

Testing a breeding strategy to select for resistance to onion basal rot caused by *Fusarium oxysporum* f.sp. *cepae* in Argentina

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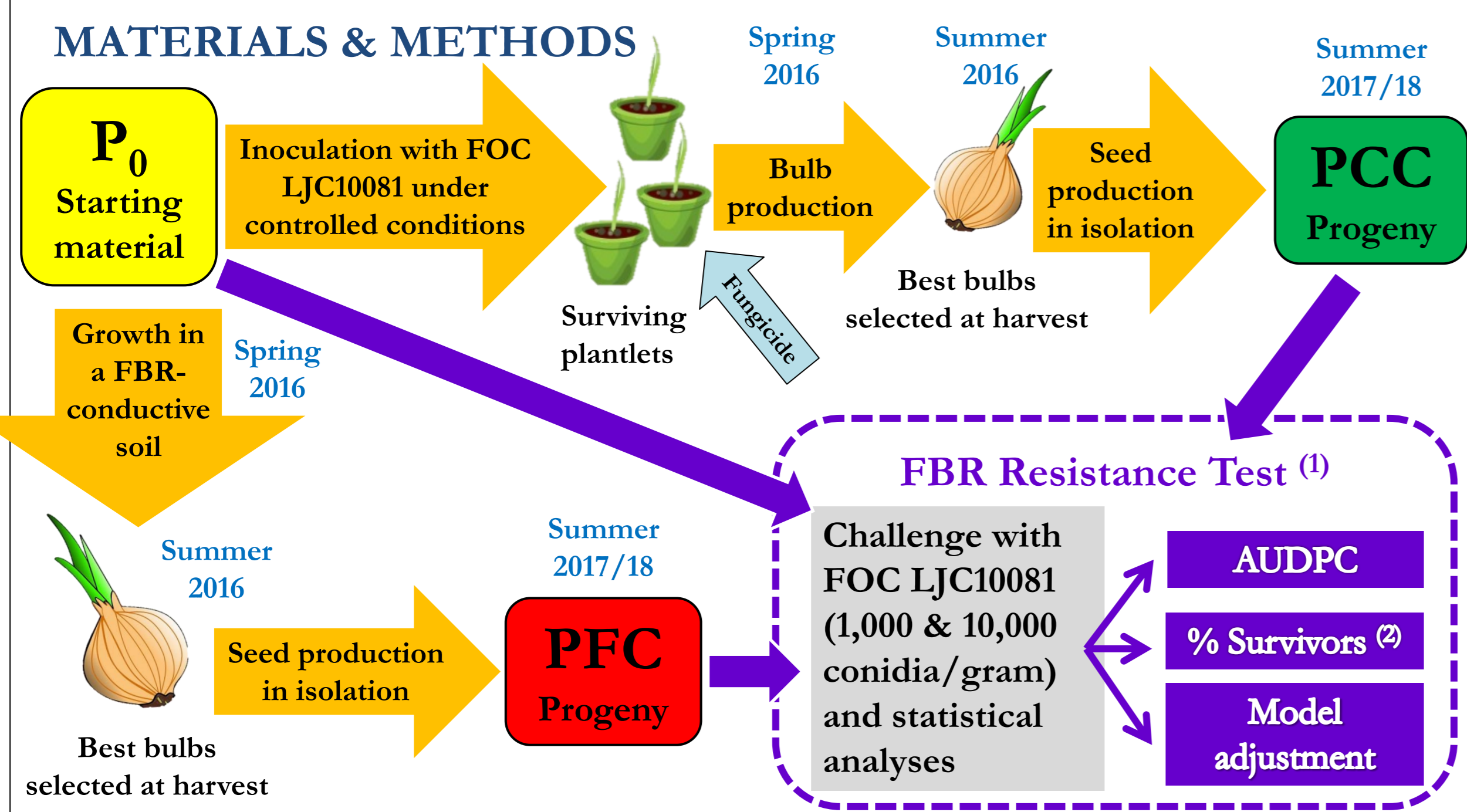
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INTRODUCTION

Fusarium basal rot (FBR) caused mainly by *Fusarium oxysporum* f.sp. *cepae* (FOC) is one of the most important onion diseases and is distributed in all regions where this vegetable is produced. Nowadays onion resistant cultivars are not commercially available in Argentina. The Onion National Breeding Program, held at INTA La Consulta, Argentina, has developed breeding lines tolerant to FBR using recurrent selection under field conditions; the individuals that show lower severity are the ones selected each generation.

The aim of this work was to evaluate the results of a selection in controlled conditions compared with the selection performed under field conditions.

MATERIALS & METHODS



RESULTS

The AUDPC values were significantly reduced in PCC at high inoculum densities (10,000 conidia per gram) compared to the original population P₀ (reduction of 37.5%); the PFC population also showed reduced AUDPC values (16.7%) (Table 1).

The evaluation of the percentage of FBR survivors showed that the PCC progeny had no diseased or dead plants at day nine (Fig. 1), while incidence of FBR in P₀ reached 62% at the same day.

Based on the adjusted epidemic model the PCC progeny described a delay in the progress curve of infection, compared with PFC and P₀ (Fig. 2).

The delayed and reduced infection rate in PCC could represent the gain of selection achieved after one cycle of selection under controlled conditions (Fig. 3).

Table 1. AUDPC values reached at day 21 in the tested onion populations, challenged by two different inoculum concentrations of the isolate FOC LJC10081. Duncan test ($\alpha=0.05$).

Onion population	Control	10,000 conidia/gram	% FBR reduction
P ₀	1.35 a	14.16 a	0.00%
PFC	1.04 a	11.87 ab	16.17%
PCC	0.25 a	8.85 b	37.50%

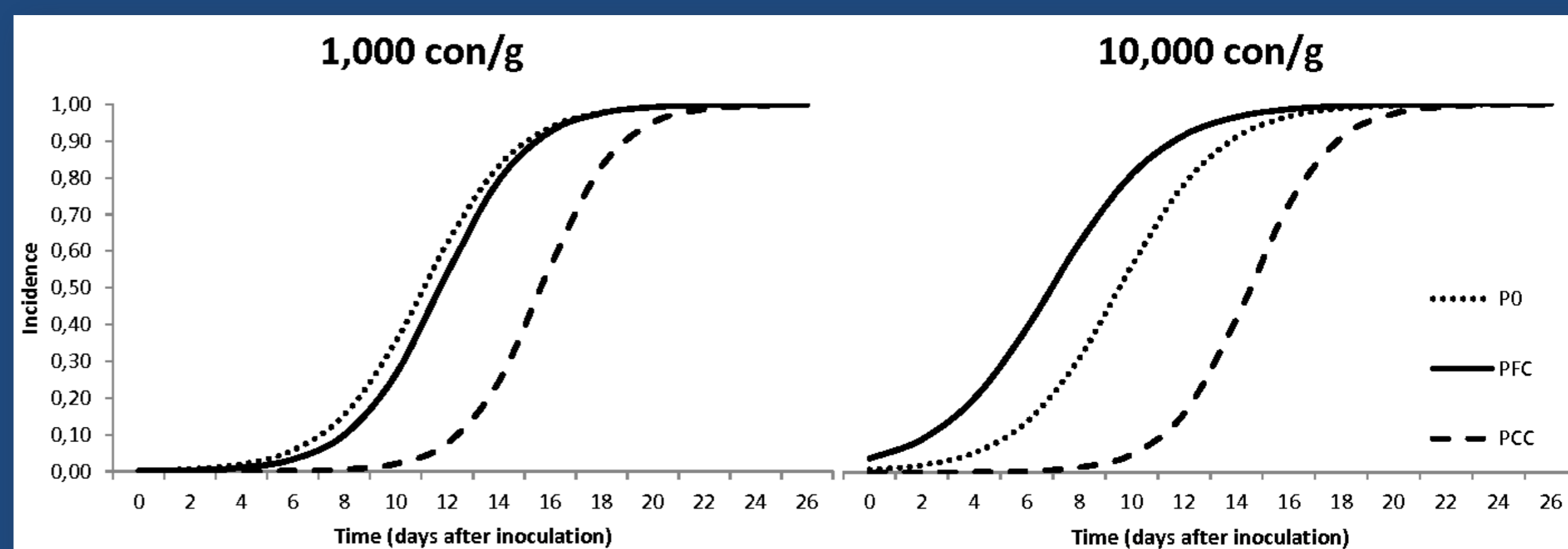


Fig. 2 Disease progression curves adjusted for different inoculum concentrations and for the three evaluated onion populations

%FBR survivors at day 9

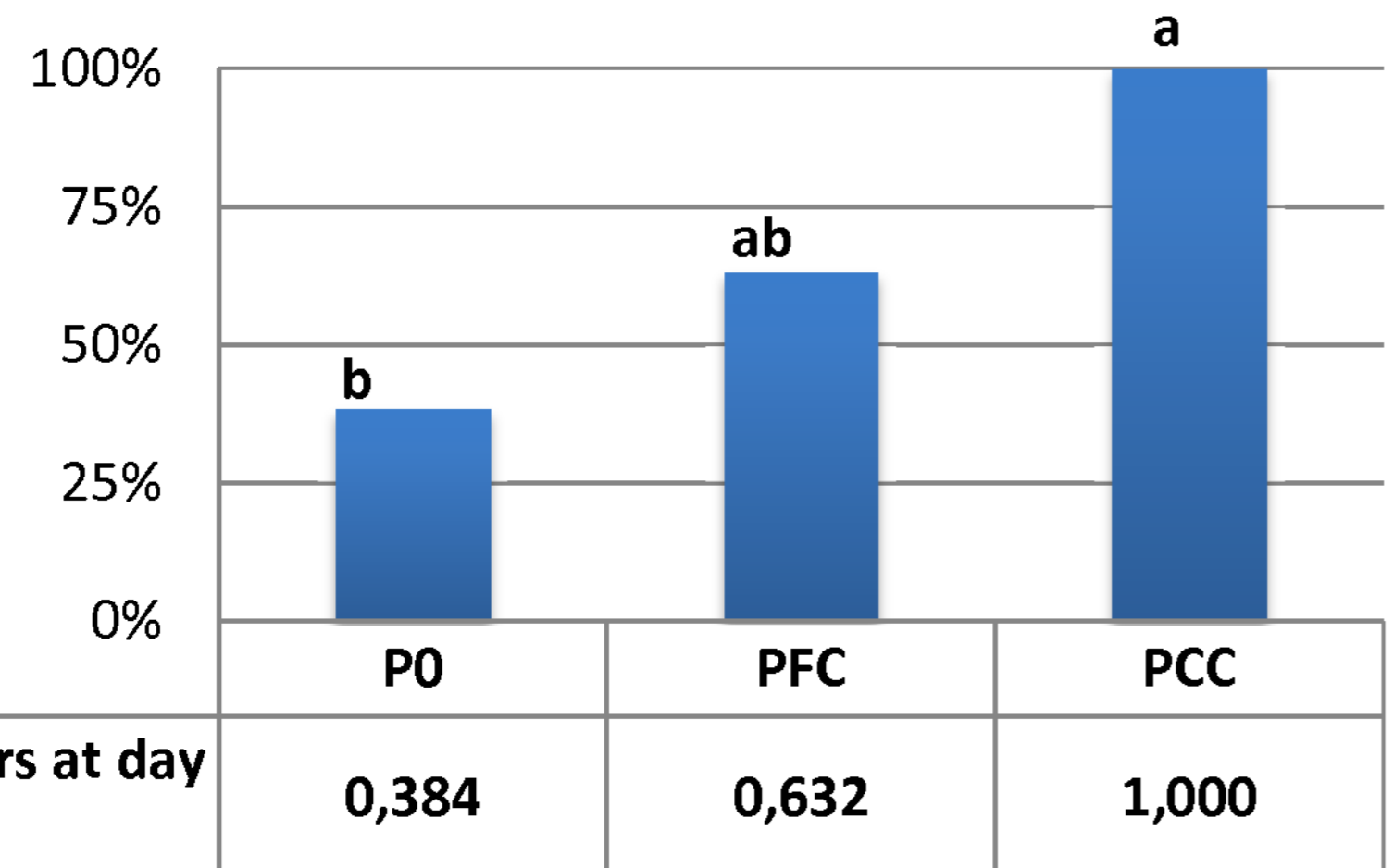
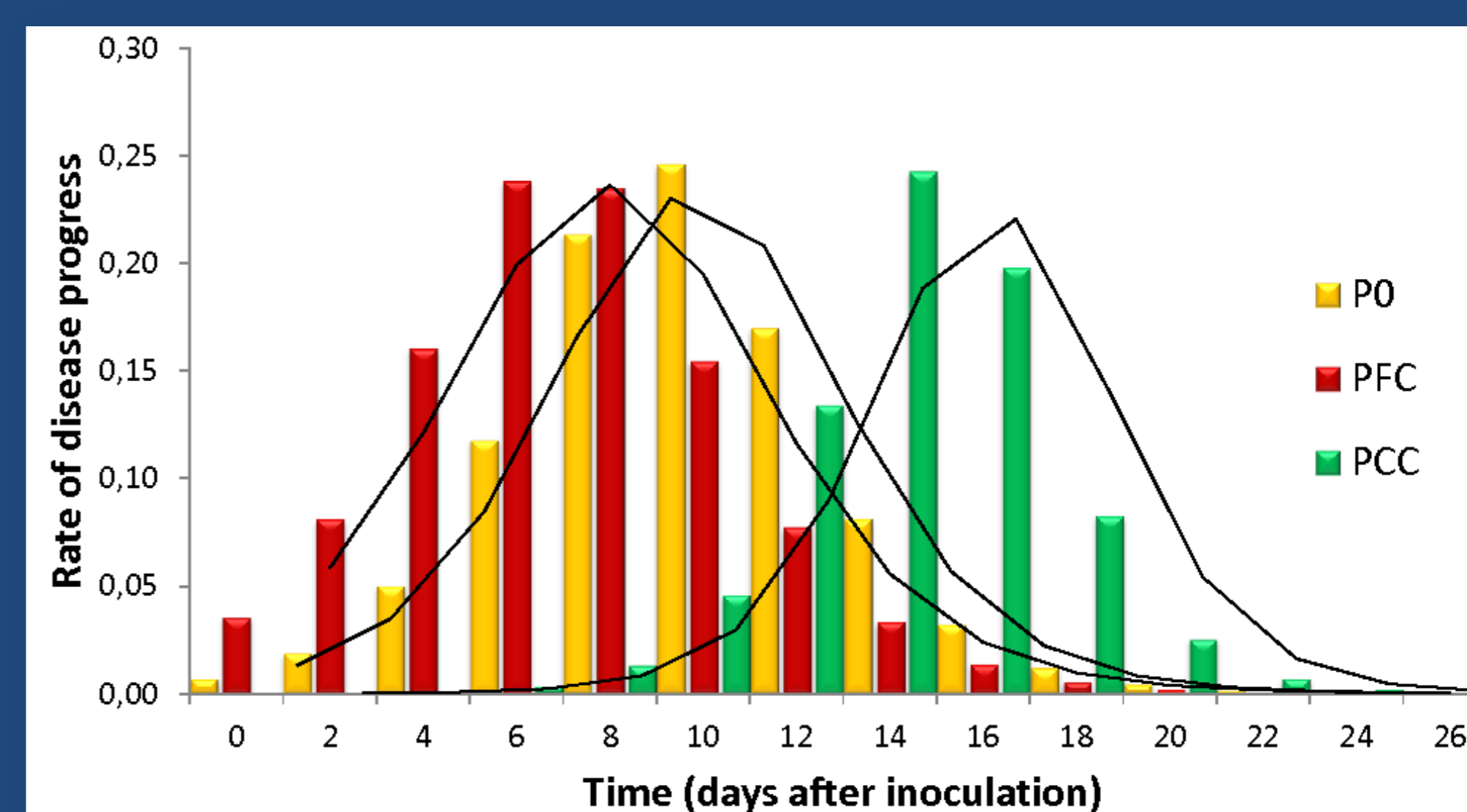


Fig. 1 Percentage of FBR surviving plants nine days after inoculation, tested with 10,000 conidia per gram of inoculum density. Distinct letters show significant differences (LSD, $\alpha=0.05$)

Fig. 3 Gain of selection in the PCC genotype, compared with PFC and P₀, expressed as a delay in the disease progress curve (lower rate)



DISCUSSION

- The progress achieved in the FBR resistance scores suggests that phenotypical selection of parent lines has been helpful to generate progenies with better performance (3).
- Although FBR resistance may be considered as a moderately heritable trait (3) the results obtained in the present work confirm that phenotypical selection under field conditions appears to be a valid method to achieve progress in breeding programs.

CONCLUSIONS

Our work allowed the comparison of progenies originated by both methods of selection: under field and controlled conditions. The analyses of AUDPC values and disease progression rates showed that the population originated after selection under controlled conditions was the one that expressed the best performance when challenged against a highly virulent isolate of *Fusarium oxysporum* f.sp. *cepae*.

REFERENCES

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