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CONTENTS

VOLUME : 3 **NUMBER : 3** **SEP. : 1974**

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Investigations on Biology and Control of the Causal Organism of Grey Mold Disease (Botrytis cinerea Pers.) of Grape Variety "Müşküle" in iznik

Nevzat ÖZHENDEKÇİ[1] and İbrahim KARACA[2]

ABSTRACT

This study was carried out in İznik district of Marmara region. Taxonomic properties of **B. cinerea** Pers. were determined. It was found that this fungus overwintered as mycelium, conidium or sclerotium and these propagules initiated the primary cycle of the pathogenesis. Incubation period of the fungus is 3-5 days and the first infection takes place on the mature grape bunches.

Chemicals such as Euparen and Sclex % WP. gave excellent results for controlling the cultural treatments like covering the vines with poyethylene films, grunung and controlled-defoliation were giving good results for preventing the disease.

Grapes can be kept 3.5 months without infection if they were treated with SO_2 gas just before the storage.

INTRODUCTION

Grey mold is one of the most destructive pathogen at the İznik müşküle vineyards of Marmara region. This fungus causes a considerable loss in İznik each year. This loss is about 10.000 tons of grape when the climatic conditions favored the development of pathogen. Cash value of this amount is about 15 million Turkish liras.

There are some reports that this

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disease was seen at other areas, although no survey has been done so for. This fungus especially damages late varieties of grape. Excessive watering and fertilizing with N-fertilizers increase the grey mold damage.

This fungus was first reported by Bremer (1948) on grape berries in Turkey; and there were not any report about either the biology or the control measures of this fungus up to now. However, there are numerous works on this disease in world literature.

Viennot-Bourgin (1949) determined that fungus has a wide range of host plants. Sorauer (1932), Bremer (1948) and Lafon and Couillaud (1959) worked on the taxonomy of the fungus and they determined its typical mycelial structure. The conidia of the fungus are round, eliptic or oblong and slightly colored (Stevens, 1913; Walton Groves and Loveland, 1953; Barnet, 1962). Conidiophores are frequently 2 mm long and sometimes 3-5 mm (Karaca, 1968; Bulıt and Lafon, 1970).

Nonaka and Akira (196) and Barnet (1962) indicated that fungus produces tough and black colored sclerotia with variable sizes.

The fungus was first reported by Persoon (1801-1822) after extensive studies were undertaken. Bremer (1948) reported that the fungus produces small and black sclerotia among the fungal layers in autumn. Vanev (1966) and Bulıt and Lafon (1970) indicated that the fungus overwintered as sclerotium, although some other workers reported that it overwintered as mycelium.

In spring, during the humid conditions, the fungus appears on the inoculated or contaminated plant materials but it can develop in very different conditions (Sorauer, 1932 and Lafon and Couillaud, 1959). For the development, minumum temperature is 2°C, maximum 33° C and the optimum temperature is 25°C (Domsch and Gams, 1970). Fungal development during the spring starts from either mycelium or sclerotium or both (Vanev, 1966 and Bulıt and Lafon 1970). Apothecia are very rare in nature and practically they are neglicible or unimportant propagules in the nature during spring or autumn. The fungus can grow in the winter, but this fungal growth can be stopped under the dry conditions and high or low temperatures (Vanev, 1966).

Infection can start only on the mature grape berries during autumn in Turkey (Bremer, 1948). Temperature and humudity are effective factors on the infection. During infection, the temperature changes between 15-20°C. Minimum temperature is 1°C, maximum temperature is 30°C and the optimum temperature is 20°C for infection (Bulıt and Lafon 1970). Incubation period of the fungus is about 3-4 days.

Chemical control of the disease is quite difficult, but some organic chemicals which were developed in recent years gave good control. For example, Euparen is one of them. Benlate and

Thiabendazole are also effective organic fungicides which controlled this disease (Gabrielson et. al. 1970). Sclex 30 % WP has been recently used as a fungicide in vineyards for the control of grey mold and it gave excellent results. According to Agulhon (1971), Sclex is the best fungicide for controlling the grey mold. Experiments with Enovit-super in Italy showed that it is also an effective fungicide for grey mold.

Studies carried out up to date have shown that the best control methods are the cultural measures provided properly. By good air vantilation, pruning of branch, twig and leaves the disease could be blocked from the development (Viennot-Bourgin, 1949, Lafon and Couillaud, 1959 and Karaca, 1968).

Harvesting of uninfected grapes and treating them with SO_2 gas then storing them in cold storage rooms are also good ways of protection (Ayanoğlu, 1970).

This study was undertaken to investigate the biology and the control measures of grey mold. The study was initiated in March 1971, continued for 2 years and ended in 1973.

MATERIALS and METHODS

Materials :

Expriments were carried out in İznik vineyards of Bursa province in Marmara region. Grape variety was Müşküle. **Botrytis cinerea** was isolated from the infected grapes and used in the experiments later on. Two systemic and two nonsystemic fungicides were tested during the whole experiment period. The tested chemicals were shown in Table 1.

Methods :

PDA (2 %) was used as a growth medium for the fungus in laboratory conditions. Lactophenol was applied for microscopic studies which were carried out under microscope, over 100 observations. Same is done for sclerotia and conidiophores under disecting microscope. Hundred grape berries, 100 spurs and 100 berry-spurs were collected during winter for the determination of overwintering structure of the fungus.

In order to determine that how the fungus overwinter bottomless boxes containing naturally infected material were placed at 3 different localities in İznik. During the winter period samples were taken from these places every 10-15 days and examined in the laboratory. This process was run for 2 years.

Mummies and sclerotia were left on the soil surface for the determination of starting date of development of the pathogen. Two frames, 4 sides which the top side were covered with nylon-grilled wire, were taken and filled with soil. The natural mummies and sclerotia were put on the grill then placed on the soil in the frames. Examples were taken every 4-5 days and examined under binocular for development.

The beginning time of the infection was determined by direct observation and hand-inoculation method. The vine-

Table 1. Information about the chemicals used in the study.

Trade Name	Company	Effective ingredient and its percentage	Formulation	Dosage/100 liter of water
Benlate	Dr. F. Frik	Methyl-1-(butylcarbamyl)-2-benzimidazole carbamate 50 %	WP	100 gr.
Enovit Super	Tuzaş	1,2-bis (3-methoxycarbonyl-2-thioureido) Benzene 70 %	WP	70 gr.
Sclex 30 % WP	Koruma	3-(3.5-dichloropenyl) 5.5 dimethyl oxazo lidinodione-2.4. 30 %	WP	100 gr.
Euparen	Bayer	N,N-dimethyl-N-Phenyl (N-fluoro-dichloro-methylhio) sulfamide. 50 %	WP	200 gr.

yards were throughly observed and fruit stalks from randomly selected nine vines were examined. By this way the first observation of the disease was determined. Hand inoculations were made on the berry clusters that had not been naturally infected. Prevention from natural infection was achieved by protecting the berry clusters in waxed paper bags or covering the whole plant with polyethylen sheets. Covers of three grapevines were removed to inoculate and berry cluster were inoculated. Berries containing 8-10 days old fungal fruiting bodies were used for the inoculation purposes. Berries were punctured by needle and diameter on the berries were accepted as then inoculation was set. Spots 3 mm in typical disease symptoms.

A randomized block design was used in the chemical control trials. Five treatments with 4 replicates were tested in 20 blocks. Each block contained 2 lines and 4 grape-vines were taken as a block. Spray programme was started before the disease symptoms were observed and the applications were carried out in calm weather conditions. Contact-fungicides were applied every 20 days. Observation and countings were completed on 4 grape-vines and 3 fruit stalks from 3 different localities on each vines. By this way 9 fruit stalks of each grape-were used.

The following scale was used for disease evaluation.

0	No infection	No symptom
1	Light «	Min. 5 berries were diseased in a fruit stalk
2	Moderate «	1/5 of the fruit stalk rotted or discolored
3	High «	2/5 of the fruit stalk rotted or discolored
4	Very high «	3/5 of the fruit stalk rotted or discolored

Percentage of the disease severity was calculated from the results, by using Towsend-Heuberger formula and the percentage of effectiveness of the chemicals was obtained according to Abbott formula,

A paired experimental design was applied in the experiments concerning pruning and defoliation of grapevines or covering them with polyethylene sheets or bagging the fruit staiks. Two plant lines, each line contained 10 plants, were paired. The tests consisted of comparison of 2 treatments with 10 replicates. The estimations were done according to the scale mentioned earlier. These values were treated according to Towsend-Heuberger formula and the percentages of the disease were determined.

Grapes arranged in the Holland-type boxes were kept in the cold rooms during the studies about storage. Five kg or 10 grape stalks were aranged in each box. Temperature was kept 0-2°C and relative humudity was kept 90-95 %. Grapes were kept as non-fumigated, fumigated with SO_2 gas and wrapped with a special paper, so-called «Grape Guard SO_2 Generator». SO_2 gas, as 7 gr/m³ space, was given every 10^2 days and the grapes were checked every 10 days. Observations were directed to main points as to disease on the fruit stalk, color of the berry and the wrinkling on the fruik stalk.

For the disease the 0-4 scale was used. The color of the berries were evaluated as «normal» or «discolored». For the fruit stalks, if its 1/4 part was assumed as «wrinkled» and the rest were accepted as «normal fruit stalks».

RESULTS

Grey mold, **Botryotinia fuckeliana** De Bary, Whetzel, is one of the most important diseases of Müşküle vineyards of İznik. The disease is seen only on the fruit stalks and exhibits its characteristics (Fig. 1).

1. Taxonomic Characteristics of **Botrytis cinerea** Pers :

The mycelium of the fungus is brown in color and septated and the color turns light at the tips. The hyphal diameter is 13.2 micron. Some sections of the hyphae might be swelled. Conidia are hyaline or very light greenish in color. Their shapes look like lemon or egg or roundish. They are single celled and the dimentions are 10.83 x 8.89 microns. They are located at the tip of the conidiophores like a berrybunch. The conidiophores are tall and they branch with a rightangle. Their average length is 2.85 mm. sclerotia may show different shapes. There are rough and black in color bodies but their inner part is white. They could be 1-14 mm on PDA and 0.5-5.8 mm on grape berries.

2. Biology of **Botrytis cinerae** Pers :

The fungus may overwinter in one of 3 forms.

1 — As mycelium or spore, or sclerotium on the berries spilled in the vineyard.

2 — As spore or mycelium on the berry petioles.

3 — As spores or mycelium on the fruit stalk petioles.

Mycelia and sclerotia could be produced on the berries during the winter period (Fig. 2).

The development of the fungus from mummified berries started between 25 and 30th of March and it reached to 100 % during a 14 day period. Development of sclerotia continued until 14-20th of April.

The studies for determining the infection time of the fungus were carried out in 1971 and 1972. In the first year first infection was observed on the berries which appeared like normal on october 19 th and in second year on october 4 th. Incubation period of the fungus was determined as 3-5 days by means of artificial inoculations. The inoculation trials applied in 1971 and 1972 (Table 2).

As a result, it was found that, the starting time of natural infection was 15th october in the first year, and 1st october in the second year.

3. Investigations on the control measures :

Benlate, Enovit super, Sclex 30 % WP and Euparen were found 84.4 %, 65 %, 87 % and 85 % effective, respectively, in 1971 and 1972 the trials with Benlate, Enovit Super, Sclex 30 % WP and Euparen gave 59 %, 52 %, 94 % and 91 % effectiveness, respectively.

Table 2. Experiments carried out during 1971 and 1972 and the incubation period of the fungus

Date of the inoculations	Number of inoculated berries	Percentage of infected berries	Incubation-Period (days)
20.10.1971	300	100	5
30.10.1971	300	100	4
2.11.1971	300	100	5
22. 9.1972	150	100	3
10.10.1972	150	100	3
10.11.1972	1500	100	4

The disease rate on the twig-and-leaf from pruned grapevines was 2.18 % and it was 9.8 % on untreated grapevines. The covered plants with polyethylene sheets showed a disease rate of zero percent and the check plants showed a disease rate of 12.8 %. Plants which fruit stalks were bagged showed a disease rate of 15.1 % and check plants showed a disease rate 10.1 %.

Following results were obtained from the studies of storage of the harvested grapes :

Nonfumigated grapes could be kept in the storage rooms with 2.5 % disease and 16 % wrinkling rate for 2 months. Grapes fumigated with SO_2 and then put into storage for 3.5 months showed 14 % wrinkling on the fruit stalks but zero percent of disease rate. Grapes wrapped with the «Grape Guard SO_2 Generator» papers and kept in the storage rooms for 4 months showed 16 % fruit stalk wrinkling and 8.25 % disease rate.

DISCUSSION

It was determined that the disease was effective on the grape berries of Müşküle variety in İznik, and Bremer (1948); Nelson (1951); Ciccarone (1959); Balıt and Lafon (1970), support our observation. The findings about the mycelium, conidium, conidiophore and sclerotium of the fungus typically characterize **B. cinerea.** Other workers confirm our results (Stevens, 1913; Walton Grovers and Loveland 1953, Bulıt and Lafon 1970).

The fungus could overwinter as conidium, mycelium or sclerotium in İznik area. This is possible since the local temperature and relative humidity are favorable. For this reason vineyards must be cleaned out of the disease materials as a first step in controlling the disease.

The fungus starts its development in early April and continues till early May. During this period, temperature

and relative humidity of the area are very favorable for the development of the fungus. It has been established that the first infection takes place after the maturity of berries. This shows a paralellity with other reports (Viennot-Bourgin, 1949; Lafon and Couillaud, 1959; Gartel, 1970). So according to this results, the maturity of berries is the main point in initation of the control.

Euparen and Sclex 30 % WP were highy active against the disease and this finding was supported by other investigators (Farben Fabriken Bayer Crop Protection Dept., 1966; Goeldner, 1968; Agulhon, 1970). Enovit super and Benlate were unsatisfactory. Because the phenology of the plants in late autumn is not suitable for systemic fungicide applications. Pruning of twigs and leaves showed a positive effect to prevent the disease. Covering the plants with polyethylene sheets also showed a positive effect as a preventive cultural method. Because fruit stalks could be prevented from the rain and mechanical bruising. Besides this plastic sheet keep the soil dry under the plants.

Bagging the fruit stalks gave a negative result in disease prevention, since autumn are generally wet and these bags could not prevent the moisture off of the berries.

From the tests of storage with SO_2 fumigation, no fumigation and wrapping the grapes with grape guard SO_2 generator papers, the best result was taken from the storage with SO_2 fumigation. With this method grapes maintained in the storage room for 3.5 months without any spoilage. The positive effect of SO_2 in storage was also confirmed by Cant and Nelson (1957); and Ayanoğlu (1970).

ÖZET

İZNİK MÜŞKÜLE ÜZÜMÜ BAĞLARINDA KURŞUNİ KÜF (**BOTRYTIS CINEREA** PERS.) HASTALIĞINI YAPAN ETMENİN BİYOLOJİSİ VE SAVAŞI ÜZERİNDE ARAŞTIRMALAR

Yapılan araştırmalar hastalığın İznik bağlarında bütün tipik özellikleriyle ortaya çıktığını göstermiştir. Fungusun saptadığımız taksonomik özellikleri, tipik **B. cinerea**'nın özelliklerini vermiştir.

Fungus kışı mycelium, conidium ve sclerotium halinde geçirebilmektedir. Fungus ilkbaharda gelişmeye, mumyalaşmış danelerde 25.3.1972 tarihinde, sclerotia'da 14.4.1972 tarihinde başlamıştır. Bölgede ilk enfeksiyonlar olgun üzümlerde ekim ayı başında tesbit edilmiş ve fungusun inkubasyon süresi 4-5 gün arasında saptanmıştır.

Hastalıkla kimyasal savaşta Euparen ve Sclex % 30 WP ilâçları iyi netice vermişlerdir. Benlate ve Enovit super ilaçları ise etkili olmamıştır.

Hastalıkla savaşta uygulanan kültürel tedbirlerden en etkili olanlar : Asmalarda dal ve yaprak seyreltmesi ve asmaların plastik örtü maddeleri ile örtülmesi şeklinde uygulananlar olmuştur.

Üzümler SO_2 gazı ile fümige edilerek depolanmak suretiyle 3.5 ay hastalınmadan muhafaza edilebilmişlerdir.

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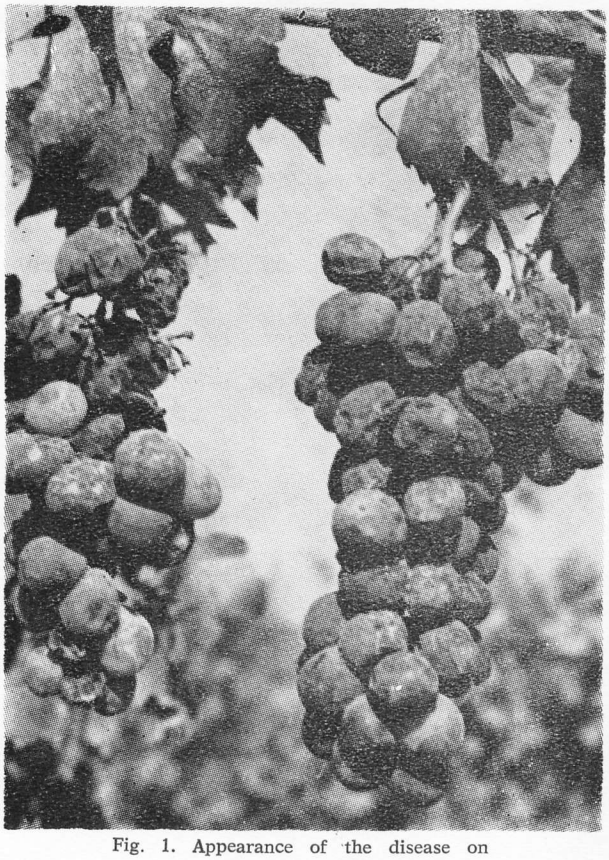

Fig. 1. Appearance of the disease on the fruit stalks.

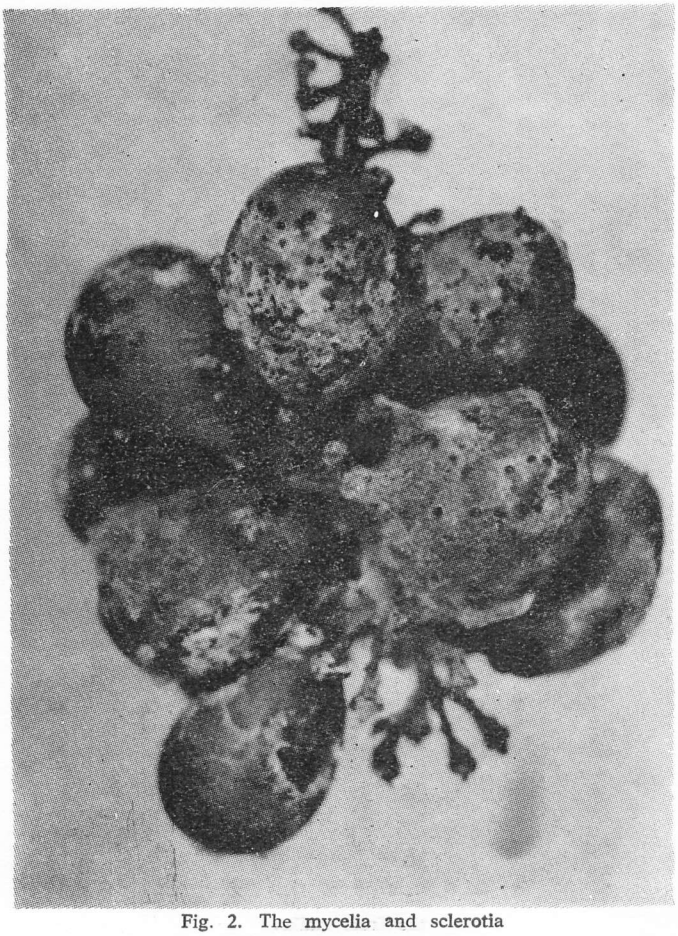

Fig. 2. The mycelia and sclerotia on the diseased berries.

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Die Untersuchung über die Anfaelligkeit der wichtigen weizensorten auf Steinbrand in Süd-Ostanatolien der Turkei bei den Verschiedenen Anbauperioden

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ZUSAMMENFASSUNG

Die Anfälligkeit der wichtigen Weizensorten auf Steinbrand ist in Süd-Ostanatolien bei den verschidenen Anbauperioden untersucht worden.

Fünf Weizensorten werden bei der untersuchung verwendet. Die sind Akbaşak, Bağacak, Bezostaja—1, Lerma—rojo—64 und Penjamo—62. Diese Sorten wurden mit den frischen 0,5 % **Tilletia foetida** (Wallr.) Liro und **Tilletia caries** (DC.) Tul. sporen infiziert. Bei jeden Anbauperiode werden diese befallenen Samenkorner benutzt.

EINLEITUNG

Schon früher war die schlechte Auswirkung von der Steinbrandkrankheit bei dem Weizenertrag bekannt. Mit Beizmitteln konnten die Schaden von dieser Steinbrandkrankheit nicht ganz abgenommen und kein voller Erfolg erreicht werden (Karaca, 1965).

Wenn man in unserem Land gegen Steinbrand mit Beizmitteln nicht vorgehen kann, gibt es einen Schaden von ungefähr 1 Milliare Lira Karaca (1965). Özkan (1956) und Karel (1951) sprechen von einem Schaden durch die Steinbrandkrankheit, der etwa bei 258-495 Millionen Lira liegt. Die Ausgaben für Beizmittel zu Bekämpfung dieser Krankheit sind sehr hoch (Esen, 1967; 23 krş/da für Mittelanatolien).

MATERIAL und METHODE

Für diesen Versuch werden die in Süd-Ostanatolien am häufigsten gesäten Weizensorten genommen: Akbaşak, Ba-

ğacak, Bezostaja-1, Lermo-roja 64, und Penjamo-62. Im Jahre 1973 werden die gesammelten Steinbrandsporenpopula - tionen von **T. foetida** und **T. caries** benutzt.

Die Steinbrandsporen sind nötig für die künstliche Inokulation. Diese wurde von den Steinbrandähren abgenommen. Bei den Versuchen wurde je 1 kg. Saatgut verwendet, das von 5 Weizensorten genommen wird. Dieses 1 kg. Saatgutmuster wird mit der frischen Steinbrandsporenpopulation 0,5 % infiziert (nach Appel, 1932).

Tabelle 1. Die anfälligkeit der wichtigen weizensorten auf steinbrand

Anbau-perioden	Sorte	Wiederholungen % I	II	III	Mittel %
17.10.1873	Akbaşak	31,4	35,2	36,6	34,4
	Bağacak	28,6	37,5	34,3	33,4
	Bezostaja-I	24,3	39,0	34,8	32,7
	Lerma-rojo-64	65,9	62,6	61,0	63,1
	Penjamo-62	2,0	1,9	2,5	2,1
1.11.1973	Akbaşak	12,8	15,0	13,0	13,6
	Bağacak	10,6	18,3	10,4	13,1
	Bezostaja-I	13,4	17,6	19,8	16,9
	Lerma-rojo-64	23,9	34,3	19,1	25,7
	Penjamo-62	1,2	0,9	1,7	1,2
19.11.1973	Akbaşak	8,0	13,0	11,5	10,8
	Bağacak	13,8	14,0	9,7	12,5
	Bezostaja-I	12,7	8,5	14,8	12,0
	Lerma-rojo-64	34,9	53,5	30,9	39,7
	Penjamo-62	0,6	1,0	1,7	0,5
6.12.1973	Akbaşak	3,5	7,5	11,5	7,5
	Bağacak	4,2	3,2	6,8	4,7
	Bezostaja-I	21,9	16,7	16,3	18,3
	Lerma-rojo-64	40,9	39,9	35,4	38,7
	Penjamo-62	-----	0,7	0,4	0,3
20.12.1973	Akbaşak	8,9	6,8	6,8	7,5
	Bağacak	3,3	5,0	2,0	3,4
	Bezostaja-I	22,4	29,7	19,6	23,9
	Lerma-rojo-64	44,0	45,0	36,9	41,9
	Penjamo-62	1,4	0,7	0,9	1,0

Die Experimentele wurden fakte - rielle zufällige Blocken in drei wiederholungen geordnet.

Dieses befallene Saatgut wurde von Forschungsinstitut in der Feldanlage in Diyarbakır gesät. Das Datum des Sàèns in der Feldanlage werden : 17.10.1973, 1.11.1973, 19.11.1973, 6.12.1973, und 20.12.1973. Während der Erntezeit des Weizens wird je Parzelle allein geerntet. Im Labor werden Gesunde und Steinbradähren gezählt.

ERGEBNISSE

Bei dem Versuch von 5 Weizensorten herangezogen und bei 5 verschiedenen Anbauperioden gesät. Diese sind mit der angreifenden Steinbrandkrankheiten (als %) und die Bekämpfungsmittel in Tabelle-1 aufgeführt worden.

Liegen die Versuchsergebnisse in form der Relativwerte var, so weisen Düzgüneş (1963) und Karman (1971) darauf hin, dass in solchen Fällen eine statistische Auswertung des Versuchs über die Varianzanalyse nicht ohne weiteres möglich und hierfür zuerst eine Transformation der Relativwert in die entsprechenden Winkelgrade erforderlich ist. Aus diesem Grund ist in dieser Arbeit die statistische Analyse in der Weise durchgeführt worden, dass die prozentualen Beobachtungswerte zunächst n Winkel-Werte umgerechnet und erst dann der Varianzanalyse unterworfen wurden.

Nach dem Ergebnis der Varianza - nalyse sind die Unterscheide im Steinbrandbefall zwischen den zur Prüfung herangezogenen verschiedenen Weizensorten signifikant. Der Zeitpunkt der Aussaat hat einen Einfluss auf das Ausmass des steinbrandbefalls. Die Wechselwirkung zwischen den Sorten und den Aussaatterminen ist ebenfalls signifikant. Um die Hauptwirkungen festzustellen und zu einem Urteil gelangen zu können, wurden bei den Vergleichen die Wechselwirkungen in ihre Komponenten aufgeteilt und die L.S.D.-teste für jedes Komponentgetrennt durchgeführt (Düzgüneş, 1963; Karman, 1971).

Tabelle Für die Varianzanalyse

Varianzursache	SQ	FG	DQ	F	F 5%	F 1%
Allgemein	13079,65	74				
Kombination	12633,19	24	5263,88			
Sorten	9443,75	4	2360,93	298,0**	252,56	3,74
Zeit	2152,61	4	538,15	67,9**	252,56	3,74
Sorte X Zeit	1036,83	16	64,80	8,1*	1,86	2,40
Wiederholung	65,96	2	32,98	4,1*	3,19	5,08
Fehler	380,50	48	7,92			

Vergleich der Befallgrade der Weizensorten mit der Steinbrandkrankheit in den unterschiedlichen Aussaatzeiten :

Es wurde der L.S.D. - Test Angewandet. Die Differenzen zwischen den Mittelwerten von den einzelnen Winkelwerten wurden mit den berechneten L. S.D. - Werten Miteinander vergleichend getestet. Es hat zu folgenden Ergebnissen geführt :

1) Bei der Sorte Akbaşak sind die Aussaaten am 17.10.1973 am stärksten, zwischen 1. und 19.11.1973 mittelmässig und zwiscen 6. und 20.12.1973 am geringsten von der Steinbrandkrankheit befallen worden und somit wird das Ausmass des Steinbrandbefalls mit der Verspätung der Aussaatzeit kleiner.

2) Bei der Sorte Bağacak sind Aussaaten am 17.11.1973 am stärksten, zwischen 1 und 19.11.1973 mittelmässig und zwischen dem 6. und 20.12. 1973 am geringsten von der Steinbrandkranheit befallen worden.

3) Bei der Sorte Bezostaja-I sind die Aussaaten am 17.12.1973 un 20.12. 1973 am stärksten und zwischen 1. und. 9.11.1973 und 6.12.1972 am geringsten von der Steinbrandkrankheit befallen worden.

4) Bei der Sorte Lermo-rojo-64 sind die Aussaaten am 17.10.1973 am stärksten und zwischen dem 19.11.1973 und 20.12.1973 mittelmässig und vom 1.11.1973 am geringsten von der Steinbrandkrankheit befallen worden.

5) Bei der Sorte Penjamo-62 sind die Aussaaten am 17.10.1973 am stärksten, zwischen 1. und 19.11.1973 und 20.12.1973 mittelmässig und 6.12.1973 am geringsten von der Steinbrandkrankheit befallen worden und somit wird das ausmass des Steinbrandbefalls mit der Verspätung der Aussaatzeit kleiner.

DISKUSSION

Bei dem Versuch wurde bei den Weizensorten Akbaşak, Bağacak, Bezostaja-1 und Penjamo-62 im allgemein vom 6.12.1973 die wenigsten Steinbrandkrankheiten festgestellt. Dieser Zeitpunkt hatte gezeigt, dass er besser als anderen Zeitpunkte ist. Um diese Zeit (6.12. 1973) betrug die unterirdische (im tiefe 5 cm.) Temperatur 5°C. Die keimenden Clamydosporen haben bei den niedrigen Temperaturen langsamer gekeimt und die Infektionfähigkeit ist sehr niedrig gewesen.

Bei dem Versuch mit den 5 Weizensorten Akbaşak, Bağacak, Bezostaja-1, Lermo-roja-64 und Penjamo-62 werden am 17.10.1973 die stärksten Steinbrandkrankheiten festgestellt. Bis zum 2. 11.1973 hatten sie nicht Temperatur vorhanden war. Am 2.11.1973 betrug die Temperatur 5 cm. unter der Erdoberfläche etwa 10°C. Ausserdem hatte es geregnet. So wurde zu diesem Zeitpunkt wegen der günstigen Bodenbedingungen die Virulenz des Steinbranderregers erhoht.

ÖZET

GÜNEYDOĞU ANADOLU'DA EKİLEN ÖNEMLİ BUĞDAY ÇEŞİTLERİNİN DEĞİŞİK EKİM ZAMANINA GÖRE SÜRME HASTALIĞINA YAKALANABİLME DURUMLARI

Denemeye alınan 5 buğday çeşidi Akbaşak, Bağacak, Bezostaja-1, Lermo-roja-64 ve Penjamo-62 dir. Bu buğday çeşitleri % 0,5 oranında **Tilletia foetida** (Wallr.) Liro ve **Tilletia caries** (CD.) Tul populâsyonları ile bulaştırılmıştır. Sürme populâsyonları ile bulaşık tohumlar 5 ekim zamanında (17.10.1973, 1.11.1973, 19.11.1973, 6.12.1973, 20.12.1973) kullanılmıştır.

Hasattan sonra buğday başakları hasta ve sağlam olarak sayılmış. Her çeşidin sürme hastalığına yakalanma oranları tesbit edilmiş. İstatistik analizde her çeşit için L.S.D. testi ayrı ayrı uygulanmıştır.

Denemeye alınan 5 buğday çeşidi 17.10.1973 tarihinde yapılan ekimde sürme hastalığına yakalanma oranları kendi aralarında en yüksek bulunmuştur. Sürme hastalığına en az yakalanma oranını Lermo-roja-64 dışında 6.12. 1973 tarihinde göstermişlerdir. Lermo-rojo-64 ise en düşük sürme hastalığına yakalanma oranını 1.11.1973 tarihinde göstermiş. Bu çeşit diğer çeşitlere nazaran daha yüksek bir ısıya dolayısiyle erken bir ekime uygunluk gösteriyor.

Netice olarak sürme hastalığı yönünden, bölgemizde ekimin aralık ayının ilk haftasında başlamasının uygun olacağı kanaatine varılmıştır.

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NEW RECORD

The First Report on the Downy mildew (Sclerospora macrospora Sacc.) on wheat in Turkey

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During the survey studies were initiated to determine the diseases of wheat, Downy mildew caused by **Sclerospora macrospora** Sacc. was observed almost all every year in different parts of the Ege Region since 1969.

The damage of the fungus on the wheat first observed in a field sown with the variety of Penjamo-62 in the Salihli (Manisa) county in 1969. This was the first record of **Sclerospora macrospora** on wheat for Turkey. The determination of the disease was made at the elongation stage of the plants and the percentage of the infection was found approximately at 10 %.

The disease was also determined with the same symptoms in a field on a local variety of the wheat in Gördes (Manisa) in 1970. The typical symptoms of the disease as the deformation of the leaves and ears were also observed in the same field at the end of heading and milky ripening stages. After these previous detections, the disease also occurred at the economical level, in a field with the Penjamo-62 variety of wheat in Aydın in 1971. It was appeared on the more than half of the field and most of the wheat plants (approximately 75 %) in the diseased area had no floral organs and then diseased ears were not able to have seeds. In 1974, only two of the more than 100 fields examined, were found infected. Particularly the typical leaf and ear symptoms were observed at the ripening stages of the plants in these fields in Selçuk (İzmir) and Manisa. The infection developed as locally in the fields and their percentage increased to 5 %.

According to the results obtained from the surveys made for five years, infection occurred as seedling foot-rot, lodging, retarded root growth and dying of the infected tillers of the wheat at the early stages of plants growth, however the common and characteristic symptoms were observed as the deformation of leaves and ears at the ripening stages.

On the other hand the elongation of internodes was reduced by the infec-

tion and this resulted as stunting of the plants. The elongation of the leaf sheaths was also reduced. Sometimes excessively tillering was determined on the diseased plants. The deformation of the leaves occurred because of the thickened and dwarfed leaf blades and sheaths. At the same time, the heads of the diseased plants were frequently deformed as the other typcally appearence of the disease. This deformation was resulted by twisting of ear shanks, devolution of floral organs and apparently proliferation of the spikelets (Fig. 1). Many of the diseased ears had no seeds. The numerous oospores of **Sclerospora macrospora** produced on the culture made from the parts of the diseased plants by using the blotter method.

As a results of these observations, it is possible to say that the heavy structure of the soil, high level of soil moisture and composition of the weeds have influenced upon the disease and the infection downy mildew on the wheat, generally occurred in every year, but only in a few wheat fields especially sown by Penjamo-62. Many of the weeds are hosts of the pathogen as well as some of the crops such as barley, oats, maize, rice, etc. (DICKSON, 1956; RAI et al., 1968; TYAGI and ANAND, 1968). Therefore the control of the weeds, good preparation and surface drainage of soil, and the crop rotation with non-host crops may be recommended as control measures of the wheat downy mildew.

The importance of the wheat and other plants on the survival of the pathogen and the relation between the infection and environmental conditions and the other aspects of the disease should be studied by further investigations.

ÖZET

TÜRKİYE'DE BUĞDAY MİLDİYÖSÜ (**Sclerospora macrospora** Sacc.) NÜN İLK TESBİTİ

1969 - 1974 yılları arasında, Ege bölgesi'nde yürütülen «Buğday Hastalıkları Survey Çalışmaları» sırasında, 1969 yılında Salihli (Manisa) de Penjamo-62 ekili bir buğday tarlasında ilk defa Buğday Mildiyösü (**Sclerospora macrospora** Sacc.) görülmüştür. Aynı hastalık, 1970 yılında Gördes (Manisa) de yerli buğday ekili bir tarlada; 1971 yılında Aydın-Merkez'de bir ve 1974 yılında ise Selçuk (İzmir) ve Manisa-Merkez'de yine birer tarlada ve Penjamo-62 varyetesinde tesbit edilmiştir.

Buğday Mildiyösü, kaleme kalkma devresinde, bodurlaşma ve aşırı kardeşlenme ile, kök boğazı çürümesi, yatma ve bitki ölümü şeklinde görülmekle beraber; tipik belirtiler, başaklanma ve olum devrelerindeki yaprak ve başak deformasyonları olarak dikkati çekmiştir.

1971 yılında Aydın-Merkez'de Penjamo-62 ekili bir tarlada saptanan mil-

diyö, tarlanın yarısından çoğunu şiddetli derecede hastalandırmış ve hasta bitkilerin % 75 inden fazlası, tipik başak deformasyonları ile birlikte dane bağlıyamamışlardır.

Bazı yabani özçimenlerle, arpa, yulaf, mısır, çeltik, v.b. gibi ürünler hastalığın konukçusu olarak bildirildiğinden ve oosporların çimlenmesi ve hastalığın oluşması için yüksek toprak nemi uygun olduğundan, Buğday Mildiyösü ile savaş olasılıklarından olarak, yabancı otların yok edilmesi, iyi bir toprak işleme ve yüzey drenajı ve konukçu olmayan bitkilerle ürün nöbetlemesi salık verilebilir.

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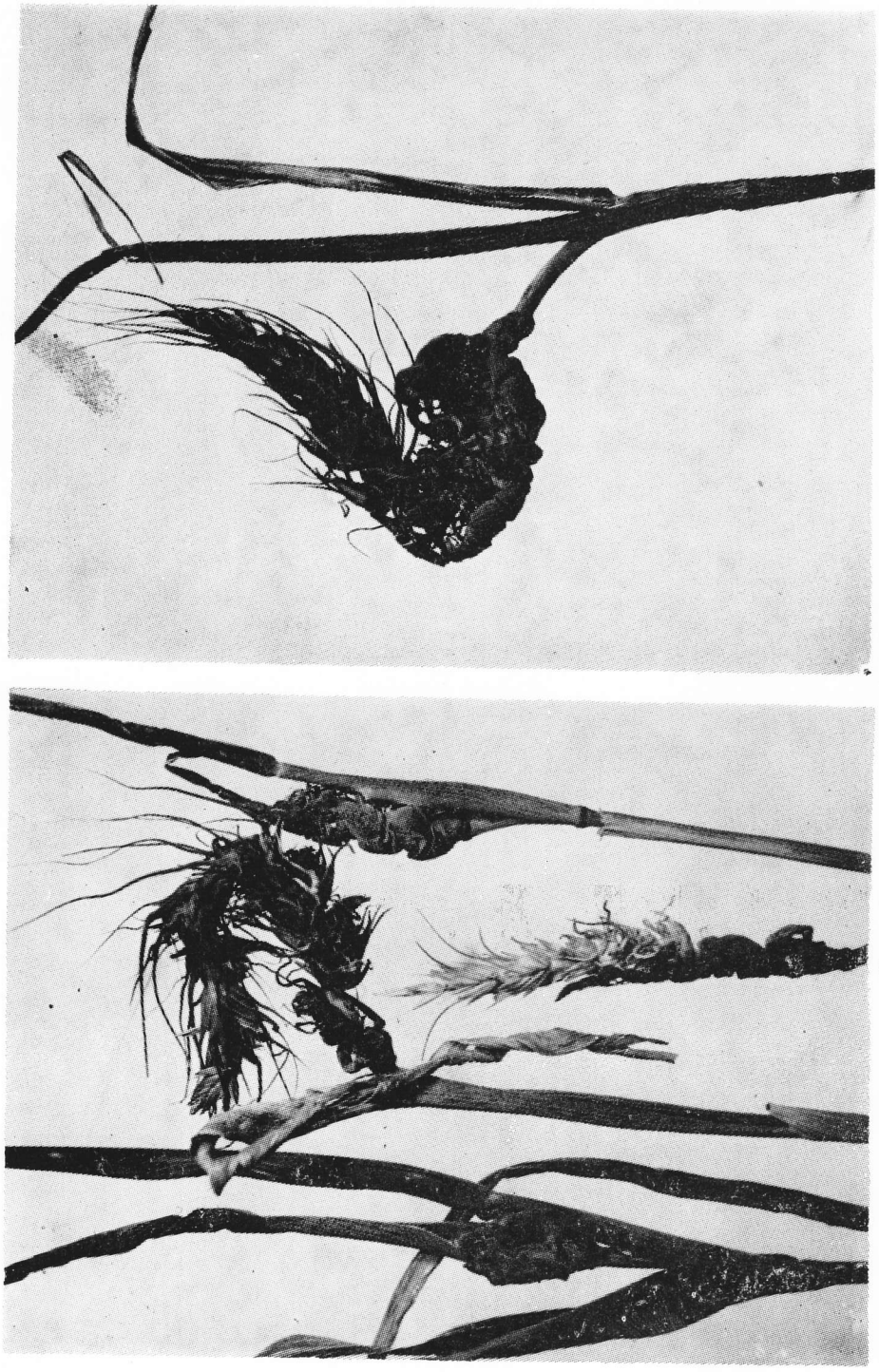

Fig. 1. The deformations of the leaves and ears caused by **Sclerospora macrospora.**

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A Phytophthora Species New for Turkey Determined in Citrus Orchards in Adana

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INTRODUCTION

A **Phytophthora** species has been determined for the first time, in Kapılı village of Adana in February 1974. In field observations and laboratory studies it was determined that this **Phytophthora** species differed from **P. citrophthora** (Sm. and Sm.) Leonian, known to cause damage on citrus in this region. The new species caused brown rot and leaf drop on the orange varieties of Shamouti and Washington navel.

It is suspected that this fungus is **P. hibernalis;** and with this paper it has been established for the first time in Turkey that **P. hibernalis** is causing damage in citrus plantations in Adana.

P. hibernalis was first reported from Australia by Carne in 1925 (FAWCETT, 1936). It is known that the fungus causes damage in South Africa (FAWCETT, 1936), in California (FAWCETT, 1936; KLOTZ et al., 1969) and in Israel (SCHIFFMANN - NADEL, 1969).

In previous studies only **P. citrophthora** isolated in the Mediterranean Region (SALİH, 1971, unpublished data).

MATERIALS and METHODS

Isolations were made by planting orange seeds, obtained from two thirds decayed fruits aseptically, in PDA (20 % potatoes, 2 % dextrose, 2 % Agar). Before isolation, decayed fruitsurface sterilised by alcohol 96 %. Then the fruits were cut into two equal sections with a sterilised knife and the seeds were taken with a sterilised pens, and planted into PDA.

The fungal colonies produced on PDA compared with those of **P. citrophthora.**

Sporangia produced by covering fungus culture with tap water and incubated about 7 days at 23°C. Then sporangia produced in the culture was examined under microscope. Some of the

fungal specimens was sent to Commonwealth Mycological Institute and the others stored at 10°C, for determination purpose.

RESULTS and DISCUSSION

The colonies of new **Phytophthora** species differs from those developed by **P. citrophthora.** They were the same of the colonical form that FAWCETT (1936) gives for **P. hibernalis.**

It was determined in microscopic examinations that sporangia were 24 - 50X 13-24 (37X18) microns.

On the other hand, abundant oospores (30-50 per microscopic area) were observed in microscopic examinations of the culture stored 3 months at 10°C. It has been found that the fungus caused damage on oranges only.

Dr. STAMS, from Commonwealth Mycological Institute, identified the fungus as **Phytophthora hibernalis** Carne.

This is the first time that **P. hibernalis** established in Turkey.

P. citrophthora cause damage on fruits up to 120-150 cm from the soil surface, but **P. hibernalis** can be seen causing damage on fruits on the top of orange trees. **P. citrophthora** cause damage on all of the citrus varieties. **P. hibernalis** has been seen only on oranges. In addition **P. hibernalis** causes leaf drop too.

It seems that **P. hibernalis** is not common in our region, because in a prior study we can not be able to isolate **P. hibernalis** from specimens collected from various localities in the region in various times in the year.

ACKNOWLEDGEMENT

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ÖZET

ADANA TURUNÇGİL BAHÇELERİNDE ZARAR YAPAN YENİ BİR **Phytophthora** TÜRÜ, (**P. hibernalis** Carne) BULUNDU

Adana Merkez Kapılı köyünde 1974 yılı Şubat ayında portakal meyvelerinde kahverengi meyve çürüklüğü ve yaprak dökümüne sebep olan bir **Phytophthora** türü tesbit edilmiştir.

Yapılan lâboratuvar tetkiklerinde bunun **P. hipernalis** olabileceği saptanmıştır. Nitekim Dr. STAMPS etmeni **Phytophtora hibernalis** Carne olarak teşhis etmiştir.

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Tabakmosaik-Virus an Gerbera jamesonii in der Türkei

Ülkü YORGANCI und İbrahim KARACA*

ZUSAMMENFASSUNG

In Bornova wurden an **Gerbera jamesonii** virusähnliche Symtome beobachtet. Mit dem Saft von kranken **Gerbera** Pflanzen wurden Testpflanzen mechanisch inokuliert. **Nicotiana glutinosa, Chenopodium amaranticolor, Datura stramonium,** und **Gomprena globosa** reagierten mit Lokalläsionen und Tabakpflanzen **(Nicotiana tabacum** «Maden») mit systemischer Erkrankung.

Der geklärte Rohsaft von inokulierten **Nicotiana glutinosa** Blättern mit Lokalläsionen wurde gegen Tabakmosaikvirus- Antiserum (Normalstamm) getestet und gab eine deutliche serologische Reaktion im Agargel.

Die negativ gefärbten Präparate des Gerbera Isolates wurden elektronenmikroskopisch untersucht und die Aufnahmen zeigten stäbchenförmige Partikeln von 320 mμ Länge.

Aufgrund der Symptome, Form und Grösse der Partikeln und der positiven serologischen Reaktion mit TMV- Antiserum kan man das Isolat als einen Stamm des Tabakmosaik-Virus ansehen.

EINLEITUNG

In Gewächshäusern der landwirtschaftlichen Fakultät der Ege Universität in Bornova zeigten die **Gerbera jamesonii** pflanzen virusähnliche Symptome. Sie waren im Wuchs zurückgeblieben und zeigten Blattflecken, die später nekrotisch wurden.

Eine Viruskrankheit an Gerbera

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wurde von Stouffer (1965) in Amerika und von Hakkaart (1968) in Holland untersucht und als einen Stamm des Tabakrattle- Virus festgestellt.

MATERIAL und METHODE

Die Blätter von virus verdächtigen Gerbera Pflanzen wurden mit O.1M Phosphatpuffer pH 7.2 homogenisiert und mit diesem Inokulum verschiedene Testpflanzen infiziert. Die Testpflanzen wurden dann jeden Tag kontroliert und bonitiert.

Für die elektronenmikroskopischen Untersuchungen werden die Objektträgernetze mit 0,5 % Formvar überzogen. Die Präparate wurden nach der Tauchmethode (Brandes, 1957) mit systemisch infizierten Tabakblättern hergestellt. Nach dem Trocknen wurden die Präparate mit 1 % Na-Phosphotungstat pH 6.0 negativ gefärbt (Murant, 1965). Die Untersuchung erfolgte im Elektronenmikroskop EM, 9S-2 der Fa. Zeiss. Die photogroaphischen Aufnahmen wurden bei 9.500- und 28.000- facher Vergrösserung auf Agfa - Scientia Film aufgenommen.

Der serologische Test wurde als Geldiffusionstest nach Ouchterlony (1949) durchgeführt. Die Agarschicht wurde aus 1 % Bacto-Agar hergestellt, indem 0,01 M Tris-Puffer gelöst wurde und 0,9% NaCl sowie 0,002% $NaNO_3$ enthielt. Einen Tag nach der Herstellung wurden die Antigen- und Antiserum-Löcher ausgestanzt. Für die serologische Untersuchung wurden die Blätter von infizierten **Nicotiana glutinosa** Pflanzen gemörsert und abzentrifugiert. Der geklärte Tabaksaft wurde gegen Tabakmosaikvirus- Antiserum (Normalstamm) getestet.

ERGEBNISSE UND DISKUSSION

Die mechanisch inokulierten Blätter von **Nicotiana glutinosa, Chenopodium amaranticolor, Datura stramonium** und **Gomprena globosa** reagierten mit Lokaläsionen (Abb. 1,2,3,4) und die infizierten Tabakpflanzen **(Nicotiana tabacum** «Maden») zeigten Mosaik und später Blattdeformationen (Abb. 5). Diese Symptome sind ausser an **Gomprena globosa** charakteristisch für Tabakmosaik-Virus (Linnasalmi, 1966; Bode und Klinkowski, 1968).

Die elektronenmikroskopischen Aufnahmen der negativ kontrastierten Präparate des Gerbare Isolates zeigten stäbchenförmige Partikeln von 320 m, Länge (Abb. 6,7). Sie entsprechen damit in Form und Grösse den charakteristischen Partikeln des Tabakmosaikvirus (Hitchborn and Hills, 1965; Linnasalmi, 1966).

Das Gerbera-Isolat liess sich im Rohsaft mit Tabakmosaikvirus-Antiserum serologisch nachweisen und gab eine deutliche Reaktion im Agargel (Ab. 7).

Aufgrund der Symtome an Testpflanzen, Form und Grösse der Partikeln, und serologischer Reaktion mit TMV-

Antiserum kann man das Gerbera-Isolat als einen Stamm des Tabakmosaik-Virus identifizieren.

Herrn Prof. Dr. Mahmut Sağlam (Ankara) sei für die Hilfe bei den elektronenmikroskopischen Aufnahmen und Herrn Prof. Dr. R. Bercks (Braunschweig/Deutschland) bei der Identifizierung des Isolates und TMV- Antiserum herzlich gedankt.

ÖZET

TÜRKİYE'DE GERBERA JAMESONII'DE TÜTÜN MOZAYIK VİRUSU

Bornova'da **Gerbera jamesonii** bitkilerinde virus benzeri belirtiler gözlendi. Hasta Gerbera bitkilerinin özsuyu ile test bitkileri inokule edildiğinde, **Nicotiana glutinosa, Chenopodium amaranticolor, Datura stramonium** ve **Comprena globosa** lokâl lezyonlar vererek, tütün bitkileri (**Nicotiana tabacum** «Maden») sistemik hastalanma şeklinde reaksiyon gösterdiler.

İnfekteli **Nicotiana glutinosa** yapraklarının kaba unsurlarından arıtılmış özsuyu, Tütünmozayıkvirusu - Antiserumu (Normal ırk) ile Agargel'de belirgin bir serolojik reaksiyon verdi.

Gerbera İzolâtının negatif boyanmış preparatları elektronmikroskobik olarak incelendi ve çubuk şeklinde 320 mμ uzunluğunda partiküller görüldü.

Belirtilere, partiküllerin şekil ve büyüklüğüne ve TMV- Antiserumu ile pozitif reaksiyona dayanılarak Gerbera-İzolâtı Tütünmozaik-Virusu'nun bir ırkı olarak kabul edilebilir.

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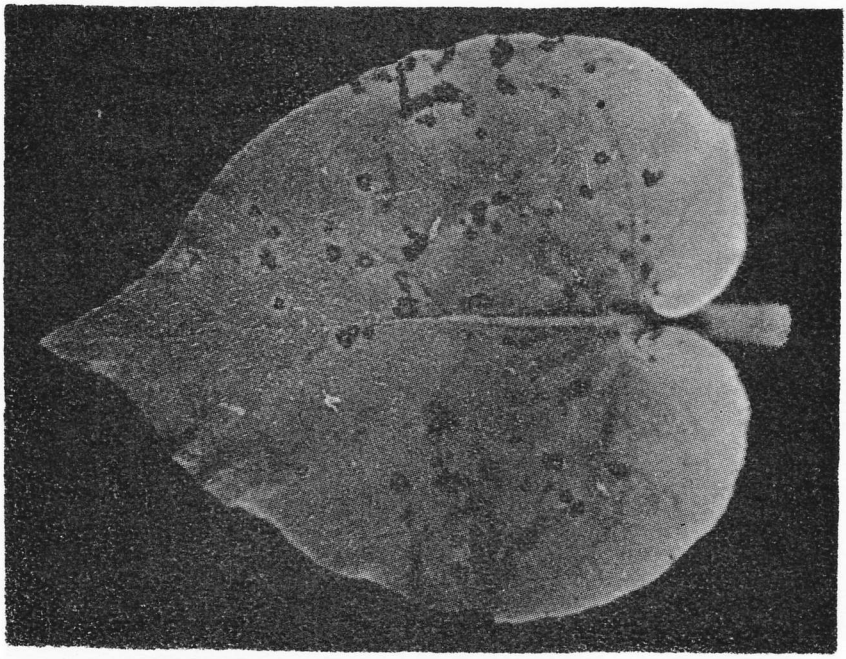


Abb. 1. Netrotische Lokalläsionen an **Nicotiana glutinosa**

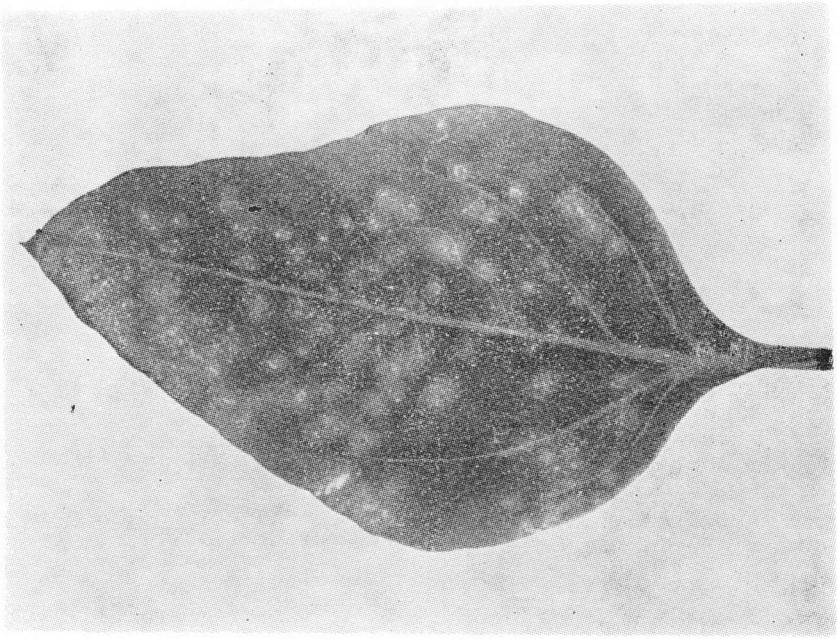


Abb. 2. Durch das Gerbera-Isolat hervorgerufene Lokalläsionen auf einem **Chenopodium amaranticolor** Blatt.

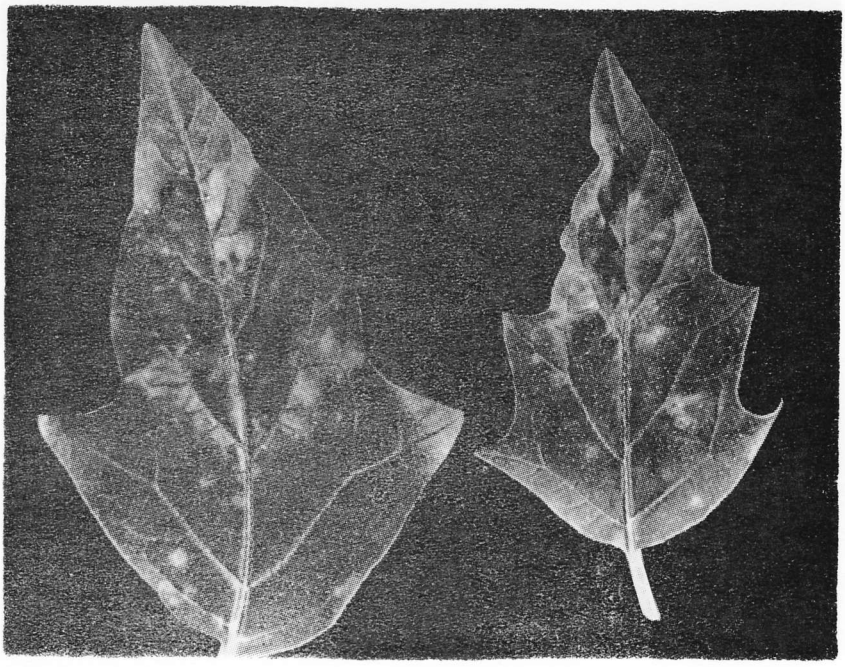


Abb. 3. Nekrotische Lokalläsionen auf den Blättern von **Datura stramonium.**

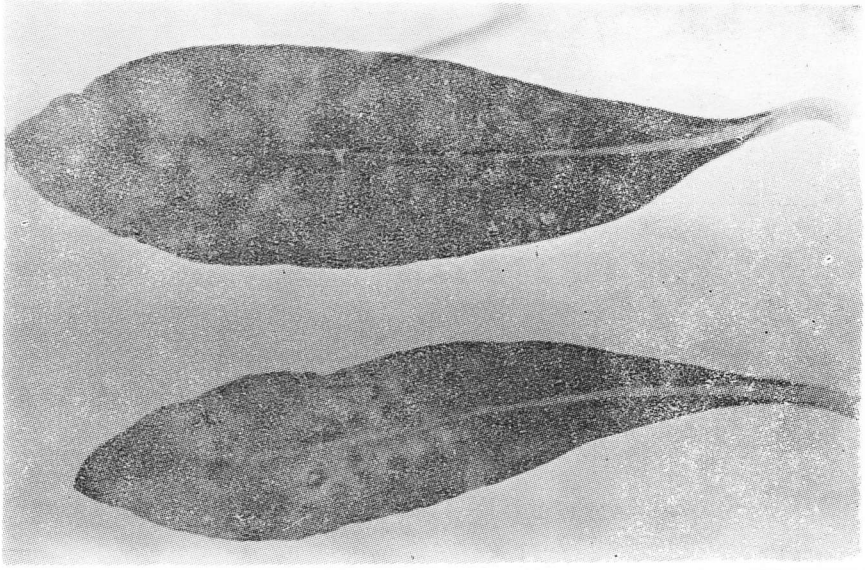


Abb. 4. Durch das Gerbera-Isolat hervorgerufene Lokalläsionen auf Blättern von **Gomprena globosa.**

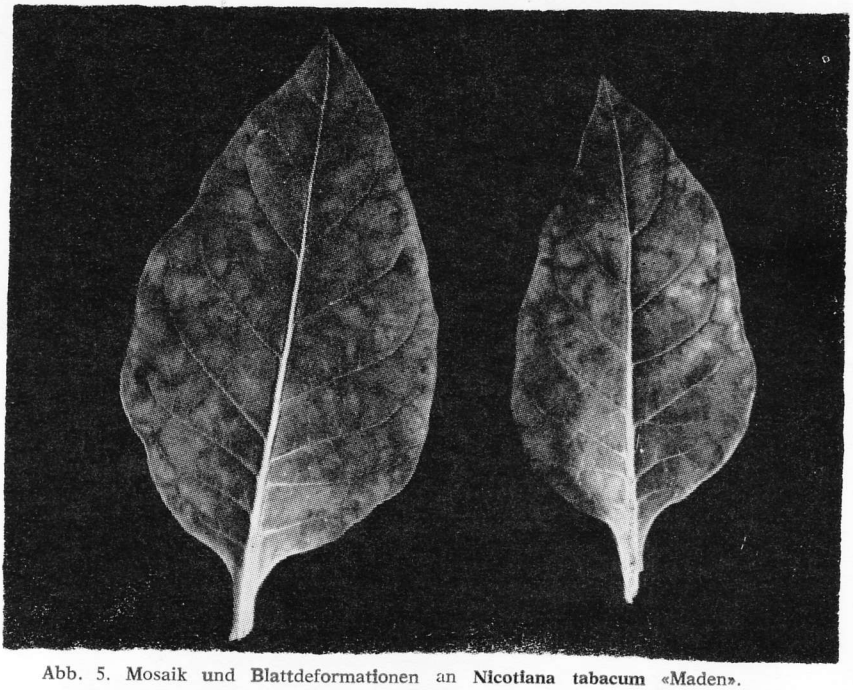
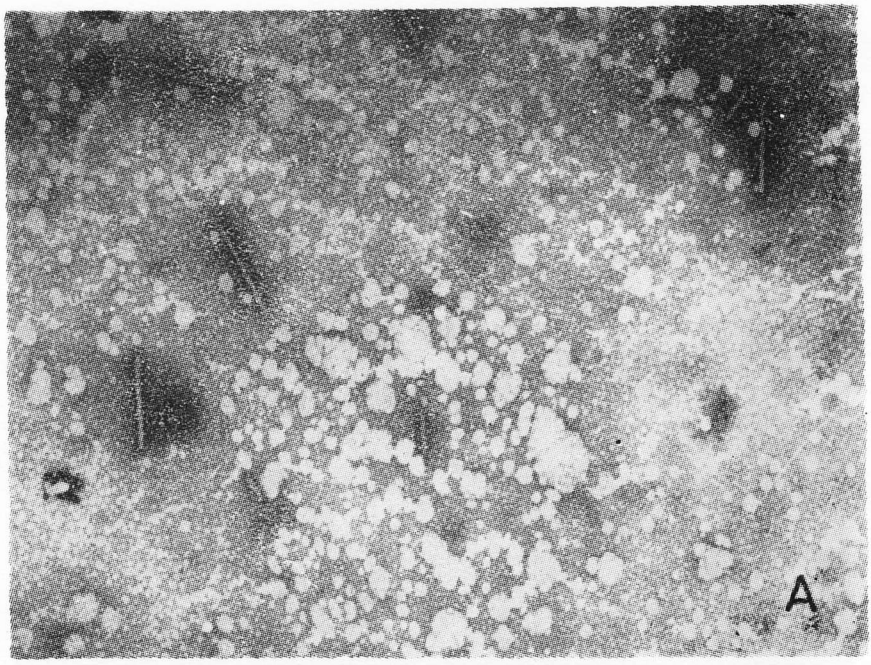
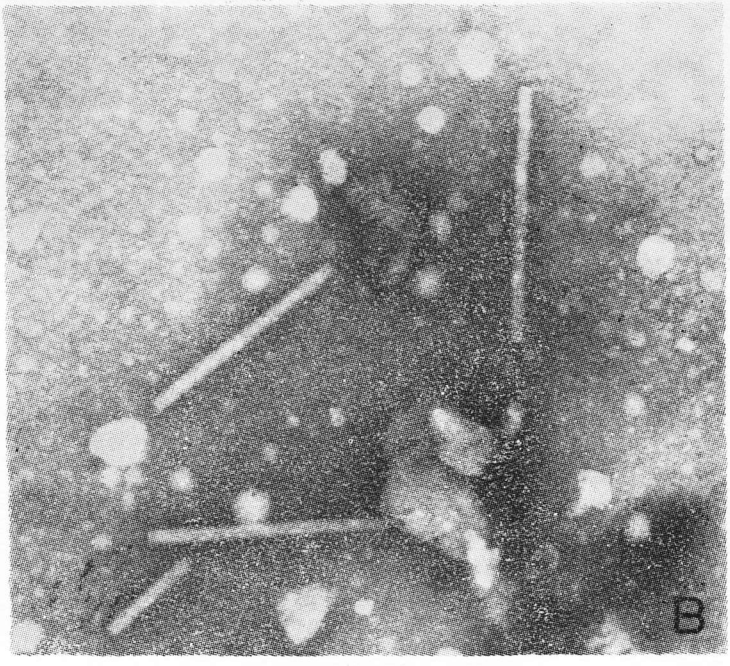


Abb. 5. Mosaik und Blattdeformationen an **Nicotiana tabacum** «Maden».



A — Vergrösserung etwa 32.000-fach.



B — Vergrösserung etwa 94.000-fach.

Abb. 6. Elektronenoptische Aufnahmen von charakteristischen Partikeln des Gerbera-Isolates.

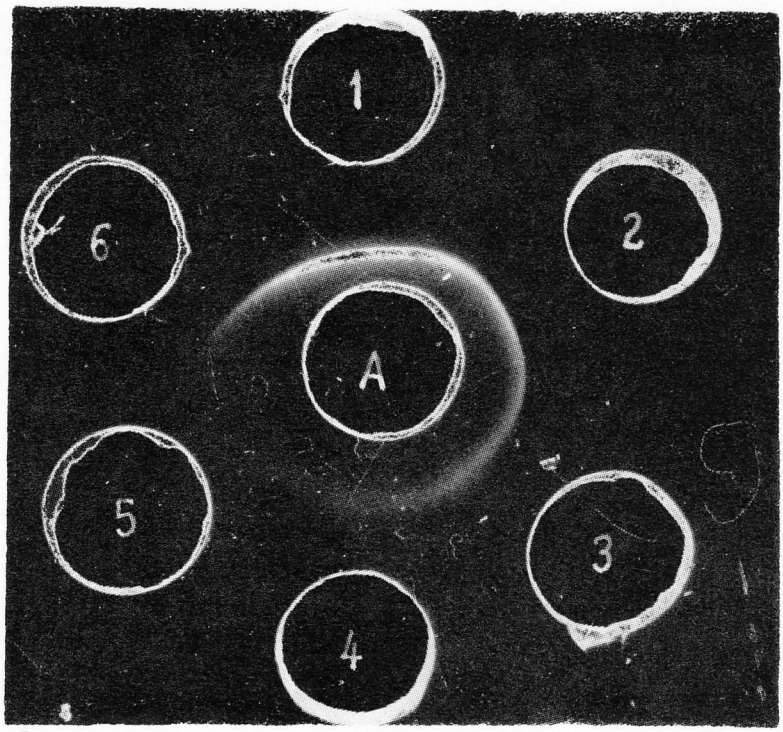


Abb. 7. Serologische Reaktion im Geldiffusionstest zwischen Gerbera-Isolat und Antiserum gegen Tabakmosaik-Virus (Normalstamm); A=Rohsaft von infizierten **Nicotiana glutinosa** Pflanzen, in den peripheren Löchern Antiserum gegen Tabakmosaikvirus, 1=u.v., 2=1/2, 3=1/4, 4=1/8, 5=1/16, 6=1/32.

J. Turkish Phytopath. Vol. : 3 Num. : 3 — 1974

Une Espèce L'oidium Rencontrèe pour la première Fois sur Pistacia vera E. en Turquie

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En 25.9.1974, L'odium a éte observé par nous aux environs de Gaziantep (Village de Büyükaraptar) sur les pista chiers. C'est la première fois qu'on y l'a rencontrée en Turquie, Il se devellope à la face inferieur des feulles des taches de mycelium (Fig. 1).

Nous l'avons constaté comme **Phyllactinia** sp., Prof. G. Viennot-Bourgin a verifié notre détermination et a signalé que c'est **Phyllactinia guttata** (Wallr.) Lév.

Nous avons observé certain caractéres morphologique de ce champignon suivante; Les cleistothéciums sont sphériques et atteignent 234 - 260µ de diametre (Fig. 2). En surface sont repartis de fulcres en nombre variable (6 á 20), dont la longeur atteigne de 19 à 29µ. Le nombre des asques varie de 5 à 15 par cleistothécium. Selon Viennot-Bourgin (1949), Le nombre des fulcres varie de 5 à 18.

Nous avons de términé la méme champignon sur un grand nombre de chéne (**Quercus** spp.) aux environs des plantation du pistacier.

Nous avons L'intention d'étudier cet maladie l'année prochaine.

ÖZET

ANTEP FISTIKLARINDA KÜLLEME HASTALIĞININ TESBİTİ

Antep fıstıklarında Külleme hastalığı, Türkiye'de ilk defa 1974 yılı Eylül ayında Gaziantep ili Büyükaraptar köyü plântasyonlarında saptanmıştır. Fransa'da Institut Natıonal Agronomique'de Prof. Dr. G. Vıennot-Bourgin'e tanısı yaptırılan etmen, **Phyloctinia guttata** (Wallr.) Lev. olarak belirlenmiş ve kültürel özellikleri incelenmiştir.

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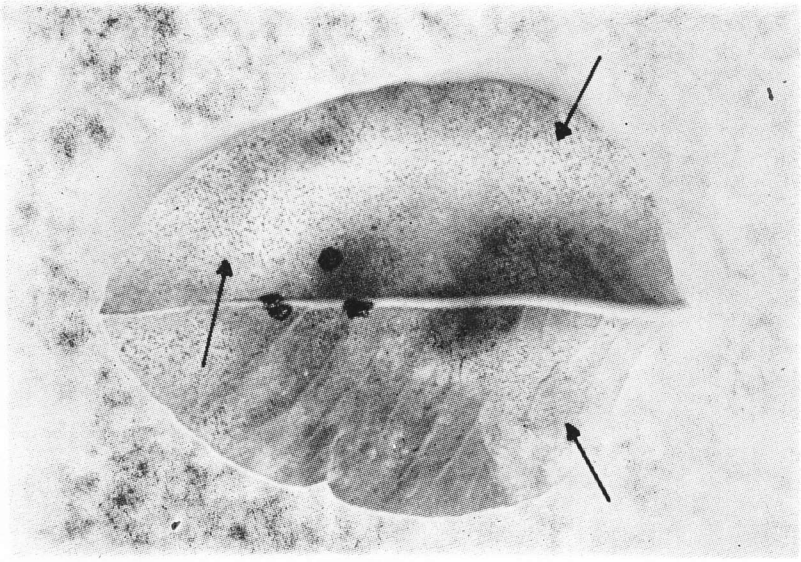

Fig. 1. Les taches d'Oidium sur les feuilles de **Pistacia vera L.**

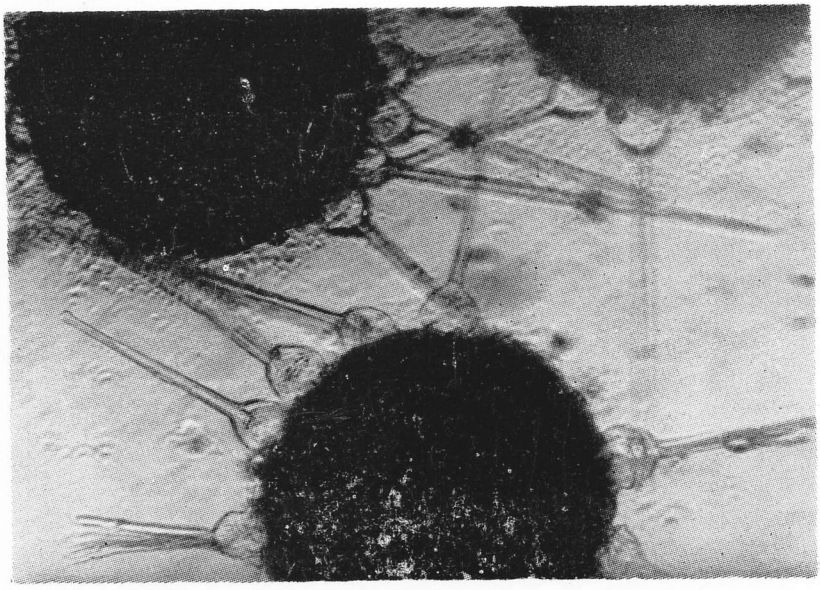

Fig. 2. Les cleistotheciums de **Phyllactinia guttata** (Wallr.) Lév.

TABLE OF CONTENTS AND INDEX TO VOLUME THIRD

1974

TABLE OF CONTENTS

No. 1-2 — JAN. — MAY, 1974

No. 3 — SEPTEMBER, 1974

INDEX

All Correspondance Should Be Made To
TÜRKİYE FİTOPATOLOJİ DERNEĞİ
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