ABSTRACT

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The present investigation aimed to evaluate the effect of heterosis, combining ability, interrelationships among traits and path-coefficient analysis for straw yield and seed yield attributes in flax (*Linum usitatissimum* L.). Twenty-one entries involving 6 parental genotypes and their 15 F_1's produced using diallel fashion in 1999/2000 were evaluated for seed and straw yields and their components during 2000/2001 under two plant distances (5 cm and 10 cm).

The results indicated that mean squares due to entries, parents and crosses were highly significant, indicating that the parental genotypes as well as their F_1 crosses exhibited reasonable degrees of variability for all studied traits. Heterosis relative to the better parent was generally pronounced and existed for all the characters except that no better parent heterosis was detected for 1000-seed weight.

Both general (GCA) and specific (SCA) combining ability variances were highly significant for all studied traits, indicating the presence of both additive and non-additive types of genetic variances. The additive effects were more important than non-additive effects in the inheritance of plant height, technical length, fiber length, fiber percentage, seed index and days to maturity. On the other hand, the non-additive effects were more important in the inheritance of straw yield/plant, basal branches/plant, stem diameter, seed yield/plant, capsules/plant and seed oil %.

Mean squares due to the interaction between GCA x plant distances (GCA x d) were highly significant for 9 out of the 12 studied traits meantime 9 traits showed significant SCA x d interaction, indicating that the magnitudes of GCA and SCA were influenced when estimated under different plant densities.

Some crosses which exhibited significant and positive SCA effects included high x high and/or high x low general combiners, such as Sakha 1 , the imported fiber type Alba and the two new promising strains S.402/12 and S.282/98/16/2, suggesting that the breeding procedure which utilize both additive and non-additive genetic variances would be more useful for improvement of both straw and seed yields of flax.

Correlation coefficients among traits indicated that straw yield/plant was positively and significantly associated with plant height, technical length, basal branches/plant, stem diameter and capsules/plant at the two distances and their combined data. Highly significant positive coefficients were found between seed yield/plant and each of capsules/plant, straw yield, basal branches, stem diameter and oil % at the two distances and their combined analysis.

The path-coefficient analysis was calculated to detect the relative importance of characters contributing to each of straw yield and seed yield. Data showed that the major straw yield contributors were plant height and basal branches/plant followed by technical length at the two distances and their combined data. Both number of capsules/plant and 1000-seed weight had high positive direct effect on seed yield at the two distances and their combined. Thus, seed yield improvement can be achieved through selection for more capsules/plant and more seed weight.

Key words: Flax, *Linum usitatissimum,* Fiber yield, Seed yield, Seed oil, Diallel crosses, Heterosis, Combining ability, Correlation and path-coefficient analysis.

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