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SUMMARY (IN ARABIC)

SUMMARY (IN ENGLISH)

Cucumber wilt and root-rot diseases are considered the cause of great yield losses in Egypt either in open field or in protected cultivation. Extensive cultivation of susceptible genotypes in the same area in open fields or in greenhouse leads to the increase of the soil borne pathogens particularly the causal organisms, of the above mentioned diseases and due to early onset of epidemic cases. Therefore, in the course of the present study, isolation, purification and identification of the soil borne pathogens were studied. Also, the factors affecting the occurrence frequencies of the dominant pathogens specially the causal organisms of wilt and root-rot were studied. The results obtained can be summarized as follows:

Studies on the occurrence and frequencies of the causal organisms showed that many *Fusarium* species were isolated. These species were *Fusarium oxysporum, F. solani, F. moniliforme, F. ovenaceum, F. chlamydosporum, F. equesti* and *F. lateratum*.

In this study, the research work was started by collecting infected roots and stem bases of cucumber plants, with root-rot and wilt symptoms, from different locations of the country. The infecting and associated fungi were isolated and identified to determine the frequency of distribution of them according to the locations. The results obtained revealed that *Fusarium oxysporum* f. sp.

cucumerinum was the most dominant pathogen in most locations while *F. solani* was in the second rank in its frequency. The rest of *Fusarium* spp. were found in low frequencies.

The frequency of occurrence of the soil borne pathogens was studied during three successive seasons i.e. 2005, 2006 and 2007. In this study, samples of infected plants (roots and crowns) were collected from different locations in Egypt from the cucumber growing areas. The results obtained showed that, the Egyptian soils are contaminated by various pathogens and associated fungi. The fungi were *Fusarium* spp. *Rhizocotnia solani, Macrophomena phaseolina*, *Pythium* spp., *Verticillium* spp. and some other fungi of low frequencies. The isolated fungi characterized by unhomogenous distribution; some of these fungi appeared all over the three seasons like *Fusarium* spp. while the others appeared in some seasons and not in the others like *Rhizoctonia solani* and some of the rest of the isolated soil borne pathogens. The samples collected from the open fields in Minufiya governorate showed the highest frequency compared to the other locations. Also, *Fusarium* spp. were dominant in the three seasons (2005, 2006 and 2007) while frequencies of the other isolated fungi were different from a location to another and from season to season.

On the other hand, in protected system frequency of occurrence of the soil borne fungi from cucumber plants was

recorded also in the three seasons. The higher frequency of *Fusarium* spp. was appeared in all governorates in all seasons. The highest frequency of isolates was in Minufiya in 2007 season (45%) while the lowest frequency was found in Sharkiya in 2005 season (2.77%).

Critical study was carried out on *Fusarium* spp. from samples collected during the three seasons (2005 – 2007) showed that different species of *Fusarium* spp. were isolated. These species were *F. oxysporum, F. solani, F. chlamydosporum, F. avenaceum, F. moniliforme, F. equesti* and *F. lateratum*. *F. oxysporum* was the most dominant pathogen.

The viability of chlamydospores of both pathogens was also studied at different periods of storage. The results obtained gave low level of spore germination at the time of storage which decreased at thirty days in storage and then increased and back again decreased. However, after 270 days there were a significant number of viable chlamydospores which were found.

The effect of inoculum density on disease incidence as disease severity and disease index was studied in pot experiment under greenhouse condition using four levels of inoculum. These levels were 500, 1000, 2000 and 4000 spore / ml which added to the soil before sowing. Generally disease incidence was increased significantly by increasing the inoculum density for all treatments.

These results confirmed that the disease incidence or the epidemic onset was affected by the level of inoculum density.

Frequency of occurrence of both *Fusarium oxysporum* f. sp. *cucumerinum* and *F. solani* was higher in the sandy soil than in the loamy soil. However, *F. oxysporum* was higher than *F. solani* due to the structure of the soil.

Frequency of isolation of *Fusarium oxysporum* f. sp. *cucumerinum* from cucumber plants was higher than the other two crops i.e. tomato and faba bean. Difference between 2005 and 2007 seasons not significant. While frequency of isolation after tomato and faba bean was lower than after cucumber plants due to the specialization of *Fusarium oxysporum* to cucumber plants. On the other hand, frequency of isolation of *F. solani* was variable according to the season of cultivation and the cultivated previous crop. The variability obtained from samples collected after cucumber, tomato and faba bean was clear. *F. solani* is a non specific pathogen therefore, it gave variable frequencies of concurrence due to the host pathogen relationship.

Different samples were taken from the commercial fields from which both pathogens were isolated and identified. The results obtained showed that the frequencies of isolation were different according to the season of cultivation. The frequencies of occurrence were higher in the summer season than both autumn and winter

seasons for both pathogens. However, the frequency of occurrence was higher in 2005 than in 2006 and 2007. These results may be due to the suitable environment prevailing in the summer than the other seasons. On the other hand, the frequency of occurrence of *F. solani* was lower than *F. oxysporum* f. sp. *cucumerinum* during the three seasons because it is non-specific and affected by the host-pathogen relationship.

No specific trend was found during the three seasons of the study either in the greenhouse or in the open field.

The dynamics of frequency of occurrence of *Fusarium oxysporum* f. sp. *cucumerinum* as colony forming unties (cfu), disease severity and disease index were determined at the different stages of growth. These growth stages were seedling, vegetative, flowering, fruiting and maturity. The results obtained showed an increase in the value of cfu by increasing the growth stage. This result was in correspondence with the disease incidence as disease severity and disease index. The increase in cfu accompanied with the disease severity value. Moreover, the incidence of disease as disease severity, disease index and the concentration of cfu was higher in Shibin El-Kom than in Quesina locations.

Three different cucumber genotypes were tested against different isolates of *Fusarium oxysporum* f. sp. *cucumerinum* and *F. solani* in three seasons. These seasons were summer, autumn and

spring. The results obtained showed that infection of both diseases were higher in summer and spring than in autumn on most genotypes.

Five groups of genotypes of cucumber were tested against three pathogens. These pathogens were *Fusarium oxysporum* f. sp. *cucumerinum*, *F. solani* and *F. avenaceum*.

Generally, no complete resistance were obtained which showed the need to resistant genotypes of cucumber.

Cluster analysis to differentiate the DNA profiles of twenty isolates of *F. oxysporum* f. sp. *cucumerinium* that were isolated from wilted and root rotted cucumber plants. The primer showed total number of scorable bands (39 bonds) ranged from 100 bp to 1731 bp, all of them were polymorphic (100%). It was found that the total number of loci detected was 87 with an average of 4, 35 loci per isolate. *F. oxysporum* isolates 2, 4 and 8 showed six loci, where isolate 15 showed the lowest number (1 loci). UPGMA cluster analysis of the twenty isolates devided these isolates into two subclusters, the first included seven isolates (1, 2, 10, 5, 6, 12 and 3) the more virulent, while the second subcluster included the rest thirteen isolates (4, 7, 17, 8, 16, 9, 13, 15, 14, 11, 18, 19 and 20). High similarity was detected between the two sub clusters (58.93%). The sub clusters were divided into four grades of sub clusters with highly similarity up to 97.88%. The DNA fragments 737, 430 were

the common detectable bands between the highly and moderately virulent isolates. It could be the carrier of the genetic information affecting the virulence of *F. oxysporum* f. sp. *cucumerinum* to cucumber plants.

The results also revealed a significant suppression of both diseases of cucumber either by the bioagents or by composts.

The bioagents i.e. *Trichoderma harzianum*, *T. hamatum* and *T. viride* were tested against the most common isolates of the causal organisms of both diseases, *in vitro*. The results obtained showed that *Trichoderma* spp. inhibited the growth of both pathogens. The percentage of reduction of *Fusarium oxysporum* reached 80.0% with *T. hamatum* followed by the effect of *T. harzianum* and *T. viride* which gave 76.6 and 64.0%, respectively, in comparison with the control treatment.

In loamy soil, the wilt and root rot suppression was measured by disease severity and disease reduction. The results obtained on wilt showed that the disease incidence was suppressed by all isolates of the bioagents. *T. harzianum* was the most effective (73.0%) in comparison with the others *Trichoderma* spp. and the control treatment. On the other hand, root rot was suppressed by *T. hamatum* which gave the lowest disease severity (0.25) with 50.13% reduction in comparison with the other bioagents and control treatment.

In sandy soil, the results obtained revealed that wilt disease was suppressed by *T. harzianum* with 0.18 disease severity and 80.22% disease reduction in comparison with the other bioagents and control treatment. On the other hand, the results obtained revealed that root rot was suppressed by T. *hamatum* with 0.24 disease severity and 72.41% disease reduction in comparison with the other control treatments.

The effect of different composts on wilt and root rot incidence was studied. These composts were cow manure, chicken manure, horse manure and plant debris. The experiment was carried out in split block design in pot experiment under greenhouse condition in loamy and sandy soils.

In loamy soil, the plant debris showed the lowest disease severity (0.47) and highest disease reduction (48.5%). While chicken manure showed the highest disease severity (0.63) and lowest disease reduction (30.8%). Cow manure gave 0.55 disease severity with 40.0% disease reduction. The horse manure showed 0.60 disease severity with 34.1% disease reduction compared to the control (only compost) and the control (compost free) which gave the highest level of disease severity.

Data on root-rot disease caused by *Fusarium solani* under the effect of horse manure, revealed the highest disease severity (0.65) and lowest disease reduction (23.5%).

Chicken manure showed also high disease severity (0.60) with 29.2% disease reduction, plant debris gave 0.59 disease severity with 30.7% disease reduction while cow manure showed the lowest disease severity (0.56) with 34.2% disease reduction compared to the control treatments.

On the other hand, in sandy soil, chicken manure showed the highest effect and suppression. It gave 0.61 disease severity with 33.1% disease reduction while the horse manure gave 0.51 disease severity with 44.1% disease reduction, cow manure gave 0.45 disease severity with 50.6% disease reduction. Also, plant debris showed the lowest disease severity (0.41) with 55.1% disease reduction compared to the different control treatments.

In root-rot, chicken manure gave the highest disease severity (0.57) with 32.9% disease reduction while cow manure gave the lowest disease severity (0.50) with 41.0% disease reduction. The other composts i.e. hourse manure and plant debris gave 0.53 and 0.55 disease severity with 3.7 and 35.2% disease reduction, respectively, compared to the different controls.