

EPIDEMIOLOGY OF ANTHRACNOSE IN COMMON BEAN LINES “PER SE” AND IN MIXTURE

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INTRODUCTION

The various pathotypes of the fungus *Colletotrichum lindemuthianum* hamper improvement studies, since the useful lifetime of a newly developed cultivar is ephemeral. Alternatives are proposals to increase the durability of resistance. The most discussed is gene pyramiding (Alzate-Marin et al., 2001; Sartorato, 2002). This strategy is labor-intensive and cannot eliminate the possibility that the surge of a new pathotype would break the resistance again. Another option, used little in common bean, is the use of a multiline. In this case, lines with different resistance alleles are mixed. Theoretically, with the mixture, the selection pressure in the pathogen is lower and the durability of resistance tends to be greater (Mundt, 2002). To date, the technique of a multiline has not been exploited in common bean. This study had the objective to investigate the epidemiology of anthracnose in common bean lines “per se” and in mixture, aiming to verify whether a mixture of lines with different resistance alleles could provide more durable resistance.

MATERIAL AND METHODS

The experiment was conducted in the experimental area of the Departamento de Biologia of the Universidade Federal de Lavras (UFLA) (21° 14' S, 44° 59' W and mean altitude of 919 m asl), sown in February 2007. Six common bean lines of carioca grain were used, agronomically uniform with different resistance reactions to the *C. lindemuthianum* fungus. These were evaluated individually and in mixture of all in equal proportion, totaling eight treatments. The experimental design was of randomized blocks with six replications and the plots consisted of three rows of 3m, spaced 0.5m apart.

Twenty days after emergence, the seedlings were inoculated with a mixture of the races 65, 72, 81, 87, 89, and 337 of *C. lindemuthianum*, in order to ensure the presence of the pathogen in the experimental area. The first evaluation of disease symptoms was performed 10 days after inoculation using a 1 to 9 grade scale proposed by Rava et al. (1993), where 1 indicates absence of symptoms and 9, totally diseased plants. Seven such evaluations were performed every 10 days until the harvest. Equations of linear regression between the independent (date of evaluation) and the dependent variable (grade of anthracnose severity) were estimated for each one of the treatments. Grain yield data per plot were also obtained.

RESULTS AND DISCUSSION

Significant differences were observed between the mean performance of the treatments for the trait reaction to anthracnose in all evaluations, except in the first. The lowest mean grade, considering all

evaluations, was given to line MA-II-22, followed by the multiline, with a mean of 2.9. The highest mean of 6.9 indicated the susceptibility of line CI-107.

As expected, the means grades of anthracnose severity increased gradually throughout the evaluations in all lines, including in the multiline, as the positive estimates of the linear regression coefficients show (Table 1). Furthermore, a lower estimate of b_1 was observed for the multiline and for line MA-II-22, evidencing that the multiline was efficient in reducing the disease progress. The opposite was true for line CI-107 and cultivar Carioca, which is resistant to race 72 of *C. lindemuthianum* only. Cultivar MA-II-22 is resistant to race 65, which predominated in the experiment, i.e., in competition with the other races, it was the most adapted cultivar.

This reaction to the pathogen was reflected in the grain yield. The most resistant lines and the multiline performed best (Table 1). Yields were lowest in line CI-107 and Carioca, which had been expected, owing to the high pathogen incidence in these lines.

TABLE 1. Estimates of the coefficients of the linear regression equation between the independent variable (date of evaluation) and the dependent variable (anthracnose severity grade), and grain yield in g/plot, obtained in the lines and multiline evaluations.

Lines	b_0	b_1	Yield
Carioca	0.94	1.29(0.000)	306 b ^{1/}
Talismã	0.61	1.05(0.000)	723 b
RC-I-8	1.17	0.48(0.000)	1043 a
MA-II-8	1.23	0.44(0.000)	1030 a
MA-II-16	1.01	0.56(0.000)	1058 a
MA-II-22	1.36	0.28(0.000)	1108 a
CI-107	2.07	1.20(0.004)	302 b
Multiline	1.37	0.38(0.000)	907 a

^{1/} Means followed by the same letter did not differ from each other in belong to the same group by the test of Scott & Knott (1974), at 5% probability.

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