

IMPLEMENTATION OF DNA MARKERS TO IMPROVE BREEDING OF FORAGE LEGUMES

S. Grljušić, M. Tucak, T. Čupić, S. Popović

Agricultural Institute Osijek, Department of Forage Crops Breeding and Genetics, Juzno predgradje 17, HR-31000 Osijek, Croatia

The low rates of estimated genetic gains in forage legumes breeding have emphasized the need for new breeding methods that would increase efficiency in forage selection and provide reliable improvement. Information on application of molecular methodologies and tools for the enhancement of the current empirical phenotype-based selection moved us toward implementation of DNA markers to our breeding activities. Firstly, attention was given to identification of genetic variability within the forage species involved in program and comparison of conventional and molecular marker efficiency in variability evaluation. RAPDs were used (i) to estimate availability of alfalfa (*Medicago sativa* L. and *Medicago falcata* L.) genetic variation and (ii) to identify changes of red clover (*Trifolium pratense* L.) variability after natural selection. SSRs were applied to evaluate diversity within and among field pea (*Pisum sativum* L. var. *arvense* and *sativum*) groups/varieties. A total of 90 (alfalfa) or 92 (red clover) polymorphic bands was found by RAPDs. Total number of SSR alleles recorded was 118. The average Roger's distance per species/genus estimated was 0.29 (red clover), 0.33 (alfalfa) and 0.51 (field pea). 2D PCo analysis of each species/genus separated materials into respective groups. A high degree of genetic variation within populations/varieties of each investigated species was found by AMOVA. The correspondence between pairs of matrices based on the morphological and molecular data was significant ($p=0.95$) only for red clover. RAPD and SSR data have given valuable information on genetic structure of materials and provided a description that determines heterogeneity. Further studies will be focused on identifying quantitative trait loci and marker assisted selection.