Effect of organic manures and inorganic fertilizers on growth and yield of bottle gourd (Lagenaria siceraria)

ABSTRACT

bottle

The experiment was conducted on ~~bitter~~ gourd at Department of Horticulture, SHUATS, The objective of the research is to UTTAR PRADESH. To find ~~out~~ the effect of organic and inorganic fertilizers on growth, fruit yield and quality of bitter gourd, with three different varieties that are TMBG-1429, TMBG 3414 AND WARAD CHECK VAREITY. Experimental factors included N:P: K(RDF) alone and with the combination of 6 various treatment including the V1, V2, V3 i.e V1+fym (18 t/ha) , V1+vermicompost(1.25 t/ha),v1 +poultry manure (12.5 t/ha), V1+NPK(100%)+FYM,V1 +NPK+VC, V1+NPK+PM same as applied for other 2 varieties. It revealed that variety V2(TMBI 3346) was recorded in significantly taller plants (201.71) and also recorded in T7 NPK +PM (210.30cm) , with earliest 50% male flower initiation (57.52), also recorded hybrid with days to germination (65.09) in T7 (69.87cm) . ~~IT also~~ The Data revealed that hybrid V3 (WARAD CHECK VARIETY) was recorded with fruit length (cm), fruit diameter (cm) and fruit weight (kg) respectively 40.43 cm, 17.34 cm and 1.94 g and also recorded in T7 (NPK (100%) + Poultry manure (12.5 t/ha) respectively 38.71cm, 17.34 cm and 1.85 g. The effect on TSS due to varieties and treatments was found maximum in hybrid V2 (WARAD CHECK) (5.00) and treatments T7 (NPK (100%) +PM (12.5/ha) recorded

(5.20).

KEYWORDS: N: P: K, Vermicompost (VC), Poultry manure (PM), FYM

INTRODUCTION

Bottle gourd [*Lagenaria siceraria* (2n = 2x = 22) Standl.] also known as calabash gourd or white flowered gourd plant, is a member of the Cucurbitaceae family, Cucurbitoideae sub family, and Benincaseae tribe. The family Cucurbitaceae is comprised of 118 genera and 825 species. The genus Lagenaria consists of five other wild species, namely

L. Brevifilora (Benth) Roberty, L. rufa (Gilg) C Jeffrey, L sphaerica E Mey, L. abyssinia (Hook. F.) C Jeffrey and L. guineensis (G Den) C Jeffrey, of which L. siceraria is the most cultivated. Within the species siceraria, two morphologically distinct sub-species of bottle gourd have been recognized *viz*. L. siceraria spp. siceraria and L. siceraria spp. asiatica. The bottle gourd can be easily distinguished from other pumpkin varieties by its white flowers and characteristic fruit, seed and leaf shapes. The fruit is used for variety of purposes, tender fruits used as vegetable and for preparing sweet dishes, rayta and pickles. Bottle gourd is rich source of various essential minerals, iron, protein and full of fibre which is helpful in digestion. The edible portion of bottle gourd contain 96.1% moisture, 3.5 % total soluble solids, 0.12% acidity, 2.5% carbohydrates, 0.2% protein, 0.1% fat, 0.5 % mineral, 0.6% fibre, 44 mg thiamin, 23 mg riboflavin, 0.33 mg niacin and 13 mg ascorbic acid/100 g of edible portion (Deore *et al*., 2008). It is a rich source of potassium, vitamin C, protein, sulphur, fat and phosphorus.

Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] is one of the most important cucurbitaceous vegetable crops grown throughout the tropical and subtropical region of the country. Bottle gourd is rich nutritional contains protein, fat, carbohydrates, minerals and vitamin. It has become popular due to antioxidant, antidiabetic and antiobese

proportion **(Chadha, 2019).** Its seed kernels contain 45% oil and 35% protein. Hard shells of mature fruits are used as water jugs, domestic instruments and made musical instruments. It is highly digestible and cooling effect on human beings.

During summer the crop is sown in February- March and the vines are allowed to spreads on the ground. The rainy season crop is grown in unirrigated upland conditions and sown in July – August; the vines are trained to climb on some artificial structure. The area and production of the summer season crop are higher than the rainy season crop. In the temperate climate, the crop may be grown during summer – the rainy season, if the temperature ranges from 15°C to 25°C available for 100-120 days. In tropical conditions, it can be grown throughout the year under irrigated conditions.

MATERIALS AND METHOD

The present investigation on "**Effect of organic manures and inorganic fertilizers on growth and yield of bottle gourd (Lagenaria siceraria)"** was conducted at Horticulture Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during Kharif season 2023. All the facilities necessary for cultivation, including labour, were made available in the Department. this experiment was planned with two factors i.e. 1. variety (V) and 2. Treatments (T) with three replications under factorial randomized block design. The different doses of organic and inorganic fertilizers were T0 (Control), T1(FYM 18t/ha),T2(Vermicompost 1.25t/ha),T3(Poultry manure 12.5t/ha),T4(NPK 100%+ FYM18t/ha),T5(NPK 100%+Vermicompost1.25t/ha), T6(NPK100%+Poultry manure 12.5t/ha) and the different varieties used in the experiment are V1(TMBG1429) ,V2(TMBG3414),V3(WARAD).

Climate

The area of Prayagraj district comes under subtropical belt in the South east of Uttar Pradesh, which experiences extremely hot summer and fairly cold winter. The maximum

temperature of the location reaches up to 46ºC – 48ºC and seldom falls as low as 4ºC – 5ºC. The relative humidity ranges between 20 to 94 per cent. The average rainfall in this area are around 1013.4 mm annually. The meteorological Data from (July, 20223 to October 2023) with respective to total rainfall, maximum and minimum temperature, relative humidity is presented.

RESULTS AND DISCUSSION

A. Growth Parameters: 1. vine length

Vine length varies significantly between different Hybrids. Longer vine length at 60 days after sowing was found in variety WARAD CHECK (8.93cm) and minimum in variety TMBG- 1429 (7.19 cm). Due to the different concentrations of organic and inorganic fertilizer, the longer vine length was recorded WARAD CHECK at NPK (100%) + POULTRY MANURE(9.37cm) followed by NPK (100) +VERMICOMPOST(9.22cm) and the minimum in WARAD CHECK at Control (RDF) (7.81cm). Interaction data revealed NPK (100%) +POULTRY MANURE was recorded with longer vine length (9.23 cm) followed by NPK (100%) +VERMICOMPOST was recorded with Vine length(8.77cm) and minimum (7.04cm) was recorded in T_0 Control (RDF).7. Similar findings of Mujalid *et al.*, (2010) [7] in lettuce and (Bano and Kale (1987)) [2] in brinjal and radish were also observed.

are reported in lettuce and in brinjal and radish (2)

2 **4. Appearance of male flower in 50s% plants.**

Appearance of 1st male flower varies significantly between different Hybrids. Early male flower initiation was found in variety TMBG-3414(58.38cm) and late in variety TMBG-1429 (52.93cm). Due to the different concentrations of organic and inorganic fertilizer the earliest male flower was recorded in TMBG-3414 at NPK(100%)+POULTRY MANURE (53.70 cm) followed by NPK(100%)+VERMICOMPOST (53.70cm) and the minimum TMBG-3414 in Control(RDF) (55.96cm).2. Similar results were also obtained by Bano and Kale (1987) [2] in the cucurbits.

Table-2?

3.Appearance of first pistillate flowers in 50% of plants.

The appearance of 1st female flower varies significantly between different Hybrids. Early female flower initiation was found in the variety WARAD CHECK (46.35cm) and late in variety

TMBG-1429 (43.09cm). Due to the different concentrations of organic and inorganic fertilizer the earliest female flower was recorded in WARAD CHECK at NPK (100%) +POULTRY MANURE (53.74cm) followed by NPK(100%)+VERMICOMPOST(49.87cm) and the late in TMBG-1429 Control(RDF)(41.71cm).2 Similar result was also obtained by Bano and Kale (1987) [2] in the cucurbits

4.Days to the first harvest

Days to first harvest vary significantly between different Hybrids. The earliest days to harvest was found in variety TMBg-1429 (62.62), whereas least number of days at first harvest was recorded in variety TMBg-3414 (65.09). Number of fruits per plant was significant due to treatments. The earliest number of fruits was found in treatment RDF (57.57), followed by treatment FYM(58.50),whereas the least number of days to first harvest was observed in TMBI 3346 NPK(100%)+POULTRY MANURE (68.14).

B. YIELD PARAMETERS

1. FRUIT LENGTH

Fruit length varies significantly between different Hybrids. Maximum fruit length was found in variety WARAD CHECK (40.43 cm) and minimum in hybrid TMBG-1429 (31.74 cm). Average length of fruit was found significant due to treatments. Maximum length of fruit was recorded in WARAD CHECK at NPK(100%)+POULTRY MANURE (44.89cm) followed by in WARAD CHECK at NPK(100%)+VERMICOMPOST(42.93cm) and minimum in TMBG-1429 Control (RDF)(26.25) .1 Similar findings previously also reported by Abusaleh (1992) [1] in okra.

2. Fruit diameter (cm)

The diameter of fruit ranged from 11.44 cm (TMBG-1429) to 17.19 cm (TMBG-3414).

Maximum fruit diameter was recorded in the Variety WARAD CHEAK (17.71cm). Variety

TMBG-1429 (14.27 cm) were noted for minimum fruit diameter.8 Enhanced flowering and vine growth might have resulted in higher core diameter of fruit the finding are in clos conformity with result of Nath (2007) [8] in cucurbit.

3. Fruit weight (kg)

among

Fruit weight varies significantly between different Hybrids. Heavier fruit weight was found in variety TMBG-3414(1.90g) and lighter in hybrid TMBG-1429(1.56g). Average weight of fruit was significant due to treatments. Heavier fruit weight was recorded NPK (100%)+POULTRY MANURE (1.57) followed by NPK(100%)+ vermicompost (1.48) and the lighter in TMBG-1429 Control(RDF) (1.23). 9 Similar result has been obtained by Vadiraj *et al.* (1993) [12] in cardamom and Sekhar and Rajashree (2009) [9] in tomato.

Table 1

4. No. of fruits per plant

among

Number of fruits per plant varies significantly between different Hybrids. Maximum number of Bitter Gourd fruits per plant was found in variety TMBG-3414(20.56), whereas minimum number of Bitter gourd fruits per plant was recorded in variety TMBG-1429 (16.33). (Table 1) Number of fruits per plant was significant due to treatments. The maximum number of Bitter gourd fruits per plant was found in treatment NPK(100%)+POULTRY MANURE TMBG-3414 (16.30), followed by NPK(100%)+VERMICOMPOST (15.46) here as the minimum number of Bottle Gourd fruits per plant was observed in TMBG-1429 control(RDF)(12.42). 9 The Similar result were reported by the Sekhar and Rajashree, (2009) [9] in tomato hybrid and Jose (1989) in Brinjal.

bottle

bottle

date not shown in table

5. Yield per acre (q/acre)

among

Fruit yield quintal per acre varies statistically between different Hybrids. Maximum fruit yield quintal per acre was found in variety TMBG-3414(34.55), whereas minimum fruit yield tons per acre was recorded in variety TMBG-1429(28.40).Due to the different concentrations of Organic and inorganic fertilizer the maximum fruit yield tons per acre was found in TMBG-3414 NPK(100%)+POULTRY MANURE(44.17), followed by treatment NPK(100%)+VERMICOMPOST(39.87), whereas the minimum fruit yield per acre was observed in TMBG-3414 control(26.33).2 Similar findings of Mujahid *et al*. (2010) [7] in lettuce and Bano and Kale (1987) [2] in brinjal and radish were also observed.

Table-1

Data not shown

6. Yield per hectare (t/ha)

Fruit yield tonnes per hectare varies statistically between different Hybrids. Maximum fruit yield tonnes per hectare was found in variety TMBG-3414 (86.38), whereas minimum fruit yield tons per hectare was recorded in variety TMBG-1429 (71.00). Due to the different concentrations of Organic and inorganic fertilizer the maximum fruit yield tons per hectare was found in TMBG-3414 treatment NPK(100%)+POULTRY MANURE(110.45), followed by treatment NPK(100%)+VERMICOMPOST (99.67), whereas the minimum fruit yield per hectare was observed in variety TMBG-3414 7.Similar findings of Mujahid *et al*. (2010) [7] in lettuce and Bano and Kale (1987) [2] in brinjal and radish were also observed.

(Table 1)

Table-2?

C. Quality parameters

TSS(°Brix)

TSS varies statistically between different Hybrids. Maximum TSS was found in variety WARAD CHECK (5.00), whereas minimum TSS was recorded in variety TMBG- 1429(4.06). Due to the different concentrations of Organic and inorganic fertilizer the maximum TSS was found in varierty WARAD CHEAK treatment NPK(100%)+POULTRY MANURE(5.72), followed by treatment NPK(100%)+VERMICOMPOST(5.48), whereas the minimum fruit yield per hectare was observed in TMBG-1429 control(3.60). Increased in Total soluble solids content of fruits in treatments of organic manures, previously also reported by Sekhar and Rajashree (2009) [9] .

Table-1

not shown in table2

Table No. 1 Effect of hybrids on growth of Vine length(cm), first male flower , first female flower , days to first harvest , No. of fruit per plant, Length of fruit(cm), Average weight of fruit(Kg) , Fruit diameter(cm) , Yield/Acre(q/acre) , Yield/hectare(q/ha), TSS.

Hybrids	Vine length (cm)	Appearance of first male flower	Appearance of first female flower	Days to first harvest	No.of fruits per plant	Length of fruits (cm)	Average weight of fruits(kg)	Fruit diameter (cm)	Yield/acre (q/acre)	Yield /hectare (q/ha)	TSS (oBrix)
V1(TMBG 1429)	7.19	40.90	42.71	61.62	16.33 √	31.74 √	1.56 √	14.27	28.40 √	71.00	4.06 √
V2(TMBG 3414)	8.64	46.85	47.44	64.09	20.57 √	39.80	1.90 √	17.19	34.55 √	86.38 √	4.87
V3(CHECK)	8.93	44.71	47.63	62.44	20.54	40.43 √	1.94	17.71	32.34	80.87	5.00 √
SEm±	0.11	0.68	0.52	0.34	0.21	0.43	0.04	0.27	1.1	2.75	0.11
CDor LSD	0.31	1.95	1.70	0.97	0.61	1.22	0.12	0.76	3.14	7.86	0.31

Table No. 2 Effect of Organic manure and Inorganic fertilizer on growth of Vine length(cm), first male flower , first female flower , days to first harvest , No. of fruit per plant, Length of fruit(cm), Average weight of fruit(Kg) , Fruit diameter(cm) , Yield/Acre(q/acre) , Yield/hectare(q/ha), TSS.

Vine length	Appearance of first male flower	Appearance of the first female flower	Days to first harvest	No. of fruits per plant	Length of fruits (cm)	Average weight of fruits(kg)	Fruit diameter(cm)	Yield /acre (q/ha)	Yield/hectare (q/ha)	TSS(oBrix)
7.04	51.97	43.63	59.16	16.99	34.18	1.63	15.27	27.96	69.91	4.01
7.53	55.24	44.15	62.19	18.03	35.55	1.70	15.76	29.97	74.92	4.19
8.08	55.90	45.77	61.41	19.09	37.30	1.79	16.15	30.10	75.27	4.35
8.50	57.48	46.23	63.34	20.25	38.68	1.91	16.55	31.61	79.03	4.80
8.63	59.07	48.79	66.30	20.99	40.06	1.97	17.51	32.64	81.60	4.89
8.77	56.35	45.56	67.85	18.92	36.80	1.74	16.16	33.52	83.81	5.08
9.23	43.63	47.35	69.80	19.77	38.71	1.85	17.35	36.54	91.35	5.20
0.17	1.04	0.79	0.52	0.33	0.65	0.06	0.41	1.68	4.2	0.17
0.48	2.97	1.89	1.48	0.94	1.86	0.18	1.17	4.8	12	0.48

CONCLUSION

From the present investigation, it was concluded that the influence of organic manures with different treatment combinations played a significant effect on, the growth yield and quality of bitter gourd. Hybrid TMBI-346 and treatment NPK (100%) + Poultry manure (12.5 t/ha) recorded best in vine length, appearance of male flower in 50%plants, Appearance of first pistillate flowers in 50% of plants, days to first harvest, average fruit weight (g), length of fruit (cm), fruit diameter (cm), number of fruits per plant, yield (t/ha), TSS (°Brix), Fruit shape, Fruit colour, with net return (198099) and Benefit-Cost ratio(3.64).

Where is this net return and BCR shown?

REFERENCES

1. Abusaleha G. The effect of half poultry manures and half N through ammonium sulphate in flowering and yield of Bhindi. vegetable crops in India. 1992; 3(4):312-316.

2. Bano K, kale RP. Vermicompost: A rural technology. Agricultural Technology. 1987; 5:33-37.

3. Fagaria MS, Choudhary BR, Dhaka RS. Vegetable, crop production. Tech. kal. publ., New, 2010; 2:1

4. Jose D, Shanmugavelu KG, Thamburaj S. Studies on the efficacy of organic vs. inorganic form of nitrogen in brinjal. Indian J Hort., 1998; 445:100-103.

5. Jose S. Effect of poultry manure and urea on yield of bottle gourd, Vegetable Crops in India, T.K. Bose, ch: 1988, 8.

6. Mausi M. Studies on the absorption of nutrient element in muskmelon. On nitrogen and phosphorus level J. Hort. ass. Japan 1960; 29:12-20.

7. Mujahid AM, Gupta AJ. Effect of plant spacing organic manures and inorganic fertilizer and their combination on growth yield and quality of lettuce. Indian j Agri. Sci. 2010; 80(2):177-181.

8. Nath P. Cucurbits - everyone's crop. Acta Horticulturae. 2007; 731;485-491. 17 ref.

9. Sekhar MP, Rajashree V. Influence of organic on growth, yield and quality of tomato and the residual performance of cowpea. Green Farming. 2009; 2(5):272-274.

10. Shanmugasundadam S. Vegetable suremountale challenges. The hindu survey of Indian agriculture, M/S Kasturi and sons ltd., Chennai. 2001, 126-127

11. Subbiah K, Sundarrajan S, Muthuswamy S. Response of tomato and brinjal to varying levels of FYM and micronutrients under different fertility status of soil. South Indian Hort. 1985; 30(1):445-47.

12. Vadiraj BA, Krisna Kumar M, Naid R. studies on vermicompost and the cardamom nursery seedling. Proceeding of national symposium on soil biology and ecology. 1993, 35-57.

.