RECURRENT SELECTION AS A METHOD TO INCREASE RESISTANCE TO ANGULAR SPOT AND GRAIN YIELD ON COMMON BEAN

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INTRODUCTION

Regarding the common bean crop, beyond grain yield, the resistance to diseases is always considered by breeders to develop cultivars. Currently, the angular spot (*Pseudocercospora griseola*) is considered one of the main diseases that reduce yield (Singh e Schwartz, 2010). The symptoms may be observed mainly on leaves and pods, and there are evidences that the resistance to the fungus at those plant organs is a quantitative character controlled by different genes (Borel et al., 2011).

For the common bean breeding aiming diseases resistance and increase in grain yield, one of the recommended methods is the recurrent selection. Thus, the objective of this study was to check the efficiency of this method on increasing grain yield and resistance to the angular spot on leaves and pods.

MATERIALS AND METHODS

It was used five of the best lines from the seven first cycles of a recurrent selection program aiming resistance to angular spot, which began on 1998 (Amaro et al., 2007). The 35 lines were sowed on the dry season of 2011 at UFLA's Experimental Farm located at Lavras - Minas Gerais state, Brazil. A randomized complete blocks design with three replications was used. The following characters were evaluated: grain yield (Kg/ha), angular spot severity on pods and severity on leaves. The evaluation on pods were made by the time of the harvest using a diagrammatic scale that ranges from 1 (resistant) to 9 (susceptible) proposed by Borel et al. (2011). Yet, the evaluation on leaves were made 21, 28, 33 and 41 days after the flowering, in order to calculate the area under the disease progress curve (AUDPC), using a diagrammatic scale that ranges from 1 (resistant) to 9 (susceptible) proposed by Godoy et al. (1997).

Using the mean data of each cycle of recurrent selection for the characters previously mentioned, it was obtained the regression equation between the cycles (independent variable x) and the grades on pods, AUDPC or yield (dependent variable y). The regression b_1 was used to estimate the gain per cycle of recurrent selection. At last, it was estimated the genetic progress (GP) throughout the expression: $GP = (b_1/b_0)*100$.

RESULTS AND DISCUSSION

One of the advantages of using the AUDPC is the possibility to estimate the genetic progress in a more accurate way, since all the assessments seasons are involved on it. For this character and angular spot severity on pods, it is feasible to notice the tendency of reduction of the disease intensity along the cycles (Table 1). The determination coefficients (R^2), which shows the data fitness to the linear regression equation, in spite of not being high, were superior than those found by Amaro et al. (2007). The genetic progress was negative both for AUDPC and severity on pods, which means that the grades reduced in more advanced cycles. In other words, recurrent selection is increasing the resistance to the fungus. For grain yield, there was a raising tendency, with a positive genetic progress. As the angular spot decreases yield, probably the greater resistance of the more advanced cycles lines is an important factor that reduces the pathogen action over the plant, which contributes for the observed yield gain. These results are in accordance with those found by Amaro et al. (2007), and they ensure that the recurrent selection is efficient to increase angular spot resistance on common beans, and therefore raise grain yield.

Table 1. Means of the seven cycles of recurrent selection for resistance to angular spot, linear regression coefficients (b_0 and b_1) and genetic progress (GP) with the selection on yield, AUDPC and severity on pods.

	AUDPC	PODS	YIELD (Kg/ha)
Cycle I	96.6	5.7	2403
Cycle II	94.7	4.9	2260
Cycle III	83.1	4.0	2178
Cycle IV	78.4	3.9	2463
Cycle V	91.7	4.6	2542
Cycle VI	87.7	3.7	2402
Cycle VII	79.8	4.3	2683
b_0	95.4	5.31	2206
b_1	-1.99	-0.21	53.11
GP(%)	-2.09	-4.03	2.41
R^2	35.4	46.8	46.2

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