

APPENDIX BManuscript submitted to Plant Breeding

The design of experiments for one-step selection with an application to the breeding of lupin.

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Abstract

The objective of this investigation was to determine an optimum experimental design for one-step selection among lines of the narrow-leaf lupin (*Lupinus angustifolius*) obtained by crossing selected germplasm strains. The underlying theory for obtaining optimum designs which maximize selection response was reviewed first and expressed in terms of the number of lines to be included in a test for a given fixed total number of plots available and a fixed number of selected lines required in the end. The lupin material consisted of 27 sets each of 25 advanced lines for which yield had been recorded in field tests with a randomized blocks design. Estimates of a ratio of variance components obtained by analyses of variance and substituted into the formula for the optimum design have then provided guidelines for the design of future tests which have useful implications in terms of the number of lines to be carried through to advanced generations after crossing using the method of random single seed descent.

Keywords

lupin breeding-optimum test design-random single seed descent