INTRODUCTION

Lentil (*Lens culinaris* Medikus) is an important food legume crop in Egypt as a source of good quality protein in the common diet (25% seed crude protein content). On the average, lentil provides more than twice the amount of dietary protein of cereals. In addition, it provides nutritionally rich residues for animal feed. It also reduces the dependence of cropping system on nitrogenous fertilizers because of its ability to fix atmospheric nitrogen in association with rhizobia.

In Egypt lentil is mainly grown in the old land of Nile Valley for thousands of years. In 1950 and 1960 the area cropped to lentil and productivity averaged 80.000 fed and 3.9 ardab/fed, respectively. The crop acreage remained stable until 1975-76, after which it declined dramatically and the crop has spread out the Nile valley to the Delta, new reclaimed areas, and later to the North Coast under rainfed condition. Although lentil productivity was improved recording 4.7 ardab/fed, lentil acreage has continued to decline reaching only 2532 fad in 2004/2005. Due to the reduction in lentil acreage, the total seed production has decreased from 12,320 ton in 1991 to 1884 ton in 2005 covering only 6.1% of the country requirements.

Many achievements have been made for improving lentil production in Egypt. Three new lentil varieties named; Giza 4, Giza 51 and Sinai 1, which are high yielding, resistant to root-rot/wilt diseases and early in maturity have been released in 1998. Nevertheless, more efforts have to be exerted to develop new varieties earlier in maturity and higher yielding than the available varieties. To achieve such purposes, more efficient breeding and selection program should be developed.

Therefore, the present study aims to select high performing and promising families from the F_3, F_4 and F_5 populations of five lentil crosses and estimate variability, heritability and expected genetic gain from selection for some agronomic traits. The study aims also to investigate the nature of associations among those traits and their

relative contribution to yield variation in order to formulate suitable selection criteria that could guide breeders in selection programs for lentil improvement.