INFLUENCE OF DIFFERENT SPACINGS UNDER VARYING FERTILITY LEVELS ON PROTEIN CONTENT, PROTEIN YIELD AND AVAILABLE NPK IN SOIL OFSUMMER GREENGRAM (*Vignaradiata* L.)

ABSTRACT

A field experiment on "Influence of different spacings under varying fertility levels on protein content, protein yield and available npk in soil of summer greengram (*Vigna radiata* L.)" was carried out at Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, SardarkrushinagarDantiwada Agricultural University, Sardarkrushinagar during summer 2020 on loamy sand soil. Twelve treatment combinations comprising of four spacings S_1 (30 × 10 cm), S_2 (30 × 20 cm), S_3 (45 × 10 cm) and S_4 (45 × 20 cm) and three fertility levels viz., F_1 (75% RDF), F_2 (100% RDF) and F_3 (125% RDF) were evaluated in factorial randomized block design with three replications. The results revealed that significantly higher protein yield (256.10 kg/ha) under 30 × 10 cm spacing as compared to other treatments.Among the fertility levelssignificantly higher protein content (24.17%), protein yield (260.27 kg/ha) and Higher value of available N and P_2O_5 status in soil after harvest was observed in treatment (F_3) 125% RDFof summer greengram. Thus, from the foregoing results of one year experiment, it can be concluded that for securing higher seed yield, stover yield, protein yield and higher available N, P2O5 in soil after harvest of summer greengram should be sown at 30 cm × 10 cm spacing and fertilized with 100% RDF (20-40-00 N-P_2O_5-K_2O kg/ha) under loamy sand soil.

Keywords: -Greengram, Protein content, Yield, Spacing.

1. Introduction

Pulses are wonder present of nature to the living universe and are the real gateway of sustainable agriculture. Food legumes constitute an important dietary ingredient of Indian diet as they supply protein and essential amino acids and play significant role in Indian farming(Patel, 2017). Pulses are the cheapest source of quality protein for the human beings(Ali, 2010). The protein hunger is common problem in India, where majority of the people have vegetative diet. Greengram native is India and central Asia. Greengram is cultivated in the countries of India, Burma, Srilanka, Pakistan, China, Fiji, Queens land and Africa.Greengram (*Vignaradiata*) is commonly known as moog, goldengram, mung. It's belonging to family Leguminosae (Patel, 2017). It is third important pulse crop after chickpea and pigeonpea, cultivated throughout India for its multipurpose uses as vegetable, pulse, fodder and green manure crop. Its seed is more palatable, nutritive, digestible and non-flatulent than other pulses grown in the world. Spacing plays an important role in contributing to the high yield because thick plant population will not get proper light for photosynthesis and high infestation of diseases(Patel, 2020). On other hand very low plant population will also reduce the yield(Patel, 2020). Due to this reason normal plant population is essential for high yield. Advantage of optimum spacing under irrigated conditions is due to reduced competition for light because when the moisture is lacking, light is no longer onlylimiting factor and advantage of uniform spacing is lost (Ihsanullah*et al.* 2002). It is the most important non-monetary input, which can be manipulated to attain the maximum production per unit area (Jain and Chauhan, 1988). Fertilizer plays important role for obtaining crop production(Shelke, 2011). For greengram, 20 kg nitrogen(N), 40 kg phosphorus should be given at sowing time. It is advisable to use fertilizers on the basis of soil test and recommendations, normally 100 kg DAP/ha is sufficient for one hectare the fertilizer should be applied by drilling either at the time of sowing or just before sowing in such way that they are placed about 2-3 cm below the seed.

Keeping facts in view the present study entitled "Influence of different spacings under varying fertility levels on protein content, protein yield and available npk in soil of summer greengram (*Vigna radiata* L.)" will be taken with the following objective:

1. To study the effect of different spacings and fertility levels on protein content and protein yield of summer greengram
2. To find the effect of different spacings and fertility levels on available nutrients in soil of summer greengram

2. Methodology

The field experiment was conducted at Agronomy Instructional Farm, Chimanbhai Patel Collegeof Agriculture, SardarkhrushinagarDantiwada Agricultural University, Sardarkrushinagar during summer season of year 2020. The experiment field was fairly leveled and uniform. The soil of the experimental plot was loamy sand in texture andslightly alkaline having pH 7.4. The soil was low in organic carbon (0.20 %) and available nitrogen (137 kg/ha), medium in available phosphorus (31.24 kg/ha) and high in potassium (282 kg/ha) status based on the chemical analysis of soil. Twelve treatments were laid out in Randomized Block Design with factorial concept with three replications. The four levels of spacings (S_1-30× 10 cm, S_2-30 × 20 cm, S_3- 45 × 10 cm and S_4-45 × 20 cm) and three levels of fertility levels[F_1-75% (15-30-00 N-P2O5-K2O kg/ha) RDF, F_2- 100% (20-40-00 N-P2O5-K2O kg/ha) RDF and F_3-125% (25-50-00 N-P2O5-K2O kg/ha) RDF]. Thegreengram variety GM 6 was sown on 4th march 2020.

3. Results and Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads.

3.1. Effect of spacings on quality parameters and nutrient studies

3.1.1. Protein content and Protein yield

The resultsfrom Table 1 revealed that protein content different spacings found non-significant effect on protein content in seed of greengram. However numerically higher protein content (23.33 %) was found in 45 × 20 cm spacing (S_4) followed by 30 × 20 cm spacing (S_2: 23.18 %). The lowest protein content (22.22 %) was noted with 30 cm × 10 cm spacing (S_1). Thereason may be more competition between plants for growth resources like nutrient, moisture, light under narrow spacing that reduced protein content in seed. Similar results observed by Panchal (2015), Patel (2012), Patel (2017) and Patel *et al.* (2019) in mothbean and incase of protein yield in Table 1 showed that 30 × 10 cm (S_1) spacing gave significantly higher protein yield (256.10 kg/ha) but it was remained statistically at par with 45 × 10 cm (S_3) and 30 × 20 cm (S_2). This might be due to increased seed yield under 30 × 10 cm (S_1) spacing. The lowest protein yield (189.54 kg/ha) was recorded under 45× 20 cm spacing (S_4). Similar results were observed by Panchal (2015) and Patel (2017).

Fig. 1: 45 cm × 20 cm + 125% RDF

3.1.2. Available NPK in soil after harvest

The results graphically illustrated in Fig. 3showed that available N, P_2O_5 and K_2O in soil after harvest did not differ significantly. Though marginally higher available N, P_2O_5 and K_2O(167.56, 41.19 and 261.90 kg/ha) was recorded under 45 × 20 cm (S_4) spacing. This might be due to less competition for nutrient in wider spacing which ultimately lead more nutrient left over in soil. The lowest available nitrogen of 161.19 kg/ha was observed under the spacing of 30 × 20 cm while available P_2O_5 and K_2O less under spacing 30 × 10 cm. Similar findings were reported by Patel (2017) and Ezung*et al.* (2020).

Table 1: Effect of spacings and fertility levels on protein content in seed and protein yield of summer greengram

Treatments	Seed yield (kg/ha)	Protein content (%) in seed	Protein yield (kg/ha)
Spacings (S)			
S_1: 30cm × 10cm	1133	22.22	256.10
S_2: 30cm × 20cm	927	23.18	216.01
S_3: 45cm × 10cm	1037	22.33	231.86
S_4: 45cm × 20cm	812	23.33	189.54
S.Em. ±	107.04	1.22	22.45
C.D. (P=0.05)	314	NS	65.84
Fertility levels (F)			
F_1: 75% RDF	808	20.99	168.77
F_2: 100% RDF	1044	23.13	241.10
F_3: 125% RDF	1081	24.17	260.27
S.Em. ±	92.70	1.05	19.44
C.D. (P=0.05)	272	3.093	57.02
Interaction(S × F)			
S.Em. ±	61.80	0.70	12.96
C.D. (P=0.05)	NS	NS	NS
C.V.%	10.95	5.35	10.05

Fig. 2: 30 cm × 10 cm + 125 % RDF

3.2. Effect of fertility levels on quality parameters and nutrient studies

3.2.1. Protein content and protein yield

A perusal of data presented in Table 1 indicated that application of 125% RDF (F_3)registered significantly higher protein content (24.17 %) and protein yield (260.27 kg/ha) in seed of greengram but it was statistically at par with 100% RDF (F_2). Protein content in mungbeen seed increased with an increase in the availability of N. This was mainly due to the structural role of N in building up amino acids. Meena *et al.* (2020). The lowest protein content (20.99 %) and protein yield of 168.77 kg/ha registered with application of 75% RDF (F_1). These results are also close conformity with the finding of Singh (2012) and Meena *et al.* (2020).

3.2.2. Available NPK in soil after harvest

The beneficial effect of varying fertility levels on available N and P_2O_5 in soil after harvest have been graphically presented in Fig. 3. Application of 125% RDF (F_3) resulted Significantly higher available N and P_2O_5 in soil 179.97 and 42.15 kg/ha) and was statistically at par with 100% RDF (F_2) Because higher rate of fertilizer application and nitrogen fixation by plants, while non-significant effect of varying fertility levels on available K_2O in soil after harvest of greengram.Similar results were also observed by khavithet *al.* (2019) in cowpea and Jat *et al.* (2012) in greengram.

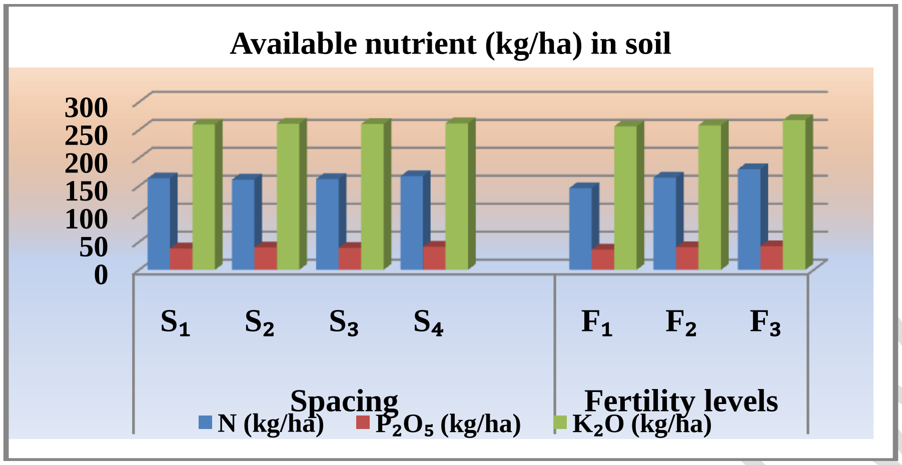

Fig.3: Effect of spacings and fertility levels on available N, P_2O_5, and K_2O content in soil after harvest of summer greengram

Conclusion

On the basis of finding of the present investigation, it can be concluded that significantly higher seed yield, stover yield, protein yield and higher available N, P2O5in soil after harvest of summer greengram should be sown at 30 cm × 10 cm spacing andfertilized with 100% RDF (20-40-00 N-P_2O_5-K_2O kg/ha) under loamy sand soil.

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