

## Effect of post shoot application of potassium through bunch feeding on fruit quality characters of banana in West Bengal

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Banana (*Musa paradisiaca*) is one of the major commercial fruit crop of many tropical and subtropical regions of India. It is cultivated in an area of 830.0 thousand ha with production of 29780.0 thousand MT and productivity of 35.9 MTha<sup>-1</sup> (Annon, 2011). Banana is a potassium loving crop and high potassium availability is important at fruiting stage. Any limitation in the supply of nutrients at the shooting stage affects bunch size and quality in banana. Among the several factors affecting fruit quality, adequate potassium application is considered to be of utmost importance in banana cultivation. Potassium is known to influence fruit yield in general and fruit quality in particular (Tandon and Sekhon, 1988).

Even though K is abundant in many banana growing soils, the bulk of soil K is unavailable to plants due to both plant and environmental factors therefore additional application through bunch feeding has been found beneficial. In high value crop like banana quality standards have become the most important factor influencing yield and farmer's income. The main aim of this study was to assess the effect of post shooting bunch feeding of potassium for quality characters of Martaman banana under West Bengal soil.

The experiment was conducted at Research Station of AICRP on Tropical Fruits at Mondouri of BCKV, Mohanpur, West Bengal in the year 2009-2010. The experiment was laid out on Martaman (AAB) banana, spaced at 2x2m. The experiment was laid out in Randomized Block Design with eight treatments and three replications.

The method used for the experiment involved excising the distal end of the bunch along with the male bud by giving a slanting cut (10 - 15 cm below the last hand) immediately after the pistillate (female) flowers had formed into fruits that is 5 - 7 days after opening of the last hand in the bunch. Blending of the required dose of chemicals (potassium in the form of K<sub>2</sub>SO<sub>4</sub>, KCl and KNO<sub>3</sub>) 20 g each and 500 g fresh cowdung with 500ml of water was done to form slurry. The blend was placed in a polythene bag and tied securely to dip the excised rachis into the slurry. The middle fingers in the top and bottom rows of the second hand were selected to record quality

parameters which included total soluble solids, total reducing and non-reducing sugars, titratable acidity, suagr:acid ratio and ascorbic acid content. The total soluble solids (TSS) was measured with the help of a hand refractometer. The sugar acidity and ascorbic acid content of fruit were determined by the standard procedure of A.O.A.C. (1984). The eight treatments were T<sub>1</sub>-500 g fresh cowdung, T<sub>2</sub>-500 g fresh cowdung + 20 g urea, T<sub>3</sub>-500g fresh cowdung + 20 g KCl, T<sub>4</sub>-500 g fresh cowdung + 20 g K<sub>2</sub>SO<sub>4</sub>, T<sub>5</sub>-500 g fresh cowdung + 20 g KNO<sub>3</sub>, T<sub>6</sub>-500 g fresh cowdung + 20 g urea + 20 g KCl, T<sub>7</sub>-500 g fresh cowdung + 20 g urea + 20 g K<sub>2</sub>SO<sub>4</sub>, T<sub>8</sub>-500 g fresh cowdung + 20 g urea + 20 g KNO<sub>3</sub>.

Due to application of different sources of potassium combined with fresh cowdung as bunch feeding a marked effect on fruit quality was observed in the present study. Total soluble solids content of fruit differed significantly among the different treated bunches over control (Table-1). Total soluble solids (TSS) a prime factor which determine the quality of fruits was the highest (25.5° Brix) in the treatment T<sub>4</sub> which was the application of 500 g fresh cowdung and 20 g K<sub>2</sub>SO<sub>4</sub> while it was 24.8° Brix due to feeding of 500 g fresh cowdung + 20 g urea + 20 g K<sub>2</sub>SO<sub>4</sub> (T<sub>7</sub>). Control showed the lowest T.S.S of 22° Brix. With regard to this present experiment it was in tune with the findings of Hasan *et al.* (1999) who found that gradual and steady increase in T.S.S with maximum of 20.10° Brix with application of K in Cavendish banana. The reducing sugar content was also significantly increased by application of 500 g fresh cowdung and 20 g K<sub>2</sub>SO<sub>4</sub> (Table-1). It recorded a highest of 8.51% as compared to control which recorded only 7.95%. Similar to the present findings Vadivel and Shanmugavelu (1978) found that potassium supply affects the fruit quality of banana by affecting the reducing sugars. Bhargava *et al.* (1993) also stated that potassium improves fruit weight and number of fruits per bunch, and increases the content of total soluble solids, sugars and starch.

Among the various bunch feeding treatments, the highest total sugar content (17.8%) was recorded in T<sub>4</sub> (500 g fresh cowdung + 20 g K<sub>2</sub>SO<sub>4</sub>) followed by 17.6 % in T<sub>7</sub> treatment (500 g fresh cowdung + 20 g urea + 20 g K<sub>2</sub>SO<sub>4</sub>). The minimum value for total sugar (16.4%) was noted in control fruits. Higher fruit

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quality especially higher sugar content can be explained as potassium plays a major role in carbohydrate synthesis, breakdown and translocation and synthesis of protein and neutralization of physiologically important organic acids (Tisdale and Nelson, 1966). The chemical fruit quality in terms of maximum non-reducing sugar (9.29%) was found in treatment T<sub>4</sub> (20 g fresh cowdung + 20 g K<sub>2</sub>SO<sub>4</sub>). It is found that potassium when supplied in form of sulphate of potash favours conversion of starch into simple sugars during ripening activating the sucrose synthetase enzyme thus resulting in higher sugar percentage (Kumar and Kumar, 2007).

The data presented in Table-1, revealed that bunch feeding of potassium has no significant effect on acidity content of fruits. However the highest acidity content of fruits was found in T<sub>4</sub> (500g fresh cowdung + 20 g K<sub>2</sub>SO<sub>4</sub>) and T<sub>7</sub> (500g fresh cowdung

+ 20 g urea + 20 g K<sub>2</sub>SO<sub>4</sub>) which recorded 0.53%. In control it recorded 0.49%. An increase in sugar to acid ratio (sugar:acid) was also observed to be highest in treatment T<sub>5</sub> (fresh cowdung + KNO<sub>3</sub>) and T<sub>8</sub> (fresh cowdung + Urea + KNO<sub>3</sub>) both recording 34.20. Highest Vitamin C (6.73 mg/100 g of pulp) were recorded with treatment T<sub>4</sub>, whereas lowest (6.02mg/100 g of pulp) was recorded in treatment T<sub>0</sub> (control). Increased ascorbic acid content in the fruits may be because potassium and sulphur could have helped to slow down the enzyme system that encouraged the oxidation of ascorbic acid, thus helping the plants to accumulate more ascorbic acid content in the fruits (Ananthi et al., 2004). The high energy status in crops well supplied with K also promotes synthesis of secondary metabolites, like Vitamin C (Mengel, 1997).

**Table 1: Effect of bunch feeding on chemical composition of banana cv. Martaman (*Musa* AAB)**

Treatments	Total soluble solids (°Brix)	Reducing sugar (%)	Non reducing sugar (%)	Total sugar (%)	Acidity (%)	Sugar:acid ratio	Vitamin C (mg.100g <sup>-1</sup> of pulp)
T <sub>0</sub>	22.0	7.95	8.45	16.4	0.49	33.46	6.02
T <sub>1</sub>	23.5	8.06	8.84	16.9	0.50	33.80	6.57
T <sub>2</sub>	24.4	8.42	8.58	17.0	0.50	34.00	6.62
T <sub>3</sub>	24.5	8.22	8.98	17.2	0.51	33.72	6.58
T <sub>4</sub>	25.5	8.51	9.29	17.8	0.53	33.58	6.73
T <sub>5</sub>	24.2	8.15	8.95	17.1	0.50	34.20	6.59
T <sub>6</sub>	24.6	8.20	9.20	17.4	0.51	34.11	6.55
T <sub>7</sub>	24.8	8.45	9.15	17.6	0.53	33.20	6.68
T <sub>8</sub>	24.1	8.16	8.94	17.1	0.50	34.20	6.57
<b>S.Em (±)</b>	<b>0.265</b>	<b>0.018</b>	<b>0.037</b>	<b>0.031</b>	<b>0.015</b>	<b>0.124</b>	<b>0.055</b>
<b>LSD (0.05)</b>	<b>0.742</b>	<b>0.051</b>	<b>0.105</b>	<b>0.087</b>	<b>N.S</b>	<b>0.247</b>	<b>0.156</b>

NS=Non-significant

Bunch feeding with potassium had positive effects on fruit quality parameters. The results demonstrated that supplementing soil potassium

application through bunch feeding increased total soluble solids, sugar content and ascorbic content levels.

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