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CONTETNS

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Nebenwirkungen Der 2,4—D + 2,4,5—T—Ester—Wuchsstoffherbiziden Auf Den Abbau Der Organischen Substanzen Im Boden [1]

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ZUSAMMENFASSUNG

Bei den Abbaumessungen der organischen Substanzen im Boden konnte nachgewiesen werden, dass die Umsetzung der pflanzlichen Substanzen in den mit der praxisüblichen Aufwandmenge der 2,4-D+2,4,5-T-ester-Wuchsstoffe (200 ml/Dekar) behandelten Böden schneller als in der Kontrolle verlief.

Die Bodenatmung wurde durch die normale Aufwandmenge des Herbizids (Die Wirkstoffkonzentration im Bodenwasser bei 50 ppm) gefördert Wenn die Herbizidkonzentration im Bodenwasser bei 5000 ppm liegt, wurde die Bodenatmung anfangs für einige Stunden vermindert, spaeter aber gefördert.

Die Dehydrogenase-Aktivitaet wurde durch die Herbizid-Zusaetze anfangs vermindert, spaeter gefördert.

EINLEITUNG

Die Anwendung chemischer Unkrautbekaempfungsmittel hat in den letzten Jahren auch in der Türkei immer mehr Eingang gefunden. Die gesteigerte Anwendung der Unkraut-bekaempfung führt zu der Frage, welche Einflüsse solche Preparate auf den Boden und die mikrobiologische Aktivitaet des Bodens haben, weil ein grosser Teil der Mittel

[1]) Vortrag gehalten auf dem I. Phytopath. Kongress in İzmir.

durch direkte Bekaempfungsmassnahmen, infolge Einarbeitung behandelter oberirdischer Pflanzenorgane oder durch das Abtropfen überschüssiger Mittelmengen in den Erdboden gelangt. Der Einflus von Herbiziden auf die Mikroflora des Bodens ist in den vergangenen Jahren in vielen Arbeiten eingehend untersucht worden (Fletcher 1960, 1966; Domsch 1963; Audus 1964, 1970; Resz 1968; Teuteberg 1968a und b; Rintelen 1968 Valaskova 1968; Heitefuss und Bodendörfer 1970; Yeğen und Heitefuss 1970a und b; Naumann 1970, Grossbard 1970; Heitefuss 1970, 1973; Brandes und Heitefuss 1971a und b; Inderawati 1973; Kathan und Eshel 1973; Bartels 1974; Yeğen und Iren 1974; Ceylan 1974).

Im Rahmen dieser Arbeit wurden die Nebenwirkungen von 2,4-D+2,4,5-T-ester-Wuchsstoffherbizide auf den Abbau der organischen Substanzen in Boden untersucht.

MATERIAL UND METHODE

Zellulose-Test mit Streichhölzer:

Die Streichhölzer wurden von den chemischen Spitzen abgeschnitten und anschliessend 3 mal je 30 Minuten unter völliger Erneuerung des Wasser in aqua dest. ausgekocht. Danach wurden diese Streichhölzer bei 105°C 12 Stunden getrocknet und im Exsiccator erkalten gelassen. Anschliessend wurden die Streichhölzer auf der Analysenwaage ausgewogen und mit einem Plastikschild nummeriert (Abb. 1). Die so vorbereitete Streichhölzer wurden je 25 Stück (Beim II. Versuch je 35 Stück) in einem Gefaess befindlichen Sandboden (Beim II. Versuch wurde diesem Boden 20 % Stahlmist zugesetzt) bis zu 5 cm Tiefe eingelegt und ausgehobene Boden in möglichst unveraenderter Lage wieder eingebracht.

In der vorliegenden Arbeit wurde als Untersuchungsobjekt das Herbizid-Tributon 60 (Bayer) ausgewaehlt. Dieses Praeparat enthaelt ca. 72 % aktiven Wirkstoff in Form 2,4-D+2,4,5-T-Ester. Die Behandlung der Erde erfolgte durch Aufsprühen der entsprechenden Menge von diesem Herbizid (200 ml/Dekar Herbizid in 100 Liter/Dekar Wasser) auf die Erdoberflaeche.

Nach 6 Wochen wurden die Streichhölzer ausgegraben. Nach dem mit Leitungswasser gründlich Waschen, wurden sie 12 Stunden lang bei 105°C getrocknet, im Exsiccator erkalten gelassen und auf Analysenwaage ausgewogen. Zur Auswertung wurde der Gewichtsverlust der Streichhölzer in % des Ausgangsgewichtes angegeben.

Bodenatmung :

Im Rahmen dieser Arbeit wurde die Beeinflussung der Bodenatmung mit der Warburg-Methode untersucht (Brauner-Bukatsch 1961). Pro Reaktionsgefaess wurde 3 g mit 2 % Weizenstroh zugesetzter Boden eingewogen. Herbizidzusaetze je 0,5 ml (50 und 5000 ppm Wirkstoff) wurden dem Boden vor Versuchsbeginn zugefügt. Die Kontrolle erhielten den gleichen Wasserzusatz. Im Zentralgefaess befand sich stets 0,2 ml 20 %'ige KOH, die jeden 48 Std. ausgewechselt wurde, Die Temperatur des Wasserbades betrug 25°C. Die Berechnung der Gefaesskonstanten erfolgte nach Umbreit (1957). Es wurde 4 Parallelgefaesse für eine Variante gebraucht und dieser Versuch wurde zweimal wiederholt.

Messung der Dehydrogenase-Aktivitaet .

Die Dehydrogenase - Aktivitaet des Bodens wurde nach dem Verfahren von LENHARD (1956) gemessen.

Je 10 g lufttrockener mit 2 % Weizenstroh zugesetzter Boden wurde in 100 ml-Erlenmeyer-Kölbchen versetzt und mit 4 ml Herbizid-Lösung (50 und 5000 ppm Wirkstoff) bzw. Wasser befeuchtet. Die mit Wat testopfen versehenen Erlenmeyern verblieben waehrend der Versuchsdauer bei 25°C im Dunkeln. Nach dem 1.,3.,7.,14. und 21. Tag der Herbizidbehandlung wurden pro Versuchsvariante je 5 Wiederholungen geprüft. Der Boden wurde mit 1 ml einer 1 %'igen Triphenyltetrazoliumchlorid-Lösung (TTC) befeuchtet und 24 Std. bei 29°C im Dunkeln inkubiert. Anschliessend wurden 50 ml Methanol eingefüllt und 1 Std. in der Dunkelheit umgeschüttelt. Danach wurden sie abfiltriert und bei 546 nm (Bausch-Lomb) photometriert.

ERGEBNISSE

Zellulose-Test mit Streichhölzer:

Beim ersten Versuch, der mit Sandboden durchgeführt wurde, wur de der Abbau der organischen Substanzen im mit Herbizid behandelten Boden etwa 27 %, dagegen in der Kontrolle etwa 22% festgestellt(Abb. 2). Beim zweiten Versuch, bei dem dem Sandboden 20 % Stahlmist zugesetzt worden war, wurde der Abbau der organischen Substanzen im mit Herbizid behandelten Boden etwa 53 %, dagegen in der Kontrolle etwa 48 % festgestellt (Abb. 2).

Aus den in Abbildung 3 dargestellten Daten laesst der Abbau der organischen Substanzen im mit Weizen ausgesaeeten und 20 % Stahlmist zugesetzten Boden erkennen, dass es beim Herbizid behandelten Boden etwa 41 %, dagegen bei der Kontrolle etwa 38 % war.

Die Ergebnisse lassen insgesamt den Schluss zu, dass die Umsetzungen der organischen Substanzen im mit 2,4-D+2,4,5-T-Ester Wuchsstoffherbizid behandelten Boden schneller als in der Kontrolle verliefen.

Bodenatmung :

Im Boden, dem 2 % Weizenstroh zugesetzt wurde, zeigte der O_2-Verbrauch bei der Herbizid-Variante von 50 ppm Wirkstoff im Bodenwasser vor Versuchsbeginn an eine leichte Erhöhung. Dagegen aber bewirkte der höhere Zusatz von Herbizid (5000 ppm Wirkstoff im Bodenwasser) die Bodenatmung zunaechst (5 bzw. 24 Std. lang) negativ. Danach lag die Atmungsrate in der behandelten Probe staendig höher als in der Kontrolle (Abb. 5).

Die Dehydrogenase - Aktivitaet des Bodens :

In einem 3 Wochen dauernden Versuch beim 2 % Weizenstroh zugesetzten Sandboden riefen die Herbizid-Zusaetze (50 und 5000ppm Wirkstoff) zunaechst (1. Tag nach dem Herbizid-Zusatz) eine leichte Abnahme der Dehydrogenase - Aktivitaet gegenüber der Kontrolle hervar. Spaeter aber wurde die Dehydrogenase-Aktivitaet im mit Herbizid behandelten Boden zugenommen (Abb. 5).

DISKUSSION

Der Einfluss von Wuchsstoffherbiziden auf die mikrobiologische Aktivitaet des Bodens wurde in den vergangenen Jahren in zahlreichen Arbeiten untersucht. Die viele Autoren kommen zu der Auffassung, dass die praxisübliche Anwendung der Wuchsstoffherbiziden nicht zu einer dauernden Beeinflussung von Bodenbiozönose führt (FLETCHER 1960, DOMSCH 1963, AUDUS 1964, MAIER-BODE 1971). SZEGI (1972) prüf te die Auswirkung einer 2,4-D-Wirkstoffe in Chernozem-Boden (87-175 g Wirkstoffe in 1 g Erde) auf den Zelluloseabbau. Der Zelluloseabbau verlief in den mit Herbizid behandelten Böden schneller als in der Kontrolle. Diese Wirkung konnte im Sandboden nicht festgestellt werden.

Bei unseren Abbaumessungen der organischen Substanzen im Boden konnte nachgewiesen werden, dass die Umsetzung der pflanzlichen Subs tanzen in den mit der praxisüblichen Aufwandmenge der 2,4-D + 2,4,5-T-Ester - Wuchsstoffherbizide (200 ml Herbizid/Dekar) behandelten Böden schneller als in der Kontrolle verlaufen (Abb. 2 und 3).

Messung des O_2-Verbrauches und die Bestimmung der Dehydrogenase-Aktivitaet des Bodens können unter bestimmten Vorbehalten als allgemeines Mass für die Umsetzungstae-

tigkeit der Bodenmikroorganismen angesehen werden (LENHARD 1956 NAUMANN 1970).

Im Rahmen dieser Arbeit machten wir Annahme, dass die praxisübliche Aufwandmenge der Wuchsstoff herbizide von 2,4 - D + 2,4,5-T-Ester (100 - 200 ml Herbizid/Dekar) im Bodenwasser der oberen 1 cm des Bodens gleichmaessig verteilt ist. Dann ist die Herbizidkonzentration im Bodenwasser bei 1 cm Eindringungstiefe, 15 % Wassersaettigung und 1,2 spezifische Gewicht des Bodens ca. 40 - 80 ppm Wirkstoff. Mit dieser Sicht haben wir bei der Bodenatmung und der Bestimmung der Dehydrogenase-Aktivitaet des Bodens, ein Mal eine normale Herbizid-Dosis (50 ppm Wirkstoff im Bodenwasser) und ein Mal eine höhere Herbizid-Dosis (5000 ppm Wirkstoff im Bodenwasser) geprüft. Die Versuchsergebnisse zeigten eine weitgehende Parallelitaet im Abbau der pflanzlichen Substanzen, in der Bodenatmung und in der Dehydrogenase-Aktivitaet. Die Förderung der Bodenatmung und der Dehydrogenase-Aktivitaet deuten auf eine Aktivierung der Zellulose-Abbauenden Mikroorganismen im Boden durch das Herbizid hin (Abb. 4 und 5).

Wenn die mikrobiologische Umsetzung der pflanzlichen Substanzen im Boden durch die Pflanzenschutzmitteln gestört oder blockiert wird, können weder die Humusversorgung des Bodens als auch der Wassergehalt des Bodens negativ beeinflusst werden. Dadurch bekommen auch einige Pflanzenpathogene, die an den Pflanzenresten weiter leben können, mehr Gelegenheit um zu existieren. In dieser Hinsicht zeigten diese Versuchsergebnisse einen positiven Einfluss auf die Bodenfruchtbarkeit durch dieses Herbizid.

ÖZET

2,4-D+2,4,5-T-ESTER HORMON TİPİ HERBİSİTLERİN TOPRAKTAKİ ORGANİK MADDELERİN PARÇALANMASI ÜZERİNE YAN ETKİLERİ

Bu çalışmada, 2,4-D + 2,4,5-T karışımı ester terkipli, hormon tabiatlı bir herbisidin (Tributon 60), toprakta biyolojik olarak süregelen bitkisel organik madde parçalanmasına yapmış olduğu yan etkiler incelenmiştir.

Araştırmadan elde edilen sonuçlar, pratikte kullanılan dozlarda 2,4-D + 2,4,5-T-Ester terkipli herbisidlerin, toprağın mikrobiyolojik aktivitesine pozitif etki yaparak, toprakta bitkisel organik madde parçalanmasını hızlandırdıklarını göstermektedir.

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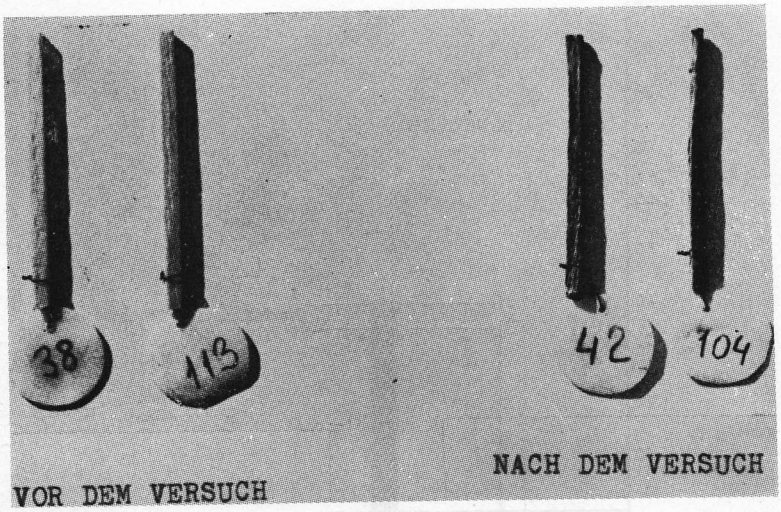

Abbildung 1. Zellulose-Test mit Streichhölzer
Links : Vor dem Versuch
Rechts : Nach dem Versuch

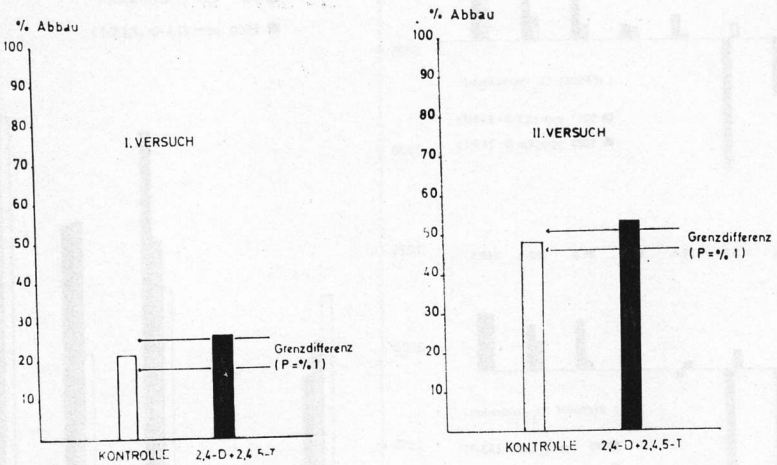

Abbildung 2. Einfluss des Herbizids auf den Abbau der organischen Substanzen im Boden

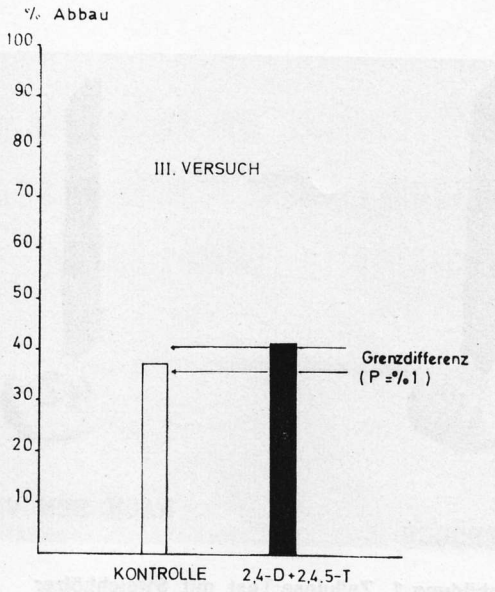

Abbildung 3. Einfluss des Herbizids auf den Abbau der organischen Substanzen im mit Weizen ausgesaeeten Boden

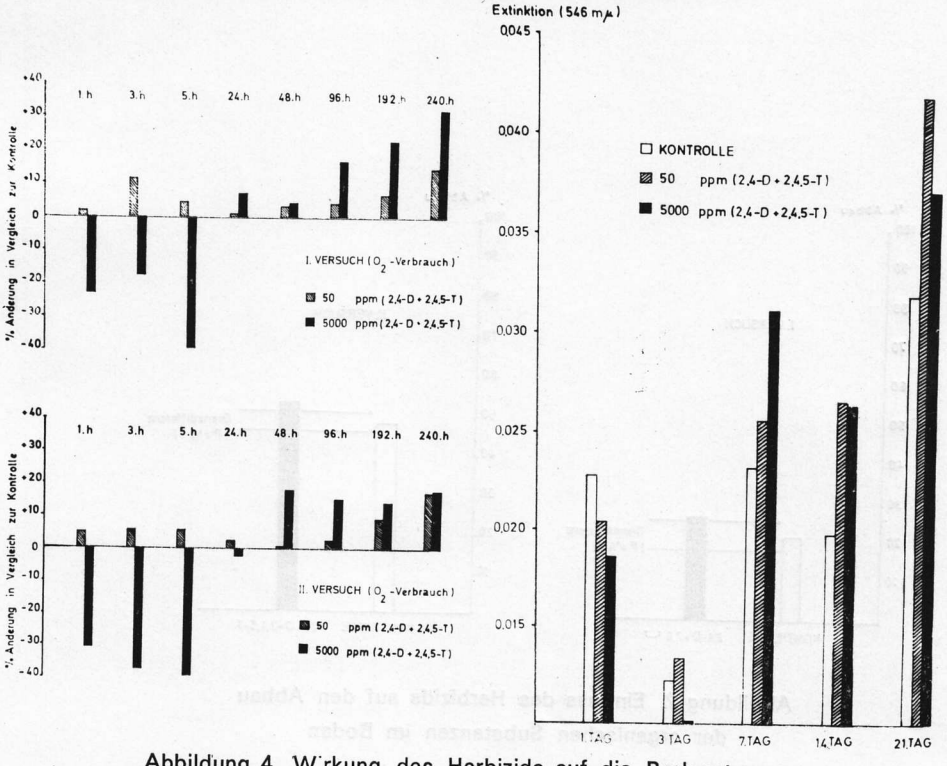

Abbildung 4. Wirkung des Herbizids auf die Bodenatmung
Abbildung 5. Wirkung des Herbizids auf die Dehydrogenase-Aktivitaet des Bodens

J. Turkish Phytopath. Vol. 6, Num. 2, 59—64, 1977

Changes in Chlorophyll, Carotenes and Xanthophylls in Chilli Leaves (Capsicum annuum L.) After Infection by Xanthomonas vesicatoria (Doidge) Dowson

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INTRODUCTION

Bacterial leaf spot caused by **Xanthomonas vesicatoria** has been found to be prevalent in different parts of Rajasthan on chillies (Shekhawat and Chakravarti 1977). Spots are formed on leaves. stems, and fruits and leaf margins, may at times be affected which turn deep brown in colour; infected leaves often become chlorotic (Figs.1,2,3). The present paper reports the results of changes in chlorophyll a, b, carotenes, xanthophyll and total chlorophyll in chilli leaves after infection by. **X. vesicatoria.**

MATERIALS AND METHODS

Quantitative estimation: The method of Arnon (1956) was followed. Freshly 0.1 g healthy and diseased leaves were crushed in 50 ml of 80% acetone separately and centrifuged at 1485xg for 10 minutes. The volume of the supernatants was maintained by addition of 80 % acetone and kept overnight in refrigerator (8 ± 1 C). The redings were taken on Bausch and Lomb Spectronic 20 Colorimeter at 645 nm and 663 nm with the use of 80 % acetone as blank. The amount of chlorophyll present in the extract was calculated on the basis of mg of chlorophyll per g of tissue by using the following formulas :

$$\text{mg chlorophyll a/g tissue} = \frac{12.7\,(D663) - 2.69\,(D645) \times V}{1000 \times W}$$

$$\text{mg chlorophyll b/g tissue} = \frac{22.9\,(D645) - 4.69\,(D663) \times V}{1000 \times W}$$

$$\text{mg total chlorophyll (a+b)/g} = \frac{20.2\,(D645) + 8.02\,(D663) \times V}{1000 \times W}$$

where D= optical density readings of the chlorophyll extract at indicated wavelengths, V=volume of 80 % acetone chlorophyll extract and W= weitht in grams of the tissues extracted.

Chromatographic Method: The method of Mishra £ Jha (1967) was followed. Two gms of freshly collected healthy and diseased leaves were weighed and ground in 2 ml of 90% ethyl alcohol to a fine pulp with the help of pestle and mortar. Five ml of alcohol was added to the pulp and filtered through muslin cloth to get clear extract. Strips of 25cm x 5cm size were cut from Whatman No. 1 filter paper and 0.1 ml of extracts from both healthy and diseased stocks were applied on the strips in the form of streaks along the width of the paper, 5 cm from below and allowed to dry up. The solvent was prepared by mixing petroleum ether and acetone (9:1 v/v). Fifteen ml of the solvent was poured in jar and the strips containing extracts from healthy and diseased leaves were hung in the jar with gum. Chromatograms were dried under ceiling fan. Observations of different bands denoting chlorophyll a, b and xanthophylls and carotenes were taken.

RESULTS

Quantitative estimation :

The experiment was repeated 2 times and average results of 3 trials are given in table 1. In infected leaves there was reduction in chlorophyll a (42%), chlorophyll b (62%) and total chlorophyll (51%), as compared to healthy leaves.

Table 1. Chlorophyll content in healthy and diseased leaves of chilli cv NP46A

Plant material	Chlorophyll a mg/g tissue	Chlorophyll b mg/tissue	Total chlorophyll c mg/tissue
Healthy leaves	0.984	0.721	1.706
Diseased leaves	0.570	0.272	0.841

Chromatographic determination :

In extracts from healthy leaves, the pigments separated into 3 distinct bands. The uppermost band was yellowish orange in colour and represented carotenes and xanthophylls; the middle band was bluish green in colour and represented chlorophyll a while the lower most band was yellowish in colour and represented chlorophyll b. In extracts from infected leaves, only 2 bands were formed in contrast to 3 bands in case of extracts of healthy leaves. The upper most was yellowish orange, representing carotenes and xanthophylls and the lower one was bluish green indicating chlorophyll a. The third band representing chlorophyll b as found in the extracts of healthy leaves was not present in extracts of infected leaves (Fig. 4). Moreover, colour of the bands in extract of infected leaves was fainter than that obtained in extracts of healthy leaves. The experiment was repeated 3 times with similar results. Interpretations of the bands as given by Mishra and Jha (1967) have been followed.

SUMMARY AND CONCLUSION

It is apparent from the results obtained in the present work that after infection by **X. vesicatoria** of chilli leaves, there is reduction in total chlorophyll (51 %), chlorophyll a (42 %), and chlorophyll b (62 %). In chromatographic determinations, only 2 clear cut bands were obtained in case of extracts of infected leaves as against 3 in healthy leaves, indicating considerable reduction of chlorophyll b and this reduction of chlorophyll was found to be 62 % when analysed quantitatively. Moreover, the faint bands formed with respect to infected leaf extractd as compared to those formed with extracts from healthy leaves may be on account of reduction of carotenes and xanthophylls which were, however, not

anlysed quantitatively. The results, in general, are in conformity with those obtained by several workers in case of some other bacterial diseases of plants (Kupervicz 1947, Sinclair **et al.**, 1970, Padmanabhan **et al.**, 1974).

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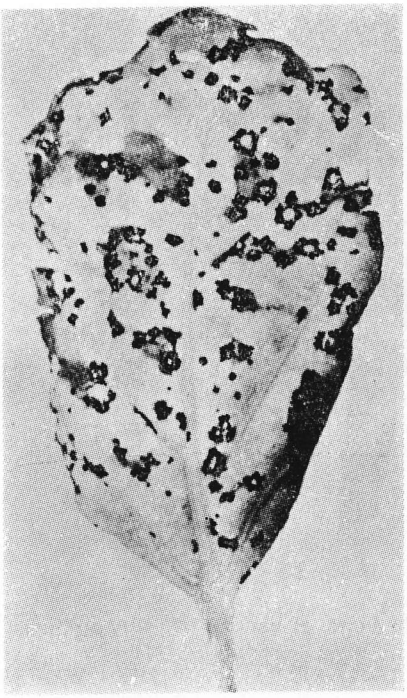

Fig.1. Severely infected leaf of a local chilli variety with chloratic lesions formed by **X. vesicatoria**

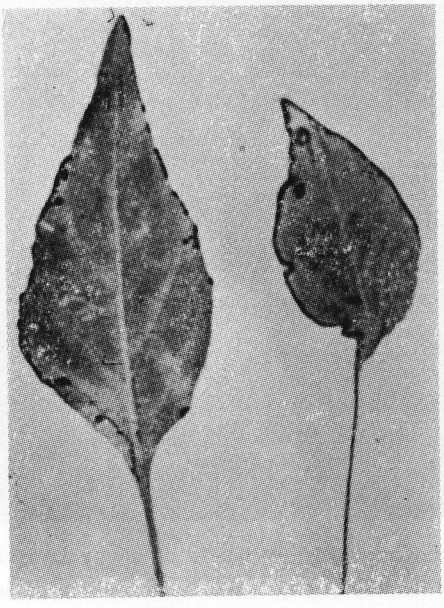

Fig.2. Marginal infection of chilli leaves variety NP 46A by **X. vesicatoria**.

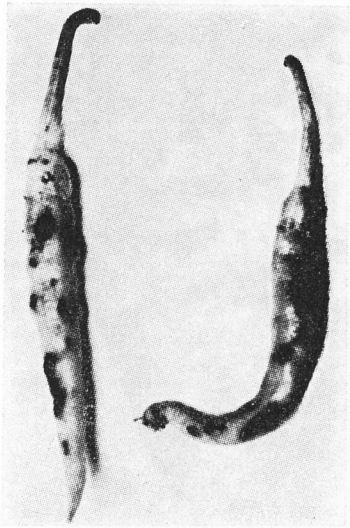

Fig.3. Bacterial spots on chilli fruits of variety NP 46A produced by **X. vesicatoria**

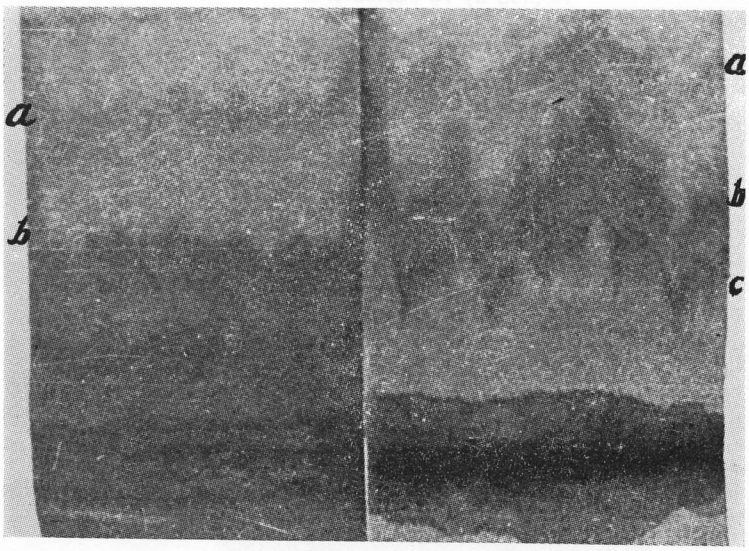

Fig.4. Chromatograms showing different bands of pigments in **X. vesicatoria** infected (left) and healthy (right) chilli leaves; (a) carotenes and xanthophylls (b) chlorophyll a (c) chlorophyll b

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Studies on Macrophomina phaseoli (Maubl.) Ashby. which causes the Onion Bulb Rots in Bitlis province

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ABSTRACT

M. phaseoli had been determined previously on certain plants in Turkey, but is was first observed on onion bulbs in 1974 in Bitlis. The onion bulbs infected by fungus had decayed becoming black colored; the roots were being separated easily from the bulbs; the masses similar charcoal had been formed at the bottoms of the bulbs, and the small, grayish black sclerotia had come into existence in the tissues of the fleshy bulb scales.

The pathogenicity of the fungus was investigated. The pathogenicity test were done by placing the wounded and unwounded bulbs, stems and fruits on agar plates on which the fungus was grown sufficiently, and by putting agar discs containing the fungus onto fruits. It was observed that the fungus infected onion bulbs, fresh onions, leeks, garlics, potato tubers, garden radishs, carrots, lettuce stems, and cucumber and vegetable marrow fruits.

Optimum growth conditions, and growth properties on different media of the fungus were also investigated for identification. The fungus grew best at 35°C among the five different temperature degrees, and at pH 5 among the five different pH steps. In spite of producing sclerotia abundantly which were grayish-black colored, small, 29 to 145 by 29 to 203 micron sized, the fungus didn't produce any pycnidium on different media.

Some chemicals were tested under laboratory conditions to find a clue for controlling the fungus, and it was determined that Derosal and Benlate were effective even at 0,001 % dose.

INTRODUCTION

Macrophomina phaseoli (Maubl.) Ashby. is a polyphagous fungus, and many cultivating plants are among its hosts It has been informed by Karaca (1974) that the fungus was first reported on egg-plant, pepper, potato, tobacco, sesame, anise and cotton plants in İzmir and Ankara provinces in 1942 in Turkey by Bremer et al. Afterwards, fungus was isolated from fibrous roots of mandarins by Akteke (1973) and from the diseased seedlings of egg-plant, pepper and tomato by Turhan (1973). Bora (1971) reported the genus **Macrophomina** obtained from the diseased tobacco seedlings together with other fungi, in Ege Region. On the other hand, **Macrophomina** sp. was obtained from the carnation seedling in the greenhouses in İzmir as associated with other fungi by Sezgin and Karaca (1976).

M. phaseoli was determined first on onion (**Allium cepa** L.) bulbs in Bitlis province in 1974 by me.

In the examination of onion samples which were sent from Narlıdere-Bitlis on September 18th 1974, it was observed that the bulbs had decayed, the roots were easily being separated from the bulbs, and a mass similar to charcoal had been formed at the bottoms of the bulbs. There were the symptoms consisting of the linear heaps of the small, black dots elongated along the veins of the scales, and resembling in appearance to those of **Aspergillus niger** v.Tiegh. which is usually a storage rot agent. This black dotted appearance on the samples was consisted of the small, grayish-black colored sclerotia in the tissues of the fleshy scales which were as water-soaked, and could not be rubbed off by finger, whereas it consists of the warm black colored masses of the spores, between the scales, of fungus, and can be rubbed off easily by finger at **A. niger.** The masses at the bottoms of the bulbs were also a pile of sclerotia.

It was determined by surveying that the area around Narlıdere where onion is produced largely, was infected by the fungus and some soil pests. The pathogenicity of the fungus was tested to be convinced about whether it is pathogen truly or not. In addition to that the pathogenicity of the fungus was also tested on some other cultivated plants to form an opinion if it is restricted to onion only or not.

The optimum growth conditions and the growth characteristics on different media was determined for identification of the fungus after determining its pathogenicity exactly, but the pycnidia of the fungus couldn't be obtained. The fungus was identified exactly by Dr. O. Karahan, from Regional Plant Protection Re-

search Institute, Ankara, Turkey. By the way, I want to thank to Dr. Karahan for his helping me.

Some laboratory works were also done to find a clue for chemical controlling the fungus.

MATERIALS AND METHODS

The fungus isolation which was isolated from the samples sent from Bitlis and preserved on PA (100 g peeled potato, 16 g agar and 1000 cc water) medium, at 6°C, was used in the experiments as inoculum source.

The white sweet onion variety bulbs which are cultivated in Bitlis, fresh onions, leeks **(Allium porrum** L.), garlics **(Allium sativum** L.), potato **(Solanum tuberosum** L.) tubers, garden radishs **(Raphanus sativus** L.) carrots **(Daucus carota** var. **sativa),** lettuce **(Lactuca sativa** var. **longifolia)** stems, and cucumber **(Cucumis sativus** L.) and vegetable marrow **(Cucurbita pepo** L.) fruits supplied from the market were used in pathogenicity tests, and it was investigated whether the fungus can infect the wounded or unwounded tissues or not. For this purpose, the tubers, the stems and the fruits were cleaned thoroughly under the running water and then the external surfaces of them were sterilized with mercuric chloride (0.1 %) for two minutes and washed with the sterile water. A part of them were put as unwounded onto the PA plates in Petri dishes inoculated by the fungus four days ago and incubated at 30°C. Another part of them were cut with a sterile knife, and put onto plates so that the cut surfaces were in contact the fungus. The Petri dishes were placed into the incubator which was adjusted to 30°C temperature and approx. 85 % humidity, and the dishes were covered with the big plastic cups so that air circulation was possible. The operation was set up in 4 replication. Another application for the infection of the healthy tissues was also done by putting the agar discs, about 5 mm. diam., which were taken near the margin of the fungus colony, on the healthy fruits and tubers which external surfaces were sterilized as mentioned above. It was incubated under the same conditions.

The fungus was incubated at 30 (∓1)°C and approx. 85 % humidity by inoculating on:

PDA (Potato Dextrose Agar, Difco 0013-01)

PA (Its formula was given above)

CMA (Corn Meal Agar, Oxoid CM103)

NA (Nutrient Agar, Difco 0001-01)

LA (5 g Lentil, 15 g Agar Oxoid No.1, 1000 cc water)

media as four parallels for determining its cultural characteristics on dif-

ferent media. Observations were made on the 6th day and at the end of the 3rd week. The fifty sclerotia were measured on the different dishes for determining the size of the sclerotia.

The fungus was grown at 15°, 20° 25°, 30° and 35°C on PDA for determining the optimum growth temperature. The diameters of the colonies were measured every day during the first week, and then in the last day of the 2nd week and at the end of the 3rd week. In addition to that, the duration of covering the Petri dishes (12 cm. in diam.) were also recorded as day.

PDA medium was used for determining the optimum growth pH. The pH of the medium was adjusted to 3, 5, 7, 9 and 11 by adding lactic acid and KOH after sterilization, using pH papers. After the incubation at 30°C for 3 days, the diameters of the colonies were measured.

Some chemicals were tested in Petri dishes (12 cm. in diam.) containing PDA. For this purpose, a hole (approx. 5 mm. in diam.) was opened on the agar plate at about 1.5 cm. distance from the margin by using a special perforator which was flamed and cooled in alcohol. During this operation, the dishes were held in vertical position so that the other microorganisms couldn't fall. On the other hand, the solutions of the chemicals were made in different doses by using the sterile materials. The two drops of each solution were dropped into the holes with a sterile dropper. The fungus was inoculated to the other side of the agar plate, opposite to the hole. The dishes were left for the incubation at 30°-35°C for 6 days. (as four parallels).

RESULTS AND DISCUSSION

It was observed that the fungus which was preserved at 6°C on PA by transferring onto fresh media every 6 months kept its virulance for a time in excess of 29 months, and it infected the onion bulbs (Bitlis variety) both from the cut surfaces in contact with the fungus and from the roots of the unwounded bulbs in all the parallels. However, the fungus produced the sclerotia in the tissues by penetrating from the roots but it didn't moved forwards the bulb in 21 days under the experiment conditions. On the other hand, it was observed that the fleshy scales in the middle of the bulb decayed thoroughly, and the fungus moved forwards the neck of the bulb through the tissues of the outer scales and produced the sclerotia seen as small, black dots under the skin and in the tissues of the scale, at the infections occured in the cut surfaces. The flesh at the

decaying parts of the bulb turned a grayish black color. The samples which were sent from Bitlis were almost same in aspect (Fig. 1).

The pycnidia were not produced by fungus on the bulbs in one month period.

The fungus infected the related plants as fresh onion, leek and garlic too. But infection was poor on leek, and restricted to the skin of the bulb on the garlic only. The infections on the vegetable marrow and cucumber fruits, the lettuce stems, the carrots and the garden radishs were fairly severe and occured promptly. The fruits decayed thoroughly in about 3-7 days, and the flesh of the fruits became a grayish black colored because of coming into existence of the sclerotia in tissues. A dried rose color came out on the infected vegetable marrow fruits because of the secretions of the fungus. At the applications which were done by putting the agar discs on the fruits, the carrot and the garden radish were infected easily at the three inoculation points too, while any infection was not observed on the cucumber and vegetable marrow fruits. The infection was realized with difficulty in a long time on the potato tuber. The results of the pathogenicity tests were given compactedly in Table 1.

Table 1. The pathogenicity of **M. phaseoli** on different vegetable under the laboratory conditions

Vegetable	Wounded	Unwounded
Onion bulb	+	+
Fresh onion (from the white part near the roots)	+	no tested
Leek (from the white part near the roots)	+	no tested
Garlic bulb	+	+
Potato tuber	+	—
Garden radish	+	+
Carrot	+	+
Lettuce stem	+	no tested
Cucumber (fruit)	+	—
Vegetable marrow (fruit)	+	—

The fungus which was incubated at 30 (∓1)°C and approx. 85 % humidity for 6 days showed the following characteristics on different media :

On PDA: It formed the grayish black colored colonies which seemed as though the charcoal powder was sprinkled on, because of the small, black colored and very abundant sclerotia. The irregular (or partially circular) margined and tightly constructed colonies were the flat, almost invisible radial lineated surfaced and they spread entirely over all the surfaces of the agar plates in Petri dishes (12 cm. in diam.). The surfaces of the colonies became felted and dulled in later days.

The young mycelia which were observed directly on the agar plate were slender, colorless, septate and thin-walled. The aerial parts of these mycelia were cobwebby, and thickened, flattened or twisted at the certain places. The older mycelia, which were usually in or on the substratum and formed the sclerotia, were thick-walled, 8-12 micron thick septate, very branched and light brown colored (but the color was darkened later).

The sclerotia were buried partially or entirely into substratum, and brown in color, large granulous in the beginning, but afterwards they were black colored, bright, hard and rough (similar mature black-berry fruits under the binocular microscope), globose, oval or amorphous shaped, 44 to 145 by 44 to 203 micron sized.

The characteristics of the mycelium and the sclerotium of the fungus on PDA are in the conformity with those which were informed by Karaca (1947). The same author informed that the size of the sclerotia has been reported as 25 to 200 by 25 to 300 micron on the cultures isolated in Turkey by Bremer et al.; the values that I obtained are in this limit.

On PA: It formed colonies which were circular (but not entire margined), 8.1 ∓0.54 cm. in diam., plain, flat surfaced. They were almost in the same color with medium (that they were distinguishable hardly from the medium on a white background) and partially cream colored near the margins. There were the grayish dots which consisted of the sclerotia and sprinkled homogeneously on the colonies.

The mycelia were resembling to those on PDA, but the older mycelia were thinner walled, relatively more slender and colorless. Some of these became brown towards the sclerotia. The hyphae, that the tips of them were free and thrusted up from the substratum, were observed in the middle part of the colony.

The sclerotia were as on PDA, but more intervals, smaller and more globose. They were 29 to 87 by 29 to 102 micron sized.

On CMA : It formed colonies which were partially circular (some

lobed margined), 8.9 ∓ 0.08 cm. in diam., flat, almost invisible radial and concentrical lineated surfaced, and almost in the same color with medium. The middle divisions, 5-6 cm. in diameter, of the colonies were glayish colored because of the small black sclerotia, but it was whitish near the margin. The amount of the sclerotia was less in the center .

The mycelia and the sclerotia were as on PA (Fig. 2). The sclerotia were 44 to 116 by 44 to 145 micron sized.

On NA: It formed colonies which were flat (relatively raised towards the margins), lobed, 6.2∓0.11 cm. in diam., and resembling a rose flower (double petaled). This appearance was very typically. The center of the colonies was dark gray colored as a 1-1.5 cm. sized patch because of the sclerotia which came out densely. 4-4.5 cm. in diameter part of colonies round these central divisions were lighter gray; but the divisions near the margins of the colonies were cream colored because it is consisted of mycelia only.

The aerial mycelia were little branched, very slender, and similar straight cotton fibres. The old mycelia and the sclerotia were as on PA. The sclerotia were 44 to 116 by 44 to 160 micron sized.

On LA. It formed colonies which were transparent (that they were indistinguishable from the medium on a white background), 6.5 ∓ 0.15 cm. in diam. The sclerotia on the colonies were consisted of the microscopic, grayish dots which sprinkled homogeneous on medium and difficulty distinguised by eye.

The young mycelia were fairly transparent and thin walled, so they were observed hardly under the microscope. The old mycelia could be observed clearly only in the parts near the sclerotia. These were septate, 3-5 micron thick, and colorless. The aerial mycelia were as on NA, but very rare.

The most of the sclerotia were globose and they were 44 to 73 by 44 to 87 micron sized.

If it is attended to the results given above, it seems that there is a correlation between the size and uniformity of the sclerotia and the richness of the medium. The sclerotia are more uniform and more globose on poor media and size of them is nearer to average values.

After a month, the colors of the colonies were more darkened, but the fungus didn't produce pycnidia.

The fungus grew best at 35°C among the five different temperature degrees. The growth at 30°C was nearly at the same level, though it was lower. But a fairly poor growth was observed at 15°C. The growth at different temperatures and the durations of covering the Petri dishes by the fungus have been shown in Table 2.

The growth of the fungus at different pH steps has been shown in Fig. 3. It can be seen easily that the fungus grew best at pH 5 among the five different pH. The growth at pH 7 follows that.

Karaca (1974) has reported that M. phaseoli grew best at 30° to 37°C temperatures and at pH 3.4 to 6.4 on media. The values which were found by me for the fungus which was isolated from the onion bulbs are in just conformity with this values reported by Karaca.

Table 2. The average colonial diameters (mm.) of **M. phaseoli** on PDA at the five different temperature.

	15°C	20°C	25°C	30°C	35°C
1st day	0	0	0	1	5
2nd »	0	0	10	33	41
3rd »	0	2	37	68(*)	72(*)
4th »	1	11	66(*)	94	100
5th »	2	24	94		
6th »	3	38			
7th »	4	56(*)			
2nd week	24(*)				
3rd week	81				
The durations of covering of the dishes (12cm. in diam)	26 days	11 days	6 days	5 days	5 days

*) The sclerotia began to come out from the centers of the colonies.

The interesting results were obtained in the tests which were done by using different chemicals for controlling the fungus. Especially, the systemic fungicides named Benlate and Derosal were effective, even in their 0.001 % (10 ppm.) doses, at the half of the parallels ,on the fungus which is a soil habitant (Fig. 4). Benlate produced a wider effect zone. The results were given compactedly in Table 3.

The chemicals mentioned above, should certainly be tested under the field conditions to see if they are active in nature, and to determine the best application method, before advising them.

Table 3. The effects of the different chemicals on **M. phaseoli.**

Commercial names	Active ingredients	OF THE CHEMICALS Doses 1%	0.1%	0.01%	0.001%	0.0001%
Mercuric chloride				—	—	—
Copper sulphate				—	—	—
Dikotan Z-78	Zineb 65 %			—	—	—
Cupravit ob 21	Copper oxychloride 84%			—	—	—
Ceresan Yaş	Methox ethyl mercury chloride 3.5%		+	—		
Benlate	Benomyl 50%		+	+	+	±
Enovit super	Thiophanat methyl 70%		+	+	+	—
Derosal	Carbendazim 60 %		+	+	+	∓
Melprex	Dodine 65%			—	—	

ÖZET

BİTLİS İLİNDE SOĞANLARDA YUMRU ÇÜRÜKLÜĞÜ YAPAN **Macrophomina phaseoli** (Maubl.) Ashby. ÜZERİNDE ÇALIŞMALAR

Türkiye'de bazı kültür bitkileri üzerinde önceden varlığı bilinen **Macrophomina phaseoli**'ye soğan yumruları üzerinde ilk defa 1974 yılında Bitlis ilinde rastlandı. Fungusun hastalandırdığı soğanlarda yumruların siyahlaşarak çürüdüğü, köklerin kolayca yumrudan ayrıldığı ve yumru tabanında mangal kömürünü andırır bir kitlenin oluştuğu, yumru yapraklarının zarların altında yaprak etine gömülü olarak küçük siyah sklerotların oluştuğu gözlendi.

Dış yüzeyleri sterilize edilmiş yaralı ve sağlam yumru, gövde ve meyveleri fungusun yeterince geliştiği petrilere bırakmak ya da fungusu ihtiva eden agar parçalarını meyveler üzerine yerleştirmek suretiyle yapılan inokulasyonlarda, fungusun soğan yumruları, taze soğan, pırasa, sarımsak, patates yumruları, turp, havuç, marul gövdesi, hıyar ve sakız kabağı meyvelerini hastalandırdığı tesbit edildi.

Optimal gelişme şartlarını ve değişik ortamlardaki gelişme özelliklerini tesbit için de bazı çalışmalar yapılarak fungusun, beş değişik sıcaklık derecesinden en iyi 35°C'de, beş değişik pH basamığından en iyi pH 5'te geliştiği, çeşitli ortamlar üzerinde büyüklükleri 29-145 x 29-203 mikronlar arasında değişen sklerotlar oluşturmasına rağmen piknit meydana getirmediği ortaya konuldu.

Savaş için bazı ipuçları elde etmek bakımından da, petrilerin bir tarafında delik açarak buraya ilâç çözeltisi damlatmak ve diğer tarafa fungusu ekmek suretiyle bazı ilâçların etkisi denenerek Benlate ve Derosal adlı sistemik ilâçların yüzbinde birlik dozlarında bile fungusa etkili oldukları tesbit edildi.

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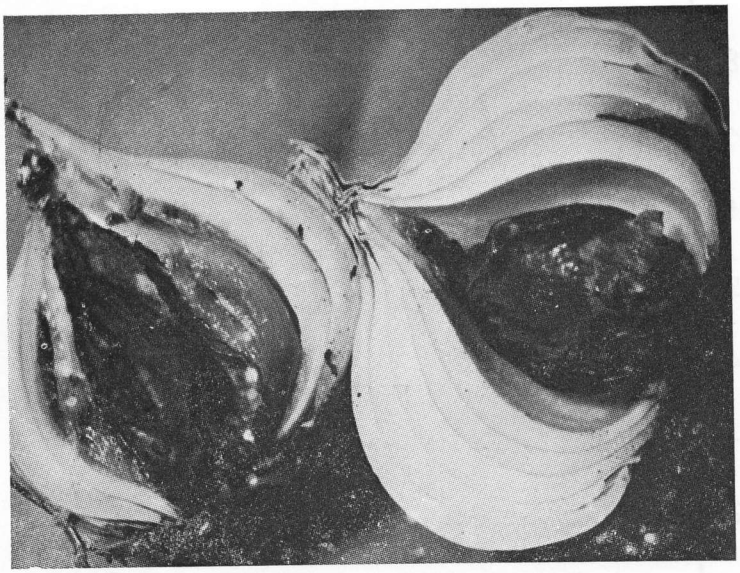

Fig. 1. The onion bulbs infected by **M. phaseoli.**

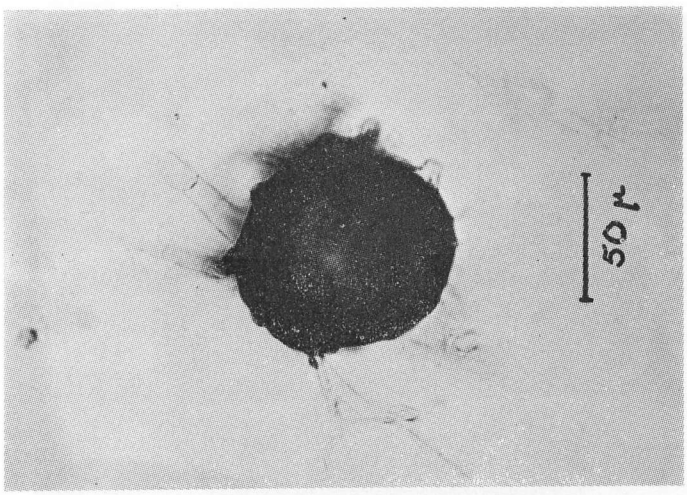

Fig. 2. A sclerotium of **M. phaseoli** on CMA medium.

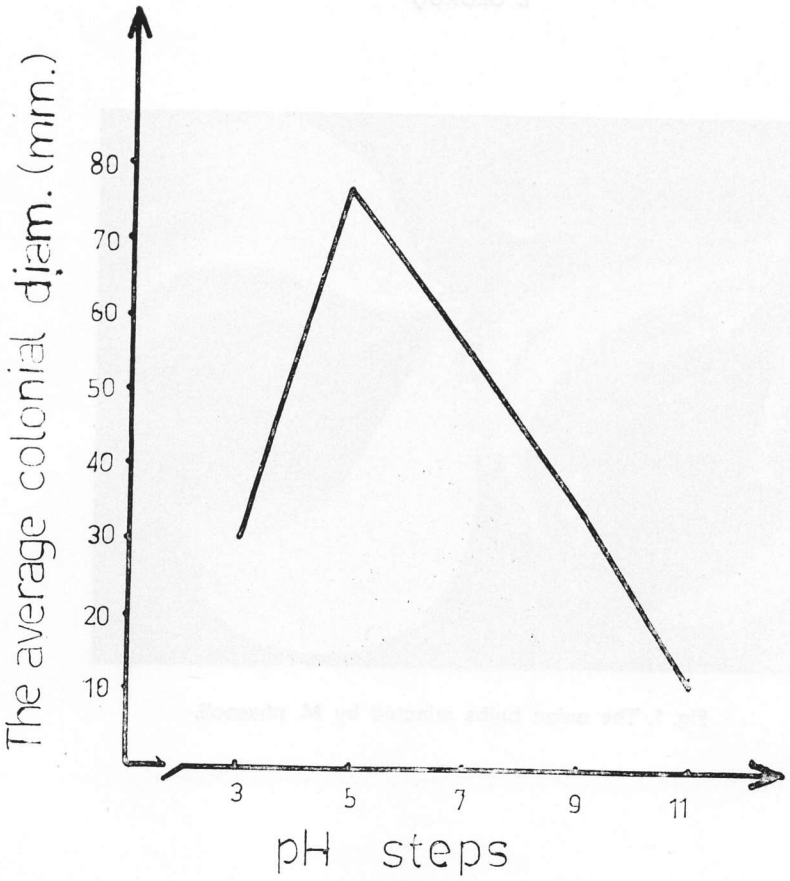

Fig. 3. The growth of **M. phaseoli** at different pH steps.

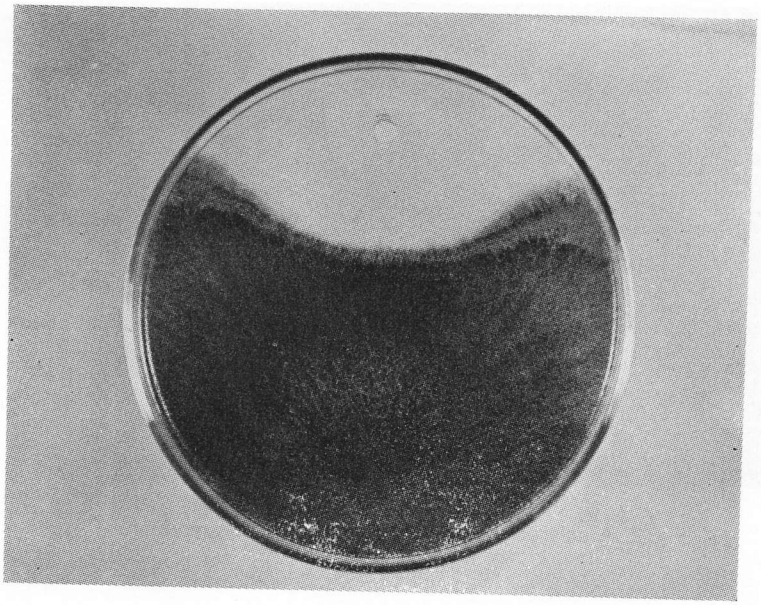

Fig. 4. The effect of Derosal in the 10 ppm. dose on **M. phaseoli**.

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The Preliminary Studies On Cotton Seed Borne Fungi and Their Rates of Presence in Ege Region

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ABSTRACT

This investigation was carried out to determine cotton seed borne fungi and their rates of existence in Ege Region.

Seed samples were collected from İzmir, Manisa, Aydın, Denizli, Muğla and Balıkesir provinces. These samples were cultured as fuzzy seed, seed coat and embryo. From the seeds 74 fungi species belonging to 43 genera were isolated. With this work 3 genera and 13 species has been added to the mycoflora of Turkey.

INTRODUCTION

Cotton is a plant which is used for its fiber, oil and seed cake, Cotton seed and fiber has a very important place in Turkish economy as an international trade items. There are many investigations on cotton diseases ,but there isn't any study about cotton seed borne fungi except Karaca et al (1973) were done a study whether cotton wilt disease agent is seed borne or not.

In the literature **Alternaria** spp. **Ascohyta gossypii** Syd., **Aspergillus flavus** Link ex. Fr., **Botryodiplodia theobromae** Pat., **Chaetomium** sp. **Cladosporium** sp., **Colletotrichum indicum** Dastur., **Eurotium chevaleri** Margin, **Fusarium** spp., **Fusarium, oxysporum** f. sp. **vasinfectum** (Akt.) Snyd. Hans., **Glomerella gossypii** Edg. **Macrophomina phaseoli** (Maubl) Ashby., **Myrothecium roridium** Tole

ex. fr., **Nematospora gossypii** Peglion **Nigrospora gossypii** Jaczewski, **Penicillium** spp., **Physalospora rhodi** (Bork. Curt.), **Rhizoctonia solani** Kühn., **Rhizopus** spp. are recorded seed borne fungi (Maier and Staffeldt 1963, Noble and Richardson 1968).

As seen above some cotton seed borne fungi are saprophytic and some of them are parasitic.

The aim of this investigation is to determine cotton seed borne fungi and their rates of existence.

This study was carried out during the years of 1975 and 1976.

MATERIALS AND METHODS

Seed samples of cotton were collected according to the divided sampling method from the cotton seed growing farmers in Ege Region. And with this method totaly 63 samples were taken from the provinces, namely Aydın (25), İzmir (14), Manisa (12), Denizli (6), Muğla (5) and Balıkesir (1).

Agar plate method was used to determine seed borne fungi. PDA and Water Agar media were used for isolations. Samples were cultured as fuzzy seed, seed coat, and embryo. 300 seeds were taken from the each samples. From these 200 seeds were used for determining seed-borne fungi on the fuzzy cotton seeds, the others were used for determining seed borne fungi in seed coat and embryo.

Cotton seeds were sterilized with Sodium hipo chloride (0,5 %) then 5 seeds were placed in each petri dish. These were incubated at 20 ∓ 2°C under alternating cycles of 12 hours light and 12 hours darkness. After 7 days of incubation every seed was examined under a stereomicroscope at 10 magnification for presence of seed borne fungi.

Identifications of genera were done by ourselves, but the species by the authorities in Centraalbureau voor Schimmelkultures Baarn-Netherlands.

RESULTS AND DISCUSSION

The fungi isolated from cotton seeds were shown in Table 1.

Table 1. The fungi isolated from fuzzy seeds, seed coats, embryos and percentage of their presence in Ege Region.

Fungi	Fuzzy seed	Seed coat	Embryo	The total number of fungi	Percentage of presence %
Actinomucor elegans	153	6	15	174	0,61
Alternaria alternata	1385	52	45	1482	5,17
Aspergillus sp.	42	5	1	48	0,17
A. chevalieri	53	21	17	91	0,32
A. flavus	1687	496	722	2905	10,14
A. fumigatus	56	98	35	189	0,66
A. manginii	303	16	26	345	1,20
A. nidulans	6	—	19	25	0,09
A. niger	4737	3255	1807	9799	34,21
A. ochraceus	114	75	39	228	0,80
A. oryzae	6	—	—	—	0,01
A. tamarii	110	9	30	149	0,52
A. terreus	38	29	9	76	0,27
A. ustus	75	33	27	135	0,47
A. wentii	120	60	98	278	0,97
Botryotrichum piluliferum	8	1	—	9	0,03
Botrytis sp.	3	—	—	3	0,01
Cephalosporium sp.	2	1	—	3	0,01
Chaetomium sp.	12	—	—	12	0,04
C. anatolicum	20	5	—	25	0,09
C. cochliodes	4	1	—	5	0,02
C. funicola	8	—	—	8	0,03
C. fusiforme	17	—	—	17	0,06
C. globosum	79	18	—	97	0,34
C. indicum	73	2	2	77	0,27
Cladosporium herbarum	43	14	11	66	0,23
Curvularia sp.	3	—	—	3	0,01
Doratomyces sp.	61	6	10	77	0,27
D. microsporus	6	—	—	6	0.02
Drechslera spicifera	35	—	1	36	0,13
Epicoccum purpurascens	3	—	1	4	0,01
Fusarium sp.	153	22	71	246	0,86
F. acuminatum	95	—	3	98	0,34
F. equiseti	39	24	6	69	0,24
F. moniliforme	422	15	53	490	1,71
F. solani	137	21	18	176	0,61

Table 1. (Continued) The fungi isolated from fuzzy seeds, seed coats, embryos and percentage of their presence in Ege Region.

Fungi	Fuzzy seed	Seed coat	Embryo	The total number of fungi	Percentage of presence %
Gilmaniella humicola	3	—	3	6	0,02
Gliocladium sp.	75	7	11	93	0,32
Humicola sp.	1	—	—	1	0,003
Melanospora sp.	1	—	—	1	0,003
Microascus cirrosus	3	—	—	3	0,01
Mucor sp.	261	53	79	393	1,37
Mycophyta sp.	1	—	—	1	0,003
Myrothecium sp.	1	—	—	1	0,003
Nigrospora oryzae	549	17	1	567	1,98
Paecilomyces variotii	—	—	1	1	0,003
Papularia sp.	1	—	—	1	0,003
P. arundinis	3	9	—	12	0,04
Populospora sp.	13	—	—	13	0,05
Penicillium sp.	1	3	12	16	0,06
P. corylophilum	4	3	—	7	0,02
P. crysogenum	176	23	130	329	1,15
P. expansum	2337	1785	1216	5338	18,64
Phaeramularia kellermaniana	3	—	—	3	0,01
Phoma jolyana	18	—	—	18	0,06
P. pomorum	162	38	—	200	0,70
Pullularia sp.	1	—	—	11	0,04
Pyronema omphalodes	52	—	10	62	0,22
Pythium sp.	2	1	—	3	0,01
Rhizoctonia sp.	15	—	13	28	0,10
Rhizopus stolonifer	1226	314	414	1954	6,82
Sordaria fimicola	2	—	—	2	0,01
Spicaria sp.	1	—	—	1	0,003
Stachybotrys sp.	4	—	—	4	0,01
Steril	13	8	15	36	0,13
Thilevia sepedonium	4	—	2	6	0,02
Torula sp.	6	—	—	6	0,02
Trichoderma harzianum	6	5	8	19	0,07
T. pseudokoningii	551	200	102	853	2,98
Trichotecium sp.	776	38	—	814	2,84
Ulocladium atrum	96	—	1	97	0,34
U. botrytis	15	—	—	15	0,05
Verticillium dahliae	2	—	—	2	0,01
V. cinnabarinum	267	5	—	272	0,95
Total	16771	6794	5084	28649	

From the cotton seeds 74 fungi species belonging to 43 genera were isolated as shown at table 1. Among these fungi **Gilmaniella, Phaeoramularia** and **Pyronema** as genera and **Actinomucor elegans, Aspergillus oryzae** (Ahlb.) Cohn., **A. tamarii** Kita **Chaetomium cochliodes** Palliser, **C. funicola** Cooke, **C. fusiforme** Chivers **C. indicum** Corda, **Drechslera spicifera** (Bain), V. Arx, **Microascus cirrosus** Curzi, **Paecilomyces variotii** Bainier, **Penicillium expansum** (Link) Thom., **Phoma pomorum** Thümen, **Ulocladium botrytis** Preuss as species were found new to the mycoflora of Turkey.

Among the isolated fungi **Alternaria, Aspergillus, Chaetomium, Curvularia, Fusarium, Myrothecium, Nigrospora, Rhizoctonia** and **Rhizopus** were recorded as cotton seed borne fungi (Maier and Staffeldt, 1963; İren 1965; Noble and Richardson, 1968).

Some of the isolated fungi are saprophytic and the others are parasitic. Such as **Aspergillus, Alternaria, Cephalosporium, Chaetomium, Cladosporium, Curvularia, Epicoccum, Fusarium, Humicola, Nigrospora, Penicillium, Phoma, Phyhium, Rhizopus, Verticillium** were recorded as the causal agent of the damping off in literature (Miller, 1943; Cagnee, 1960: Maier and Staffeldt, 1963; Sinclair, 1965; Jacop, 1967; Stepanova, 1972).

In our country **Fusarium, Rhizoctonia, Alternaria, Aspergillus, Macrophomian, Verticillium, Trichoderma, Penicillium, Helminthosporium Phythium, Curvularia, Anixiopsis, Ulocladium, Sclerotinia, Gliocladium Monilia, Myrothecium, Populaspora,** were isolated from the diseased cotton seedlings (Karcılıoğlu, 1976).

According to Karcılıoğlu (1976) among the isolated fungi such as **Rhizoctonia, Alternaria, Fusarium** and **Aspergillus** were found pathogen as 93,2 %, 66,6 %, 30,8 % and 9,6 %, but in our study **Rhizoctonia, Alternaria Fusarium, Aspergillus** were found at the rate of 0,10 %, 5,17 %, 3,76 % and 49,83 % respectively. As seen above **Rhizoctonia** is not important as seed-borne pathogen. Although **Alternaria** and **Fusarium** were pathogen as 66,6 % and 30,8 %, but their rates of presence are not so much. **Aspergillus** is also not important as seed-borne pathogen. Because, although its rates of presence is 49,83 %, its pathogenicity is too low. This results shows that damping-off pathogens are seed-borne, but they are not so important.

Verticilium dahliae Kleb. which causes wilt disease in late stage of cotton in field is also borne by fuzzy cotton seed, but it is not so important as a seed-borne pathogen (% 0,01). The same results was obtained by Karaca et al. (1973).

In this study among the isolated fungi **A. flavus, A. chevalieri, A. niger, A. ochraccus, A. oryzae, A. tamarii, A. wentii, Penicillium** spp. and **Rhizopus** sp. are known aflatoxin producing fungi. It was recorded that aflatoxin is very harmfull for animal and human health (Mc Donald et al. 1963; Diener and Davis, 1970; Spensley, 1970). For this reason it should be studied on this subject separately

ÖZET

EGE BÖLGESİNDE PAMUK TOHUMLARIYLA TAŞINAN FUNGUSLAR ve BUNLARIN BULUNUŞ ORANLARI ÜZERİNDE ÖN ÇALIŞMALAR

Bu çalışma Ege Bölgesinde pamuk tohumlarıyla taşınan fungusları ve bunların bulunuş oranlarına saptamak amacıyla yapılmıştır.

İzmir, Manisa, Aydın, Denizli, Muğla ve Balıkesir'den olmak üzere 63 örnek alınmış ve bu örnekler havlı kabuk ve embriyo olarak kültüre alınmıştır, izolasyon çalışmalarında PDA ve Su Agarı ortamları kullanılmıştır.

Bu çalışma sonunda 43 genusa bağlı 74 tür izole edilmiştir. **Gilmaniella, Phaeoramularia** ve **Pyronema** genus olarak, **Actiomucor elegans Aspergillus oryzae** (Ahlb.) Cohn., **A. tamarii** Kuta, **Chaetomium cochliodes** Palliser, **C. funicola,** Cooke, **C. fusiforme** Chivers, **C. indicum** Carda **Drechslera spicifera** (Bain.) V. arx, **Microascus cirrosus** (Curzi, **Paecilomyces variotii** Bainier, **Penicillium expansum** (Link) Thom, **Phomapomorum** Thümen, **Ulocladium botrytis** Preuss'un tür olarak Türkiye mikoflorası için yeni funguslar olduğu saptanmıştır.

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Studies on Foot Rot of Wheat (Drechslera sorokiniana (Saac.) Subram. and Jain.) in Mardin Province

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ABSTRACT

Drechslera sorokiniana (Saac.) Subram. and Jain. was isolated from the wheat in Mardin province. The numbers of septa and the size of conidia, the optimum growth temperature, the effect of the light on growth and sporulation, the pathogenicity on different hosts of the fungus was investigated.

INTRODUCTION

Drechslera sorokiniana was first recorded in Izmir province in 1939 in Turkey by Bremer et al. and İren has named the disease as «Spot blotch» (Karaca, 1968). Fesli (1975) has determined the fungus in Izmir, Manisa and Denizli provinces.

In Turkey, except above mentioned reports other is available about the distribution of the fungus.

The disease has been found first in May 1976 in Mardin province, while the wheat was at the earing stage. There were whitened heads and foot rots on the diseased wheat plants. After isolation, the pathogenicity of the fungus was investigated. It was observed that the fungus was pathogen on wheat plants.

The fungus was identified by Hüseyin Aktaş, from Regional Plant Protection Research Institute, Ankara, Turkey.

The laboratory and greenhouse studies were made on fungus. The size of conidia, the numbers of septa, the optimum growth temperature, the effect of light on growth and sporulation, the pathogenicity of the fungus on different hosts was investigated.

MATERIALS AND METHODS

The size of conidia was determined by measuring 100 spores from three weeks old pure culture of the fungus at 25°C.

For determining the optimum growth temperature on the fungus, incubators were regulated at 5°, 10°, 15°, 20°, 25° and 30°C. The fungus was grown on PDA (pH 6) in petri dishes for 7 days in these incubators. Colony diameters of the fungus were determined by measuring every day.

For determining the effect of light on growth and sporulation, the fungus was grown in the permanent dark and light, conditions.

The diameters of the colonies were measured at the end of the 7 th day after inoculation (Ayaydın,1975) The mass of the fungus in each petri dish was scratched carefully with a blade. Afterwards, this mass of the fungus was crushed carefully in a porcelain mortar and 50 cc. distilled water was added, then rinsed for 5 minutes and filtered through a sterile gauze. The spores were counted under microscope by using the counting-slide. The experiment was planned as three replications. Ten countings were made from each petri dish.

15 days pure culture was used as inoculum for determining the pathogenicity of the fungus on different hosts. The inoculations were made individually both on leaves and on roots. For determining the pathogenicity on the leaves, the following wheat and barley cultivars, were used :

Wheat cultivars : Penjamo 62, Bağacak, Bezostaja, Sakarya, Dicle 74, Jupateco, Elgin, Kop, Ulucak 3, Cumhuriyet 75, I.N.I.A., Fırat I, Malabadi HD 832 Bb (BVD-6), MB 171 and MB 172.

Barley cultivars: Hudson CI 8067, CI 9291, (1976 P.No.503/K.No.73 No.35), (1976 P.No.504/K.No.65 No.2), Güzlük (Autumnal), Güzlük (3896 x 1-3) Güzlük mutant, Güzlük Uşak, A-147, Cumhuriyet 50. For this purpose oats maize and sorghum were also used but it was not possible to find their origin.

These cultivars were grown in the sterilized soil pots. 15cc. destilled water was added in each petri dish and 5cc. from this solition was sprayed to each pot. These pots were kept in moist chamber at 20°C. for 24 hours and controlled at the same tem perature in the greenhouse.

For determining the pathogenicity on the roots, the fungus was grown in cracked - wheat medium for 15 days (40 g. creacked-wheat was sterilized in the autoclave at 120°C. and 22.06 lbs. pressure for 30 minutes by adding 50 cc.water). This inoculum was placed at 1cm. thickness and to 5cm. depth from the soil surface in each pot. In this experiment Elgin

wheat and (1976 P. No. 503/K.No. 73 No. 35) barley varieties, were used. This barley variety was provided from the Southeast Anatolia Regional Agricultural Researc Institute and it was the most susceptible to the spot blotch in the former experiment The experiment was designed as three replications and two characters then the results were observed.

RESULTS AND DISCUSSION

The size of conidia and the numbers of septa varied between 44-102 x 17-25 microns (average 71.36±1.136 x 20.61±0.718) and four to eleven septate respectively. The conidia are generally seven or eight septate.

The results of present study are in agreement with the literature records (Karaca, 1968; Gilman, 1959; Viennot Bourgin, 1949).

The fungus was grown the best at 25 C°. The growth was weaker at 20 C° and 30 C°. The growth of the fungus at 5, 10, 15, 20, 25 and 30 C° was shown in figure 1 .

The growth curves of the fungus in dark and light was shown in figure 2. As a result the light has affected the growth and the colony dia meter of the fungus was more in 24 hours light.

The colour of the fungus which was grown in the light was dark olive whereas the one which was grown in dark was between dark grey and olive coloured. The under sides of the petridishes exbihited no colour differenciations.

The spor countings were made for determining the effect of the light on the sporulation. The averages of the 30 countings were computed in the permanent light and dark as 56.9 and 57.5 respectively. It is clear that light had no effect on the sporulation.

The following results have been obtained in case of pathogenicity tests of the fungus: Three days after inoculations, the leaves of the wheat, barley and oats varieties have been observed to have brown spots measuring 2-5 mm. in length and 2-3 mm. in width. No symptoms have been observed on the checks. The fungus has been reisolated from the spots.

It is understood that the fungus is a pathogen which produces leaf spot on wheat and barley. It was observed that the fungus was also pathogen on oat. No symptoms were observed on maize and sorghum. Viennot-Bourgin (1949) recorded that the fungus is known as a leaf spot agent in America.

18 days after sowing seeds, the tips of the leaves dried up, and the collars became brown in the wheat and barley varieties which were inoculated from the soil. It was observed that the inoculated plants were weak er and shorter than the checks. Forty

five days after sowing seeds, the plants were pulled out by washing the pots under the tap water. The diseased and healty rooted plants in each pot were counted individually. The counting results were given in Table 1. The fungus was reisolated from the diseased roots.

Table 1. The number of the diseased and healthy rooted plants in the pots which were inoculated with **D. sorokiniana.**

	Wheat		Barley	
Replication	Diseased roots.	Healthy roots.	Diseased roots	Healthy roots.
1	77	—	36	—
2	57	—	39	—
Check	—	50	—	39

It is seen in Table 1. that the inoculated roots of the wheat and barley were thoroughly diseased, but the roots of the check plants were compeletly healthy. Karaca (1968) has also stated that the height of the diseased plants is shorter than healthy plants.

As a result, this work showed that the fungus was pathogen on the roots of the wheat and barley, and it produced the root rots.

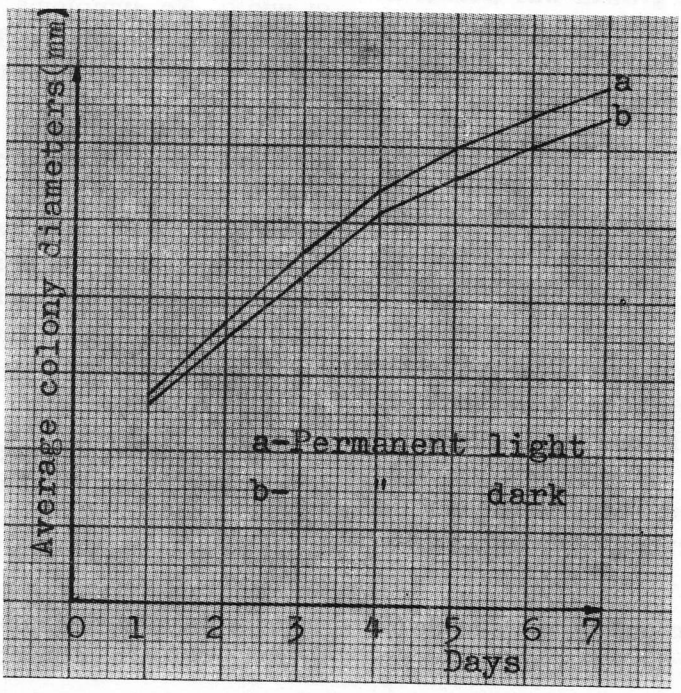

Fig.1. The growth curve of **D. sorokiniana** on PDA medium, incubated for 7 days at different temperatures.

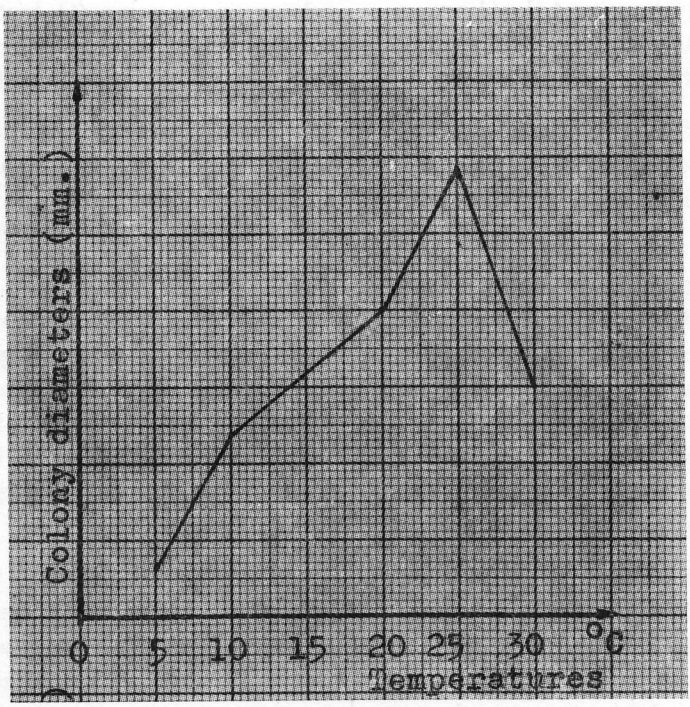

Fig.2. The growth curves of **D. sorokiniana** on PDA medium which was grown in the dark and light at 25°C.

ÖZET

MARDİN İLİNDE BUĞDAY ÇÜRÜKLÜĞÜ ETMENİ (**Drechslera sorokiniana** (Saac.) Subram. and Jain.) ÜZERİNDE ÇALIŞMALAR

15.5.1976 tarihinde, Mardin ilinde buğdaylar başaklanma döneminde iken kurumalar, akbaşak oluşumu ve kök boğazı çürüklüğü ile hastalık dikkati çekmiştir. Alınan hastalıklı bitki örneklerinden **Drechslera sorokiniana** fungusu izole edilmiştir.

Fungus üzerinde laboratuvar ve ser'a çalışmaları yapılarak conidia büyüklükleri, bölme sayıları, optimal gelişme sıcaklığı, ışığın gelişme ve sporülasyona etkisi ve farklı konukçularda patojenliği incelenmiştir.

25°C. de PDA ortamında yetiştirilmiş 3 haftalık saf kültürden 100 sayım yapılmış ve konidia büyüklükleri 54-102 x 17-25 mikron, ortalama (71.36 ± 1.136 x 20.61 ± 0.718) mik-

ron bölme sayıları ise 4 ila 11 arasında değişmekte olup genellikle 7-8 bölmeli olarak tespit edilmiştir.

Fungus 5, 10, 15, 20, 25 ve 30°C. lerde PDA ortamında yetiştirilmiş bunlar içerisinde en iyi 25°C.de gelişmiştir.

Işığın gelişme ve sporülasyona etkisini tespit etmek için fungus 25 °C.de PDA ortamında sürekli ışıkta ve karanlıkta tutulmuştur. Ölçülen koloni çapları (t) testi ile kontrol edilmiş ve farklı bulunmuştur. Koloni çaplarının artışına ışığın etkisi müspet olmuştur.

Işığın sporülasyona etkisini saptamak için 25°C.de PDA ortamında sürekli ışık ve karanlıkta yetiştirilen fungus kitlesi kazınarak 0.1 mm^3 spor süspansiyonundaki spor sayımları yapılmış ve sonuçlar (t) testi ile kontrol edilmiştir. Fungusun ışıkta ve karanlıkta sporülasyonu ayni olmuştur.

Farklı konukçularda patojenliğin tespiti için 16 buğday, 10 arpa varyetesi ayrıca piyasadan temin edilen yulaf, mısır ve kocadarı kullanılmıştır.

Spor süspansiyonu püskürtmek suretiyle yapraklarda yapılan patojenlik denemesinde buğday, arpa ve yulafta yaprak lekesi oluşturduğu tespit edilmiştir. Mısır ve kocadarıda ise herhangi bir belirti gözlenmemiştir.

Toprak inokulasyonu ile gerçekleştirilen patojenisite denemesinde fungus, kullanılan buğday ve arpa varyetelerinde kök çürüklüğü oluşturmuştur.

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