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Effect of Land Configuration and Nutrient Management on Growth and Yield of Organic Guar Gum

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Abstract A field experiment was conducted during 2013-14 to study the effect of land configuration and nutrient management on growth and yield of guar gum. Opening of furrow in each row and alternate rows permit to drain excess moisture which resulted in increased growth, yield attributing characters and seed yield (270.17 kg ha^{-1}) compared to flatbed configuration. Organic source of nutient vermicompost-2.0 t ha^{-1} increased growth characters and yield attributing characters viz.,plant height, functional leaves, dry matter, no. of pods per plant, no. of seeds per pod and no. of cluster per plant compared to FYM-2.5 t ha^{-1} and soybean compost-2.0 t ha^{-1}. Seed yield (281.71 kg ha^{-1}), pod yield (471.84 kg ha^{-1}) and biological yield (1069.91 kg ha^{-1}) were increased due to vermicompost-2.0 t ha^{-1} followed by other organic sources.

Keywords Guar gum, Organic, Fym, Vermicompost, Soybean compost.

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Introduction

Guar gum is short durational legume crop suitable under rainfed conditions. Guar gum, a natural gum,is an edible thickening agent extracted from the guar bean, which contains galactomannan gum which forms a gel in water. This gum has multiple uses such as oil well drilling, textile printing, paper, explosive, mining, frozen food, bakery, dairy products, beverages, pet foods, slimming aids, tablet preparation, ointment, and thus an important foreign exchange earner for the country [1]. In India, Rajasthan is the leading state (70%) in the production followed by Gujarat, Haryana and Punjab. Being a leguminous crop, it has importance for soil imporvement through symbiosis with nitrogen fixing bacteria (*Rhizobium* spp.) on its root nodules which adds about 50—150 kg nitrogen ha^{-1} by mechanism of nitrogen fixation in soil. Guar gum has short duration (90—110 days), its water nd nutritional requirement are quite low compared to other crops. Moreover, it is well suited for marginal and sub marginal land and hence an experiment was conducted to see the suitability of guar gum under limited resources of Vidarbha region.

Materials and Methods

The field experiment was conducted during *kharif* season of 2013-2014 at the farm of Agronomy department, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The soil was clayey with pH-7.8 having organic carbon 0.43%, available N 174.30 kg/ha, P_2O_5 14.40kg/ha and K_2O 374.33 kg/ha. The experiment consisted of twelve treatment combinations

of three levels of land configuration (flat bed, open ing furrow in each row 30—40 DAS and opening furrow in alternate rows 30—40 DAS) and four levels of nutrient management (control, FYM-2.5 t ha^{-1}, soybean compost-2.0 t ha^{-1} and vermicompost-2.0 t ha^{-1}). The experiment was laid out in split plot design, allocating land configuration in main plots and nutrient management in sub plots and was replicated four times. Land configuration was done after 30 DAS while the organic sources of nutrient were applied before sowing of the seeds. Seeds of guar were dibbled all along the ridges according to recommended spacing i.e., 45 cm. Observations were recorded on plant height, dry matter production, no. of pods per plant, no. of seeds per pod. Analysis of variance for individual characters was done by the procedures suggested Panse and Sukhatme [2].

Results and Discussion

Effect of land configuration

Growth characters like plant height , number of functional leaves, and dry matter was significantly influenced by land configuration compared to conventional layout. The treatment opening of furrow in each row increased these growth parameters as compared to flat bed sowing but was at par with opening of furrow in alternate rows. Significant increased in growth parameters with opening of furrow in each row and opening of furrow in alternate rows indicated adequate moisture conservation in soil, which had benefited to the crop during growth period, resulted in optimum cell division and their elongation which resulted in enhanced plant height functional leaves and dry matter per plant. This observation is in line with findings Allotti et al. [3].

Yield contributing characters viz., number of pods plant^{-1}, number of seeds pod^{-1}, number of cluster plant^{-1} were significantly higher with opening of furrow in each row which was at par with opening of furrow in alternate rows and superior than flat bed. These may be related to better availability of moisture which has increased plant height and ultimately better fruiting. These findings are in close conformity with those of Patil et al. [4, 5].

Highest seed yield (270 kg ha^{-1}), pod yield (460.73 kg ha^{-1}) and biological yield (1049.08 kg ha^{-1}) was recorded with opening of furrow in each row which was at par with opening of furrow in al-

Table 1. Growth, yield and yield attributes as influenced by land configuration and nutrient management.

Treatments	Plant height (cm)	Functional leaves plant^{-1}	Dry matter (g)	No. of pods plant^{-1}	No. of seeds pod^{-1}	No. of cluster plant^{-1} (g)	Pod yield (kg ha^{-1})	Seed yield (kg ha^{-1})	Biological yield (kg ha^{-1})
Land confoiguration									
Flat bed	37.95	23.67	5.23	10.70	6.78	3.44	380.12	238.25	867.17
Opening of furrow in each row	43.87	27.96	6.41	14.56	7.26	4.66	460.73	270.17	1049.08
Opening of furrow in alternate rows	42.19	25.44	6.13	13.29	720	4.49	429.82	261.63	981.44
SE (m) ±	0.68	0.95	0.19	0.46	0.11	0.26	13.63	5.87	16.15
CD at 5%	2.37	3.29	0.56	1.62	0.36	0.89	47.19	20.33	55.88
Nutrient management									
Control	37.40	22.73	5.31	11.38	6.81	3.35	372.35	226.36	868.14
FYM-2.5 t ha^{-1}	42.21	26.26	5.93	13.00	7.09	4.33	428.24	260.71	972.35
Soybean compost-2.0 t ha^{-1}	40.67	25.53	5.91	12.78	7.01	4.16	421.79	258.94	953.19
Vermicompost-2.0 t ha^{-1}	45.07	28.23	6.53	14.28	7.42	4.95	471.84	281.71	1069.91
SE (m) ±	0.57	0.6	0.15	0.39	0.10	0.25	11.80	4.05	13.88
CD at 5%	1.66	1.74	0.49	1.13	0.29	0.73	34.26	11.76	40.29
GM	41.34	16.71	5.92	12.85	7.08	4.20	423.56	256.68	965.90

ternate rows and found significantly higher than flat bed sowing. The increased seed yield was mostly attributed to more pod bearing and dry matter accumulation in the treatments. Similar effect of modified land configuration has also been reported patil et al. [5] and Jogdande et al. [6].

Effect of nutrient management

Application of vermicompost-2.0 t ha^{-1} had favorable effect on plant height, number of functional leaves and dry matter accumulation than FYM-2.5 t ha^{-1}, soybean compost-2.0 t ha^{-1} and control treatments. The improved growth might be due to better soil physical conditions, prolonged availability of macro and micro nutrients to crop during entire crop growing season as stated Reddy and Reddy [7] and More et al. [8].

Yield contributing characters viz., number of pods, number of seeds pod^{-1} and number of cluster $plant^{-1}$ were higher with vermicompost-2.0 t ha^{-1} than FYM-2.5 t ha^{-1}, soybean compost-2.0 t ha^{-1} and control. Significant increase in yield attributing characters due to application of vermicompost might be because of increased growth parameter like plant height, number of functional leaves and dry matter accumulation $plant^{-1}$. Higher pods in vermicompost may be due to more nutrient content and better its availability compared to other sources. This observation is in line with findings Ramawtar et al. [9].

Highest seed yield (281.71 kg ha^{-1}), pod yield (471.84 kg ha^{-1}) and biological yield (1069.91 kg ha^{-1}) was recorded with vermicompost-2.0 t ha^{-1} than FYM-2.5 t ha^{-1}, soybean compost -2.0 t ha^{-1} and control treatments. The improved yield components due to vegetative and reproductive growth led to higher seed yield. The findings are in close proximity with Ramawtar et al. [9], Chhipa et al. [10].

Conclusion

Interaction effects of land configuration and nutrient management were found to be non-significant in respect of all growth characters, yield attributes and yield of guar gum. With this finding it can be interfered that guar gum may be sown with opening of furrow in each or alternate rows vermicompost-2.0 t ha^{-1} for better yield.

References

1. Kumar D (2005) Status and direction of arid legumes research in India. Ind J Agril Sci 75 : 375—391.
2. Panse VG, Sukhatme PV (1985) Statistical methods for agricultural workers, ICAR publication, New Delhi pp 359.
3. Allolli TB, Hulihalli UK, Athani SI (2008) Influence of *in-situ* moisture conservation practices on the performance of dryland cluster bean. Karnataka J Agric Sci 21 : 250—251.
4. Patil M (2005) Influence of nutrient management and land layouts on growth and yield of soybean (MSc (Agric). thesis. (unpub.) Dr. PDKV, Akola.
5. Patil DB, Mendhe SN, Kolte HS, Sathe HD (2011) Effect of land configuration and irrigation management on yield attributes and economics of linseed. J Soils and Crops 21 : 86—89.
6. Jogdanbe VJ, Malvi GC, Dalal SR, Karunakar AP (2003) Effect of different layouts and nitrogen levels on growth and yield of soybean. PKV Res J 27 : 183—184.
7. Reddy C, Reddy M (2005) Differential levels of vermicompost and nitrogen on growth and yield in onion-raddish cropping system. J Res ANGRAU 33 : 11—17.
8. More SR, Mendhe SN, Kolte HS, Yenprediwar MD, Chaudhary RL (2008) Growth and yield attributes of soybean as influenced by nutrient management. J Soils and Crops 18 : 154—157.
9. Ramawtar A, Shivran C, Yadav BL (2013) Effect of NP fertilizers , vermicompost and sulfur and quality of cluster bean and their residual effect on grain yield of succeeding wheat. Leg Res 36 : 74—78.
10. Chhipa BG, Chandra Atul, Gulati IJ (2012) Residual effect of integrated nutrient management on growth, yield and quality of vegetable cluster bean. Prog Hort 44 : 116—121.