COMUNICACIONES

Role of certain morphological characters in relation to boll rot resistance in *Gossypium hirsutum* L.

Sumario. Se evaluaron cinco lineas bracteoladas de esta planta en comparación con diversos tipos comerciales tomando en cuenta diferentes caracteres como bracteola, ausencia de las glándulas y de los nectarios, la hoja y el dosel cuando estos caracteres se encuentran individualmente y en combinación, para determinar la incidencia de la enfermedad de la podredumbre de la cápsula. Se observó que funcionaron dos tipos de mecanismos, uno externo y otro interno y que estos dos tipos de mecanismos tienen entre ellos una relación negativa. El daño causado por inoculación artificial y por incidencial natural tuvo una semejanza cercana entre ellos. Cuando se combinan estos caracteres en una variedad adptada puede resultar una reducción considerable del daño causado por la podredumbre de la cápsula.

Boll rot caused by a complex of pathogens is of considerable economic importance in many cotton growing regions of the world. Previous studies have indicated that certain plant characters contribute to minimization of disease damage (1, 2, 5, 6, 7, 8, 9). However information on the precise role of these characters, when present singly and in combination and extent of resistance, is not available. In this communication, data gathered on the above aspects have been presented and discussed.

Materials and method

Five frego bracteole lines of different character backgrounds namely, glandless frego, glandless-nectariless frego, semiglanded frego, red super bayout okra frego and narrow frego, were tested along with different canopy types like Laxmi, BJA 592, PRS 74, Roil 12 (bayou okra leaf) and okra leaf derivatives of Reba x race *punctatum* and Roil 12 x race *palmeri*, for boll rot incidence. These types were grown both in irrigated and rainfed conditions in randomized block design with three replications and normal cultural practices adopted. Inoculation was done at appropriate stage of the crop under favourable humid weather.

For inoculation, the isolation of disease causing pathogens was made by cutting tissue fragments from the necrotic areas of rotten boll tissue, disinfecting in 0.1 per cent mercuric chloride for 2-3 minutes followed by thorough rinsing in sterilized water. Such fragments were then transferred to Petri-dishes having agar media. The boll rot complex in the field consisted of pathogens like *Nematospora gossypii* Ashby and Nowell in large proportion followed by *Fusarium moniliforme* Sheldon, *Aspergillus niger* Van Teigh, *Alternaria macrospora* Zimm, *Colletotrichum gossypii* Southw and *Rhizophus nigricanus* Ehrenb. After 3-4 days of growth in the petri-plates, the pathogens were isolated individually in another agar media and allowed to grow (3).

Inoculation for the disease was done in suitable humid weather. Two kinds of inoculations were done following Cauquil (4). Bolls were tagged accordingly and evaluated for the degree of rotting, on and within the boll, periodically at five days interval. Final grading of the disease was done 15 days after the date of inoculation. Control plants were also evaluated for natural incidence and compared with the treatments.

Results and discussion

External capsular resistance:

The data (Table 1) indicated that frego bracteole has some advantage over the standard types in

Table 1. Boll rot disease incidence after artificial inoculation.

Genotype	Damage by inoculation % External	Internal
Glandless frego	1.88	7.03
Glandless-nectariless frego	1.35	6.70
Semiglanded frego	2.24	6.21
Red frego	2.09	7.30
Narrow frego	0.22	2.56
Glanded frego	2.18	6.04
BJA 592	1.15	5.92
Roil 12	2.22	5.53
Laxmi	2.75	6.99
PRS 74	2.96	6.62
Reba x *punctatum* derivative	3.05	2.44
Roil 12 x *palmeri* derivative	2.89	2.07
S.E. ±	0.16	0.54

conferring resistance. Disease attack varied very much with different lines. The narrow frego and glandless-nectariless frego showed lesser attack than others. The glandless frego came next in rank. The semiglanded frego was on par with other glanded frego types. Laxmi and *punctatum* derivatives showed very high external rot incidence.

The frego bracteole appeared to inhibit the disease spread. Roncadori (9) reported also that the frego bracteole provided an escape mechanism but actual resistance was dependent upon the genotype. In the present study also, BJA 592 showed better resistance to external capsular inoculation, indicating the role of genotype.

Internal capsular resistance:

Plants bearing smaller bolls and derivatives of *puctatum* and *palmeri* showed considerable resistance. All frego bracteole lines showed susceptibility when artificially inoculated (Table 1).

Damage observed in field conditions and under artificial inoculation was more or less similar (Table 2). The influence of punctures on boll rot also varied with genotypes. The glandless-nectariless frego, narrow frego and glandless frego showed lesser number of bollworm punctures and boll rot damage. PRS 74, Red frego, BJA 592 and glanded frego showed the largest number of bollworm punctures (Table 2). Glanded frego and BJA 592 had lesser boll rot incidence in spite of the occurrence of large number of bollworm punctures.

Table 2. Boll worm punctures in relation to boll rot incidence under natural conditions.

Genotype	Natural Incidence Number of boll worm punctures	% of boll rot in bolls with punctures
Glandless frego	12.85	2.62
Glandless-nectariless frego	9.01	1.43
Semiglanded frego	21.69	5.47
Red frego	30.11	7.24
Narrow frego	10.48	1.66
Glanded frego	26.45	753
BJA 592	26.89	3.04
Roil 12	18.92	6.93
Laxmi	27.52	10.57
PRS 74	36.99	11.86
Reba x *punctatum* derivative	14.56	5.31
Roil 12 x *palmeri* derivative	17.13	5.26
S.E. ±	1.32	0.44

Breeding for resistance to boll rot disease involves two distinct kinds of resistances, namely external capsular resistance and internal capsular resistance. A negative relation was observed between these two resistances. Genotype plays an important role in boll rot control and hence these novel plant characters and forms, when brought together by breeding, have good value in imparting resistance to the disease.

Abstract

Lines possessing different bracteole, glandless, nectariless, leaf and canopy characters were evaluated, these characters being present singly and in combination, for boll rot disease incidence. Two kinds of capsular resistance mechanisms, one being external and the other internal, were found to operate which showed negative relationship between them. Damage by artificial inoculation and natural incidence showed close resemblance to each other. When these characters were combined together into an adaptive variety, a considerable reduction of boll rot damage is expected to result.

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Effect of artificial defoliation on the yield of two indeterminate bean (*Phaseolus vulgaris* L.) cultivars

Resumo. Dois cultivares de feijão de hábito de crescimento indeterminado "S–182–N" e "Carioca" foram submetidos a 33 e 66% de desfolhamento artificial, quando as plantas tinham 20, 30, 40, 50 ou 60 dias de idade. Verificou-se que 66% de desfolhamento é muito prejudicial ao rendimiento da cultura, quando realizado nos estádios de florescimento e formação das vagens. O cv. "Carioca" é algo mais tolerante ao desfolhamento que o "S–182–N".

There are in Brazil several leaf-feeding pests that attack the common bean crop, such as the beetles *Diabrotica speciosa* (Germar), *Cerotoma uncicornis* (Germar) and *Lagria villosa* F; the slugs, and others. They can be controlled by appropriate pesticides but the farmers have no information on when the pesticide should be used in relation either to the foliar area destroyed or to the growth stage of the bean plants.

Leaf removal has been used to simulate pest or disease damage. Galvez *et al.* (5) reduced the foliar area of two bean cultivars to 80, 60, 40, 20, and 0% when they reached the following growth stages: first three trifoliate leaves, flowering initiation, pod formation, and the beginning of maturation. They found that, for any stage, yield reduction followed the increase of percentage of defoliation, with the greatest yield losses when defoliation occurred at the flowering and pod formation stages. Chagas *et al.* (3) removed 0, 1, 2, and 3 leaflets of each leaf from two determinate type cultivars. The defoliations were done once at each of the following ages: 20, 30, and 40 days after seedling emergence. Total defoliation at any age always brought about a strong decrease in yield. At the age of 20 days the other levels of defoliation were not detrimental to the bean yields; however, the removal of 2 leaflets was detrimental to the bean plants when they were 30 and 40 days old.

The tolerance to defoliation among bean cultivars is variable, as shown by several authors (1, 3, 4). According to Edje *et al.* (4), seed yield reduction due to defoliation is much less in indeterminate than in determinate cultivars.

This communication reports the results of an investigation as to the effect of leaf removal on bean yield, carried out at Viçosa, state of Minas Gerais, Brazil. Two indeterminate cultivars were used, since in a previous investigation, at the same locality, two determinate cultivars were included (3).