

GENETIC VARIATION IN FIELD AND NUTRIENT SOLUTIONS AND THE EFFECT OF TEMPERATURE FOR LEAF CHLOROSIS IN DRY BEANS (PHASEOLUS VULGARIS L.)

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Dry bean (Phaseolus vulgaris L.) breeders are interested in the development and/or selection of cultivars with high resistance to iron deficiency chlorosis symptoms under calcareous soil conditions. The objectives of the research were to determine bean genotypic variation and the extent of bean genotype x environment interaction for iron chlorosis in the field and under nutrient solutions in growth chambers, and to investigate the effect of temperature upon the development of iron chlorosis in beans grown in nutrient solutions in growth chambers.

One hundred dry bean cultivars/lines were evaluated for iron chlorosis on a calcareous soil. Twenty-four of these cultivars/lines, ranging from resistance to susceptibility to iron chlorosis, were grown in nutrient solutions in growth chambers and analyzed for total iron content in leaves. Fifteen of these 24 cultivars/lines were subsequently screened for iron chlorosis under field conditions in a calcareous soil. Five of these 15 cultivars/lines were grown in a nutrient solution in growth chambers under low temperature (21.1-15.6°C) and high temperature (32.2-26.7°C) day and night, respectively, and a photoperiod of 12 hours.

The cultivars/lines differed in the severity of iron chlorosis symptoms, and showed a continuous variation in symptoms ranging from high to intermediate resistance and susceptibility. Some of the most resistant cultivars/lines grown in the field and in the nutrient solutions were as follows; Black DCB, 'Pinto UI 114', 'LRK 2602', 'Pinto UI 126', 'Cranberry (vine)', and 'Pinto ND 912'. No correlation was found between the degree of iron chlorosis symptoms and total iron content in leaves. A genotype x environment interaction was noted. The following cultivars/lines behaved differently under the field and nutrient solutions; 'Stuben Yellow Eye', 'LRK NW126', 'LRK 2602'. The following cultivars/lines behaved differently in the 2 field experiments; 'Navy Fleetwood' and 'G.N. Sapphire'.

The rate of iron chlorosis development was more rapid and the severity of symptoms greater under low temperature than under high temperature in the growth chambers. A genotype x temperature interaction was noted. The following cultivars/lines behaved differently under different temperature regimes; 'Navy NW11', 'LRKNW 126', 'LRK 2602', 'Stuben Yellow Eye', and G.N. JM 24.