

APPLYING A DEVELOPED PATH ANALYSIS MODEL IN FABA BEAN

By

Yamani¹, Kh. M. M., W. M. Fares², A. A. M. Ashrie¹ and E. H. EL-Harty¹

¹ Food Legume Crops Res. Sec., Field Crops Res. Inst., ARC, Giza.

² Central Lab. For Design & Stat. Analysis Res., ARC, Giza.

ABSTRACT

Two field experiments were conducted at the Agricultural Research Station of New Valley during the successive seasons of 2010/2011 and 2011/2012 to evaluate the yielding ability of twelve faba bean genotypes and to study the relationship between seed yield and its main components. Analogous to regression model, the orthogonality (no or weak associations among the explanatory variables independent) is a necessary assumption to satisfy goodness of fit of the ordinary path analysis model. In fact, this assumption is usually violated because there are strong associations among yield components which are called the multicollinearity problem. Therefore, the current work proposed and examined an alternative path analysis model to overcome the negative effects in the presence of multicollinearity dilemma. The proposed model (sometimes called ridge path analysis) is considered a simple modified form of the normal path analysis model. The results revealed significant differences among the tested genotypes for all studied traits. Families, 11, 12 and 5 surpassed the other genotypes for seed yield (ardab/fed). Significant and highly significant positive associations were obtained between seed weight/plant and each of number of pods/plant and the weight of 100 seeds, respectively. Highest values of Variance Inflation Factor VIF (above 10) were obtained for same yield components *i.e.* number of pods/plant, number of seeds/plant and number of seeds/pod indicating the presence of multicollinearity. Consequently, unreliable estimators *i.e.* unstable path coefficients and their variances, undesirable high value of determination R^2 and wrong sign for same path coefficients were resulted using the normal model of path analysis which is statistically enough to reject this model. More precise and valid results were obtained using the modified path analysis model because it can overcome the adverse effects of multicollinearity problem. The proposed model revealed that the traits of the weight of 100 seeds, number of seed/plant and number of pods/plant exerted the greatest influence directly or indirectly upon seed weight/plant in faba bean indicating their importance as selection criteria to option a valuable gain of selection for seed yield in faba bean.

Key words: Path Analysis, multicollinearity, Faba Bean Genotypes.