COMUNICAÇÃO

EVALUATION OF SOYBEAN GERMPLASM FOR RESISTANCE TO *RHIZOCTONIA SOLANI* KUHN

ABSTRACT

A rapid method of screening soybean populations for resistance to damping-off and root hypocotyl lesions incited by *Rhizoctonia solani* Kuhn is presented.

Nine cultivars and thirty plant introductions (PI's) of soybean were tested in growth chambers under favorable conditions for pathogenic activity of the fungus.

Even though, no significant source of resistance has been found compared to the susceptible cultivar Chippewa 64, it does not exclude the possibility of getting satisfactory results with this method in future experiments using a more diverse population.

(Fitopatologia Brasileira 3: 205 - 209, 1978)

RESUMO

Avaliação do germoplasma de soja quanto à resistência a *Rhizoctonia solani* Kuhn

Um método rápido para se detectar resistência ao "damping-off" e lesões da raíz e do colo causada por *Rhizoctonia solani* Kuhn em soja é apresentado.

Nove cultivares e trinta introduções (PI's) de soja foram testadas em câmara de crescimento sob condições ambientais favoráveis à atividade patogênica do fungo.

Embora nenhuma significante fonte de resistência tenha sido encontrada em relação à cultivar Chippewa 64, não se exclui a possibilidade de se conseguir resultados satisfatórios com o presente método, em futuros ensaios, utilizando-se um maior diversificação populacional.

(Fitopatologia Brasileira 3: 205 - 209, 1978)

Earlier experiments (Cardoso *et al.*, unpublished data) suggested the possibility of the development of a rapid method of evaluating soybean population for resistance to *R. solani*. Although this method would probably not be reliable enough by itself to determine definitively the source of resistance to be included in a breeding program, it could detect possible sources of resistance to be included in a breeding, program, it could

detect possible sources of resistance for fur ther greenhouse or field trials.

In the present experiment a growth chamber techniques for testing soybean lines for resistance or tolerance to *R. solani* was tried out.

Four-day old cultures of an isolate of *R. solani* obtained from soybean fields in Beltsville – Maryland U.S.A. and belonging to anastomosis group – 4 (AG – 4) were transferred to 50ml of patoto dextrose broth amended with 1g/liter of yeast extract in 300ml flasks. It was allowed to grow for 10 days, at 24ºC and in darkness. The mycelial mat formed was washed and partially dried. Four grams of partially dried mycelium was incorporated with 2.000ml of vermiculite in a 30 x 24 x 5cm aluminum pan.

Eight cultivars and thirty plant introductions kindly supplied by Dr. E.T. Gritton (Agronomy Department of University of Wisconsin Madison U.S.A.) and Dr. P.S. Lehman (Soybean National Research Center, Londrina – Paraná) were used in two sets. The soybean cultivar Chippewa 64, a susceptible variety (Cardoso *et al.* unpublished data) was used as the control.

The seeds were planted in 5 rows of 24 cm per pan. Each row consisted of a different cultivar or PI'. Pans containing non infested vermiculite served as controls. The pans were kept in growth chambers at 28ºC, 12 hour-day ligth and plenty of water.

A randomized block design was used with four replications and the experiment was repeated once. The Duncan's multiple range test was used to compare the means among cultivars and lines.

After four days plant emergence was recorded. Ten days later the experiment was harvested and the surviving seedlings were scored according to a disease severity index (DSI) stablished. It consisted of a numerical indez from 0 (zero) to 4; 0 = symptomless plants, 1 = plants with slight root or hypocotyl lesions, 2 = plants with larger root or hypocotyl but without any apparent effect on growth, 3 = plants with larger root or hypocotyl lesion girdling and showing visible effects on growth, and 4 = plants with roots or hypocotyl completely rotted, stunted and dying.

Survival of seedlings and root and hypocotyl lesions according to DSI revealed no significant differences in incompatible reaction to *R. solani* compared to cultivar Chippewa 64 (Table 1,2).

Line PI 6270 obtained from Brazil was originally believed to be resistant due to its performance in field trials in Rio Grande do Sul (Lehman *et al.*, 1976). However in posterior trials it failed to show resistance (Dr. P.S. Lehman, personal communication) and it also failed to demonstrate resistance by this present method, (Table 1).

Several workers reported that resistance in benas (*Phaseolus vulgaris* L.) to *R. solani* was associated with the dark seed character (Prasad & Weigle, 1969; 1970; 1976). Recently, Prasad and Wiegle (1976) reported that extracts of black seed coats of bean contained phenolic compounds that inhibited growth of *R. solani*. The lines PI – 250137, PI – 295545 and PI – 189952 are all black seeded soybeans. Nevertheless all this lines were equal (PI 250137) or more susceptible (PI – 255545 an PI 189952) than Chippewa 64 as to damping-off symptom and equal as to DSI (Table 1).

The data suggests that there may be a difference in resistance to damping-off and root rot aspects of the infection.

There were some lines which were very susceptible to damping-off but the survival seedlings showed less root or hypocotyl lesions (PI – 189952, PI – 153320 and PI – 189875). The inverse situation also occurred (Cvs: Hark Corsoy). On the other hand, there were lines which appeared to be very susceptible to both aspects of the infection (PI – 6270, cv. Roanoke, PI – 232997).

From the presente studies, however, no conclusions can be drawn about the applicability of this method, since resistant plant was found. Howerer, this can be due to

Table 1. Percentage emergence and mean disease severity index (DSI) of soybean seedlings (PI's and cultivars) planted in vermiculite infested with *R. solani*.

PI or cultivar	Percentage emergence[1]	Mean DSI
Hark	67,50a	3.56
PI–250137[2]	62.50ab	1.99
Chippewa 64	60.00abc	2.23
PI–347548	60.00abc	1.88
Corsoy	50.00abcd	3.28
Shore	42.00bcd	4.00
PI–250127	41.60bcd	3.47
PI–189903	37.50bcd	1.95
PI–189965 =	37.50bcd	2.84
PI–347546–A	37.50bcd	2.00
PI–200595	35.00cde	2.21
PI–295545[2]	30.00def	1.81
Arksoy	30.00def	3.05
Amsoy	25.00defg	3.66
PI–185893	15.00efg	2.78
PI–189901	7.50fg	2.33
Roanoke	5.00fg	3.33
PI–6270	5.00fg	3.83
UFV–1	0.00gg	–
Bossier	0.00g	–

[1] Percentagem emergence of non-inoculated controle seedlings = 100%. Results not having similar letter were significantly (P = 0.05) different as determined by Duncan s test.

[2] Dark seeded line.

Table 2.

PI or cultivar	Percentage emergence[1]	Mean DSI
PI–257437	62.50a	2.42
PI–180502	57.50ab	2.82
PI–347545	55.00ab	2.56
Chippewa 64	55.00ab	3.29
PI–257507	40.00bc	3.61
PI–189875	37.50bc	1.50
PI–232999	32.50cd	2.00
PI–227323	32.50ad	2.13
PI–184947	25.00cde	2.25
PI–347551	25.00cde	2.15
PI–227327	22.50cde	2.65
PI–231172	15.00def	3.33
PI–154191	12.50def	3.20
PI–189952[2]	7.50ef	1.75
PI–153319	7.50ef	1.85
PI–153320	7.50ef	1.60
PI–232997	5.00ef	3.62
PI–258356=	5.00ef	2.00
PI–189913	5.00ef	2.14
PI–225330	0.00f	–

[1] Percentage emergence of non-inoculated control seedlings = 100%. Results not having similar letter were significantly (P = 0.050) different as determined by Duncan s test.

[2] Dark seeded line

the relatively low number of tested plants. Further trials with a more diverse populations of soybeans could lead to positive results.

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