Plant-Soil Interactions at Low pH: Sustainable Agriculture and Forestry Production

Proceedings of the Fourth International Symposium on Plant-Soil Interactions at Low pH, Belo Horizonte, Minas Gerais, Brazil, 17-24 March 1996

Edited by

A.C. MONIZ, A.M.C. FURLANI, R.E. SCHAFFERT, N.K. FAGERIA, C.A. ROSOLEM and H. CANTARELLA

BRAZILIAN SOIL SCIENCE SOCIETY

CAMPINAS / VIÇOSA

economically feasible. CIMMYT has developed maize research for better understanding the genetic mechanisms of tolerance to soil acidity and consequently facilitate acid soil maize breeding and new cultivars release. Cualitative and quantitative inheritance has been reported for acid soil tolerance. Additive and no additive genetic effects and heterosis are important for maize yield in acid soils.

P43 **ALUMINUM TOLERANCE VARIABILITY IN RYE AND WHEAT PORTUGUESE GERMPLASM.** 0. Pinto-Carnide* and H. Guedes-Pinto; Genetics and Biothecnology Department, University of Trás-os-Montes and Alto Douro, Ap. 202, 5000 Vila Real. Portugal.

As 80% of Portuguese soils are acid, plant breeding *{viz.* cereals) must take account of aluminum toxicity and of sources of genetic variability for tolerance to aluminum. Using nutritive solution method (POLLE *et al,* 1978) Portuguese regional rye populations showed better tolerance than the polish cv. Dank, Zlote, used as tolerant tester. EPM 305/81, a reselection of portuguese wheat landrace Barbela, was the most tolerant in a collection of wheats with the same behaviour of cv. BH 1146, a tolerant tester. In other lines selected from Barbela landrace, aluminum tolerance variability was detected. Some lines were as tolerant, or higher, as wheat tester. These data support the idea that natural biotic or abiotic stresses associated to man selection, lead to the adaptation of genotypes to specific regional conditions and, in this case, to acid soils where aluminum toxicity occurs.

P44 **DEVELOPMENT OF ALUMINUM TOLERANT WHEAT CULTIVARS AND THEIR GENETIC BASIS.** C.R. Riede*, D. Brunetta, Instituto Agronômico do Paraná-IAPAR, Caixa Postal, 481; 86001-970 Londrina-PR-Brazil.

Aluminum (Al) tolerance is an important adaptative trait for several plant species, including wheat (*Triticum aestivum* L.). It is estimated that more than 20% of the world's agricultural land may contain acid soils were Al toxicity becomes a seriuos growth limiting factor when the soil pH is lower than 5.5. Selection for Al tolerance may be performed in different conditions varying from the soil itself, to more controlled environments like greenhouse pots or laboratory nutrient solution, furthermore the process can be helped by the use of DNA molecular markers. The development of tolerant wheat cultivars in the areas where soil acidity occurs is done by incorporation of gene(s), using different breeding methodologies. Yield potential of cultivars grown under Al stress and normal soil conditions is compared to evaluate the thresholds due to growing conditions, as well as to estimate the gains made by wheat breeding programs in Brazil.

P45 **EVALUATION OF ALUMINUM TOLERANCE IN TRITICALE IN A SOIL WITH HIGH AL+ CONTENT.** C.N.A. de Sousa* and A.C. Baier, EMBRAPA-CNPT, Cx. Postal, 569, 99001-970 Passo Fundo, RS, Brazil.

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Aluminum containing acid soils predominate in southern Brazil, impairing growth of Al-sensitive small grains. Tolerance of 91 triticale, 5 wheat, and 1 rye cultivars was evaluated in the field (pH of 4.40, 3.50 $cmol_c$ Al/L), in 1995, in Passo Fundo, at EMBRAPA-CNPT. Anahuac 75 (sensitive) and IAC 5-Maringá (tolerant) were placed alternately in plots (2 lines with 3m) ending in 0 or 5. Prior to flowering and at maturity the 3 replications were visually evaluated [1 = tolerant (0.5 = highly tolerant) and 5 = highly sensitive]. Averaging the 6 observations, rye 'Centeio BR 1' and triticale cultivars 'PFT 215', 'PFT 407', 'PFT 408', and 26th ITYN lines No. 45 and 50 were highly tolerant; wheat IAC 5-Maringá and most triticales were tolerant; wheat 'Trigo BR 23'and triticale 'PFT 410', 'BR 1', and 'Fahad 8-2' were moderately tolerant; wheat 'Trigo BR 10' was moderately sensitive; and wheats 'Genaro'and 'Anahuac 75' were sensitive. The below average rainfall during most of the cycle enhanced the expression of Al-toxicity. This evaluation confirms the adaptation of triticale to acid soils.