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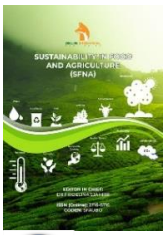

RESEARCH ARTICLE

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON YEILD AND YEILD ATTRIBUTING CHARACTERS OF BLACKGRAM IN LAMAHI, DANG

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ABSTRACT

The research was conducted to determine which type fertilizer dose produces a higher yield of black gram. Khajura mash-1 variety was used for the experiment which was collected from the NARC office of Khajura, Nepalgunj. Eight different fertilizer treatments were studied in the research field of Prithu Technical College, Bangaun, Lamahi, Dang. The experiment was carried out in Randomized Complete Block Design (RCBD) with three replications. From each plot 5 sample plant was taken for collection of data. From the research, it is concluded that among different treatments, 50%RDF +10t goat manure/ha produces higher yield (1510.54 kg/ha). Treatment 100%RDF+5t goat manure/ha and 50%RDF+10tVermicompost/ha produces somewhat equal yield (1268.67 kg/ha and 1264.61kg/ha respectively). A higher number branch was seen in treatment 100%RDF+5t goat manure/ha (average 8.16). Higher test weight was identified in treatment 100%RDF+5t goat manure/ha (38gm). In the case of control treatment, many parameter shows less yield and poor growth and development. This result helps for further research for students as well as in NARC to determine the fertilizer dose to increase the yield of black gram, this may help in the rise of the economic standard of farmers.

KEYWORDS

Black gram, Integrated nutrient, Yield.

1. INTRODUCTION

Agriculture remains Nepal's principal economic activity, employing about 65.7 percent of the total population (MoAD,2018). The diverse physiographic and agro-climatic condition makes it suitable for cultivation of a wide variety of crops and vegetables that are grown in different season and different parts of the country. Despite this, the agriculture sector is mostly subsistence; it contributes only about 27 percent of the total Gross Domestic Product (MoAD, 2018). Among various crops, pulses are one of the important crops. Pulses (grain legumes) are important in terms of nutrition and subsistence farming. It plays a role in enhancing the soil fertility by symbiotic nitrogen fixation. Pulses supply the major part of the dietary protein for the majority of poor who cannot afford expensive animal protein and vegetarians. Crop residues and by-products are valuable as fodder, feed, and firewood. In Nepal, pulses (includes soybean) occupy 10% of total cultivated land, ranking fourth in area after rice, wheat, and maize. Grain legumes are grown in 319,472 ha with production and productivity of 262,357 and 821 kg/ha, respectively (MoAC, 2011).

Black gram (*Vigna mungo*) is a significant mid-hill legume for summer grains. With large hairy leaves, and 4-6 cm seed pods, the plant grows 30-100 cm. Black gram popularity in Nepal is growing, as evidenced by a 273 percent rise in acreage and a 473 percent increase in production in the 25 years between 1984/85 and 2009/2010. Black gram production in Nepal is 19,402 metric tonnes, with an area of 23,312 ha (Nepalese Agriculture Statistical Information 2015/16). Black gram is an outstanding source of fine protein. Among other pulse crops, the importance of this crop is its high nutritional value, short duration, adaptability to all seasons and suitability for the different crop system. It can be used for cattle as a rich source of protein & mineral feed. Black gram is the key source of protein from the deity (24 percent), 67 percent starch, 3.5 percent fiber,1.74 percent fat, and a small portion of lysine in a vegetarian diet. As a leguminous crop, black gram is often used as a green manure crop; it can fix nitrogen in the atmosphere.

This also helps avoid soil erosion. Being a short-lived garbage and offseason adaptability, this suits well in many intensive crop rotations. Use of fertilizer has adversely affected soil's physical and chemical properties making it acidic or saline. To preserve soil fertility and productivity, organic matter such as FYM compost must be added when organic manures are not available in the necessary quantity. The use of organic manures in soil plays a crucial role in maintaining the fertility of the native soil. This not only increases the soil's moisture retaining ability but also plays significant role in the conservation of soil and water through its binding and aggregation properties. These also aid in balancing the availability of nutrients to grow as well as successive crop plants and in improving crop production and quality Organic manures provide significant quantities of humus.

Humus improves soil structure, drainage, aeration, holding water, buffer and exchange ability, soil mineral solubility, and serves as energy source for microorganism growth. Slow microbial breakdown of humus triggers a gradual release of plants, thereby ensuring long-term availability of nutrients and thus representing the residual effect of organic manures in subsequent application seasons. Goat manure that is high in nutrients such as nitrogen, phosphorus and potassium instead of receiving manure from

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the farm yard. It is expected that goat manure can add nutrients to the soil and also alter the soil's physical properties (Ojeniji and Adegboyega, 2003). Vermicompost is the Earthworms end-product of organic matter. It comprises a carbon- and nitrogen-rich micro-site. Since vermicompost increases soil microbial activity, it also increases nutrient solubility (Parthasakthi et al., 2008).

A study reported that combination of goat manure and vermicompost promoted the yield of black gram (Haridha et al., 2020). Nagarajan and Balachandar at revealed that application of FYM @ 15 t ha-1 significantly improved nodulation of black gram and green gram over control (Nagarajan and Balachandar, 2001). They further reported that number of nodules per plant was found at par with control in black gram as well as in green gram in acidic soils. Significant increases in seed and straw yield were observed at 40 kg P20 S and 20 kg S ha·1 application mainly due to improvement in plant height, branches per plant and pods per plant (Thakur, 1999).

2. Materials and Methods

2.1 Experimental site

The experiment was conducted during Kharif season (22nd July to 7th October 2019) at Research Farm, Institute of Agriculture and animal science (IAAS), Tribhuwan University, Prithu technical college Lamahi, dang. The Agricultural Research Farm is situated in Lamahi, Dang, Nepal. It is located at 27.8771° N latitude and 82.5727° E longitude with an elevation of 269 m (884 ft) above sea level.

2.2 Meteorological information

The site has monsoon type of climate and more than 75% of rain occurs during 4 months, June to September. The maximum relative humidity was found in 4th week of September. Similarly, maximum temperature was noted on 1st week of August and maximum rainfall occurs on 3rdweek of September. The soil type of the field was sandy loam and received average annual rainfall of 1850 mm.

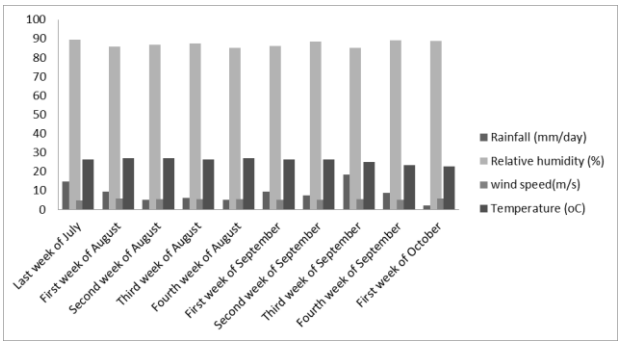

Figure 1: Weather pattern during experiment period at Bangaun, Dang, 2018/19

2.3 Experimental design

The experiment was carried out in a randomized complete block design (RCBD) with eight treatments and three replications. There are altogether 24 plots having each 8m²(4m*2m). The spacing 20cm*20cm (R*P) was maintained. There are 200 plants per plot. Randomly selected 5 plants per plot were used for data recording. The total area of the research field was 273 m² (19.5m*14m). The net cultivated area was 192 m².

S.N	Treatment number	Treatment
1	T1	Control
2	T2	100% RDF
3	T3	100% RDF + 5t FYM/ha
4	T4	50%RDF +10t FYM/ha
5	T5	100%RDF+5tVermicompost /ha
6	T6	50%RDF+10tVermicompost/ha
7	T7	100%RDF+5t goat manure/ha
8	T8	50%RDF +10t goat manure/ha

The experiment was laid out as per the plan of the layout the certified seed of black gram, Khajura mash-1 was sown @ 15 kg/ ha on 22 July 2019. Gap filling was done after one month of sowing and after 12 days of sowing thinning was performed to maintain optimum population in the field. The fertilizers, FYM, goat manure and vermicompost were applied as per treatments. For nitrogen, Phosphorous and potassium, fertilizers like Urea (46%N), single superphosphate (16% P2O5) and MOP (60% K) are used respectively. The application of FYM and vermicompost was done 7 days before sowing and was mixed in soil thoroughly. To suppress the growth of weed, 2 hand weeding and one hoeing was done. Harvesting was done manually when the crop showed physiological maturity. The harvesting was done by picking pods. Border rows were harvested and kept separately and then crop from each net plot area was harvested separately. The harvested produce from each net plot was collected in different bags as per treatment. Observation plants were harvested separately and were taken to the laboratory for postharvest studies. After sun drying the produce from each net plot was threshed manually and clean seeds were obtained by winnowing. Observation for plant height (30 DAS and 60 DAS), no. of branch plant-1, seeds pod-1 and pods plant-1 were recorded in the field, while dry weight, grain yield, and test wt/1000g grains, were recorded after harvest.

2.4 Data processing and analysis

The collected data were compiled and entered treatment wise under 3 replications. The data were processed to fit into R-Studio software for analysis. MS-excel program was used for data tabulation, and DMRT was done at 5% level of significance for mean comparison from the reference (Gomez and Gomez, 1984). Data entry was carried out to develop ANOVA.

3. Result and Discussions

3.1 Yield

The highest yield was found on treatment 50%+10tgoat manure/ha which was 1510.54 kg/ha and followed by 100%RDF+5tgoat manure/ha and 50%RDF+10tvermicompost/ha with 1268.67kg/ha and 1264.61 kg/ha respectively. The lowest yield was found in control treatment that was 712.67kg/ha. The yield of Vermicompost, goat manure and fertilizers were found highest compared to other fertilizers treatment followed by vermicompost with fertilizers (Haridha et al., 2020). Due to various factors the result was somewhat different for this research.

S.N	Treatment	Yield(kg/ha)
1	50%RDF +10t goat manure/ha	1510.54^{a}
2	100%RDF+5t goat manure/ha	1268.67^{b}
3	50%RDF+10tVermicompost/ha	1264.61^{b}
4	100%RDF+5tVermicompost/ha	1180.94^{b}
5	50%RDF +10t FYM/ha	1175.48^{b}
6	100%RDF+5t FYM/ha	1110.79^{bc}
7	100% RDF	946.75^{c}
8	Control	712.67^{d}
	C.V	9.54
	L.S.D	191.65
	Significant	***

3.2 Plant height and branching

In both 30 and 60 days after sowing, treatment100% RDF+5t vermicompost/ha shows higher plant height having 26.4 cm and 28.46cm respectively followed by treatment 50%RDF +10t goat manure/ha having 25.16 cm and 28.30 cm respectively. In the case of 30days after showing treatment 50% RDF +10t goat manure/ha shows higher branching with value 2.21 and in case of 60 days after sowing treatment 100%RDF+5t goat manure/ha shows a higher number of branching with value 8.16.

Treatment	Plant height		Number of branching	
	30 DAS	60DAS	30 DAS	60 DAS
100%RDF+5t goat manure/ha	22.23^{a}	25.53^{a}	1.93^{a}	8.16^{a}
50%RDF +10t goat manure/ha	25.16^{a}	28.30^{a}	2.21^{a}	8.03^{a}
50%RDF+10tVermicompost/ha	24.53^{a}	27.16^{a}	2.10^{a}	7.26^{b}
100%RDF+5tVermicompost/ha	26.40^{a}	28.46^{a}	1.83^{a}	7.13^{b}
50%RDF +10t FYM/ha	24.28^{a}	27.23^{a}	1.90^{a}	6.79^{b}
100%RDF+5t FYM/ha	23.3^{a}	26.07^{a}	1.83^{a}	7.23^{b}
100%RDF	22.83^{a}	25.85^{a}	1.80^{a}	5.70^{c}
Control	25.15^{a}	27.86^{a}	1.90^{a}	5.86^{c}
C.V	10.83	8.4	11.46	5.3
L.S.D	4.6	9.3	0.38	0.65
Significant				***

3.3 Test weight, pods/plants, and Dry weight

The highest test weight was found in treatment 100%RDF+5t goat manure/ha having weight 38 gm followed by treatment 50%RDF+10t goat manure/ha with value 37.43gm. In the case of pods/plant, the highest value was found in treatment 50%RDF+10t goat manure/ha with value 28 pods/plants followed by treatment 100%RDF+5t goat manure/ha having value 27.66 pods/plants. In case of dry weight, the highest dry weight was found in treatment 50%RDF+10t goat manure/ha with value 22.25gm.

Treatment	Test weight(gm)	pods/plant	Dry weight(gm)
100%RDF+5t goat manure/ha	38[a]	27.66[a]	20.85[a]
50%RDF+10t goat manure/ha	37.43[a]	28[a]	22.25[a]
50% RDF+10t Vermicompost/ha	35.2[b]	25.33[b]	20.14[ab]
100% RDF+5t Vermicompost/ha	34.8[b]	25.53[b]	17.91[bc]
50%RDF +10t FYM/ha	34.33[bc]	25.56[b]	17.63[c]
100%RDF+5t FYM/ha	34.26[bc]	25.23[b]	16.91[cd]
100% RDF	32.33[cd]	22.83[c]	17.22[c]
Control	30.66[d]	19.83[d]	14.68[d]
C.V	3.17	4.19	6.53
L.S.D	1.92	1.83	2.11
Significant	***	***	***

4. Conclusion

There were eight treatments in the research. Various parameters were analysed among them yield, number of branching at 60 DAS, test weight, pods/plant, and dry weight were highly significant. Besides these other parameter shows the non-significant result. In the case of yield, treatment 50%+10tgoat manure/ha produces higher yield i.e. 1510.54kg/ha. So, the goat manure results in a higher yield than that of other treatments. In the case of control condition, the yield was very low compared to others.

In case of height, treatment 100% RDF+5tvermicompost /ha results in higher height in both 30DAS and 60DAS having 26.4 cm and 28.46cm height respectively. After the analysis of the number of branching in 30 DAS, treatment 50%RDF +10t goat manure/ha shows higher results having a value of 2.21 but in the case of 60DAS, treatment 100%RDF+5t goat manure/ha shows higher branching 8.16. The number of branching in control treatment is very low compared to other treatments. Higher test weight was found in treatment 100%RDF+5t goat manure/ha having weight 38 gm. But in the case of pods/plant and dry weight, the treatment 50%RDF+10t goat manure/ha shows higher weight 28 and 22.25gm respectively. In control condition, parameter such as yield, pods/plants, dry weight and test weight shows less value. From the above result, the use of goat manure along with fertilizer shows good results than that of other treatments. For further confirmation, this result provides help to other researcher for further research.

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