

Original Research Article

Effect of bunch feeding of nitrogen (N) and potassium (K) on yield characters in Banana, cv. Barjahaji (*Musa* AAA group) under Assam condition

ABSTRACT

The present investigation entitled “Effect of bunch feeding of nitrogen and potassium on yield in banana (*Musa* spp.) cv. Barjahaji (*Musa* AAA group) under Assam condition” was carried out at the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during March 2015 to June 2016. Nitrogen and Potassium were applied in the form of different chemicals along with FYM and compared with control. Results revealed that bunch fed with T₇ (500g fresh cowdung + 7.5g Urea + 7.5g K₂SO₄) at the time of harvest showed highest yield of (58.65 t ha⁻¹), highest finger length (22.28 cm), finger girth (14.10 cm), volume of fingers (254.25 cc), weight of fingers (148.73 g), weight of second hand (4.00 kg), and bunch weight (19.00 kg), were observed when the bunch fed with T₇ (500g fresh cowdung + 7.5g Urea + 7.5g K₂SO₄) at the time of harvest. However, the highest pulp to peel ratio of 3.40 was recorded in T₆ (500g fresh cowdung + 7.5g Urea + 7.5g KCl). Whereas, maximum rind thickness (3.71 mm) was observed in T₄ (500g fresh cowdung + 7.5g K₂SO₄).

Keywords: Bunch, Feeding, Urea, Fingers, Yield.

1. INTRODUCTION

Banana is one of the most important fruit crops majorly grown in India. Add the latest area and production of banana in India.

In view of its nutritive value and fruit value, banana could be considered as “Apple of paradise” and it is cheaper than any other fruits in the country. Banana and Plantains (*Musa* spp.) belong to the family Musaceae. It is one of the major commercial fruit crop grown in tropics, subtropics and considered as the most economic source of food. It is considered as one of the most important energy producing foods, cheap, highly nutritious and easily digestible fruit. They are excellent source of potassium which benefits the muscle spasms.

Add the quantity of potassium and other major nutrients present in banana.

They are one of the most affordable fruits in the market and can be found all year round nearly everywhere in the world. Nitrogen and Potassium are the most used nutrient elements in plant growth and development which plays an essential role in high yields and fruit quality. Potassium is the key element in banana nutrition. Bunch is the most drastically affected organ if potassium is insufficiently supplied. It stimulates early shooting and significantly shortens the time required for fruit maturity. It improves the grade of the bunches as well as the size of the individual fingers. Banana plants fed with recommended quantity of major and micro nutrients either through soil or by foliar application, the uptake and utilization of nutrients by banana plants is inadequate resulting in poor growth of the bunch and fingers at the distal end of the bunch. This reduces both the total weight as well as its overall appearance leading to a lower profitability. This has been a major constraint faced by the banana growers irrespective of the variety of banana grown. Bunch feeding of banana at distal end by

removing of male bud will not only help in easy translocation of nutrient to the sink but it also removed the unwanted male bud which can be used as vegetable (Singh, 2001).

2. MATERIAL AND METHODS

The present investigation entitled “Effect of bunch feeding of nitrogen and potassium on yield in banana (*Musa* spp.) cv. Barjahaji” was carried out at the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during March 2015 to June 2016. The experiment was laid out in Randomized Block Design (RBD) with three replications comprising nine treatments (Table 1). There were twenty seven plots each having eight numbers of plants with the spacing of 1.8 m x 1.8 m. Individual plot size was 25.92 m² and the total area of the experimental site was 699.84 m². Uniform cultural practices were followed for all the treatments. Immediately after the fruit set or bunch formation and shedding of 7 - 8 flower petals (spathes), the male bud was denavelled at the stalk end of the bunch by cutting with a sharp knife at 60° angle in such a way that about 10-15 cm long rachis / stalk end was available after the last hand of the bunch. A fresh cow dung of 500 g is blended with the fertilizers (7.5g each Urea, KCl, K₂SO₄, and KNO₃) dissolved in 100 ml of water to form slurry for imposing to Barjahaji banana bunches after denavelling. This slurry was placed in a 200 guage 15 cm × 25 cm plastic bag and tying the bag with a strong thread such that about 8 – 10 cm of the distal end of the rachis was immersed in the slurry and the remaining part above the tied portion is visible. Harvesting was done uniformly at three fourth maturity stages when the ridges of the fingers had disappeared and colour turned from dark green to light green. The peduncle was cut at 22.5 cm above the first hand along with the bended poly bag.

3. RESULTS AND DISCUSSION

3.1 LENGTH OF FINGER

The significantly highest finger length of 22.28 cm (Table 2) was recorded in T₇ (500g fresh cowdung + 7.5g Urea + 7.5g K₂SO₄). Finger length is the important factor which decides compactness, symmetry and rigidity of bunches as well as the market price of the fruit. The results are in accordance with Ancy and Kurien (2000) in cv. Nendran and Nandan *et al.* (2011) in cv. Nanjangudu rasabale (AAB). According to them nutrient supplied externally in the form of urea helped more in cell elongation of the fruits which resulted in more fruit length. There was a direct relation between urease activity and lengthening of the fruit as reported by Ancy *et al.*, (1998).

3.2 GIRTH AND VOLUME OF FINGER

The significantly highest finger girth of 14.10 cm and finger volume of 254.25 cc was recorded in T₇ (Table 2). The increase in girth and volume of the finger clearly indicated that potassium was involved in cell enlargement. The increase in finger circumference by 500g fresh cowdung + 7.5g Urea + 7.5g K₂SO₄ might be due to exogenous potassium supply which acted as an activator of several enzymes. Potassium has also a role in synthesizing the precursor of chlorophyll pigments. Presence of sulphur in K₂SO₄ has a synergistic effect with zinc which is essential for carbon dioxide absorption and utilization, synthesis of RNA and auxin which increases the size of fruit. Similar observations were

74 reported by Mustaffa *et al.* (2004) in cv. Nanjanagudu rasabale and Kumar and Kumar (2007) in cv.
75 Neypoovan and Nandan *et al.* (2011) in cv. Nanjanagudu rasabale.

76 3.3 RIND THICKNESS

77 The data regarding the rind thickness (Table 2) revealed that T₄ (500g fresh cowdung + 7.5g K₂SO₄)
78 recorded the significantly highest value of 3.71 mm. However, the lowest rind thickness of 3.24 mm
79 was observed in T₉ (Control). Such result might be due to comparatively lower availability of nutrient
80 in control treatment than other treatments.

81 3.4 PULP TO PEEL RATIO

82 The significantly highest pulp to peel ratio of 3.40 (Table 2) was recorded in T₆ (500g fresh cowdung +
83 7.5g Urea + 7.5g KCl) which was at par with T₈ (3.33). The reason behind such result might be due to
84 more pulp and less rind weight. This indicates the beneficial role of potassium to get good pulp
85 recovery. This might be due to less experienced physiological loss in weight by fruits may contribute
86 towards the more pulp weight. The results were in conformity with those obtained by Kumar *et al.*
87 (2008) in Robusta, Nandan *et al.* (2011) in cv. Nanjanagudu rasabale.

88 3.5 WEIGHT OF FINGER

89 Exogenous application of nitrogen, potassium as bunch feeding along with cowdung improved the
90 finger weight over control. The data regarding the weight of fingers (Table 2) revealed that T₇ (500g
91 fresh cowdung + 7.5g Urea + 7.5g K₂SO₄) recorded the significantly heaviest finger of 148.73 g. The
92 increase in fruit weight might be due to removal of flower bud after formation of bunch which helped in
93 conservation and utilization of photosynthates in more efficient way. Potassium improves fruit weight
94 and number of fingers per bunch, and increases the content of starch and sugar content (Bhargava *et*
95 *al.*, 1993).

96 3.6 WEIGHT OF SECOND HAND

97 The significantly heaviest second hand (Table 2) was recorded in the treatment T₇ (4.00 Kg) which
98 was at par with T₄ (3.40 Kg). Increase in weight of the hand might be attributed to the application of
99 potassium which indirectly improves utilization of nitrogen and protein formation in terms of size,
100 weight etc. In the present study application of sulphate of potash improved yield of hand and the
101 findings are in accordance with the results of Pandey and Sinha (1999) who reported that the
102 increase in weight of the hand, weight of the bunch and yield per hectare are due to sulphur present
103 in the sulphate of potash which might be responsible for the formation of iron-sulphur protein in plants
104 which might have a direct impact in activating the catalase and peroxidase enzymes.

105 3.7 BUNCH WEIGHT

106 The significantly highest bunch weight of 19.00 kg (Table 2) was recorded in T₇ (500g fresh cowdung
107 + 7.5g Urea + 7.5g K₂SO₄). It was found from the data that denaveling and bunch feeding improved
108 yield in all the treatments irrespective of the control. This might be due to conservation and utilization
109 of energy of nutrients for finger development which would be otherwise lost for opening of the

remainder of the flower and removal of a strong and active competing sink for photosynthates and mineral nutrients despite its smaller size relative to the bunch. The increase in bunch weight can be attributed to the cumulative effect of yield attributing characters like finger weight, length of the finger, circumference of the finger and pulp to peel ratio. The favourable influence of K₂SO₄ as compared to other nutrients on the production of heavier bunches might be attributed to the heavier dry matter and starch accumulation and additionally promoted by the sulphur present in K₂SO₄ (Kumar and Kumar, 2008).

3.8 YIELD

Yield depends upon many factors however, the significantly highest yield of 58.65 t ha⁻¹ was recorded in T₇ (500g fresh cowdung + 7.5g Urea + 7.5g K₂SO₄) (Table 2). Sulphur helps in energy transformation and activation of enzymes in carbohydrate metabolism and subsequently greater partitioning of photosynthates. Sulphur application increased the yield since it is a constituent of amino acid and protein production (Ahmed *et al.*, 1998). The influence of sulphur in enhancing fruit yield in banana was stressed by Lahav and Turner (1983).

4. CONCLUSION

Bunch feeding of banana not only helped in increasing the yield and yield characteristics of the plant but it also give additional income by selling the male bud which is used as vegetable. From the above study it can be concluded that treatment T₇ (500g fresh cowdung + 7.5g Urea + 7.5g K₂SO₄) can be used as bunch feeding for increasing the yield of the crop under Assam condition.

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158 Singh, H.P. (2001). Banana. In : *Handbook of Horticulture*, ICAR publication, New Delhi, p. 152.

159 **Table 1. Treatment details**

Notations	Treatments
T ₁	500g fresh cowdung
T ₂	500g fresh cowdung + 7.5g Urea
T ₃	500g fresh cowdung + 7.5g KCl
T ₄	500g fresh cowdung + 7.5g K ₂ SO ₄
T ₅	500g fresh cowdung + 7.5g KNO ₃
T ₆	500g fresh cowdung + 7.5g Urea + 7.5g KCl
T ₇	500g fresh cowdung + 7.5g Urea + 7.5g K ₂ SO ₄
T ₈	500g fresh cowdung + 7.5g Urea + 7.5g KNO ₃
T ₉	Control

Treatments	Bunch weight (kg)	Weight of second hand (kg)	Weight of fingers (g)	Length of fingers (cm)	Girth of fingers (cm)	Volume of fingers (cc)	Rind thickness (mm)	Pulp peel ratio	Yield (t ha ⁻¹)
T₁ : 500g fresh cowdung	13.00	2.01	128.36	16.40	12.60	163.51	3.42	2.02	40.13
T₂ : 500g fresh cowdung + 7.5g Urea	16.33	2.83	128.42	17.70	13.00	186.00	3.50	2.49	50.41
T₃ : 500g fresh cowdung + 7.5g KCl	13.57	2.26	126.70	16.83	12.65	166.91	3.56	2.92	41.89
T₄ : 500g fresh cowdung + 7.5g K ₂ SO ₄	17.00	3.40	142.10	19.75	13.49	219.67	3.71	1.81	52.48
T₅ : 500g fresh cowdung + 7.5g KNO ₃	13.50	2.08	128.42	16.40	12.63	168.75	3.56	2.75	41.67
T₆ : 500g fresh cowdung + 7.5g Urea + 7.5g KCl	15.67	2.07	126.70	16.36	12.35	154.25	3.41	3.40	48.37
T₇ : 500g fresh cowdung + 7.5g Urea + 7.5g K ₂ SO ₄	19.00	4.00	148.73	22.28	14.10	254.25	3.50	1.90	58.65
T₈ : 500g fresh cowdung + 7.5g Urea + 7.5g KNO ₃	15.33	2.07	126.70	16.21	12.07	152.20	3.49	3.33	47.32
T₉ : Control	11.00	2.50	128.45	16.82	12.62	165.75	3.24	3.01	33.96
S.Ed (±)	0.70	0.30	0.51	0.15	0.10	0.64	0.05	0.10	2.16
C.D _{0.05}	1.48	0.64	1.07	0.32	0.20	1.35	0.11	0.20	4.58

