The Pharma Innovation Journal 2021; 10(9): 1207-1211

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(9): 1207-1211

www.thepharmajournal.com
Received: 10-07-2021
Accepted: 12-08-2021

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Effect of micro nutrient and FYM on growth and yield of cucumber (*Cucumis sativus* L.) under plastic house Kanpur, India

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Abstract
An experiment was carried out to access the effectiveness of different doses of FYM and micronutrients on plant growth and yield characters of cucumber (*Cucumis sativus* L.) in plastic tunnel at the field of Rama University during March 2021 to June 2021. The experiment consists of seven treatments (RDF as control, RDF+2-ton FYM/ha, RDF+2.5-ton FYM/ha, RDF+3-ton FYM/ha, RDF+2% MN, RDF+4% MN and RDF+6% MN) replicated three times and laid out in Complete Randomized Block Design (CRBD). About one month of cucumber seedling were planted in March 1st week. Soil application of recommended dose of fertilizer and FYM was applied and foliar application of micronutrient at 15, 45 and 75and days after transplanting. Soil application of RDF + 3-ton FYM/ha showed significant different in 75, 90 and 105 DAT in number of leaves (26, 36 and 38) and in length of leaves (31cm, 32cm and 34cm) followed by RDF + 4% MN compare to control (28cm, 29cm and 29cm) respectively. Maximum diameter (11.33mm) was recorded in RDF + 3-ton FYM/ha as compare to control (10.33mm), RDF + 2.5-ton FYM/ha (10.67mm), RDF + 2% MN (10mm), RDF + 4% MN (9.33mm) and RDF + 6% MN (9mm). The RDF + 3-ton FYM/ha was not significantly different in number of fruits with other treatments. RDF + 3-ton FYM/ha was found effective length of fruit and diameter of fruit (30.67 cm, 10.5cm) per sample plant as compare to control (22.33cm, 7.1cm), RDF + 2-ton FYM/ha (25.67cm, 8.16cm), RDF + 2.5-ton FYM/ha (27cm, 9.3cm), RDF + 2% MN (29cm, 8.6cm), RDF + 4% MN (24.3cm, 7.16cm) and RDF + 6% MN (23cm, 6.5cm). The RDF + 3-ton FYM/ha was found effective weight of fruits per sample plant (6.5kg) as compare to control (5.13kg), RDF + 2-ton FYM/ha (5.16kg), RDF + 2.5-ton FYM/ha (5.46kg), RDF + 2% MN (5.6kg), RDF + 4% (4.9kg) and RDF + 6% (4.5kg). However, the application of RDF + 3-ton FYM/ha was most effective as compare to other doses of FYM and micronutrients.

Keywords: cucumber, RDF, FYM, micronutrient, growth and yield

Introduction
Cucumber (*Cucumis sativus* L.) is an important members of the Cucurbitaceae family in horticulture. It's one of the oldest cultivated vegetables from ancient time. It is soft and succulent which is eaten as salads and stew. Cucumber is widely consumed both fresh and as a processed food. Unlike India which is considered as the primary centre of diversity of Cucumber, China is considered as the secondary centre of diversity in sense of cucumber (Jing *et al*., 2012) [3].

Bhaktapur Local is a variety of cucumber recommended for mid hills cultivation and it is preferred by consumer. With other exotic varieties, Bhaktapur Local is competitive overall supported assessment of taste preference, and even the assembly isn't that depressing. Bhaktapur local cucumber have a good performance with Mahcyo Green Long variety of exotic Cucumber which is the Indian Variety (Upadhyay, 2010) [9]. It is fourth most vital vegetable crop following tomato, cabbage, and onion within the Asian continent (Tatlioglu, 1997) [9].

FYM is a type of organic manure and slowly nutrient release so, takes a long time to decompose when incorporated into the soil and also helps to activate soil microbes. Organic manures can sustain cropping systems through better nutrient recycling and improvement of soil physical characters (El-Shakweer *et al*., 1998) [2].

It has been observed that addition of manure increases the soil microbial activity, maintain soil pH, soil water holding capacity and this means that nutrients would be made more available to crops where manures are added to the soil (Costa *et al.*, 1991) [1]. Murwira and Kirchman

(1993) [4] observed that nutrient use efficiency could be increased through the mixture of inorganic fertilizer and manure.

As Integrated Nutrient Management (INM) is the prescription for soil health, INM is an acceptable strategy for suggesting judicious and appropriate use of chemical fertilizers with matching addition of organic manures, compost, FYM, biofertilizers and others. Organic manures are dependable source of micro and macro nutrients and are helpful in improving biological chemical and physical health of soil, reduces nutrient losses, increases nutrient availability and uptake resulting in sustainable production barren of harmful residues, besides improving quality of vegetables (Shinde, 1992) [6].

Materials and Methods

The field experiment was conducted under plastic house at Rama University, Mandhana road, Kanpur, UP, India from 1st week March 2021 to 1st week June 2021.

Germination media was prepared by mixing three different media i.e., Soil, FYM and Cocopit in the ratio of 1:1:1 in first week of February and seeds were placed. 30 DAS seedlings become ready to transplant in main field under plastic house. The experiment was laid out in Completely Randomized Design with three replication and seven treatments (Table No.1).

Table 1: Details of the treatments used in study

Treatments	Concentration
T0	RDF as control
T1	RDF + 2 ton/ha
T2	RDF + 2.5 ton/ha
T3	RDF + 3 ton/ha
T4	RDF + 2% Micro Nutrient
T5	RDF + 4% Micro Nutrient
T6	RDF + 6% Micro Nutrient

30 days old seedling of cucumber (Bhaktapur Local) with a spacing of 75cm row to row and 75cm plant to plant transplanted in the plot in the afternoon, immediately followed by irrigation for the proper establishment of seedling.

Growth parameter were assessed at 15, 30, 45, 60, 75, 90, 105 and 120 DAT. Number of leaves was assessed by visual count of the green leaves, length of leaves was measured by scale and diameter of vine was measured by vernier caliper. Yield parameter were assessed at different weeks after flowering. Number of fruits was counted by visual count, length of fruits by scale, diameter of fruits by vernier caliper and weight by electric weighing machine. The data were summed up for the data analysis using.

Result and Discussion

Effect of FYM and micronutrient in growth parameter of cucumber under plastic house

The data presented in Table no. 2 demonstrate that the application of FYM and micronutrient significantly influence the growth parameter of cucumber. It was clearly shows that the combination application of RDF and FYM cause increasing the number of leaves, length of leaves and diameter of leaves. The maximum number of leaves (38.67) were observed from T3 (RDF + 3-ton FYM) which is followed by 37.67 number of leaves from T1 (RDF + 2-ton FYM) and T2 (RDF + 2.5-ton FYM) at 120 DAT. However, minimum number of leaves (35.33) were observed inT6 (RDF + 6% MN) at 120 DAT. The vigorous growth in cucumber which was experienced during the growing period as evidenced in number of leaves per plant (Tables 2) was in agreement with (Costa *et al.*, 1991) [1] It has been observed that addition of manure increases the soil water holding capacity and this means that nutrients would be made more available to crops where manures have been added to the soil.

The treatment T_3 (RDF + 3-ton FYM) was recorded maximum length (31.33cm) of leaves followed by 30.33 cm, 29.33 cm and 28.67cm in T_4 (RDF + 2% MN) and T_5 (RDF + 4% MN) at 120 DAT. However, minimum length was observed in T_0 (RDF) as control at 120 DAT. The observed result was agreement with Murwira and Kirchman (1993) [4].

Table 2: Effect of FYM and Micronutrient on growth parameter of cucumber

Treatment	Number of Leaves 120 DAT (cm)	Length of Leaves 120 DAT (cm)	Diameter of Stem 120 DAT (cm)
T_0 = RDF	36.67	27.33	10.33
T_1 = RDF + 2-ton FYM	37.67	28.33	10.33
T_2 = RDF + 2.5-ton FYM	37.67	28.67	10.67
T_3 = RDF + 3-ton FYM	38.67	31.33	11.33
T_4 = RDF + 2% MN	35.67	30.33	10.00
T_5 = RDF + 4% MN	35.67	29.33	9.33
T_6 = RDF + 6% MN	35.33	28.33	9.00
Mean	36.67	29.10	10.14
CV	1.6	2.0	4.8
LSD	1.011	1.011	0.855
F value	<0.001	<0.001	<0.001
Significance	***	***	***

Observed that nutrient use efficiency might be increased through the combination of manure and inorganic fertilizer.

The stim diameter of cucumber increased significantly with increase crop growth period. Treatment T_3 (RDF + 3-ton FYM/ha) was recorded maximum diameter of 11.33mm which was followed by T_2 (RDF + 2.5-ton FYM/ha). However, minimum stem diameter 9mm was observed in T6 (RDF + 6% MN).

Effect of FYM and micronutrient on yield parameter of cucumber under plastic house

The number of fruits per plant enhanced by the application of RDF + 3-ton FYM/ha but not significant with RDF only and high dose of micronutrient spray. Highest number of fruits 7.33 per plant was observed in T_3 (RDF + 3-ton FYM/ha) at 4th WAF and T_4 (RDF + 2% MN) but minimum number of fruits 6.33 per plant was observed in remaining treatments (Table no.3) at 4th WAF.

Table 3: Effect of FYM and micronutrient on yield parameter of cucumber

Treatment	Number of Fruits 4th WAF	Length of Fruits 5th WAF (cm)	Diameter of Fruits 5th WAF (cm)	Weight of fruits (kg/plant)
T0 (RDF)	6.667	22.33	7.100	5.133
T1 (RDF + 2-ton FYM)	6.333	25.67	8.167	5.167
T2 (RDF + 2.5-ton FYM)	6.333	27.67	9.333	5.467
T3 (RDF + 3-ton FYM)	7.333	30.67	10.50	6.500
T4 (RDF + 2% MN)	7.333	29.33	8.600	5.667
T5 (RDF + 4% MN)	6.333	24.33	7.167	4.933
T6 (RDF + 6% MN)	6.333	23.00	6.500	4.567
Mean	6.67	26.14	8.195	5.348
CV	8.7	2.5	4.6	6.7
LSD	1.011	1.146	0.6652	0.6314
F value	0.134	<0.001	<0.001	<0.001
Significance		***	***	****

Maximum length of fruits 30.67 cm was observed in T_3 (RDF + 3-ton FYM/ha) which was followed by 29.33cm and 27.67cm in T4 (RDF + 2% MN) and T_2 (RDF + 2.5-ton FYM). Minimum length of fruits 22.33 cm was observed in T_0 (RDF) as control (Table no. 3). The vigorous growth in cucumber which was experienced during the growing period as evidenced in the fruit length per plant (Tables 6) was in agreement with Prasad and Singhania (1989) [5] reported that combination of inorganic fertilizers with organic manures is better than the fertilizer alone in respect of some soil chemical characteristics.

Maximum diameter of fruits 10.50cm per sample plant was observed in T_3 (RDF + 3-ton FYM/ha) which was followed by 9.33cm and 8.60cm in T2 (RDF + 3-ton FYM/ha) and in T_4 (RDF + 2% MN). Minimum diameter of fruit 6.5cm was observed in T_6 (RDF + 6% MN) at 5th WAF (Table no. 3) which was in agreement with Titiloye (1982) [8] reported that the most satisfactory method of increasing maize yield was by judicious combination of organic wastes and inorganic fertilizers.

Maximum weight of fruits 6.5 kg/plant was measured in T_3 (RDF + 3-ton FYM/ha) which was followed by 5.667 kg/plant and 5.467 kg/plant in T4 (RDF + 2% MN) and T2 (RDF + 2.5-ton FYM/ha). Minimum weight 4.567 kg/plant was measured in T6 (RDF + 6% MN) in a sample plant in average (Table no. 3). The finding of the experiment was in agreement with the report of Murwira and Kirchman (1993) [4] who found increased yield of crops through the combination of farmyard manure and inorganic fertilizer and the findings of Titiloye (1982) [8] who reported that the best way to increase maize yield was by the combination of organic wastes and inorganic fertilizer.

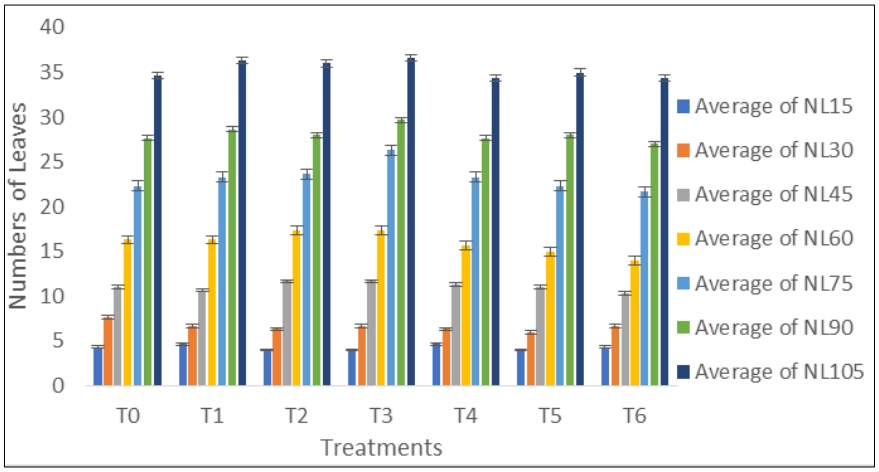

Fig 1: Effect of FYM & micronutrient on number of leaves of cucumber at different DAT

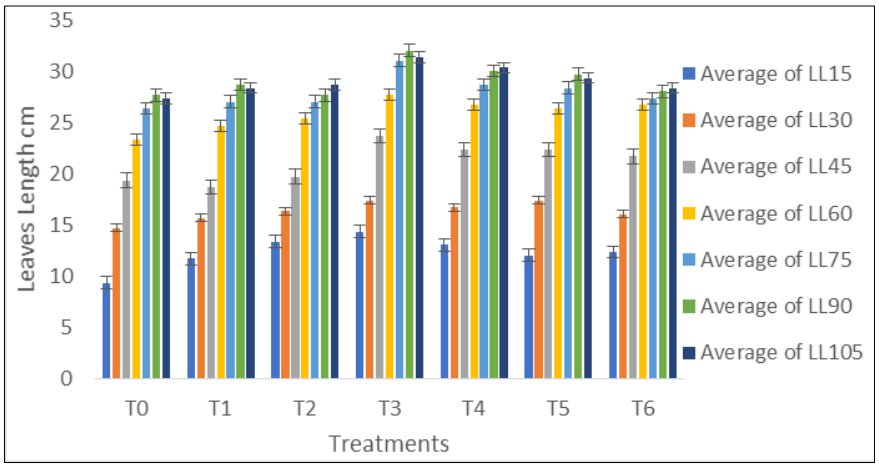

Fig 2: Effect of FYM & micronutrient on length of leaves of cucumber at different DAT

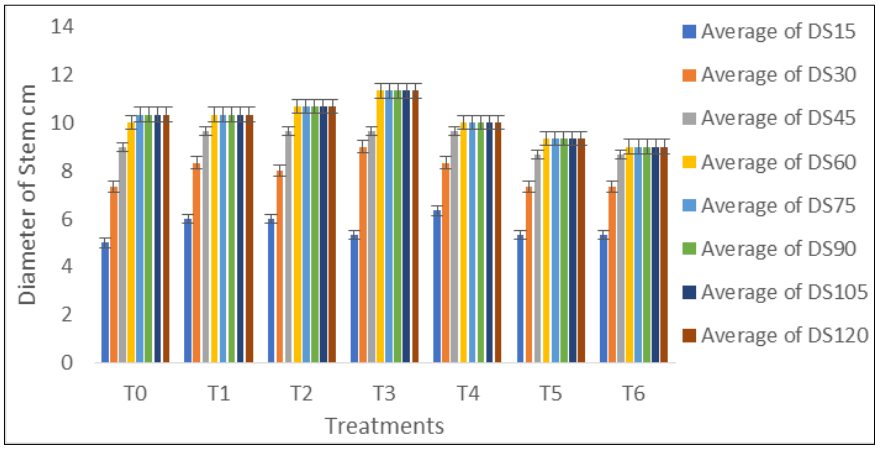

Fig 3: Effect of FYM & micronutrient on stem diameter at different DAT

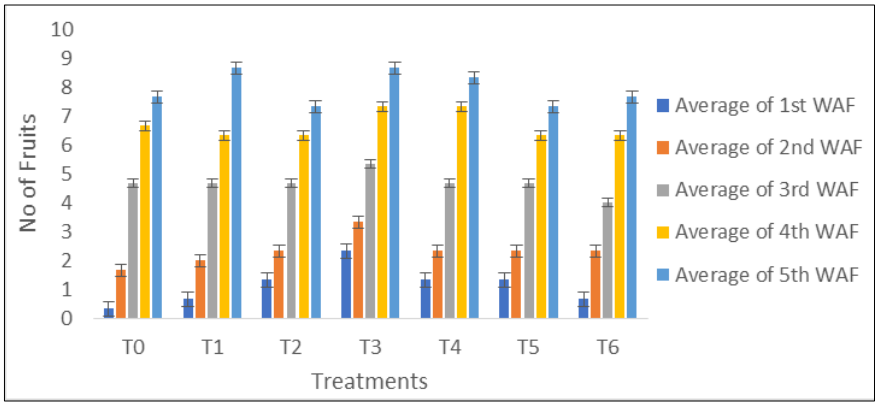

Fig 4: Effect of FYM & micronutrient on number of fruits at different WAF

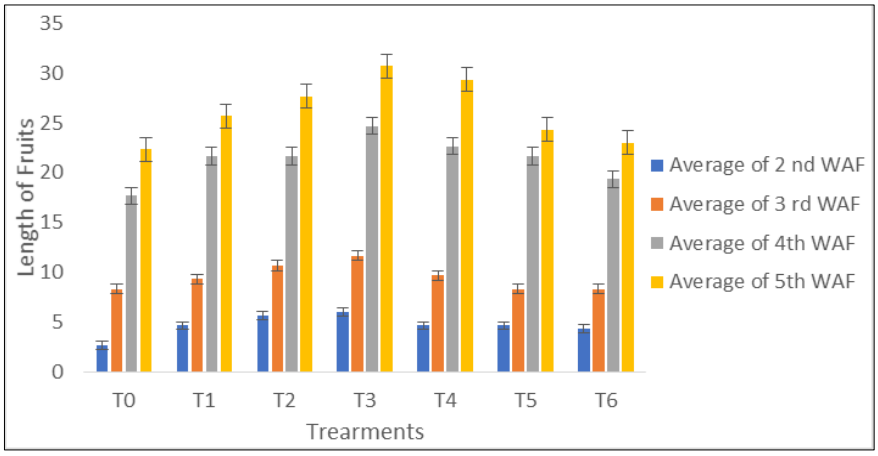

Fig 5: Effect of FYM & micronutrient on length of fruits of cucumber at different WAF

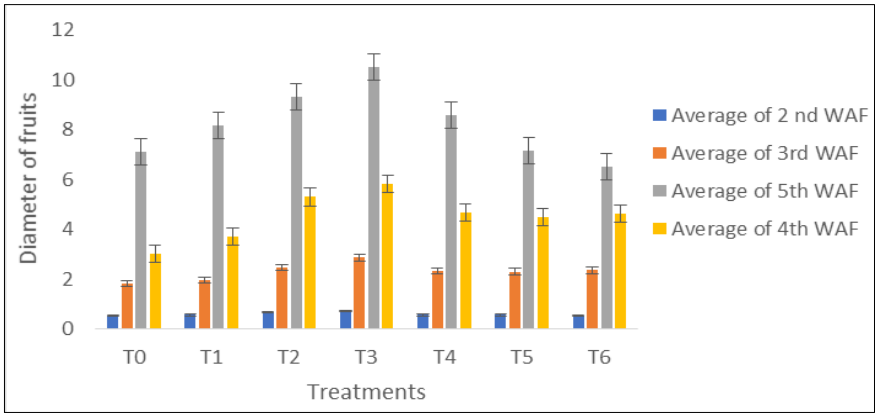

Fig 6: Effect of FYM & micronutrient on fruit diameter at different WAF

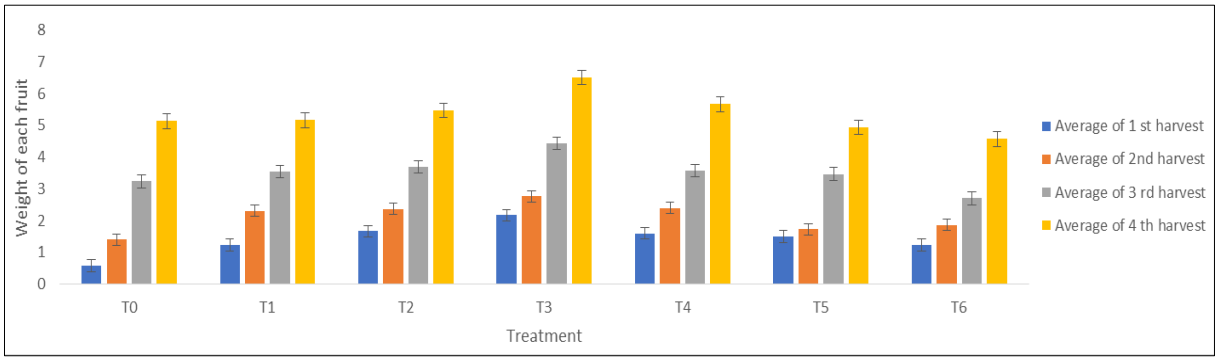

Fig 7: Effect of FYM & micronutrient on average fruit weight of cucumber after harvesting

Conclusion

In this study, FYM and compost with Recommended Dose of Fertilizer (RDF) of different doses were applied, where RDF and FYM applied at land preparation and MN as foliar spray to cucumber cultivar Bhaktapur local to evaluate the effect of micronutrient and FYM in number of leaves, length of leaf, diameter of stem, length of stem, diameter of stem and weight of fruit. Based on the information obtained in the various parameters, it is observed that, RDF + 3-ton FYM shows marked influence on the number of leaves, length of leaves, diameter of stem, fruit length, fruit diameter and weight or yield of cucumber so, it is concluded that that cucumber growth can be promoted by the combine application of RDF and 3-ton FYM/ha and farmers will be encourage to apply combination of RDF and FYM in cucumber vr. Bhaktapur local. Under Kanpur district condition.

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