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Effect of organic and inorganic fertilizer on growth, yield and quality of ridge gourd [*Luffa acutangula* L. Roxb.]

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Abstract

The present experiment was carried out during June to September 2018 in Departmental Research Field of Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Factorial Randomized Block Design (FRBD), with Four Treatments, replicated three having five varieties of ridge gourd. The treatments were T₁ (Control), T₂ (FYM 1kg+25:50:50g, urea, SSP MOP), T₃ (Only 19:19:19 water soluble Fertilizer 3-5g/-), T₄ (FYM 1kg + 25:50:50g, urea, SSP MOP+ 19:19:19 water soluble Fertilizer 3-5g/-). From the present experimental finding it was found that variety in combination with T resulted in best performance in terms of observations (vine length, fruit length, fruit weight, fruit diameter, total yield per) ared to other treatment combinations. In Five varieties of Ridge Gourd i.e. Jaipur Long, INDAM-1222, Dharidhar, Ankur, NHRG-1001, variety INDAM-1222 was found better with different treatments of Organic and Inorganic fertilizers, and lowest reading was recorded in T₃ (Dharidhar) in all parameters.

Keywords: Ridge gourd, organic manure and inorganic fertilizer

Introduction

Ridge gourd (*Luffa acutangula* L. Roxb), belongs to the family Cucurbitaceae. It is popularly known as Kalitori and called angled gourd, angle loofah, chinese okra, silky gourd and ribbed gourd. Ridge gourd belongs to genus *Luffa* of Cucurbitaceae and has chromosome number $2n = 26$. It contains a gelatinous compound called luffein and has medicinal importance. Green fruits are cooked as vegetable. *Luffa acutangula* fruit include carbohydrates, carotene, fat, protein, phytin, amino acids, alanine, arginine, cystine, glutamic acid, glycine, hydroxyproline, leucine, serine, tryptophan and pipercolic acid. Its leaves and flowers contain flavonoids (Schilling and Heiser 1981) and herb contains saponins and acutosides (Nagao *et al.*, 1991). The seeds contain a fixed oil which consist of glycerides of palmitic, stearic and myristic acids (Jaysingrao and Sunil 2012).

Ridge gourd has hermaphrodite, andromonoecious and gynoeccious types of flowers. Anthers are free and pistil has three placenta with many ovules. Stigmas are three and bilobate. Fruit is club shaped and angled with ten prominent ribs and many seeded. It becomes hard, bitter and inedible on maturity. Seeds are black, flattened and wrinkled. One thousand seeds weigh about 150 to 170g (Doijode, 2002) [1].

In Karnataka, it occupies an area of 2,753 ha with an annual production of 18,706 tonnes of fleshy fruits (Anon, 2004) [5]. Considering its medicinal use, commercial use of its by product in manufacturing household dutensils, consumption of fleshy fruit as vegetable in daily food and its contribution to the welfare of people, there is a need to enhance the productivity level of this crop.

Materials and Methods

This chapter comprises the details about materials used and the methods adopted during the course of investigation entitled Effect of Organic and Inorganic fertilizer on Growth, yield and quality of Ridge Gourd (*Luffa acutangula* L. Rox. b) was conducted at Department Research Field of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, during September to December 2018.

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Climatic condition in the experimental site

The area of Prayagraj, district comes under subtropical belt in the south east of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46° C- 48° C and seldom falls as low as 4 °C- 5 °C. The relative humidity ranges between 20 to 94 %. The average rainfall in this area is around 1013.4 mm annually. However, occasional precipitation is also not uncommon during winter months.

Results and Discussion

The present investigation entitled Effect of organic and inorganic fertilizer on growth, yield and quality of ridge gourd [*Luffa acutangula* L. Roxb.] were carried out at Research Field of Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) in the year 2018-19. The results of the investigation, regarding the Ridge Gourd on growth yield and quality have been discussed and interpreted in the light of previous research work done in India and abroad. The experiment was conducted in Factorial Randomized block design with 4 treatments, three replications and five varieties of Ridge Gourd.

The results of the experiment are summarized below.

Growth parameter

1. Vine length (m)

The organic manure and inorganic fertilizer has avital role in growth of plant. The increase in plant height may be attributed to improved root system of plants resulting in absorption of more water and nutrients from soil and consequently they improved different plant organs and also entire plant. The organic manure and chemical fertilizers like castor cake has a vital role in growth of plant. It regulates oxidation reduction in plants. There is an enhancement in cell multiplication and cell elongation resulting in more plant height.

More or less the above findings are in close agreement with the results of Patil *et al.*, (1997), Patil (1998) ^[15], Mohmmad *et al.*, (2000) and Jan *et al.*, (2000) in bottle gourd and Reddy and Rao (2004) ^[3] in bitter gourd whereas, Lalitha *et al.*, (2010) in ridge gourd.

2. Number of branches

Increase in vine length and branches is quite obvious as nitrogen being integral part of plant building material promoted the vine length as well as branches per plant which is depicted from the number of leaves borne on each plant.

These results are in agreement with the result of Rekha *et al.*, (2001), Reddy and Rao (2004) ^[16] and Tirakannanavar *et al.*, (2005) in bitter gourd and Sharma *et al.*, (1997) and Selvakumar and Sekar (2000) in cucumber, whereas, Siyag and arora (1988) in sponge gourd.

3. Days to appearance of first male flower

The decreased in the number of days taken for appearance of first male flower in best treatment of organic and inorganic fertilizers in bottle gourd is due to combined effect of the vermicompost and Chemical fertilizers. The Similar results were also obtained by Bano and Kale (1987) in the cucurbits.

4. Days to appearance of first female flower

The present study about the day to appearance of female flower is significantly produced the earlier female flower in bottle gourd by using the vermicompost and Chemical

fertilizers. The Similar result was also obtained by Bano and Kale (1987) in the cucurbits.

5. Node of first female flower emergence

Increase of length of vine followed by more number of internodes might be attributed to the release of nitrogen at higher levels from organic manure, which was readily available to plant, more balanced C/N ratio, abundant supply of available nutrients from the soil with comparatively lesser retention in roots and more translocation to the aerial parts for protoplasmic proteins and synthesis of other compounds.

More or less the above findings are in close agreement with the results of Sharma *et al.*, (1997) in cucumber and Chander and Mangal (1983) in muskmelon.

6. Number of male flowers per plant

Earliness and closer sex ration might be due to the presence of growth promoting substances like gibberellic acid indole acetic acid and dihydrozeatin from organic manure and inorganic fertilizers which had a positive influence on the physiological activity of the plant which could have assisted the host plant to induce female flowers there by favourably modified Sex ratio and consequently increasing the yield.

These findings are in agreement with the results of Patil (1998) ^[15] in bottle gourd and Sharma *et al.*, (1997) and Patil (1998) ^[15] in cucumber and Kumar *et al.*, (2004) in ridge gourd and Karuthamani *et al.*, (1995) in pumpkin whereas Shivashankar Murthy *et al.*, (2007) in gherkin.

7. Number of female flowers per plant

The increase in number of hermaphrodite flowers per plant could be explained on the basis that at the onset of flowering phase, the vegetative growth ceased to develop any further. Thus, incoming nitrogen which was to be utilized by vegetative parts was translocated towards reproductive organs. Hence, increasing the levels of nitrogen and organic manure in the present experiment might have increased the number of hermaphrodite flowers per plant.

More or less the above findings are in close agreement with the results of Pandey and Singh (1973). Patil (1998) ^[15] in bottle gourd and Ali *et al.*, (1995) in bitter gourd whereas, Sivag and Arora (1988) in sponge gourd.

Yield

1. Fruit length (cm)

Rapidly increased photosynthetic activities, translocation of more photosynthesis to growing plant with the application of organic manure and inorganic fertilizers may be the reason behind the increase size of fruit.

More or less the above finding are close agreement with the results of Mohmmad *et al.*, (2000), Jan *et al.*, (2000), Patil (1998) ^[15] and Umamaheswarappa *et al.*, (2000) in bottle gourd and Lalitha *et al.*, (2010) in ridge gourd whereas, Siyag and Arora (1988) in sponge gourd.

2. Fruit weight (g)

The increased weight of fruit could be due to the higher rate of photosynthesis, nitrogen fixation enhanced chlorophyll synthesis, translocation of more photosynthates to developing fruit and enzyme activity by application of FYM and NPK.

These findings are in agreement with the results of Mohmmad *et al.*, (2000), Jan *et al.*, (2000) and Umamaheswarappa *et al.*, (2004) and Lalitha *et al.*, (2010) in ridge gourd whereas, Siyag and arora (1988) in sponge gourd.

3. Fruit diameter

The data on Fruit diameter (cm), after application of organic and inorganic fertilizer in different treatment combinations was recorded and are presented in table 4.10. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to Fruit diameter (cm).

Based on the data it is found that in four treatments of organic and inorganic fertilizer T₃ (29.445cm) recorded maximum fruit diameter followed by T₄ (29.385cm), whereas minimum fruit diameter recorded in T₂ (28.829cm) followed by T₁ (28.928cm).

In five variety of Ridge Gourd V₁ (29.746cm) recorded maximum fruit diameter followed by V₃ (29.258cm) whereas minimum fruit diameter recorded V₂ (28.503cm) followed by V₄ (29.008cm).

The integrated use of NPK along with organic manures significantly influenced the length diameter ratio of fruit result are conformity with finding of Mausi (1960) also reported that application of muskmelon resulted in bigger fruit.

4. Fruit girth

Rapidly increased photosynthetic activities, translocation of more photosynthates and nitrogen is integral part of chlorophyll, enzymes are participating in dark reaction in photosynthesis to growing plant with the application of organic manure and inorganic fertilizers may be the reason behind the increased size of fruit.

More or less the above findings are in close agreement with the results of Jan *et al.*, (2000). Patil (1998) [15] and Umamaheswarapa *et al.*, (2002) in bottle gourd and Mulani *et al.*, (2007) and Rekha *et al.*, (2001) in bitter gourd whereas, Kumar *et al.*, (2004) and Lalitha *et al.*, (2010) in ridge gourd.

5. Total yield per plant

Increased in yield of ridge gourd is directly related to increase in fruit weight and number of fruits per plant and an increase in fruit weight under the influence of combination of organic manure and inorganic fertilizer may be due to the higher rate of photosynthesis and sugar formation due to enhanced chlorophyll synthesis and enzyme activity which lead to translocation of more photosynthate to developing fruits which ultimately leads to higher production of dry matter and consequently more yield. The favourable effect of organic manure on yield may be attributed to higher rate of chlorophyll synthesis more photosynthetic to higher production of sugar. The above stated reason may be the cause of appreciable increase in yield due to the application of organic manure and inorganic fertilizer significant effect brought due to their combined application.

More or less the above finding are in close agreement with the results of Pandey and Singh (1973), Shukla (1987), Patil *et al.*, (1997), Patil (1998), Mohmmad *et al.*, (2000) and Jan *et al.*, (2000) in bottle gourd whereas, Arora *et al.*, (1994), Sreenivas *et al.*, (2000) [17], Kumar *et al.*, (2004) and Lalitha *et al.*, (2010) in ridge gourd.

6. Number of fruits per plant (kg)

This increase might have been on account of combined effect of chemical fertilizer and organic manure, which favourably influenced flowering and fruiting and ultimately resulted in increased number of fruits per plant.

These results are in agreement with the results of Pandey and Singh (1973), Patil *et al.*, (1997) and Patil (1998) [15] in bottle gourd whereas, Rekha *et al.*, (2001) and Ali *et al.*, (1995) in bitter gourd.

Table 1: Effects of Organic and Inorganic fertilizers on Vine length (m), Number of branches/plant, Days to appearance of first

Symbol	Treatments	Vine length	Number of branches /plant	Days to appearance of first male flower	Days to appearance of first female flower	Node number of first female emergence	Number of male flower/plant	Number of female flower/plant	Fruit Length	Fruit Weight
T1	Control	5.75	5.27	30.32	29.99	13.08	290.82	28.12	26.10	28.19
T2	Fym 1kg +25:50:50g urea, SSP, MOP	5.86	4.68	30.49	30.49	15.03	295.14	27.98	27.87	27.76
T3	Only 19:19:19 water soluble fertilizer 3-5g/	5.53	4.78	30.90	29.97	14.93	292.83	29.34	28.36	26.79
T4	FYM 1kg +25:50:50g urea, SSP, MOP + 19:19:19 water soluble fertilizer 3-5g/-	5.60	4.76	31.81	30.60	14.43	292.76	27.70	29.53	27.66
	F-test	S	S	S	S	S	S	S	S	S
	SE(d)	0.114	0.096	0.387	0.242	0.245	1.997	0.212	0.312	0.393
	C.D. at 5%	0.232	0.195	0.787	0.491	0.498	4.058	0.431	0.635	0.798
V1	Jaipur Long	5.99	4.89	30.33	30.66	14.69	290.75	29.23	29.11	27.84
V2	INDAM-1222	5.34	4.48	31.23	29.40	14.43	287.65	29.05	28.21	26.64
V3	Dharidhar	5.37	4.99	31.59	30.03	14.60	297.77	27.19	27.21	27.91
V4	Ankur	5.68	4.91	30.94	30.55	14.26	301.36	27.88	27.53	27.55
V5	NHRG-1001	6.04	5.10	30.31	30.60	13.85	294.41	28.08	27.77	28.05
	F-test	S	S	S	S	S	S	S	S	S
	SE(d)	0.128	0.10	0.43	0.27	0.27	2.232	0.23	0.349	0.439
	C.D. at 5%	0.26	0.21	0.88	0.54	0.55	4.53	0.48	0.709	0.892

Table 2: Effects of organic and inorganic fertilizers on fruit diameter (cm), fruit girth, total yield per plant (kg), number of fruits per plant.

Symbol	Treatments	Fruit Diameter	Fruit Girth (cm)	Total yield/plant (kg)	Number of fruit /plant
T1	Control	28.92	15.77	5.362	3.238
T2	FYM 1kg +25:50:50g urea, SSP, MOP	28.82	15.46	5.715	3.013
T3	Only 19:19:19 water soluble fertilizer 3-5g/	29.44	15.62	5.232	2.935
T4	FYM 1kg +25:50:50g urea, ssp, mop + 19:19:19 water soluble fertilizer 3-5g/	29.38	16.21	5.057	2.845
	F-test	S	S	S	S
	SE(d)	0.25	0.215	0.22	0.033
	C.D. at 5%	0.52	0.437	0.446	0.067
V1	Jaipur Long	29.74	15.94	5.136	3.033
V2	INDAM-1222	28.50	16.28	4.807	3.218
V3	Dharidhar	29.25	15.09	5.181	2.76
V4	Ankur	29.008	15.66	5.556	3
V5	NHRG-1001	29.21	15.86	6.028	3.02
	F-test	S	S	S	S
	SE(d)	0.289	0.24	0.245	0.037
	C.D. at 5%	0.587	0.488	0.499	0.075

Conclusion

From the present experimental finding it is concluded that the treatments T2 (FYM 1kg+25:50:50g urea, SSP, MOP) was found superior treatments in terms of growth, yield and quality of Ridge Gourd. In five varieties of Ridge Gourd Variety NHRG-1001 was found better with different treatments of Organic and Inorganic fertilizers, and lowest reading recorded in all parameters.

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