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Investigations on the Effects of Some Cultural Applications and Antagonistic Fungi on **Rhizoctonia solani** Kühn. and **Verticillium dahliae** Kleb. in the Aegean Region

II. EFFECTS OF HERBICIDES AND ANTAGONISTIC FUNGI

Emel SEZGİN* **Ayhan KARCILIOĞLU*** **Ümit YEMİŞÇİOĞLU****

ABSTRACT

The effects of various herbicides and some antagonistic fungi on damping-off and wilt disease of cotton were investigated **in vitro** and **in vivo.** Tested herbicides increased wilt disease when compared with control. They also, affected the growth and weight of colony and population of sclerotia of test fungi **in vitro.** In rhizosphere studies, it was determined that herbicides have qualitative and quantitative effects on mycoflora.

Antagonism studies indicated that. **Trichoderma** sp., **harzianum** Rifai, **T. viride,** Pers. ex Fr., **Penicillium patulum** Bain, **Aspergillus sulphureus** (Fres.) Thom and Church, **A. ochraceus** Wilhelm,**Gliocladium virens** Miller et al., **Myrothecium verrucaria** (Alb., Schw.) Ditm., **M. roridum** Tode ex. Fr. and **A. flavus** Link. ex. Fr. were effective on **V. dahliae** Kleb., and **P. patulum, Aspergillus** sp. (A 18), **A. terreus** Thom., **Pennicillium** sp. (P 1), **Chaetomium** sp. (C 12) and **A. fumigatus** Fres. were effective on **R. solani** Kühn.

INTRODUCTION

In recent years, the use of herbicides for control of weeds on agricultural as well as on nonagricultural land has gradually increased. In 1945, SMITH **et al.** (1945) noted that herbicides may either stimulate or inhibit various groups of organisms, However, investigations on interactions between soil microorganisms and organic pesticides have developed primarily within the last 25-30 years (RANNEY, 1964;

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KATAN and ESHEL, 1973). Literature reviews indicate that certain herbicide compounds in soil may cause an increase or decrease in total microbial populations, but long-term effects seldom occur (RODRIGUEZ - KABANA et al 1970). Herbicides may vary greatly in their effects on various groups of soil microorganisms; being either toxic of stimulatory (CULLIMORE, 1971). Many herbicides were found to increase the various diseases, e.g. Rhizoctonia damping-off of cotton, sugar beets and other crops (KATAN, and ESHEL, 1974). The results of herbicide treatments in field plots of cotton in Israel indicated that Trifluralin increased the incidence of disease caused by **R. solani** (NEUBAUER and AVIZOHAR - HERSHENSON, 1973). PICKARD and STANDIFER (1966) have shown that seedlings growing in soil treated with trifluralin were more susceptible to damping-off. Certain herbicides were also reported to increase the incidence of Verticillium wilt of cotton (TASHMATOVA, 1974).

It has been demonstrated by a number of workers that antagonistic relationship exist between many microorganisms, and in a few cases the phenomenon has been observed in plant pathogens. In the glass house, applications of **Trichoderma harzianum** wheat bran cultures to soil infested with **R. solani** effectively controlled damping-off of bean, tomato and egg plant seddlings (HADAR et al, 1979). WEINDLING (1932) reported that **T. lignorum** was parasitic on **Rhizoctonia** and several other fungi and suggested the possibility that this fungus might be used to control certain soil-borne pathogens. MARUPOV (1974) found that, spore preparations of **T. lignorum** suppress development of **V. dahliae** in soil.

The present study was conducted to find the effect of the applications of herbicides and some antagonistic fungi on damping-off and wilt disease of cotton and also on the rhizosphere of cotton.

MATERİAL AND METHODS

Field experiments : Field experiments were designed according to Randomised Block Design with four replications. Disease incidence was determined by assesment of the percentage of plants effected by post-emergence damping-off up to 38 days after planting and «O-3» scale was used at green boll stage for wilt disease. The herbicides used in the study were Trifluralin (a, a, a, trifluore-2,6 dinitro N, N-dipropyltolnidine), Stomp 330 E(N- 51, ethyl porpyl)-2,b Dintro-3,4- Xylidine), Sonolan (N-ethyl-N-2 (2 methyl-2 propanyl)-2, b-dinitro-4-(trifluoromenthyl benzemomine) and Amex-820 (4- (1,1-dimithylethyl)- N-(1-methylpropy)- 2-b-dinitrobenzenamine) and were applied 200, 500, 300 and 400 cc/dk. respectively. Plot size was 20 (4X5) m^2.

Laboratory experiments: The effects of the herbicides on the growth of **R. solani** and **V. dahliae** were tested on PDA, Czapeck's and sucrose nitrate solutions. Herbicides were added to the media at various dosages after autoclaving. Cultures were incubated at 22 C° and 24 C° temperatures. Each treatment were replicated ten times.

The rate of growth of the fungi measured as the average daily growth increment. On the other hand, the effect of the herbicides on dry weight of **R. solani** and **V. dahliae** was tested in Czapeck's and SN solutions. The colonies from each flask were washed, oven-dried and weighed.

Rhizosphere experiments: Soil samples were taken from all plots according to MEREDITH (1940)'s methods in May and September. The soil-plate technique and MARTIN (1950)'s media were used to determine rhizosphere fungi. The soil plates were incubated for 5 days at 24 C°, then each colony was counted. The fungi were identified as genus. The population of **V. dahliae** and **R. solani** in the soil were investigated according to NADAKAVUKAREN and HORNER (1959) and PAPAVIZAS and DEVAY (1967) methods respectively.

Antagonism experiments : The antagonistic fungi used in the study were isolated from the cotton rhizosphere. These fungi were separated into groups in accordance with their morphological and cultural characters and then, one isolate from each group was selected for preliminary tests. So that, 13 isolates from **Chaetomium,** 12 isolates from **Aspergillus,** 10 isolates from **Penicillium,** 3 isolates from **Trichoderma,** 2 isolates from **Myrothecium,** 2 isolates from **Gliocladium** and 1 isolate from **Papulospora** were tested for their antagonistic effect on **R. solani** and **V. dahliae.** According to the preliminary tests 24 isolates against **R. solani, 15** isolates against **V. dahliae** were selected for laboratory and pot experiments.

The effects of the antagonistic fungi on the growth of **R. solani** and **V. dahliae** were tested on PDA; 5 mm diam discscut with a sterile corkborer from PDA culture of **R. solani** and **V. dahliae** which were incubated for 5 and 15 days at 24 C° and 22 C° respectively, served as inoculum. Each host fungus inoculum was seeded on one side of petri dishes and each of the antagonistic fungi were placed on the opposite side of the plate. The planted dishes were incubated at 24 C°, and then diameter of the colony growth of pathogens and antagonist were measured as milimeters.

The effects of the antagonistic fungi on the dry weight of **R. solani** and **V. dahliae** were tested in Czapeck's and SN solutions. Antagonist fungi were grown for 15 days in the liquid media. Then the culture liquid was filtered aseptically and the filtrates were inoculated with **R. solani** and **V. dahliae** discs. Also, **R. solani** and **V. dahliae** were inoculated in their own culture filtrates.

Pot experiments : Interactions between pathogens and antago-

nists were also studied in the pots. The inocula of **R. solani** and **V. dahliae** were grown on PDA and sterilized oat seeds respectively. The pot soils were inoculated with 1/4 of a petri dish **R. solani** and 40 gr. of **V. dahliae** inocula. Seven days later, antagonist fungi were added to the pots at 1/2 of a petri dish and 25 cotton seeds were sown in them.

Disease incidence was determined by assesment of the pencentage of plants affected by pre and post emergence dampin-off and «O-3» scale was used at green boll stage for wilt disease.

RESULTS AND DISCUSSION

Herbicide experiments : The effects of herbicides on damping-off and wilt diseases were shown in Table 1.

Table 1. The incidence of damping-off and wilt diseases.

HERBİCİDES	Mean ratio of damping off (%)	Severitiy of wilt (%)
TREFLAN	18.40	53.33
STOMP	16.76	57.66
SONOLON	15.20	49.66
AMEX	13.35	50.99
CONTROL	14.90	43.66

Results of herbicide treatments in the fielde plots indicated that herbicides increased the incidence of damping-off disease in proportion to the control plots except Amex. Herbicides in their orginal forms or as degradation products may interact in different ways with any one of the organisms involved in the disease, at one or more points in the chain of events leading to disease development. The final results may be an increase, a decrease, or no change in disease severity or its incidecne (KATAN, ESHEL, 1973). In our experiments, the highest disease incidence was found in the plots belonging to trifluralin treatments. CHANDLER and SANTELMANN (1968) found that, trifluralin or prometryne in combination with **R. solani** reduced the weight of cotton plants in growth chambers. Under field conditions, however, only trifluralin treatments significantly reduced the percent of surviving seedlings and inhibited cotton plant growth in **Rhizoctonia** infested soil. An increase on incidence of **R. solani** on cotton in soil treated with trifluralin has been reported (NEUBAUER, AVIZOHAR-HERHENSON, 1973) and explained by a decrease of host resistance.

The population of **R. solani** in the soil changed in proportion to

the herbicides (Fig. 1). The most significant finding resulting from the present studies is that contary to the control, the autumn population of **R. solani** increased in the plots where herbicides were applied. This phenomenon is just the opposite of rotation and fertilizer experiments. It has been suggested that herbicides increased the saprophytic aktivity of **R. solani.** NEUBAUER and AVIZOHAR - HERSHENSON (1973) used such a baiting method and found an increase in the saprophytic activity of **R. solani** in trifluralin treated soil. Since this herbicide is inhibitory to the pathogen, its stimulating effect on saprophytism was attributed to a shift in the biological equilibrium. KATAN and ESHEL (1972) found that, diphenomid enhanced saprophytic activity of **R.. solani** and also delayed its later decline which normally occurs during the course of substrate colonization. In vitro tests the herbicides did not affect the growth of **R. solani** significantly although they caused an important morphogenic change on hyphal growth of **R. solani.** For example, trifluralin stimulated the production of sclerotia of **R. solani** in culture media. SEZGİN (1978) found that, the sclerotial production of **R. solani** in media was stimulated when the concentration of trifluralin and EPTC increased. TANG (1970) reported that, trifluralin icreased production and germination of chlamydospores of **Fusarium oxysporum** f. sp. **vasinfectum** in soil. Trifluralin and Sonolan increased the dry weight of **R. solani** although Stomp and Amex decreased it in proportion to control. Herbicides did not afftect the growth of **R. solani** significantly according to the control except Amex.

Herbicides increased the severity of wilt disease according to the control in the field experiments (Table 1). Also, herbicides increased the spring population of **V. dahliae** in soil (Fig. 1) Some studies reported that herbicides may increase the wilt disease. TASHMATOVA et al (1974) reported that soil treatment with cotoran (at sowing 1,5 Kg / ha) and prometry (7 - 10 days before sowing 1,5 Kg/ha) decreased wilt resistance of cotton var. 108-8 for 2 years. Also, NILSSON (1977) found that trifluralin increased the disease severity and eliminated varietal resistance to the wilt in the experiments which he carried out with the oil seed rape susceptible and resistant to the Verticillium wilt. Herbicides affected the growth and dry weight of **V. dahliae** in culture media. For example, Treflan increased the growth and dry weight of **V. dahliae** 13,44 and 20,05 % respectively. However, Amex retarded the growth and dry weight of **V. dahliae** 12,14 and 12,85 % respectively. The increase on incidence of various plant diseases caused by the application of herbicides has been shown in many green house and field studies. This might be due to the effect of the herbicide on the pathogen, the host, or the surrounding microorganisms (KATAN and ESHEL, 1973).

Rhizosphere experiments: In the present study it was found that her-

bicides had an effect on cotton rhizosphere flora qualitatively and quantitatively. These results confirmed to the results obtained by KAUFMAN (1970) and SOBIESZCZANSKI et al 1975). There were 28 genera identified from herbicide treatments and control plots. These fungi were indicated in Table I. Among these fungi **Melanospora fallax** Zuka is a new species for Turkish mycoflora.

Table I. Fungi isolated from herbicide treatment and control plots (Number of colonies per gram of soil)

FUNGUS GENERA	SPRİNG					AUTUMN				
	CONTROL	TREFLAN	STOMP	SONOLAN	AMEX	CONTROL	TREFLAN	STOMP	SONOLAN	AMEX
PYCOMYCETES										
Mucor	14	5	13	3	5	19	29	6		
Rhizopus	3	14	1	9	8	12	8	15	2	
Pythium		4								
Actinomucor		1		1						
ASCOMYCETES										
Melanospora			1			2				3
Chaetomium			5	2			5		28	73
Preussia						1				
Pyrenoma									1	1
DEUTEROMYCETES										
Aspergillus	427	414	7	526	449	10	31	6	23	30
Penicillium	114	195	649	255	214	62	797	38	6	4
Fusarium	76	73	130	51	67	154	127	183	93	70
Trichoderma	5	9	16	5	3	0	12	22	27	15
Alternaria			1	1		50	21	1	24	16
Helminthosporium						26				
Dreschslera						26				
Cladosporium			1			6	9	1	2	2
Ulacladium		2	1	1		5	1		1	
Myrothecium						5	1	1		1
Botryotrichum			1			4			1	10
Cephalospirium						3			3	1
Stemphylum				1		2			9	
Cylindrocarpon				1		1	2		1	

Table I Continuing

Papulospora										1		
Scopulariopsis	1		2	2								
Gliocladium		2				3		1	7		5	
Gliomastix			3			2						
Verticillium									1			
Steril					7	3		2			4	

Soil character : Clay

In herbicide treated plots the total number of fungi was greater than control plots in sprig. However, in Trifluralin treated plots the total number of fungi was higher than control and other herbicide in autumn. TANG et al. (1970), reported that trifluralin increased population of fungi, bacteria and actinomycetes in soil. The prevalence of the fungi affected by herbicides was summarized in Fig 2.

Aspergilli, Penicillia and Fusaria were the most occuring groups in herbicide experiments as in the rotation and fertilizer experiments. The group of Aspergilli was isolated in the highest number in spring. Stomp Significantly decreased the species of **Aspergillus** in spring and in autumn whereas, it stimulated the species of **Penicillium** in spring in proportion to the other herbicides and control plots (Fig. 2). Triflüralin stimulated the species of **Penicillium** in autumn. Growth of **Trichoderma + Gliocladium + Myrothecium + Chaetomium** species was also stimulated by herbicides in autumn rhizosphere according to the control plots. Literature reviews indicate that certain herbicide compounds in soil may cause an increase or decrease in total microbial population. For example, Siduron did not affect counts of filamentous fungi or actinomycetes, although it reduced count of bacterial groups (FIELDS and HEMPHILL, 1968). Atrazine and simazine did not change the total number of fungi in soil but greatly decreased the number of certain species of **Aspergillus** and **Penicillium** (FINK et al, 1968) Paraquat increased the total number of fungi and percentage of Penicillia but decreased Mucors in one soil and not in another (TU and BOLLEN, 1968).

Antagonism expertiments : In the laboratory experiments **M. roridum, M. verrucaria, Penicillium** spp. (P_1, P_3, P_9, P_{10}), **P. patulum, A. fumigatus, A. nidulans, A. ochraceus A. flavus, A. sulphureus A. niger, A. terreus, Chaetomin** spp. (C_5, C_6, C_{12}) and **G. roseum** showed inhibition zones with **R. solani** on PDA; **T. viride, T. harzianum, Trichoderma** sp. and **G. virens** showed no inhibition zones but rapidly overgrew **R. solani.** These observations were in accordance with many studies (VASUDEVA and SIKKA, 1942; BOOSALIS, 1954; DEVAY, 1956; FEDORINCHIK, 1956; DESPHAN-

DE, 1961; GAZIKHODZHAEVA et al, 1968; VLASOVA, 1969; NAIKI, 1972).

Among the test organisms used, **M. verrucaria, M. roridum, P. patulum, A. fumigatus, A. ochraceus, A. flavus, A. manginii, A. terreus** and **A. sulphureus** showed inhibation zone; **Trichoderma** sp., **T. viride, T. harzianum** and **G. virens** overgrew **V. dahliae**. These results conformed to the results obtained by TILLAEV (1964), CATANI and PETERSON, 1967, MOSTAFA (1967) and MARUPOV (1974).

When the antagonistic fungi were cultured in liquid media the filtrates were more effective on the **R. solani** and **V. dahliae.** These filtrates completely inhibited the growth of pathogens. However the normal growth of **R. solani** and **V. dahliae** occured in their own culture filtrates (Fig 3). This may be the result of the fact that the phytotoxic substances produced by the antagonists are readily soluble in liquid media.

Although the test fungi showed antagonistic effect in laboratory tests but most of them lost their ability in the soil. Competition between other soil microorganisms and rapid dilution of the toxins in the soil could recude the antagonistic potential of these fungi (CATANİ and PETERSON, 1967). Also, inactivation of antibiotics produced in soil due to a number of processes, including adsorption clay colloids and humus particles, actual microbiological degradation, and instability due to pH. The most important of these may be adsorption (BAKER, 1963).

In the pot experiments, antagonist fungi were more effective on the pre-emergence damping-off than post-emergence damping-off disease caused by **R. solani** in proportion to the control. **P. patulum** was the most effective antagonist on the disease and it was followed by **Aspergillus** sp. (A_{18}), **A. terreus, Penicillium** sp. (P_1), **Chaetomium** sp. (C_{12}),**Penicillium** sp. (P_{10}) and **T. viride** (TableII).

Table II. Effects of antagonistic fungi on the damping-off and wilt disease of cotton

Antagonist fungi	Damping-off (%)	Antagonist fungi	wilt disease (%)
Penicillium patulum	33.30	**T. harzianum**	31.10
Aspergillus sp. (A18)	41.63	**P. patulum**	33.33
A. terreus	49.96	**Trichoderma** sp.	33.33
Penicullium sp. (P1)	55.53	**T. viride**	35.55
Chaetomium sp. (C12)	58.30	**M. verrucaria**	35.55
Trichoderma viride	63.86	**G. virens**	35.55
Penicillium sp. (P10)	66.63	**A. ochraceus**	35.55
T. harzianum	72.20	**A. sulphureus**	35.55
Myrothecium roridum	74.96	**Penicillium** sp. (P7)	35.55
A. niger	74.96	**M. roridum**	37.77
Chaetomium sp. (C6)	74.96	**G. roseum**	39.99
A. ochraceus	74.96	**A. fumigatus**	39.99
A. fumigatus	79.13	**A. manginii**	39.99
A. nidulans	83.30	**V. dahliae** (control)	42.21
Gliocladium virens	86.06	**A. terreus**	42.22
Chaetomium sp. (C5)	86.06	**Penicillium** sp. (P5)	42.22
R. solani (control)	88.86		
Penicillium sp. (P3)	88.86		
A. sulphureus	91.63		
Penicillium sp. (P6)	91.66		
Trichoderma sp.	94.40		
Penicillium sp. (P9)	97.20		
A. flavus	97.20		
G. roseum	97.20		
M. verrucaria	100.00		

Cotton plants inoculated with **V. dahliae** alone and with **V. dahliae**+ antagonist mixtures in the pots show little difference on the wilt severity. However. **T. harzianum, P. patulum, Trichoderma** sp., **T. viride, M. verrucaria, G. virens, A. sulphureus, A. ochraceus** and **Penicillium** sp. (P7) were found antagonistic to the **V. dahliae** according to the statistical analysis.

Both the present studies and the others have shown that certain fungi such as **P. patulum** and **T. viride** can biologically control or reduce the development of damping-off and wilt diseases caused by **R. solani** and **V. dahliae** respectively. **P. patulum** was found antagonistis to certain phytopathogenic fungi and

bacteria. It was evident from **in vitro** studies that isolates of **P. patulum** strongly inhibited the growth of **R. solani** on PDA. Also, adding culture filtrates of **P. patulum** to infested soil decreased the attack of **R. solani** on cotton, because the percentages of healty seedling significantly increased. The antagonistic effect of **P. patulum** is due to it's antibiotic derived of patulin (clavatin, clavacin) (EL-GOORANI, 1976).

WEINDLING (1932) recorded antagonism between **T. viride** and certain phytopathogenic soil fungi, such as **R. solani, Phytophthora parasitica, Pythium**, spp., **Rhizopus spp.** and **Sclerotium rolfsii** and noted that the antagonism is apparently due to a diffusible toxic substance produced by the **Trichoderma**. WEINDLING and EMERSON (1936) isolated a crystalline substance from culture filtrates of one of their moulds; this material was subsequently named gliotoxin. For years, many workers have confirmed the antagonism between **Trichoderma** and other fungi, both **in vitro** and in soil (BRIAN, 1944; WOOD and TVEIT, 1955; CATANI and PETERSON, 1967).

The present studies indicate that control of some plant diseases such as damping-off and wilt by antagonistic fungi will require the development of a suitable methods of keeping the concentration of the various antagonists at a high enough level in the soil to continually inhibit or reduce the infection potential of pathogens.

Ö Z E T

EGE BÖLGESİ PAMUK TARLALARINDA UYGULANAN BAZI KÜLTÜREL İŞLEMLER İLE ANTAGONİSTİK FUNGUSLARIN PAMUKLARDA HASTALIK ETMENLERİNDEN **Rhizoctonia solani** Kühn. VE **Verticillium dahliae** Kleb'A OLAN ETKİLERİNİN ARAŞTIRILMASI

II. HERBİSİDLERİN VE ANTAGONİSTİK FUNGUSLARIN ETKİLERİ

Çalışmada bölgemizde pamuk tarımında yaygın olarak kullanılan bazı herbisidler ile bazı antagonistik fungusların pamuklarda çökerten ve solgunluk hastalıkları ile pamuk rizosferine olan etkileri in vitro ve in vitro koşullarda araştırılmıştır.

Teste alınan herbisidlerin çökerten ve solgunluk hastalıklarına olan etkileri tarla koşullarında incelenmiş, Treflan'ın çökerten hastalığını arttırıcı etki gösterdiği teste alınan tüm herbisidlerin de solgunluk şiddetini arttırdığı görülmüştür.

Antagonistik funguslar ile yürütülen çalışmada, **Trichoderma harzianum, Trichoderma** sp., **Penicillium patulum, Aspergillus sulphureus, A. ochraceus, Gliocladium virens, T. viride, Myrothecium verrucaria, M. roridum** ve **A. flavus, V. dahliae** nin oluşturduğu solgunluk hasta-

lığını, **P. patulum, Aspergillus** sp. (A18), **A. terreus, Penicillium** sp. (P_1), **Chaetomium** sp. (C_{12}) ve **A. fumigatus** ise **R. solani**'nin oluşturduğu çökerten hastalığını kontrola oranla azaltmışlardır.

LITERATURE CITED

1) BAKER, R., 1968. Mechanism of biological control of soilborne pathogens. Annual Review Phytopath. **6**: 263-294.

2) BOOSALIS, M.G., 1954. **Penicillium** sp. parasitic on **Rhizoctonia solani.** Phytopath **44**: 482.

3) BRIAN, P.W., 1944. Pruduction of gliotoxin by **Trichoderma viride.** Nature, Lond., **154**: 667.

4) CATANI, C.S., ad L.Y. PETERSON, 1967. Antagonistic Relationship between **V. dahliae** and fungi isolated from the rhizosphare of **Acer platanoides,** Phytopath. **57**: 363-366.

5) CHANDLER, J.M., P.W. SANTELMANN, 1968. Interaction of four herbicides with **R. solani** on seedling cotton. Weed Science **16**: 453-456.

6) CULLIMORE, D.R. 1971. Interaction between herbicides and soil microorganisms. Weed Abst. **21**: 175, 1972.

7) DESPHANDE, K., 1961. Antagonizm between **Rhicoztonia solani** Kühn. and certain soil saprophytes a lobaratory studies. (Rew. of Plant. Path. **3**: 192-199, 1962).

8) DEVAY, J.E., 1956. Mutual relationship in fungi. Ann. Rew. of Microbiology. **10**: 115-140.

9) EL-GOORANI, M.A.; S.A. FARAG, and M.R.A. SHEHATA, 1967. The effect of **Bacillus subtilis** and **Penicillium patulum** on in vitro growth and pathogenicity of **Rhizoctonia solani** and **Phytophthora cryptogea.** Phytopath. Z. **85**: 345-352.

10) FEDORINCHIK, N.S. 1956. The role of antagonists in controlling infectious sources of causal agents of soil-borne diseases. (Rew. of Plant. Path. **36**: 485, 1957).

11) FIELDS, M.L., D.D. HEMPHILL, 1968. Influence of siduron and its degradation products on soil microflora. Weed Sci. **16**: 417.

12) FINK, R.J., O.H. FLETCHALL, and O.H. CALVERT, 1968. Relation of triazine residues to fungal and bacterial colonies. Weed Sci. **16**: 104.

13) GAZIKHODZHAEVA, M.A.; Z.E. BEKKER, 1968. «Adaptation of antagonistic fungi in the rhizosphere of cotton and their influence on yield and Verticillium wilt.» (Rew. of Plant Path. **47**: 625, 1968).

14) HADAR, L., I. CHET., Y. HENIS, 1979. Biological control of **R. solani** damping-off with wheat bran culture of **Trichoderma harzianum** (Rew. of Plant. Path. **59**: 69, 1980).

15) KATAN, J., and Y. ESHEL, 1972. Increase in damping-off of pepper caused sy diphenamid. Weed Soc. Sci. Amer. Abstr. p. 100.

16) KATAN,J., and Y. ESHEL, 1973. Interactions between herbicides and plant pathogens. Residue Rev. **45**: 145-177.

17) ————, ————, 1974. Effect o fthe herbicide diphenamid on

damping-off disease of pepper and tomato. Phytopath. **64**: 1186-1192.

18) KAUFMAN, D.D., 1970. Influence of diuron, linuron, atrazine and simazine on soil fungus populations in fallow and soybean or corn cropped soils. Weed Abstt. **21**: 258.

19) MARTIN, J.P., 1950. Use of acid, rose bengal and streptomycin in the plate method for estimating soil fungi. Soil Sci. **69**: 215-232.

20) MARUPOV, A., 1974. «On the question of methods of using **Trichoderma** against **Verticillium** wilt of cotton». (Rev. of. Plant. Path. **54**: 530, 1975).

21) MEREDITH, C.H., 1940. A quick method of isoleting certain Phycomyecetous fungi from soil. Phytopath. **30**: 1055-1056.

22) MOSTAFA, A.K.M., 1967. Studies on the control of vascular wilt diseases of cotton by fungi assosiated with the cotton plant. (Rev. of Plant. Path. **47**: 289, 1968).

23) NADAKAVUKAREN, M.J. ad C.E. HORNER, 1959. An alcohol agar medium selective for determining **Verticillium** microsclerotia in soil. Phytopath. **49**: 527-528.

24) NAIKI, T. U.T., 1972. «The microorganisms associated with the sclerotia of **R. solani** in soil and their effects on the viability of the pathogens. (Rev. of. Plant. Path. **52**: 8, 1973).

25) NEUBAUER, R. and Z. AVIZOHAR-HERSHENSON, 1973. Effect of the herbicide, Trifluralin on Rhizoctonia disease in cotton. Phytopath. **63**: 651-652.

26) NILSSON, H.E., 1977. Influence of herbicides on infection by **V. dahliae** on soil seed rape. **Brassica napus** var. **oleifera**. Phytopath. Z. **90**: 361-363.

27) PAPAVIZAS, G.C. and C.B. DAVEY, 1967. Soil moisture and isolation of **Rhizoctonia**. Sourcebook of Laboratory Exercises in Plant Pathology American Phytopathological. Society. W.H. Freeman and Company p. 234-235.

28) PICKARD, J.A. and L.C. STANDIFER, 1966. An apparent interaction between cotton herbicidal injury and seedling blight. Proc. cotton Consil. **26**: 108-109.

29) RANNEY, C.D. 1964. A. deleteroius interaction between a fungicide and systemic incesticides on cotton. Plant. Dis. Reptr. **48**: 241-245.

30) RODRIGUEZ, KABANA, R. E. A. CURL, and J.L. PEEPLES, 1970. Growth response of **S. rolfsii** to herbicide EPTC in liquid culture and soil. Phytopath. **60**: 431-436.

31) SEZGİN, E., 1978. Investigations of effects of some herbicides on the growth and virulence of **R. solani** and **T. viride**. J. Turkish Phytopath. 7: 105-112.

32) SOBIESZCZANSKI, J.J. ROLA, M. ZUREK, 1975. «Effect of many years application of high herbicides doses on the soil biology. (Weed Abstr. **25**: 202, 1976).

33) SMITH, N.R., V.T. DAWSON, and M.E. WENZEL, 1945. The effect of certain herbicides on soil microorganisms. Proc. Soil. Sci. Soc. Amer. **10**: 197-201.

34) TANG, A., E.A. CURL, ad A.R. ROD-

RIGUEZ-KABANA, 1970. Effect of trifluralin on inoculum density and spore germination of **F. oxysporum** f.sp. **vasinfectum** in soil. Phytopath. **60**: 1082-1086.

35) TU. C.M. and W.B. BOLLEN, 1968. Effect of paraquat on microbial activities in soil. Weed Research **8**: 28.

36) TASHMATOVA, F., A.A. PUSHKAREVA, C.H. ALIBEKOVA, 1974. «Physiologobiochemical indicators of cotton wilt disease on the ground of introduced herbicides» (Rev. of. Path. **54**: 530, 1975).

37) TILLAEV, K.H. 1964. «The fungus **Trichoderma** in the control of wilt.» (Rev. of. Plant. Path. **43**: 18, 1964).

38) VASUDEVA, R.S., M.R. SIKKA, 1941. Effect of certain fungi on the growth of root-rot fungi. (Rev. of. Plant. Path. **21**: 76-77, 1942).

39) VLASOVA, E.A., 1969. **Corticium solani** on strawberry. (Rev. of. Plant. Path. **48**: 661, 1969).

40) WEINDLING, R. 1932. **Trichoderma lignorum** as a parasite of other soil fungi. Phytopathology. **22**: 837-845.

41) ———————— and O.H. EMERSON, 1936. The isolation of a toxic substance from the culture filtrate of **Trichoderma.** Phytopath. **26**: 1068-1070.

42) WOOD, R.K.S. and M. TVEIT, 1955. Control of plant diseases by uze of antagonistic organisms. Bot. Rev. **21**: 441-492.

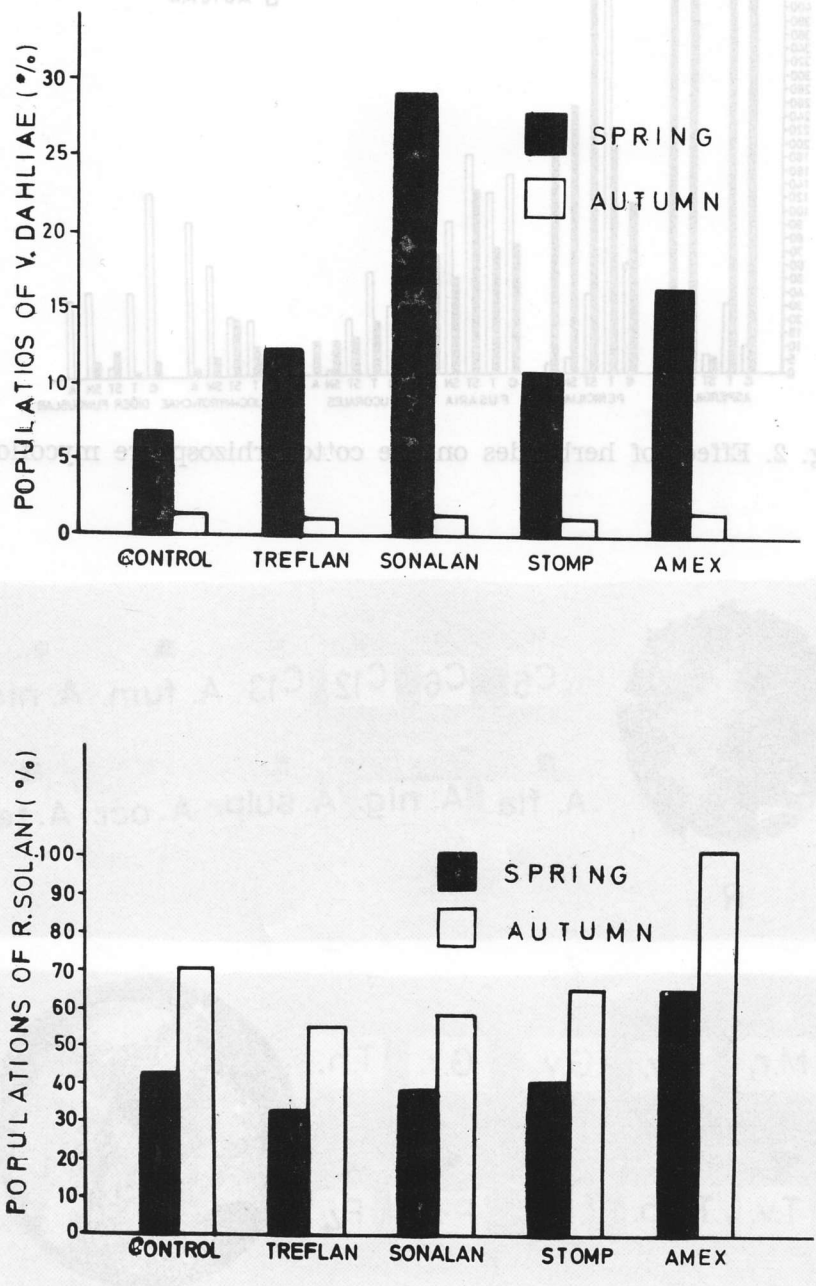

Fig. 1. The population of **V. dahliae** and **R. solani** in cotton rhizosphere in the herbicide-experiments.

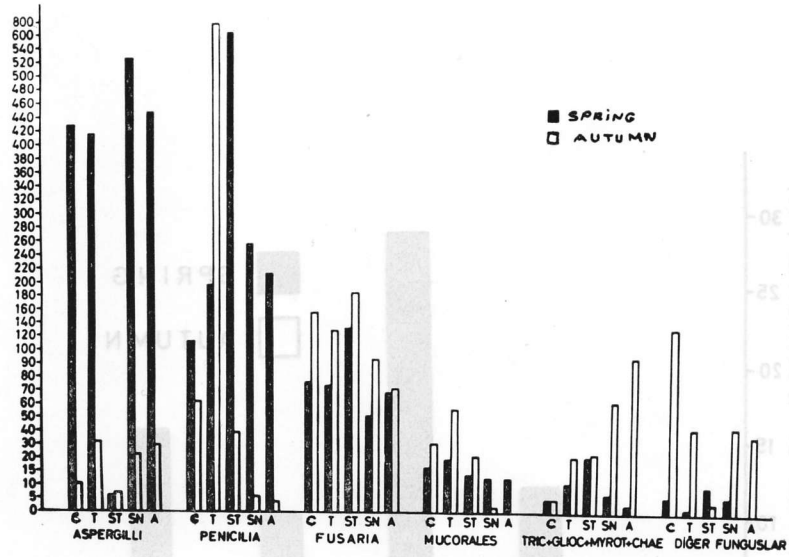

Fig. 2. Effect of herbicides on the cotton rhizosphere mycoflora.

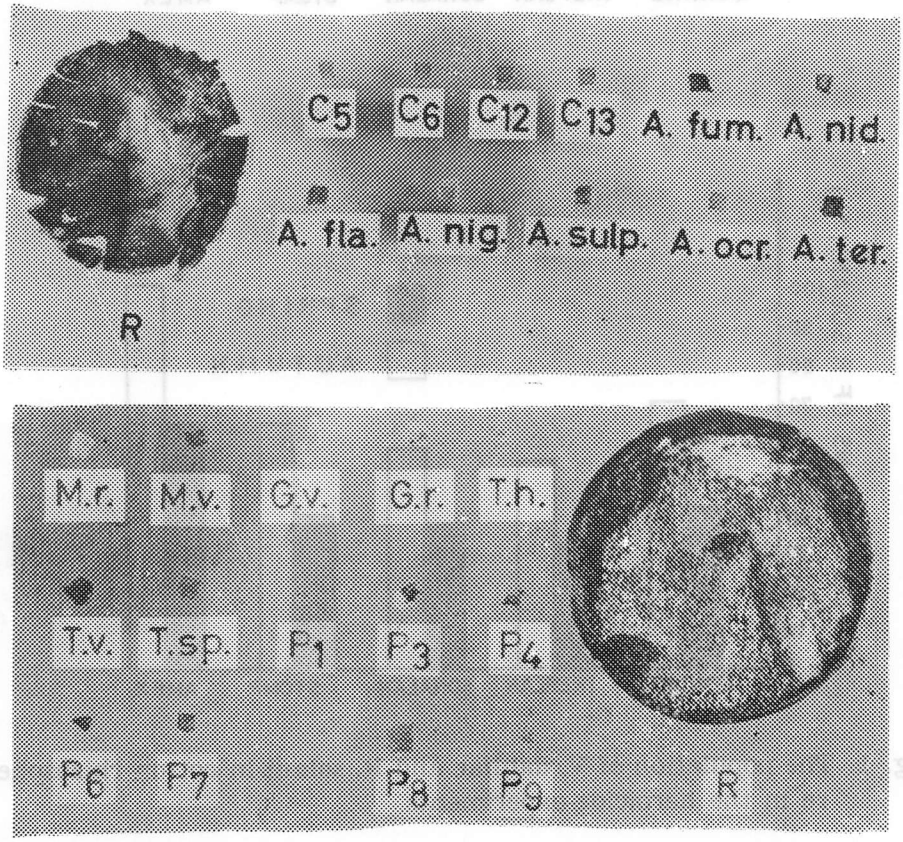

Fig. 3. The growth of **R. solani** in the antagonistic fungi filtrates.

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Investigations on the Inhibition of Potato Virus X (PVX) Infectivity bü Some Plant Extracts. II. The Inhibition of PVX Infection on Potato Plants by **Capsicum annuum** L. Plant Extract

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ABSTRACT

In the present study the inhibitory effects of various types of applications of **C. annuum** leaf extract against PVX infection were investigated on potato plants. According to the results obtained, it was found that **C. annuum** extract or soluble proteins isolated from this extract inhibited PVX infection at high level when applied to potato plants before virus inoculation. In this work, moreover, it was determined that the transmission of PVX to tubers can be prevented to some extent by these applications.

INTRODUCTION

Up to now, many studies have been made as to the inhibition of virus infections by plant exracts. In these studies carried out on test plants, the extract from **C. annuum** plant has been reported to inhibit greatly the infections of some viruses such as Tobacco Mosaic Virus (TMV), Alfalfa Mosaic Virus (AMV), Cucumber Mosaic Virus (CMV), Potato Virus Y and PVX (3, 4, 7, 8, 11, 13, 15). In a previous paper, Erkan and Yorganci (6) have shown through the tested plant extracts, that **C. annuum** extract inhibited the infection by PVX at higher level in comparison to the others. In the same study, it was also found that certain factors affected less, the inhibitory activity in **C. annuum** plant extract than that in other extracts (6).

In the present investigation, **C. annuum** plant extract, which was appeared to be more inhibitory compared with others in the experiment conducted on test plants, was tested for its ability to inhibit PVX infection on potato plants in greenhouse this time.

MATERIALS and METHODS

For this study, the leaf samples were obtained from the healthy individuals of **C. annuum** plant at the actively growing stage. These

samples were stored in deep-freezer at —30°C until used.

The strain PVX-3 was used as inoculum throughout this study and was maintained in **Nicotiana tabacum** L. «xanthi-nc» plants.

The leaf extract of **C. annuum** plant and inoculum were prepared as previously described by Erkan and Yorgancı (6). The isolation of soluble proteins from **C. annuum** extract were made according to the methods used by Lowry et al. (10) and Potty (12). In the consequence of isolation studies, the obtained precipitate containing soluble proteins was diluted with the distilled water (1:3, w/v) and used in studies.

Chenopodium amaranticolor Coste and Reyn. and **Gomphrena globosa** L. test plants were used in local lesion assays for PVX and in determining the existence of PVX in sprouts of tubers obtained from potato plants, respectively. In the present study, the tubers of potato cultivar named «Resy» were used. With an eye to growing the potato plants, the virus-free tubers, which had been previously tested for viruses at the Regional Agricultural Research Institute (Menemen-Izmir), were planted in 30 cm clay pots at the rate of one tuber per pot. When the plants resulted from these tubers reached at. 15-25 cm height (about 20-25 days after the planting date,) inoculum containing PVX was inoculated on their leaves by a small brush. Before inoculations celite was added to inoculum as abrasive. The inoculated leaves of potato plants were rinsed with water and then, all potato plants were stored in a green-house with an average temperature of 22,8°C, (max. 35,0°C, min. 14,0°C) and a mean of relative humidity of 68,4% (max. 89,0%, min 33,5%).

The types of applications taken in hand in the experiments performed to investigate the inhibitory effect of **C. annuum** extract to the infection by PVX on potato plants as follows:

1. Spraying the extract to potato plants before PVX inoculation
2. Spraying the extract to potato plants after PVX inoculation
3. Spraying the extract to potato plants after PVX inoculation until the harvest in weekly intervals
4. Spraying soluble proteins isolated from the extract to potato plants before PVX inoculation
5. Spraying soluble proteins isolated from the extract to potato plants after PVX inoculation
6. Spraying soluble proteins isolated from the extract to potato plants after PVX inoculation until the harvest in weekly intervals.
7. Dipping tubers into the extract for 24 hours before planting.

To study whether the inhibitory effects of various types of applications of **C. annuum** extract on PVX infection fluctuated depending on the growing stages, the leaf samples were separately taken from potato plants in each type of applica-

tions at three different stages mentioned below:

a) at the beginning of vegetation
b) in the middle of vegetation
c) near the harvest - time

The extraction of the leaf samples were made as mentioned earlier by Erkan and Yorgancı (6). The inhibitory effects of various types of applications of **C. annuum** extract were studied in confirmity with half-leaf method (3, 4, 6, 8). For this purpose, the **leaf** extracts were inoculated on 10 half leaves of **C. amaranticolor** test plants. The corresponding half leaves were inoculated with the **leaf extract** obtained from control plants. Then, the test plants the leaves of which rinsed with water, were placed into a room with a temperature of $22+2°C$, a light intensity of 4000-5000 Lux and an illumination of 16 h a day. Considering the number of local lesions produced on each half leaf, the inhibition (%) for each of samples was estimated (14). Then, results were analysed according to Analysis of Variance and L.S.D. test were applied.

For the purpose of examining the effectiveness of various types of applications of **C. annuum** extract on the transmission of PVX to tubers, the potato plants were harvested one by one at the end of the vegetation. As suggested by Keller and Berces (9), rindite was used in order to break dormancy and to obtain the sprouts on tubers. As the result of rindidite treatment, the sprouts were obtained on tubers. Then, sprouts were individually homogenized with 0,02 M phosphate buffer pH=7,2 (1:3, w/v) in a homogenizer. The resulting homogenates were clarified by centrifugation. The presence of PVX in the sprout saps were checked by two different methods as precipitine test on slides (2) and the inoculation of **G. globosa** test plants. Considering the precipitates on slides and symptoms on test plants, the results obtained were evaluated as percentage.

The studies on **C. amaranticolor** and potato plants were carried out in compliance with the randomizing plot design with ten and five replications, respectively.

RESULTS

The results of experiments conducted on potato plants in order to study the inhibitory effect of **C. annuum** extract on PVX infection were given in Table I. It follows from the data in Table I that **C. annuum** extract or soluble proteins isolated from this extract inhibited PVX infection at high level when they were sprayed to potato plants before virus inoculation. As seen in Table I, the effectiveness obtained in these applications went ahead without having considerable loss until the harvest. At the beginning of vegetation period the application of the extract or soluble proteins from the same extract inhibited the

infection of PVX by 85,01% and 83,14% respectively, whereas the inhibition percentages noted for these two applications at the stage near the harvest-time were 72,40 and 69,32 respectively.

Table I. The inhibitory effects of various types of applications of **C. annuum** plant extract against PVX infection on potato plants.

Type of application	Inhibition %[1]		
	At the beginning of vegetation	In the middle of vegetation	Near the harvest-time
1. Spraying the extract to potato plants before PVX inoculation	85,01 a[2]	85,53 a	72,40 cd
2. Spraying the extract to potato plants after PVX inoculation	80,96 ab	65,08 d	46,39 e
3. Spraying the extract to potato plants after PVX inoculation until the harvest in weekly intervals	23,31 fg	29,46 f	21,80 fgh
4. Spraying soluble proteins isolated from the extract to potato plants before PVX inoculation	83,14 ab	75,01 bc	69,32 cd
5. Spraying soluble proteins isolated from the extract to potato plants after PVX inoculation	24,53 f	14,95 hij	8,46 jk
6. Spraying soluble proteins isolated from the extract to potato plants after PVX inoculation until the harvest in weekly intervals	16,03 ghi	6,96 k	0,05 l
7. Dipping tubers into the extract for 24 hours before planting	23,28 fg	10,17 ijk	-8,42 m

[1] Figures are the average of inhibition (%) obtained from 10 replication.

[2] Means followed by the same letter are not significantly different at the 5 % level of probability as determined by L.S.D. test.

The figures represented in Table I show that when **C. annuum** extract or soluble proteins from this extract were sprayed to potato plants after virus inoculation and the tubers were dipped into the extract in question, for 24 hours before planting, the inhibition of PVX on potato plants considerably reduced and furthermore, greatly was lost at the stage near the harvest-time of potatoes.

The fact that some types of applications of **C. annuum** extract showed high inhibition against the infection by PVX at the stage near the harvest-time impressed that, at least, some of tubers to be produced can be virus-free. Considering this impression, a further experiment was made in order to study the effectiveness of various types of applications of **C. annuum** extract on the transmission of PVX to tubers. The results of this experiment are summarized in Table II.

As seen in Table II, it was found that 36,36% of the tubers produced were non-infected with PVX when **C. annuum** leaf extract was sprayed to potato plants before virus inoculation. Moreover, the data in Table II indicate that soluble proteins isolated from the extract in question prevented the transmission of PVX to tubers at the ratios of 27,27 and 31,82 precent, respectively, according to two methods used when sprayed to potato plants before virus inoculation.

Table II. Effectiveness of various types of applications of **C. annuum** plant extract on the transmission of PVX tubers.

Type of application	No.of tubers harvested	Precipitine Test		Inoculation of G.globosa	
		No.of tubers non-infected with PVX	%	No.of tubers non-infected with PVX	%
1. Spraying the extract to potato plants before PVX inoculation	22	8	36,36	8	36,36
2. Spraying the extract to potato plants after PVX inoculation	24	4	16,67	5	20,83
3. Spraying the extract to potato plants after PVX inoculation until the harvest at a week intervals	27	4	14,82	5	18,52
4. Spraying soluble proteins isolated from the extract to potato plants before PVX inoculation	22	6	27,27	7	31,82

Table 1 Continuing

5. Spraying soluble proteins isolated from the extract to potato plants after PVX inoculation	21	3	14,29	3	14,29
6. Spraying soluble proteins isolated from the extract to potato plants after PVX inoculation until the harvest at a week intervals	27	3	11,11	2	7,41
7. Dipping tubers into the extract for 24 hours before planting	25	0	0	2	8,00

DISCUSSION

In this study, the extract from **C. annuum** plant was found to be promising to inhibit the infection by PVX on potato plants. In the studies on test plants, it was determined that the same extract inhibited the infection of PVX (3, 6, 8, 13, 15). On the other hand, Erkan and Yorgancı (6) previously reported that the inhibitive activity in this extract were not greatly influenced due to certain factors. Furthermore, since there is an agreement between the vegetation periods of **C. annuum** and potato plants (5), it is very simple to obtain and to apply extract. From these results, it is considered that this extract can be used to prevent the infection of PVX on potato plants. As it can be seen in Table I, the spraying **C. annuum** extract or soluble proteins from the same extract to potato plants before inoculation brought about the inhibition of PVX infection at high level until harvesting of potatoes.

In our view, providing an application will be performed at the beginning of vegetation period, **C. annuum** extract can be protected the potato plants from this disease. Bawden (1) indicated that the application of the inhibitory extracts as sprays to tobacco and tomato seedlings before transplanting greatly decreased the spread of TMV. It was determined by Yorgancı und Erkan (16) that the spraying **C. annuum** extract to tomato seedlings inhibited TMV infection by 84,31 percent. According to the results we obtained, it is likely that the application of **C. annuum** plant extract to plants should inhibit the spread of some viruses which are usually transmitted by contact such as PVX during the cultural practices.

The figures represented in Table

II show that the transmission of PVX to tubers may be prevented to a degree by some types of applications of the aforementioned plant extract. As it is known to all, there is no effective control measure to PVX infection. Therefore, the fact that **C. annuum** extract is used is especially seed-potato production, in our opinion, will be very useful.

Although the promising results are being obtained with **C. annuum** extract to prevent the infection by PVX in the present study, further work to be carried out as to the inhibition of virus infections by plant extracts is required to clarify the possibility.

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Ö Z E T

BAZI BİTKİ EKSTRAKTLARI İLE PATATES X VİRUSU (PVX)'NUN İNFEKSİYON OLUŞTURMA YETENEĞİNİN ENGELLENMESİ ÜZERİNDE ARAŞTIRMALAR

II.**Capsicum annuum** L. Bitki Ekstraktı ile Patates Bitkilerinde PVX İnfeksiyonunun Engellenmesi.

Bu çalışmada **C. annuum** yaprak ekstraktının değişik uygulama biçimlerinin, PVX infeksiyonuna olan engelleyicilikleri patates bitkileri üzerinde incelenmiştir. Elde edilen sonuçlara göre, **C. annuum** ekstraktının veya bu ekstraktan izole edilen suda eriyebilir proteinlerin, virus inokulasyonundan önce patates bitkilerine uygulandıkları zaman, PVX infeksiyonunu yüksek düzeyde engelledikleri bulunmuştur. Ayrıca, bu uygulamalar ile PVX'nun yumrulara ulaşmasının belirli bir oranda önlenebileceği de saptanmıştır.

LITERATURE CITED

1. Bawden, F.C., 1954. Inhibitors and plant viruses. Adv. Virus Res., 2: 31-57.

2. Bercks, R., 1963. Untersuchungen über individuelle Unterschiede von Antiseren gegen Kartoffel X-virus bei Reaktionen mit verwandten Viren. Phytopath. Z., 47: 301-313.

3. Blaszczak, W., A.F. Ross and R.H. Larson, 1959. The inhibitory activity of plant juices on the infectivity of Potato Virus X. Phytopathology, 49: 784-791.

4. Ebrahim-Nesbat, F. and F. Niemhaus, 1972. Beeinflussung von Tabakmosaikvirus-und Gurkenmosaik-

virus infektion durch Hemmende Prinzipien in Pflanzenextrakten. Phytopath. Z., **73**: 235-250.

5. Ekinci, A.S., 1972. Sebzecilik. Ahmet Sait Matbaası, İstanbul, 312 pp.

6. Erkan, S. and Ü. Yorgancı, 1982. Investigations on the inhibition of Potato Virus X (PVX) Infectivity by some plant extracts I. The effectivenesses of extracts from various plant species on PVX Infection and the effects of certain factors on the inhibitive activity of plant extracts. J. Turkish Phytopath., **11**: (2-3) (in press) .

7. Feldman, J.M., 1963. Effet inhibiteur des extrais de semence de piment (**Capsicum annuum**) sur le pouvoir infectieux de quelques virus des plantes. Ann. Epiphyties, **14**: (4) 377-385.

8. Fischer, H. und F. Nienhaus, 1973. Virushemmende Pirinzipien in Paprikapflanzen (**Capsicum annuum** L.). Phytopath. Z., **78**: 25-41.

9. Keller, E.R. and S. Berces, 1966. Check-Testing for Virus X and Leaf-Roll in seed potatoes with particular reference to methods of increasing precision with the A6-leaf tests for Virus Y. Eur. Potato J., 9 (1) : 1-13.

10. Lowry, O.H., N.J. Rosebrough, A.L. Farr, and R.J. Randall, 1951. Protein measurement with the folin phenol reagent. J. Biol. Chem., **193**: 265-275.

11. Marchoux, G., 1967. Effet inhibiteur des extrais de feuille de Piment (**Capsicum annuum** L.) sur l'infection par quelques virus de leurs hotes hypersensibles. Ann. Epiphyties, **18**: 35-45.

12. Potty, V.H., 1969. Determinations of proteins in the presence of phenols and pectines. Anal. Biochem., **29**: 535-539.

13. Rao, D.G. and S.P. Raychaudhuri, 1965. Further studies on the inhibition of a ring spot strain of Potato Virus X by plant extracts, culture filtrate of Trichothecium roseum and chemicals. Indian J. Microbiol., **5** (1) : 9-12.

14. Schade, C., 1958. «Kleines virologisches Praktikum.» Pflanzliche Virologie Band I. Einführung in die allgemeinen Probleme, 221-264. Ed.: M. Klinkowski, Akademie-Verlag, Berlin. X+279.

15. Sharma, D.C. and S.P. Raychaudhuri, 1965. Antiviral effect of plant extracts and culture filtrate of **Aspergillus niger** on ring spot strain of Potato Virus X. Indian J. Microbiol., **5** (1) : 41-48.

16. Yorgancı, Ü. und S. Erkan, 1982. Vergleichende Untersuchungen über die Anwendungsmöglichkeiten von Milch und Capsicumpressaft zum Schutz von Tomatenpflanzen gegen Tomatenmosaik. J. Turkish Phytopath., **11** (2-3) (in press).

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Estimation of Residue Levels of DDT and its Metabolites in the Main Drainage Channels of Lower Seyhan Delta Throughout 1979.

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ABSTRACT

In this research, it was tried to find out the residue levels of DDT and its metabolites in water samples that were taken from the main drainage chanels in Lower Seyhan Delta, from the end of 1978 until the end of 1979. The amount of DDT and its metabolites in drainage, water, depends on climatic conditions. In autumn and winter when there was heavy rain these were higher. In addition, some samples contained residues of DDT and its metabolites much higher than the acceptable tolerance limits for environmental pollution.

INTRODUCTION

The Lower Seyhan Delta is an irrigated plain located next to the Mediterrannean Sea and surrounded by the Seyhan River in the west, Ceyhan River in the east and Yakapınar and Adana provinces in the north. Monoculture cotton and wheat crops are the primary agricultural products. Consequently, large quantities of pesticides are used to control insects and other undesirable organisms. The usage of DDT was permitted by The Ministry of Agriculture and Forestry and General Directorate of Plant Protection and Quarantine until 1978. But after the risks of usage of organochlorine compounds have become known, the application was restricted by law in developed countries one or two decades ago.

In our country the use of organochlorine chemicals on crops for human consumption was restricted by Plant Protection Research Institutes, but any restriction for these chemicals in industrial plant cultivation was not applied until 1978. Today DDT production and application are continued for different purposes. Some cotton growers become accustomed to DDT and they still use it against certain pests (e.g. stored grain pests and bollworm larvae in cotton).

In the food chain chlorinated compounds are extremely rare in nature. These compounds that are

used commercially as insecticides are toxic to human and warm blooded animals. For these reasons the metabolism of chlorinated compounds in human and animal bodies, plants, microorganism, soil and water should be understood. In 1969 The United States Environmental Defence Fund (EDF) explained that DDT is a highly toxic substance, that DDT and its metabolites are poisons which persist in soil and the aquasphere, it can be transported by leaching, erosion, run-off and volatilization. Since DDT is slightly water soluable it accumulates in fatty tissue, and organisms tend to concentrate it. Once it is consumed, DDT can be stored and become toxic to both animal and human, in the case of fish and wild life it may inhibit regeneration of species.

This highly toxic substance has many different ways of usage in our region. The purpose of our research is to estimate the degree of DDT residue in the irrigation channels.

MATERIALS AND METHODS

On the six main drainage channels (shown on fig 1.), of lower Seyhan delta, 12 different sampling sites were chosen. One - two liters of water sample was taken into the wide - mouth glass jars from each site once a month. Ideally, analysis of the sample should be made within a matter of hours from the time of sampling (1), however, this was impractical in terms of distance from sampling sites to laboratory, samples being examined solely for organochlorine residue may be held to a week under refrigiration at 2° to 4°C (1). This knowledge allowed us to store our samples briefly in the refrigirator, before the first solvent extraction was made.

Since it was not feasible to analyse 12 samples at once, we separated 12 sampling sites into two groups. Sampling sites having numbers from one to six were taken as group 1, and sites from seven to twelve were taken as group 2.

DDT and its metabolites were extracted from water with methylene chloride as follows: 500 ml of water were transferred to a I 1. separatory funnel and extracted twice with 50 ml of $MeCI_2$, solvent layer was collected, and drained through in sodium sulfate column. This organic phase was collected and evaporated with rotary vacuum evaporator, in a water bath at 35°C. Evaporation was transferred to a silica gel column which was prepared separately. In this glass column (22 mm in inside diameter and 300 mm long) a small piece of preextracted glass wool was placed at the bottom. 1 gr of deactivated silica gel was added and, then topped with 25 mm of anhydrous sodium sulfate. This column was prewashed with 10 ml of hexane and the elutriation was discarded. 0.5 ml of sample extract was transferred to the column. When sample had sunk into the bed, column washed

with 2 different solvents. The first one was 10 ml hexane, the second was 15 ml of benzene/hexane (60/40 v/v). Elutriations were collected in separate bottles. These two fractions were concentrated to 0.5 ml in rotary vacuum evaporator, and final volume adjusted to 5 ml with hexane. 4 ml of the sample were injected into the GLC, E.C. detector, % 1.95 QF-1, % 1.5 OV-17 column, The resulted peaks were examined and compared with the standart peaks which were obtained from known standard samples. DC-200 and SE-30, QF-1 columns were used to compare the resulted peaks.

Working Conditions :

Tracor 560 GLC.

Ni 63 E.C. detector = 300-325°C
oven = 200°C
injection port = 225°C
Carrier gas N_2 X 60 ml/min

A reagent blank was prepared as follows : To 1500 ml of distilled water 100 ml $MeCl_2$ was added in a 2 lt separatory funnel. After shaking the separatory funnel vigorously for 2 minutes, the phases were allowed to separate and solvent layer discarded. This extraction was repeated with another 100 ml portion of $MeCl_2$. And this double extracted water sample drained into a glass stoppered bottle for storage. 500 ml were withdrawn to serve as a reagent blank with each set of samples.

Quantitation was made by comparing the peak height of a known amount of standart with the peak height of samples and from these ratios the amount of pesticide residue in the sample was calculated as Mg/1.

RESULT AND DISCUSSION

Lower Seyhan Delta is centrally located in Çukurova Plain, is irrigatable, and is surrounded by Seyhan and Ceyhan Rivers. Drainage water is collected by 6 main drainage channels (fig 1), which reach to Mediterrannean Sea.

The amount of DDT, DDD and DDE residues found in the samples that were taken at different times was calculated as mg/l and is shown in Table 1.

The date of sampling, sampling site numbers and amount of residue found were shown in Table 1. Numbers were given from the plain to the sea.

When Table 1. was examined the amount of DDT and its metabolites carried from the places of application to the sea with rain, apparently depended on climatic conditions. In autumn and in winter this was higher. No residue had been seen at the irigation season, during July to September.

When persistence of chlorinated pesticides was examined, persistence of compounds in river water in term of precentage recovery over a period of 8 weeks was shown in table 2 (1). Chlorinated compounds especially DDT and its derivatives at the end of 8 th week were still 100 % present.

Table 1. Amount of DDT, DDD and DDE residues in water samples taken from drainage channels of Lower Seyhan Delta. Calculated as micrograms/liter.

Group 1.

Draiage channel	Sampling sites	18.12.1978	6.3.1979	5.4.1979	14.5.1979	3.9.1979
YD—1	11	—	0.121 DDT	0.066 DDT	0.027 DDD 0.42 DDT	—
YD—2	10	—	—	0.024 DDT	0.030 DDD 0.059 DDT	—
	8	—	—	0.035 DDT	0.025 DDD 0.035	—
YD—3	12	—	0.148 DDT	0.027 DDT	—	—
	9	0.132 DDD	0.258 DDD 0.082 DDT	—	—	—
	7	0.170 DDD		—	0.021 DDD 0.032 DDT	—

Group 2.

		28.11.1978	13.2.1979	19.3.1979	19.4.1979	25.7.1979
YD—4	1	—	0.018 DDT	—	—	—
	6	0.060 DDD	—	—	—	—
	5	0.930 DDD	0.820 DDD 0.012 DDE	—	0.065 DDE	—
YD—5	2	0.940 DDD	0.029 DDD	—	0.060 DDE	—
	3	0.680 DDD	—	0.055 DDE	—	—
	4	—	0.049 DDD	0.025 DDT	—	—

It was found that no measurable degradation either biologically or chemically of DDT, TDE or DDE took place. Microbial life, microflora and amount of oxygen in the environment were responsible for the conversion of DDT to DDE and TDE (DDD).

The major route of DDT metabolism by microorganism is through TDE formation by reductive dechlorination under anaerobic conditions. This can be degraded further in aerobic conditions since it is subject to ring cleavage and may be converted completely to CO_2, H_2O and HCl. Aerobically, DDE is prime DDT metobolite and apparently does not undergo further biologicol alteration (2). For these reasons in our analysis we looked for DDD and DDE with DDT, in the water samples.

In U.S.A. Federal Committee on

Table 2. Persistence of chlorinated compounds in river water in terms of percentage recovery.

Organochlorine compounds	% of original compound found				
	0 - time	1 wk.	2 wk.	4 wk.	8 wk.
BHC	100	100	100	100	100
Heptachlor	100	25	0	0	0
Aldrin	100	100	80	40	40
Endosulfan	100	30	5	0	0
DDE	100	100	100	100	100
DDT	100	100	100	100	100
DDO (TDE)	100	100	100	100	100

water Quality Criteria recommends that environmental levels of pesticides not be permitted to rise above 0.05 Mg/1. Because of the biological concentration factor, this level is considered hazardous in water from which fish are harvested for human consumption. In addition they are toxic to fish (2, 3). According to Table 1. begining in November and continuing to May, the residues of these chlorinated compounds were above this level. In winter these drainage channels have a high rate of flow and they reach the sea at the region that has main fishing place, Yatağan Lake.

Solubility of DDT in water is 1, 2 mg/l (2, 3). As it can be seen from Table 1 sample taken from site 6 on November 28 th, 1978 showed the amount of residue to be 1.06 mg/l.

It was near this solubility level and much higher than the tolerance limit of U.S.A. Environmental Protection Agency. Naturally the biggest problem with pesticide residues in environment is the movement of persistent pesticide residues along food chains, coupled with biological concentration of the residue at each in the chain.

In our country there is not any serious consideration about environmental pollution caused by agricultural chemicals. Our results shows, to some extent, the risk to the environment. Residue concentration may reach dangerous levels, considering only the benefits of pesticides brings many environmental problems. To solve these problems, improper applications should be prevented and residue in the environment should be estimated before the application.

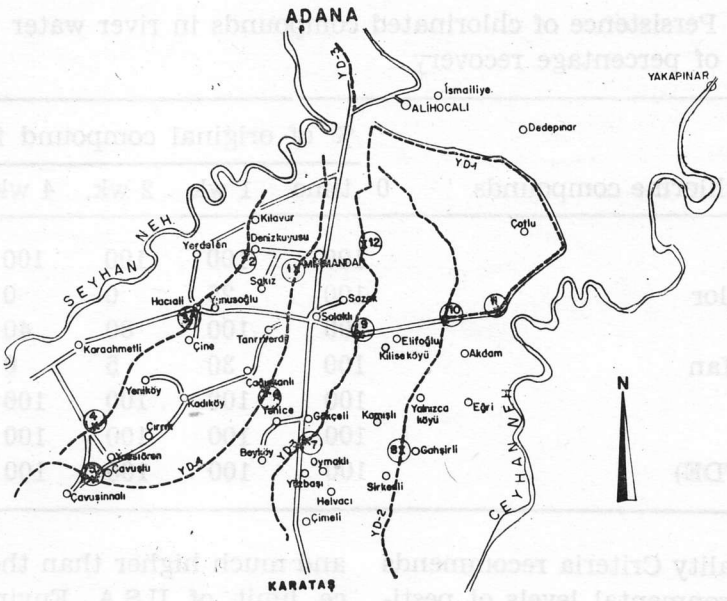

Fig. 1. Lower Seyhan Delta, Six drainage channels, and 12 sampling sites.

ÖZET

AŞAĞI SEYHAN OVASI ANADRENAJ KANALLARINDA 1979 YILI DDT VE TÜREVLERİ KALINTILARININ SAPTANMASI

Bu çalışmada 1979 yılında Çukurova Bölgesi Aşağı Seyhan Ovasında bulunan anadrenaj kanallarındaki suya geçen DDT ve türevleri miktarları araştırılmıştır. Özellikle yağışların olduğu bahar ve kış aylarında kanallarda DDT ve türev miktarlarının arttığı saptanmıştır. Ayrıca bazı tarihlerde suların çevre kirliliği için konmuş tolerans sınırlarının çok üzerinde DDT ve türevleri ile bulaşık olduğu görülmüştür.

REFERENCES

1. Anonymous, 1976. Manual of analytical quality control for pesticides in human and environmental media. Sec 6. U.S. Environmental Protection Agency Environmental Toxicology Division.
2. ————, 1977. Manual of analytical methods for the analysis of pesticides residues in human and environmental samples. Section 10, U.S. Environmental Protection Agency. Environmental Toxicology Division.
3. ————, 1978. Modern environmental analysis methods, Environmental Sampling Sample preservation and in situ measurement course I. Ch. VII. METU. Environmental Engineering Dept.
4. Johnsen, R.E., 1976. DDT metabolism in microbial syatems. Residue Rewiews, 61, 2-112.
5. Ruzicka J.H.A. and D.C. Abbott. 1973. Pesticide residue analysis. Talanta Review. 20. 1261-1277.

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Untersuchungen zu manchen biologischen Eigenschaften Affodill (**Asphodelus aestivus** Brot.)

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ZUSAMMENFASSUNG

Diese Arbeit wurde durchgeführt, um einige biologische Eigenheiten von Affodill (**Asphodelus aestivus** Brot.) zu untersuchen. Die von den Weiden Gazianteps - İslahiye gesammelten Samen wurden an der Universitaet Hohenheim, İnst. f. Phytomedizin untersucht und folgende Ergebnisse wurden erhalten:

1. Die Affodill-Samen keimen sowohl bei Licht als auch im Dunkel bei einem Minimum von 2 - 3°C, einem Optimum von 5 - 25°C und einem Maximum von 40°C.

2. Bei den gaschromatografischen Untersuchungen wurde in den Wurzeln Saccharose, Sorbit, A-Glucose, Fructose, Ramnose, B-Glucose und Arabinose festgestellt.

3. Unter Gewaechshausbedingungen wurde die Pflanzenentwicklung waehrend einer Zeit von 1, 2, 3, 4, 5, 6, 7 und 12 Monaten beobachtet. Der Prozentsatz von löslichen Kohlenhydraten in der Trocksensubstanz betrug waehrend dieser Zeit, begonnen im ersten Monat 12,6 %, 15,7 %, 17,2 %, 20,4 %, 21,9 %, 22,7 %, 26,9 % und im 12. Monat 33,6 %.

EINLEITUNG

Affodill, **Asphodelus aestivus** Brot. (Syn. : **Asphodelus microcarpus** Viv.) ist eine der Familie **Liliaceae** zugehörige Pflanze (Reed and Hughes, 1977). Es gibt von **Asphodelus** 10 vedschiedene Arten, ihre Verbreitung reicht von der Mittelmeerküste bis nach Indien (Engler 1964). In der Türkei ist die meistverbreiteste Art im Weideland in den Marmara, ägäischen und Mittelmeergetieten **A. aestivus** (Bilgir 1961; Baytop 1963).

Affodill ist eine mehrjährige krautige Pflanze. Sie bildet verlängert rübenförmige, 10-20 cm lange, 1-3 cm breite Knollen. Ihre Blätter sind schwertförmig, 50-100 cm lang und 1-2 cm breit; die Blüten befinden sich in einer Höhe von 80-120 cm,

also im letzten Teil des Stengels, in Paniculaart. Die Kelchblätter sind aufrecht und kürzer als die Blüten. Das Perigonium ist 2 cm groß, in der Art eines weißen Trichters, die Spitzen sind geteilt, breit, rötlich oder grünlich. Im Februar - April blüht die Pflanze. Die Samen sind 7-8 mm lang und befinden sich in einer 1-teiligen Kapsel. In einer Kapsel sind ungefähr 6 Samen; im grünen Zustand sind sie giftig. Ende Mai beginnen die oberirdischen Teile der Pflanze zu trocknen, die unterirdischen Teile gehen in einen Ruhezustand (Post 1933, Bilgir 1961, Reed and Hughes 1977).

Die Samen sind ungefähr 5, 8-6, 0 mm lang; 2, 8-3, 2 mm breit, dreikantig, mit scharfen Kanten und ähneln Orangenscheiben. Ihre Farbe ist dunkelbraun oder schwarz.

Affodill besitzt 2 n = 28 Chromosomen (Milan 1975). Cotte (1927) stellte nach Versuchen fest, dass bei dieser Art keine Unterscheidung in Varietäten nöting ist.

In den Knollen der Affodill Pflanzen befindet sich Asphodelosid. Andere Wissenschaftler nennen es Lycorocid. Dieser Stoff ist dem Insulin ähnlich, aber schon in kaltem Wasser löslich. Der Stoff beinhaltet 11 : 1 Fruktose und Glukose (Hegnauer 1963). Nach Neyron (1930) kann man in den Knollen eine Asphodeloholosid benannte Zuckerart finden. Diese Zuckerart ist in den grünen Teilen der Pflanze nicht zu finden. Während der Saccharoseausbildung kann man Asphodeloholosid auch finden. Zu Beginn der Trocknung der oberirdischen Pflanzenteile im Mai wechselt die Saccharose in Sukrose über und ihre Menge steigt in großem Maße. Fell (1968) fand nach gasluquidchromatografischen Untersuchungen der Samen Sukrose, Rafinose, Stakyose und Melibiose Cuckerarten.

In dieser Arbeit wurde Affodill, nachdem es in der Türkei in den Küstengebieten von Marmara, ägäischem und Mittelmeer ein wichtiges Weideunkraut ist, nach folgenden Hinsichten untersucht:

1. Keimtemperaturen der Samen
2. Die löslichen Kohlenhydratarten und ihre Menge und Art in den Knollen.

MATERIAL and METHODE

Als Material wurden die auf den Weiden von Gaziantep (Islahiye) gesammelten Samen verwendet. Die Untersuchungen wurden im Labor und Gewächshaus durchgeführt.

1. Keimtemperaturen der Samen

4 x 100 Stück der Samen von Affodill wurden auf Filterpapier in Petrischalen ausgelegt und im Reihenthermostaten in verschiedenen Wärmestufen belassen. Das Filterpaeier wurde in einer bestimmten Feuchtigkeit gehalten. In 2-tägigen Abständen wurde die Keimung konntrolliert. Im Reihenthermostat wurden die Petrischalen bei den konstanten Temperaturen von 0,

2-3, 5, 10, 10, 20, 25, 30, 35, 40°C 30 Tage belassen. Die Keimversuche wurden auch in dunklem Raum durchgeführt und bei einer Beleuchtung von 750-800 lux. Um die Keimschnelligkeit festzustellen, wurde eine tägliche Keimung von 50 % angenommen.

2. Lösliche Kohlenhydrate (ihre Menge und Arten) in den Knollen von Affodill

Die Samen von Affodill wurden in 1-monatigem Abstand unter Gewächshausbedingungen aufgezogen. Als Wachstumsstufen wurden 1, 2, 3, 4, 5, 6, 7 und 12 Monate genommen (Abb. 1, 2, 3).

Von den die Wachstumsperiode beendeten Pflanzen wurden die Wurzeln ausgegraben und im Tieftrockner getrocknet. Danach wurden diese Proben fein zermahlen.

Zur Analyse des Pflanzenmaterials wurden 30 mg abgewogen und in ein Reagenzglas eingefüllt. Das Reagenzglas wurde mit 5 ml 80 % igem Äthanol aufgefüllt und 30 Minuten in 45-50°C Wasserbad belassen. Danach zentrifugiert (5000 upm) und in Rundkolben eingefüllt. Dieses wurde 4 x wiederholt und danach die Lösung im Rotations Evaporator verdampft. Der im Rundkolben verbliebene Rest wurde mit 4 mal 1 ml 98 % igem Methanol gelöst. Diese Lösung wurde wieder in 5 ml Reagenzgläser gefüllt und noch einmal mit Methanol N Gas verdampft. Der im Reagenzglas verbliebene Rest wurde, um besser zu trocknen, 4-5 Stunden im Desicator belassen. In die aus dem Desicator genommenen Reagenzgläser wurden folgende Zusätze hinzugefügt (Neubeller und Buchlol, 1975) :

0,15 ml Pyridin (wasserfrei)

0,20 ml BSTFA (N,N-Bis-Trimethylsily-triflouracetamid)

0,05 ml Trimethylchlorsilan

0,10 ml 2,5 % iges Arabit in Pyridin als interner Standard

Von dieser Lösung wurden danach 1 in den Gaschromatographen injiziert.

Gaschromatographische Analysen

Fraktometer Modell Varian 184û (Varian = Fa. Varian)

Säulentyp Glas: 1,61: 6 mm Ø außen; 2 mm Ø innen; 3 % Silicon OU auf Gas-Chrom,-Q-Träger, Korngröße/v. Träger 125-160 u

Säulentemperatur 180°C, Programete 4°C/Min.

Injektortemperatur	250°C
FID-Temperatur	250°C
Trägergas-N_2	25 ml/Min
Wasserstoff	25 ml/Min.
Luft	250 ml/Min.
Empfindlichkeit	0,423 cm/Min.

ERGEBNISSE und DISKUSSION

1. Keimtemperaturen

Nach Betrachten von Tab. 1 sieht man, da das Keimoptimum sowohl bei Licht als auch im Dunkel zwischen 5-25°C liegt. Vor und nach diesen Wärmestufen nimmt

die Keimschnelligkeit ab. Bei Licht und Dunkel ist die Keimgeschwindigkeit bei niedrigen Temperaturen langsam, dagegen wird die Keimung bei den Maximumtemperaturen innerhlb von 2 Tagen beendet.

Tab. 1. Die Wirkung verschiedener Wärmestufen auf die Keimung der Affodill Samen

Temperatur (°C)	Keimung bei Licht %	Geschw./Tag	im Dunkel %	Geschw./Tag
0	0	0	0	0
2-3	24	14	17	18
5	95	15	79	18
10	97	9	87	9
15	98	5	93	6
20	95	5	89	7
25	54	4	66	4
30	38	2	40	2
35	29	2	27	2
40	10	2	8	2

Die Vegetation von Affodill zieht sich in der Türkei von Herbst bis Ende Frühjahr. Wie man daraus sieht, trifft die Vegetationszeit auf eine kühle Periode.

Tab. 2. Die Durchschnittstemperaturen (gemessen in 0-5 cm Bodentlefe) einiger Monate der Jahre 1938-1965 in Islahiye (Met. Bult. 1967)

Messstelle	Durchschnittstemperaturen (°C) Okt.	Nov.	Dezem.	Januar	Februar	März	April
Bodenhöhe	21,4	12,1	7,1	5,1	6,4	11,2	18,6
5 cm Bodentiefe	21,7	13,2	7,3	6,9	11,2	18,2	24,4

Die Durchschnittstemperaturen in 0-5 cm Bodenteife der Jahre 1938-1965 wurden in Tabelle 2 angegeben.

Nach dieser Tabelle schwanken die Temperaturen in 5 bis 5 cm Bodentiefe in den Monaten Januar - Februar und Dezember bei 5-10°C. In den Monaten der vegetativen Wachstumsperiode von Affodill sind sie höher. Die während der vegetativen Wachstumsperiode kältesten Temperaturen liegen in Islahiye und Umgebung noch im Bereich der optimalen Keimtemperatur. Die Niederfälle dieses Gebietes

im Herbst, Winter und Frühjahr spielen für die Keimfeuchtigkeit eine bedeutende Rolle. Aus diesem Grunde zieht sich die Keimung von Mitte Herbst bis hinein ins Frühjahr.

2. Die löslichen Kohlenstoffarten und ihre Menge in des Wurzeln von Affodill

Da Affodill eine die Nährstoffe in den Wurzeln speichernde Pflanze ist, wurde der lösliche Zuckergehalt in den Wurzeln 1, 2, 3, 4, 5, 6, 7 und 12 Donate nach Keimung untersucht. Als Ergebnisse der gaschromatographischen Analysen erhielt man folgende Depotkohlenhydrate (Trockengehalt in %) Saccharose 8,80, Sorbit 3,68, A-Glykose 2,87, Fruktose 2,67, Ramnose 1,51, B-Glukose 1,16, Arabinose 0,68. Der Kohlenhydratgehalt weist, begonnen im ersten Monat, eine stetige Zunahme auf (Tabelle 3).

Bei Affodill wurden als Zuckerarten in den Knollen Saccharose, Sukrose, Levilose, Fruktose, Glykose, Rafinose, Stakyose und Melibiose festgestellt (Neyron 1930, Hegnauer 1963, Fell 1968). Ein Teil der Zuckerarten wurde auch bei den von mir durchgeführten Versuchen festgestellt, dagegen konnte ein anderer Teil nicht nachgewiesen werden. Außerdem konnten noch andere Zuckerarten festgestellt werden. Es wurden, zum Beispiel, genau wie bei den früheren Untersuchungen anderer Forscher Saccharose, Fruktose und Glykose festgestellt, ausserdem wurden aber noch Sorbit, Ramnose und Arabinose nachgewiesen; Levilose, Raffinose und Melibiose konnten nicht nachgewiesen werden (Grafik 1). In den Knollen ist die mengenmäßig wichtigste Zuckerart Saccharose und während einer Zeitspanne von 12 Monaten steigt die Gesamtzuckermenge in im Topf gezogenen Pflanzen stetig an. Unter natürlichen Wachstumsbedingungen zieht sich die Vegetationszeit von Mitte Herbst bis Ende Frühjahr (Post 1933, Bilgir 1961). Während unter Gewächshausbedingungen 12 Monate lang Kohlenstoffe

Tabelle 3. Lösliche Karbonhydrate (Menge und Art) in den Wurzeln von unter Gewaechshausbedingungen aufgezogenen **Asphodelus aestivus** Pflanzen (Trockensubstanz in %).

Datum	Arabinose	Ramnose	Fruktose	A-Glukose	Sorbit	B-Glukose	Sakkarose	Mittelwert
1. Monat	0,82	0,81	1,39	1,84	2,22	0,89	4,67	12,64
2. "	0,71	0,83	1,66	1,96	2,86	0,85	4,87	15,74
3. "	0,59	0,90	2,39	2,60	3,70	0,67	6,33	17,18
4. "	0,54	0,83	2,74	2,83	3,75	0,77	8,95	20,41
5. "	0,77	1,65	3,18	2,58	3,67	1,21	8,90	21,68
6. "	0,63	1,94	3,18	3,59	3,94	1,24	8,04	22,56
7. "	0,79	2,69	3,45	3,80	4,53	1,82	9,84	26,92
12. "	0,59	2,46	3,36	3,76	4,88	1,79	16,76	33,60
Mittelwert	0,68	1,51	2,67	2,87	3,68	1,16	8,80	

In den Knollen gespeichert werden, ist dies unter natürlichen Bedingungen nicht möglich, da die oberirdischen Teile Ende des Frühjahrs vertrocknen. Aus diesem Grunde ist es nötig, um eine Zirkulation der Kohlenstoffe in den Knollen festzustellen, die Pflanzen unter natürlichen Wachstumsbedingungen zu untersuchen.

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Herrn Prof. Dr. W. Koch, Inst. f. Phytomedizin der Univ. Hohenheim, möchte ich für sein während der Durchführung der Versuche gezeigtes Interesse danken.

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ÖZET

ÇİRİŞ OTUNUN (**Asphodelus aestivus** Brot.) BAZI BİYOLOJİK ÖZELLİKLERİ ÜZERİNDE ARAŞTIRMALAR

Bu araştırma çiriş otunun (**Asphodelus aestivus** Brot.) bazı biyolojik özelliklerinin araştırılması amacıyla yapılmıştır. Gaziantep-İslahiye kazası mer'alarından toplanan tohumlarla Hohenheim Üniversitesi Bitki Koruma Enstitüsünde çalışılmış ve şu sonuçlar alınmıştır.

1. Çiriş otu tohumları gerek ışıklı ve gerekse karanlık ortamda 2-3°C - 40°C (optimum 5-25°C) sıcaklıklar arasında çimlenmişlerdir.

2. Gaskromatografisi ile çiriş otu köklerinde sakkaroz, sorbit, A-glikoz, fruktoz, ramnoz, B-glikoz ve arabinoz saptanmıştır.

3. Sera şartlarında bitki gelişmesi 1, 2, 3, 4, 5, 6, 7 ve 12 ay süre ile gözleme tabi tutularak, bunlardaki kuru maddedeki eriyebilir toplam karbonhidrat oranı birinci aydan itibaren (%) 12,6; 15,7; 17,2; 20,4; 21,9; 22,7; 26,9 ve 12. ayda ise 33,6 olarak bulunmuştur.

LITERATURVERZEICHNIS

BAYTOP, T., 1963 : Türkiye'nin tıbbi ve zehirli bitkileri, İsmail Akgün Matbaası, İstanbul.

BİLGİR, S., 1961 : **Asphodelus microcarpus** SALZMET VİV. (Çiriş otu)'na karşı davpon ilacı ile mücadele denemeleri. Bitki Koruma Bülteni. 2. (9).

COTTE, J., 1927 : **Asphodelus microcarpus** VİV. Var crinipes Aschers et Gr. Rev. Gen. Bot. 39 (466) : 597-602. 1927 (Biol. Abstr. 2: 6-8 1928)

ENGLER, S., 1964 : Syllabus der Pflanzen Familien, Band II. Gebrüder Borntraeger, Berlin.

FELL, K.R., F.M. HAMMOUDA and A.M. RIZK, 1968 : The constutuennts of the seeds of **Asphodelus microcarpus** Viviani and **A. fistulosus** L. J. Pharm. Pharmacol 20 (80) : 646-649 (Biol. Abstr. Vol. 50 (5) 1969)

HEGNAUER, R., 1963 : Chemotaxonomie der Pflanzen Bd. Birkhäuser Verlag, Basel und Stuttgart.

METEOROLOJİ BÜLTENİ, 1967 : Ortalama ve Ekstrem Kıymetler. T.C. Tarım Bakanlığı Devlet Meteoroloji İşleri Genel Müdürlüğü. Ankara Basım ve Ciltevi.

MİLAN L., 1975: A. contribution to the cytotaxonomy of Yogoslav Spermatophyta Part 1. = Liliaceae S. Lat. Biol. Vestn. 23 (1) : 25-40. (Biol. Abstr. Vol. 62 (6) 1976)

NEUBELLER, J. und G. BUCHLOH, 1975 : Zuckerbestimmung in Gartenbauprodukten im Hinblick auf die Qualitäasbildung. Mitteilungen Rebe und Wein Obstbau und Früchteverwertung. Klosterneuburg 25.

NEYRON, M.Ch. 1930 : Recherches sur le principe fermentescible des tubercules D'asphode'le. (Thesis: Universite Paris) 1-52 p.A. maretheux et 1. Pactat : Paris (Biol. Abstr. 7 (8) 1933).

POST, G., 1933 : Flora of Syria, Palestine and Sinai. Vol. II. S. 655 American Press. Beirut.

REED, C.F. and R.D. HUGHES, 1977 : Economically important foreign weeds. Agriculture Handbook No: 498. Agricultural Research Service Animal and Plant Health Inspection Servic U.S. Goverment Printing Office, Washington.

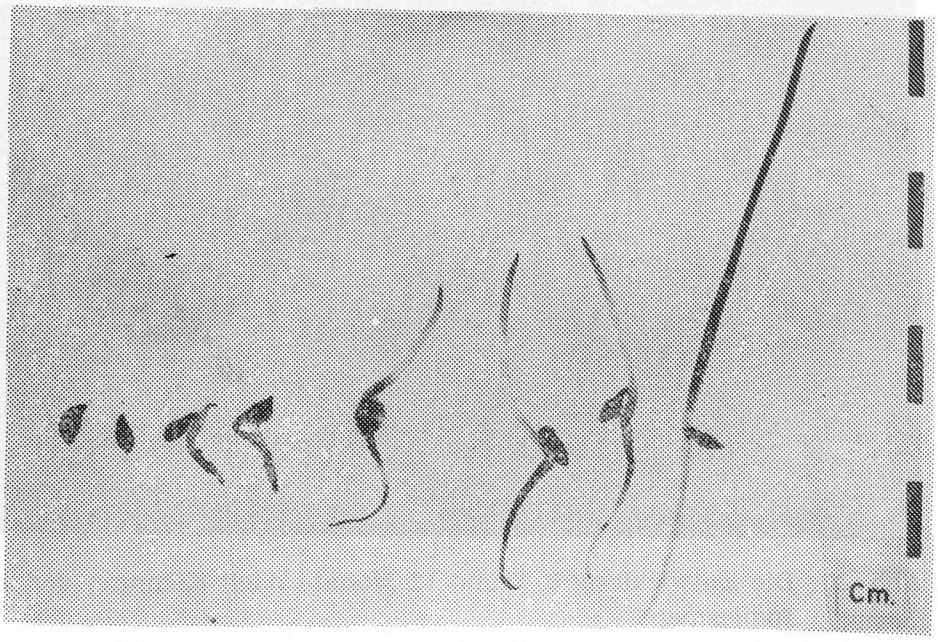


Abb. 1 : Die Entwicklung nach der Keimung der Affodillsamen innerhalb von 1 Monat.

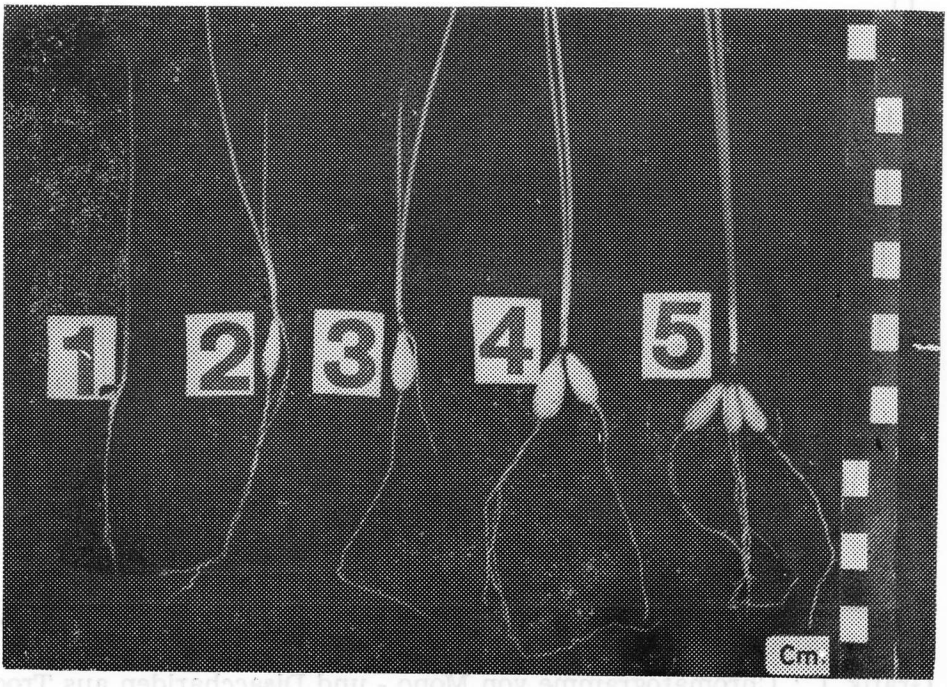


Abb. 2 : Die Entwicklung nach der Keimung der Affodillsamen nach 1, 2, 3, 4 und 5 Monaten.

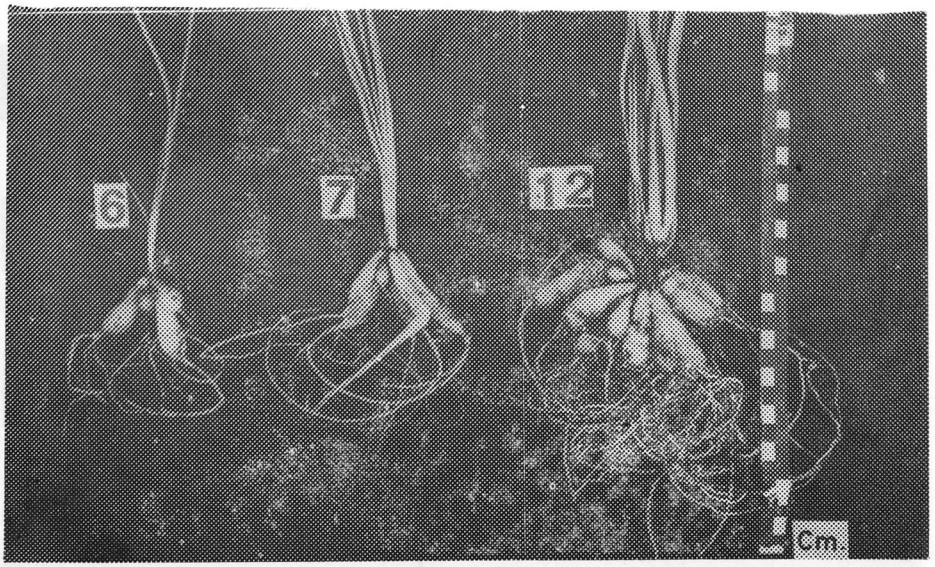
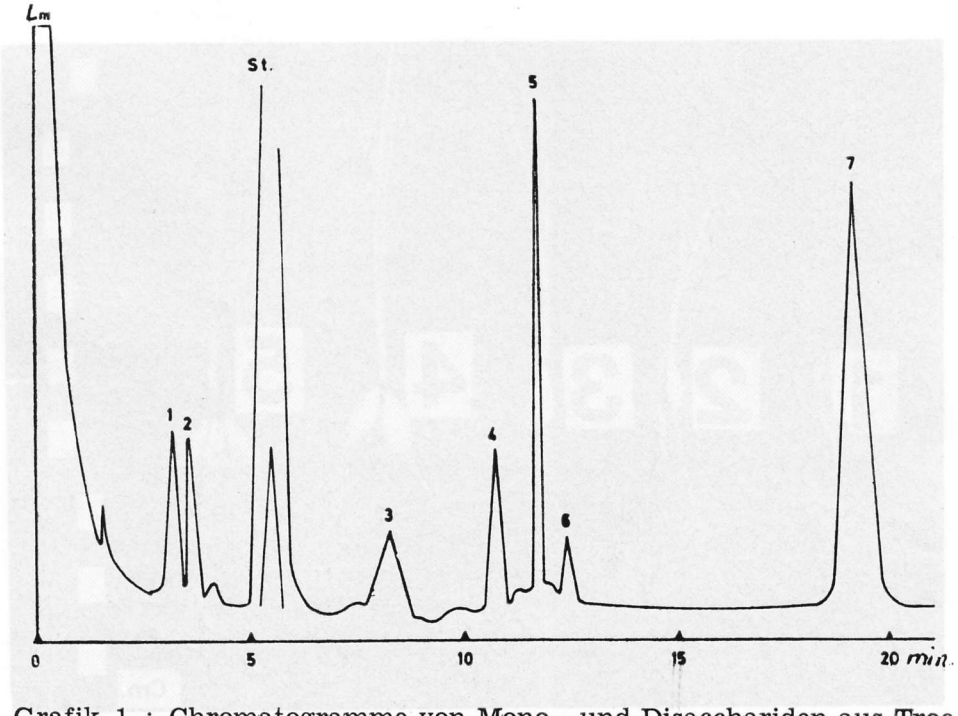


Abb. 3 : Die Entwicklung 6, 7 und 12 Monate nach Keimung der Affodilsamen.

Asphodelus aestivus



Grafik 1 : Chromatogramme von Mono - und Disacchariden aus Trockensubstanz von **Asphodelus aestivus** Wurzeln. Lm: Lösungsmittel, St: interner Standart. 1: Arabinose, 2: Ramnose, 3: Fructose, 4: A-Glucose, 5: Sorbit, 6: B-Glucose, 7: Saccharose.

SUMMARIES OF THE REPORTS SUBMITTED AT THE THIRD PHYTOPATHOLOGICAL CONGRESS. ADANA - TURKEY

(12-15 October 1982, Plant Protection Division of Agricultural Faculty, Çukurova University, Adana, Turkey)

1— FUNGI

1.1. AKTAŞ, H. Nachweis des Fusskrankheitserregers **«Drechslera sorokiniana** (Sacc.) Subram. and Jain» an der Gersten-und Weizenanbauflaeche im Mittelanatoliengebiet

Diese Arbeit wurde 213 Gersten-und 117 Weizenfelder untersucht. Im Untersuchungsgebiet wurde von 213 ausgewarteten Gerstenfeldern 77 Feldern, und von 117 Weizenfelder nur 8 Feldern mit **D. sorokiniana** (Sacc.) Subram. und Jain Befall festgestellt. Der Gerstenanbauflaeche von der Mittelanatoliengebiet sind 36.2 % mit dem Pathogen befallene nachgewiesen worden. In Gerstenfeldern lag die durchschnittlich prozentuale Krankheitserscheinung zwischen 0.33 % bis 30.0%. Im Mittelanatoliengebiet wurde eine durchschnittliche prozentuale Krankheitserscheinung von 8.25% festgestellt.

D. sorokiniana wurde im Untersuchungsgebiet auf den Weizenanbau nur von Mihalççık (Eskişehir) und Tefenni (Burdur) beobachtet. Soweit uns bekannt ist, wurde bisher noch nicht von **D. sorokiniana** auf Weizenanbau in der Türkei berichtet.

D. sorokiniana entwickelte sich sehr gut bei hönen Waermeklima und Trockenboden bei Gersten-und Weizenanbau. Aus diesen Grunden können die Klimabedingungen und Bodenbeschaffenheit des Mittelanatoliengebietes für die Entwicklung der infizierten und epidemisch ausbreiteten Eigenschaften des Pathogens als sehr günstig angesehen werden. Als Ergebniss kann **D. sorokiniana** anuf der Gersten und Weizenanbauflaeche im Untersuchungsgebiet fast jedes Jahr überall hervorgerufen werden (Regional Institut für Pflanzenschutz, Ankara).

1.2. ÇINAR, A. and M. BIÇICI. Head, Root Crown and Stem Rots of Sunflower and Their Etiologies and Importance in Çukurova.

Head rot (**Rhizopus stolonifer** (Ehrenb. ex Fr.) Vuill) and root, crown and stem rot (**Pythium butleri** Subramanian) have been determined on sunflower plants (**Helianthus annuus** L.) in Çukurova since 1979. Also downy mildew (**Plasmopara halstedii** (Farl.) Berl and de Toni) and root rot and wilt (**Sclerotinia sclerotiorum** (Lib.) de Bary) were found in the same region and period. Among these, first three were to be the most important in respect to disease severity and incidence (Çukurova Univ. Agr. Fac., Plant Prot. Dept., Adana).

1.3. ÇOPÇU, M. Rice Diseases caused by Fungi in Aegean Region of Turkey.

The rice diseases caused by fungi were investigated between the years of 1974-1978 in the Aegean Region of Turkey. The main diseases of rice are Blast (**Pyricularia oryzae** Cav.), Brown Leaf Spot (**Helminthosporium** spp.), Footrot (**Fusarium moniliforme** Sheld.) and Minute Leaf Spot (**Nigrospora oryzae** «Berk.-Br.» Petch.) In the greenhouse tests the reaction of the commercial rice varieties against the blast was studied and found that Maratelli was the most susceptible variety. From the leaves infected with Brown leaf spot 6 fungi were isolated. The pathogenicity of the fungi significantly varied and main pathogens were found to be **H. oryzae** Breda de Haan, **H. monoceras** Drechsl., and **H. sativum** Pamm. King and Bakke. With the inoculation experiments, using 5 fungi, **N. oryzae** (Berk.-Br.) Petch. only resulted the minute leaf spots on the rice varieties (Reg, Plants Prot. Res. Inst., Bornova, Izmir).

1.4. DELEN, N. and M. YILDIZ. Studies on the Sensitivity of **Phytophthora** spp. Isolates to Metalaxyl.

The tests conducted showed the mean ED_{50} values of the **Phytophthora** specieses are, 0.00016 mg/ml for **P. capsici**, 0.00018 mg/ml for **P. citropthora** and $<$ 0.00005 mg/ml for **P. parasitica** var. **parasitica.** After 5 transfers of a **P. capsici** isolate which is sensitive to 0.0005 mg/ml metalaxyl, this isolate adapted to 0.025 mg/ml. On the other hand, there was no significant difference between the virulences of the sensitive original isolate and the trained, irradiated isolates (Ege Univ. Agr. Fac. Plant Prot. Dept., Bornova, Izmir).

1.5. ESENTEPE, M., A. KARCILIOĞLU, E. SEZGİN and E. ONAN. Investigations on Relation Between the Severity of Cotton Wilt Disease (**Verticillium dahliae** Kleb.) and Yield Loss in the Aegean Region.

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

Experiment was designed with fourteen replications and disease severity was assayed in the plots at the mature-bolls stage. Different disease severity were obtained from the plots. Cotton were collected twice. The sum of collected cotton in two different times was counted as the yield of that plot.

The difference between the severity of wilt and yield loss was significant at the level of 10% (p:0.1) and regression line was found as $y = 0.34x—0.49$ (Reg. Plant Prot. Res. Inst., Bornova, İzmir).

1.6. GÖKSEDEF, M. O. Quantity of Phenolic Substances in the Bark Tissue of Some Citrus Species, and Activity of Peroxidase and Polyphenoloxidase in the Infection Site of **Phytophthera citrophthora** (Smith) Leonian.

The quantity of phenolic compounds in bark tissue was lowest in sweet Lemon, and increased in orance, lemon, grapefruit, and sour orange, respectively. A rapidly increasing peroxidase and polyphenoloxidase activity was observed up to 22 nd day after the infection in the samples taken 2.5 cm away from the infection point. The activity of two enzymes decreased rapidly after 22 nd day from the infection. Peroxidase spesific activitiy increased rapidly in barks samples of lemon that taken 5 cm away from infection point between 8 to 15 days and then began to decrease. An increase the peroxidase spesific activity began on 15 th day and continue up to the 22 day when the samples were taken 10 cm away from the infection point. Polyphenoloxidase spesific activity were high between 8 to 22 nd days in 5 cm away samples, and between 15 to 22 nd days in 10 cm away samples (Reg. Plant Prot. Res. Inst., Adana).

1.7. KARCILIOĞLU, A., E. ONAN, M. ESENTEPE and E. SEZGİN. Investigations on the Determination of the Diseases Occuring on Opium Poppy (**Papaver somniferum** L.) Growing Areas in Ege Region.

Opium poppy is an important oil-plant in the growing region. It is grown in the provinces of Uşak and Denizli only, in our Region. The present study which were carried out during 1981-1982 has aim to determine the disease agents and their prevelance in Uşak Province.

Survey studies were carried out in 3 stages, namely seedling, blooming and capsule stages. Isolations were made from diseased plants and the causal agents were identified.

As the results of the studies drying of plants, downy mildew of opium poppy, leaf and capsule spots and stem blight diseases were established (Reg. Plant Prot. Res. Inst., Bornova, Izmir).

1.8. OKTAY, M., E. E. ONOĞUR and H. ÇOLAKOĞLU. The Effects of Different Forms and Levels of Nitrogenous Fertilizers on Barley - **Helminthosporium sativum** P., ve B. Correlations and on the Intensity of the Disease.

This research has been conducted in order to determine the effects of different forms and levels of nitrogenous fertilizers on te spot blotch disease intensity of barley plant. The other aim of this study was to find out the relation between the disease intensity and the mineral constituents of this plant.

With this purpose, a pot experiment with four replications was carried out under controlled conditions. Increasing amounts of nitro-

gen 50-150-250 Kg N/Ha) were applied in in NO_3— and NH_4+ forms. Phosphorus (120 Kg P_2O_5/Ha) and potassium (80 Kg K_2O/Ha) were given in fixed amounts. Fifty-day old plants were inoculated with pathogen and five days after the inoculation, the intensity of the disease was observed. NO_3 and total N contents of the 5th leaf from the bottom and N, P, K, Ca and Mg contents of the aerial parts were determined.

Obtained results were as follows:

1. In comparison to the control pot, the dry matter yield of inoculated plants were found low in all of the N applied pots.

2. The second dose of N increased the intensity of the disease. On the other hand, NO_3 form of N decreased the intensity of the disease when compared to NH_4.

3. Both forms of N increased the leaf surface area.

4. Total nitrogen percentage and crude protein contents of the inoculated plants were found be high comparison to healthy plants. Similar conditions were determined for P, K, Ca and Mg (Ege Univ. Agr. Fac. Soil Dept. and Plant Prot. Dept., Bornova, Izmir).

1.9. ONAN, E. Investigations on the effect of the fertilizers Utilized in Cotton Growing on the Virulence of **Rhizoctonia solani** Kühn.

The effects of the fertilizers either in combination or individually (Potassium nitrate, Ammonium nitrate, Urea, Potassium chlorure, Potassium suphate, Triple superphosphate and Ammonium sulphate) is investigated on the virulence of **Rhizoctonia solani.**

Through the study it is observed that fertilizers influence the virulence of **R. solani.** Generally, there is a tendency with the N-fertilizers in icreasing the virulence but this is not the case with K-fertilizers. In the combinations N and K fertilizers, the disease severity is higher than K-fertilizers alone and lower than N-fertilizers alone (Reg. Plant Prot. Res. Inst., Bornova, Izmir).

1.10. SEZGIN, E., A. KARCILIOĞLU, M. ESENTEPE and E. ONAN Investigations on the Diseases that Detected on Some Commercially Grown Ornamental Plants in the Aegean Region.

Studies were covered the whole area of commercially grown ornamental plants in İzmir. Surveys were made during 1979-1980.

Disease and disease incidence were established occuring on both foliage and under-ground parts of cut-flowers, causal organisms of the diseases of pot and garden flowers, ornamental trees and shrubs were identified and pathogenicity tests were made in the necessary cases (Reg. Plant Prot. Res. Inst., Bornova, Izmir.)

1.11. SORAN, H. Warzelfaulekrankheiten an Kichererbser, Linsen und Bohnen.

In den letzten jahren haben die Leguminosen wegen ihren höhen

proteingehalt und auch Anbaumöglichkeiten in den Brachfeldern, mehr Bedeutung gewonnen. An mehreren Gebieten wurde Wurzelfaule als wichtigste Krankheit beobachtet.

Aus den erkrankten Pflanzen wurden bei Kichererbse: **P. ultimum, F. oxysporum, F. accuminatum;** bei Linsen: **P. ultimum. R. solani, F. oxysporum, F. acuminatum, R. solani** und **F. rodolens;** bei Bohnen **P. ultimum, R. solani, F. acuminatum, F. culmorum, F. equiseti, F. redolens, F. solani** isoliert (Lehrsthul für Biologie Naturwissenschaftliche und Literaturwissenschaftliche Fakultaet der Çukurova Universitaet, Adana).

1.12. YILDIZ, M. and S. ERKAN. The Studies on the Reaction of the Pepper Cultivars to the Important Causal Agents **(Phytophthora capsici, Verticillum dahliae** and Tobacco Mosaic Virus «TMV»).

In the presents, study, 90 pepper cultivars obtained from various Institutions or collected from the region were screened against three important pepper diseases the control measures of which were difficult in general and their reactions were noted. In conclusion, it was observed that the p'ants belonging to **Capsicum chacoense** species were almost not affected at all by these three causal agents whereas all of other pepper cultivars were infected by the same agents, though different in severity. In the same study, it was experimentally determined that TMV was transmitted by seeds in most of pepper cultivars under test (Ege Univ. Agr. Fac., Plant Prot. Dept., Bornova, Izmir).

2— BACTERIA

2.1. ÇINAR, Ö. Die Untersuchungen Über Der Identifizierung, Bekaempfungsverfahren Und Resistente Tomatensorten Gegenüber Bakterielle Tomatenwelke (**Corynebacterium michiganense** (Erwin. F. Smith) Jensen).

23 Tomatensorten wurden auf Anfaelligkeit gegenüber **C. michiganense** durch Wurzelinfektion getestet. Nach den hervorgerufen Symtomen und der Bakterienvermehrung im Pflanzen zeigten sich die Tomatensorten Lucy, Tobol (748) und VFN 8 wening anfaelling.

Um die geeigneten chemischen Praeparate gegen bakterielle Tommatenwelke auszusuchen, wurden Brassicol, Derasol, Dithane, M22 Femaset in 0.2% von Trockenbeizpraeparaten; Formalin in 0.1%, Polyram combi und Tiezene in 0.3% von Nassbeizpraeparaten und Streptomycin sülfade in 300 ppm von Antibiotika im Gewaechshaus und auf dem Feld untersucht.

Nach den Ergebnissen haben von den Trockenbeizpraeparaten Femaset und von den Nassbeizpraeparaten Tiezene gegen die bakterielle Tomatenwelke gute Engebnisse gebracht (Lehrstuhl für Pflanzenschutz, Landwirtschaftliche Fakultaet der Çukurova Universitaet, Adana).

2.2. ÇOLAK, Ö. Die Übertragung der fähigkeit zur Tumorinduktion von **Agrobacterium tumefaciens** auf **Agrobacterium rhizogenes.**

Eine virulentes Derivat von **A. rhizogenes** und der virulente Stamm B6-806 von **A. tumefaciens** wurden durch eine Reihe biologischer und biochemischer Reaktionen charakterisiert. In einem invitrotransfer-Experiment wurde die Fähigkeit zur Induktion unarganisierter Tumoren von **A. tumefaciens** auf **A. rhizogenes** übertragen. Nacher wurden die optimalen Bedingungen ermittelt, um höhste Transkonjugantezahl zu bekommen (Naturwissenschaftliche Fakultaet der Çukurova Universitaet, Adana).

2.3 DÖKEN, M. T. Morphological Variation in the Cultures of **Colletotrichum atramentarium** (B. et Br.) Taub. and the Pathogenicity of the Variants on Some Potato Varieties.

A morphological variation as sectoring occur in the cultures of **Colletotrichum atramentarium** (B. et Br.) Taub derived from the sclerotial and mycelial types of isolates made from the under ground parts of infected potatoes grown in Erzurum and Pasinler Plains. Light has a very little stimulatory effect on variation, although it increases sporulation. No variation appear in the single spore cultures even after prolonged subculturing. But variants are formed in cultures derived from inoculum containing a heterokaryon or mixed homokaryons. The genetically different hyphae arise as a result of heterokaryosis or break down of heterokaryons into homokaryons produce morphologically different sectora in cultures. All variants show almost same degree of virulance on potatoe cultivars Arı, Cossima and Izola in which Arı is being more-susceptible than others (Atatürk Univ. Agr. Fac. Plant Prot. Dept., Erzurum).

2.4. KARACA, I. and H. SAYGILI. Investigations on Disease Rate, Causal Agents and Symptoms of Bacterial Diseases of Tomatoes and Sensitivity of the Host Varieties in Some Parts of Western Turkey.

Three types of bacteria are isolated from field grown tomatoes in Izmir, Manisa, Balıkesir, Bursa and Çanakkale districts. These three bacteria respectively are **Pseudomonas tomato** (OKABE) Alstatt, **Corynebacterium michiganense** (E. F. SMITH) and **Xanthomonas vesicatoria** (DOIDGE) Dowson.

Amongst these bacteria, **P. tomato** was wide-spread throughout the region, **C. michiganense** was effective in Manisa, Balıkesir and Çanakkale, whereas **X. vesicatoria** was only effective in Çanakkale.

As result of pathogenicity test for these bacteria on 6 tomato cultivars, ROMA VF and C-33 cultivars are fonud to be most resistant whereas PETOMECH and H-2274 are found to be less resistant.

Amogst the 6 isolates tested, isolate of **P. tomato** (LE 26/1) and **C. michiganense** (LE 140/1) were pathogenic on all the tomato cultivars.

Biochemical and pathogenic tests for the bacteria isolated from pepper plants showing the disease symptoms like **X. vesicatoria** leaf spot gave no positive results (Ege Univ. Agr. Fac. Plant Prot. Dept., Bornova, Izmir).

2.5. ÖKTEM, Y. E. Studies on Antisera Production and Bacteriophage Isolation in Identification of **Corynebacterium michiganense.**

Bacterial cancer of tomato is quite a widespread disease in Turkey. Reliable methods which would lead to prompt results is higly needed in identification especialy certification and other plant protectional matters related to the pathogen. To identify the pathogen antisera is produced and bacteriophage is isolated. Isolations are made through selective media on various soil samples and diseased plant material collected from Ankara and some other cities. Antisera-bacteriophage is used in identification of the cultures obtained from the above mentioned materials which gave a positive reaction. In this way, the time needded for identification which is approximately 12-14 days, has been shortened to 48 hours as a consequence of serum-bacteriophage usage (Ankara Univ. Sci. Fac., Biological Dept., Ankara).

3— VIRUSES

3.1. AÇIKGÖZ, S. and A. ÇITIR. Some Studies on Virus Diseases of Dry-Bean Produced in Narman (Erzurum).

Dry-bean production is one the traditional agricultural practice in Yoldere, Yanıktaş and Samikale villages of Narman County in Erzurum Province. A study which started in 1980 have been releaved that an infectious disease on bean plants caused mosaic, leaf-rolling and reduction of the yield prevailing in those villages. As the result of an inspection in laboratory, there were no fungal, bacterial and the other pathogenic agents on the samples of those mosaic infected beans. So it could be predicted that a virus could be responsible of the disease.

Mechanical inoculations were made from infected bean plants to a number of virus indicators which include two cultivars of **Phaseolus vulgaris L.** revealed that causal agent could be transmissible to some indicator plants and cause some mosaic symptoms on both of those indicator beans. The search for the identification of the pathogen is still going on. But depending on the collected data, it could be said that the causal agent of bean mosaic disease has a virus nature (Atatürk Univ. Agr. Fac. Plant Prot. Dept., Erzurum).

3.2. AZERİ, T. Tomato Spotted Wilt Virus, (TSWV) and Its Symptoms on the Different Host Plants.

Durig the recent years, tobacco plants was seriously damaged in some tobacco growing areas of Çanakkale province due to the attack and the epidemy of Tomato Spotted Wilt Virus (Lycopersicon Virus 3). A survey was made between 1980-1981 in the tobacco fields.

The typical symptoms of TSMV, concentric rings with a central spot, large plaque like lesiöns with concentric zones or necrotic tissue, necrotic lines mainly along the side of vein, apical necrosis, stunting and leaf malformation have been observed on the infected tobacco plants. Sap-inoculation tests with sensitive herbaceous host plants and the physical property tests have been revealed that, the causal virus is TSWV. It has been experimentally shown that **Thrips tabaci** L. was responsible from the epidemy of TSWV in the survey areas (Reg. Plant Prot. Res. Inst., Bornova, Izmir).

3.3. ÇITIR, A. Virus-Free Cosima Seed Potato Production in Erzurum Plain.

In order to obtain virus-free potato clones in Erzurum Plain a study was initiated in 1977. Potato tubers, free from bacteria, fungi and nematodes were selected from the samples which were collected from growers. Seed material were prepared for virus tests by growing incised buds from the tubers. Only the potato plants free from spindling-tubers and leaf-roll symptoms were allocated for virus tests. Separate sap-inoculations were made to nine different virus indicator plants from every potato plant. As the result of all these tests only one Cosima tuber, taken from Ortabahçe Village of Aşkale County was found as a healty clone. Thus by multiplying this, an initial clone free from all viruses, fungi and bacteria was obtained (Atatürk Univ. Agr. Fac. Plant Prot. Dept., Erzurum).

3.4. ERKAN, S. and N. DELEN. The Preliminary Studies on the Effectiveness of Carbendazim on the Infection of Tomato Mosaic Virus (TMV).

In the result of experiments carried out in green-house, it was found that all types of applications of carbendazim reduced the accumulation of TMV in totato plants. It was determined that this reduction observed in the accumulation of TMV was more remarkable when carbendazim was applied to plants at the doses of 0.24 mg/ml and 0.36 mg/ml after virus inoculation and the dose of 0.60 mg/ml before virus inoculation. In the result of this study, total chlorophyll content was greater in the tomato plants treaed with carbendazim after virus inoculation than in the infected and untreated plants. In the present study, furthermore it was observed that carbendazim had on effect on the plant growth and the symptom appearance. (Ege Univ. Agr. Fac. Plant Prot. Dept., Izmir).

3.5. ERKAN, S. and Ü. YORGANCI. The Studies on the Inhibition of Tomato Mosaic Virus Infection by Certain Detergents.

Among the detergents in this study, MG, D 10 and Pril greatly inhibited the infection of Tobacco Mosaic Virus-tomato strain on **N. glutinosa** test plants. The results from the studies showed that the most of detergents were phytotoxic when applied without diluting. When the mixtures of virus and detergent were diluted with buffer and inoculated on various host plants, there was no remarkable change in the inhibitory action. Moreover, it was also found that when detergents were applied before virus inoculation and sprayed onto the lower surfaces of leaves, they inhibited TMV infection at high level. In the electron microscobical studies, it was observed that detergents caused the aggregation of virus particles. Therefore, it is supposed that the detergents under test act on both virus and the host plant and prevent the infection (Ege Univ. Agr. Fac. Plant Prot. Dept., Bornova, Izmir).

3.6. GÖKSEDEF, M. O. Obtaining of Viroid, **Spiroplasma** and Virus Free Citrus Plants by Shoot Tip Grafting **in Vitro.**

Viroid, spiroplasma and virus free citrus plants as true to-type were obtained from infected plants by shoot tip grafting. Almost all of citrus trees in Mediterranean region have been infected with one to several virus, viroid and spiroplasma pathogens. Two weeks old Troyer citrange seedlings were used for shoot-tip-grafting in aseptic conditions. 0.14-0.18 mm long apical meristem along with three primordial leaves of shoot tips was used for grafting of canditate plants which contaminated with above pathogens. Virus free plants can be used in citrus bud wood improvement program (Reg. Plant Prot. Res. Inst., Adana).

3.7. TUZCU, Ö., A. ÇINAR and M. O. GÖKSEDEF. Studies on the distribution of Stubborn disease of Citrus in Içel Province in 1982.

During the survey carried in 1982, it was found that an average of 10.36% the Washington navel orange orchards was contaminated with stubborn **(Spiroplasma citri)** in İçel, This rate was varied from 4.46 to 55.83% in the villages. The 84.53% of the contaminated orchards was located in central county. Heavy disease symptoms were observed in 45.03% of the diseased trees and this rate varied between 9.27 to 76.82%.

A periodic survey studies in citrus areas will be very benefical in order to determine the spread of the disease and to provide some information for control measures (Çukurova Univ. Agr. Fac., Adana).

3.8. TÜRKOĞLU, T. and Ü. FİDAN. Investigations of Virus Diseases Infecting Some Commercially Grown Ornamental Plants in Ege Region.

In Ege Region, investigations were carried out to establish the

diseases and pests of commercially grown ornamental plants together with the control measures of economically important ones.

Investigations which were concerned with the viruses of ornamental plants were carried out in our laboratory.

During survey studies, which were covered both field and green house grown plants, it was noticed that the virus diseases were widespread and still spreading progressively due to the vegetative reproduction.

Further investigations were concerned with the establishment of virus infections of some ornamental plants and their reproduction materials. Preliminary identifications were based upon the symptoms observed on host plants (Reg. Plant Prot. Res. Inst., Bornova, Izmir).

4— MISCELLANEOUS

4.1. ÇINAR, A., Ö. ÇINAR and M. BIÇICI. The Plant Protection Clinic in Çukurova.

Plant protection clinics have many functions such as to relate disease informations to growers, educate graduate students, train extension situations and information for the possible initiation of related research programs according to diseases of region crops and finally self-teaching for faculty. Plant protection clinics have been initiated in Çukurova region since early 1982 for above mentioned tasks. With regard to regional crop production three pilot localities which have different agricultural activities were selected on the basis of their extensivity. These localities include green-house and plastic cover vegetable growings, citrus areas and field crops. They were examined every ten days by experts one of plant pathology and entomology with doctorants. It has been tried to teach the difficulties, identical viewpoints, diagnosis and protection and control measures of plant pathology and entomology to graduate students. There were also offered some informations and practices to growers and solutions to their problems. As a result of plant protection clinic activities some new diseases and pests were recorded for the first time in Çukurova and neighbouring aereas (Çukurova Univ. Agr. Fac. Plant Prot. Dept., Adana).

4.2. KARACA, I. et E. ULUĞ. Les Recherches sur les Espéces des Mauvaises Herbes, Leurs Phénologies, Leurs Distributions et les Possibilitiés de Lutte Contre Celles dans le Vignobles du Province de Manisa.

Dans ces recherches on, a été réalisées leurs détérminations, leurs phénologies, leurs distiributions et avec leur possibilité des herbages qui se posent des problémés aux vignobles de Manisa ou les cultures des vignobles sont le plus intensif.

Les trois principaux muavaises herbes entre les éspeces 151 de la flore hivernale sont **Matricaria chamomilla** L., **Anthemis** spp. et **Bromus tectorum** L., et entre les éspeces 62 de la flore aestivale sont **Cynodon dactylon** (L.) Pers., **Sorghum halepense** (L.) Pers. et **Cyperus rotundus** L.

En ce qui concerne de desherbages contre les adventices vivaces, les trois applications de Gromoxon et une application de Weedazol TD + Dowpen ort étaienst supérieur par comparaison les trois fois piochements. Par le piochement, Caragard-combi + Ansar 529 HC, Weedazol TD + Dowpon et Gesaprim-S + Dowpon ont été influeencés positivement sur les longeur des sarments selon les parcelles témoins. D'autre part aucuns traitements n'ont pas manifestés un éffet different sur les bourgeonnements et n'ont pas été phytotoxique (Ege Univ. Agr. Fac. Plant Prot. Dept. Reg. Plant Res. Inst., Bornova, Izmir).

4.3. ÖĞÜT, M. Combined Treatments of Wheat Seeds and The Effective Factors on the Storage of Treated Seeds.

Wheat seeds are treated with different fungicides containing different activite ingredients against common bunt and also this application can be combined with the insecticide treatments against soil and storage pests.

Following these applications treated seeds can be stored for short or long periods. Depending upon the period of storage the effectiveness of chemicals, germination and emergence rates seeds can affected negatively.

The results of the various studies revealed that this problem is in relation to the kind and dose of the chemical, variety, quality and humidity of seed, temperature and relative humidity of store together with period of storage and type of the store (Reg. Plant Prot. Res. Inst., Bornova, Izmir).

4.4. SAYDAM, C. Plant Protection in Turkey and its Problems today and Opinions on Their Solution.

Plant protection has a great importance in order to obtain healthy crops and the chemical control method is common throughout the world. In this paper the problems of the plant protection in Turkey and the opinions on their solution were discussed (Reg. Plant Prot. Res. Inst., Bornova, Izmir).

b.5. YILMAZ, M. A. and S. BALOĞLU. The Past, Present, and Future of Phytovirology in Turkey.

Considering Phytovirology in Phytopathology, special laboratory and greenhouse requirements, and the needs of specialists have limited

phytovirological studies to be classical in Turkey. Most of the studies have been restricted to the surveys of the viruses causing damages to cultural plants; rate of damages; and identifications by host-range. But some studies on morphology of virus particles, virus-vector relations, and use of serology for identification have also been carried out. These studies, however, are at their beginning phase. A determination of new viruses by means of biophysical and biochemical ways, structure and traslocations of viral proteins and nucleic acids, and other similar studies cannot be carried out in Turkey due to lack of necessary laboratory facilities.

Of 25 Phytovirologist in Turkey; 2 are professors, 2 are associate professors, 5 are doctors, and the remaining are at master level. There are no, but one, institutions in Turkey having complete virus laboratory and green house facilities. Among the studies conducted in Turkey, 16% of the virus studies were on citrus, 13.6% on tomatoes, 10.2% on potatoes, 8% on broadbean, 8% on bean, 6.8% on viticulture, 5.7% on tobacco, 5.7% on pepper, 3.7% on floriculture, 3.7% on banana, 3.7% onlettuce, 3.7% on wheat, 3.7% on fig, 1.13% on soybean and the rest on other plants (Çukurova Univ. Agr. Fac. Plant Prot. Dept., Adana).

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