



REVIEW ARTICLE

IMPACT OF BIO-FERTILIZERS AND CHEMICAL FERTILIZERS ON YIELD AND YIELD ATTRIBUTES OF PUMPKIN (*Cucurbita moschata*) IN LOWER ASSAM

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ARTICLE INFO

Article History:

Received 20th June, 2024

Received in revised form

19th July, 2024

Accepted 19th August, 2024

Published online 30th September, 2024

Key words:

Vermicompost, Field soil, Jeevamrit, Gross return, Net return, Fruit yield and Arka-Suryamukhi.

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ABSTRACT

(Highest Pumpkin fruit yield (q/ha) was recorded by the treatment T7 followed by T5 treatment and both these two treatments were found at par and significantly superior to rest of the treatments. Highest vine length(m), Total leaf/vine and Fruit yield(q/ha) were recorded by the treatment T7 (30% Field soil+30% Vermicompost+40% Jeevamrit). Highest net return(Rs/ha) was also recorded by the treatment T7 (2,16,750=00) followed by the treatment, T6 (1,92,900=00), T5 (2,16,375=00), T4 (1,91,813=00), T3 (1,80,750=00), T2 (1,57,688=00) and T1 (1,54,011=00). Experimental soil was Loamy textured soil with p^H -5.25 to 5.36, Available N(kg/ha) was Low to Medium, Available P_2O_5 (kg/ha) was Low and Available K_2O was medium to high. Av. rainfall during this crop growing period was 870mm to 950mm with the air temperature varies from $30^{\circ}C$ - $36^{\circ}C$. Relative humidity was found almost 82% during the vegetative period of Pumpkin crop)

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Citation: Kalita, M.C., Brahma, J., Das G. and Boro, P. 2024. "Impact of bio-fertilizers and chemical fertilizers on yield and yield attributes of pumpkin (*Cucurbita moschata*) in lower Assam..". International Journal of Current Research, 16, (09), 29898-29900.

INTRODUCTION

Pumpkin crop is directly affected by Organic/In-organic fertilizers for its growth and development and the effects can be observed at morphological and physiological stages of its crop growth period. Vermicompost and Jeevamrit are highly nutritious Bio-fertilizers and it is used by many farmers for growing different vegetable crops. "Vermicomposting" has the huge amount of nutrients like nitrate or ammonium nitrogen, Exchangeable phosphorus and soluble potassium, Calcium and Magnesium derived from the waste material. While "Jeevamrit" improves the soil quality by increasing the activity of soil-micro-organisms and it helps plant to uptake micro-nutrients from the soil. Botanically, Pumpkin fruits are classic type of Berry known as Pepo. They are generally large sized of 2-8 kg but some varieties of Pumpkins were found small in some parts of Lower Assam. The fruit and stems are hard and woody, ridged and angled. Fruits mature in Autumn season and can be stored for a few months in a dry places; well above the freezing temperature. Pumpkin is mainly grown as an annual vegetable and also grown as offseason commercial crop for its edible quality viz Leaves, Stems, Fruits, Flowers etc. The optimum temperature for its growth and development ranges from $22^{\circ}C$ to $35^{\circ}C$. It can be grown well on wide range of soils but it performs well on loamy and sandy loam soils with good conservation of moisture percentages, rich in

Organic matter content and proper drainage facilities. The climatic conditions of the region are very much suitable for its growth and development. That is why, an experiment of Bio-fertilizers with the combinations of Field soils on Pumpkin crop was taken to know the performances of applications of Bio-fertilizers with Field Soils on yield behaviour of Pumpkin crop at Zonal Livestock Research Station, Mandira during 2023&2024.

MATERIALS AND METHODS

"Arka Suryamukhi" is a typical Pumpkin variety with a weight of 4-5kg; which is disease resistant variety grown in many places of South Kamrup area of Assam. Seedlings are raised in a plastic bag containing field soil plus organic matter. One certified seed of "Arka Suryamukhi" is placed in one small plastic bag with mixed garden type soil and organic matter and water was applied daily in each plastic bag. It starts to grow well after seven days. Bamboo stakes were used to climb the Pumpkin plants over it. To complete the experiment; seven treatments were imposed viz-T1-100% Field soil, T2-20%Field soil +80-% Vermicompost, T3-20%Field

Table1: Physico-Chemical Properties of Field Soil and Bio-fertilizer treated soil (Vermicompost+Jeevamrit+Field soil) at

crop growing stage of Pumpkin. soil +80% Jeevamrit; T4-80% Field soil +20% vermicompost; T5-70% Field soil+20%Vermicompost+10% Chemical fertilizer; T6-50% Field soil+50% Vermicompost and T7-30%Field soil+30% Vermicompost +40% Jeevamrit. This experimental trial was conducted at zonal Livestock Research Station for two years viz-2022 and 2023-24. All yield data and economic analysis has been completed as per the local market price of Bio-fertilizer, Chemical fertilizer and Pumpkin. "Jeevamrit" was prepared from the mixture of fresh Cowdung (5Kg)+50 litres of water +10 litre of Cowdung Urine+250 gm of Gur+250gm Besan. This mixture was applied in each hole(1m. length+1m.width+1m. height) prepared just before planting the Pumpkin seedling. In each hole oneseedling of Pumpkin plant was planted. All ingredients were applied as per treatments. Distance between two hole was 5m.Seven treatments were considered in one year and same treatments were repeated in next year also. Each seedling of Pumpkin (cv-Arka Suryamukhi) crop was transplanted in field soil of already digged hole during second forth-night of April in each year.

Harvesting starts from1st week of July and ends in the second forth-night of September in each calender year. Vine length (m);Total leaves/vine and Fruit yield(q/ha) were taken as per the treatments on Av. basis of data collections. Av. Rainfall was 870-950mm during the whole crop growing period with max and min temperature was recorded as 36⁰C and 30⁰C, respectively. RH was more then 78% at the time of experimentation. Physico-chemical properties of the experimental site was shown in Table No.-1 for information only. The experiment was conducted in 3 replications with 7 treatment combinations during 2023 &2024 and one year this crop was grown on surface soil (2022)directly.

RESULTS AND DISCUSSION

The results shown in the Table-2 that highest Fruit yield was recorded under the treatment T7 followed by T5treatment and both this two treatments were found at par and they were significantly superior to rest of the treatments.

Next highest treatment was recorded under the treatment T6 and found significantly superior to rest of the treatments but inferior to T7 and T 5 treatments. Lowest fruit yield was recorded by the treatment T1 (140.00q/ha).

Both Vermicompost and Jeevamrit affects various soil properties viz- p^H, moisture content, water holding capacity, Available nitrogen, Available P₂O₅, Available K₂O, Organic carbon content, Bulk density and Field capacity (Table-1). That is why the fruit yield (q/ha) of Pumpkin crop was found highest under the treatment T7(30%Field soil+30%Vermicompost +40%Jeevamrit). This is because of higher content of Chlorophyll content(1.77mg/g of leaf sample) found under the treatment T7;which resulted in the formation carotenoids, potassium, vitaminC, B2 and E, protein compound, Amino acid, Polysaccharides etc. Similar findings were also reported by Holden in 1960.The increased yield of Pumpkin fruits with the combined application of Vermicompost, Jeevamrit and Garden soils as a source of plant nutrient was attributed to significant improvement in fruit yield resulting in enabling Pumpkin plant to assimilate sufficient photosynthates; resulting higher fruit yield of Pumpkin crop mostly found in T7 T6 and T5 treatments.

These effects were also found in other combinations also. But the chlorophyll content as well as soil nutrients availabilities were found little bit lesser in comparision to T7& T5treatments. Vine length (m) and Total leaves/vine were also recorded highest under the treatment T7being at par with T5 and both this two treatments were found significantly superior to rest of the treatments. Lowest being recorded by the treatment T1and found significantly inferior to rest of the treatments. Highest Gross return of Rs.2,85,000.00/ha was received by the treatment T7. This is followed by the treatments like T5, (Rs.2,82,000.00/ha) T6(Rs.2,58,000.00/ha), T4 (Rs.2,53,500.00/ha), T3 (Rs.2,49,000.00/ha),T2 (Rs.2,22,000.00/ha) and T1 (Rs.2,10,000.00/ha). Similarly, highest net return ofRs.2,16,750.00/ha was also recorded by the treatment T7.

Table1: Physico-Chemical Properties of Field Soil and Bio-fertilizer treated soil (Vermicompost+Jeevamrit+Field soil) at crop growing stage of Pumpkin

Soil Properties	Vermicompost +Jeevamrit+ FieldSoil	Field Soil	Method Used
Organic Carbon (%)	0.82%	0.72%	Walkly and Black Method (1934)
Available N.(Kg/ha)	275.50	272.62	Alkaline PermanganateMethod (Subbiah and Asija, 1956)
AvailableP ₂ O ₅ (kg/ha)	25.50	22.36	Brays I, Method (Jackson1973)
Available K ₂ O(kg/ha)	215.00	210.00	Flame Photometer Method (Jackson,1973)
P ^H (1:2.5Soil water Suspension)	5.25	5.36	Glass Electrode P ^H Meter (Jackson,1973)
Texural Class	Loamy	Loamy	International PipetteMethod(Piper,1960)
Bulk density(g/cm ³)	1.33	1.43	Core Sampler Method, Bodman,1042)
Field Capacity(cm ³ /100cm ³)	30.15	28.15	Field Method.(Dastane,1966)

Table 2. Yield and Yield attributes of Pumpkin with it's Economic Analysis part in Lower Assam

Treatments	Vine length(m)	Fruit yield(q/ha)	Total leaves/Vine	Cost of Cultivation(Rs/ha)	Gross return(Rs/ha)	Net return(Rs/ha)
T1	6.05	140.00	60.00	55,989.00	2,10,000.00	1,54,011.00
T2	6.45	148.00	68.00	64,312.00	2,22,000.00	1,57,688.00
T3	6.65	166.00	78.00	68,250.00	2,49,000.00	1,80,750.00
T4	6.35	169.00	76.00	61,687.00	2,53,500.00	1,91,813.00
T5	8.00	188.00	90.00	65,625.00	2,82,000.00	2,16,375.00
T6	7.75	172.00	83.50	65,100.00	2,58,000.00	1,92,900.00
T7	8.65	190.00	98.00	68,250.00	2,85,000.00	2,16,750.00
CD at 5%	2.01	9.62	3.81	-	-	-

This is followed by the treatments like T5,T6,T4,T3,T2 and T1 only. The optimum applications of bio-fertilizers influenced the growth and development of Pumpkin crop quite favourably.

CONCLUSIONS

From this experiment; it is quite evident that the effects of *Jeevamrit* and *Vermicomposting* play important role in development of crop growth on Pumpkin crop from seedling to maturity stage. The results were found encouraging in the treatment combinations of T5 (70%Field soil+20% Vermicomposting+10% Chemical Fertilizers) and T7(30% Field soil +30% Vermicompost +40%Jeevamrit). This is because of the process of N-supply with the application of *Jeevamrit* & *Vermicompost*; which have resulted in stimulating cell division in the meristematic tissue and ultimately increased cell size and cell numbers in the green Pumpkin plant significantly. Similar type of findings were also reported by Meena & Suman (2024). Thus it is confirmed that Organic material combinations viz *Jeevamrit*, *Vermicompost* with *Field soil* enhances the quality of Pumpkin crop under the climatic situations of Assam favourably. Pumpkin seeds can be roasted as a snack.

Pumpkins contain potassium, which keeps our hearts healthy and vitamin A; which improves our eye vision nicely. Pumpkin is an excellent source of nutrients; which includes vitamins, minerals, essential oils, protein, and fibre.

This versatile fruit provides many health benefits for the skin, eyes, heart, gut, immunity and more.

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