

RESISTANCE TO *Macrophomina phaseolina* IN COMMON BEAN GERMPLASM IN MEXICO¹

N. Mayek-Pérez², C. López-Castañeda², E. López-Salinas³, J. Cumpián-Gutiérrez³, I. C. Joaquín-Torres³,
and J. A. Acosta-Gallegos³.

¹ Project supported by CONACyT-México (Grant No. 3230P-B9607). ² Colegio de Postgraduados. Montecillo, México. 56230. ³ Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP)-SAGAR. Apdo. Postal 10. Chapingo, México. 56230. E-mail: nmayekp@colpos.colpos.mx

Macrophomina phaseolina (Mp) causes charcoal rot in common beans. This disease is particularly severe during periods of drought and high temperature stresses, reducing drastically seed yields (1). The development of cultivars with genetic resistance to Mp may help increase seed yields and improve management of the pathogen in the soil. This study was conducted to identify bean germplasm with genetic resistance to Mp under field conditions.

Three experiments were conducted in fields known as highly infested with Mp at Isla (18°06' N, 95°53' W, 25 masl) and Cotaxtla, Veracruz (18°44' N, 95°58' W, 16 masl), and Iguala, Guerrero (17°52' N, 98°45' W, 760 masl), Mexico. Trials were planted on 27 and 28 of October in 1997 at Isla and Cotaxtla, and on the 25 of July in 1998 at Iguala. Three groups of twenty genotypes were evaluated in each trial. These materials were identified as resistant, intermediate, and susceptible to Mp in a previous study conducted under greenhouse conditions (3). Four cultivars of common bean were included as controls. Lattice experimental designs 8 x 8 with three replicates were used for each experiment. Each trial was established under two soil inoculation treatments; inoculated plots (5 g row⁻¹ of rice seeds colonized by a local isolate of Mp) and control plots (no inoculation was applied). Plots were one row 3 m in length and 0.7 m wide (40 seeds row⁻¹). Data on disease severity (DS) was recorded at 28 and 56 days after sowing (das). At maturity, seed yield was determined by harvesting all plants present in each plot. Data of each experiment was subjected to ANOVA and a Principal Component Analysis (PCA). Means were compared using Tukey test (P=0.05), where the ANOVA detected significant differences.

Artificial inoculation was effective to increase DS caused by Mp in each experiment. Mp significantly decreased seed yield in all trials. The highest values for DS and the lowest yields were recorded at Iguala, whereas the highest yields and lowest scores for DS were observed at Isla. DS and seed yield were negatively associated at each location (Fig. 1). The highest Mp pressure e.g. the highest damages caused by the pathogen, was observed at Iguala. This may be due to Iguala being drier and warmer than the other sites (2). These results confirm that dry and warm conditions are favourable for charcoal rot disease in common beans. This also suggests that Iguala would be an appropriate environment for the screening of segregating populations of common beans. PCA showed that scoring DS at 28 das is important for screening germplasm with resistance to charcoal rot in common beans. Genotypes Negro Tacana, BAT 477, Carioca, SEQ 12, G5150, Jamapa, Negro INIFAP, MUS 133, BAT 1467, TLP 20, Negro Huasteco 81, and Flor de Mayo M38 showed resistance to Mp and the highest yields across locations. Cultivars Negro Perla, Pinto Villa, Bayo Madero, G2333, Apetito, Tlaxcala 475, Satevo, G13746, Bayo Blanco Serdan, Puebla 152, A 169, Negro Queretaro, and Bayo Durango had the lowest yield and they were susceptible to Mp. Genotypes with resistance to Mp included bred cultivars and lines with growth habit types II and III and they belong to the Mesoamerica bean race. Susceptible genotypes included bred cultivars and landraces with growth habit types III and IV and they belong to Jalisco and Durango bean races.

Resistant common bean germplasm identified in this study may be used as parental material in breeding programs aimed to obtain cultivars with resistance to Mp. Iguala may be considered as an appropriate environment for the screening of lines resistant to Mp. The use of germplasm resistant to Mp may help reduce the infestation of this pathogen in soils where common beans are cultivated in each growing season.

Literature Cited.

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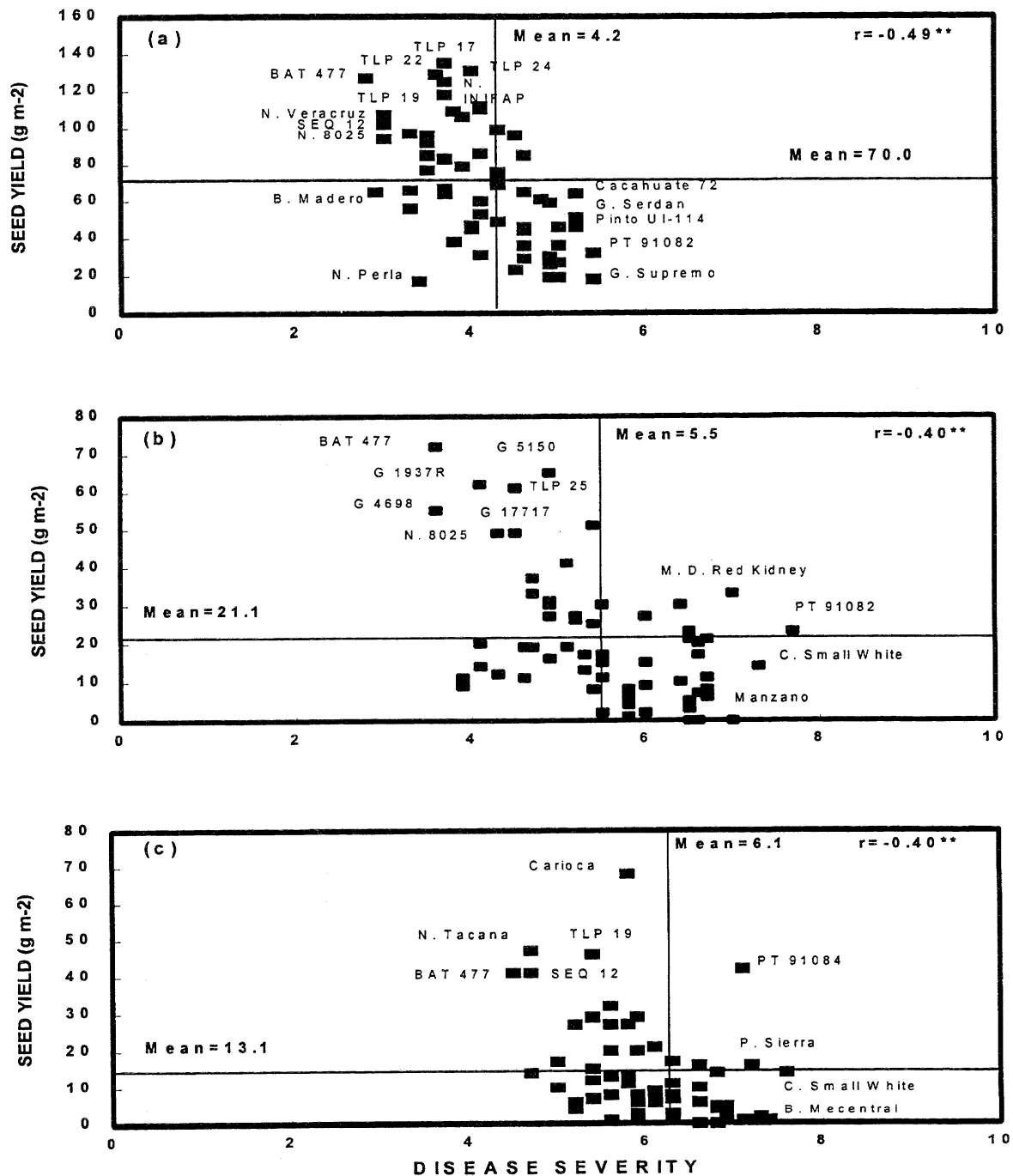


Fig. 1. Relationship between disease severity caused by *M. phaseolina* and seed yield of 64 bean genotypes grown in Isla, Veracruz (a), Cotaxtla, Veracruz (b), and Iguala, Guerrero (c), during 1997-1998.