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EFFICIENCY OF ISOLATES OF TRICHODERMA SPP. TO SUPRESS RHIZOCTONIA SOLANI IN SESAME

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Abstract:

Fifteen isolates of Trichoderma spp. from rhizosphere and rhizoplane regions of sesame plants were isolated on Tomato Paste Agar medium. The antagonistic activities of these isolates against R. solani; the causal agent of damping-off in sesame were invistigated under field conditions. Data of total lost in seedlings revealed significant variations among the isolates of Trichoderma spp. However, the lost percentage was significantly reduced when the isolates T5, T17 and T21 were used. The lost percentages were 25.28, 27.14, and 25.53 respectively in comparison to 89.90% when R. solani was used only. The results showed that most isolates of Trichoderma spp. used in this study be able to supress R. solani in spite of heavy inoculum used.

INTRODUCTION

Rhizoctonia solani Kuhn, probably causes different types of diseases to a wider plant cultivars over a large part of the world and under more diverse environmental conditions than any other plant pathogen (1,2). However, damping -off of seeds and seedlings is responsible for remarkable losses in many crops. In United States, the

losses specially mentioned for R. solani during one year on cotton, dry beans, green snap beans, potato, and tomato transplants totaled nearly $6 millions (3). Recently the Rhizoctonia damping- off in sesame was reported to cause a high percentage of reduction in survivals during 30 days (4). Thus, this pathogen may destroy the entire field of sesame in area highly infested.

Regarding disease control, broad spectrum fungicides or soil fumigants could be used (5), but it is expensive and may establish imbalances in the microbial community unfavorable for activity of benefcial organisms (6). Meanwhile numerous attempts have been conducted on the use of Trichoderma spp. to control damping-off or to surpress the activity of R. solani in the soil (7-8-9). However, extensive commercial application of the agents to control such disease has not been occurred. This may be due to the failure of biocontrol agents for matching the efficiency of certain fungicides (10). In our institute, two programms have been in progress, first one oriented for selection Rhizoctonia-Macrophomina resistant lines from certain sesame induced mutants throughout a screening procedaure in artificially infested soil. The other one has been dealing with the biological control.

The study reported here was initiated to select the high antagonistic isolates of Trichoderma spp against R. solani in sesame.

MATERIALS AND METHODS

During 1985, soil samples collected from rhizosphere and rhizoplane of sesame roots were tested for isolation of Trichoderma spp. using soil dilution method (11). The soil samples were collected from two locations namely Babil and Baghdad where seseame has been cultivated for many years. The isolation of Trichoderma spp. was conducted on Tomato Paste Agar (TPA), 50g. tomato paste, 3g calcium carbonate and 15g purified Agar in 1000 ml of distilled water. The medium was amended with Tryton 100(4ml/IL) to inhibit the growth of Rhizopus spp. . All

the plates were incubated at 26°C with 12 hr photoperiod. Three to four days later, a hyphal tip from any Trichoderma colony was cut and transfered to another TPA plates. All Trichoderma isolates were grown on Potato Dextrose Agar, Tomato Past Agar, Mycological Medium, Corn Meal Agar, and Water Agar for cultural characteristics and distinction of different isolates.

To evaluate the efficiency of these isolates to supress R. solani in sesame field, three of 20 m^2 field plots with three rows in each were used as three replicates for each isolate. Prior to soil infestation, R. solani isolate 178 and isolates of Trichoderma spp. were grown on Mycological medium and Tomato Paste Agar respectively for one week. For soil infestation, 500 ml. of fragment suspension (9.87×10^5 /ml) of R. solani and 500 ml of each isolate of Trichoderma (3.6×10^6 spores/ml) were mixed and used as inocula for each plot. Three field plots were recieved R. solani alone while other three plots were used as a check treatment. Immediately after infestation each row was seeded with 300 surface sterilized seeds with $HgCl_2$ 0.2% for 2 minutes. The seeds then were covered and the plots were irrigated. Number of survivals was counted at day 10,20 and 30 after seeding. The data of survivals were converted to obtaine the percentage of lost based on the survivals at the check treatment. Analysis of variance was used to evaluate the efficiency of Trichoderma isolates in disease control (12).

RESULTS AND DISCUSSION

Fifteen different isolates of Trichoderma spp. were obtained as a result of culturing soil dilution of both rizosphere and rhizoplane regions of sesame healthy plants. From Rhizoplane of Babil samples, T5,T6, and T17 were isolated while T8,T9,T10,T11,T12,T13,T15 and T16 were isolated from rhizosphere regions. The other isolates namely T21,T23,T25 and T26 were isolated from the rhizosphere of Baghdad samples.

Damping -off induced by R. solani were similar to pervious description (4) and became apparent 4 days

after soil infestation. Meanwhile, control seedlings in a check treatment remained free of infection during the first 10 days with slight losses in the following period. However the disease incidence at first reading consist of both pre and post emergence damping-off. The incidence continued to increase in different manner due to the efficiency of supperssiveness to R. solani by Trichoderma isolates particularly the supress of post-emergence incidence. However, only the 30-day ratings were analyzed bacause this latest rating could be the best in separating the efficiency of all isolates of Trichoderma spp. in disease control.

of 15 Trichoderma isolates tested in the field, 3 reduced the incidence of Rhizoctonia damping-off in sesame to 25-27% as compared with 89.90% disease incidence in R. solani infested soil (Table 1). However the other isolates showed significant reduction in disease incidence which reflected in the total lost. The best three antagonistic isolates against R. solani were T5, T17 and T21. The method of soil infestation used in this test was adopted in order to select the best isolate of Trichoderma having remarkable overgrowth and antagonsitic activity on heavy and fresh inoculum of R. solani at seed beds. The three isolates were successfully proved their activity against R. solani when they added to Rhizoctonia infested soil or when their spores were used as seed coating (unbublish data).

Thus, in spite of using heavy inoculum of R. solani, our data exhibited promissing results in disease control of Rhizoctonia damping-off in sesame by local isolates of Trichoderma spp. from sesame healthy plants. Similar results were obtained in field experiments on Fusarium crown rot of tomato by Trichoderma, Aspergillus, and Pencillium (13). Considering the biological control, the antagonists usually were selected for inhibit a pathogen under pure culture condition (5). However, the antagonistic phenomenon failed to reduce disease incidence when applied under field conditions. This might be due to the fact that the environmental conditions in agar plates are not related to those in the soil. Therefore the success of reducing disease incidence under

Table 1: The efficiency of *Trichoderma* spp. in disease control of *Rhizoctonia* damping off in sesame.

Trichoderma spp. isolates	Percentages of total lost based on control		
	10 days	20 days	30 days
R. solani	52.63	69.28	89.90
R+T5	13.16	19.10	25.28
R+T6	22.38	36.79	40.07
R+T8	17.21	32.87	35.27
R+T9	43.11	64.73	73.32
R+T10	34.26	39.19	44.50
R+T11	34.13	38.68	40.96
R+T12	23.13	32.49	35.39
R+T13	14.79	28.32	40.58
R+T15	20.23	25.92	35.78
R+T16	28.57	37.42	42.60
R+T17	22.10	24.61	27.14
R+T21	13.53	22.25	25.53
R+T23	36.66	43.48	45.64
R+T25	27.94	33.25	36.79
R+T26	45.89	60.05	64.47
Control	0.0	4.17	11.50
LSD P=0.05			15.78

growth chamber and green house conditions in pot experiments could be attributed to the formation of microbial community which inhibited the saprophytic activity of the pathogen rather than to detrimental interaction of the pathogen with the antagonists (14).

In general, further tests will be performed to select the inoculum level of both R. solani and Trichoderma spp. and the method of application of the three isolates (T5, T17 and T21) of Trichoderma spp. in Rhizoctonia infested soil.

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مجلة البحوث الزراعية والموارد المائية - المجلد ٧ - العدد ٢ - ص ١٠٧-١١٤ تشرين الاول ١٩٨٨

كفاءة عزلات الفطر ترايكودرما في اعاقة نمو الفطر الممرض Rhizoctonia solani في السمسم

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المستخلص:

تم الحصول على خمسة عشر عزلة من الفطر Trichoderma spp. عند زراعة معلق التربة المحيطة بجذور نباتات السمسم السليمة على الوسط الغذائي الحاوي على معجون الطماطة . وقد اختبرت كفاءة هذه العزلات ضد الفطر R. solani المسبب لموت بادرات السمسم تحت الظروف الحقلية . تشير نتائج النسب المئوية للخسارة في اعداد النباتات الى وجود اختلافات معنوية بين العزلات . ولذلك فان الخسارة الكلية لعدد النباتات بعد ٣٠ يوما قد اختزلت معنويا بواسطة العزلات T5 و T17 و T21 من الفطر Trichoderma spp. حيث كانت 25.28 و 27.14 و 25.53% على التوالي مقارنة بالخسارة الحاصلة عند استخدام الفطر الممرض لوحده 89.90% . ان النتائج المستحصل عليها في هذه التجربة تشير الى ان معظم العزلات قد اعطت نتائج مشجعة في مكافحة المرض .