STUDY ON YIELD ATTRIBUTES, INTERRELATIONSHIPS AND PATH ANALYSIS IN SEVERAL LARGE AND SMALL SEEDED PROMISING CHICKPEA LINES

(Cicer areitinum L.)

By

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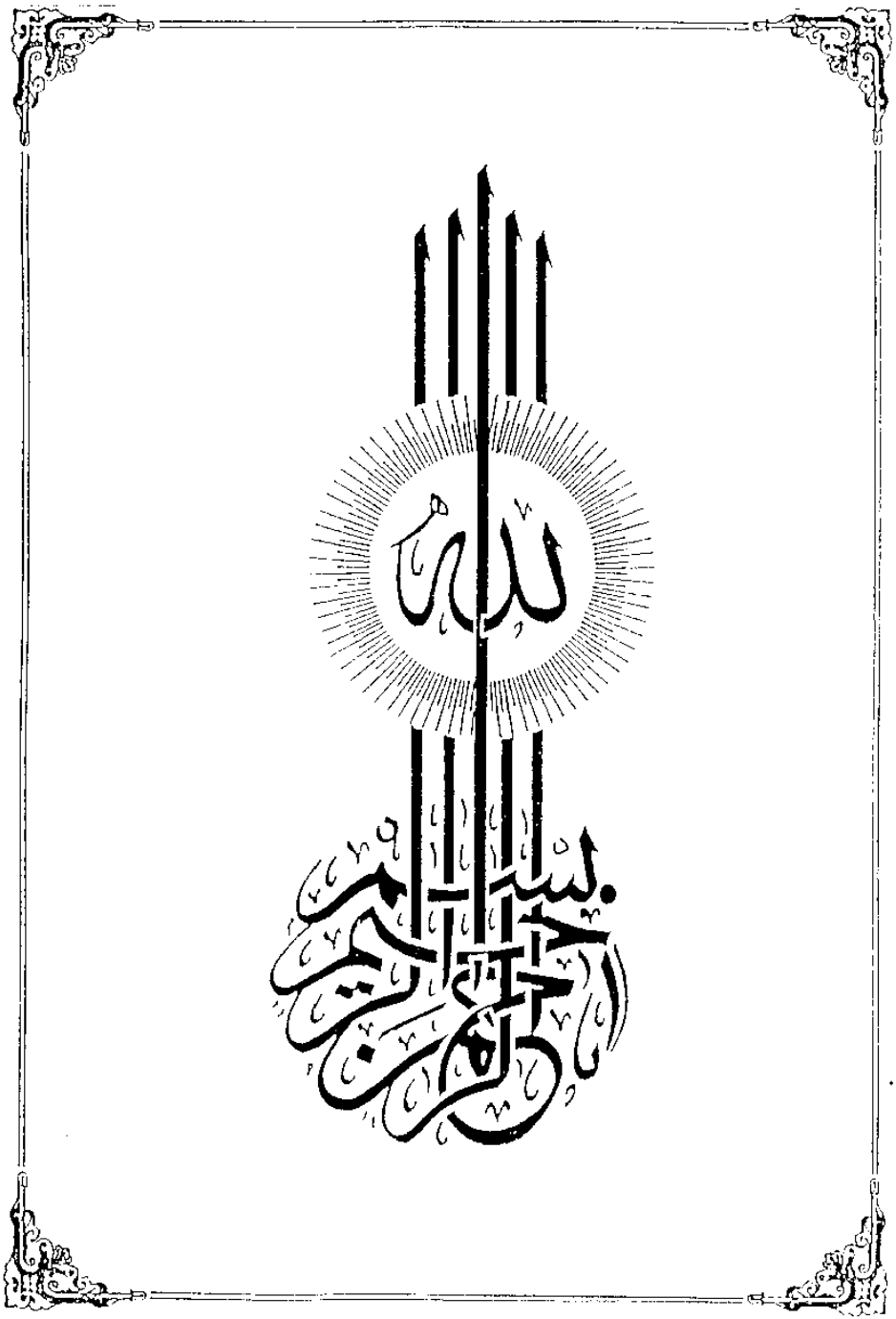

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ABSTRACT

Three field trials were carried out to investigate the effect of Rhizobium inoculation and varietal differences on growth, yield and its components of chickpea. The results revealed that treating seeds with Rhizobium inoculation increased significantly seed yield per feddan, number of pods per plant, number of seeds per pod, seeds weight per pod, seeds weight per plant, seed protein content, nodules number and weight, migration coefficient, secondary branches, leaves, chlorophyll "a" and "b" and carotene. On the other hand, pod length, straw yield for individual plant and feddan, 100-seeds weight, harvest and crop indices, plant height, number of main branches were not statistically affected by inoculation treatments.

Varietal differences were obtained for seed yield t/fed., seeds weight per plant, seed index, seed protein content, nodules number and weight, harvest and crop indices, migration coefficient, plant height, main and secondary branches, chlorophyll "a", "b" and carotene content.

The vegetative dry matter represented by dry weight of leaves and stem showed an increasing trend from stage 86 DAS to 107 DAS and picked up very fast growth at last stage. The total dry matter in grams per plant was significantly heavier in treated plants than in the untreated ones at 135 DAS. The difference reached to 10.7%. Genotypic statistically differences were obtained in accumulating dry matter.

Number of seeds/pod had the highest positive direct effect on seed yield (0.510) followed by seed index (0.347) and number of pods/plant (0.309) whereas direct effect of number of branches was very tiny (0.028).

At 65-86 days interval, the path analysis revealed that, crop growth rate had the highest positive direct effect on yield (0.469) followed by RGR (0.054). However, LAI and NAR had negative direct contribution.

At 86-107 days interval, the path diagram show that both CGR and RGR had sizable direct effects on yield but with reverse direction. Other two direct effects were negligible, 0.007 for LAI and -0.006 for NAR.

At 107-128 days interval, the direct effect of LAI at this late growth stage was sizable and negative (-0.747) but with high positive indirect effect via CGR (0.693), thus the total correlation was not sounded (-0.146).

This study clearly indicated that the chickpea productivity was influenced more by NAR rather than LAI. Maintaining higher photosynthetic efficiency up to harvest would lead to enhanced productivity as it was evidenced from this study.

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INTRODUCTION

Investigations of the physiology of yield in the chickpea, one of the cool season food legumes have often adopted the traditional approach of measuring only the end-products of physiological and phenological processes at reproductive maturity, Viz seed yield (per plant or per unit area) and three of its components i.e the number of fruits that ripen, the average number of seeds in them, and the mean weight of individual seed (Summerfield et al 1992).

These data provide little understanding of why economic yield or any particular component of it varies; neither do they provide much understanding of the processes by which components of yield are determined, nor how they relate to plant growth or the environment. Four types of processes- development, expansion (e.g. of leaf area), and the assimilation and distribution of dry matter - combine to determine economic yield.

Environmental factors and agronomic variables including effects of Rhizobium inoculation have considerable effects on each of these processes, and there can be substantial quantitative differences between genotypes. Progress requires a move away from traditional analyses of components of yield towards the use of simple models which seek to quantify and so interpret and predict the effects of environment, genotypes, and agronomy practice on development, expansion, assimilation, and distribution - and so, ultimately, on seed and biological yield.

Since studies of this nature with chickpea are limited, the prime objectives of this investigation were to study (1) the effect of genotypes and rhizobia inoculation on the growth analysis and yield contributing variables of chickpea. (2) to furnish information on the nature of associations of both growth and seed yield contributing varia-bles and find out which have substantial influence on yield under inoculation and non-inoculation conditions by the method of path - coefficient in correlation analysis through a system of related variables. However, such objectives may furnih important informations on scientific basis for both the breeder and the physiologist.