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Studies on the Survey and Biology of Mal Secco Disease (Phoma tracheiphila (Petri) Kanciaveli et Ghikascvili) of lemon Trees

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ABSTRACT

Studies were conducted in three parts i.e. surveys, greenhouse experiments and field experiments. The incidence, severity, prevalence and annual loss caused by the disease was confirmed by surveys in the İçel province. The varieties, growing in the province may be arranged according to the degree of resistance as Kıbrıs, Yediveren, Interdonato, İtalyan Memeli (Demre Dikensiz), Lâmas and Kütdiken. The annual loss was found 12,3 % Kg per tree. The rate of disease has been found directly proportional with the plant age.

The infection has occured more often in Autumn (October, November) than Spring and Winter. No infection has occurred during the Summer. The time of nitrogen fertilizing and the time of prunning have important roles on the infection and disease development. The disease symptoms which appeared on 6 months old seedlings (resistance and susceptible) with culture filtrates application have been the same as with natural symptoms. Artificial inoculations were made on 20 lemon varieties (five years old) to detect the reactions to **Phoma tracheiphila** in Antalya. The local Turkish varieties namely Finike Yuvarlak and Molla Memed were most resistant whereas, Antalya Yuvarlak, Kıbrıs and Interdonato were at the second degree in resistance. Other local varieties and Eureka, Lisbon clones were found susceptible.

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The penetration tests and experiments were conducted in the greenhouse and under natural conditions on the ten-month old seedlings and the six-year old trees respectively to find out if they are resistant or susceptible.

INTRODUCTION

The Mal secco disease has been known since 1894 in the World and in Turkey since 1929. In Italy during the years of 1931-1951 lemon production had been decreased by 50 % due to this disease (Burke, 1951). In Turkey, in the years of 1949 - 1950 the disease was spread seriously and it was controlled only by forced Government protection measures.

The fungus, which is the causal agent of Mal secco disease was described as **Deuterophoma tracheiphila** Petri. After this discovery, researches related to Mal secco disease were accelerated in Italy and in other countries; but some aspects about the biology of the disease has not explored yet. Some Researchers had revealed that there were some varieties resistant to Mal secco, and on the other hand some classic and systemic fungicides had been proved effective against Mal secco, but have not provided any satisfactory prevention measure yet.

The lemon growing has started to develop after 1930 in Turkey, but the threat of the disease has not been taken away from the lemon producing areas. Since that time in Turkey there has not any sophisticated research study about the biology and damage of the disease until this time. Therefore the objective of this research is to determine some data releated to the biology and damage of disease. The studies were conducted during 1973-1976 in İçel, İzmir and Antalya.

MATERIALS AND METHODS

The surveys were conducted on Kütdiken, Lâmas, İtalyan Memeli, Kıbrıs, Yediveren and Interdonato varieties, which are grown economicaly in the Province of İçel. Two hundered orchards, situated in 24 villages-representing different areas of the province, were selected and ten representative plants were sampled from each orchard.

These 2000 trees had been rated four times according to 0-5 scale, in September 1973, December 1973, April 1974 and July 1974. The disease rates were calculated according to Towsend - Heuberger formula and crop loss were calculated according to Bora and Karaca (1970).

The fungus which was used in artificial inoculations was isolated from Mezitli Village in July-1974 surveying. The fungus had been grown on solid sugarless carrot-agar at 19 C° in dark chamber. The inoculations were made through lenticel (on stem), stoma (on Leaf), petiole, pedicel and wound (on stem) (fig. 1),

The culture of fungus have been fastened with wet cotton and nylon cloth to the localitions mentioned above (Figure 2).

For the filtrate application the fungus was grown on Scrivani's (1954) liquid medium at 20°C for 32 days. The filtrate was diluted with sterile distile water at equal rates, and then applied on three-month old seedlings. The observations were made 2,4,6,12,24 and 48 hours after applications.

RESULTS

A. Survey studies

The number of diseased trees and disease incidence in relation to survey times scale values are graphically represented in the Figure 3.

The diseases rates which were determined at different periods in İçel are given in table 1 and 2.

Table 1 The disease rates of different varieties (%)[1]

Variety	September- 1973			December- 1973			April- 1974			July- 1974		
	DS.	DI.	DP.	DS.	DI.	DP.	DS.	DI.	DP.	DS.	DI.	DP.
Kütdiken	7,5	18,6	44,2	13,9	27,7	50,9	19,6	30,8	48,3	26,9	36,9	58,1
Lâmas	9,2	18,4	46,1	13,6	25,7	46,1	18,1	27,2	46,1	20,7	27,6	51,4
Interdona.	0,3	2,1	6,0	3,7	11,3	21,2	6,6	11,8	27,3	10,1	16,1	30,3
İ. Memeli	1,7	5,6	10,0	4,6	11,5	22,9	8,0	13,9	28,4	11,5	17,9	33,0
Yediveren	1,0	4,1	12,0	3,6	9,3	23,9	4,3	8,2	23,9	6,5	10,1	23,9
Kıbrıs	1,4	4,4	11,4	0,1	0,6	5,6	0,7	1,1	5,6	2,7	5,0	11,1

1) DS. Disease severity, DI. Disease incidence, DP. Disease prevalence.

Table 2. The disease rates, estimated in accordance with the age groups (%)

Age groups	September- 1973			December- 1973			April- 1974			July- 1974		
	DS.	DI.	DP.	DS.	DI.	DP.	DS.	DI.	DP.	DS.	DI.	DP.
1- 5	0,0	0,0	0,0	0,5	1,5	11,8	0,9	1,5	10,2	1,2	6,9	16,9
6-10	3,6	9,0	27,2	6,9	14,7	37,3	10,8	18,2	43,4	16,4	20,9	50,5
11-19	7,7	20,1	54,8	14,1	28,5	60,3	19,2	31,1	61,6	27,0	38,4	61,6
20-40	16,2	35,7	85,7	28,4	23,7	100,0	37,0	60,0	100,0	46,1	65,2	100,0

In Mersin county, especially in Davultepe, Mezitli and Tece villages the disease severity and prevalence are too much spread around (Figure 4 and 5).

The relationship between the disease severity and the crop loss was $y= 20{,}614 - 1{,}378\ X_1 + 8{,}148\ X_2$. In In this equation y= yield of each tree (Kg) X_1= Disease severity (%) X_2= Age of tree (years). This equation was applied for 3 to 20 years old trees. The yearly crop loss calculated by means of that equation for the year of 1973 in İçel, has been 12,3 Kg %. That equals to 12992 tons of lemon fruit or 33 779 200 TL.

It has been seen that prunning and application of nitrogenous fertilizers has an increasing effect on the disease.Especially prunning in March and June, application of nitrogenous fertilizers in February and March had increased the rates of disease.

B. Application of Culture Filtrate

After 48 hours from application, according to the number of the leaves which showed wilting, the following varieties seemed to be resistant; Sour orange, Molla Memed, Interdonato, Antalya Yuvarlak, İtalyan Memeli, Yediveren, Kıbrıs respectively. First 4 varieties have showed significant differences when compared with the Lisbon variety which is very susceptible to the disease (Fig. 6).

Some cuttings were made from diseased seedlings' stem and after 48 hours the similar results were obtained.

C. The Reactions of Varieties Against the pathogen

In this study, results were obtained in two ways:

a) Natural and artificial inoculation and the results were estimated according to the 0-5 scale.

b) The drying of the twigs and spread of the disease due to artificial inoculation, was measured in centimeter.

The results which were obtained in the first year are summarized in table 3.

Table 3. Disease development as a result of natural and artificial inoculations (%).

Variety	Artificial inoculation (1)		Natural inoculation (2)	Appering after Pruning of branches (3)	
	Disease severity	D.incidence	D.incidence	D. Severity	D.incidence
Lâmas	98,18	100,00	100,00	98,19	100,00
Molla Memed	55,00	83,33	0,00	6,66	8,33
D. Dikensiz	83,63	91,66	54,54	20,00	33,33
Finike Yuvar.	43,33	75,00	8,33	5,00	16,66
Antalya »	70,91	83,33	16,66	27,27	33,33
Interdonto	51,66	75,00	8,33	16,66	16,66
Kütdiken	76,66	83,33	66,66	80,00	83,33
Peri	78,33	91,66	58,33	60,00	75,00
Kıbrıs	62,00	83,33	0,00	20,00	33,00
F. Eureka	73,33	83,33	50,00	58,33	58,33
C.F. Eureka	86,66	100,00	75,00	58,33	75,00
C. Eureka	95,00	100,00	75,00	98,33	100,00
F. Lisbon	70,00	75,00	75,00	56,66	58,33
Cas. Eureka	98,00	100,00	75,00	73,33	75,00
C. Lisbon	57,00	88,88	88,88	24,24	44,44
M. Lisbon	75,00	83,33	58,33	45,00	50,00
A. Eureka	85,45	100,00	81,81	85,45	91,66
P. Lisbon	90,00	100,00	100,00	63,33	66,66
Saasli	63,33	75,00	50,00	30,00	33,33
S. Teresa	56,36	66,66	9,09	61,81	66,66

1) Inoculations were made November 18, 1974 and measurements were made on May 28.1975

2) Natural inoculations for 5 years, observation was made on may 28.1975.

3) The diseased branches were prunned in August, 1975 and disease development observed on November 14, 1975 once again.

The average lengths of the dry branches measured on different lemon varieties which were artificially inoculated were given below in order

Lâmas	:	181,77 Cm	Peri	:	138,22 Cm
F.Lisbon	:	172,22 »	Saasli	:	137,88 »
Cas.Eureka	:	164,11 »	D.Dikensiz	:	127,77 »
P.Lisbon	:	162,11 »	Antalya Yuv.	:	120,88 »
C.F.Eureka	:	158,11 »	İnterdonato	:	113,44 »
C.Eureka	:	157,68 »	Molla Memed	:	110,55 »
F.Eureka	:	151,33 »	S. Teresa	:	100,33 »
A.Eureka	:	150,33 »	Kıbrıs	:	94,55 »
Kütdiken	:	149,44 »	Finike Yuv.	:	81,33 »
M.Lisbon	:	145,55 »			

The average infection and disease spread due to artificial inoculation is given in table 4.

Tab. 4. Percentage infection and spread rate of the disease on the varieties

Variety	Infection (1)	Spreading (2)
Lâmas	100,00	66,66
Molla Memed	96,29	22,22
Demre Dikensizi	92,59	40,74
Finike Yuvarlak	85,18	7,40
Antalya Yuvarlak	96,29	18,51
Interdonato	100,00	29,62
Kütdiken	100,00	96,29
Peri	100,00	48,14
Kıbrıs	96,29	33,33
F. Eureka	100,00	81,48
C.F. Eureka	100,00	81,48
Cook Eureka	96,29	92,59
Frost Lisbon	100,00	88,88
Cascade Eureka	96,29	95,83
Monroe Lisbon	100,00	74,07
Allen Eureka	100,00	74,07
Prior Lisbon	100,00	92,59
Saasli	100,00	59,25
Santa Teresa	100,00	33,33

1) The rates are for 27 successful inoculations on branches.

2) The spreading of the fungus on 27 inoculated branches.

All the varieties can be infected by the disease by 95 % by means of wounds but the rate of spreading differs in each variety. (Figure 7 and 8.)

D. The Penetration Studies

The rate penetration of the fungus in the naturally growing plants and in the greenhouse seedlings was as follows:

Seedlings (11 months old)	
Through the wounded root in the soil	40 %
Through the wounded leaf stalk	100 %
Through the uppersurface of the leaves (Stomata)	40 %
Through the undersurface of the leaves (stomata)	20 %
Trees (6 Years old)	
Through the fruit stalk of which fruit was cut off	65 %
Through the undersides of the leaves (susceptible varieties)	65 %

Penetration through the stomata of the leaves on resistant varieties didn't occur in natural conditions.

DISCUSSION

The infection of the disease occurs in October, November, December, January, February, March and April; but there are no infections between May and September. Most infections occur in Fall, because it is harvesting time and the trees are wounded too much. According to Gassner's (1974) opinion, the infections do not accur in the Fall. Whereas according to Stepanov and Şumakova's (1952) investigations, the maximum degree of infection periods are October-November and January-April. During the infection periods, wounding of the trees must be avoided and if there are some wounds the trees must be sprayed with protective chemicals.

The application of nitrogenous fertilizer and prunnig should not be made in February and March, because these applications increase disease development in these months.

Although the disease prevalence is more in old trees, the damage of disease is more in young trees. For this reason young orchards must be protected from the disease better. During the passage of a time old trees relatively become more resistant to the disease than the young trees (Goliadze and Tikanadze, 1969).

There is a positive correlation between disease rates and meteoro-

logical phenomena and this correlation was more prominent in Mersin than in other counties.

On the basis of wilt symptoms of the leaves and occlusion in the trachea it is relatively possible to classify the varieties as resistant and susceptible.

The resistanceness of the varieties is not determined on the basis of the infection but, it is determined in the multiplication of the pathogen in the host tissue. For the reason protective sprays and host cultural measures are very important. The multiplication of fungus in the host tissue was inhibited mostly in the following varieties : Finike, Yuvarlak, Antalya yuvarlak, Molla Memed and Kıbrıs.

Formerly some Italian varieties such as Monachello, Santa Teresa and Interdonato have been reported as resistant (Ruggieri, 1953, 1958; Gas ner, 1944; Donadze, 1969; Chapot, 1974), but the present study revealed that the local varieties are somewhat more resistant than the above mentioned Italian varieties. The fruit qualities of these resistant varieties are also good but cultivation procedures need some more investigations. In the greenhouse seedlings, both the susceptible and resistant varieties could be inoculated both on the lower and upper surfaces of the leaves. Whereas in case of six years old trees, infection only on the lower surface of the leaves in susceptible varieties. These findings may be related in the natural conditions in relation to the age of the trees.

ÖZET

LİMON AĞAÇLARINDA KURUTAN «MAL SECCO» HASTALIĞININ YAYILIŞI ve ETMENİN (**Phoma tracheiphila** «Petri» Kanciaveli et Ghikascvili) BİYOLOJİSİ ÜZERİNDE ÇALIŞMALAR

1973-1976 yıllarında İçel Turunçgil alanları, Antalya Turunçgiller Araştırma İstasyonu ve E.Ü. Ziraat Fakültesi Fitopatoloji ve Zirai Botanik Kürsüsünde yürütülen çalışmalardan elde edilen bulgulara göre;

1— İçel'deki limon bahçelerinin % 50,5 i uçkurutanla bulaşık olup, 1973 yılında hastalıktan ölen ağaç oranı % 1,2 dir; hastalığın 1973 yılı için limonlarda yaptığı zarar ise 33 779 200 TL. dır.

2— İlde yetiştirilen çeşitlerden Kütdiken ve Lâmas hastalığa karşı çok duyarlı, Interdonato, İtalyan Memeli ve Yediveren az dayanıklı, Kıbrıs çeşidi ise dayanıklı olarak bulunmuştur.

3— Çeşitlerde ağaç yaşı arttıkça hastalık oranı da artmaktadır; fakat hastalığın zararı küçük yaşlı ağaçlarda daha şiddetlidir.

4— Hastalık yaralar ve yapraktaki stomalardan bitkiye girmekte

olup, Ekim-Nisan arasında bulaşmakta, Mayıs - Eylül arasında bulaşmamaktadır. Hastalıktan ölümler ise en fazla Temmuz ayında olmaktadır.

5— Yerli çeşitlerden Finike Yuvarlak, Antalya Yuvarlak, Molla Memed, Kıbrıs hastalığa karşı dayanıklıdır. Lâmas, Kütdiken, Peri, Demre Dikensizi (İtalyan Memeli), Yediveren, İnterdonato gibi yerli çeşitlerle, Lisbon ve Eureka klonları ise hastalığa karşı duyarlıdırlar.

6— Azotlu gübre kullanma ve budama zamanı, hastalığın bulaşma ve gelişmesinde etkin rol oynamaktadır. Özellikle Şubat ve Mart aylarında yapılan budama ve azotlu gübreleme bulaşmayı arttırmaktadır.

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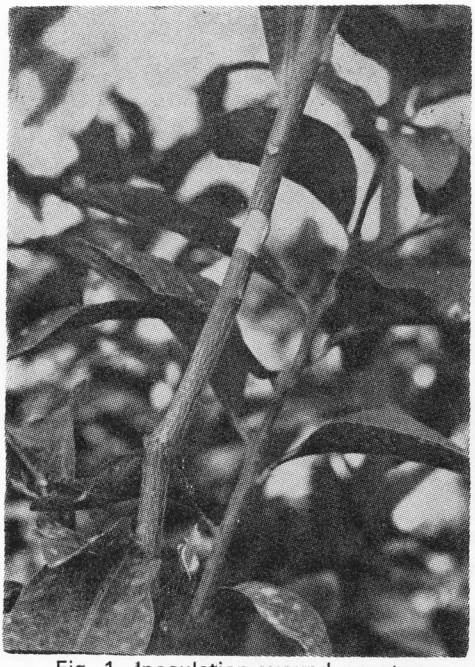


Fig. 1. Inoculation wound on stem

Fig. 2. The leaf inoculation

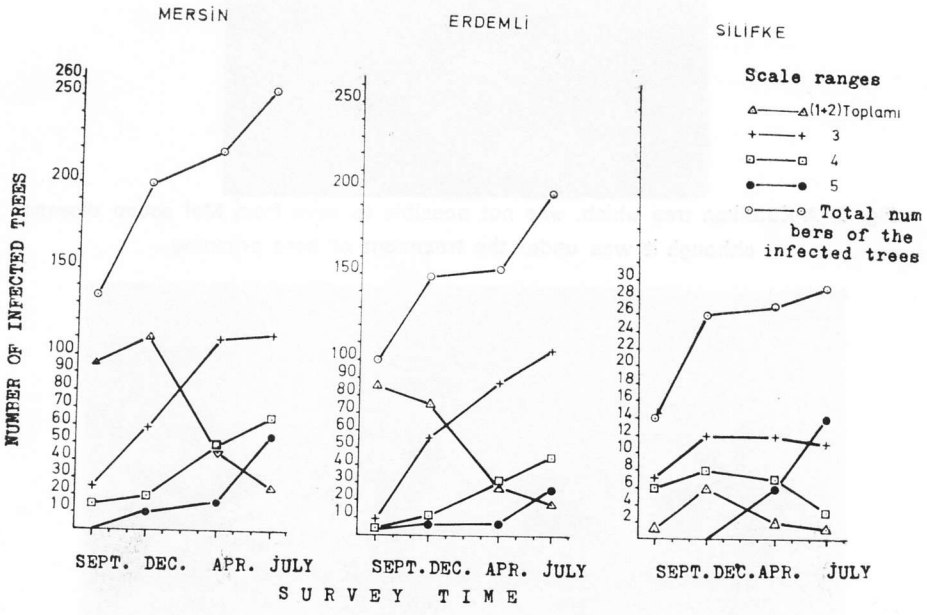
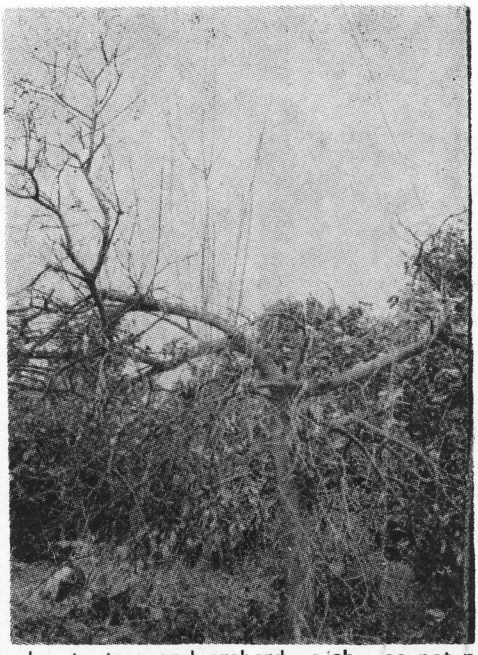


Fig. 4. The number of diseased trees in relation to survey times and scale values.



F.g. 4. A young Interdonato tree and orchard wnich was not possible to save from Mal Secco disease although it was under the treatment of hard prunning

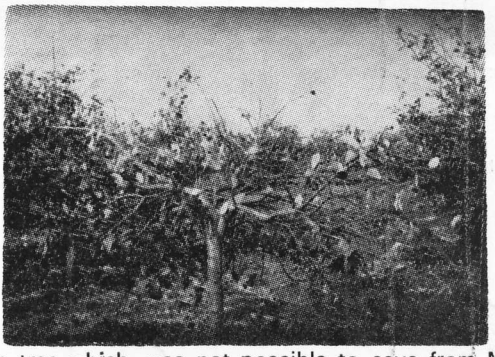


Fig. 5. A Kütdiken tree which, was not possible to save from Mal secco disease although it was under the treatment of hard prunning

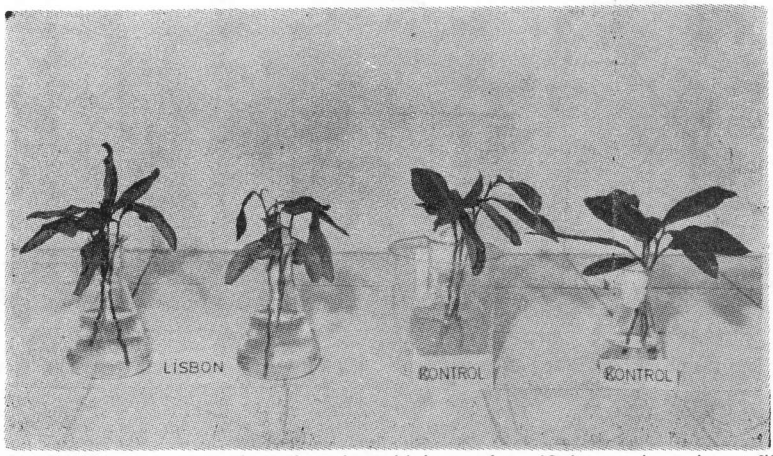


Fig. 6. Relative susceptibility of variety Lisbon after 48 hours in culture filtrate.

Fig. 7. Finike Yuvarlak. The disease have appeared only on inoculated branch and absent on the other branches

Fig. 8. Frost Lisbon. The disease have spreaded to all branches

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Preservation of Germination Ability of Some Weed Seeds Passed Through the Gastro Intestinal Tract of Sheep

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ABSTRACT

The purposes of this experiment were, to determine the possibility of loosing the germination ability of some of the weed seeds pass through the gastro intestinal tract (GIT) and the rate of passage of these weeds through the GIT of sheep.

The experiment was conducted at Atatürk University farm and 3 ten-month old male lambs were used. 1000 seeds from each of 8 species which are important weeds for the Eastern Anatolia and fed to each lamb.

1. The excretion rate of å species of weeds fed to lambs were as follows: **Poligonum aviculare** 31,4 %, **Melantrium album** 34,3 % **Reseda lutea** 13,7 %, **Thlaspi arvense** 10,1 %, **Isatis tinctoria** 4,4 %, **Cephalaria syriaca** 2,7 %, **Ranunculus aces** 1,8 %, **Boreave orientalis** 0,23 %.

2. Generally 87,0 % to 97,1 % of all weed seeds are excreted between 14 to 62 hours.

3. It was determined that, passage of the weed seeds through the GIT reduced their germination potential up to 6,6 to 32 % and germination ability 1,0 % to 77,4 % respectively.

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1) Atatürk University Agriculture Faculty Dept. of plant protection.

2) Atatürk University Agriculture Faculty Animal Sci. Dept. Erzurum.

3) A paper presented at the VI th. Interbalkanic Plant Protection Conference 10-16 October 1977, İzmir/TURKEY.

INTRODUCTION

Since the beginning of domestication of wild animals, it is well known that part of the seeds and fruits of the plant eaten by animals, passthrough the gastro intestinal tract (GIT). After giving up their nomatic life humanbeings settled down on definete places and started cultivation. Later that noticed that soil began loosing its productivity. In this case, generally they looked for the new area to move or to find some remedies and means to increase soil productivity. As human population increased the possibility of finding new settlement places came to an end. There was only one promising way: to concerve the soil productivity. The oldest and most convenient method of increasing soil productivity is to fertilize it with manure. The way of handling the soil necessitates some precautions in fertilizing it with manure.

Directly spreading out manure on the soil increases the possibility of having weed problem which depends on the number and the kind of weed seeds embedied in it. Even though this problem is reduced in fermented manure to some extent but it still exists.

On the other hand if grasses are not renewed and restored properly it is not possible to protect them and to grow or establish good pastures. Pasture plants can be grown and spread out in a number of ways. One of the most important one is that the seeds are carried by the animals, a mature seds of a animal without loosing its germination ability. This might be desirable but some times under inevitable conditions animals may eat the seeds and fruits of low quality forages and spreading those seeds may reduce the quality of pastures.

The purposes of this experiment were as follows.

1. To determine the possibility of loosing the germination ability of some of the weed seeds passed through the GIT of sheep.

2. Rate of passage of these weeds through the GIT of sheep.

LITERATURE REVIEW

There are some studies on the passage of weed seeds through the GIT of domestic animals. The rate of loosing germination ability of weed seeds consumed by domestic animals during the passage through the GIT depends on the species of animal and of plants. Lenartz (1955), determined that many plant seeds especially the small **Graminea** seeds which are round and shiny cornered harmed less than larger seeds during their passage through the cattle's GIT. On the other hand, the weed seeds that passed through the GIT of cattle required 2-3 times more time to germinate as compared to those normal seds. Kerner and Marilaun (1966), indicated that feeding 250 kinds of

seeds were harmed during chewing and rumination. It was also indicated that number of the germinated seeds which passed through the GIT were negligable.

According to Korsmo (1930), the seeds fed to animals are harmed during their passage through the GIT. The percentage of unharmed seeds were; 27 to 58 % in cattle, 1 to 15 % in chicken. Howere mistletoe **(Viskum album)** seeds swollen by birds passed through the GIT and excreted without loosing theis germination ability.

The presence of a seed in manure without loosing its germination ability is effected by its resistance to digestion process during its passage through the GIT (Salzmann, 1939).

In contrary, germination ability of unharmed seeds loose their vitality during the fermentation of manure and rest of the vital seeds' number is negligable (Ehrenberg, 1935).

There have been numerous papers dealing with passage of food materials through the ruminant GIT as a whole. Balch (1961), fed dairy cows with strained particles of long hay, ground hay and concentrates. Hay particles first appeared in the feces 12-24 hours after feeding. Excretion was characterized by a slow excretion of the first 10 %, followed by a higher rate typically resulting in passage of 80 % with 70 - 90 hour. Digestibility was not correlated to rate of passage. Church (1970), indicated that similar results were found with sheep and goat.

MATERIALS AND METHODS

The experiment was conducted at Atatürk University farm and 3-ten- month old male lambes were used. 1000 seeds from each of **Poligonum aviculare, Melandrium album Reseda lutea, Thlaspi arvese, Isatis tinctoria, Cephalaria syriaca, Ranunculus acer, Boreave arientalis** which are important weeds for the Eastern Anatolia and fed to each lamb. The weed seeds were mixed with sugar beet pulp and fed in plastic buckets. This method prevented wastage of seeds during feeding. Before and during the experimental periods the lambs were fed only good quality hay. After feeding the weed seeds in feces collected at 14, 24, 38, 48, 62, 72, 86 and 96th hours were determined, counted and germinated according to the following procedure. Collected feces were put in a bucket containing some water in it, mixed and mashed and then put in a fine batiste It was washed completly with compressed fountain water. After this procedure in fine batiste there was only undigested hay material and weed seeds escaped from digestion. Weed seeds were picked up by a forceps and were transferred on the blotting paper, then it was put in petri dishes at room temperatures for germination. Germination period was planned for 28 days. At the end of this period germination potentials of ungerminated weeds were controlled using the method of Tetrazolium (TTC), (Bulat, 1965; Rieder, 1966; Özer 1975)

In the feces samples containing more than 200 ungerminated seeds; the TTC method was applied to 200 seeds; the TTC method was applied to 200 seeds only and samples containing less than 200 ungerminated seeds, the TTC method was applied to all seeds.

In order to control the percentage changes in germinations of seeds passed through the GIT, 200 untreated control seeds from each tested species were put in petri dishes at room, temperature (20-25°C) for germination.

RESULTS

The amount of digested weed seeds fed to 10-month old male lambs are shown in Figure 1. Among the eight different weed seeds used in this experiment, the amount of unharmed weed seeds excreted in feces was highest for **Melandrium album,** 34,3 % and the lowest for **Boreave orientalis,** 0,23 %. Contrary to his, germination percentages of undigested of **Melandrium album** was 18,6 % and **Thlaspi arvese** was 5,8 % respectively. The germination percentages of the other species in 28 days were less than the species mentioned above and zero for **Boreave orientalis.**

Figure 2. shoves the percentage passage of 8 different weed seeds' species fed 3000 seeds from each species to 3 lambs, excreted in feces and collected at 10-14 hour intervals for 96 hours (4 days). It could be observed that from 0 to 14 hour only 0.7 % to. 5.5 % weed seeds were excreted via feces during the first 14 hour. Generally 87,0 % to 97,1 % of weed seeds are excreted between 14 to 62 hours and 2,2 % to 7,5 % of weed seeds are excreted via feces between 62 to 96 hours. On the other hand, the highest amount of undigested weed seeds were excreted between 24 and 38 hours and consisted of 33,3 - 73,9 % of the total excreted amount of seeds. This was almost the same for all species.

Table 1. The Germination Potential (%) and Germination Power of Weed Seeds Under Normal Conditions Before and After Freeding to Lambs.

	Seeds passed through the GIT		Control seeds	
Plants	Germination ability	Germination potential	Germination ability	Germination potential
Polygonum aviculare	1,1	86,4	2,1	97,0
Melandrium album	54,4	70,6	83,0	98,0
Reseda lutea	1,7	93,0	2,5	99,6
Thlaspi arvense	57,1	89,2	66,0	98,4
Isatis tinctoria	2,3	60,8	31,0	86,2
Cephalaria syriaca	8,6	65,4	86,0	97,4
Ranunculus syriaca	9,2	85,4	58,0	98,8
Chenopodium album	3,6	90,6	40,0	99,8
Boreave orientalis	—	90,8	—	98,0

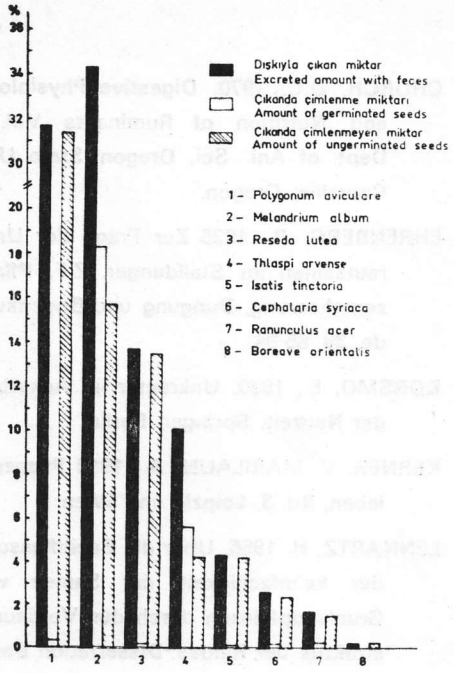

Fig.1. Amound of und gested excreted and percentages of germination of weed seeds to 10-month old male lambs.

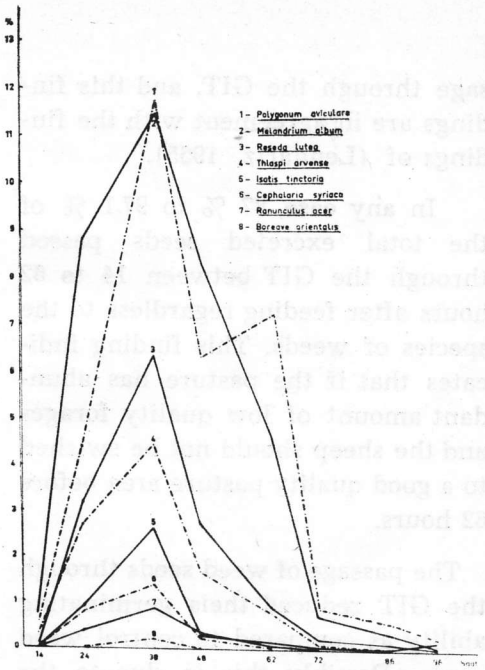

Fig.2 Percentage passage of different weed seeds in feces collected at different hours after feeding.

It was shown on Table 1 that the germination ability of the seeds decreased after the passage of weed seeds through the GIT. The seeds of **Boreave orientalis** did not germinate under normal conditions and 28 days after their passage through the GIT. On the other hand the passage through the lamb's GIT had various effects on the germination potentials of the different species of weed seeds The harmful effect of passage through the GIT on germination potensials of weed seeds, as compared to normal conditions, were 6,6 % for the **Reseda lutea** and 32,0 % for the **Cephalaria syriaca**

DISCUSSION

The highest excretion rate was found with seeds of **Melandrium album** as 34,3 % among all 8 different weed species. Contrary to this the excretion rate was found 0,23 % for **Boreave orientalis.** In another world harmful effect of the digestion process on weed seeds was found as 65,7 % with the seeds of **Melandrium album** and 99,7 % with the seeds of **Boreave orientalis.** Figure 1. shows generally the germination ability of seeds with smooth surface were less harmed than those bigger seeds with irregular surface during their pas-

sage through the GIT, and this findings are in agreement with the findings of (Lennartz, 1955).

In any case, 87 % to 97,1 % of the total excreted seeds passed through the GIT between 14 to 62 hours after feeding regardless to the species of weeds. This finding indicates that if the pasture has abundant amount of low quality forages and the sheep should not be swiched to a good quality pasture area before 62 hours.

The passage of weed seeds through the GIT reduced theis germinating ability as compared to control weed seeds. Possibly this is due to the harming effect of the gastro intestinal tract on the weak hulled seeds. Therefore, most of the seeds which passes through the GIT are the strong hulled seeds (Salzmann,1939).

As a conclution we could say that when ever the contaminated feeds with weeds are fed to sheep, the manure should be fermented and then should be carried to the field.

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Studies on the Occurrence of Fusarium Wilt of Cucumber in Ege Region of Turkey

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ABSTRACT

Recently, cucumber plants grown in greenhouses around İzmir were found to exhibit wilt symptoms. The isolations yielded only **Fusarium** spp. and **Fusarium oxysporum** isolates which were dominant, were found to be all pathogenic. The tests schowed that the pathogen is highly specialized only to cucumber, so it is decided to be **Fusarium oxysporum** f. sp. **cucumerinum.**

INTRODUCTION

The cultivation of commercial crops in the green houses have increased considerably, especially in suburbs of İzmir and Seferihisar. Out of total 544 green houses-comprising 622 dekares of area, majority of them are only meant for cultivation of early vegetables or ornamentals. Amongst the vegetable crops, cultivation of winter cucumbers in considered to be the Bora (1966) and Karaca (1968) have reported the existence of **Sclerotinia sclerotiorum** (Lib.) de By. in the green-house grown cucumbers of our region. Cucumber-mildew was also being observed by us in the fields as well as in the green houses. In 1976 a preliminary survey was undertaken to find out some other diseases of cucumbers. As a result, it was observed that in the green houses-especially those which were subjected to continous cultivation, a considerable number of plants were showing typical wilt symptoms.

Keeping in view, this fact, the diseased specimens from Izmir district green houses were collected and investigations were conducted in order to establish the identity of the causal organism.

MATERIALS AND METHODS

The stem pieces from diseased plants, were disinfected with 0,1 % mercury chloride, washed thoroughly in setrile water and plated on acidic PDA and alcohol water-agar for isolation of the pathogen.

As a result of isolations, only **Fusarium** spp. were taken into consideration. All 18 **Fusarium** isolates-comprising 10 **F. oxysporum** (Schlecht) Sny and Han., 2 **F. equiseti** (Corda) Sacc., 1 **F. solani** (Mart.) App et Wr. and 5 **Fusarium** spp. were tested for pathogenicity. In these tests, a cucumber cultivar «Dere» grown mostly in the region, was used as a host.

The determination of **F. oxysporum** isolates was confirmed by microscopic examinations of them growing on different media, i.e. PDA malt extract agar, oatmeal agar (Difco) and rice medium. These four **F. oxysporum** isolates were tested for their pathogenicity on Cucumber (**Cucumis sativus** cv. Dere), squash (**Cucurbita pepo** cv. Sakız), watermelon (**Citrullis vulgaris** cv. Sugar baby) and melon (**Cucumis melo** cv. Hasanbey).

Pathogenicity tests were carried out in 19 Cm diameter clay pots containing approximately 2 kg garden Soil, sterilized with methyl bromide. For the tests, inocula was prepared from single spore in 300 ml Erlenmeyer flasks containing 100 ml Czepeck-Dox medium. After one week of incubation every flask was diluted with 150 ml sterile water and every pot was inoculated with 50 ml of this suspension.

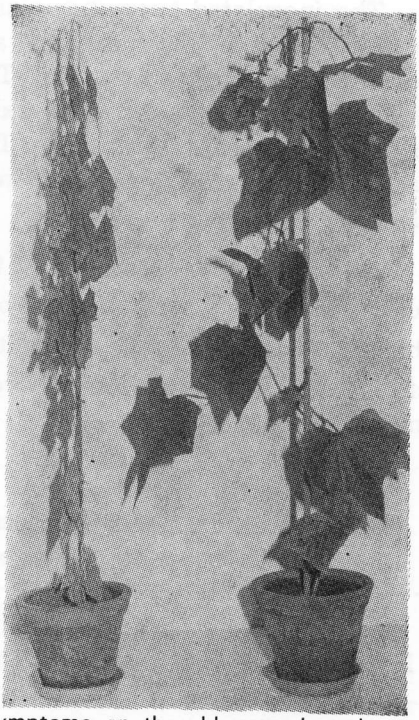
RESULTS

Only **Fusarium** species were being isolated from 12 representative diseased plants. Amongst our isolates **F. oxysporum** was the dominant specie, whereas **F. solani** and **F. equiseti** along with some unidentified species were few in number.

1.1. Pathogenicity tests: All the ten **F. oxysporum** tested, showed 80-100 % pathogenicity. Amongst these, seven isolates caused severe wilting, resulting in the death of the plants. The unidentified **Fusarium** spp. tested, exhibited no pathogenicity with the exception of one which proved to be 60 % pathogen. **F. solani** and **F. equiseti** not showed any pathogenicity at all. It was also being observed that the isolates were pathogenic to the **Cucumis sativus** cv. Dere in the seedlings (Fig. 1) as well as in the old stage (Fig 2).

1.2. Inoculations of different hosts: Four pathogenic isolates of **F. oxysporum** (No 4,8,9 and 10), were tested on other members of the cucurbitaceae. As a result, none of the four isolates were found to be pathogenic on watermelon and squash. In case of melon, these four isolates were found to be pathogenic up to some extent. But all the isolates tested, showed high degree of pathogenicity on cucumber (Fig 3).

Fig. 1. Wilt symptoms shown by the Seedlings of cucumber cv. Dere, right inoculated, left non-inoculated.



Wilt symptoms on the old cucumber plants.

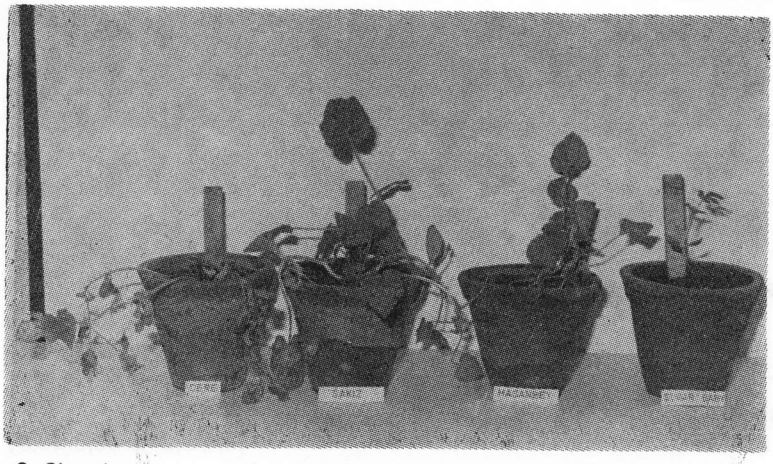


Fig. 3. Showing comparative virulence of **F. oxysporum** isolate Number 4 on different members of cucurbitaceae (From left to right: Cultivars of Cucumber, Squash, Melon and Water melon).

The inoculated cucumber plants wilted with in 3-5 days after the appearance of disease symptoms. The leaves drooped down and stem exhibited clear vascular browning. The pathogen was readily reisolated from all the wilted plants.

1.3. Taxonomic characters of the fungus : As previously pointed out, there were some cultural pecularities of the fungal isolates on different media.

The growth of **F. oxysporum** on PDA was very rapid and different isolates generally showed violet colour on media. On all the four media the production of microconidia was abundant in comparison to very little growth of macroconidia. It was observed that the production of macroconidia was much more on oatmeal agar medium as compared to other media. That's why, all the macroconidial measurements were made from this medium (Table 1).

Table I. Measurements of macroconidial characteristics of **F. oxysporum** isolate Number 10 grown on oatmeal agar medium in microns.

Number of Septa	Number of measured spores	Measurements of macroconidia
One septate	59	3.53 x 26,71 (3,3-5,5 x 23,1-38,50)
Two septate	69	4,75 x 37,27 (3,3-5,5 x 25,3-49,5)
Three septate	100	4,80 x 42,14 (4,4-5,5 x 26,4-52,8)
Four septate	100	5,12 x 48,94 (4,4-6,6 x 38,5-60,5)
Five septate	11	5,60 x 52,01 (4,4-6,6 x 41,8-60,5)

The size of microconidia of the four pathogenic isolates were given on table 2.

Table II. Measurements of microconidia of 4 **F. oxysporum** isolates grown on different media (in microns).

Isolate	MEDIA			
Number	PDA	Rice	Malt. extract agar	Oatmeal agar
4	3,42 x 10,21 (2,2-5,5 x 4,4-17,6)	3,78 x 10,57 (2,2-5,5 x 6,6-13,2)	3,31 x 9,08 (2,2-5,5 x 6,6-13,2)	3,27 x 8,55 (2,2-5,5 x 6,6-12,1)
8	4,03 x 10,07 (2,2-6,6 x 6,6-15,4)	3,54 x 9,5 (3,3-5,5 x 6,6-15,4)	3,34 x 9,26 (2,2-5,5 x 6,6-15,4)	3,65 x 10,28 (2,2-5,5 x 7,7-13,2)
10	3,42 x 9,71 (2,2-5,5 x 6,6-17,6)	3,49 x 10,10 (2,2-5,5 x 6,6-14,3)	3,10 x 8,67 (2,2-5,5 x 6,6-12,1)	3,61 x 10,59 (2,2-5,5 x 7,7-14,3)
12	3,92 x 10,24 (2,1-5,5 x 6,6-16,5)	3,47 x 9,73 (2,2-5,5 x 6,6 14,3)	3,86 x 10,68 (3,3-5,5 x 6,6-15,4)	3,67 x 10,81 (2,2-5,5 x 6,6-15,4)

DISCUSSION

Uptil now, **Fusarium oxysporum** and **F. solani** have been isolated very often from wilted plants (Koswig 1955; Rafaila and Costache 1970). The present study also showed the **F. oxysporum** as the dominant species where as **F. solani, F. equiseti** and other unidentified **Fusarium** spp. as secondary isolates; so close similarity exists between our results with that of other investigators work.

As, all our ten **F. oxysporum** isolates showed 80-100 % pathogenicity on cumuber cv. «Dere», so the study is in close agreement with that of Owen (1956), who also found no significant difference in virulence of the cucumber fusarial isolates.

The results obtained for the pathogenicity tests on older plants are also similar to those already shown by Koswig (1955); Owen (1955); Fletcher and Kinghaam (1966); Rafaila and Costache (1970). Four **Fusarium oxysporum** isolates were found to be neither pathogenic to squash, nor to watermelon during the inoculation trials. But in case of melon, the isolates caused the death of the seedlings. This test was not performed on the older plants. As a result of cross-inoculations performed by Owen (1955; 56), Fusaria isolated from cucumber were not pathogenic to squash cultivars, slightly pathogenic to watermelon, where as melon seedlings showed too much mortality. Our results which are obtained in case of seedlings are exactly, similar to the results of Owen (1955). In addition to this, Owen (1956) has also showed that the **F. oxysporum**, isolated from cucumbers only proved pathogenic to old age cucumber plants where as other cucurbits namely melon, squash, and watermelon show no wilt symptoms

Owen (1956), Fletcher and Kigham (1966) have reported that the **F. oxysporum** from cucumber produces abundant microconidia on PDA and other cultural media, where as production of macroconidia is very sparse. This observation is also being clearly observed in the present study. The measurements of macroconidial cells are found to be little more than the measurements reported already by Owen (1956). This difference probably arises from the different media used. The measurements of microconidia of four **F. oxysporum** isolates were almost the same on different media. This finding also closely resembles that of Owen's (1956).

As the **F. oxysporum** isolates of Owen (1956) from cucumber were found to be pathogenic only to cucumber (showing host specialisation) and they were deffinitely different from the already known **F. oxysporum** formae specialis of watermelon and melon, so he named this pathogen as **F. oxysporum** f. sp. **cucumerinum**. **F. oxysporum** isolated from wilted cucumber plants of our region is concered to be the same as has

been reported by Owen (1956) as **F. oxysporum** f. sp. **cucumerinum.** This conclusion is drawn on the basis of microscopic studies as well as on pathogenicity trials of the pathogen.

The outhors want to thank to Mr. H. S. Kureyshi for his kind helps.

ÖZET

Ege Bölgesinde Hıyarlarda **Fusarium** Solgunluğu Üzerinde İlk Çalışmalar

İzmir çevresi seralarında hıyar yetiştiriciliği önemli bir yer tutmaktadır. Bu bitkinin üretimi, diğer bazı hastalık etmenleriyle birlikte, son yıllarda, bir solgunluk hastalığıyla da karşı karyışa bulunmaktadır. Solgunluk belirtisi gösteren bitki örneklerinden yapılan izolasyonlarda, **F. oxysporum** başta olmak üzere, **F. equiseti, F. solani** ve tanımı yapılamıyan bazı **Fusarium** spp. izole edilmiştir. «Dere» hıyar çeşidi ile yürütülen testlerde, denemeye alınan tüm **F. oxysporum** izolatlarının yüksek derecede patojenik oldukları saptanmıştır. Diğer **Fusarium** türlerine ait izolatlar önemli bir patojenisite göstermemişlerdir.

Yapılan kültürel çalışmalar ve mikroskobik incelemeler sonucunda elde edilen veriler, denemeye alınan ve solgunluk oluşturan **F. oxysporum** izolatlarının, Owen (1956)'nın hıyar **Fusarium** izolatlarıyla benzer olduğu kanaatini uyandırmıştır. Yine bu izolatlarla, kavun, karpuz ve kabak'a yapılan inokulasyon denemeleri sonuçlarında, fungusun hıyara özelleştiği görülmüştür. Bu nedenlerle, Bölgemiz seralarında solgunluk yapan bu fungusun, Owen (1956)'nın verilerine göre, **F. oxysporum** f.sp. **cucumerinum** Owen olabileceği kanısına varılmıştır.

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Control of Phytophthora capsici Leonian on Red Peppers

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ABSTRACT

Root and Crown rot of red pepper was first detected in 1970 in Kahramanmaraş. It later spread rapidly to the other parts of Turkey. Red pepper is an economical crop in Turkey due to its exportation as powder and great use in paste production. Culture of this crop has been threatened by **Phytophthora capsici** a causal agent of root and crown rot. Effectiveness of 15 fungicides against **P. capsici** were studied in laboratory and field, and only triphenyltinacetate proved to be highly effective. Control of disease was 92 % under the field conditions by application of triphenylinacetate at a rate of 3.0 g/m^2 a.i. with 20 day intervals.

INTRODUCTION

The root, crown, leaf and fruit rots caused by **Phytophthora capsici** Llonian on pepper **(Capsicum annuum** L.) and some members of cucurbitaceae were first noticed in 1918 in New Mexico and California (1,2). It, then, has been seen all over the world especially on tomatoes and studied extensively (2,4,6,7,9,10).

Several cultural and chemical methods have been tested for the control of **P. capsici** and cuprous materials were reported as effective chemicals. In addition to these, difolatan, mancozeb, captafol, and captan were also reported to be effective. Some, but not strong enough, resistance has been found against **P. capsici** (8).

Symptomps on peppers were first noticed in 1970 in Kahramanmaraş, a southern province of Anatolia. Since then, it spread rapidly to the other parts of Turkey. In Kahramanmaraş **P. capsici** only causes root and crown rot and does not have any effect on

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leaves and fruits.

In this study, fungicides were used in addition to cultural practices in order to find the means of controlling **P. capsici.**

MATERIALS AND METHODS

Laboratory Studies: Fourteen different fungicides and one herbicide, oryzalin, were tested against **P. capsici.** Petri dish cultures at 0, 50, 100, 150, 250, 350 and 500 ppm concentrations of each compound were prepared with 15 ml of PDA medium. A culture disk, of **P. capsici**, 5 mm in diameter, was inoculated in to the petri dishes. These dishes were kept at 27°C and the growth diameter of fungus in each dish was measured daily.

The effect of mancozeb, maneb, captan, triphenyltinacetate, copper sulphate, copper oxychloride, and thiram on zoospore activity were also tested. Suspensions of fungicides at concentrations of 1, 10, 100, 200 and 1000 pm were prepared. Then 0,1 ml of suspension from each concentration was added in to the watchglass which contained zoospore suspension. Activity of zoospores were observed under the microscope.

The efect of triphenyltinacetate on fungus at low dosages was tested in hygrocultures. Plants growing in hygroculture were inoculated by dipping fungus cultures wrapped in cheesecloth into the hygroculture. Following inoculation, 0; 0;25; 1;0; 4;0; 16;0; and 32;0 ppm concentrations of triphenyltinacetate applied to the hygrocultures.

Field Studies: Seeds were hand sown into clay-silt soil in Kahramanmaraş in 1976, NP application was made at a rate of 10 kg/dek. Statistical design of split-split plot was chosen to test the effect of irrigation fungicides, and the number of applications. Promising fungicides determined in laboratory studies, mancozeb, maneb, captan, triphenyltinacetate, thiram, and chlorneb were tested at a rate of 3.0 g/m^2 a.i. as a soil drench. Application of chemicals were made when soil temperature reached 20°C and repeated 5-times with 20 day intervals. Diseased plants were counted before and after 1 st, 3 rd, and 5 th applications. Fungicides were applied around the base of plants by the aid of diagramatic back sprayer with nozzle removed. Irrigations was of two type; controlled and flooded. Experiment was a 2x4x 6=48 factorial and repeated 3-times. Data was transformed to angle from percent prior to statistical analysis. Abbott's formula was used to determine the percent effectivenes of fungicides.

RESULTS

Growth of the fungus on PDA medium for different concentrations of chemicals is given in Table 1. Control is not presented in Table 1 since fungus reached its full growth in petri dish by the 4 th day. PCNB stimulated the growth of fungus.

The effect of fungicides on the activity of zoospores is given in Table 2.

Table 1. Effect of different concentrations of fungicides on the growth of p. capsisi[1]

Fungicides	Colony diameter of P. capsici (mm)					
	50 ppm	100 ppm	150 ppm	250 ppm	350 ppm	500 ppm
Triphenyltinacetate	13.5	13.0	12.5	12.0	10.5	10.5
Copper sulphate	20.0	—	—	—	—	—
Copper oxychloride	40.0	28.0	15.0	13.0	10.0	7.0
Mancozeb	50.0	15.5	13.8	6.0	6.0	6.0
Maneb	58.5	21.0	7.0	6.0	6.0	6.0
Captan	60.9	43.3	26.2	20.0	16.4	15.6
Oryzalin	63.8	63.0	55.6	54.0	53.0	53.6
Dithianon	74.2	68.6	56.8	49.8	43.6	38.4
Zineb	79.6	72.4	67.7	52.0	44.8	32.0
Thiram	Full	69.93	49.95	23.31	19.98	14.98
Chlorneb	Full	Full	Full	Full	Full	Full
Dexonal	Full	Full	Full	Full	Full	Full
PCNB	Full	Full	Full	Full	Full	Full
Prothiocarb	Full	Full	Full	Full	Full	Full

1) Measurments were taken a the end of one week.

Table 2. Activity of zoospores at different concentrations of fungicides

Fungicides	Zoosporeactivity (minute)[1]				
	1.0 ppm	10 ppm	100 ppm	200 ppm	1000 ppm
Triphenyltinacetate	18	7	no movement	no movement	no movement
Copper sulphate	unaffected	25	8	6	5
Maneb	unaffected	60	1	no movement	no movement
Mancozeb	unaffected	65	7	7	4
Thiiram	unaffected	unaffected	7	5	2
Captan	unaffected	unaffected	26	18	9
Copper oxychloride	»	unaffected	unaffected	unaffected	unaffected

1) Observations were made after 120 minutes. The ones still active after this period were considered unaffected.

There was no -indication of **P. capsici** development in 0.25; 1.0; 4.0; 16.0 and 32.0 ppm concentrations of triphenyltinacetate in hygrocultures for 20 days whereas in the control, symptoms were evident by the 6 th day and infected plants were eventually killed.

According to the statistical analysis there was no significant differences between the controlled and flooded irrigation system. Number of applications resulted significant differences. Five times application gave significantly better control than that of others. Three times application differed significantly than the control but not than that of one aplication. Triphenyltinacetate gave significantly better control compared to the other fungicides.

DISCUSSION

Laboratory studies indicated that the fungicides except mancozeb, maneb, captan, thiram, triphenyltinacetate, copper sulphate and copper oxychloride had no effect on controlling **P. capsici** at all. The reports for PCN B as a growth stimulator (11) is also being proved by this study. Triphenyltinacetate was highly effective on suppression of zoospore activity. Even 1 ppm concentration stopped zoospore activity in 18 minutes. This duration of activity was of no importance for the infection since 0,25 ppm concentration prevented infection of the fungus for 20 days in hygroculture.

Studies in pots indicated that fungicides composed copper had phytotoxic effects on plant. This phytotoxicity provided better conditions for infection by weakening the plants. Similar results were reported by Sonoda et al., (1971). No statistical differences between the irrigation systems, indicated that there was enough humidity and water movement even in controlled irrigation for infection and zoospore transportation Triphenyltinacetate was reported to be very effective as a soil applicant against wilt in hops **Humulus lupulus** caused by **Fusarium oxysporum** and **Verticillium albo-atrum** (5). It was the most affected controlling the **P. capsici** compared to the others in this study. Since sporangia of **P. capsici** develop at 20°C, it is not economical to apply the fungicides if soil temperature is below 20°C. It should also be kept in mind that applications not be effective when temperature is above 20°C since sporangia development will have already been comp leted. Therefore it is best to start chemical control at 20°C soil temperature when sporangial development is in its initial stages (1,3). Three times application of triphenyltinacetate was found to be most economical.

In conclusion, 3 application of triphenyltinacetate with 20 day intervals at a rate of 3 g/m^2 a.i. was highly effective in controlling **P. capsici.** Applications should begin at 20°C and the field should be irrigated right after application in order to

provide the penetration of chemicals in the soil. Since this chemical is phytotoxic, special attention should be paid not to contact green parts of plants with chemical.

ÖZET

KAHRAMANMARAŞ KIRMIZI BİBERLERİNDE **PHYTOPHTHORA CAPSICI** Leonian'NIN NEDEN OLDUĞU KÖK VE KÖK BOĞAZI HASTALIĞINA KARŞI İLAÇLI SAVAŞ YÖNTEMLERİNİN ARAŞTIRILMASI

İlk kez 1970 yılında Kahramanmaraş kırmızı biber alanlarında görülen kök ve kök boğazı çürüklükleri sonraki yıllarda tüm ülke düzeyinde yaygınlık kazanmıştır. Biber gerek toz biber halinde ihraç edilmesi gerekse sera sebzeciliği ve salça üretiminde büyük bir yer tutması nedeniyle oldukça ekonomik öneme sahiptir. Bu denli ekonomik olan biber ürünü tarımı **Phytophthora capsici** Leonian'nın neden olduğu kök ve kök boğazı çürüklükleri yüzünden kuşku verici düzeyde gerilemeler göstermiş tir. Bu tehlikeli durumu düzeltmek amacıyla laboratuvar ve tarla koşullarında çeşitli kimyasallarla çalışmalar yapılmıştır. Araştırılan toplam 15 kimyasaldan yalnızca kalay asetat çalışmanın tüm basamaklarında **P. capsici**'ye karşın yüksek oranda etkinlikler göstermiştir. Özellikle tarla çalışmalarında, 20 gün ara ile üç kez 3.0 gr/m^2 oranında aktif madde esası üzerinden toprak ilaçlamaları ile hastalık % 92 oranında önlenebilmiştir.

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The Relationship Between Actinomyces spp. and Blossom - End Rot of Tomatoes

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ABSTRACT

The damage of Blossom-End Rot increased when tomato plants were grown in the soil that inoculated with **Actinomyces** spp. grown in media for culturing cultivated mushroom consists of compost manure and pastorised oats.

There was a considerable decrease of Blossom-End Rot when plots were treated with Sulphure Dust at the rate of 37.5 Kg/da.

INTRODUCTION

It has been known that Blossom-End Rot causes primarily on tomato fruits. It is also prevalent and causes important crop loss in Turkey.

In literature, there are records of Blossom-end Rot on tomato, pepper, melon, watermelon and peanuts. Roger (1951) recomments to give nitrogen phosphorus and organic manure to the soil to prevent Blossom-End Rot. Messiaen et Lafon (1963), Murray et al (1972), Borkowski and Ostrzycko (1973), Goor (1975), Greenkof and Adams (1969), Anonymus (1975) have the opinion that Blossom-End Rot of tomato occurs when the plants can not get enough calcium and irrigation is not regulated. Some authors state that ratio of Ca, K, and Mg in the soil is important. Some claim that high levels of Ca are the causes of Blossom-End Rot of tomato.

In this previous study, after having increased the density of **Actinomyces** spp. in the soil, the relation between **Actinomyces** spp. and Blossom-End Rot was investigated.

MATERIALS AND METHODS

The experiments was carried out in plots of 1x1.20m in the green house and 1.5x4m in the fields. Plots in the green house were seperated by concrete walls. Randomised plot desing was applied in the experiment with 2 replicates in the green house and 4 in the field respectively.

The soil of which 3/4 was farm fertilizer, was put in each plot in the green house 3 kg of pastorised compost manure and 0.5 kg of **Actinomyces** spp. inoculum incorporated 0.30m into the soil of two replicated plots. Other two plots were control.

Compost manure was the mixture of wheat straw (1 ton) + poultry manure (400 kg) + Amonium Sulphate (15 kg) + Urine (15 kg) + potassium sulphate (3 kg) + tripple super phosphate (3 kg) + molasses (20 kg) + marble dust (15 kg) + plaster (40 kg) + water (2 - 2.5 tons). This mixture was left for fermantation at 40 - 75 C°, and pastorised for seven days for 24 hours at 60 C°, 2 days at 57 C°, 4 days at 50 - 55 C°). **Actinomycess** spp. densely developed in the compost manure on the 5th day. Tomato seedlings were transplanted to the experimental plots after 5 days 225 g (375 kg/hec.) sulphur dust was applied to each plot of replicated plots under field conditions and in corporated 0.15 m into the soil. Other 4 plots were control.

From the experiment plots at the different dates manure and premature tomato fruits were picked up. Healthy and spotted fruits were counted.

RESULTS AND DISCUSSION

The mixture of pastorised compost manure and **Actinomyces** spp. which was reproduced on oat grains, were taken as a inoculation material. Every 3 kg of the material was in corporated per square mater of soil surface.

Healthy and spotted fruits in whole experiment plots were counted between Feb. 2, and July 20 1976. The results of the control were given in table 1. According to the this result 21.50 % of tomato fruits have been damaged by Blossom-End Rot. This percentage was 6.35 % in control plots.

In the case of increasing the density of **Actinomyces** spp. in the soil the degree of the blossom - End Rot damage was reached to 75.65 %. The observations and countings of the second experiment that was planed under field conditions were done between Agust 16 and Septem. 14 1976. The results of this experiment were summarized on the table 2. According to the these results 0.24 % of tomato fruits in sulphure dust treated plots have been damage by Blossom - End Rot. The spotted fruit ratio was 3.89 % in the control plots. The damage of Blossom - End Rot has been decreased 93.83 % by using sulphur dust to decrease the density of **Actinomyces** spp. in the soil. As a result it was

concluded that the damage of Blossom-End Rot of tomatoes increased if soil had proper conditions to reproduce the species of **Actinomyces.**

Table 1. The number of healthy and spotted tomato fruits obtained from the Greenhouse experiment

Characters	Healthy I	Healthy II	Spotted I	Spotted II	Spotted fruits (%)	Effect (%)
Compost+Actinomyces	39	60	9	12	21,50	74,65
Control	45	38	1	4	6,35	—

Table 2. The number of healthy and spotted tomato fruits obtained from field experiment

Characters	Healthy I	Healthy II	Healthy III	Healthy IV	Spotted I	Spotted II	Spotted III	Spotted IV	Spotted fruits (%)	Effect (%)
Sulphure Dust	675	511	583	679	1	1	4	0	0,24	93,83
Control	621	362	520	657	13	40	10	21	3,89	—

ÖZET

DOMATES ÇİÇEK BURNU ÇÜRÜKLÜĞÜ İLE **Actinomyces** TÜRLERİ ARASINDAKİ İLİŞKİ

Kültür mantarı üretmek amacı ile hazırlanmış olan pastörize edilmiş kompost gübre ve Yulaf tanelerinde çoğaltılmış **Actinomyces** spp. karışımı inokulasyon materyeli olarak alınmış tır. Bu materyelden 1 m² toprağa 3 Kg miktarında karıştırılmıştır. Şahit parsellere herhangi bir uygulama yapılmamıştır.

İnokulüm karıştırılan ve şahit parsellerde yetiştirilen domateslerde 2.6.1976 - 20.7.1976 tarihleri arasında kontrolları yapılarak lekeli ve sağlam meyveler sayılmıştır. Kontrol sonuçları Cetvel 1 de gösterilmiştir. Bu sonuca göre, toprağı inokule edilen parsellerde % 21.50 oranında domates meyveleri Çiçek Burnu Çürüklüğüne yakalanmıştır. Şahit parsellerde ise % 6.35 oranında olmuştur. Toprakta **Actinomyces** spp.'in yoğunluğunun artırılması ile % 74.65 oranında Çiçek Burnu Çürüklüğü zararının artışı etkilemiştir.

Tarla şartlarında yapılan denemede, toprak ilaçlaması yapılan ve şahit

bırakılan parsellerde domates yetiştirilmiştir. Toprak ilaçlamasında toz Kükürt kullanılmış ve dekara 37.50 Kg miktarında ekimden önce toprak yüzeyine serpilerek çapa ile karıştırılmıştır.

16.8.1976 - 14.9.1976 tarihleri arasında kontrollar yapılarak lekeli ve sağlam meyveler sayılmıştır. Bu denemeden elde edilen sonuçlar Cetvel 2 de gösterilmiştir. Cetvel 2 de gösterilen sonuçtan da anlaşıldığına göre, toprak ilaçlaması yapılan parsellerde ortalama % 0.24 oranında domates meyveleri Çiçek Burnu Çürüklüğüne yakalanmıştır. Şahit parsellerde ise, % 3.89 oranında olmuştur. Bu sonuca göre, Toz Kükürt uygulaması, Çiçek Burnu Çürüklüğü zararını % 93.83 oranında müsbet yönde etkilemiştir.

Toprakta bulunan **Actinomyces** spp yoğunluğunu düşürmek amacile Toz Kükürt kullanılmıştır.

Bu çalışmadan elde edilen sonuç, **Actinomyces**'lerin yoğun olduğu topraklarda domates meyvelerinde Çiçek Burnu Çürüklüğü zararınında arttığı kanaatini vermektedir.

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