Abstract

Guar or cluster bean belongs to leguminosae family. It is an annual plant and tolerant to salinity and drought. In order to assess and survey the effects of nutritious factors and density on ecophysiological traits, yield and yield components, a factorial experiment using randomized complete blocks design with three replications was conducted. This research was carried out twice in two cultivating years in the center of agricultural research of Isfahan province. First factor included: chemical fertilizer (two levels of 60, 70, 70 and the other 90, 100, 100, kilograms per hectare respectively nitrogen, potassium and phosphorous) , animal manure (in two levels 10 and 20 tons per hectare) and vermicompost (at two levels of 300 and 600 kilograms per hectare) and density as the second factor consists of three levels of 60, 75 and 90 plants / m2. The growth trend index and some quantitative traits were measured for 8 times during the growth period. At the end of the growing period, other traits such as final height, biological yield, grain yield, number of sub branches, number of seeds per plant, pod length, number of seeds in pods, 1000 seed weight and harvest index were measured. Qualitative traits such as chlorophyll, carotenoid, crude protein, crude fiber, mucilage, swelling factor, NDF and seed ash were also measured. Growth indices were CGR, RGR, TDM, NAR, LAD, SLW, SLA, LWR and LAR. Based on the results, the plant height, biological yield, grain yield, number of sub branches, number of pods, pod length in nutritious treatments and plant density were significant, but the interaction between fertilizer levels and density, except for the number of pods, were not significant. The weight of 1000 seeds just in the first year was significant. In all treatments, by increasing the density the plant height increased too, and by decreasing the density the number of branches and consequently the number of pods increased. The simple effects of fertilizer, density and time on height, total dry weight, leaf dry weight, leaf area and leaf area index were significant. The interaction effects of fertilizer with density were significant for height and the other traits were nonsignificant, the interaction effects of time with fertilizer and time with density in all traits were significant. Triple effects of fertilizer in density in time were not significant In addition, final height, biomass, grain yield, number of sub branches, number of pods, length of pods and harvest index were superior in chemical fertilizer, but the number of seeds in pod and 1000-seed weight did not differ in most of the cases. The amount of nitrogen, protein, mucilage and NDF were significant and other qualitative traits were non-significant in chemical treatment. The interaction effects of fertilizer on density were significant for nitrogen, protein and NDF as well. The effect of year on most of qualitative traits were significant. Mean comparison of the densities in regard to dry matter indicates that the density of 60 is superior. As a whole the density of 60 plants per square meter was preferred in most of traits. In most of the yield components, preference is to chemical fertilizer, but in the qualitative traits, vermicompost was at the same level or sometimes superior to other treatments. So at the same condition, it is advisable to use 60 plants per square meter and to get a better result in cropping and to decrease the negative environmental effects, it is advisable to use a combination of chemical fertilizer and vermicompost.

Key words: cluster beans, legume, medicinal plant, growth indices, biomass, seed yield

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A survey on different ecophysiological and agronomic aspects on quantitative and qualitative traits of guar *(Cyamopsis tetragonoloba* [L.] Taub*)*

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