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Distribution and the Biology of Chestnut Blight [Endothia parasitica (Murrill) Anderson and Anderson]

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ABSTRACT

During the survey for determining the prevelence of pathogen it was found that the mean number of infected trees in Marmara Region is 32.3∓ 4.9 %. In taxonomic studies, the structure of the organism showed the all characteristics of the species. Ascospores are wind-borne, pycnidiospores are carried by rain drops, insects and birds. The pathogen can only be penetrate through wounds. It was determined that, incubation period is varied between 97.6 ∓ 40.00 days to 28.1 ∓ 1.06 days. All tannin concentrations which was determined on the bark of 11 chestnut varieities are stimulate the growth of organism.

INTRODUCTION

Castanae varieties are high altitude, cool and rainy climate trees. They have great adaptation capacity and grow naturally all around the world. Well known species are: European Chestnut (**Castanea vesca** Gartner), American Chestnut [**C. dentata** (Marsh.) Borkh], Japanese Chestnut (**C. crenata** Borkh. and **C. japonica**), Chinese Chestnut (**C. mollissima**). Besides these species, **C. henryi, C. pumila, C. sequinii** are also present (Graves, 1950; Gravatt, 1951; Anonymus, 1956; Diller, 1965).

European chestnut which is a native species of Turkey, grows wi-

dely on costal ranges of Black Sea Region, around Marmara Sea, Western Anatolia Region until Antalya territory in south (Erdem, 1951; Von Regel, 1963).

From very ancient times, it is known that chestnut has been worthwhile tree by its timber, bark, leaves, flowers and being a source of charcoal with its branches (Boyce, 1948; Erdem, 1951).

From an economic point of view however, the most important part of chestnut is its fruit.

Fruits as appetizers or sweets made out of them always have a good market (Erdem, 1951). According to the 1970 statistics, there are 2.417.000 chestnut trees in Turkey. Annual fruit harvest is approximately 48.000 tons (Anonymus, 1971 a), and earned exchange value of the crop was over 3.392.000 TL. (Anonymus, 1971 b).

Chestnuts whose importance was mentioned above, has a blight problem in Marmara Region which is caused by the pathogen **Endothia parasitica** (Murrill) Anderson and Anderson. Since there is no definite method of preventing the disease besides plant quarantine methods, the disease creates an important danger for Turkey's chestnut production. **E. parasitica** also infects oak varieties **(Quercus spp.)** somak **(Rhus tyhina).** caria **(Carya ovata)** quite efficiently (Anderson and Rankin, 1914; Heald, 1933; May and Davidson, 1960; Batson and Witcher, 1968; Karaca, 1968; Peacher, 1969; Stipes and Phipps, 1971). For this reason it is a great danger for our oak forests which cover a wide acreage in Turkey (Figure 1).

MATERIAL and METHODS

1. Material

This study consists of Marmara Region, with Istanbul, Kocaeli, Sakarya, Bursa, Bolu counties. All surveys consist of these 5 counties and 13 districts. The host species used was European chestnut **(C. vesca).**

In order to investigate the effect of tannin on pathogen, İzmitli, Öküzgözü, Gavur Kestanesi, Valiçe, Hacı Ömer, Kara Mehmet, Sarı Kestane, Acı İbiş, Kuyruklu, Fordola and a wild variety (Deli) which are grown in Tepeköy discrict of Kocaeli County were used.

Laboratory studies were carried out by using single pycnidium isolate of **E. parasitica.**

2. Method

Sampling for the studies to detec the infected areas of Marmara Region were made according to grouped random sempling method (Lazarov, Grigovov, 1961). Because of the greatness of population, it was necessary to decrease the number of samples in 1:10 ratio. The districts with less than 50 samples were not included in our studies. The districts co-

vered in our survey and the number of samples examined were listed on Table-1.

Every part of the trees above soil were examined and classified as infected and uninfected.

The Cook solution and 2% P.D.A. were used to examine pathogen's mycellium (Shear et al., 1917). Mycellium studies on living texture were done on samples taken from infected trees.

Pycnidia and pycniospores were cultured and studied on 2 % P.D.A. Perithecia were obtained in artificial media by the method of Baldacci and Orsenigo (1952).

Fruitingbodies of the fungus on the plants were studied by examining sections of diseased tissue. In these studies, the sections were stained with Bismarc-brown (Shear et al., 1917; Johansen, 1940).

Laboratory experiments were carried out on two parallel lines in order to determine the effect of tannin concentrations of some important chestnut varieties on the activity of pathogen.

In the first part of the studies, eleven different varieties of chestnut were sampled and collected bark species were examined for the development of the pathogen.

In the second part of the investigations, pure tannin (Ridel) was added to PDA in equal concentrations as its found in each chestnut varieties and the size of the colonies were measured on 6th, 8th and 10th day of inoculation. Differences of fungal growth were specially studied on Hacı Ömer and Fordola varieties since there two have quite different tannin concentrations.

On biological experimentations, the following methods were chosen:

-The effect of wind on transporting the pahogen was studied by hanging slides covered with vaselin, holding petri plates with PDA against the wind for 2 or 3 minutes and making wounds on the healthy trees and covering them with screen.

-The effect of rain on transportation of the pathogen was also studied by atomizing water on the infected bark samples, in the laboratory conditions.

-Effect of insects and birds on transportation was studied with the following method: The insects and birds were caught and shot, then identified* and put into sterilized beher-glasses.

Each beher-glass contained 50 cc. of sterilized water. Spores were diffused by stirring into the water. Then

*) Systematic nomenculature of birds were done by İ. İLTER Vice Ass. of Reg. Agr. Res. Institute of Erenköy-İSTANBUL. Nomenculature of insects were made by Dr. F. ÖNDER-Dr. Ş. KISMALI Aegean Univ. Agricultural Fac. Dept. of Enthomology. Also S. KEYDER and E. İLTER from Reg. Agr. Res. İnstitute of Erenköy-İSTANBUL and Dr. S. ZÜMREOĞLU from Reg. Agr. Res. Institute of Bornova_İZMİR have partnered on these naming.

five, five-fold diluted of this solution were made. Each dilution was inoculated on PDA and incubated and checked with 24-hour intervals.

In order to examine pathogen's penetration period, incubation period and infection rates, wounds were made on different parts of young plants (Batson and Witcher, 1968). Pycnidiospores and mycelia were etched from diseased tissue and inoculated to these wounds (Batson and Witcher, 1968). Some seedlings more than 1 cm diameter were inoculated without making a wound. In order to observed the frutingbodies of the fungus, samples were taken from the plants at different times and sectioned by the freezing microtome. The sections were stained with Bismarc brown prior to examinations (Shear et al., 1971, Johnsen, 1940; Jensen, 1962).

Wintering of the pathogen was investigated by examination of the samples collected during summer and winter months.

RESULTS

1. Area of Infection:

Survey of **E. parasitica** was made in Marmara region in 1970 and the results are shown on Table 1.

According to the table 1 the average infections were found as 33,4 %, 27,7 %, 27,0 %, 11,3 % and 53,1 % in İstanbul, Kocaeli, Sakarya, Bursa and Bolu provinces respectively. No disease was found in Hendek distric of Sakarya province. The average of infected trees was 32,3 ∓ 4,9 percent in Marmara Region.

2. Taxonomy of **Endothia parasitica**

2.1. Structure of mycellium

Mycellium, under bark and cambium, have a definite spreading form (Figure2). Under microscope, hyphae show a monopodial branching and sectioned appereance. 100 cells of hyphae were measured and mean dimensions of 20,75 ∓ 0,86 x 4,91 ∓ 0,01 microns were found least and most 55,89 - 6,21 x 14,94 - 1,66 microns). Their protoplasm has no homogenity but granulated structure.

The Mycelial growth starts on PDA media four days after inoculation. Owing to pigmentation, hyphae get a yellow collor after six or eight days. Inspections has been done and anastomosis has not been observed between the mycellium.

2.2. Pycnidia and Pycnidiospores:

Matured pycnidia appear in the stromas, which were found in living tissues of host. Young pycnidia mostly have round or conic formations while matured forms completely labyrithiform.

Inner surface of pycnidia are covered with conidiophores whose interior are full with a floody-liquid that consist of pycnidiospores (Figure 3).

Table I. Districts of surveyed area, number of infected and un-infected trees and percentages of infected trees

Counties	Districts	Number of tree	Samples controled	Number of infected tree	Percentages of infected trees
İstanbul	Beykoz	5.500	124	77	62,0
	Yalova	18.000	1.332	410	30,7
	Total	23.500	1.456	487	
	Mean				33,4
Kocaeli	Merkez	6.500	79	25	31,6
	Gölcük	28.600	1.550	336	21,6
	Karamürsel	17.000	549	244	44,4
	Total	52.100	2.178	605	
	Mean				27,7
Sakarya	Hendek	10.000	80	0	0,0
	Karasu	100.000	8.070	2.194	27,1
	Sapanca	8.800	62	35	56,4
	Tatal	118.000	8.212	2.229	
	Mean				27,0
Bursa	Merkez	66.000	2.970	321	10,8
	İnegöl	64.000	2.790	233	8,3
	Orhangazi	6.400	280	130	46,4
	Total	136.400	6.040	684	
	Mean				11,3
Bolu	Akçakoca	100.000	8.290	4.475	53,9
	Düzce	16 000	221	46	21,8
	Total	116.000	8.501	4.521	
	Mean				53,1
Total of the region		446.800	26.387	8.526	
Mean of the region					32,3∓4,9

The average size of pycnidial stromota on living tissue was found as 365,55 ∓ 14,25 x 183,43 ∓ 9,62 microns (100 stromota were measured).

The dimensions of pycnidial stromata in P.D.A. media are 123,80∓ 11,40 x 117,67 ∓ 5,10 microns (least and most 323,70 - 20,75 x 290,50 - 24,90 microns).

Pycnidiospores are formed on the conidiophores which covered the inner surface of the pycnidia (Figure 3). The shape of picnidiospores varies between oblong to cylindric with round end, hyalin and no septum is present. The dimensions of pycnidiospores obtained out of living tissue average 2,88 ∓ 0,009 x 1,11 ∓ 0,0007 microns (least and most 3,78 - 2,14 x 2,16 - 0,54 microns). When the organism was grown on PDA, the avarage of 100 spores measurments were 4,05 ∓ 0,001 x 2,02 ∓ 0,002 microns (least and most 5,79 - 2,89 x 2,27 - 1,65 microns).

2.3. Perithecia and Ascospores

Perithecia appear as small dark colored protuberences over the bark of the host plant. They usually have a long and cylindirical neck. They, grow up to the bottom of the stromata which are like pycnidial stromata.

The dimension of 100 perithecia which were isolated from the living tissues of the host plant were found 380,70 ∓ 10,1 microns (lest and most 250,00-445,00 microns). The samples cultured on artificial medium were 678,62∓56,10 x 693,27∓47,42 microns/ 100 samplest (least and most 3766,50-243,00 x 2430,00 - 296,60 microns). Their interiors were found empty.

The side of perithecia which were formed in living tissues were full of, tube-like asci. Each ascus has eight ascospores. The dimensions of asci in 100 measurments were found 50.10 ∓ 2,01 x 8,70 ∓ 0,01 microns (least and most 60,00 - 30,00 x 9,00 - 7,10 microns).

Ascospores have two cells and vary in shape from oblong to spherical with round or peaked ends. Their protoplasms have no homogenity. Dimensions of 100 samples were 10,00 ∓ 0,10 x 3,70 ∓ 0,05 microns (least and most 11,00 - 7,90 x 4,10 - 3,00 microns).

2.4. Systematic Nomenculature of **E. parasitica**

There are still some problems in the sistematic nomenculature of **Endothia parasitica** (Murr.) A. and A. In our research we prefered the nomenculature of C.J. Alexopoulos (Alexopoulos, 1966; Alexopoulos and Beneke, 1968; Karaca, 1968; Kobayashi, 1970).

3. Biology of **E. parasitica:**

3.1. Inoculation

Some methods were applied in order to find the effect of the wind on inoculation of spores. Applying these methods great numbers of

spores those were carried by wind, were found on the vaselined glasses and lams. Adaquate numbers of pathogen's colony were found in the petricups those were wind-breaked. The healty trees which were wounded were greatly infected by wind-carried spores. They showed typical symptoms of cancer.

In order to investigate the effect of the rain on inoculation spores which are on the water atomized or partly jetted over the infected barks or tissue were observed.

The insects and birds determined as carriers of **E. parasitica** spores were shown in table 2 and 3.

Table 2. The list of trapped insects and their evaluation as spore carriers.

Name of insect	Spore isolations	Location where it was trapped	Note
Aphrophoda alni	—	Beykoz	
Dolichosoma lineare	—	Beykoz	
Labidostomia prepenqua	—	Beykoz	
Melasoma populi	—	Beykoz	
Hemicopus pilosus	—	Beykoz	
Coenoympha sp.	—	Beykoz	
Leptura sp.	—	Beykoz	
Leptura fulva	—	Karamürsel	
Aemaedera dermestoides	—	Karamürsel	
Messor barbarus	+	Karamürsel	
Judolia erratica	+	Karamürsel	
Labidura riparia	—	Karamürsel	
Trichodes angustifrons	—	Karamürsel	
Graphosoma italicum	—	Karamürsel	
Apis mellifica	—	Karamürsel	
Valgus hemipterus	—	Karamürsel	
Phinocoris punctiventris	—	Karamürsel	
Boletophagus sp.	—	Karamürsel	

Table 2. (Continued) The list of trapped insects and their evaluation as spore carriers.

Conopia sp.	—	Karamürsel	Larva
Buprestidae*	+	Karamürsel	Larva
Ostomidae*	+	Karamürsel	Larva
Chrysomelidae*	—	Karamürsel	
Blattidae*	—	Karamürsel	
Alleculidae*	—	Karamürsel	

+ Pathogen's spores were isolated
— Pathogen's spores were not isolated
* Classification could only be carried out until family level.

It can be seen from Table 2. that **Messor barbarus, Judolia erratica,** larva of **Conopia** sp., larva of **Buprestidae** and **Ostomidae** families were found as disease carriers. Large amount of pycnidiospores were found in the suspentions of these insects.

Table 3. Effect of birds on transportation of the pathogen

Name of the bird	Spore isolations	Location where it was shot	Note
Lanius colleria	—	Beykoz	
Parus caeruleus	—	Karamürsel	♀
Parus caeruleus	—	Karamürsel	♂
Sitta europea	—	Karamürsel	
Musicapa parva	+	Karamürsel	
Musicapa sp.	—	Karamürsel	
Phylloscopus collybita	—	Karamürsel	
Hippolais sp.	+	Karamürsel	
Turdus merula	—	Karamürsel	♀
Erithacus rubecole	—	Karamürsel	♂
Erithacus rubecole	—	Karamürsel	♀
Carpodacus erytrinus	—	Karamürsel	♂

+ Species from which spores of pathogen isolated.
— Species spores non - isolated.

It can be seen from Table 3. that, **Musicapa parva** and **Hippolais** varieties were important as spore carriers. Large numbers of pycnidiospores were obtained out of washing of these birds.

3.2. Penetration

The symptoms of cancer were obtained on wounded trees but not unwounded.

For penetration of the pathogen, the age of the host tissues was also important. Pathogen could not penetrate on the living (green) tissues and branches smaller then 0,3 cm in diameter.

3.3. Incubation

Incubation period of the pathogen was 97,6 ∓ 40 days of the temperature of 18,5°C, 28,1 ∓ 1,06 days at 26°C and 39,6 ∓ 3,4 days at 28,8°C. There was no incubtion period at 15,0°C.

3.4. Infection

After penetration, mycellium of pathogen starts to spread under the bark of the tree. The results of the studies have shown that, the symptoms created by the pathogen varies greatly. For instance some craks and bumps (Figure 4) were observed on surface at 18,5° C and 78,1 % relative humidity and also at 20°C with 73,1 % relative humidity. However, only slight symptoms were observed on the bark at 26,2°C temperature with a relative humidity of 54,6% and at 28,8°C with relative humidity of 67,5 %.

As mycellium continue to expand under the bark (Figure 5). Pycnidia start to develope on the outside surface (Figure 6). These pycnidia are observed as red dots at the beginning later they form protuberences.

When the pycnidia spread its spores, perithecia usually starts to developed at the edge of stroma (Fig.7,8,9). Perithecia have become mature at 18,5°C and 78,1 % relative humidity in 107,0 ∓ 10,1 days. Perithecia were not occur at 22,9°C and 70,8% relative humidity and 28,8°C and 67,5 % relative humidity.

3.5. Wintering

The quantity of perithecia were found more in autumn and winter than in summer or in dry seasons.However there were not found any important differences on pycnidium and pycnidiospores variations.

4. The Effect of Tannin Concentration of Some Important Chestnut Varieties on Development of Pathogen.

Table 4 gives tannin concentrations of some important chestnut varieties and time requirements for first mycelium and pycnidium apperence on inoculated bark pieces. It also gives the amount of bark area covered with mycelium and pycnidia 13 days after inoculation.

Table 4. Tannin concentrations of various chestnut varieties, time requirements for the first mycellium and pynidium appereance after inoculation and mycellial and pycnidial growth rate

Variety	Tannin concentration (%)	Average time requlred for mycellium formation	Avarage time requiren for pycnidium formation	Exposion in 13 days	
				Mycelial	Pycnidial
Sarı kestane	3,5	3,75	4,00	1,49	7,48
Yabani (Deli)	5,6	4,00	4,00	3,75	5,22
Kuyruklu	5,7	4,50	5,50	3,24	20,26
Öküz Gözü	6,1	4,00	5,00	4,24	8,14
Gavur Kestanesi	6,2	4,75	5,75	6,95	8,76
İzmitli	6,7	4,75	5,00	4,26	11,50
Valice	6,8	4,00	4,50	7,78	9,77
Acı ibiş	6,8	4,00	4,50	3,50	4,48
Kara Mehmet	7,3	4,25	5,25	5,80	8,41
Hacı Ömer	9,8	3,75	4,25	4,15	9,29
Fordola	17,2	4,25	4,50	6,40	11,87

It can be seen from Table 4 that, tannin concentrations were found to be 3,5 % to 17,2 %, mycellium apperence 3,75 to 4,75 days, the development of pycnidium is 4,00 to 5,75 days; area covered with mycellium was 4,28-20,26 mm². There was some variations between all the numerical results.

Paralled studies were carried out using dilute solution of pure tannin. The results of these studies are shown in Table 5.

Table 5. The diameters of colonies on 6th, 8th, 10th, days after inoculations.

Age of colony (in days)	Tannin concentration (%)	Avarage colony radius (mm)	
		Tannin present	Tannin absent
6	0,0	—	5,5
	3,5	8,2	8,1
	5,6	9,0	12,5
	5,7	14,2	7,7
	6,1	9,6	9,6
	6,2	11,7	9,7
	6,7	14,3	10,4
	6,8	7,8	6,3
	7,3	9,2	6,3
	9,8	8,2	5,3
	17,2	15,9	11,1
8	0,0	—	9,7
	3,5	12,3	11,5
	5,6	9,7	11,5
	5,7	17,5	10,6
	6,1	13,3	11,2
	6,2	11,6	15,0
	6,7	19,0	12,5
	6,8	16,0	6,8
	7,3	12,2	8,2
	9,8	12,6	8,8
	17,2	24,0	14,8
10	0,0	—	12,0
	3,5	11,5	7,7
	5,6	12,3	13,0
	5,7	21,1	14,1
	6,1	20,8	12,8
	6,2	25,6	18,7
	6,7	25,2	15,0
	6,8	15,8	6,6
	7,3	21,1	9,0
	9,8	15,3	9,7
	17,2	32,7	20,0

From table 5 it can be seen that the tannin concentration, affected on the degree of increase of infestation and some variations were found in fungal activities.

In order to investigate whether some variations are subject in between 9,8 and 17,2 % concentrations. Some experiments were carried out in 9,8, 12,0, 16,0, and 17,2 % concentrations respectively. Results of this study is shown in Table 6.

Table 6. The diameters of colonies between 9,8 to 17,2 % concentrations, on 6th, 8th, 10th days after inoculation.

Age of colony (in days)	Tannin concentrations (%)	Average colony radius (mm)	
		Tannin present	Tannin absent
6	9,8	20,6	18,6
	12,0	22,0	20,6
	14,0	21,6	17,7
	16,0	22,0	20,0
	17,2	27,0	19,8
8	9,8	30,4	27,6
	12,0	31,3	30,7
	14,0	32,0	28,5
	16,0	32,6	30,5
	17,2	30.7	29.6
10	9,8	40,9	37,5
	12,0	40,5	39,2
	14,0	40,6	40,0
	16,0	41,6	39,0
	17,2	41,1	39,7

From Table 6 it can be seen that, all concentrations effected on the rate of infestation directly, variations were found very low and peak was around at 17,2 % of tannin concentrations.

DISCUSSION

Disseminations : -Results of our survey showed that, 32,3 ∓ 4,9 % of Marmara Region were infected by the pathogen. As Karaca (1968) mentioned, pathogen was introduced to our country from Caucasus. Bursa Region is the end of the chestnut horizon on the Black Sea Cost. Bursa and İnegöl were infected in the rate of 10,8 % and 8,3 % respectively. There were the lowest disseminated areas, Hendek region which is far

from the shore - line found uninfected.

Taxonomic study of the pathogen: - Results of our taxonomic study very nearly to Heald (1913, 1933). Shear and Stevens (1913), Anderson (1914), Anderson and Rankin (1914), Shear et al. (1917) and Kobayashi (1970)'s conclusions.

Biology of the pathogen : -It has been found that, pathogen's ascospores were carried by wind and pycnidiospores by rain - water, insects and birds. This results supports conclutions of former researcers.

E. parasitica could not penetrate on the green branches and branches less than 0,30 cm in diameter. Anderson and Babcock (1913) could obtain penetration on one year old branches artificially, Batson and Witcher (1968) concluded that, pathogen can not penetrate on green branches less than 0,50 cm in diameter. This is due to inability of the pathogen to develop on the living tissue and its need to grow on dead tissue before it can move to the living parts (Shear et al., 1917).

In our studies, incubation periods showed variations between 97,6∓40,0 to 28,1 ∓ 1,06 days. Anderson and Babcock (1913), Rankin(1913), Heald (1913), Boyce (1948), Stevens (1954), May and Davidson (1960), Viennot-Bourgin (1967) concluded that, due to climatic conditions, incubation periods range between 2 to 6 weeks.

The most effective factor on the perithecia fomation was the humidity as mentioned by Anderson(1914) Anderson and Rankin (1914), Karaca (1961), Viennot-Bourgin (1967).

The results of our studies on overwintering of the pathogen were the same as Anderson and Rankin (1914), Heald (1913; 1933), Viennot-Bourgin (1967).

Tannin concentrations of some important chestnut varieties and their effect on the pathogen: - It is belived that tannin is a carbon source for the pathogen. Cook and Wilson (1915) mention that pure tannin increases the rate of vegetatif growth of the organizm

Nienstaedt (1953) worked with barks of Chinese, Japanese and American chestnuts. He found that, fungal growth has no direct relation with the exterior tannin concentration of the bark, at least some other factors such as type of tannin in the tissues, the form its present in the tissue and some compounds besides tannins are also important. Foster (1952) mentoned that, sugar concentration and its percentage is much more important than the tannin concentration of the tissues. For this reason, after the 9,8 % concentration of tannin affect on growth the pathogen. That is the main reason why «Valiça» and «Acı İbiş» varieties in an equal tannin concentrations have different effect on fungal growth.

ÖZET

KESTANE KANSERİ [ENDOTHIA PARASITICA (Murr.) A. AND A.] HASTALIĞININ YAYILIŞI VE BİYOLOJİSİ

Marmara Bölgesi'nde patogenin yayılış alanını saptamak amacıyla yapılan sürveyde, otalama bulaşık ağaç yüzdeleri, İstanbul İlinde 33,4, Kocaeli ilinde 27,7, Sakarya ilinde 27,0, Bursa ilinde 11,3, Bolu ilinde 53,1 dir. Bu verilere göre, Marmara Bölgesindeki bulaşık ağaç oranı % 32,3 ∓ 4,9 dur.

Organizmin taksonomik incelenmesinde verilerin türün tüm karakteristiğini taşıdığı ortaya konmuştur.

Etmenin biyolojisi konusunda yapılan çalışmalarda, askosporların rüzgârlarla, piknosporların ise yağmurlar, böcekler ve kuşlarla taşındığı saptanmıştır.

Etmen fungus ancak yaralardan penetre edebilmekte, yeşil ve çapı 30 cm. den ince kısımlara penetrasyon olmamaktadır.

İnkubasyon periyodu sıcaklıkla ilişkili olarak değişim göstermekte; 15,0°C ta etmen hiç bir simptomunu oluşturamamaktadır. Ödemlerin oluşabilmesi yüksek nemle bağıntılıdır.

Bazı önemli kestane çeşitlerimizin tannin konsantrasyonlarının patogene etkilerine ilişkin çalışmada, % 3,5 - % 17,2 oranındaki tannin yoğunlukları etmeni arttırıcı etkide olmuştur.

LITERATURE CITED

ALEXAPOULOS, C.J., 1966. Introductory mycology, Second Edition, John Wiley and Sons, Inc. New York, London, Sydney. XVIII+613.

————and E.S. BENEKE, 1968. Laboratory manual for introductory mycology. Fifth Edition, Burgess Publishing Company, Mineapolis. V+199.

ANDERSON, P.J., 1914. The morphology and life history of the Chestnut Blight Fungus, Pennsylvania Chestnut Tree Blight Com mission Bull. No : 7, 1 - 44.

———— and D.C., BABCOCK, 1913. Field studies on the dissemination and growth of the Chestnut Blight Fungus. Pennsylvani Chestnut Tree Blight Commission Bull. No:3,1 - 45.

———— and W.H. RANKIN, 1914. Endothia Cancer of chestnut. Cornel Univ. Agric. Exp. Stat. Bull. No:347, 530-618.

ANONYMUS, 1959. Chestnut blight and resis_ tant chestnut U.S. Department of Agriculture, Farmers Bull.. No:2068.1-21.

———— (a), Tarımsal İstatistikleri özetleri

————(b), Tarımsal yapı ve üretim 1969. Başbakanlık Devlet İstatistik Enstitüsü, VII+386.

1970. Başbakanlık Devlet İstatistik Enstitüsü, 25.

BALDACCI. E. and M. ORSENIGO, 1952. Chestnut blight in Italy. Phytopathology, 42 : 38-39.

BATSON. W.E. and W. WITCHER, 1968. Live oak cancers caused by **Endothia parasitica**. Phytopathology, 58(11):1473-1475.

BOYCE, J.S., 1948. Forest pathology. Second Edition, McGraw-Hill Bokk Company, Inc. New York, XI+550.

COOK, M.T. and G.W. WILSON, 1915, The influence of the tannin concent of the host plant on **Endothia parasitica** and related species. Bot. Gaz. 60:346-361.

DILLER, J.D., 1965. Chestnut blight.U.S.Department of Agriculture Forest Pest Leaflet 94, 1-7.

ERDEM, R., 1951. Türkiye'de kestane ölümünün sebepleri ve savaş imkanları. Biricik Matbaası, Ankara, IV+82.

FOSTER, J.W., 1952. C hemical activities of fungi. Acedemic Prees Inc. Publisher, New York, 551-555.

GRAVATT, G.F. Diseases of the chestnut and poplar in Europe. Final Report of Organisation for European Economic Cooperation Timber Committee No:29.1-10.

————, 1950. Relative blight resistance in species and hybrids of Castanea. Phytopathology, 40(12).1125-1131.

HEALD, F.D., 1913. A method of determining in analytic work wheter colonies from picnospores or ascorspores. Mycologia, 5: 274-277.

————, 1933. Manual of plant diseases. Second Eiditon, McGraw-hill Book Company Inc. New York.

JENSEN, W.A., 1962. Botanical histochemistry, W.H. Freeman and Company, San Fransisco and London. VI+408.

JOHANSEN, D.A., 1940. Plant Microtechnique. McGraw-Hill Book Company Inc. New York and London. XI+523.

KARACA, İ., 1961. Genel Fitopatoloji. Atatürk Üniversitesi Yayınları No:17. VII+224.

KARACA, İ., 1968. Sistematik Bitki Hastalıkları (Ascomycetes) Cilt III, Ege Üniversitesi Ziraat Fakültesi Yayınları No:143. VI+ 242.

KOBAYASHI, T, 1970. Taxonomic studies of Japanase **Diaporthaceae** with special reference to their life-histories. Bulletin of the Government Forest Experiment Station No:226, 1-242.

LAZAROV. A., P. GIRIGOVOV, 1961. Karantina na rotenijata. Zemisdat, Sofia 258.

MAY. C. and R.W. DAVIDSON, 1960. **Endothia** parasitica associated with a cancer of live oak. Plant Disease Reporter, 44(9):754.

NIENSTAEDT, H., 1953. Tannin as a factor in the resistance of chestnut, **Castanae** spp. to the chestnut blight fungus **Endothia parasitica** (Murr.) A. and A., Phytopathology. 43(1) 632-38.

PEACHER, P.H., 1949. Live oak in Mississippi infected by **Endothia parasitica**. Plant Disease Reporter, 53(4):304.

RANKIN. H. W., 1913. Some field experiments with the chestnut canker ftngus. Phytopathology, 3:73.

SHEAR, L.C. and N.E. STEVENS, 1913. Cultural caractrs of the chestnut blight fungus and its near relatives. U.S. Dep. Agr. Bur. Plant Indust. Cir. 131, 3-18.

———— and R.J. TILLER, 1917. **Endothia parasitica** and related species. U.S. De partment of Agriculture. Bull. 380, 1-82.

STEVENS, F.L., 1954. Plant disease fungi. The Mac Millan Comp., New York, V+469.

STIPES, R.J. and P.M., PHIPPS., 1971. A species of **Ensothia associated** with a canker disease of Pin Oak **(Quercus palustris)** in Virginia. Plant Disease Reporter, **55(6)**: **467-469.**

VIENNOT-BOURGIN, G., 1967. Le champignons parasites des arbes fruitiers a noyau. **73,** Boulevard Raspail, Paris-VI. VI+165.

VON REGEL, C., 1963. Türkiye'nin flora ve vegetasyonunda genel bir bakış (Tercüme Edenler: A. Baytop, R. Denizci). Ege Üniversitesi Fen Fakültesi Monografiler Serisi No:1.143.

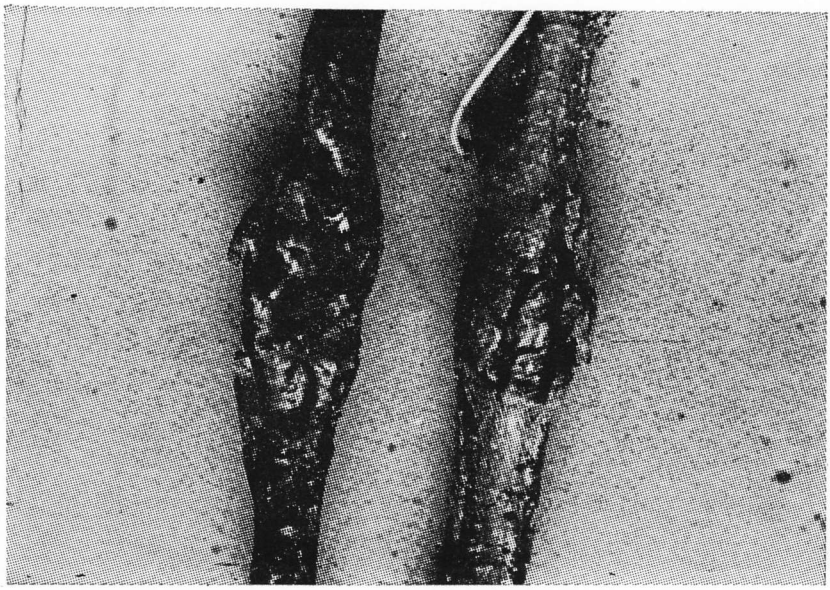

Figure 1. The infected oak branches by **E. parasitica**

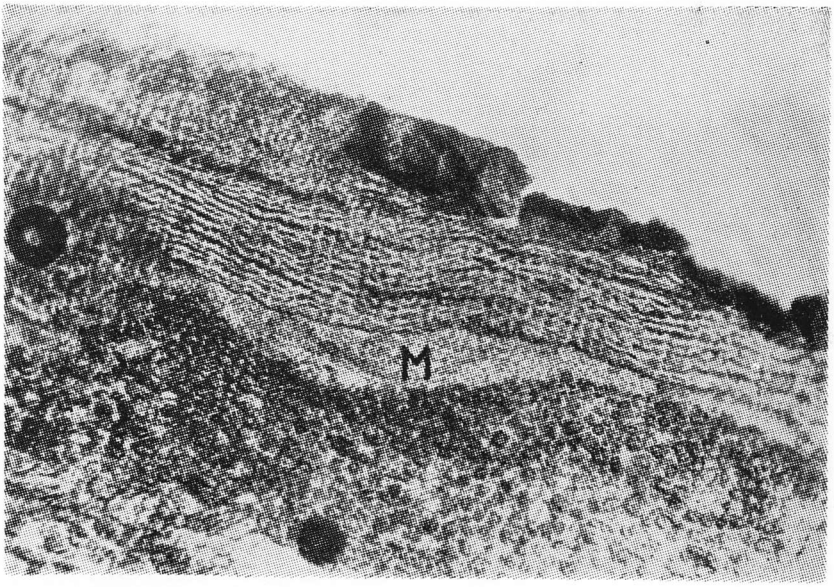

Figure 2. The appearance of the mycellial mass(M) on the cross section from the tissue (x 465)

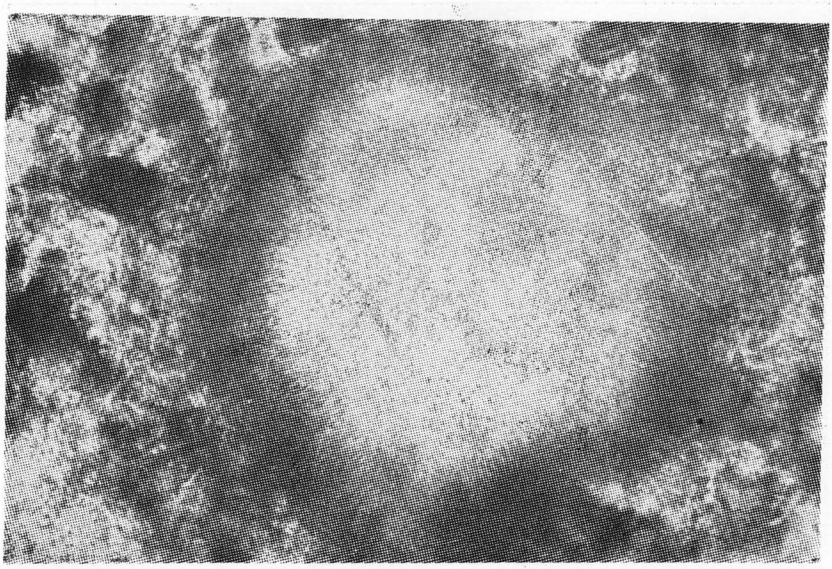

Figure 3. The conidiophores on the picnidium wall (x 465)

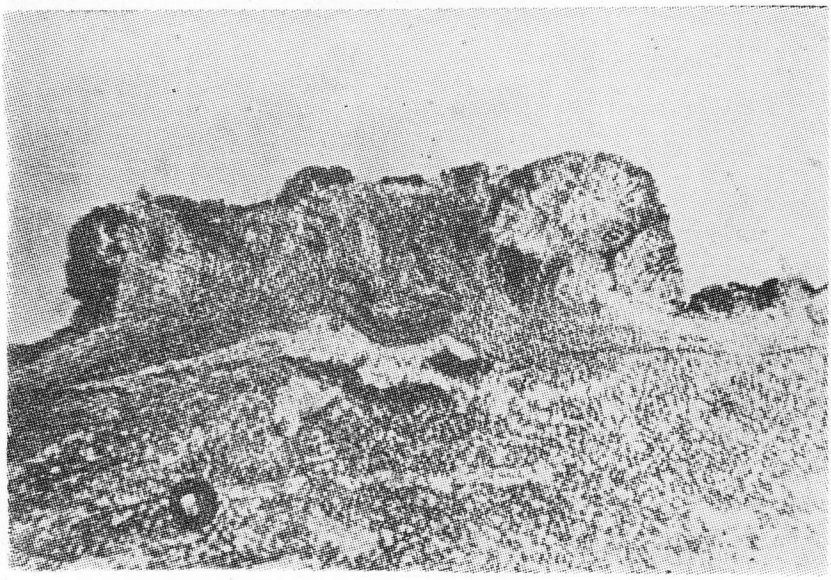

Figure 4. Early stage of the bump formation on the bark (x 115)

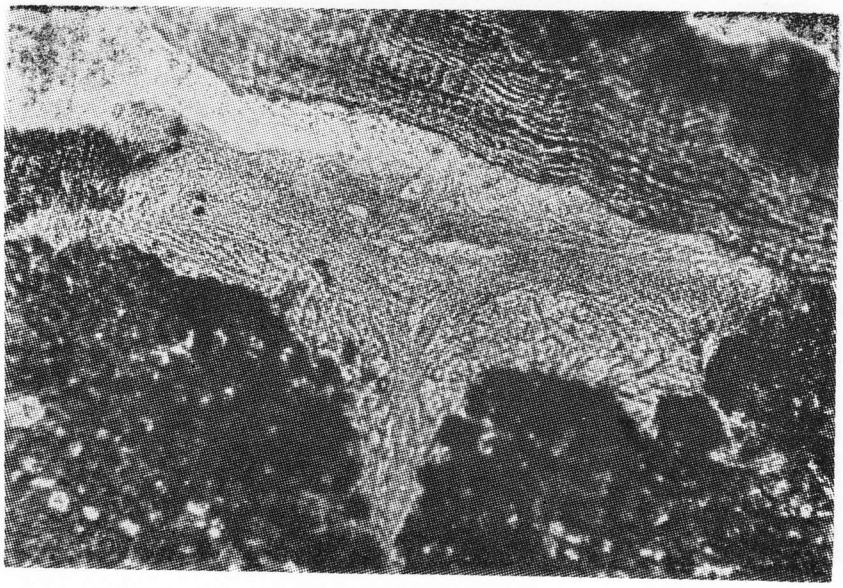

Figure 5. Deep improvement of the mycelial mass in the tissue (x 465)

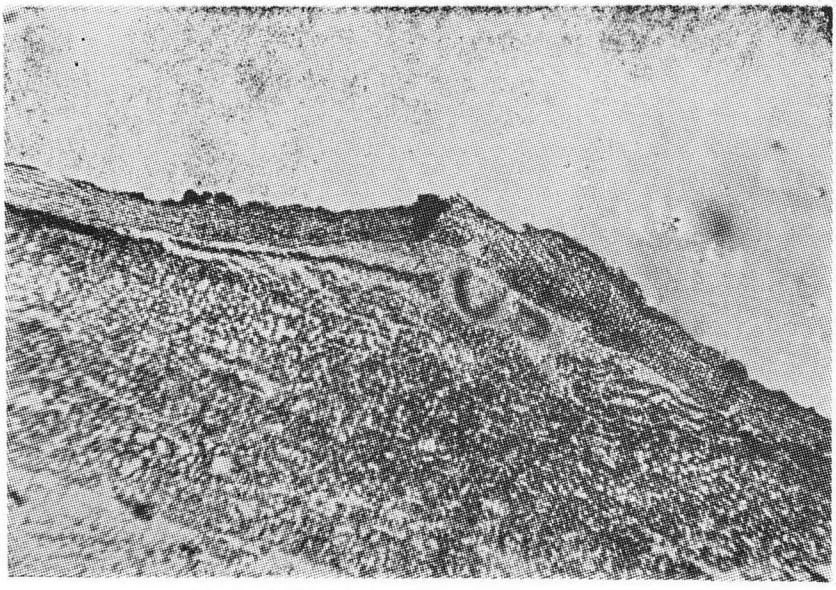

Figure 6. Begining of the pycnidial formation (x 115)

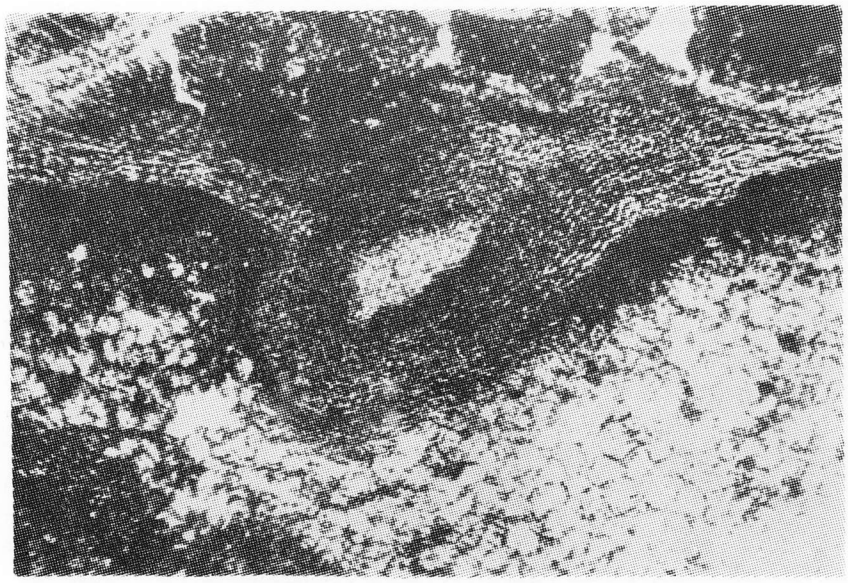

Figure 7. Begining of the perithecial formation at the deep of the empty pycnidial stroma (x115)

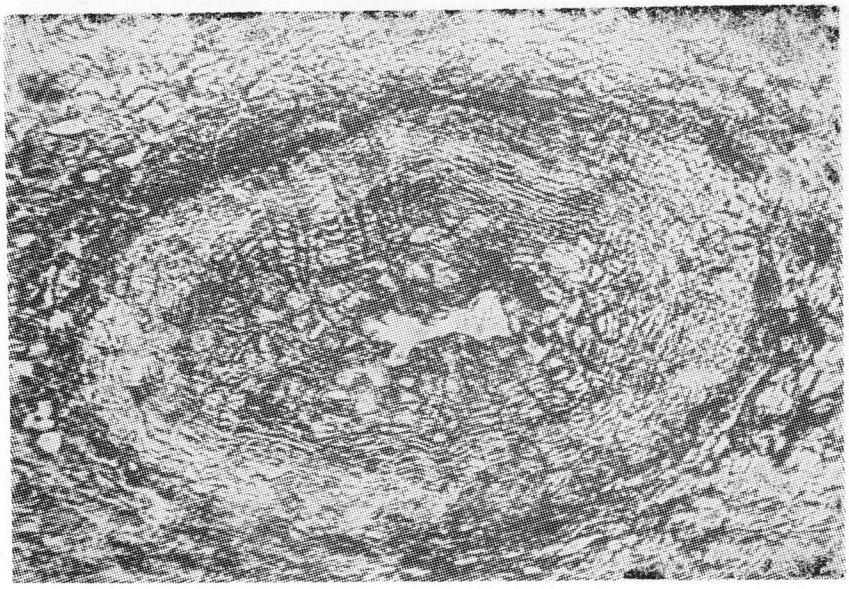

Figure 8. The model of a perithecium (x 115)

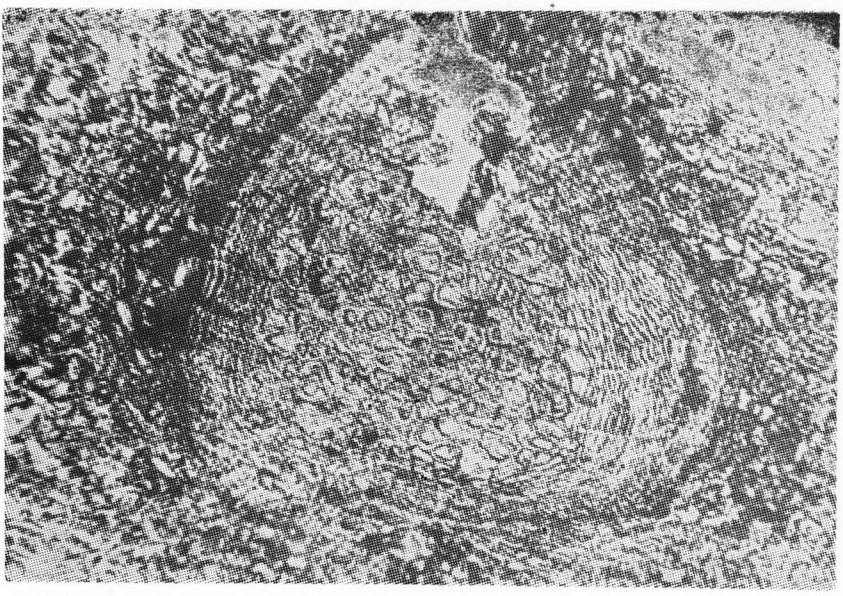

Figure 9. Begining formation of a neck on a model perithecium (x 115)

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Use of Trifluralin and Benefin on Onions Grown from Onion Sets for Weed Control*

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ABSTRACT

Six replicated experiments and eight large - scale demonstration trials were established in Turkey on bulb onion with Trifluralin and Benefin. It has been demonstrated both in research trials and in large scale demonstration trials that Trifluralin when applied at 0,96 kg ai/ha (2.0 L.FP/ha) prelant incorporated in bulb onions gave very good (85-95 %), to excellent control of annual grass weeds and susceptible bradleaf weeds.

INTRODUCTION

Trifluralin and Benefin are two important members, with dinitroaniline composition, of the selective pre-emergence herbicides which have started a new era in chemical weed control. It was previously known that dinitroanilines could be obtained as a by-product in dye production. we see that the phytotoxicity trials with dinitroanilines were carried out on beans for the first time in 1955. The use of this group as herbicides is more recent. ALDER et al., showed that 2,6-dinitroaniline showed more. herbicidal properties than 2,4 and 2,3-dinitroanilines as a result of their trials (PROBST and TEPE, 1969).

Trifluralin and amino derivative of trifluralin were isolated and identified from feces. Three urinary metabolites were isolated and identified as dealkylated product, the diamine, and the reduced monodealkylated derivative (PROBST and TEPE, 1969).

*) This paper has been given at First Turkish Phytopathological Congress, İzmir, October 20-24, 1975.

Photodecomposition is particularly important, therefore, incorporation with suitable equipment is a definite, time after the application of the chemicals onto the soil surface.

Trifluralin and Benefin show their herbicidal effect by inhibiting root and shoot growth and development. The morphological and histological findings proved that Trifluralin appered to inhibit cell division in meristematic root tissues . SCHULTZ (1968), searched for the effects of Trifliuralin on the synthesis of nucleic acid and the proteins in corn roots and found that nucleic acid and proteins decreased in the treated roots. A significant increase was detected in the prophase stage of the division in susceptible plants and this resulted in multi-nucleicells. (HACSKAYLO and AMATO, 1967), upon their examination of the treated roots, showed that the number of nuclei reached five in some cells and, thus, a normal mitosis division could not be achieved.

Nowadays, Trifluralin is safely used for the weed control on many plant species and varietes, the emphasis being on cotton and the soybeans, Since the plant species and the varieties grown are not the same in all countries, then, the fact that planting/sowing techniques will be different, too, is self - evident. These differences result in new application areas as regards the herbicides. In fact, we did not known the effects of Trifluralin and Benefin on onion sets until we started this trial. Besides, weeds have very significant effects on onion yield. For example, in onions, leaving 15 % weed stand for the first six weeks before removal reduced onion bulb weight by 86 %. Fifty percent weed stand reduced it by 91 % (KLINGMAN, 1963). The rapid increases in labor wages in the racent years make it necessary to reduce the labor share in agriculture in Turkey. Besides, we felt it necessary to conduct trials to search the possibilities of using Trifluralin and Benefin on onions which have a total population of 65.000 - 80.000 hectares per year.

MATERIAL and METHODS

Fourteen trials were conducted in Karacabey (Bursa) and Turgutlu (Manisa) in 1972 and 1973. Six of them were made, each with four replications, according to the replicated random block design and eight were large scale demonstrations (treated and control). Trifluralin (Treflan 48 EC) was applied at 0.72, 0.96, 1.20 and 1.92 kg ai/ha, Benefin (Balan 18 EC) at 1.17 and 1.53 kg ai/ha rates in the replicated trials. In large scale demonstrations, only Trifluralin was used at 0.96 kg ai/ha rate. The loca-

tion and the design of the trials, plot sizes, soil types and the incorporation equipments are presented in Table 1.

Hudson pulverizers having four teejet-80015 type nozzles were used in the trials, chemicals were sprayed onto the soil with 400 liters of water per hectare afer the last plowing and incorporated 0 - 4 hours later to a depth of 6-14 cm. with one of the following equipment; rotary hoe, discharrow and ordinary rake. When the former two are used, one incorporation was made. In case of using rake, two incorporations were necessary. For the trials in Karacabey, local onion species which are resistant to winter and thoroughly planted in the territory were planted. Set onions were planted within 1-10 days following the application, first and the second weed counts were made 30-42 and 70-99 days after the application, respectively. The weed species present in the four rows at the centre of each plot were counted one by one;

To determine the susceptibility of onions planted from onion sets (bulbs) to the chemicals, onion plants appearing above the ground were counted one by one, bulb sizes were recorded and the yield was found by weighing in each plot. The evaluations with the bulb sizes were based on hundred onions randomly picked up from each plot during harvest.

RESULTS and DISCUSSION

No statistical differences were recorded between Trifluralin's 0.72 kg ai/ha and the higher rates according to the results of the first weed conutings. However, the second weed counts showed some difference between the efficacy of the 0.72 and the higher rates. 0.96 kg ai/ha rate did not deviate from the other rates, statistically. Benefin was seen to be less effective than Trifluralin. The results of the six trials showed that Trifluralin's 0.96 kg ai/ha rate provided sufficient weed control for the weeds susceptible to the chemical from planting to harvest. The weeds can be grouped into four against Trifluralin's 0.96 kg ai/ha rate.

1. Weeds that are controlled best (95-100% weed control): **Amaranthus ret roflexus, A. albus, Chenopodium album, Cerastium vulgatum, Echinochloa crus-galli, Phalaris minor, Poa annua, Polygonum aviculare, Setaria verticillale, S. viridis, Stellaria media.**

2. Good control (85-95 % weed control): **Papaver rhoeas, Urtica urens.**

Table 1. Summary of Materials and Methods for Transplanted Bulb Onion Experiments Conducted with Trifluralin and Benefin in Turkey (1972 — 1973)

Experiment no	Location	Experimental design	No. of reps	Plot size (m^2)	Sail type	Incorporation equipment
72—1	Karacabey	Random Blocks	4	30	Loam	Rotary hoe
72—2	Hotanlı	» »	4	15	Loam	Rotary hoe
73—3	Hotanlı	» »	4	20	Sandy Loam	» »
73—4	Karacabey	» »	4	20	Silty Loam	» »
73—5	Sed	» »	4	20	Loam	Disc harrow
73—6	Yenisarıbey	» »	4	20	Loam	Rotary hoe
73—D—7	Turgutlu	L.P. Demonstration	1	1000	Sandy	Animal tool
73—D—8	Karacabey	» »	1	300	Loam	Tractor rake
73—D—9	Hotanlı	» »	1	1500	Sandy Loam	Rotary hoe
73—D—10	Hatal	» »	1	2000	Silty clay	Rotary hoe
73—D—11	Kirmikir	» »	1	2500	Sandy Loam	Disc harrow
73—D—12	Yenisarıbey	» »	1	2500	Loam	» »
73—D—13	Sedaltı	» »	1	500	Loam	» »
73—D—14	Yenisarıbey	» »	1	1500	Loam	» »

3. Erratic control (more that 80% control in some trials, less than 50% control in some others):

Avena fatua, Solanum nigrum.

4. Unacceptable control: **Aethusa cynapium, Anthemis tinctoria, Convolvulus arvenis, Datura stramonium, Sinapis arvensis, Xanthium spinusum.**

Weed control counting in large scale demonstrations were made for annual grasses, broadleaves and the total flora.

As seen in Table 2 the efficacy is 72-94 % for the annual grasses, 40-83 % for broadleaves and 68 - 86 % for the whole flora. As regards the susceptibility of onion to Trifluralin and Benefin, data obtained indicates that it tolerant the highest rates. In fact, as seen in Table 3, all rates of the chemicals did not show any negative effects on the crop stand of onions. If one considers the size of the bulbs, the ones in the treated plots have always grown better than the ones in the control plot.

As far as yield is concerned, the replicated trials showed that the yield in the treated plots was superior than the yield in the conrol plots (Table 4).

Much bigger differences in yield was recorded between treated and the untreated plots in the large scale demonstrative trials (Figure 1).

According to the average of the 8 trials, the yield per 100 sqm. was 164 kg in the unweeded control, 191 kg. in the handweeded control and 234 kg in the treated plot. These figures clearly indicate the effect of weeds on yield.

The fact that Trifluralin and Benefin are not phytotoxic to onions when planted from onion sets in spite of the phytotoxicity observed on onions sown from seed may be due to the physiological resistance gained by the onion sets. According to PROBST and TEPE (1969), the selective herbicidal properties of the chemicals with dinitroaniline compounds is closely related to the physiological resistance coupled with the seeds having well deveoped embryos,

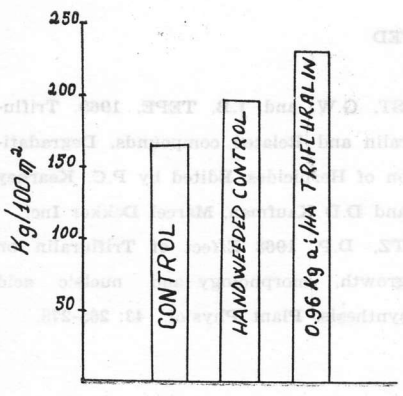

Figure 1. The yields in treated (with Trifluralin). handweeded and undweeded plots according to the averages of eight large scale demonstrations

rapid sprouting and getting away from the treated zone quickly gives way to the growth of the roots and the shuts.

As a result, Trifluralin at 0.96 kg ai/ha (200 cc formulated product per 1000 m^2) rate proved to be a reliabel herbicide for weed control in onion fields planted by onion sets. The cost of Benefin per unit area is higher, therefore, it is not acceptable in onions fields for the present.

ÖZET

ARPACIKTAN SOĞAN YETİŞTİRİLEN YERLERDE TRİFLURALİN VE BENEFİN'İN YABANCI OTLARA KARŞI KULLANILMASI

Arpacıktan soğan yetiştirilen yerlerde Trifluralin ve Benefin'in yabancı ot kontrolü ve soğanlara etkilerini ortaya koymak için altısı tesadüf blokları desenine göre, sekiz tanesi de geniş uygulama denemesi şeklinde 14 deneme Bursa-Karacabey ve Manisa-Turgutlu'da açılmıştır. Tekerrürlü ve geniş uygulama denemelerine göre, Trifluralin hektara 0.96 kg aktif dozunda (dönüme 200 cc preparat) uygulandığında duyarlı özçimenler ve geniş yapraklı otlar üzerinde çok iyi % 95-100) ve yeterli (% 85-95) düzeylerde kontrol sağlamıştır. Trifluralin ve Benefin'in yüksek dozları (Trifluralin hektara 1.92 kg aktif, Benefin hektara 1.52 kg aktif) dahi yumru iriliğine kumlu-tınlı, killi-tınlı ve tınlı topraklardaki sonuçlara göre olumsuz bir etkide bulunmamışlardır. Tekerrürlü ve tekerrürsüz denemelerin sonuçlarına göre, Trifluralin hektara 0.96 kg aktif dozunda uygulandığında verimde önemli artışlar sağlamıştır. Bu artış özellikle geniş uygulama denemelerinde daha belirgin olarak ortaya çıkmıştır.

LITERATURE CITED

HACSKAYLO, J. and V.A. AMATO, 1967. Effects of Trifluralin on roots of corn, cotton. Weed science.

KLINGMAN, G.C. 1963. Weed Control: As a science. New York, London, John Wiley and Son Inc.

PROBST, G.W. and J.B. TEPE, 1969. Trifluralin and Related compounds. Degradation of Herbicides. Edited by P.C. Kearney and D.D Kaufman, Marcel Dekker Inc.

SHULTZ, D.P. 1968 Effect of Trifluralin on growth, morphology and nucleic acid synthesis. Plant Physiol., 43: 265-273,

Table 2. Percent Weed Control 40—55 Days after Treatment (Large Scale Demonstrations; Dosage: 0.96 kg. ai/ha)

Experiment No.	Percent Weed Control			Total Weed Number in one sqm.
	Annual Grass	Broadleaf	Total	
73— 7	87	68	76	120
73— 8	93	40	68	227
73— 9	82	78	80	103
73—10	86	62	74	97
73—11	94	75	81	143
73—12	89	80	81	185
73—13	89	80	86	327
73—14	72	83	76	65

Table 3. Summary of Crop Stand Rating from Experiments

Treatment	Dosage kg ai/ha	73—3 1/	73—4 1/	73—5 1/	73—6 1/
Trifluralin	0.72	256 aa	255 bb	482 aa	447 aa
»	0.96	255 aa	253 bb	435 aa	448 aa
»	1.20	256 aa	258 ab	462 aa	456 aa
»	1.92	259 aa	255 bb	459 aa	473 aa
Benefin	1.17	257 aa	260 ab	461 aa	464 aa
»	1.52	253 aa	269 aa	443 aa	480 aa
Handweeded control	—	255 aa	259 ab	473 aa	436 aa
Unweeded control	—	253 aa	255 bb	456 aa	445 aa

1/ Average plants of four replications.

Table 4. Summary of Yield Data from Experiments

Treatment	Dosage kg ai/ha	72—1 Yield/ 30 m²	72—2 Yield/ 15 m²	73—3 Yield/ 20 m²	73—4 Yield/ 20 m²	73—5 Yield/ 20 m²	73—6 Yield/ 20 m²
Trifluralin	0.72	41 aa	13 bc	48 aa	27 aa	41 ab	26 ab
»	0.96	36 ab	16 ab	47 aa	28 aa	44 ab	26 ab
»	1.20	40 aa	18 aa	49 aa	29 aa	40 ab	25 ab
»	1.92	34 ab	15 ac	51 aa	24 ab	46 aa	28 aa
Benefin	1.17	36 ab	14 bc	47 aa	28 aa	42 ab	24 ab
Benefin	1.53	43 aa	13 bc	46 aa	25 ab	40 ab	21 bb
Handweeded control	—	38 aa	14 bc	48 aa	28 aa	39 ab	24 ab
Unweeded control	—	28 bb	13 cc	41 bb	20 bb	39 bb	21 bb

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Bestimmung der Keimpotenz von Cephalaria syriaca und Boreave orientalis mit der TTC - Methode

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ZUSAMMENFASSUNG

Hier wurde mit Tetrazoliummethode (TTC) die Keimpotenz von **Cephalaria syriaca** und **Boreave orientalis**- Samen bestimmt, und die Versuchsmethode erklärt. Mit dieser Methode besteht die Möglichkeit die Keimpotenz, unter Ausschaltung der Dormanz-Faktoren, mit einer Genauigkeit von 100 % festzustellen.

EINLEITUNG

Durch keimversuche kann man bei Unkrautsamen nicht genau feststellen, ob die Samen lebendig oder tot sind. Da Unkräuter nah mit Wildpflanzen verwandt sind, wirken die inneren Dormanzfaktoren mehr und stärker. Durch die von Lakon im jahre 1942 dene TTC-Methode kann man durch die Keimpotenz den genauen Zustand der Samen feststellen.

TTC (2,3,5-Triphenyl - tetrazoliumchlorid) ist ein weißes pulvriges Salz, in Wasser leicht löslich. Wenn man die Samen mit TTC behandelt, reduzieren die Dehydrogenase Fermente das stark karminrote Formazan und die lebenden Zellen werden sichtbar. Bei den Dehydrogenase Fermenten sind die wichtigsten Diphosphopyridinnucleotid oder Triphosphopyridinnucleotid. Diese Nucleotide bilden Redoxsysteme. In toten Zellen kann solch ein Redox system sich nich bilden.

Bei der topografischen Auswertung bedeutet der rote Teil bei den Samen lebend, der weiße Teil tot.

Über die in der Praxis benutzten Samen wurden über die Familien und Gattungen von Lakon und Bulat gearbeitet (Mand arbeitete bei den Unkrautsamen mit der TTC-Methode (Lakon 1949; Lakon und Bulat 1951; Bulat 1961; Rieder 1966).

Da die Samenschale abhängig von der Pflanzenart die TTC-Lösung meist nich eindringen läßt, müssen die Samen so behandelt werden, daß das TTC einfach und homogen in den Embryo und das Endosperma eindrin gen kann. Deshalb muß bei so hartschaligen Samen wie Leguminosen die Schale gegenüber dem Embryo eingeritzt werden. Von Compositen Samen der die Kotyledonen enthaltene Teil geritzt werden, falls die Samenschale wasserdurchlässig ist, ist keine Präparation vor der TTC-Behandlung nötig.

MATERIAL und METHODEN

Hier wurde über 2 Arten gearbeitet : **Cephalaria syriaca** und **Boreave orientalis.**

1. Cephalaria syriaca

Damit die TTC-Lösung homogen und einfach eindringen kann, wurde der die Kotyledonen enthaltene Teil eingeritzt. Der Samen wurde bei Zimmertemperatur 4 - 5 Stunden im Wasser liegen gelassen, danach wurde die Schale abgeschält. Die abgeschälten Samen wurden in der vorbereiteten 1 % igen TTC-Lösung 2 Stunden bei 25°C gelassen. Danach wurden die Samen aus der Lösung genommen und mit Wasser gut gewaschen. Die Samen wurden bei 15° C (optimale Keimtemperatur) in Petrischalen auf Filterpapier zum Keimen ausgelegt. Davor wurden die Samen mit ihren gefärbten und nicht gefärbten Teilen genau gezeichnet. Für jede Zeichnung wurden zur Überprüfung mindestens 40 Samen zum Keimen gebrcht und danach die topografische Karte gemacht.

2. Boreave orientalis

Bei den zu **Cephalaria syriaca** unterschiedlichen Samen von **Boreave orientalis** wurde die Schale mit der Pinzette abgetrennt und die Samen 2 Stunden in Wasser gelassen. Die weiteren Behandlungen sind gleich wie bei 1.

ERGENIBSE und DISKUSSION

Von jeder Art wurde die Topografie-Karte in Zeichnung 1 und 2 gezeigt. Die mit Positiv (+) bezeichneten Samen besitzen Keimpotenz, dagegen haben die negativ (—) bezeichneten keine Keimpotenz. Bei beiden Arten ist die Keimpotenz vom toten Teil der Kotyledonen wenig abhängig. Im Embryo muß die Radikula und Primula lebend sein und

mit dem Kotyledonenteil in Verbindung stehen. Bei beiden Samen war die Keimtemperatur niedrig (15°C).

Wenn man mit dieser Methode die Keimpotenz bestimmen will, soll man die Samen präparieren, die Schalen ritzen oder abschneiden oder unbehandelt lassen, danach im Dunkel bei 30°C in 1%iger TTC-Lösung eine Zeit liegen lassen. (Die Zeit ist abhängig von der Pflanzenart). Die aus der TTC-Lösung genommenen Samen werden danach öfters mit Wasser gespült. Dann wird dee Samenschale abgeschält und unter dem Binokular oder der Lupe der Färbungszustand festgestellt. Der Färbungszustand festgestellt. Der Färbungszustand wird mit fertigen topografischen Zeichnungen verglichen und festgestellt, ob die Samen Keimpotenz besitzen.

Mit Keimversuchen kann man nur die ungefähre Keimfähigkeit von Samen feststellen. Man nimmt nur die gekeimten Samen als lebend, die ungekeimten als tot an. Hier besteht ein Fehler, weil man manche Dormanzfaktoren nicht berücksichtigen kann und somit die unter Dormanzfaktoren befindlichen Samen als tot bezeichnet. Mit dieser Methode kann man die wahre Keimfähigkeit (Keimpotenz) feststellen. So kann man bei unter Dormanzie befindlichen Samen auch den Zustand feststellen. Es ist interessant zu wissen, wenn man den Dormanz - Faktor aufhebt, wieviele Samen noch keimen.

ÖZET

CEPHALARIA SYRIACA ve **BOREAVE ORIENTALIS** TOHUMLARININ ÇİMLENME POTANSİYELLERİNİN TESBİTİ ÜZERİNDE BİR ÇALIŞMA

Cephalaria syriaca ve **Boreave orientalis** tohumlarının çimlenme potensiyallerini tesbit maksadıyla Tetrazolium metodunun (TTC) kullanılışı izah dildi. Bu metodla dormant tohum numunelerinin çimlenme potansiyallerini büyük bir kesinlikle bulmanın imkan dahilinde olduğu belirtilmiştir.

LITERATURVERZEICHNIS

LAKON, G., 1949. Orginalvorschrift vur Feststellung der Keimfähigkeit von Getreide und Mais nach dem topografischen Tetrazoliumverfahren. - In: Eggebrecht (1949), 37 38.

LAKON, G. und H. BULAT, 1951. Die Feststellung der Keimfähigkeit der Kruziferensamen nach dem Topografischen Tetrazoliumverfahren.- Saatgutw. 3: 134-136.

BULAT, H., 1961. Reduktionsvorgänge in lebendem Gewebe, Formazane. Tetrazoliumsalze und ihre Bedeutung ald Redoxindikatoren im ruhenden Saten.- Proc. Int. Seed Test. Ass. 26, 686 - 696.

RIEDER, G., 1966. Der Einfluß des Schwemmistes auf die Unkratverbreitung und die Anwendung der Tetrazoliummethode bei Unkrautsamen.- Diss. Hohenheim.

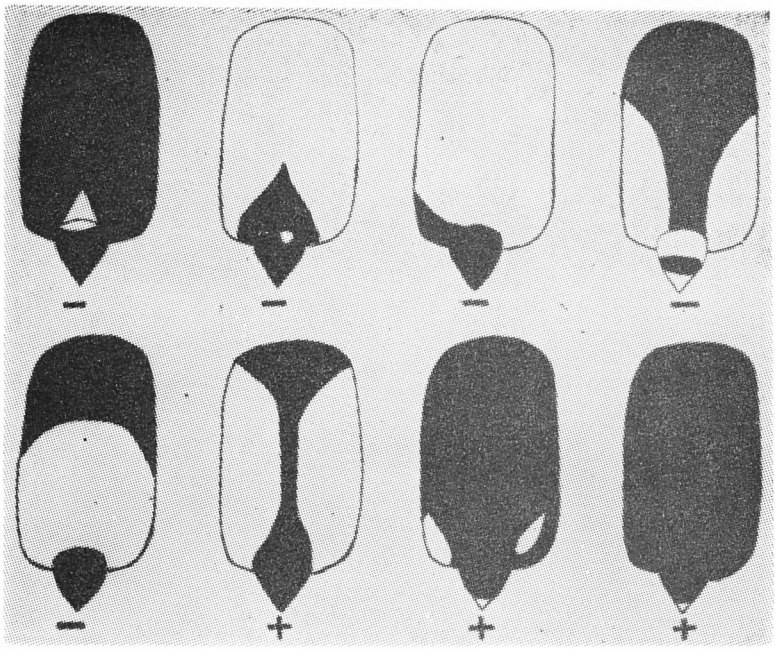

Abb. 1. Mit TTC - Lösung gefärbte **Cephalaria syriaca** - Samen ((+) mit Keimpotenz, (-) tot)

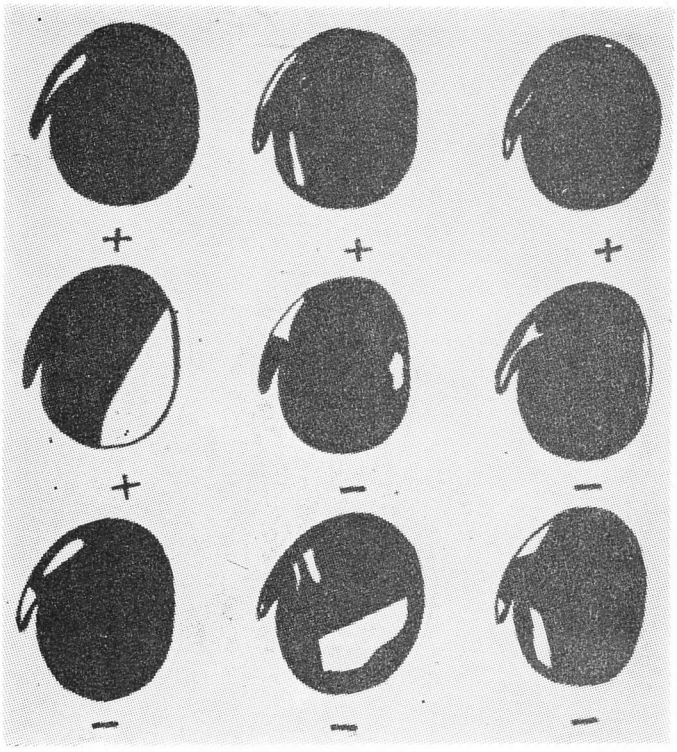

Abb. 2. Mit TTC - Lösung gefärbte **Boreave orientalis** - Samen ((+) mit Keimpotenz, (-) tot)

J. Turkish Phytopath. Vol. : 4 Num : 3 — 1975

Untersuchungen über die besten Infektionsmethoden an Erdbeerpflanzen mit Verschiedenen Phytophthora cactorum (Leb. et Cohn) Schroet - Herkünften *

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ZUSAMMENFASSUNG

Um die beste Infektionsmethode an Erdbeerpflanzen mit verschiedenen **Phytophthora cactorum** (Leb. et Cohn) Schroet Isolaten herauszufinden, wurde diese Untersuchung im Institut für Obsthrankheiten der Biologischen Bundesanstalt für Land- und Fortwirtschaft in Deutschland durchgeführt. Im Institut gab es 23 verschiedene **P. cactorum** - Herkünfte (Isolationen von Apfel, Erdbeerrhizom und Erdbeerfrüchten). Zunaechst wurden 23 verschiedene **P. cactorum**- Herkünfte für Virulenz geprüft. Anschliessend wurden vier verschiedene virulente **P. cactorum** Isolaten ausgewaehlt und mit denen wurden Labor- Versuche dieser Arbeit durchgeführt.

EINLEITUNG

Zu dieser Arbeit wurden vier verschiedene virulenten **P. cactorum**-Herkünfte und Erdbeerpflanzen herangezogen. Den inhalt dieser Arbeit kann man kurz so fomilieren : Mit welcher Infektionsmethode kann man am besten unter vier verschiedenen virulenten **P. cactorum** - Herkünften bei abgeschnittenen Erdbeerpflanzen impfen? Die hunzugezogenen **P. cactorum** - Herkünfte werden mit der Nr. 3,4,17 und 18 gekennzeichnet.

*) Diese Untersuchung wurde im BBA Institut für Obstkrankheiten in Heidelberg durchgeführt.

MATERIAL und METHODE

Material: Die Erdbeersorte «Regina» wurde vorher um die Anfaelligkeit gegen Gorella geprüft.

Pilzmaterial : 2 Staemme von Apfel Nr. 3 und 4, 2 Staemme von Erdbeerrhizom Nr. 17 und 18.

Methode : Erdbeere herausnehmen, Wurzeln und Beaetter abschneiden, sauber waschen (unter fliessender Wasser, etwa 2 Stunden). In 5 % iger Chlorlauge (Na—Hypochlorit= NaOCl) 5 Minuten oberflaechlich sterilisieren und danach mit Dest. Wasser nachspülen. Impfstück wird auf die Wurzeln und auf die abgeschnittenen Blattstiele aufgebracht. Genauso kann man vom Rhizom (stücke) abschneiden (Verletztes Rhizom) und darauf Mycelstück legen oder das Impfstück wirt seitlich auf das Rhizom (unverletztes Rhizom) gelegt. In einer Feuchtkammer werden die geimpften Stücke in Gruppen mit 5 Pflanzen aufgestellt.

Vorher wurde die Petrischalen 2 Stunden lang bei 160°C in Thermostaten sterilisiert. Alle Versuchsglieder wurden in der Feuchtkammer im Labor untergebracht. Vor den Versuchen wurde der Pilz auf dem Kultursubstrak der Kartoffelsaft-Agar gewachsen.

ERGEBNISSE und DISKUSSION

Im ersten Versuch wurden die **P. cactorum** - Herkünfte mit den Nummern 3,b,17 und 18 am 2.5.1972 in Kultur genommen. Am 8.5.1972 hatten sie einen Durchmesser von ca. 30 - 40 mm. In zweiten Versuch wurden sie am 17.5.1972 in Kultur genommen und am 25.5.1971 hatten diese Kulturen einen Durchmesser von ca. 70 mm. Zum Beimpfen der Rhizome wurden jeweils ein ø 9 mm. grosses Impfstück mit dem Korkbohrer vom Rande der Kultur entnommen.

Die Erdbeerpflanzen wurden für erste Versuch am 8.5.1972 auch für den zweiten Versuch am 25.5.1972 aus dem Freiland entnommen und mit den Isolaten infiziert. Für den ersten Versuch wurden die Rhizome in einer 5 % igen Chlorlauge (5 min.) nud für den zweiten Versuch mit 0,1 % $HgCl_2$- lösung (2 min.) sterilisiert.

Erster Versuch wurde am 12.5. 1972 bonitiert. In allen Versuchsgliedern war Fremdbefall. wir hatten den Eindruc, dass der Pilz in 4 Tagen nicht Lange genug einwirken konnte und deshalb die Symtome nicht deutlich ausgepraegt waren. Der zweite Versuch wurde am 5.6. 1972 wie der erste Versuch ausgewertet. Die Sterilisation mit $HgCl_2$ Lösung scheint wesentlich besser zu sein. Nur hatten

eine Pflanze - fremdbefall. Fast waren alle Rhizome auch in der kontrolle stark gebraeunt. Die meisten Rhizome waren zunaechst ausgetrieben aber nachtraeglich getrocknet, so dass die Schadsymtome sehr undeutlich waren, und man konnte durch natürlich und künstliche Infektionen Abgestorbenen Schlecht unterscheiden.

Für die Braeunung der Rhizome Kaemen folgende Ursachen in Frage

1. Die Ausvertung war zu spaet oder.
2. Die Rhizome waren natürlich infiziert.

Obwol das Ergebnis dieses Versuches etwas unklar ist, scheinen die Infektionen über das verletzte Rhizom und den Blattstiel nach den Ergebnissen aus dem ersten und zweiten Versuchen am sichersten zu sein. die von Wurzel und unverletztem Rhizom geimpten Pflanzen sind weniger als die Anderen krankheitsanfaellig. Die Infektionen am verletztem Rhizom und Blattstiel sind immer grösser von leichtem Befall zum starken Befall als die Infektionen am Wurzel und unverletztem Rhizom und genauso der Befall untereinander im ersten Fall grosser als im zweiten Fall. Aus diesem Grunde wurde noch ein Versuch nur mit Infektionen auf dem verletzten Rhizom und über durch geführt.

Zur Sicherung der Ergebnisse wurden parallel zwei neue Versuchsserien angesetzt. Eine Serie im Labor in dem Feuchtkammern und die andere Gewaechshaus bei 22°C und 85 % Luffeuchtigkeit vorbereitet.

Die dritte und vierte Versuche wurden am 12.6.1972 in Kultur von der **P. cactorum** genommen. Am 21. 6.1972 hatten sie einen Durchmesser von ca. 65-78 mm. Die gleichen Erdbeerpflanzen wurden am 21.6.1972 aus dem Freiland entnommen und mit dem Isolaten infiziert. Als Methodik wurden sie wie im zweiten Versuch durchgeführt. Die sterilisation des Pflanzenmaterials mit 0,1 % ige $HgCl_2$-Lösung scheint am geignetesten zu sein. In allen Versuchsgliedern war kein Fremdbefall.

An Dieser Stelle möchte ich meine tiefe Dankbarkeit an Herrn Prof. Dr. A. Schmidle und P. Assadi sowie auch Frau Thaler, die mir bei dieser Arbeit behilflich war, ausdrücken.

ÖZET

ÇEŞİTLİ **PHYTOPHTHORA CACTORUM** (LEB. ET COHN) SCHROET-İZOLATLARIYLA ÇİLEK BİTKİLERİNDE EN İYİ ENFEKSİYON METODU ÜZERİNDE ARAŞTIRMALAR.

Çilek bitkilerinde en iyi enfeksiyon metodunu bulmak için enstitüde mevcut olan 23 adet farklı virulanslı **P. cactorum** izolatlarından 4 adedi alındı (Nr.3,4,17 ve 18). Regina cinsi çilek bitkisinin yaralanmış rizom, yaprak sap izi, kök ve rizom kısımlarına Patates-Agar besiyerinde geliştirilmiş olan fungusun izolatları aynı anda aşılandı. Her izolat için 5 çilek bitkisi enfekte edilerek nemlendirilmiş filtre kağıdı bulunan büyük petrilere yerleştirildi ve laboratuvarda oda sıcaklığına konuldu.

İnokulasyondan bir hafta sonra değerlendirildi. Çilek bitkisinin yaralanan rizom ve yaprak sap izine yapılan enfeksiyonun, kök ve rizom'a yapılan enfeksiyondan daha fazla başarılı olduğu görüldü.

Üçüncü bir araştırmada ise bulunan enfeksiyon metodunun doğruluğunu göstermek amacıyla aynı izolatlar çilek bitkisinin yaralı rizom ve yaprak sap izleri üzerine enfekte edildi. Neticede bütün çilek bitkileri bu fungus tarafından hastalandırıldığı, enfeksiyon şiddetinin ise zayıf enfeksiyona doğru arttığı görüldü.

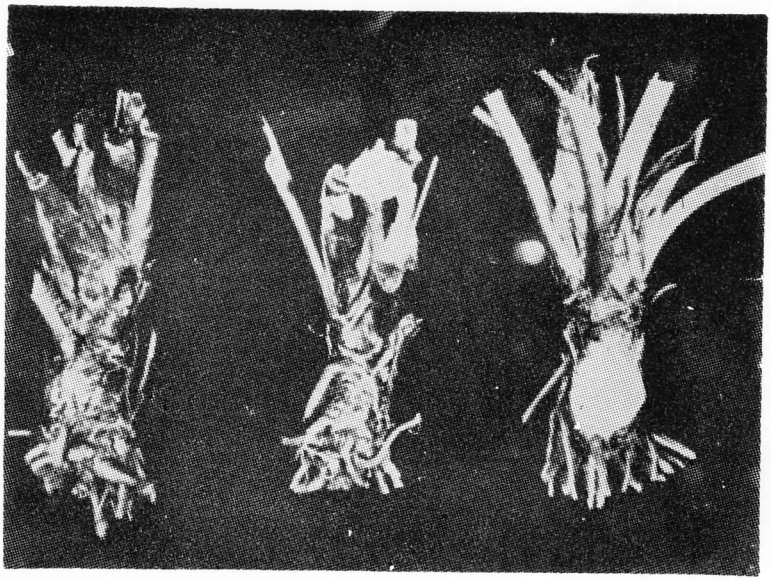

Abbildung 1 : von Links Kontrolle- Blattstiel und Rhizom. (Original)

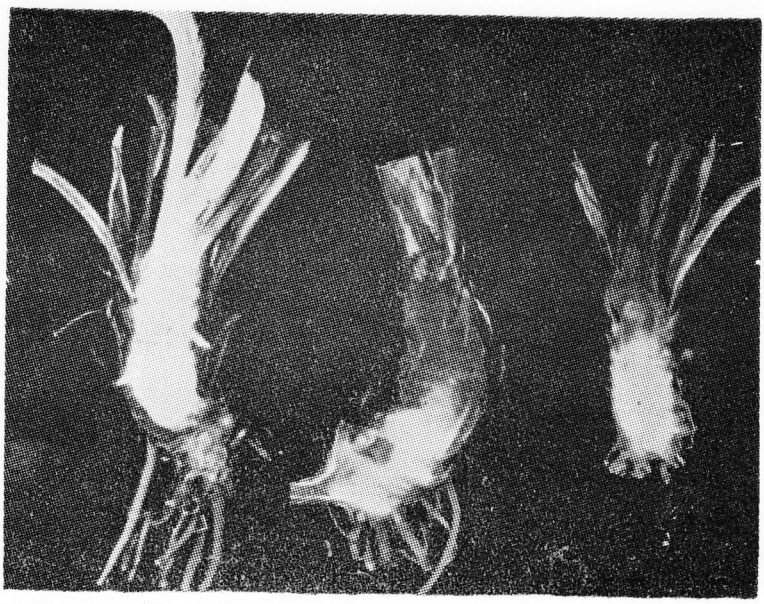

Abbildung 2 : Durchschnitten von Links Kontrolle(Gesund)-Verletzte Rhizom (befallen)-Blattstiel (befallen). (Original)

J. Turkish Phytopath. Vol. : 4 Num : 3 — 1975

Recherche Sur Uromyces terebinthi (DC.) Wint (Syn. Pleolaria terebinthi Cast.)

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Dans quelques recherches, **Uromyces terebinthi** (DC.) Wint. a été signalé sur les pistachiers en Turquie. BREMER et al. (1947) et KARACA (1965), raportent sa présence sur **Pistacia terebinthus** à İzmir et à Kozan et sur **Pistacia lentiscus** à İstanbul. Cette espèce a été aussi trouvée sur **Pistacia terebinthus** par ŞİŞLİ (1953) aux environs d'Elazığ (Cumabağları).

C'est la premier fois qu'on signale sa présence sur les pistachier vrai (Pistacia vera L.) en Turquie (Tarsus Bozyazı, Anamur, Mersin). Dans ces régions cette maladie était très peu repandue, et on ne l'a observé qu'aux arbres près de **Pistacia terebinthus** (Fig. 1).

Cette espéce n'a pas pu être trouvée à Gaziantep où une trés grande population des pistachier vrai est repandue et où la chaleur élevé et la secheresse dominent. Nous croyons que la domage causée par cette rouille est à la dépendance des conditions climatique.

Au debut du mois du mai (le 8 mai 1970), nous avons observé les sores à uredospores d'abord sur la face inferieur, en avance, sur la face supérieur des feuilles. Elles fùent obtenues par ŞİŞLİ (1953) au debut du juin à la région du Siirt.

Les uredospores forment les petites masses sur les feuilles. La diamétre des uredospores varie de 19,5 à 36,3η (27,8 moyen $\mp$ 0,28). Selon ŞİŞLİ (1953) elles mesurent (21,6-28,8) X (25,2 - 34,2)η

A peu prés 25 jours après d'infection, les teliospores ne se forment plus à la face supérieur: les pustule brun foncé à teliospores se constituent à la face inferieur de la feuille. La teliospore à loge unique posséde une membrane épesse, brun foncé, verruquese et est portée par une pedicelle allongé, elle est plus large que haute à la forme disqoide (Fig. 2,3).

Elles mesurent 32,5 - 44,3η (moyen 36,6 $\mp$ 0,40η), selon ŞİŞLİ (1953), (47 - 53,2) X (39,2 x 50,4)η, d'aprés VIENNOT-BOURGIN (1949) 28,35η.

ÖZET

UROMYCES TEREBINTHI (D.C.) WINT. **(PLEOLARIA TEREBINTHI** CAST.) ÜZERİNDE BİR ÇALIŞMA

Antep Fıstığı pası hastalığı Türkiye'nin Güney ve Güneydoğu Bölgesindeki Antepfıstığı anaçlarından menengiçle **(P. terebinthus** L.) üzerinde zaman zaman görülmektedir. Hastalığın meydana geldiği yerlerin Tarsus, Bozyazı, Anamur, Gülnar (Mersin) Kozan (Adana), Zinnar bahçeleri (Mardin) gibi nisbeten sıcak sulak ve nemli yerler olduğu saptandı. Ancak yaptığımız gözlemlerde fıstık pasının Antep fıstığı **(P. vera** L) üzerinde de bulunduğunu tesbit ettik. Bilhassa menengiçlere yakın olan Antep fıstıklarında görülmektedir.

BIBLIOGRAPHIE

BREMER, H., et al., 1947. Beitrage Zur Kentnis parazitischen Pilse der Türkei, İst. Üniv. Fen Fak. Mec. B., 12 (4), 310-311.

KARACA, İ., 1965. Sistematik Bitki Hastalıkları (Phycomycetes, Basidiomycetes). 2. Ege Üni. Mat. - İzmir. 159 P: 180.

ŞİŞLİ, N. 1953. Fıstıklarda Pas Hastalığı Pleolaria terebinthi Cast. (Uromyces terebinthi D.C. Wint). Tomurcuk 2 (22) 14-155 Cituri Basm.- İstanbul.

VIENNOT BOURGIN, G.V., 1949. Les champignons parasites Des plantes Cultivies. 11. Massen- Cie, Editeurs de Médecine 120. Bolevard Saint. Germain. Paris 6e; 996 P; 1850.

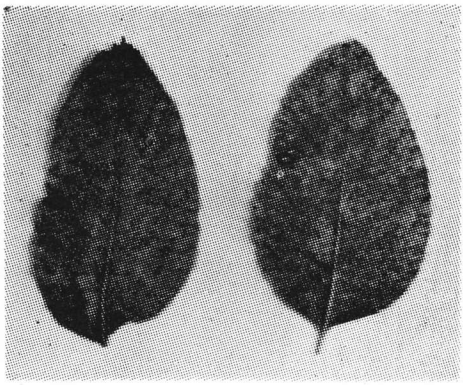

Fig. 1. Des feuilles des pistachier vrai attaqué par **Uromyces terebinthi** (D.C.) Wint.

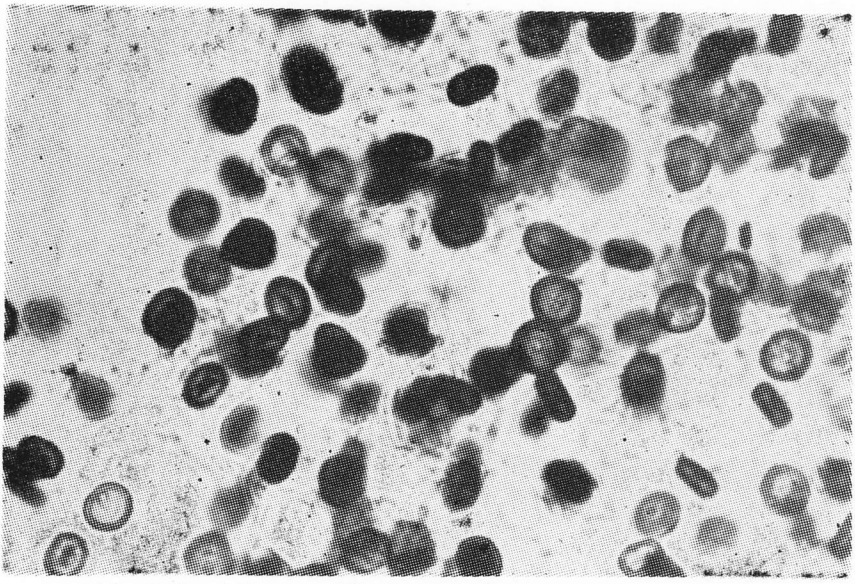

Fig. 2. Des teliospores d'**Uromyces terebinthus** (DC.) Wint (X 135).

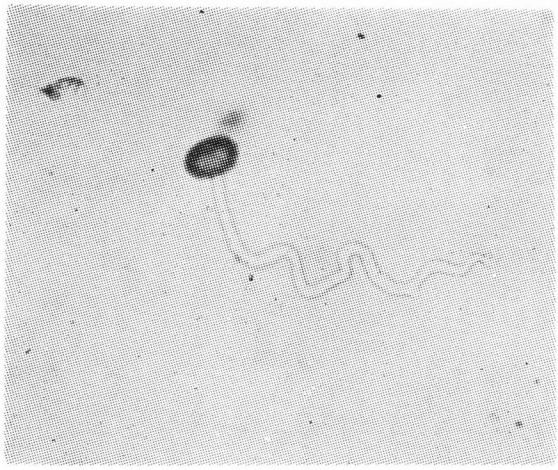

Fig. 3. Une teliospore d'**Uromyces terebinthi** avec son pedicelle cylindrique allongé et transparent (X 135)

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