

CORRELATIONS FOR IMPORTANT AGRONOMIC CHARACTERS BETWEEN PARENT LINES AND F₁ HYBRIDS OF SUNFLOWER

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ABSTRACT

When developing SC cms hybrids it is important to know the manifestation of heterosis as well as the correlations for important agronomic characters between parent lines and F₁ hybrids in order to be able to model correctly the inbreds and develop hybrids possessing desired characters. We examined correlations between a number of parent lines and their hybrids and drew the following conclusions:

- highly significant correlations were found for plant height and oil content in seed;
- significant correlations were found for seed yield per hectare, leaf number per plant, leaf area, and husk percentage;
- F₁ hybrids had higher correlation values for seed yield per hectare and oil content in seed with the mother than with the father lines;
- positive correlations were also found for other characters.

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RELATIONSHIPS AMONG TRAITS OF INBREDS AND HYBRIDS OF SUNFLOWER.

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ABSTRACT

The identification of positive relationships between various attributes of an inbred line of sunflower (*Helianthus annuus* L.) and the same attributes or yield of its hybrid progeny would aid in identifying desirable genotypes in early stages of breeding. The objectives of this study were to correlate traits of plants in the F₃ through F₆ generations with the expression of those traits in their hybrid progeny and to determine associations of self-fertility in the F₃ with seed yield in later generations. No significant correlations were obtained for yield of the hybrid with yield of the F₄, F₅, and F₆ lines nor with F₃ self-fertility. Significant and positive correlations and regressions were found between hybrid oil percentage and the oil percentage of the F₄, F₅, and F₆ lines. Multiple regression analysis indicated that 50.5% of the variation in hybrid oil percentage could be accounted for by the variation in oil percentage of the female line, which implies high heritability. F₃ self-fertility was significantly correlated with F₄, F₅ and F₆ yields ($r = 0.53^{**}$, 0.39^* , 0.33^* , resp.) but not with hybrid yield ($r = 0.16$). The lack of definitive correlations between yields of female parent inbred lines and their F₁ hybrids indicates that selection for this trait should be based on performance of the lines in crosses rather than on the lines themselves. High oil percentage in the female parent, however, was transmitted to the hybrid crosses and effective selection could be practiced.

INTRODUCTION

The development and testing of inbred lines of sunflower (*Helianthus annuus* L.) has been the primary breeding method for commercial and public programs since the hybrid industry expanded in 1975 — 1976. Efficient identification of superior lines has been an area of recent experimentation. During inbreeding, different pressures are applied for various traits, and final selections are made as the lines approach homozygosity. Several undesirable traits are easily identified, and lines may be discarded due to obvious morphological deformities, difficulty in maintenance because of poor self-fertility, susceptibility to specific diseases, or poor plant vigor. However, we know little about whether inbred expression regarding yield, oil percentage, and other seed characteristics are useful indicators of their potential in hybrids. Selection would be more effective during inbreeding if some knowledge about combining ability and line performance could be established.

Studies of correlations among sunflowers have shown that characters that contribute to good plant growth are associated with high seed yield (Gundaev, 1971; Kloczowski, 1972; Putt, 1966). Among inbred traits, the achene number, achene weight, height, capitulum diameter, and stem diameter have correlated well with inbred yield (Kovacik *et al.*, 1980; Putt, 1943). Russell (1953) correlated traits in inbred lines with yield of outcrossed hybrids. The fertile lines were open-pollinated with a cultivar, but hybrid percentage was not