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A Virus Infection Inducing Ringspot Symptoms on Tomatoes

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ABSTRACT

The disease occurred on tomato was described. Symptoms appeared as chlorotic rings and line pattern on leaves and necrotic, somewhat sunken rings on fruits. The virus was easily transmitted by mechanical inoculation onto test plants and some physical properties were determined. The results of the experiments showed that this specific disease of tomato caused by a group of mosaic inducing viruses.

INTRODUCTION

Virus diseases have been known for a long time on tomato crop and are of widespread occurrence causing economically important losses. A great deal of extensive studies have been made with tomato viruses (Silberschmidt, 1963, Rast, 1965, Gracia et al., 1968, Yorgancı, 1975, Azeri, 1981, Yılmaz, 1985). Many types of symptoms can be observed in the field and in recent years damage caused by virus diseases has been increasing.

A disease of tomato with characteristic symptoms of chlorotic rings and line patterns on leaves and somewhat sunken necrotic rings on green fruits were observed on tomato crop in Manisa. The disease was found in the fields of tomato grown for processing (Fig 1, 2).

In the present study investigations based on differential host range and some physical properties.

MATERIALS and METHODS

Infected leaf tissue was homogened with mortar and pestle in 0.2 M phosphate buffer, pH 7.0, containing a small amount of celite as an abrasive, then the inoculum was applied on to host plants mechanically by means of forefinger.

The host plants used for the experimental inoculations were: **Nicotiana tabacum**, (Burley, Samsun, Xanthi), **N. glutinosa, Chenopodium amaranticolor, C. quinoa, Datura stramonium, Petunia** sp., **Lycopersicon esculentum, Gomphrena globosa, Phaseolus vulgaris.**

The serological techniques used were micro-precipitin drop on slide-test and agar-gel diffusion test. The antiserum for tobacco mosaic virus was kindly supplied by Dr. YORGANCI from the Department of Plant Pathology.

The sap of systemically infected leaves of **N. tabacum** and also the leaves of **N. tabacum** «Xanthi» bearing necrotic lesions were used as the source of inoculum in the test of dilution end point (DEP) and thermal inactivation point (TIP). Determinations were made on local lesion hosts.

RESULTS and DISCUSSION

Results of mechanical inoculations of plant with virus extracted from tomato leaves were as follows:

C. amaranticolor : Chlorotic local lesions about 1 mm in diameter were occurred on the inoculated leaves somewhat different from those initiated by the type virus of tobacco mosaic on this host (Fig. 3). **C. quinoa** also reacted with necrotic local lesions.

D. stramonium, produced local necrotic lesions with 2 mm in diameter as shown in Fig. 4.

N. glutinosa plants showed necrotic local lesion reaction. The lesions were 5 mm in diameter and had quite distinct appearrence from those necrotic local lesions induced by the type virus of tobacco mosaic. The lesions were larger and rather greyish in colour (Fig. 5).

N. tabacum Samsun : Necrotic local lesions on inoculated leaves appeared after inoculations but followed by a systemic necrosis on the new growth.

N. tabacum, White Burley plants reacted with local lesions on inoculated leaves but the lesions were yellowish in centre and circled by reddish halo at margins at the begining as the plants became older the necrosis was progressed (Fig. 6).

G. globosa plants showed veinal necrosis on inoculated leaves and reddish necrotic areas of interveinal parts of the leaves as shown in Fig. 7.

L. esculentum, P. vulgaris and **P. hybrida** plants reacted with systemic infections.

The isolate which was induced local lesions on **N. tabacum** Samsun was inactivated at 85°C in 10 min and dilution end point was 10^{-2} - 10^{-3} when tested on **N. tabacum** Samsun; whereas the inoculum obtained from systemically infected **N. tabacum** when tested on

N. glutinosa lost its activity at 90°C in 10 min and dilution end point was found to be 10^{-5} - 10^{-6}. The relationship of the isolates to TMV was confirmed by a positive serological reaction with the TMV antiserum commonly used at the Department of Plant Pathology.

A comparison of the host range, serological and physical properties of the virus under investigation revealed that it is related to tobacco mosaic virus, but it differs from the type virus chiefly in producing local lesion on **N. tabacum** Samsun and quite different local lesions produced on **N. glutinosa.**

In earlier works, the ringspot strain of TMV described by Smith (1957) is characterized by the development of local necrotic rings on tobacco «Samsun» and another yellow ringspot strain of tobacco mosaic virus from tomato reported by Rast (1965) producing necrotic lesions without systemic spread on «Samsun NN».

Silberschmidt (1963) reported a virus disease of tomato in Brazil which causes identical symptoms on tomato with the virus disease described in the present study. Apart from the symptoms observed on tomato, the physical properties obtained in this study are in accor dance with the results recorded by the same author.

Therefore, it is thought that a mixed infection namely TMV and its ringspot strains are responsible of the disease observed on tomato plants but differantiation and characterizations of the strains need more detailed studies.

ACKNOWLEDGEMEHTS

The authors wishes to thank Miss Semra Öz for collecting the original samples which supplied the material of this study. They also are grateful to Dr. Yorgancı for her help in performing the serological test.

ÖZET

Domates yapraklarında klorotik halka lekeler ve meyvelerde çökük nekrotik halkalar oluşturan bir virus hastalığı Manisa'daki salçalık domates ekim alanlarında gözlenmiştir. Virus mekanik olarak kolaylıkla test bitkilerine taşınmış ve bazı fiziksel özellikleri saptanmıştır. Elde edilen sonuçlara göre infeksiyonun TMV ve onun halka leke oluşturan ırkları tarafından müşterek olarak oluşturduğu kanısına varılmış fakat ırk ayırımı yapılmamıştır.

LITERATURE CITED

Azeri, T., 1981. Preliminary report of tomato spotted wilt virus (TSWV) and its epidemy on tobacco in Çanakkale Region of Turkey. J. Turkish Phytopath., 10 (2-3) : 79-87.

Gracia, O., J.M. Feidman, R.E. Pontis and J. Boninsegna, 1968. Some viruses affecting tomatoes and peppers in Argentina. Pl. Dis. Reptr., 52 (9) : 674-676.

Rast, A. Th. B. 1965. A yellow ringspot strain of tobacco mosaic virus (TMV) from tomato. Neth. J. Plant Path., 71 : 91-93.

Silberschmidt, K., 1963. Studies on a Brazilian tomato ringspot disease. Phytopath. Z., 46 : 209-229.

Smith, K.M. 1957. Plant Virus Disease, J.A. Churchill Ltd. 104 Gloucestor Place, London W 1. 652 pp.

Yılmaz, M.A. 1985. Identification of viruses infecting vegetable crops along the Mediterranean Sea coast in Turkey. J. Turkish Phytopath., 14 (1) : 1-8.

Yorgancı, Ü. 1975. İzmir ilinde domateslerdeki virus hastalıkları, yayılma ve zarar durumları, elde edilen izolatlarla biyolojik ve serolojik araştırmalar .E.Ü. Zir. Fak. Bornova-İzmir

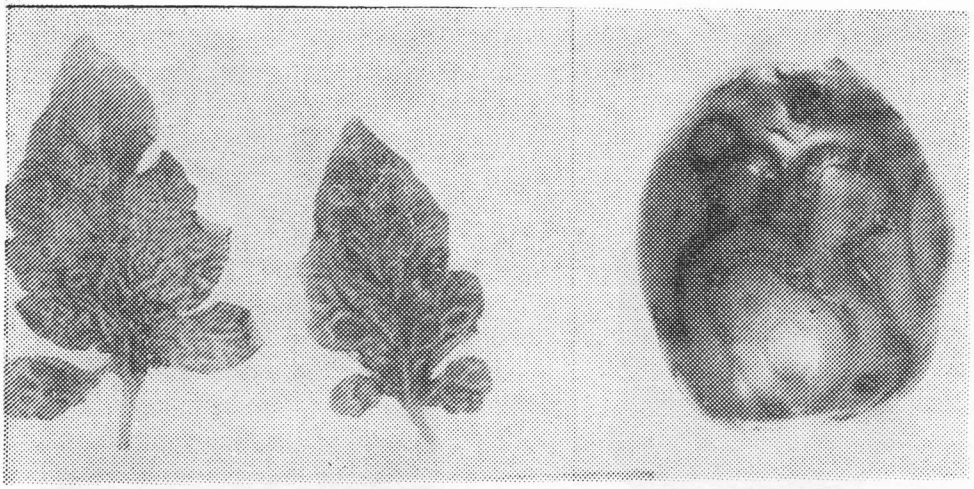

Fig. 1. Tomato leaflet with yellow ringspots.

Fig. 2. Green fruit showing necrotic sunken rings.

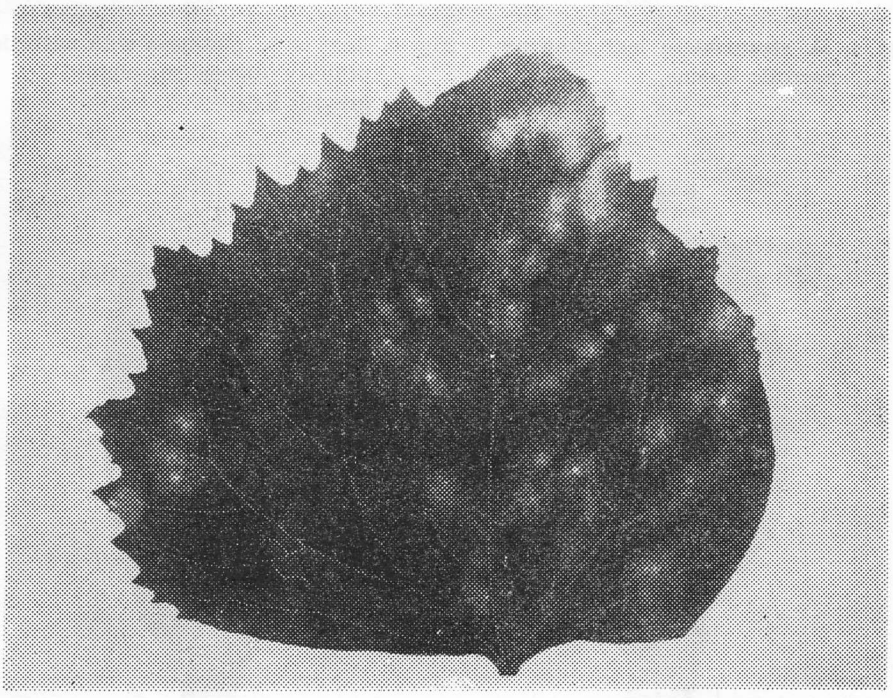

Fig. 3. Leaf of **C. amaranticolor** with necrotic local lesions surrounded by chlorotic area.

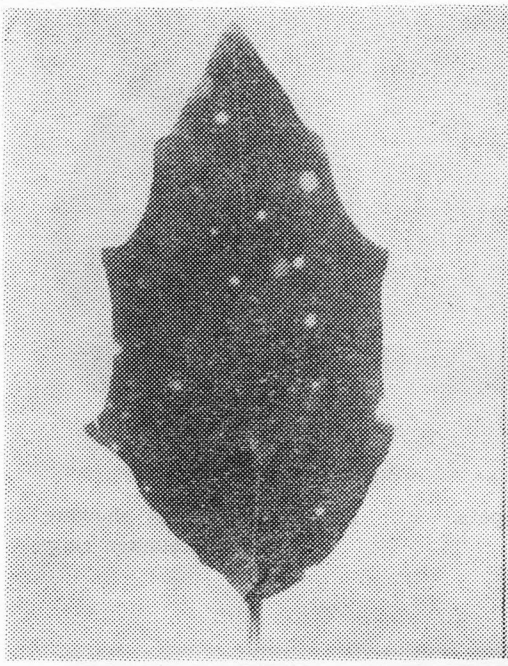

Fig. 4. **D. stramonium** leaf showing necrotic lesions.

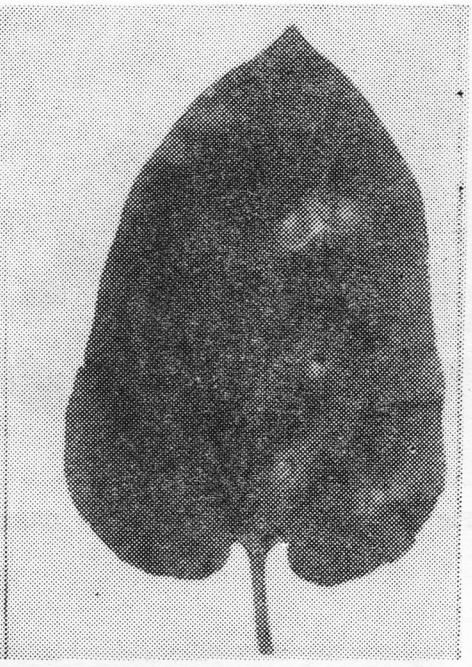

Fig. 5. Leaf of **N. glutinosa** with necrotic primary lesions surrounded by greyish hale.

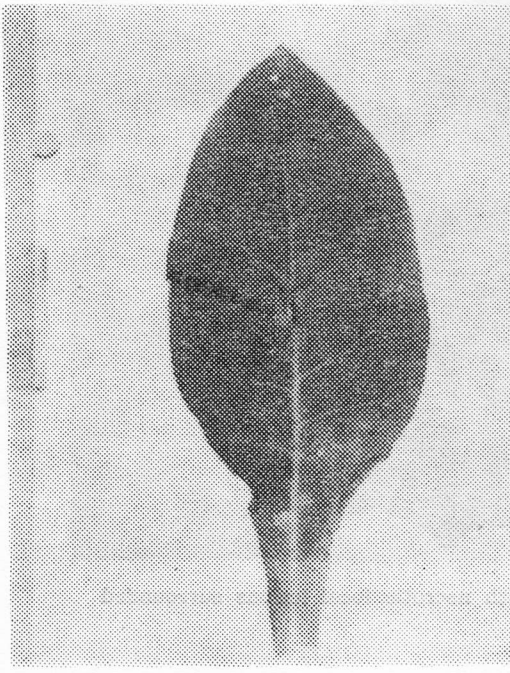

Fig. 6. **N. tabacum** White Burley leaf showing necrotic lesions on inoculated leaf.

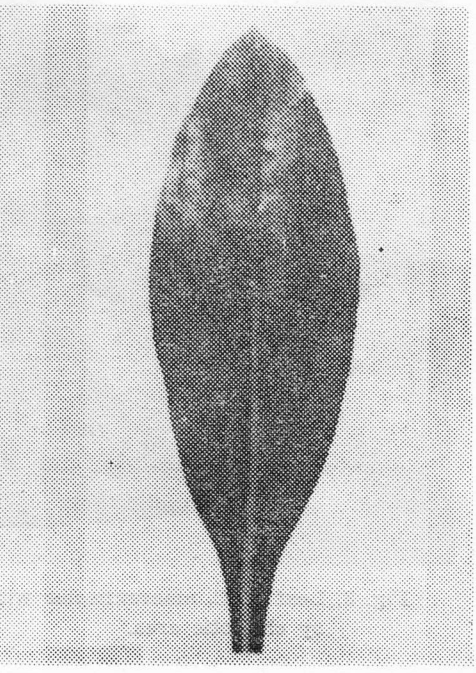

Fig. 7. **G. globosa** leaf with necrotic lesions and interveinal parts.

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Die Einflüsse von Viren auf den Ertrag, die Ausbeute, die Qualitat und die chemische zusammensetzung des Tabaks

Ülkü YORGANCI *1 und Seval SEKIN *2

ZUSAMMENFASSUNG

Das Ziel dieser Arbeit war, den Verbreitungsgrad der Viruskrankheiten an Tabak festzustellen, die Einflüsse der Virusinfektionen auf Ertrag, Ausbeute und chemische Zusammensetzung von Tabak zu untersuchen und mit biologischen, serologischen und morphologischen Eigenschaften die Isolate zu identifizieren.

Um die Veränderungen durch Virusinfektionen im Ertrag und bei der Ausbeute zu bestimmen, wurden Feldversuche mit sechs Viren bzw. Viruskombinationen an vier Tabaksorten (Incekara-Izmir, Karabağlar, Ege-64 und Burley S_3) durchgeführt. Die Ertragsverluste variierten nach Virus und Tabaksorte zwischen 13,5-48,8 %. Die Ausbeute aus den virusinfizierten Tabakpflanzen war wie deren Ertrag niedriger. In den chemischen Analysen wurde festgestellt, dass besonders die TMV-Infektionen an allen Tabaksorten zu einem erhöhten Stickstoff- und Proteingehalt führten. Demgegenüber war der Gesamtgehalt an Zucker und Stärke niedriger in den infizierten Pflanzen. Keine ausgeprägte Wirkung bestand gegen Alkaloide, Rohfaser und Petrolextrahierbaren Stoffen. In den virusinfizierten Pflanzen war der Kalziumgehalt höher, während der Kaliumgehalt abfiel.

EINLEITUNG

Obwohl die Verluste durch Tabakvirosen aus ökonomischer Sicht sehr bedeutend sind, werden ihnen in der Türkei kein Wert beigemessen (3). In anderen Ländern werden ihnen in der Türkei kein Wert beigemessen (3). In anderen Ländern wurden zahlreiche Versuche über die Einflüsse von Tabakvirosen auf den Ertrag, die Ausbeute, die Qualität und die chemische Zusammensetzung durchgeführt und die Ergebnisse zeigen, dass man diese Kriterien beeinflussen kann (4, 14, 15, 17, 18). Es ist in der Wissenschaft seit langem bekannt, dass der Gesamtstickstoff und insbesondere der Proteinstickstoff in den virusinfizierten Pflanzen erhöht ist. In einer Arbeit, die von Mickoswski in Griechen-

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land durchgeführt wurde, wurde gezeigt, dass der erhöhte Nikotin-, Stickstoff- und Albumingehalt die Tabakqualität beeinflussen kann (10).

In den Versuchen, die in anderen Ländern durchgeführt wurden, kam man zu ähnlichen Ergebnissen (14, 15, 17, 18, 19). Wie man weiss, entsteht bei den orientalischen Tabaksorten durh die Einflüsse von Stickstoffverbindungen bzw. Proteinen ein schlechter Geruch während des Brennens (19).

Der im Ägäischen Raum angebaute Tabak zeigt einen hohen Zuckergehalt. Da der erwünschte Zuckergehalt durch Virusinfektionen absinkt, verliert der Tabak an Wert.

Es gibt widersprechende Ergebnisse in der Literatur über die Einflüsse der Virusinfektionen auf den Gesamtalkaloidgehalt des Tabaks. Zum Beispiel berichteten Pirone und Davis (15), dass der Gesamtalkaloidgehalt bei Virusinfektionen absinkt. Dem gegenüber stellte Mickowski (10) fest, dass er zunimmt. Nach Sievert (17), Harman und Mitarbeitern (15) haben die Virusinfektionen keinen deutlichen Einfluss.

In dem ersten Teil dieser Arbeit wurde die Verbreitung von Viruskrankheiten an Tabak im Ägäischen Raum dargestellt. Die Prozentsätze des Virusbefalls wurden mit Hilfe von Testpflanzen errechnet. Die Virusisolate wurden serologisch und elektronenmikroskopisch untersucht. Dieser Teil wurde getrennt publiziert (20).

Im vorliegenden Teil wurde mittels der Feldversuche mit repräsentativen Virusisolaten und vier Tabaksorten, von denen drei einheimische sind, festgestellt, dass die Viren den Ertrag und die Ausbeute beeinflussen können. In dem gewonnenen Material wurden die Veränderungen in der chemischen Zusammensetzung mit den neuesten Methoden bestimmt.

MATERIAL UND METHODEN

Die gesammelten und durch Testung an Testpflanzen ausgewählten sechs Viren bzw. Viruskombinationen wurden in Feldversuchen als Infektionsmaterial verwendet (20). Für die Bestimmung der chemischen Veränderungen durch Virusinfektionen wurden von den Feldversuchen Proben entnommen.

Bei den Feldversuchen wurden als orientalische Tabaksorten Incekara-Izmir, Ege-64 und Karabağlar und - zum Vergleich - 'Burley' Sorte S_3 benutzt. Die Feldversuche wurden nach der randomizierten Blockmethode in vier Wiederholungen angelegt. Die Tabakpflanzen wurden künstlich infiziert.

Zur Bestimmung der Ausbeute wurden die nach Alter getrennt geernte-

ten Tabakblätter normal getrocknet und von den Experten des türkischen Monopols nach Eigenschaften wie Farbe, Gewebestruktur und Grösse in 'erste Qualität' und 'minderwertiger Tabak' klassifiziert und daraus die Ausbeute im Prozentsatz ausgedrückt.

Chemische Analysen:

Für die chemischen Analysen wurden die 2. und 3. Schnitte in gleichen Mengen gemischt (Mittelgut) und davon die Proben entnommen.

Bestimmung des Gesamt-Stickstoffs: Für die Bestimmung des Gesamt-Stickstoffs wurde die Kjehdahl-Methode von AOAC verwendet, zur Destillatio nals Vorlage 2 % ige Borsäure, die Indikator enthielt, und bei der Titration wurde 0,1 N HCl benutzt (13).

Protein-Stickstoff: Für die Bestimmung von Protein-Stickstoff wurden die Proben nach Nelson analysiert (11).

Anteil des löslichen Stickstoffs: Der Protein-Stickstoff wurde von dem Gesamt-Stickstoff abgezogen und damit der lösliche Stickstoff und sein Anteil am gesamten Stickstoff in Prozent gerechnet.

Gesamt-Alkaloide: Für die Bestimmung der Gesamt-Alkaloide wurde die Standard-Methode, die auch von Coresta verwendet wurde, benutzt (1).

Gesamt-Zucker: Er wurde mit der volumetrischen, abgewandelten Munson-Walker-Methode bestimmt (11, 16).

Stärke: Für die Analysen wurde die modifizierte enzymatische Methode benutzt (2, 16).

Rohfaser: Die für Tabak empfohlene Methode wurde verwendet (11).
Petrol-extrahierbare Stoffe: Es wurde dafür die Anlage für die Rohölbestimmung nach dem Prinzip der Soxhlet-Extraktion benutzt.

Roh-Asche: Die Tabakproben wurden bei 550-600°C für 2 Stunden verascht und daraus die Menge der Roh-Asche errechnet (11).

Kalzium und Kalium: Frisches Material wurde verascht und für die Bestimmung wurde das Eppendorf Flammen Photometer verwendet (7).

Die Auswertung der Ergebnisse:

Die Erträge von den Parzellen mit den Wiederholungen wurden umgerechnet und als Ertrag pro Dekar ausgedrückt. Die analytischen Werte wurden in den Tabellen als Gehalte in der Trockensubstanz angegeben. Die statistischen Analysen bezüglich des Ertrags, der Ausbeute und der chemischen Eigenschaften wurden im Institut für Datenverarbeitung der Universität Ege durchgeführt. Die LSD-Werte (0,01 und 0,05) wurden unter den Tabellegen angegeben. Wenn es keine Variation bestand, wurde als «nicht signifikant» bezeichnet.

ERGEBNISE

Die Einflüsse der Viren auf den Ertragan Tabak

Die Einflüsse der Virus-Isolate auf den Ertrag von orientalischen Tabaksorten und 'Burley' S_3 im Jahre 1978 wurden in Tabelle 1 wiedergegeben, Betrachtet man die durschnitliche Erträge der orientalischen Tabaksorten, so kann man leicht sehen, dass alle Viren eine Verminderung swischen 13,5 % - 48,8 % verursachten.

Die Virus-Kombination PVX-TMV verursachte die höchste Verminderung der Erträge an allen Tabaksorten. Die negativen Einflüsse von Viren auf den Etrag zeigte sich auch bei der Sorte 'Burley' genau so deutlich: in der Kontrolle war der Ertrag 263 kg pro Dekar. Unter dem Einfluss der PVT + TMV-Infektion sank er auf 173 kg pro Dekar ab. Die TMV-Isolate verursachten ebenfalls bei allen Tabaksorten grosse Verminderungen des Ertrags. - Die Ertragsergebnisse des Jahres 1979 wurden in Tabelle 2 dargestellt.

Verleicht man die Tabellen 1 und 2, so kann man leicht sehen, dass die negativen Einflüsse der Viren auf den Ertrag sich im Jahr 1979 wiederholten. TMV (1) und TMV (3) hatten die höchsten negativen Wirkungen auf Ertrag.

Die Wirkung von Viren auf die Ausbeute an Tabak

Die Gegenüberstellung von Tabelle 1 und 3 zeigt, dass die Ausbeute aus den inokulierten Tabakparzellen im Vergleich mit der Kontrollparzellen parallel zum Ertrag absank. TMV (3) erzeugte die beachtenswerte Verminderung, TMV + PVX und TMV (2) folgten. Die anderen drei Kombinationen hatten fast die selben Wirkung auf den Ertrag.

Die Ergebnisse für die Ausbeute im Jahr 1979 wurden in der Tabelle 4 angegeben. Diese erhärten mit leichten Abweichungen die Ergebnisse von 1978. Zum Beispiel erzeugte TMV (3) ebenfalls grosse Minderungen (I 38,9 %, E 14,6 % und K 16,2 %) an der Ausbeute.

Da die Ausbeute in den 'Burley' S_3-Parzellen sehr niedrig war, wurde sie von den Experten als 'minderwertig' eingestuft.

Die Einflüsse von Viren auf die chemische Zusammensetzung des Tabaks

Die Wirkung auf die Stickstoffverbindungen:

Gesamt-Stickstoff: Wie in der Tabelle 5 dargestellt wird, erzeugten alle TMV-Isolate in den Pflanzen einen Anstieg des Gesamt-Stickstoffs im Vergleich zu dem in den gesunden Kontrollpflanzen der jeweiligen Tabaksorten.

Besonders auffallend sind die Werte für TMV (1) und TMV (3) bei Karabağlar und für TMV (3) bei 'Burley'.

Proteine: Die Einflüsse von Viren auf die Verteilung von Protein-Stickstoff wurden in der Tabelle 6 gezeigt. Die Erhöhung des Protein-Stickstoffs durch TMV (1) kann man deutlich sehen. Die anderen Viren hatten ebanfalls mehr oder weniger steigernde Wirkungen.
Löslicher Stickstoff: In der Tabelle 7 kann man die Wirkungen von Viren auf den Prozentsatz des löslichen Stickstoffs vom Gesamt-Stickstoff sehen. Die Viren liessen allgemein im Vergleich zu den Kontrollen den Gefalt sinken.

Die Einflüsse von Viren auf die Gesamt-Alkaloide

Die Wirkung von Viren auf die prozentuale Verteilung von Gesamt-Alkaloiden in den untersuchten Tabaksorten wurden in der Tabelle 8 dargestellt. Man kann sagen, dass ihre Wirkungen auf die Gesamtalkaloide nicht bemerkenswert waren.

Die Wirkungen von Viren den Zuckergehalt

Ihre Einflüsse auf den Zuckergehalt wurden in der Tabelle 9 angegeben. Wenn die Ergebnisse der virusinfizierten Proben mit den Kontrollproben verglichen werden, kann man sagen, dass die Viren zu einer leichten Verminderung im Zuckergehalt führen können. Bei der Burley-Sorte entstanden erhebliche Verluste, die swischen 18 % (Tabakringfleckenvirus) und ca 50 % (TMV) (1) und TMV (2) schwankten.

Die Wirkung auf den Stärkegehalt

Im allgemeinen entstanden bei den Stärkegehalten Verminderungen durch Viren sowohl bei den orientalischen Tabaksorten als auch bei der Burley-Sorte.

Die Einflüsse auf die Rohfaser

Obwohl unter dem Einfluss von Viren im allgemeinen der Gehalt an Rohfaser verringert war, waren die Differenzen statistisch nicht gesichert.

Die Einflüsse auf Petrol-extrahierbare Stoffe

Die Einflüsse von Viren auf den Gehalt von Petrol-extrahierbaren Stoffen bzw. Harz waren nicht nennenswert.

Die Wirkungen auf die Roh-Asche

Die Viren hatten auf den Roh-Aschegehalt keinen besonderen Einfluss.
Die Wirkungen auf den Kalzium-und Kaliumgehalt

Das Kalzium und das Kalium bilden den Hauptteil der Asche und beeinflussen im allgemeinen die Qualität des Tabaks. Die Viren steigern bei allen Tabaksorten den Kalziumgehalt. Demgegenüber steht eine Verringerung des Kaliumgehalts.

DISKUSSION

Wenn die Wirkungen von Viren auf den Ertrag, die Ausbeute und die Qualität von Tabak diskutiert werden, kann man einige Vergleiche mit Hilfe anderer Viren und Tabaksorten machen, da keine oder sehr wenige Ergebnisse mit den selben Tabaksorten und Virustypen in der Literatur vorhanden sind. So berichtete zum Beispiel Sievert (17, 18), dass Kartoffel-Y-Virus auf Tabak und Gooding and Ross (4) dass Tabakätzmosaikvirus den Ertrag und die Ausbeute bei Burleysorten erniedrigten. In unseren Versuchen waren die Ergebnisse über die Einflüsse von Viren auf die Minderung des Ertrags in jedem der beiden Versuchsjahre statistisch gesichert. Am schlimmsten wirkten sich PVX+ TMV und TMV (3) auf den Ertragaus. Genau so gefährlich war TMV (3) für die Ausbeute. Es folgten PVX+TMV, TMV (2) und TMV (1). Ihre Einflüsse auf die Erträge waren ebenfalls bemerkenswert gross. Nach den Ergebnissen der chemischen Analyse steigerten die Viren den Gesamt-Stickstoff, wobei der Protein-Stickstoff unter allen Fraktionen am meisten betroffen war. Bei allen drei orientalischen Tabaksorten war der Anstieg an Protein-Stickstoff durch Viren nach der P 1 % Grenze statistisch signifikant.

Mickowski (10) bekam ähnliche Resultate mit den orientalischen Tabaksorten An den durch Tabakmosaikvirus befallenen Blättern waren Nikotin, Stickstoff und Albumine in dem Masse angestiegen, dass sie die Qualität beeinflussen konnten. Es entstehen durch N-haltige Stoffe bzw. durch Protein-Stickstoff ein unangenehmer Geruch an den orientalischen Tabaksorten während des Brennens (6). Die Burley-Sorten enthalten die Stickstoff-Verbindungen in etwas höheren Mengen.

Es ist bekannt, dass der Gesamtzuckergehalt (Glukose, Fruktose und Saccharose) im Ägäischen Tabak höher als in dem von den anderen Gebieten ist. Durch den höheren Zuckergehalt entsteht ein säuerlicher Rauch, was eine positive Wirkung auf die Qualität hat. Von den untersuchten Tabaksorten war der Zuckergehalt bei Karabağlar und Burley S_3 am stärksten durch die Viren beeinflusst. TMV (1) und TMV (3) wirkten bei den orientalischen Tabaksorten und TMV (1) an der Burley-Sorte erniedrigend auf den Stärkegehalt. Diese Minderungen waren aber nicht gravierend. Ebenso kann man nicht sagen, dass die Viren auf Rohfaser, Petrol-extrahierbare und anorganische Stoffe einen auffallenden Effekt haben. Dagegen wirken die Viren bei allen Tabaksorten auf den Kalziumgehalt steigernd und auf den Kaliumgehalt im allgemeinen senkend.
Zum Schluß können wir sagen:

1. Der Verbreitungsgrad von Viruskrankheiten an Tabak wurde als 16,03 % ermittelt.

2. Durch Virusinfektionen wurden der Ertrag und die Ausbeute, was ökonomisch sehr wichtig ist, beachtenswert beeinflusst. Es wurde festgestellt, dass die Viren auf den Ertrag eine mindernde Wirkung bis 48,8 % hatten.

3. Es ist bemerkenswert, dass sie eine parallele Wirkung auf die Ausbeute hatten.

4. Die chemische Zusammensetzung von Tabak war durch Virusinfektionen beeinflusst: sie hatten auf stickstoffhaltige Stoffe bzw. Protein-Stickstoff einen steigernden und auf den Zuckergehalt einen mindernden Effekt. Damit wurde die Qualität negativ beeinflusst.

ÖZET

VİRUSLARIN TÜTÜNDE VERİM, RANDIMAN, KALİTE VE KİMYASAL BİLEŞİM ÜZERİNE ETKİLERİ

Tütün bitkisinde virus infeksiyonları nedeniyle verim ve randımandaki değişmeleri saptamak amacıyla altı tipik virus kombinasyonu ve İncekara-İzmir, Karabağlar, Ege-64 ve Burley S_3 tütün çeşitleriyle tarla denemeleri yürütüldü. Verim kayıpları virus ve tütün çeşidine bağlı olmak üzere % 13,5 - 48,8 arasında değişiyordu. Virusla infekteli bitkilerde randıman verime paralel olarak daha düşüktü. Kimyasal analizlerle, özellikle TMV-infeksiyonlarının bütün tütün çeşitlerinde toplam azot ve özellikle protein azotunda bir yükselmeye neden oldukları saptandı. Buna karşın infekteli bitkilerde toplam şeker ve nişasta miktarları daha düşüktü. Virusların alkaloidler, ham lif ve petrol eteri ekstratları üzerine belirgin bir etkilerinin olmadığı sonucuna varıldı. Virusla infekteli bitkilerde potasyum miktarında düşme olduğu halde, kalsiyum miktarı artmıştı.

LITERATUR

1. Anonymus, Bestimmung der Alkoloide in Tabakerzeugnissen. Deutschenormen DK. 663.97, 543.062, 547.97 DIN 1024, 1969.

2. ————, Methods of enzymatic food analysis Boehringer Mannheim BmbH. Biochemica, 1977.

3. Erdiller, G. Orta ve Doğu Karadeniz Bölgesi Tütünlerinde Tütün Mozayık Hastalığı Belirtileri, Etmeninin Bulaşma Yolları ve Zarar Dereceleri Üzerinde Araştırmalar (Doktora Tezi) A.Ü. Ziraat Fakültesi, 1969.

4. Gooding, G.V., H. Ross. Effects of tobacco etch virus on yield and market value of commercial cultivars of Burley tobacco in North Carolina. Tob. Sci. XIV, 55-57, 1970.

5. Harman, G.E.; G.D. Gooding; T.T. Hebert. Effect of tobacco mosaic virus infection on some chemical constituents of flue-cured Tobacco. Tob. Sci. XIV. 138-140. 1970.

6. İncekara, F. Endüstri Bitkileri ve Islahı, 4. Cilt, Keyf Bitkileri ve Islahı, E.Ü. Matbaası, Bornova, 1971.

7. Kacar, B. Bitki ve Toprağın Kimyasal Analizleri. II. Bitki Analizleri. A.Ü.Z.F. Yayınları, 453. A.Ü. Basımevi, Ankara. 1972.

8. Marquard, R. Eine neue Extraktionsanlage zur Serienmässigen quantitativen Fettbestimmung in Ölsaaten. Z. Pflanzenzüchtung 68 : 333-340, 1972.

9. Methods of Analysis AOAC, 11th. Edition, 56-57, 1970.

10. Mickowski. J., 1965. A. Contribution to the knowledge of Tobacco Mosaic virus in SR Makedonia. Institut Za Tütün Prilep (Doktora Tezi).

11. Nelson, R.A. Methods of Analysis for tobacco and tobacco products. U.S. Treasury Department, Internal Revenue Service (IRS), Publication No. 445 (10-60).

12. Official Methods of Analysis (AOAC) Washington D.C. 11th Edition, Section 31.054 - 31.056. 1970.

13. Pearson, D. The Chemical Analysis of foods. 6. Ed. Churchil Publisher, London. 1970.

14. Pirone, T.P. Effects of tobacco vein mottling virus on yield of Burley tobacco cultivars. Tob. Sci. XVIII: 113-114, 1974

15. ————, D.L. Davis. Modification of the chemical compositio of Burley tobacco by infection with tobacco vein mottling virus. Tob. Sci. XXI, 83-84, 1977.

16. Sekin, S. Ege Bölgesi Tütünlerinin Kimyasal Bileşimleri ve Fermantasyon Sırasında Meydana Gelen Değişmeler. (Doçentlik Tezi), E.Ü. Ziraat Fakültesi Bornova pp. 115, 1979.

17. Sievert, R.C. Effect of early harvest of Burley tobacco infected with potato virus Y on yield quality and chemical constituents. Tob. Sci. XXII, 51-53, 1978a.

18. ————. Effect of time infection with potato virus Y on yield, quality and chemical constituents of leaves of Burley tobacco. Tob. Sci. XXII., 64-66, 1978b.

19. Spurr, H., J.F. Chaplin. Tobacco mosaic virus concentration, total nitrogen and altered enzyme activities of field grown tobacco cultivars differing in mosaic symptom severity. Tob. Sci. XVIII., 133-136, 1974.

20. Yorgancı, Ü.; S. Sekin. Die Ausbreitung von Tabakvirosen im Ägäischen Gebiet, biologische, serologische und elektronenmikroskopische Untersuchungen mit isolierten Viren. J. Turkish Phytopath. 13 (2-3), 91-101, 1984.

Tabelle 1 : Die Wirkungen von Viren auf Ertrag (kg/da) im Jahre 1978.

Virustypen	Orientalische Tabaksorten			
	İncekara	Ege-64	Karabağlar	Burley
Kontrolle	132	133	133	263
TMV (1)	111	99	110	207
TMV (2)	92	115	128	177
PVY+TMV	115	114	116	173
PVX+TMV	72	50	81	175
Tabakringflechen-Virus	84	112	72	202
TMV (3)	66	115	66	199
LSD (0,05)	24,8	24,5	32,4	28,1
LSD (0,01)	34,1	33,6	44,4	NS

NS = Nicht signifikant

Tabelle 2 : Die Wirkungen von Viren auf Ertrag (kg/da) in Jahre 1979.

Virustypen	İncekara İzmir	Ege-64	Karabağlar
Kontrolle	91	106	73
TMV (1)	64	73	48
TMV (2)	75	96	64
PVY+TMV	73	89	56
PVX+TMV	66	81	60
Tabakringflecken-virus	76	97	61
TMV (3)	61	80	49
LSD (0,05)	16.5	NS	10,5
LSD (0,01)	NS	NS	14,4

NS : Nicht Signifikant

Tabelle 3 : Die Einflüsse von Virustypen auf die Ausbeute an erster Qualität (%) im Jahre 1978.

Virustypen	İncekara İzmir	Ege-64	Karabağlar
Kontrolle	61,7	65,3	63,2
TMV (1)	55,7	61,6	58,0
TMV (2)	53,5	56,0	57,3
PVY + TMV	54,9	58,6	57,2
PVX + TMV	55,7	54,5	49,9
Tabakring-fleckenvirus	59,7	60,9	54,5
TMV (3)	49,7	48,0	49,2
LSD (0,05)	NS	4,7	4,4
LSD (0,01)	NS	6,3	6,1

NS : Nicht signifikant

Tabelle 4 : Die Einflüsse von Virustypen auf die Ausbeute an erster Qualität (%) im Jahre 1979

Virustypen	İncekara İzmir	Ege-64	Karabağlar
Kontrolle	67,4	67,2	64,1
TMV (1)	54,0	60,9	48,7
TMV (2)	62,5	64,8	61,4
PVY + TMV	64,9	64,1	63,6
PVX + TMV	63,7	65,9	64,0
Tabakring-fleckenvirus	59,2	66,4	64,9
TMV (3)	41,2	57,4	53,7
LSD (0,05)	9,0	NS	5,1
LSD (0,01)	12,4	NS	7,0

NS : Nicht signifikant

Tabelle 5 : Die Wirkungen von Viren auf Gesamtstickstoff (%)

Virustypen	Orientalische Tabaksorten (1979) İncekara İzmir	Ege-64	Karabağlar	Burley (1978)
Kontrolle	3,23	3,35	2,68	2,55
TMV (1)	3,47	3,72	3,78	2,29
TMV (2)	3,38	3,51	2,67	2,82
PVY+TMV	3,27	3,33	2,66	2,94
PVX+TMV	3,21	3,58	2,93	2,73
Tabakring-fleckenvirus	3,22	3,02	2,37	2,80
TMV (3)	3,52	3,66	3,42	3.10
LSD (0,05)	NS	0,36	0,55	NS
LSD (0,01)	NS	0,49	0,75	NS

NS : Nicht signifikant

Tabelle 6 : Die Wirkungen von Viren auf Protein-Stickstoff (%)

Virustypen	Orientalische Tabaksorten (1979) İncekara İzmir	Ege-64	Karabağlar	Burley (1978)
Kontrolle	1,53	1,58	1,30	1,25
TMV (1)	1,94	2,11	2,25	1,53
TMV (2)	1,87	1,76	1,38	1,54
PVY+TMV	1,80	1,78	1,50	1,52
PVXTMV	1,73	1,88	1,62	1,56
Tabakring-fleckenvirus	1,61	1,46	1,19	1,64
TMV (3)	1,95	1,91	2,00	1,62
LSD (0,05)	0,20	0,29	0,25	0,23
LSD (0,01)	0,27	0,40	0,34	NS

NS : Nicht signifikant

Tabelle 7 : Die Einflüsse von Virustypen auf den Prozentsatz des löslichen Stickstoff im Gesamt-Stickstoff

Virustypen	Orientalische Tabaksorten (1979)			Burley
	İncekara İzmir	Ege-64	Karabağlar	(1978)
Kontrolle	52,5	52,9	51,0	51,0
TMV (1)	44,4	43,5	40,4	32,8
TMV (2)	44,8	49,7	47,7	45,3
PVY+TMV	44,7	46,7	42,8	47,0
PVX+TMV	46,0	47,5	44,7	39,7
Tabakring-fleckenvirus	49,3	51,8	48,9	40,9
TMV (3)	44,4	47,7	41,4	47,1
LSD (0,05)	NS	5,8	7,1	9,0
LSD (0,01)	NS	NS	NS	12,4

NS : Nicht signifikant

Tabelle 8 : Die Einflüsse von Virustypen auf Gesamtalkaloidgehalt

Virustypen	Orientalische Tabaksorten (1979)			Burley
	İncekara İzmir	Ege-64	Karabağlar	(1978)
Kontrolle	0,38	0,68	1,00	0,64
TMV (1)	0,35	0,57	1,05	0,52
TMV (2)	0,32	0,75	1,06	0,67
PVY+TMV	0,39	0,52	1,02	0,58
PVX+TMV	0,40	0,67	1,18	0,65
Tabakring-fleckenvirus	0,40	0,65	0,89	0,63
TMV (3)	0,48	0,70	1,20	0,66
LSD (0,05)	NS	NS	NS	NS
LSD (0,01)	NS	NS	NS	NS

NS : Nicht signifikant

Tabelle 9 : Die Einflüsse von Virustypen auf Gesamtzuckergehalt

Virustypen	Orientalische Tabaksorten (1979)			Burley
	İncekara İzmir	Ege-64	Karabağlar	(1978)
Kontrolle	8,67	8,54	13,70	5,38
TMV (1)	8,07	7,03	6,44	2,72
TMV (2)	8,45	8,77	12,90	2,75
PVY + TMV	8,27	8,26	12,89	3,99
PVX + TMV	9,31	8,13	9,35	4,39
Tabakringflecken-virus	8,73	9,06	13,36	3,32
TMV (3)	8,55	7,98	8,78	3,84
LSD (0,05)	NS	NS	3,84	1,49
LSD (0,01)	NS	NS	5,26	2,09

NS : Nicht signifikant

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Identification and Characterization of Seedborne Cowpea Mosaic Virus*

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ABSTRACT

A seedborne cowpea mosaic virus transmitted through sap and aphids **Aphis craccivora** Koch and **A. gossypii** Glover has been investigated. The host range was confined to some species of family Chenopodiaceae and Leguminosae. The virus had a thermal inactivation point (TIP) between 50-55°C, dilution end point (DEP) between 1:500-1:1,000 and longevity **in vitro** (LIV) of 7 hrs at room temperature of 27-35°C. The virus was located in the cotyledons and embryo.

INTRODUCTION

During the year 1980-81, a survey was made on the farm of Botany Department, Rajasthan College of Agriculture, Adaipur wherein cowpea (**Vigna unguiculata**) germplasm collection was grown. It was observed that ten out of two hundred thirty seven cultures had severe cowpea mosaic virus symptoms. Since cowpea mosaic viruses are known to be seedborne in nature, the seed was collected from such plants and sown in steam sterilized soil which served as a source of inoculum. The virus was obtained from cowpea cv. Pusa-4 and maintained on cowpea cv RCM-2 as the virus titre was maximum. Although cowpea is an important crop of Rajasthan and the studies on cowpea seedborne virus diseases have been made elsewhere, yet no reports of any detailed work done on cowpea mosaic virus and its nature have been undertaken in Rajasthan. Taking this factor into account, the present investigations to establish the identity of the cowpea mosaic virus of seedborne nature existing under the conditions of Rajasthan were taken up.

MATERIALS AND METHODS

Seeds of cowpea cvs. viz. Jaipur local collection-A (JLC-A), Jaipur

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local collection-B, C-152, Jaipur local collection-D, Jaipur local collection-H, Jaipur local collection-I, Jaipur local collection-10-RZ and Pusa-4 were sown in stream sterilized soil. On germination virus culture was obtained from cowpea cv. Pusa-4 and maintained on RCM-2 plants by sap inoculation using 0.1 M boric acid buffer (pH 7.5) and celite powder as an abrasive served as inoculum, **Chenopodium amaranticolor** was used as local lesion host in all the experiments.

Host range of the virus isolate was studied by inoculating 48 host plants belonging to 33 genera from 14 families. Plants belonging to families of Cucurbitaceae and Leguminosae were inoculated at primary leaf stage. Whereas other host plants were inoculated at 6-8 leaf stage, the plants were observed for symptom expression upto 30 days and their reactions recorded. Physical properties of the virus were carried out by employing routine procdure.

For testing seed transmission, 600 seeds collected from artificially inoculated cowpea cv. Pusa-4 plants were sown and observe continuously for their symptom production for two months.

Location of the virus in the true seed was studied by collecting the seed from the artificially inoculated cowpea cv. Pusa-4. The seeds thus collected were soaked in distilled sterile water for 48 hr and then testa, colyledons and plumular buds of each seed were separated carefully under sterile conditions. Seed parts were separately macerated and indexed on **C. amaranticolor.**

Insect transmission of the virus was studied by collecting two aphid species viz. **Aphis craccivora** and **A. gossypii** from the Department of Entomology, Rajasthan, College of Agriculture, Udaipur. They were raised on healthy plants of **Vigna unguiculata** and **Solunam nigrum** respectively. The apterous adult aphids were starved for 90 min prior to 15 min access to diseased young plants and then transferred in batches of 10 to each test plant. The plants were sprayed with 0.02 per cent dimecron 12 hr later and observed for symptom expression.

Purification of the virus was achieved by centrifugation after clarification with suitable clarifying agents. The virus was precipitated by using differential precipitating agents. A modified method of Fisher and Lockhart (1976) and Hollings **et al.** (1968) was employed for purification and the infectivity wass assayed at each step of purification on **C. amaranticolor.**

For establishing the serological relationship against the virus un-

der study, 4 antisera wera tried. Ouchterlony agar-gel diffusion technique was adopted for this study.

RESULTS

Symptomatology: : The symptoms appeared on the cotyledonary/primary leaves of cowpea cv. Pusa-4, 6-7 days after sowing, in the form of dark green banding along the veins accompanied by slight crinkling followed by reduction in leaf size. Main and axillary branches of young trifoliates showed typical dark green bands along the veins. Inoculated plants developed fine mottle symptoms in 8-19 days followed by mosaic pattern. Maximum virus titer was found in cowpea cv. RCM-2, therefore, this was selected for maintenance of virus culture.

Host range : Chenopodium album developed small chocolate brown local lesions, whereas **C. amaranticolor** caused chlorotic local lesions in 6-8 days. **Crotalaria juncea** produced systemic mosaic symptoms in 9-12 days after inoculation. Cowpea, cv. C 152, JLC-A, Pusa-4 and RCM-2 developed systemic mosaic mottling and vein banding symptoms in 8-18 days.

Physical properties : Thermal inactivation point of the virus is between 50-55°C. The virus in crude sap was active only upto a dilution of 1:500 but not upto 1:1000. It was inactivated between 7 and 8 hr. storage at room temp. (27-35°C) and in 1 and 2 days at 8°C.

Seed transmission and location of virus in cowpea seeds : The seed transmission of the virus was 11.44 per cent. The virus was located in cotyledons and plumular buds and the infection percentage was 1.94 and 16.5 respectively.

Aphid transmission : The virus was transmitted by **Aphis craccivora** and **A. gossypii** to the extent of 90 and 70 per cent respectively.

Purification : The infectivity of the virus was slightly reduced at each step of purification. The pellets obtained after high speed centrifugation contained good amount of virus as determined on the basis of local lesion production on **C. amaranticolor.** Good amount of virus with partially purified preparation was obtained in the supernatant after high speed (15000 rpm for 40 min) and low speed (5000 rpm for 15 min) centrifugation.

Serology : The virus under study was not reacted positively with

antisera of cowpea mosaic (Sub. Isolate from Surinam), Cowpea mild mottle and two antisera of seedborne mosaic viruses indicating thereby the virus is serologically unrelated to these viruses.

DISCUSSION

The majority of viral diseases which are of common occurrence in cowpea cultivation are known to be seed transmitted. In view of this, seed of each of the ten cultivars, was obtained and sown in the steam sterilized soil which served as a source of inoculum. The virus was obtained from cowpea cv. Pusa-4 and maintained on cowpea cv. RCM-2. The symptoms resemble those of cowpea mosaic virus reported by Chenulu **et al.** (1968), Sharma and Varma (1975) and Fischer and Lockhart (1976). The virus produced local lesions on **C. album** and **C. amaranticolor.** Systemic symptoms developed on **Crotalaria junjea, Phaseolus vulgaris** and **Vigna unguiculata.** The host range was similar to cowpea mosaic virus reported by Anderson (1955 b), Chenulu **et. al.** (1968), Sharma and Varma (1975), Phatak **et al.** (1976) and Fischer and Lockhart (1976).

The virus had a TIP between 50-55°C, DEP between 1:500-1:1000 and LIV for 7 hr at room temp (27-35°C). The virus has similarity in symptomatology, host range, physical properties to that of cowpea mosaic virus reported by Chenulu **et al.** (1968). The virus is seed-transmitted and is also transmitted by **Aphis craccivora** and **A. gossypii** which confirm the reports of earlier workers (Chenulu **et al.,** 1968; and Sharma and Varma, 1975). The present virus reacted negatively with the standard antisera of cowpea mosaic virus (sub-Isolate from Surinam), cowpea mild mottle and two antisera of seedborne cowpea mosaic viruses indicating that the virus is not related to these viruses.

The symptomatology, host range, physical properties and insect transmission studies of the virus under study resembled cowpea mosaic virus reported by Chenulu **et al.** (1968). It is identified as cowpea mosaic virus and placed in cucumo virus group. This is the first report of seedborne cowpea mosaic virus from Rajasthan State.

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LITERATURE CITED

Anderson, C.W., 1955. **Vigna** and **Crotalaria** viruses in Florida. I. Preliminary report - the strain of cucumber mosaic virus obtained from cowpea plants, **Plant Dis. Reptr., 39** : 346-348.

*Chenulu, V.V., S.C. Sachchidananda and S.C. Mehta, 1968. Studies on cowpea (**Vigna sinesosis**) from India. **Phytopath. Z., 63** : 381-387.

Fischer, H.U., E.E. Lockhart, 1976. A strain of cucumber mosaic virus isolated from cowpea in Morocco. **Ibid., 85** : 132-138.

*Hollings, M., O.M. Stone and A.A. Brunt, 1968. Cucumber mosaic virus. Ann. Rep. Glasshouse Crops Res. Inst., pp. 77-82.

Phatak, H.C., J.R. Diaz-Ruiz and R. Hull, 1976. Cowpea ringspot virus : A seed transmitted cucumo virus, **Phytopath. Z., 87** : 132-142.

Sharma, S.R. and A. Varma, 1975. Three sap transmissible viruses from cowpea in India. **Indian Phytopath., 28** : 292-298.

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Investigations on Relation Between The Severity of Cotton Wilt Disease (**Verticillium dahliae** Kleb.) and Yield Loss in Aegean Region

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ABSTRACT

The present study has been conducted in order to determine the relation between the severity of cotton wilt disease and yield loss. Experimental work has been carried out in a field where the disease occurs abundantly every year at Nazilli Regional cotton Research Institute.

Experiment was designed with fourteen replications and disease severity per plot was estimated when the bolls were matured. Different disease severities were obtained from plots. Picking was made very carefully in two rounds. The sum of two pickings per plot was considered as its yield.

It followed from two years' data that the relation between wilt-severity and yield loss wass significant at the level of 1 % (P:0, 01; $t = 6,26 > t = 2,779$). Regression line was found to be $y = 0,67x-7$.

INTRODUCTION

Cotton is a plant which plays a significant role in industry and in the economy in world. In Turkey's economy, cotton is an important raw material in textiles and oil industry and provides foreign currency at most with portion of 34,1 % at total exports (Madran, 1971).

One of the most important problems of cotton with 2.150.990 da. growing-areas in Ege Region (Anonymus, 1980) is wilt disease (**Verticillium dahliae** Kleb.). Due to the fact that crop rotation and cultural measures have not been applied and sensitive cotton-varieties have been grown, the disease has begun to threat the cotton-growing in our region by increasing its population in soil. According to surveys in Aydın and Izmir, which are the important cotton-areas of Ege Region, in 1978 it was found that the disease-incidence was 38,8 % and

26,4 % and the disease-severity was 20,3 % and 15,8 % respectively (Uygun et al, 1978).*

Upto now, studies have been carried out cotton-wilt disease such as its idenfication, hosts, of disease agent, some cultural measures, inoculation methods, determination of resistance cotton varieties, the effects of urea and its chemical control. In addition to these, there is an investigation on the relation between the disease severity and the yield but the findings are only the data of one year (Karaca and Ceylan, 1972).**

The present study, the aim of which was to determine the relation between the cotton wilt disease severity and the yield, went on four years, but results were obtained only in 1981 and 1983.

MATERIALS and METHODS

Materials

Cotton plants (Nazilli 66/100 (77-115)

Methods

Experiment was carried out in a field where the disease occurs abundantly every year at Nazilli Regional Cotton Research Institute. It was done in fourteen replications. Plot size was 5 m. x 20 m. = 100 m^2 and inter-plots was 1,5 m. After cotton-seeds were dusted with Korsikol-18 against damping-off, they were sown on May, 19, 1981 and on May, 7, 1983.

During vegetation, plants were sprayed with Metasystox, Kelthane and Rogor against aphids, leaf hopper and spider mites. When the bolls were matured, all plants in plots were estimated according to 0-3 scale (Karaca et al, 1967) on September, 17, 1981 and on September, 6, 1983 and disease-severity per plot was found according to Towsend and Heuberger formula.

Scale values :

0 : no disease symptoms

1 : moderately disease symptoms; leaves becoming yellow and wilted about 50 % but not becoming dry.

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* Uygun, O., E, Urkan, İ. Menger ve K. Saray, 1978. Aydın, İzmir ve Manisa illerinde Nazilli 66/100 çeşidine solgunluk hastalığının etkisi (105.814, report)

** Karaca, İ. ve S. Ceylan (Kocatürk), 1972. Ege Bölgesinde pamuk bitkilerinde görülen solgunluk hastalığının sebepleri ve korunma imkanları üzerinde çalışmalar (105.814 C6, report)

2 : Severe symptoms; leaves becoming yellow or wilted about 100 % and becoming dry partially

3 : Most of the leaves drop and plants die by wilting

Picking on all plants in plots with different disease severity was made on Oct., 22 and Nov., 19, in 1981 and Oct. 8 and Nov., 3, in 1983. The sum of two pickings per plot was its yield.

Yield per plant for each plot was counted and it was multiplied by average plant number of plots. These yields were accepted as corrected yield of plots because of being different plant number in plots. The percentage of crop loss from these yields was found (James, 1974), and the relation between the disease severity and crop loss was determined with the aid of correlation and regression (Karman, 1971).

RESULTS

Results in 1981

The disease severity and yields obtained from plots were indicated in Table 1.

Table 1. The disease severity and yields (kg/100 m²) on Nazilli 66/100 (77-115) cotton variety in plots (Nazilli, 1981).

Plot No.	Scale value 0	1	2	3	Total Plant number	(X) Disease severity	Yield (kg/100m²)	Corrected yield (Kg/100m²)	(Y) Yield loss %
1	94	147	200	82	532	50,54	28,8	26,76	22,77
2	88	183	183	50	504	45,95	33,1	31,91	7,90
3	116	153	175	57	501	44,84	31,6	30,65	11,54
4	109	189	146	53	497	42,92	30,7	30,02	13,36
5	109	203	173	43	528	42,80	33,0	30,37	12,35
6	102	209	127	31	469	39,51	26,7	27,66	20,17
7	156	147	164	37	504	38,52	30,8	29,70	14,28
8	141	142	134	22	439	36,14	28,2	31,21	9,92
9	121	243	110	18	492	35,02	33,5	33,09	4,50
10	180	179	136	26	521	33,84	33,6	31,34	9,55
11	185	150	100	28	463	31,24	27,7	29,07	16,10
12	218	165	87	20	490	27,14	32,2	31,93	7,84
13	199	146	81	12	438	26,17	30,2	33,50	3,31
14	226	133	64	10	433	22,40	27,7	31,09	10,27

As shown in Table 1, disease severity was between 50,54 % and 22,40 % and yield was between 26,76 kg and 33,500 kg. Correlation coefficient was r= 0,516 and it was significant at the level of 10 % ($t=2,125$ $t_{10\,\%}$ 1,7982). Regression line was drawn according to Y= 0,34x-0,49 (Fig. 1).

Results in 1983

Date were given in Table 2.

Table 2. The disease severity and yields (kg/100 m²) on Nazilli 66/100 (77-115) cotton variety in plots (Nazilli, 1983)

Plot	Scale value				Total	(X)	Yield	Corrected	(Y)
					Total	Disease	(kg/100m²)	Yield	Yield
No.	0	1	2	3	number	severity			loss %
1	38	172	180	127	517	58.86	21.150	20.918	56.74
2	58	167	157	126	518	56.36	24.950	25.193	48.05
3	64	173	189	83	509	52.39	25.740	25.937	46.52
4	98	167	130	121	516	51.03	25.860	25.706	46.99
5	99	159	160	91	509	49.24	26.270	26.475	45.41
6	89	200	149	89	527	48.38	26.900	26.183	46.01
7	92	192	149	80	513	47,43	27.690	27.686	42.91
8	139	152	150	85	526	44.80	29.130	28.409	41.42
9	105	187	127	69	488	44.26	29.960	31.493	35.06
10	103	219	123	54	499	41.88	30.680	31.539	35.05
11	121	177	141	48	487	41.27	30.780	32.421	33.15
12	149	195	127	72	543	40.82	31.040	29.323	39.54
13	157	181	130	73	541	40.66	31.180	29.564	39.04
14	143	183	117	57	500	39.20	31.780	32.606	32.77

As shown in Table 2, In 1983 disease severity was between 58,86 % and 39,20 % and yield was between 20,981 kg and 32,606 kg. Correlation coefficient was r=0,922 and it was significant at the level of 1 % ($t=3,41$ $t_{1\,\%}$ 3,55) Regression line was drawn according to Y=1,02x-5,78. (Fig. 2).

The results obtained by connecting two years' data were shown in table 3.

Table 3. The disease severity and yields (kg/100 m²) on Nazilli 66/100 (77-115) cotton variety in plots (Nazilli, 1981 and 1983).

Plot No.	X Disease severity	Corrected Yield (Kg/100 m²)	Y Yield loss %
1	58.86	20.918	43.76
2	56.36	25.193	32.27
3	52.39	25.937	30.27
4	51.03	25.706	30.89
5	50.54	26.760	28.06
6	49.24	26.475	28.33
7	48.38	26.183	29.61
8	47.43	27.686	25.57
9	45.95	31.910	14.22
10	44.84	30.650	17.60
11	44.80	28.409	23.63
12	44.26	31.493	15.34
13	42.92	30.020	19.30
14	42.80	30.370	18.36
15	41.88	31.539	15.21
16	41.27	32.421	12.84
17	40.82	29.323	21.17
18	40.66	29.564	20.52
19	39.51	27.660	25.56
20	39.20	32.606	12.34
21	38.52	29.700	20.16
22	36.14	31.210	16.10
23	35.02	33.000	11.04
24	33.84	31.340	15.75
25	31.24	29.070	21.85
26	27.14	31.930	14.16
27	26.17	33.500	9.94
28	22.40	31.090	16.42

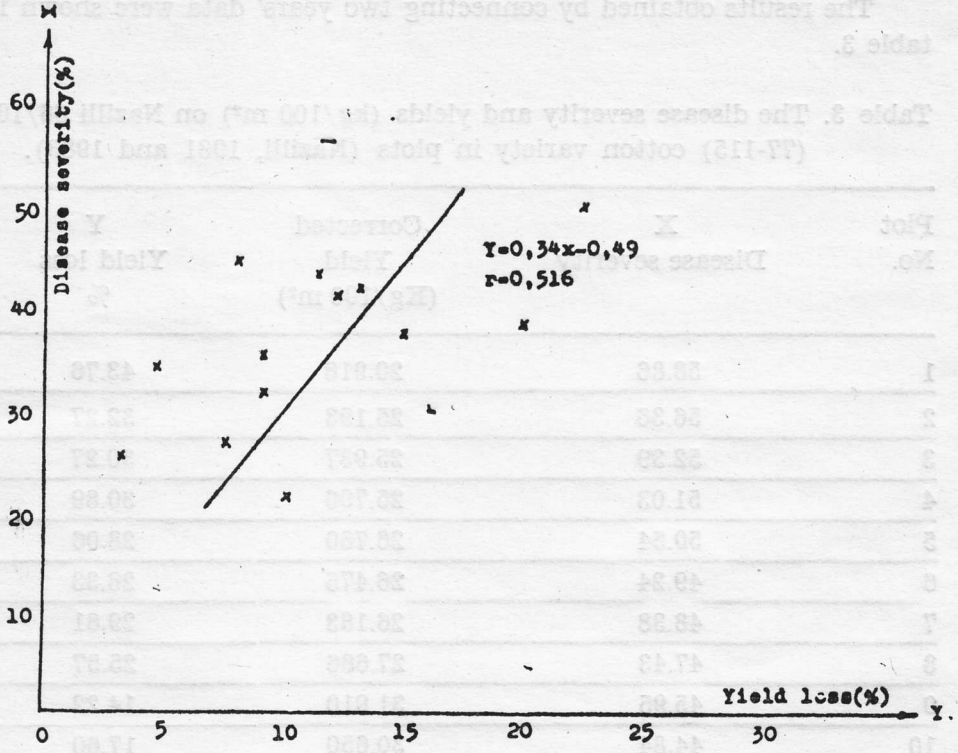

Fig. 1. The relation between the severity of cotton wilt disease (**V. dahliae** Kleb.) and yield loss (1981)

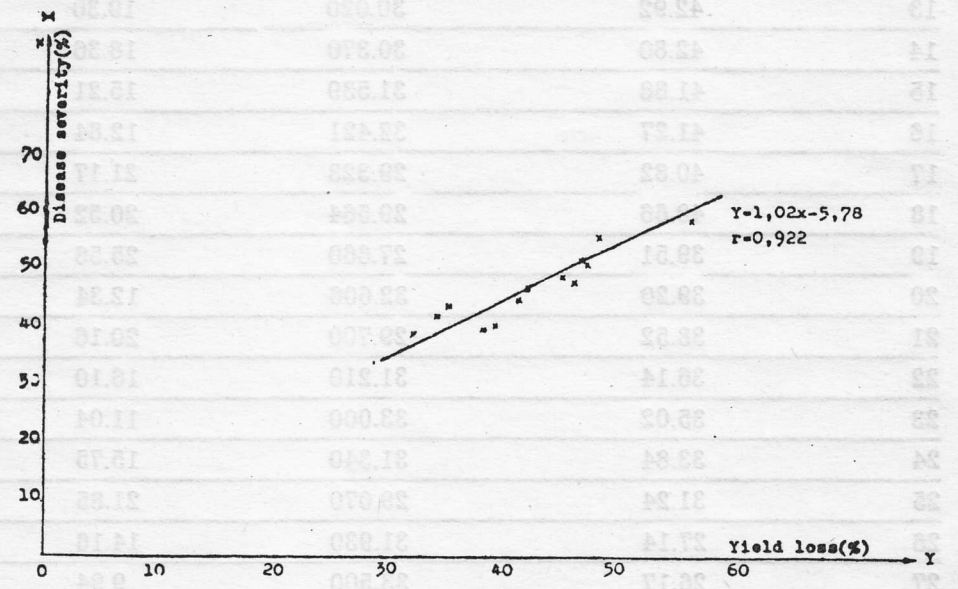

Fig. 2. The relation between the severity of cotton wilt disease (**V. dahliae** Kleb.) and yield loss (1983)

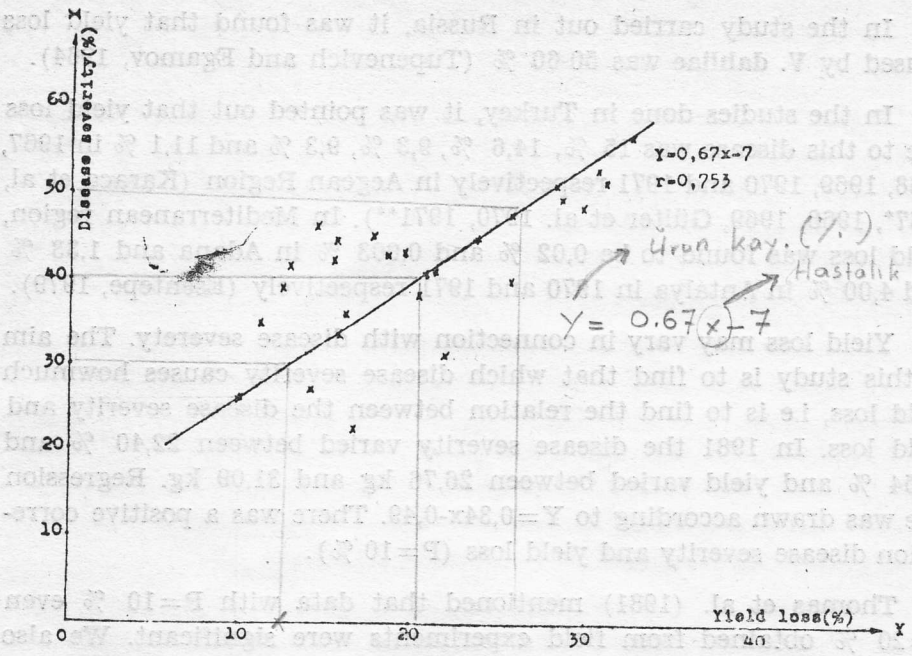

Fig. 3. The relation between the severity of cotton wilt disease (**V. dahliae** Kleb.) and yield loss

As seen in Table 3, disease severity was between 22,40 % and 58,86 % and yield was between 20,981 kg and 33,500 kg. Correlation coeficent was r=0,753 and it was significant at the level of 1 % ($t=6,26$ $t_{1\%}=2,779$). Regression line was drawn according to Y=0,67x-7 (Fig. 3).

DISCUSSION

Cotton wilt disease, caused by **Verticillium dahliae** Kleb., is a widespread and serious disease. It occurs in most countries and Turkey where cotton is grown and it causes yield loss (Presley, 1953; Tupenevich and Egamov 1964; Cotton Disease Coucil 1971, Karaca et al, 1971; Esentepe, 1979).

According to the studies in U.S.A., it was found that mean yield loss was 10-15 % in the area between South Carolina and California (Presley, 1953). But later mean yield loss was found to be 2,48 % in several states (Cotton Disease Council, 1971).

In the study carried out in Russia, it was found that yield loss caused by **V. dahliae** was 50-60 % (Tupenevich and Egamov, 1964).

In the studies done in Turkey, it was pointed out that yield loss due to this disease was 15 %, 14,6 %, 9,3 %, 9,3 % and 11,1 % in 1967, 1968, 1969, 1970 and 1971 respectively in Aegean Region (Karaca et al, 1967*, 1968, 1969, Gülter et al. 1970, 1971**). In Mediterranean region, yield loss was found to be 0,02 % and 0,003 % in Adana and 1,33 % and 4,00 % in Antalya in 1970 and 1971 respectively (Esentepe, 1979).

Yield loss may vary in connection with disease severety. The aim of this study is to find that which disease severity causes howmuch yield loss, i.e is to find the relation between the disease severity and yield loss. In 1981 the disease severity varied between 22,40 % and 50,54 % and yield varied between 26,76 kg and 31,09 kg. Regression line was drawn according to $Y=0,34x-0,49$. There was a positive correlation disease severity and yield loss ($P=10$ %).

Thomas et al. (1981) mentioned that data with $P=10$ % even $P=20$ % obtained from field experiments were significant. We also found that correlation coefficient was significant at the level of 10 %.

In 1983, the diseases severity varied between 39,20 % and 58,86 % and yield varied between 20,981 kg and 32,606 kg. The relation between the disease severity and yield loss was significant at the level of 1 % and regression line was drawn in accordance with $Y=1,02x-5,75$.

According to the results obtained by connecting two years' data, it was found to be $r=0,753$ and regression line was drawn in accordance with $Y=0,67x-7$.

Studies both by Booth (1970) and by Karaca and Ceylan (1972)*** indicated that the relation between the disease severity and yield loss was significant. Their findings confirm our data in 1981 and 1983.

Consequently, according to two years' studies it was found that there was a positive correlation between cotton wilt disease severity and yield loss on cotton plant which plays an important role in our

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* Karaca, İ., S. Ceylan, A. Karcılıoğlu, C. Saydam, 1967, 1968, 1969. Ege Bölgesinde pamuk bitkilerinde görülen solgunluk hastalığının sebepleri ve korunma imkanları üzerinde çalışmalar (105.814 C/3, report)

** Gülter, İ., O. Tokmak, K. Saray, 1970, 1971. Ege Bölgesinde pamuk bitkilerinde görülen solgunluk hastalığının sebepleri ve korunma imkanları üzerinde çalışmalar (105.814 D/2, report)

*** Karaca, İ. ve S. Ceylan (KOCATÜRK), 1972. Ege Bölgesinde pamuk bitkilerinde rülen solgunluk hastalığının sebepleri ve korunma imkanları üzerinde çalışmalar (105.814, report)

economy. Regression lines of two years were drawn separately and regression line obtained by connecting two years, data were also drawn. So, as the conclusion to use the graph of the relation between the disease severity and the yield loss given in this study will be suitable for our country.

In pratice, if the disease severity is determined according to 0-3 scale at the mature boll stage in the first half of September, yield loss can be estimated with the aid of this graph (Y=0,67x-7). But this study will be suitable to repeat at different regions as well.

ÖZET

EGE BÖLGESİNDE PAMUK SOLGUNLUK HASTALIĞI (**Verticillium dahliae** Kleb.) ŞİDDETİ İLE VERİM EKSİLİŞİ ARASINDAKİ İLİŞKİNİN SAPTANMASI ÜZERİNDE ARAŞTIRMALAR

Ege bölgesinde pamuklarda önemli hastalıklardan biri olan solgunluk hastalığı (**Verticillium dahliae** Kleb.) şiddeti ile verim eksilişi arasındaki ilişkiyi saptamak amacıyla bu çalışma yapılmıştır.

Nazilli Bölge Pamuk Araştırma Enstitüsü Müdürlüğü deneme tarlasında 14 tekerrürlü deneme açılmış ve parsellerde farklı şiddette hastalık oluşmuştur. Parsellerde var olan tüm bitkilerdeki pamuk toplanarak verim bulunmuştur.

4 yıl yapılıpta 2 yıl süre ile sonuç alınan çalışma sonunda yüzde hastalık şiddeti ile yüzde verim eksilişi arasındaki ilişkinin 1. yıl % 90 güvenle, 2. yıl % 99 güvenle önemli olduğu bulunmuştur. İki yıllık veriler üzerinden Y=0,67x-7'ye göre regrasyon grafiği çizilmiştir. Bundan böyle hangi hastalık şiddetinin ne kadar ürün kaybına neden olacağını bu grafik yardımıyla bulmak mümkün olacaktır.

LİTERATÜR

Anonymus, 1980. Tarımsal Yapı ve Üretim, Başbakanlık Devlet İstatistik Enstitüsü No: 231, Ankara.

Booth, J.A. 1970. Host **Gossypium hirsutum** (Cotton). Crop Loss Assesment Methods Supplement 1. F.A.O. Manual ot the Evulation and Prevention of Losses by Pests and Diseases and Weeds : 50

Cotton Disease Council, 1971. Reduction in Yield of Cotton by Parasitic Diseases in 1970. Pl. Dis. Reptr. 56 (6) : 506.

Esentepe, M., 1979. Adana ve Antalya İllerinde Görülen Solgunluk Hastalığının Etmeni, Yayılışı, Kesafeti ve Zarar Derecesi ile Ekolojisi Üzerinde Araştırmalar. T.C. Gıda-Tarım ve Hayvancılık Bakanlığı İzmir Bölge Zirai Mücadele Araştırma Enstitüsü Müdürlüğü Araştırma Eserleri Serisi No: 32, + 45.

———————, A. Karcılıoğlu, E. Sezgin, E. Onan, 1982. Ege Bölgesinde Pamuk Solgunluk Hastalığı (**Verticillium dahliae** Kleb.) Şiddeti ve Verim Eksilişi Arasındaki İlişkinin Saptanması Üzerinde Araştırmalar. Türkiye Fitopatoloji Derneği III. Türkiye Fitopatoloji Kongresi Bildirileri Adana : 145-151.

James, W.C., 1974. Assesment of Plant Diseases and Losses. Ann. Rev. Phytopath. **12** : 27-48.

Karaca, İ., A. Karcılıoğlu, S. Ceylan, 1971. Wilt Disease of Cottan in the Ege Region of Turkey. J. Turkish Phytopathol. 1 (1) : 4-11.

Karman, M., 1971. Bitki Koruma Araştırmalarında Genel Bilgiler. Denemelerin Kuruluşu ve Değerlendirme Esasları, T.C. Tarım Bakanlığı Zirai Mücadele ve Zirai Karantina Genel Müdürlüğü Yayınları, Mesleki Kitaplar Serisi Bölge Zirai Mücadele Araştırma Enstitüsü, İzmir-Bornova + 279.

Madran, N., 1971. Türkiye'de Pamuk, Tarım Bakanlığı Bölge Pamuk Araştırma Enstitüsü Müdürlüğü, Adana, Yayın No: 27.

Presley, J.T., 1953. **Verticillium** Wilt of Cotton Plant. Diseases of the Yearbook of Agriculture. Washington D.C. : 301-303.

Thomas, P.A., C.N. Park, J.L. Page and J. Geronima, 1981. Considering Economic aswell as Statistical Significance in Evaluating Field Trial Yield Results. Down to Earth **37** (3) : 17-19.

Tupenevich, S.M., I. Egamov, 1964. Effects of Nature Soil Compast on **Verticillium** wilt of cotton. Rev. App. Mycol. **43** (3) : 38.

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The Reactions of Wheat Varieties Grown in Turkey to Some Common Bunt Races

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ABSTRACT

Totally 62 wheat varieties which are grown in Turkey were tested against common bunt races C-6, C-20, F-65, F-66, F-67 and F-68. These experiments showed that the varieties Irnat-69, Karakılcık-1133, Sakarya-75 and Yayla 305 were resistant to all of these races. It is suggested that these varieties should also be tested in different ecological regions. If they show resistance reaction, they can be used as resistant materials in breeding programs and their cultivation areas can be expanded. Also, it will not be necessary to treat the seeds with some chemicals.

INTRODUCTION

As we know, seed treatment is commonly recommended for all wheat varieties against common bunt in Turkey. However, it is not known very well which varieties are resistant. Hence seed treatment is applied on all of the varieties both the resistant and non-resistant, with the expenditure of money and time in vain.

It is necessary to know the reactions of all the varieties grown in Turkey against common bunt and on the other hand, there is necessity to obtain resistant varieties in order to minimize the cost of seed treatment and side-effects of chemicals. As a first step the races of common bunt have been established in Turkey by us before the present investigation is carried out (Finci et al., 1983). In the present work, some races with high pathogenity were chosen and they were used against common wheat varieties grown in Turkey. The varieties were supplied by Agricultural Research Enstitute, Diyarbakır. In a previous work, we had determined the virulence of the chosen races against a set of differential cultivars (Bt 1-Bt 10) which have resistant genes (Finci et al., 1983). That is, when a wheat variety is resistant to the races tested in this investigation, it shows resistance against all of the established races.

In the study in question, it was tried to determine the reactions of wheat varieties to some bunt races.

MATERIALS AND METHODS

The virulence patterns of the common bunt races and 62 common wheat varieties used in our experiments, are shown in Table 1 and 2 respectively.

TABLE 1. The virulence patterns of the common bunt races used in the test.

Race designation	Virulence formula (Virulence / avirulence against Bt genes)
C — 6	1, 2, 7/3, 4, 5, 6, 8, 9, 10
C — 20	2, 3, 4, 5, 6, 7, 10/1, 8, 9
F — 65	1, 2, 4, 5, 6, 7, 8/3, 9, 10
F — 66	1, 4, 5, 6, 7, 8, 9/2, 3, 10
F — 67	2, 4, 5, 6, 7, 8, 9/1, 3, 10
F — 68	3, 4, 5, 6, 7, 8, 9, 10/1, 2

The seeds of each wheat variety were inoculated with teliospores of each race suspended in 5 % methylcellulose (Kendrick et al., 1964) and were sown in deep furrow 3 rows 2 m long in October at the University farm in Elazığ. Experiments were performed in randomized block design in 3 replicates. The percentages of bunt infection on each wheat variety were determined by head counts. Infection percentages from 0 to 10 were classified as avirulent and those from 11 to 100 as virulent (Hoffmann and Kendrick, 1968). The highest infection rates in the replicates were accepted in the calculations. The inoculated wheat varieties were sown in 1982 and 1983, and countings were done at harvest seasons in 1983 and 1984.

RESULTS AND DISCUSSION

The reactions of wheat varieties to the races used in this experiment are shown on Table 2. As it is seen from this table, wheat varieties showing resistance to the bunt races are Irnat-69, Karakılçık-1133, Sakarya-75 and Yayla-305. Dicle-74 is susceptible to race C-20, and variety Ceyhan is susceptible to race F-66. The other wheat varieties showed susceptibility to 2 or more than 2 races.

From differantial wheat varieties, Bt 8 has bunt resistance gene conveyed from variety Yayla-305 in Turkey (Waud and Metzger, 1970). All races in the United States are avirulent against Bt 8. However, some of bunt races established in Turkey are virulent on this variety.

This situation has occured because Turkey is a wheat gene center and some of the seeds are sown without treatment, and so the new and more pathogenic races arise in Turkey. As a matter of fact, 75 pathogenic types of bunt were established in Turkey (Finci et al., 1983) as compared with 25 races in the United States (Hoffman and Metzger, 1976).

TABLE 2. Reaction of wheat varieties to races of common bunt at the Farm of Fırat University

Variety name	Races and % Common bunt					
	C-6	C-20	F-65	F-66	F-67	F-68
Akova	15	0	0	22	0	15
Aköz	0	0	0	2	15	17
Ariana-66	12	2	0	12	15	45
Aşure	3	3	0	15	13	1
Ada SM-86	2	20	12	12	17	15
Bb-Kal	1	0	2	20	1	25
Bobalink	2	15	20	27	3	18
Bolal-2973	15	15	20	40	0	40
Bezostaya	25	45	1	50	2	20
Bezostaya-1-671020	11	5	30	5	12	0
Campadora	1	20	15	50	0	0
Chiroca	4	15	15	20	20	0
Ciano	50	20	17	80	5	3
Ceyhan	1	1	2	14	1	3
Conte Marzotto	5	0	12	15	5	3
Cumhuriyet-75	5	2	20	16	16	80
Çankırı	13	5	15	25	16	22
Çark-1	12	15	5	0	1	5
Dicle-74	4	20	3	1	2	2
Dicle-75	12	2	13	1	11	2
Etoil De Choisy 68829	3	2	15	41	1	40
Funone	12	0	0	20	20	2
Gediz	1	20	10	2	10	2
Gediz-75	10	15	10	3	2	2
Gerek-79	15	25	16	60	15	2
Siete Cerros	2	3	0	15	2	15
Seyhan	1	2	30	11	2	3
Süper X	2	20	15	12	12	40
SM-71	25	15	12	30	18	3
Tevere	20	16	15	2	15	16

TABLE 2. (Continuation)

Variety name	Races and % Common bunt					
	C-6	C-20	F-65	F-66	F-67	F-68
Gökgöl-79	30	2	15	1	0	12
HD-832	5	20	1	0	10	10
Irnat-69	0	0	3	1	2	2
İrnerio	11	15	11	20	11	2
Karakılçık-1133	2	0	1	3	5	0
Kırkpınar-79	3	15	12	5	2	18
Kunduru	2	2	26	3	3	16
Kösemelez-1718	1	20	15	20	2	3
Kıraç-66	4	0	20	2	5	3
Lancer	25	3	2	16	28	11
Lerma Rojo-64	15	15	0	25	0	16
Libellula	2	15	1	17	0	15
Mara	5	18	20	15	22	13
Mentana	12	26	15	40	35	20
Menceki	—	20	55	11	0	30
Malabadi	12	30	12	15	20	3
Nadadores-63	15	2	26	22	16	20
Norteno	9	20	46	30	18	50
Orso	20	35	12	15	2	5
Penjoma-62	15	20	20	15	0	27
Pitic-62	30	15	26	90	25	26
Porsuk-2800	2	0	26	2	0	5
Samsun-66	15	13	16	2	5	4
Sakarya-75	5	1	2	8	2	2
Sakarya	15	15	11	1	3	27
Tosun-21	5	2	21	5	5	40
Tosun-144	2	2	2	15	2	22
Tunca-79	11	2	20	2	2	12
Tobari	30	19	15	80	26	2
Yayla-305	2	2	2	2	1	3
T.C. 60	2	15	0	1	2	50
220/39	11	15	12	15	0	42
Heines VII (Check)	40	30	40	30	30	40

Some races in Turkey show virulence against Bt 8 (Finci et al., 1983). But, the same races are avirulent on Yayla-305 according to our results. This difference can be explained by different environmental conditions in which the two experiments were set up. These different conditions may effect the host-pathogene interaction differently (Rodenhiser and Holton, 1937; 1942; Holton and Rodenhiser, 1942; Kendrick and Mc Neal, 1963; Finci, 1975). Taking this situation into consideration, the varieties Irnat-69, Karakılçık-1133, Sakarya-75 and Yayla-305 should be tested in different environmental conditions in Turkey. If they show resistance reaction to the races used in this experiment in different ecological regions, they can be used as resistant materials in breeding program and their cultivation areas can be expanded. Also it will not be necessary to treat the seeds with fungicides against bunt.

ÖZET

TÜRKİYE'DE EKİLEN BUĞDAY ÇEŞİTLERİNİN BAZI SÜRME IRKLARINA KARŞI REAKSİYONLARI

Türkiye'de ekimi yapılan ve Diyarbakır Bölge Zirai Araştırma Enstitüsünce temin edilen 62 buğday çeşidine karşı daha önce tarafımızca tespit edilen sürme ırklarından potajenisiteleri yüksek olanlardan C-6, C-20, F-65, F-66, F-67 ve F-68 nolu ırklar 2 yıl üst üste Elazığ'da Fırat Üniversitesi Çiftliğinde denenerek buğday çeşitlerinin bu ırklara karşı reaksiyonları tespit edilmeye çalışılmıştır. Denemeye alınan bu ırkların seçiminde Türkiye'de tespit edilen ırkları temsil etmelerine ve bu ırkların tamamına birden dayanıklı görülebilecek bir buğday çeşidinin mevcut ırklara karşı bütün dayanıklılık genlerini taşıyacak anlamını vermesine özen gösterilmiştir.

Çalışmalar sonunda Irnat-69, Karakılçık-1133, Sakarya-75 ve Yayla 305 çeşitleri dayanıklı bulunmuşlardır. Diğer çeşitler ise kullanılan ırklara karşı farklı şekillerde duyarlılık göstermişlerdir.

Dayanıklı görülen 4 çeşit farklı ekolojik bölgelerde de denenmeli ve dayanıklı görüldükleri takdirde, ıslah materyali olarak kullanılmaları ve ekiliş alanlarının genişletilmesi yararlı olacaktır. Ayrıca, bu hastalık için tohum ilaçlamasına gerek olmaması da bu çeşitlerin bir diğer avantajıdır.

LITERATURE CITED

Finci, S., 1975. Türkiye'de Saptanmış bulunan bazı **Tilletia foetida** (Wallr.) Liro ırklarının, halen memleketimizde yetiştirilmekte olan yerli ve yabancı kaynaklı başlıca buğday varyetelerine karşı potojeniteleri üzerinde çalışmalar. Teknik Bülten No: 10.

————, et al., 1983. Buğday sürme etmenleri (**Tilletia foetida** Wallr. Liro ve **T. caries** (D.C.) Tul.)'nin Türkiye'de yayılmış olan ırklarının saptanması üzerinde araştırmalar. Bitki Koruma Bülteni, **23** (3) : 124-147.

Hoffman, I.A. and E.L. Kendrick, 1968. A new pathogenic race of **Tilletia foetida**. Pl. Dis. Reptr., **52** : 569-570.

———— and R.J. Metzger, 1976. Current status of virulence genes an pathogenic races of wheat bunt fungi in the Northwestern U.S.A. Phytopathology, **66** : 557-660.

Holton, C.S. and H.A. Rodenhiser, 1942. New physilogic races of **Tilletia tritici** and **T. levis**. Phytopathology, 32 : 117-129.

Kendrick, E.L. and F.H. Mc Neal, 1963. Variability in reaction of spring wheat varieties to common bunt. Pl. Dis. Reptr., **47** : 557-561.

————, R.J. Metzger and C.R. Rhode, 1964. Overwintering of race T-18 of **Tilletia caries**. Pl. Dis. Reptr., **48** (5) : 379-380.

Rodenhiser, H.A. and C.S. Holten, 1937. Physiologic races of **Tilletia tritici** and **T. levis**. J. Agric. Res., 4 : 483-496.

————, 1942. Variability in reaction wheat differential varieties to physiologic races of **Tilletia levis** and **T. tritici**. Phytopathology, **32** : 158-164.

Waud, J.L. and R.J. Metzger, 1970. Inheritance of a new factor (Bt 8) for resistance to common bunt in wheat crop. Science, **10** : 703-704.

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Study on The Resistance of Some Carnation Cultivars to **Uromyces caryophyllinus** (Schr.) Wint

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ABSTRACT

Resistance of six carnation cultivars (Minirosa, Alicetta, Ernesto, Floriana, Lena and Astor (with four different lines) against **Uromyces caryophyllinus** (Schr.) Wint. were investigated in **in-vitro** conditions. Minirosa appeared to be resistant to rust, whereas Alicetta and Ernesto were less and moderate susceptible, respectively. The other cultivars under study were sensitive to **U. caryophyllinus.**

INTRODUCTION

Carnation rust (**Uromyces caryophyllinus** (Schr.) Wint.) is a major diseases of carnation in the Ege Region. The disease was found to be wide spread in greenhouses. During the surveys in 1979-1980 carnation rust disease was observed in 81.7 % and 92.5 % of the greenhouses and average disease ratios were 60.3 % and 50.9 %, respectively (2).

MATERIALS AND METHODS

Carnation cultivars (Minirosa, Alicetta, Ernesto, Floriana, Lena and Astor) were chosen for study of their reaction to the **Uromyces caryophyllinus** under controlled conditions in a moist chamber. The moist chamber was an area under a bench enclosed with clear polyethylene. The inoculum was prepared by scraping from the pustules on the surface of the diseased carnation leaves. The uredospores were collected in water until it became turbid. The inoculum was poured into small hand sprayers.

Rooted cuttings were transplanted into Knopp solutions in glass tubes and placed in a moist chamber at room temparature. After 7 days cuttings were inoculated with the suspension of **U. caryophyllinus with** a small hand sprayers. After inoculation, cuttings were stored at 100 % relative humidity.

Observations were made every day following inoculation. Ten cuttings of each cultivars were inoculated, and the experiment was repeated twice. First experiment was made in February-March, 1983, second in March-April, 1983.

Certain days after inoculations, the number of diseased cuttings and the number of pustules on each leaf were counted and the average was calculated.

RESULTS AND DISCUSSION

In the first experiment pustules were seen on leaves 30 days after inoculation, whereas in the second experiment they were seen 18 days after inoculation. Differences between the incubation periods were correlated with temperature. These results was reinforce Pavel et al. (1) observations.

The results of these studies as shown Table 1. indicated that carnation cultivars tested for their reaction to the **U. caryophyllinus** none of the cultivars were completely free of symptoms except Minirosa. But, the number of pustules that produced on leaves was different within cultivars. For example Alicetta has a few pustules on the leaves, whereas other cultivars has a lot of pustules on the leaves.

Table 1. Reaction of carnation cultivars after inoculation with **Uromyces caryophyllinus**

Cutlivar	Number of diseased cutting		Total number of pustules		Percantage of diseased cuttings	
	I	II	I	II	I	II
Minirosa	0	0	0	0	0	0
Alicetta	2	2	2	3	20	20
Esnesto	2	6	2	58	20	60
Floriana	5	6	42	106	50	60
Lena	7	6	170	97	70	60
Astor (1)	4	6	62	101	40	60
Astor (2)	6	6	156	102	60	60
Astor (3)	8	5	129	41	80	50
Astor (4)	8	7	29	181	80	70

I : The first experiment
II : The second experiment

Minirosa was symptom-free cultivar in the both experiments. Alicetta appeared to be less susceptible and, Ernesto was moderate suscaptible and the other cultivars were susceptible to the rust disease. Minirosa and Alicetta were not grown widely in the region. The varietis that were grown mostly in the region were found to be susceptible in these experiments.

ÖZET

BAZI KARANFİL KÜLTÜR VARYETELERİNİN **Uromyces caryophyllinus** (Schr.) Wint'a DAYANIKLILIKLARI ÜZERİNDE ÇALIŞMALAR

Altı karanfil kültür varyetesinin (Minirosa, Alicetta, Ernesto, Floriana, Lena ve Astor (Dört farklı hat.) karanfilde pas hastalığına sebep olan **Uromyces caryophyllinus**'a karşı reaksiyonları **in-vitro** koşullarda araştırılmıştır. Denemeler iki kez tekrarlanmış ve her kültür varyetesinden onar çelik kullanılmıştır. Köklenmiş çelikler içinde knopp solüsyonu bulunan tüplere yerleştirilmiş ve yapraklarına el spreyi ile uredospor süspansiyonu püskürtülmüştür. Denemeler Şubat-Mart, 1983 ve Mart-Nisan 1983 tarihlerinde yürütülmüştür. Deneme sonuçlarına göre Minirosa varyetesi her iki denemede de hastalığa hiç yakalanmamıştır. Alicetta'da çok az sayıda püstül oluşmuş ve hastalık oranı her iki denemede de % 20 bulunmuştur. Esnesto'da da püstül sayısı ve hastalık oranı diğer varyetelere oranla daha az olmuştur. Diğer varyeteler ise duyarlı bulunmuştur.

LİTERATURE

Pavel, A., I. Ene, M. Costescu. Etude sur la resistance d'une sorte d'ceillets l'attaque du champignon **Uromyces caryophyllinus** et resherches concernant la lutte chimique de celui-ci., Symposium on carnations. Acta Horticulture **71**, 1977 carnations.

Sezgin, E., A. Karcılıoğlu, M. Esentepe, E. Onan. Ege Bölgesinde Ticari Amaçla Yetiştirilen Bazı Önemli Süs Bitkilerinde Saptanan Hastalıklar Üzerinde Araştırmalar. Türkiye Fitopatoloji Derneği III. Türkiye Fitopatoloji Kongresi Bildirileri : 251-263, 1982.

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