keine oder wenige Untersuchungen über Biologie und Ökologie von Pflanzenkrankheiten, neue Bekämpfunsmethoden, Toxikologie von Fungisiden und Epidemiologie.

Weil das Landwirtschaftsministerium die angewandte Forschung bevorzugt, wird das von den Forsch-

ern falsch angenommen, Die angewandte Forschung besteht nicht nur aus Survey und aus der Anwendung von Pflanzenschutzmitteln. Dafür sollen aber die Instituten volständig sein.

Die Meisten von denen, die in diesen Instituten arbeiten, beschäftigen sich mit der ökonomischen Phytopathologie. Deswegen gibt es an manchen Zweigen keinen Forscher. Es ist notwendig, das diese Fehler mit Jungen Kollegen zu beseitigen.

Die erste türkische phytopathologische Gesellschaft, die auf diesem Gebiet arbeitenden Forscher in sich aufnimmt, heisst Turkish Phytopatholagical Society und im jahre 1970 errichtet, Die verfolgt das Ziel, den Mitgliedern Möglichkeiten zu schaffen, damit sie beruflich weiterkommen und ihre berufliche Rechte zu schützen.

Die Türkische Phytopathologische Gesellschaft hat angefangen, als erstes diese Zeitscrift, the Turkish Phytopathology zu publizieren. Die wird jetzt 3 mal im Jahre erscheinen und die Puplikationen der Mitglieder enthalten.

Weil wir die Türkei im Ausland bekannt machen und den Türkischen Forschern behilfch sein wollen, haben wir die fremden Sprachen gewählt.

Wir wünschen, dass unsere Zeitschrift nützlich wird.

J. Turkish Phytopath. Vol.: I. Num. : 1 — 1971

Wilt Disease of Cotton in the Ege Region of Turkey

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ABSTRACT

An investigation comprising 4 years survey was carried out on the wilt disease of cotton prevalent in Aydın, Manisa and İzmir provinces of the Ege reigon. It was found that *Verticillium dahliae* is the pathogen causing wilt disease on*Gossypium hirsutum* which is under cultivation in these provinces. Soil structure and irrigation were the common factors responsible for the severity of infection. The severely infected cotton growing province was Aydın (38.64%) and the least were Manisa (34.01%) and İzmir (21.68%).

INTRODUCTION

The cotton growing areas in the Ege region of Turkey totals 225,500 hectares and represents 31.4% of the total cotton producing area. The total cotton production in the Ege region is 166,237 tons representing 33.7% of the total cotton production in Turkey. Cotton cultivation in this region, is mainly on irrigated lands. Therefore, average production of cotton is more than non-irrigated lands of other regions in Turkey. For instance, in the year 1967, the total average production of cotton from different regions in Turkey was 551 Kg/ha while the output from Ege region alone, amounted 737 Kg/ha (Incekara 1971; Madran, 1969).

Coker 100-A-2 variety of *Gossypium hirsutum* is cultivated in the Ege region. The reduction in yield of cotton produced in this region is usually due to wilt disease of cotton plants. During the present investigations, it has been found that wilt disease of cotton was widespread in the Ege region of Turkey. Damage to cotton plants due to wilt disease is observed every year but during some years, when infection is severe, extensive damage has been observed.

During the present investigations, 3 important cotton producing provinces; Aydın, İzmir and Manisa of the Ege region were investigated. The investigations comprised 4 years survey work. The aim of this investigations was to determine (i) causal agents of wilt disease (ii) areas under infection and (iii) per-

centage incidence of occurrence of the disease.

In Turkey, the prevalence of wilt disease of cotton plants has been observed since long. Forsteneichner (1931) was first to report "sore-shine" disease of cotton seedlings from Adana. He isolated from the diseased seedlings some pathogens like ***Rhizoctonia gossypii*** n. sp. var. ***anatolica*** Forst., ***Rhizopus nigricans*** Ehren, ***Fusarium scirpi*** Lamb. et Fautr,. ***Alternaria humicola*** Oudem var. ***gossypii*** and ***Gibberella moniliformis***.

Bremer (1943,1944) in his research investigations isolated ***Fusarium solani*** and ***F. scirpi*** from the roots of cotton seedlings showing wilt disease.

Jakop (1969)[1] collected seedlings showing "damping off" from the cotton growing areas of Ege region and from these isolated some pathogens like ***Fusarium oxysporum*** Schl., ***F. moniliforme*** Shelz., ***F. scirpi*** Lamb. et Fautr., ***F. solani*** (Mart.) App. et Wr., ***F. orthoceras*** App. et Wr., and ***Rhizoctonia gossypii*** var ***anatolica*** Forst. He reported that the primary cause of wilt disease; ***F. oxysporum*** f. ***vasinfectum*** (Atk.) Snyder and Hansen; could not be isolated from the diseased seedlings.

Lately, Karaca and Ceylan (1968) investigated the comparative studies of pathogenicity tests with the mentioned species of *Fusarium*. Among other species of *Fusarium*, ***F. oxysporum f. vasinfectum*** 2 was the only pathogenicity while others proved to be weak parasites.

Rudolph and Harrison (1944); Chester (1950); Dickson (1956); Kamal and Naim (1969) reported that the causal organisms of wilt disease to ***Gossypium hirsutum*** (upland varieties) grown in U.S.A., were ***Verticillium dahliae***, ***V. albo-atrum*** and ***F. oxysporum f. vasinfectum*** But when the same verieties of cotton were cultivated in Russia, ***V. dahliae*** was the only causal agent of wilt disease.

It has been reported that ***F. vasinfectum***, ***F. solani*** and ***F. vasinfectum*** were causal agents of wilt diseases of ***Gossypium herbaceum*** and ***G. babardense*** cultivated in Egypt and India (Naim and Shaaban 1966; Jakop 1969).

Barducci ((1966) working on the wilt disease of cotton in Peru reported in his earlier findings that ***F. oxysporum f. vasinfectum*** was the cause of wilt. But in his subsequent investigations he discovered that ***Verticillium alboatrum*** was the cause of wilt disease.

V. dahliae Kleb, has been reported to be the pathogen causing wilt disease to cotton crops cultivated in Iran and Pakistan (Cognee 1962; Cauquil and Rahmani 1964; Kamal and Naim 1969).

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1) Jakop performed his experimentations in the year 1967 but published in 1969.
2) The culture of **Fusarium oxysporum f. vasinfectum** was provided by Prof. Dr. Grossmann, Giessen University, Germany.

MATERIALS AND METHODS

In the Ege region, a short fibred variety; Coker 100 / A - 2 of ***Gossypium hirsutum*** is under cultivation.

Collection of the diseased cotton plants showing wilt symptoms was carried out from Manisa, İzmir and Aydın provinces of the Ege region. The cotton growing areas were splitted up into different units each consisting of 10.000 dekkars. Each unit was further splitted into 5 fields of different sites at random and the area covered in one field comprised 40 m^2. In each field healthy and infected plants were counted. The twigs of some healthy plants manifested no symptoms of wilt were cut to determine any vascular browning.

The degree of severity was scored against a scale of showing O for no infection and 1, 2. 3, with the increasing amount of infection.

In order to isolate pathogens which cause wilt diseases, the diseased stalks 30 cms in length from above the soil surface were collected. Each stalk was peeled off and five pieces from different sites, each bearing 1 cm length were selected. These pieces were longitudinally sectioned and surface sterilized for 1 minute in mercuric chloride. Later, these pieces were washed in sterilized water for 4-5 times, plated on the nutrition medium and incubated at 25C° for 7 days. Following Nadakavukaren-Horner (1959) the nutrition medium was alcohol-water agar.

Fungi isolated from the diseased specimens were identified by Dr. W. Gerlach (B.B.A. Berlin-Dahlem).

RESULTS

In the years 1967-1970, a survey was carried out in Aydın, İzmir and Manisa provinces of the Ege region. Every year survey was started from the last week of August up to the end of September. Results recorded from the survey are given in table 1.

TABLE 1. Percentage incidence of wilt disease

Provinces	Stations	Percentage incidence (%)				
		1967	1968	1969	1970	Average
Aydın	Aydın	57.51	78.56	31.77	33.74	50.39
	Germencik	28.05	37.58	19.49	29.95	28.77
	Nazilli	55.78	51.10	31.18	37.19	43.81
	Koçarlı	51.58	60.04	31.65	47.04	47.58
	Söke	27.49	23.68	12.97	26.47	22.65
						38.64
İzmir	Selçuk		[1]23.93	21.49	4.50	16.64
	Torbalı		30.17	33.30	10.07	24.51
	Bayındır		19.88	15.60	6.38	13.95
	Menemen		35.15	39.44	18.92	31.17
	Bergama		29.72	17.15	19.60	22.15
						21.68
Manisa	Manisa		50.90	33.44	47.52	43.95
	Saruhanlı		45.81	32.02	33.58	37.13
	Salihli		35.71	28.63	33.66	32.63
	Turgutlu		28.92	21.99	16.19	22.36
						34.01
Total average		38.46	37.63	25.30	24.30	31.44

1 In the year 1967 the survey was only carried out in the Aydın province.

As shown in table 1 the disease was widespread in the valley of "Büyük Menderes" in Aydın. At Koçarlı station of this valley, the disease was severely widespread.

In Manisa, the percentage of 3 years average infection was 34.01% and the place under severe infection, was Saruhanlı.

Izmir with 21.68% of infection, was least affected province. In this province the severely infected cotton growing area was Menemen.

If we look yearly infection rate in table 1 we find that it was maximum in the years 1967-1968. Specimens collected during survey were used to isolate wilt disease pathogens. Isolations were carried out in the years 1967, 1968 and 1969. Isolation was stopped in 1970, when sufficient evidence of wilt pathogens was obtained. The results are given in table 2.

TABLE 2. The percentage rate of fungi isolated from wilted cotton stalks.

Name of fungus	1967	1068	1969
Verticillum dahliae	81.79	92.51	96.80
Fusarium spp.	13.01	3.62	0.9
Other fungi	5.20	3.87	2.3

Following species of ***Fusarium*** were isolated:- ***F. culmorum*** (W. Sm.) Sacc., ***F. moniliforme*** Scheld., ***F. equiseti*** (Cda.) Sacc., ***F. accuminatum*** Ell. et Ev., ***F. sambucinum***., ***F. solani*** (Mart.) App. et Wr., and ***F. semitectum*** B. et Rav.

DISCUSSION

Fusarium has been regarded to be the cause of wilt disease to cotton crops in Turkey (Bremer 1943, 1944). In fact, invariably, species of Fusarium have been observed in the isolations from wilt diseased cotton plants. But the pathogenicity tests with these species of Fusarium have never been carried out. In the recent years, investigations carried out by Karaca and Ceylan (1968) shcwed that these species of ***Fusarium*** isolated from cotton stalks were weak parasites. They only caused "damping off" to the cotton seedlings.

In the present investigations, *V. **dahliae*** Kleb. was found to be the pathogen causing wilt disease of cotton in the Ege region of Turkey. ***Gossypium hirsutum*** L., is under cultivation in Turkey, and is resistant to ***Fusarium*** but susceptible to ***Verticillium***. That is why ***Verticillium*** was found abundant on these varieties.

Varieties of ***Gossypium hirsutum*** cultivated in Russia, Iran, Pakistan and U.S.A.. has been reported to be susceptible to ***Verticillium*** causing wilt disease (Dickson 1956, Chester 1950, Kamal and Naim 1969).

Two species of ***Verticillium*** cause wilt disease of cotton: (i) ***V. dahliae*** Kleb. (ii) ***V. albo-atrum*** Reinke and Bert. In America both these species of ***Verticillium*** are found while in Asia only ***V. dahliae*** is common in occurrence. In reality, in the Ege region ***V. albo-atrum*** is prevalent on vegetables. In our opinion. Coker 100-A-2 variety of ***Gossypium hirsutum*** is resistant to ***V. albo-atrum*** since the latter cannot stand higher temperature. Investigations carried out by Halisky, Garber and Schnathorst (1959) showed that ***V. albo-atrum*** can grow well at 21-24.C but if the temperature exceeded above 30°C growth stopped. Table 3 shows the temperature of soils in the Ege region of Turkey.

TABLE 3. Average temperature of soil recorded in the years 1929-1965.

Provinces	Months	Average soil temperature C°	
		5 cms deep	15 cms deep
Aydın	June	30,6	30.2
	July	34.3	33.5
	August	33.1	32.5
İzmir	June	30,2	29.1
	July	33.2	32.2
	August	32.7	32.0
Manisa	June	31.2	29.8
	July	34.7	33.3
	August	33.7	33.0

Table 3 shows that the temperature of soil is unsuitable for *V. albo-atrum*.

It is interesting to note the spread of wilt disease of cotton plants in the Ege region of Turkey The severely infected cotton growing province was Aydın (38.64%) next came Manisa (34-01%) and Izmir (21.68%) Soil structure and irrigation are the most important factors for the severity of infection. In the valley of "Büyük Menderes" in Aydın. Fields formed by alluvial soil irrigated by river water had maximum infection. Similar condition prevailed in Manisa, where the fields in the Gediz planes formed by alluvial soil were irrigated by the river Gediz. In the Izmir province the maximum infection was at Menemen (31.17%) which is established on a delta (Map 1)

As shown in the table 1 the percentage incidence of disease was comparatively less on some unirriga ted cultivated places like Söke (22. 65%), Selçuk (16.64%) Bayındır (13. 98%) and Turgutlu (22,36%). This evidence supports the view that the damage caused by *V. dahliae*, was enhanced by irrigation. As a matter of fact, first symptoms of wilt disease were noticed in the middle of july following first irrigation.

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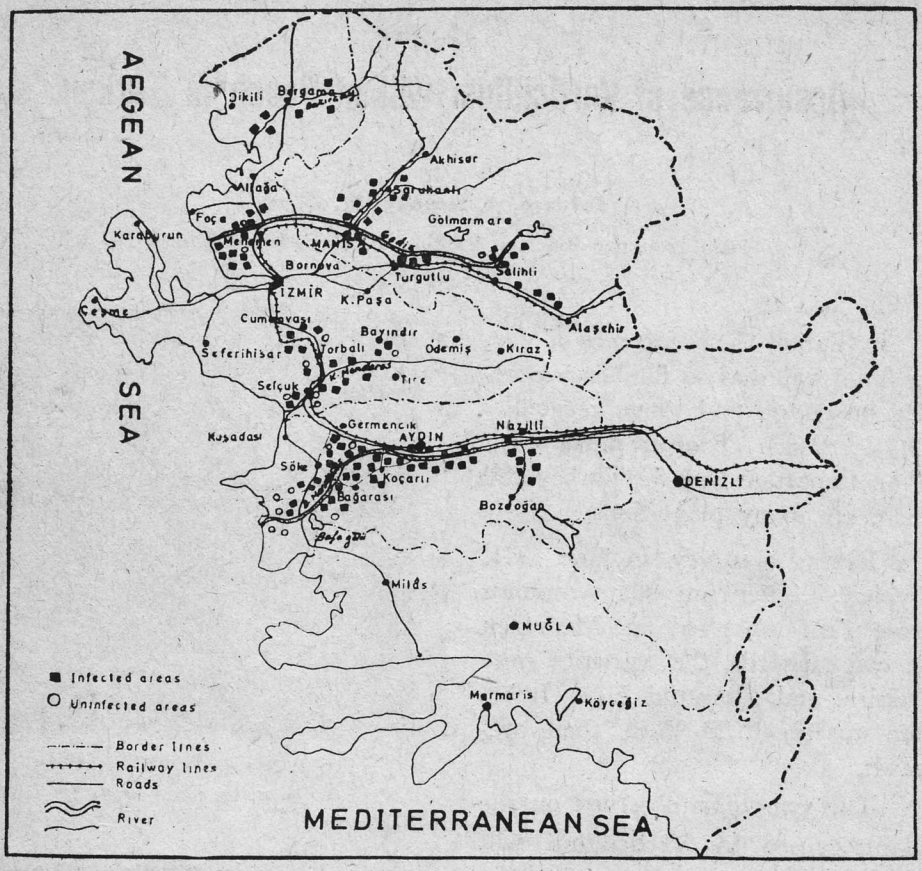

Map showing infected and uninfected areas in the Ege region.

J. Turkish Phytopath Vol: I. Num. : 1 — 1971

Occurrence of Verticillium wilt of Peach in Turkey

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In Turkey the occurrence of Verticillium wilt has so far been recorded on cotton and some vegetables (2,3,4). Peach (*Prunus persica* L.) is an important fruit for Turkey and there are many plantations.

During a survey in june 1971. Typical Verticillium wilt symptoms were first observed in Menemen at two orchards, the varieties were Diksiret and Morettini 5.14. Infection was about 20 % in these orchards.

The symptoms observed on the plants caused by Verticillium wilt were essentially the same as those described by the other workes (1,5). Symptoms were defolation of shoots at the end of june, and twigs of the affected trees had distinct vascular browning (Fig 1). The degree of browning varied according to the severity of disease.

Isolations were done from shoot pieces showing vascular browning on 0 8 % water agar medium. The bark of the diseased shoots was peeled off and surface sterilized with absulate alcohol, later, the shoots were cut into small pieces with a sterilized knife, The pieces were placed in sterile petri dishes and water agar at a temparature of 40°C was poured on them. The dishes

Fig. 1. Symptoms of Verticillium wilt on peach tree.

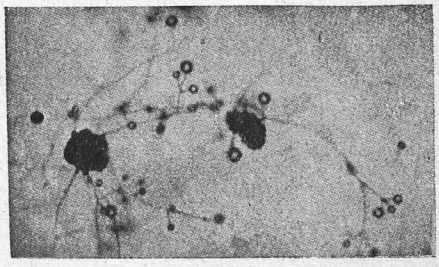

Fig. 2. Sclerotia and verticils of the pathogen (Apprex. × 150)

were incubated at 22°C for a week. The resulting fungus was determined to be *Verticillium dahliae* Kleb. (Fig. 2)

Therefore this costitute is the first report on Verticillium wilt of Peach in Turkey. The studies are expandet on the other varieties of peach in order to establish a method of control and found the resistant varieties.

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J. Turkish Phytopath. Vol.: I. Num. : 1 — 1971

The Percentage Loss In Tobacco Seed-Beds And The Distribution Of Some Fungal Genera Inciting Damping-Off Disease In Ege Region

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SUMMARY

During the years 1968, 1969 investigations were carried-out for determining the percentage loss and the prevalence of some fungal genera causing tobacco damping-off in Ege Region of Turkey. In the three largest tobacco seed-bed areas, İzmir, Manisa and Muğla, the average loss due to damping-off was estimated to be 4,02% of total seed-bed areas. In terms of money there was a loss of 2.470.539.- TL.

The following genera of fungi were isolated from the diseased tobacco seedlings obtained from the surveyed areas: *Fusarium*, *Pythium*, *Rhizoctonia*, *Alternaria*, *Sclerotinia*, *Botrytis*, *Penicillium*, *Aspergillus*, *Trichoderma*, *Verticillium*, *Thielaviopsis*, *Nigrospora*, *Papularia*, *Chaetomium*, *Pleurage*, *Cladosporium*, *Helminthosporium*, *Stemphylum*, *Colletotrichum* and *Macrophomina*. *Papularia* is a new record for Turkey.

INTRODUCTION

Of all the tobacco-seedling growing regions of Turkey, Ege has the largest area of tobacco seed-beds. Totally 17.013.567 m² of seedbed is sown in this region. The distribution of this total seed-bed area into the tobacco growing provinces shows following ratios: Aydın 7%, Balıkesir 6%, Çanakkale 2%, Denizli 7%, Manisa 31%, Muğla 18%. Three provinces, İzmir, Manisa and Muğla are the most important seedling growing areas among the others (15).

Previously some fungi have been recorded as causal agents of damping off disease prevalent in tobacco seed-beds in Ege Region: *Pythium debaryanum* Hass, *Olpidium*

brassicae (Wor.) Dangeard, *Sclerotinia sclerotiorum* (Lip,) Sacc (8), *Alternaria solani* (Ell-Mart J-G (II). Since it had been also isolated from healthy tobacco seedling (8) *O brassicae* should not be considered as primary causal agent of seedling damping-off.

In the present paper, the results of field survey carried-out in the years 1968-1969 in Izmir, Manisa and Muğsa, and also the genera of fungal isolates obtained from the diseased seedlings, collected from the surveyed areas are given.

Since there is no control measure applied by the growers, the damping-off disease is being increased by the time.

MATERIALS and METHODS

The diseased tobacco seedlings were obtained from 200 different seed-beds distributed at random in Izmir, Manisa, Muğla and were used for isolations.

Mostly two cultivars of *Nicoiiana tabacum* are cultuvated in this region: Ege-64 and Karabağlar.

The whole area under survey was visited twice, once in 1968 and later once in 1969. During these visits the tobacco seedlings were 40-45 days old.

In each seed-bed damaged area of the total seed-bed was measured and the percentage loss due to damping-oft was estimated.

Ten diseased seedling were obtained for isolations from each seedbed. They were washed in tap water, surface sterilized with 0.5% Sodium hypochloride, again rinsed with distilled water and plated on potato-dextrose-agar (PDA) medium in petri dishes. The diseased portions of five seedling were plated in each petri dish.

Results and Discussion

The percentage loss is estimated from the field survey in the years 1968, 1969 is shown in Table I.

Table I. The % age loss in Tobacco Seed-Bed Areas due to Damping-Off Disease

Place	Loss (%)	
	1968	1969
İzmir	2,78	1,76
Bergama	8,10	2,54
Çeşme	1,82	2,31
Kınık	7,93	4,36
Menemen	5.61	6,99
Ödemiş	2,95	2,85
Tire	1,72	4,47
Torbalı	4,96	4,36
Urla	3,19	1,32
Manisa	7,06	2,88
Akhisar	5,71	5,73
Salihli	5,29	6,94
Saruhanlı	2,55	3,12
Turgutlu	5,36	4,02
Muğla	2,17	2,61
Fethiye	2,11	4-01
Milâs	0,77	2,82
Ula	5,67	5,41
Yatağan	0,63	3,27

As an average value of the two years the percentage loss for the most important tobacco growing area is 4,02 %. According to the Table I, there is a variation between the years for the same places. Comparing with 1968, the percentage loss in İzmir and Manisa decreased in 1969 while in Muğla it was showing an increase. This may be attributed to the changing of climatical conditions in 1968 and 1969. Indeed, there was a considerable decreasing in the mean values of soil temparature and the amount of rainfall in İzmir and Manisa. Contrarily, in Muğla, in the first year, 127,3 mm of mean value of rainfall reached to 179,1 mm in 1969. The close relation between the excess humidity and the severity of damping- off has always been reported (3, 6, 10, 20, 21).

If the loss is expressed in money, it shows the value of 2.470.539.- TL. as an average for the two years.

The distribution of the lsolates obtained from the collected diseased tobacco seedlings is shown in Table 2.

A total of twenty genera of fungi and in addition some moulds belonging to fhe order Mucorales such as ***Mucor***, ***Rhizopus*** and ***Absidia*** were isolated from the diseased tobacco seedlings. Out of the total fungi isolated some genera are known to be parasitic on tobacco seedlings. These are ***Fusarium Pythium***, ***Rhizoctonia***, ***Alternaria***, and ***Thielaviopsis*** (1,2,4,7,9,10,12, 13,14,16,17,18,19,21). The others are not primary causal organisms for tobacco damping-off disease. Among the different genera isolated ***Papularia*** is reported for the first time from Turkey. It has dark coloured, 1-celled, ovoid, and often lenticular in side view condidia.

Among the isolates of the two years, fifteen fungal genera excluding Pythium, Rhizoctonia, Alternaria, and Sclerotinia are being reported for the first time from tobacco seed-beds in Turkey.

Table 2. The Genera of Fungi Isolated from the Diseased Tobacco Seedlings Obtanined from the three Provinces in the years 1968, 1969.

The Fungal Genera	Places and % age of Isolates					
	İzmir		Manisa		Muğla	
	1968	1969	1968	1969	1968	1969
Fusarium*	41,90	36,33	32,55	39,73	39,32	42,76
Pythium	15,55	18,31	10,18	25,00	9,35	16,92
Rhizoctonia	5.65	13,87	13,18	13,43	4,31	11,80
Alternaria	9.64	7,15	6.34	4,46	5,51	6,45
Sclerotinia	2,57	5.43	0	0	4,79	5,12
Botrytis*	1,28	0	0,50	0,18	2,39	0,89
Penicillium*	2'57	9,29	10,35	7,27	1,91	5,79
Aspergillus*	0	1,28	4.50	1,49	0	0,66
Trichoderma*	0	0,57	1,83	1,11	0	0,89
Verticillium*	0	0,14	1,00	0	5,03	0
Thielaviopsis*	0,89	0	0	0	0,47	0
Nigrospora*	0,25	0	0	0	0	0
Papularia**	0,25	0	0	0	0	0
Chaetomium*	0,64	0,14	0,33	0	0	0
Pleurage*	0	0'14	0,33	0,18	0	0
Cladosporium*	0	0	0	0,37	0	0
Helminthosporium*	0	0	1,00	0,18	0	0
Stemphylum*	1,79	0	2,50	0	1,20	0
Colletotrichum*	1,64	0	0	0	0	0,22
Macrophomina*	0	0	0	0	0	0,89
Moulds	16,32	7,29	16,36	6,34	25,65	7,57

* Firs report from tobacco seed-beds in Turkey

** First report for Turkey

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Suppression of Fusarium Solani Wilt by the Addition of Cellulose to the Soil *

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ABSTRACT

Fusarium solani (Mart.) Appel and Wollen., was found to be the cause of wilt to the seedlings of ***Eucalyptus cammaldulensis*** Dehnh. The pathogen attacked roots only in the presence of N available in the soil. Addition of cellulose to the soil suppressed the attack of pathogen. The seedlings did not wilt in the presence of high C:N ratios. Presence of excess N nullifies the beneficial action of rhizosphere microorganisms.

INTRODUCTION

It was observed in the Forest nursery of Pakistan Forest Research Institute, Peshawer that many seedlings of ***E. cammaldulensis*** Dehn., died due to wilt. ***Fusarium solani*** was isolated from the wilted seedlings. The rhizosphere mycoflora of the wilted seedlings was also studied. It was found that in the rhizosphere ***F. solani*** was present in a very high frequency in addition to fungi like ***Emericella nidulans*** (st. conid. ***Aspergillus nidulans***), ***E. rugulosus*** st. conid. ***Aspergillus rugulosus***), ***Aspergillus niveus***, ***A. niger***, ***A. terreus***, ***Neocosmospora vasinfecta***, ***Thielavia sapedonium***, ***and Chaetomium*** spp.

Addition of excess of nitrogen fertilizer to the soil had promoted the development of fungi and this view is supported by several workers (2,4,8,13.14). These soil microorganisms in the rhizosphere, in turn, exert profound changes and may lead to the death of plant body (15). Montegut (6) studied the fungal population in the soil and found that it increases by mineral fertilizers. Williams (9) found that nitrogen fertilization had a remarkable effect on soil fungus population and total number of fun-

* Investigations carried out in the department of Botany, Pakistan Forest Research Institute, Peshawar, W. Pakistan.

gi increased in both laboratory and field soils. Soil organisms also respond and increase by phosphorus fertilization (5). Since phosphorus is essential for fungus growth and the effect of phosphorus deficiency on soil fungi has been observed in certain soils where decomposition was low (3).

MATERIALS and METHODS

Fusarium solani was isolated from the roots of wilted seedlings of ***E. cammaldulensis*** taken from the Forest nursery of Pak-Forest Institute, Peshawar. The roots were surface sterilized with 0.05 % mercuric chloride and plated on Czapek dox agar medium. Mycelium was found in the hand made longitudinal and transverse sections of wiltedroots. The sections of healthy roots did not show any mycelium.

Soil plate method (16) and soil dilution method (12) were used for studying rhizosphere mycoflora. In the soil plate method the soil was mechanically scraped (11) from the immediate root surface of the wilted seedlings after shaking off the superfluous soil. Molten, but cooled, Czapek dox agar was added to this soil and the whole dish rotated to form a thin coating. In the soil dilution method the roots were agitated in 500 ml flask with sterilized distilled water untill all the soil had been washed off. The weight of the soil was known to make a suspension of 1:500. From this soil suspension 1 ml was pipetted out and poured on solidified Czapek dox agar dishes and incubated at 20-25C,

RESULTS

The wilted seedlings were dark yellow in color. The symptoms were drooping of the foliage leaves by general yellowing and afterwards drooping of all foliage. The roots were dark brown with black streaks possibily representing discoloration of vascular tissues.

Septate, hyaline and profusely branched myelium of ***Fusarium solani*** was found in the longitudinal and transverse sections of the wilted roots. Mycelium could only be seen in the xylem vessels. Vascular bundles were intact.

Seedlings of ***E. cammaldulensis*** in experimental pots infested with ***F. solani*** and supplied with an excess amount of a nitrogen fertilizer showed an immediate appearence of wilt symptoms. On the contrary, pots infected with ***F. solani*** and supplied with cellulose: nitrogen fertilizer did not cause wilt to the seedlings. Possibily N favours successful penetration of ***F. solani***(7). Cellulose with a nitrogen fertilizer establishes a C:N ratios.

Populations of ***F. solani*** in the rhziosphere was very high and it was determined by counting the number of colonies obtained in Czapek dox agar medium by soil plate or soil dilution methods. The rhizosphere mycoflora of the wilted seedlings consisted of the following fungi:

TABLE 1. Rhizosphere mycoflora of the wilted seedlings of *E. camml-dulensis*

Acrophialophora levis Samson and Tariq Mahmood
Alternaria alternata (Fr.) Keisoles
Arachniotus dankaliensis (Cast.) van Beyma
Aspergillus niveus Blochwitz
A. niger van Tieghum
A. fumigatus Fres.
A. terreus Thom
A. phoenicis (Cda.) Thom
A. flavus var. *columnarius* Link
Chaetomium of *jodhpurense* Lodha
C. flavum Omvik
Emericella nidulans (Eidams) Vuill (st. conid. *A. nidulans* (Eidams) Wint.).
E. rugulosus (Thom and Raper) C.R. Benjamin (st. conid. *A. rugulosus* Thom and Raper).
Fusarium solani (Mart.) Appel) and Wollenw
Neocosmospora vasinfecta E. F. Smith
Rhizopus arrhizus Fischer
Thielavia sapenoium Emmons
T. terricola var. *minor* Zopf

DISCUSSION

The pathogenicity of *Fusarium solani* (Mart.) Appel and Wollonw., to the seedlings of *E. cammaldulensis* Dehnh solely depends upon the presence of excess N available in the soil. This is supported by the work of Baker (1) who found that bean root rot organism *Fusarium solani* (Mart.) Appel and Wr., f. sp. *phaseoli* (Buk.) Snyd and Hans., may be suppressed by amendments in carbon: nitrogen ratios. Addition of nitrogen nullifies the beneficial action of rhizosphere microorganisms antagonistic to *F. solani* (10). Our view point is also supported by the work of Papavizas (10) who concluded that high application and available N in the soil was detrimental to rhizosphere microorganisms antagonistic to *F. solani* f. sp. *phaseoli* and an increased antagonism was however noted in bean rhizosphere when oat straw with high C:N ratio was added to the soil. The rhizosphere mycoflora showed a high frequency of *F. solani* determined by counting the number of colonies which showed that *F. solani* richly grows in the rhizosphere of wilted seedlings.

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J Turkish Phytopath Vol,: I, Num : 1 — 1971

Essais de Lutte Avec Differents Fongicides Systemiques

Contre la Cercosporiose de la Betterave à sucre en Turquie en 1970.

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Généralités.

En Turquie dans les régions des Sucreries d'Adapazarı et de Susurluk la Cercosporiose de la betterave à sucre provoque de grands dommages sur une surface annuelle de 25.000 hectares. carte. 1.

Le climat de ces régions est favorable au développement de cette maladie. Selon l'echelle de Kleinwanzleben, le degré de la Cercosporiose en Turquie est 5.A la mi-août, toutes les feuilles sont completement detruites et en septembre, avec les nouvelles pluies, les betteraves repousent et leur polarisation diminiue.

Le tableau I donne les conditions climatiques de la région d'Adapazarı. L'humidité relative et la température sont telles qu'elles favorisent le développement de la maladie et la repouse des betteraves.

Tab. I. Conditions climatique dans la région d'Adapazarı

	Mois										
	Janv.	Févr.	Mars	Avr.	Mai.	Juin	Juil.	Août	Sept.	Octob.	Novem.
Températ. moy. en °C	5,8	6.3	8.1	12.5	16.8	20.9	22.8	22.7	18.7	14.2	11,8
Pluie moy, en mm.	90	80	76	59	47	58	49	36	61	69	75
Humidité rel. %	78	77	76	72	69	70	69	69	75	76	74

Nous avons fait des essais sur différents sujets pour evaluer les dommages causés par cette maladie et etudier les possibilités de lutte. Ces essais ont donné les résultas suivants:

a) Dommage causés par la Cercosporiose sur diffèrentes variétés.

En Turquie on emploie les semences de betterave à sucre de la société turco-allemande Kleinwanzleben. C'est pourquoi nous donnons seulment les résultats obtenues avec ces variétés. Tab. II.

On voie que la resistance à cette maladie n'est pas suffisante. (colone non traitées). Dans ces conditions il faut semer la variété CRY resistant et il faut traiter.

Tab. II. Moyennes des resultats des essais sur différentes Variétés traités et non Traités 3 fois avec bouil. Bordelaise

	teneur % en sucre		poids d'une racine gr		poids de sucre d'une racine gr.	
Variétés	traité	non traité	traité	non traité	traité	non traité
Kleinw.E	16.1	14.4	800	750	129	108
Y	16.7	15.2	820	730	137	111
CRY	17.1	16.1	750	660	128	106

b) Nombre de traitements.

Les conditions climatiques de ces régions sont trés favorables à la cercosporiose de fin Juin à mi-septembre. Dans ces conditions combien faut-il appliquer de traitements

Avec les produits cuprique et etainique nous avons fait des essais avec 2-5 traitemens s'echelonnant du I er Juillet à mi-septembre. Les 4 me et 5 me traitements ne sont pas economique ni pratique étant donné que ces sucreries commencent la campagne le 15-20 Août, il faut donc appliquer 2-3 traitements.

Le tab. III. donne les resultats d'une essais sur le nombre de traitement realisé en 1960 sur les variétés E,Y et CR (CR est une variété resistant et diploide, depuis 5 ans cette variété est ramplacé par CRY, resistant et polyploide)

Tab. III. Nombre de traitements contre la cercosporiose en Turquie (Avec bouil. bordelaise).

Nombre de traitement	teneur en sucre % des variété Kleinw.		
	E	Y	CR
0	13.5	14.3	14.8
2	15.3	16.1	16.6
3	15.8	16.7	17.3

Depuis 1960 on fait le traitement de la cercosporoise sur 25.000 hectares avec les produit etain. On applique 3 traitement de I re semaine de Juillet fin d'août

En 1970, nous avons fait des essais avec quelques nouvels fongicides systemiques. Les noms et leurs dosages sont ci-dessous :

1. Controle sans traitement.
2. Brestan conc. (54 % etain acetat) . . . . . 600 gr/hec. avec I ton d'eau.
3. Hoechts 2872 (45 % » chloride) . . . . . 600 » » » »
4. Benlate (50 % butylcarbamoyl) . . . . . 400 » » » »
5. Du-Ter fort (60 % etain hydroxide) . . . 600 » » » »
6. Enovit super (70 % thiophanat Methyl) . 400 » » » »

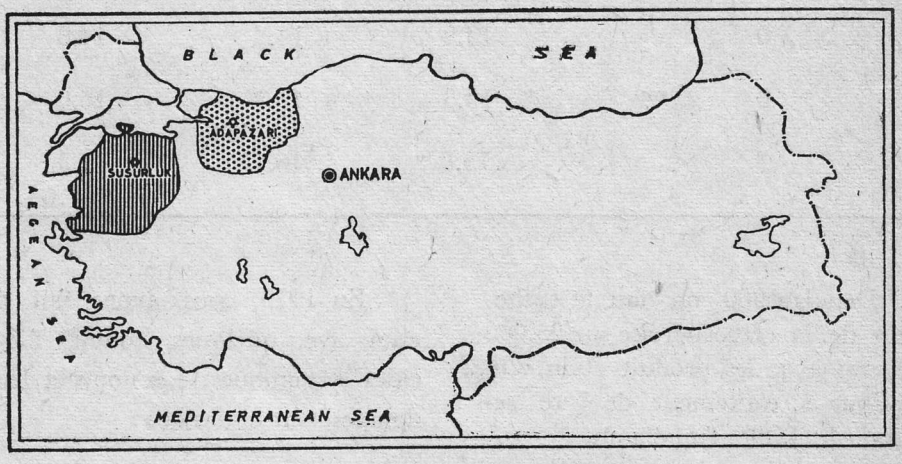
La resultat de cet essai on a donné dans la tab. IV.

Tab. IV. la resultat d'essai avec different fongicide en 1970 en Turquie

Traitements	Betterave à sucre ton/h	Polarisation	Sucre kg/h
Controle	68,040	15,39	10470
Brestan conc.	71,360	16,04	11450
Hoechst. 2872	70,420	16,06	11310
Benlate	69,340	17,14	11890
Du - Ter fort	72,140	16,15	11650
Enovit super	72,320	17,16	12410
$Lsd_{0.5}$		0,44	

Nous voyos que les nouvels fongicides, BENLATE et ENOVITE ont donnés trés bons resultats que les fongicides enciens.

En 1971 nous faisons un grand applications sur 1000 hectares avec ces nouvels fongicides systemiques.



Cartc. I - Région favorable au développement de la cercosporiose.

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Investigations On the Identification of Plant Virus Diseases By Serological and Precipitation Tests In western Turkey

M. ORHAN ÖZALP *

I — SUMMARY

The studies were carried out for identification of some virus diseases in Western Turkey (Ege region) by means of antiserums during the years of 1962-1971. Serological and precipitation tests were applied with this purpose.

As a result of these studies the following virus diseases were established for the region of Ege:

Potato virus Y, Potato virus X, Potato virus A, Potato virus S, potato virus M, Tobacco mosaic virus, Tabacco necrosis virus, Sugar beet yellow virus, Onion mosaic virus, Onion mosaic virus, Tomato mosaic virus, Pepper mosaic virus and Phaseolus mosaic virus-2

II — INTRODUCTION

The plant virus diseases are caused great losses of crop. there-fore, they have been the most important problems of world Agriculture. As a matter of fact' only Tristeza was killed more than 20 Millions sweet orange trees in America. Also, in United States various virus diseases were caused the following per. centages of crop losses (7): on grapevine 18,5 %, on potato 30 %, on sugar beet 37,5 %, on cherry 45%, onpear 72%. In Mexico. Hoja blanca virus caused 75% crop-loss on rice (7) and plum pox (Sharka disease) was destroyed 16 millions of plum trees in Bulgaria and Yugoslavia (3).

The problem is also big and worrying for our country, for example Stubborn virus disease has been found as 80% on sweet oranges and this proportion is reached at 100% in some orchards in Mediterranean area (6).

According to the results of a survey and the project sudies it has been found that 60% of citrus trees, 80% of some vineyards, 100% of fig trees, 80 % of some potato fields, 90% of tomato plants and 100%

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of pepper plants were infected by various virus diseases in Ege region (10,11,12).

There is no direct control methods against the plant virus diseases by the use of chemicals, so the importance of the problem has been increased. At present, indirect control methods are applied againts the virus disease such as controlling the vectors of viruses. Recently, more attention has been paid to virus diseases and investigations has enlighten some of the most important points. In addition, some of the causal agents of plant diseases which were thought as viruses previously, it has been now confirmed that they are not viruses, but are mycoplasms for example potato stolbur and some fruit viruses (4).

The investigations on the plant virus diseases in Ege region has began with the studies on potato project in 1960. Afterwards, the following test and methods have been applied for the identification of various virus diseases:

I — Mechanical test (Saplnoculation test)

II — Serological test

III — Precipitation test

IV — Tuber-grafting test

V — Leaf test

VI — Stem grafting test

VII — Agar-gel diffusion test

VIII — Double indexing method on grapevines

IX — Indexing methods on the fruit trees:

A — Direct indexing method

B — Indirect indexing method

X — Statining test

Quite a long time has been spend for the identification of virus diseases in Ege Region by applying the above methods (10,11.12). There fore, studies have been concentrated for the identification of viruses in a short time (i.e.3-5 hours). We brought some serums and antiserums from the Netherlands and we made serological tests. Studies were continued from 1962 to 1971.

IV — MATERIAL and METHOT

1 — Serum and antiserum materials

Serums and antiserums have been brought from the Netherlands and they have been used for the diagnosis of the following viruses:

Patato	virus	Y	antiserum	and	normal	serum
,,	,,	X	,,	,,	,,	,,
,,	,,	A	,,	,,	,,	,,
,,	,,	S	,,	,,	,,	,,
,,	,,	M	,,	,,	,,	,,
Tobacco mossic virus			,,	,,	,,	,,
,,	necrosis	,,	,,	,,	,,	,,
Sugar beet yellows		,,	,,	,,	,,	,,
Onion mosaic		,,	,,	,,	,,	,,
Tomato	,,	,,	,,	,,	,,	,,
Pepper	,,	,,	,,	,,	,,	,,
Phaseolus virus - 2				,,	,,	,,

2— Centrifuge ond Sterilisator

Centrifuge was German made «Üniversal II», 5000 rpm, 8 tubes and 220 V.

Sterilizator was also German made «Heraus» and was operated between 20°C- 200°C-, 2'0 V,

3 — Plant metarials for serological and precipitation tests

Serogical and precipitation tests have been made on infected potato plants from Bornova and Ödemiş districts in Izmir province, on infected tobacco plants from Akhisar district in Manisa, province. on infected sugarbeet plants from central district in Uşak province, on infected onion plants from central district in Denizli province, on infected tomato plants from İzmir, Manisa, Aydın, Denizli, Muğla, Çanakkale, Balıkesir and Uşak provinces, on infected pepper plants and bean plants from Izmir province.

B — METHOD

1 — Methods of Sampling in Field

First, the fields have been selected that they were showing the typical virus symptoms, then the best samples have been collected. Usually mature leaves were selected as samples from three different plants and placed in polyethylen bags. Possible care was taken to Prevent mechanical infections during the sampling.

2 — Laboratory Methods:

a — Serological test:

The hands have been washed for cleanliness and all the glass ware and other tools were sterilised at 120°C for 2 hours. One petri-dish was used for 6 samples only.

One gr of «Movital F-40» mixed with 100 cm^3 Chloroform. This mixture was poured into each petri-dish at abcut 0,5-1 cm level and waited for 5-10 minutes to form a hydrophobic layer. Then excess chloroform and «Movital F-40» mixture poured back into a bottle in order to use for another time. 3x8 cm cardboards were devided into 1x1 cm squares and put under the petri dishes (9).

The infected sap from the samples was obtained by macerating plant material. Each serum and antiserum was dissolved in 2 cm^3 of 0,9% NaCl then put a drop in each square in the petri-dishes. The drops of the same antiserum were placed in the squares of a column from the top to the bottom using the same pippette.

The normal serum was placed in the squares of the last colunumn in the same manner. Then the sap from infected material mixed with antiserums dropwise from left to right, i.e from the first antiserum to the normal serum. Thus, each sample was mixed with each antiserum. Then some paraffin-oil was poured over the petri-dishes gently to prevent the evaporation. The covers of petri-dishes have been clo-

sed and left for at least 3-5 hours. At the end of the given time petri-dishes were examined under the stereomicroscope.

The droplets that showed agglutination have the positive reoction that is to say that the sample has the virus of that special antiserum. Also, it has been compared the normal serum of the same row. If the normal serum also showed positive reaction the test was repated. Positive agglutination appears like pieces of sponge or moss in dark colour. If the droplet in petri-dish has not positive agglutination reaction and looked like normal serum, it is accepted as negative reaction.

b — Pecipitation tests

Precipitation tests have been applied together with the serological tests in order to check the results. Precipitation method gave some what better results, because the sap was centrifuged and thus some of the carbonhydrates were separated.

Petri-dishes, hyrophobic layers, serums and antiserums have been prepared by the same methods as described before. The infected sap was obtained by macerating the plant material then the sap was mixed with 0.9% NaCl in the proportion of 1:1 and shaken to mix well then centrifuged at 4000 rpm. for 4 minutes.

At the end of the given time the supernatant was pippetted out and 2 cm^3 of this sap was put in the test tubes that were containing 2 cm^3 of 0,9% NaCl. Then the same operation was carried out as in serological test. Afterwads the petri-dishes were kept at 87°C in an incubator for two hours and examined under the microscope to see the positive (+) and negative (—) reactions. These results were compared with the normal serum, in order to identify the virus.

V — RESULTS

A — Table 1 shows the virus diseases that confirmed by tests and their host plants.

B — Distribition of Virus Diseases in Ege Region.

Virus diseases, their hosts and place shown in Table 1 were also observed other parts of Western Turkey, in the other words these viruses were wide-spread in Ege Region specially pepper, tomato and potato virus diseases. Sugar-beet yellows and bean viruses were more localised and onion mosaic virus was found only in Denizli province.

IV — DISCUSSION

Serological and precipitation tests were carried out in order to establish the virus diseases of certain plants in Western Turkey (1,9).

According to these investigations virus diseases were wide-spread on pepper, tomato and potato crop especially. The observations showed that pepper virus diseases were 100 % in some vegetable gardens. The virus which caused the mosaic di-

sease on tomato and pepper plants was tobacco masaic virus (Nicotiana virus-1). Thus, it was established that the most important virus disease iu Western Turkey was tobacco mosaic virus (10).

İn Ege region potato virus disease were also important. Potato virus-X and potato virus-Y were most widespread, Potato virus-A Potato virus-S and Potato virus-M were also found on some potato plants (12).

«Virus free potato seed breeding centre» is established on high plateau of Ödemiş in İzmir province. This centre will distribute virus free potato seeds to the farmers and it is hoped that potato virus diseases will be reduced in Western Turkey.

Although, sugar-beet, bean and onion virus diseases are localised; neverheless Ege Region is a policulture area and there are many other virus other hots plants too (10, 11, 12).

Serological and precipitation test are not enough for the identifaction of virus diseases; mechanical and other test should also be applied.

TABLE I

Virus diseases that confirmed by serological and precipitation tests.

Name of virus disease	Test methods	Host plant	Place
Potato virus-Y	Serology and precipitation	Potatoes	İzmir (Ödemiş,) Bornova, Menemen
Potato virus-X	» »	»	» » »
Potato virus-A	» »	»	» » »
Potato virus-S	» »	»	» » »
Potato virus-M	» »	»	» » »
Tobacco mosaic virus	Serology	Tobacco	İzmir (Bornova, Menemen, Manisa (Akhisar)
Tobacco necrosis virus	»	»	Manisa (Akhisar)
Sugar beet yellows virus	»	Sugarbeet	Uşak
Onion mosaic virus	»	Onion	Denizli
Tomato mosaic virus	»	Tomato	İzmir, Manisa, Aydın, Çanakkale
Pepper mosaic virus	»	Pepper	İzmir, Manisa (Salihli)
Phaseolus virus-2	»	Bean	İzmir

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