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EFFECT OF POST SHOOTING BUNCH FEEDING OF NUTRIENTS ON YIELD AND QUALITY OF BANANA (*Musa* spp.) CV. NEY POOVAN (AB)

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ABSTRACT

Banana (*Musa* spp.) is a climatic and delicious fruit, which is nutritionally superior and economically important for local and export markets in world trade and plays a key role in the economy of developing countries. The present investigation was carried out in Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu, and India during the period 2022 - 2023 to assess the effect of denavelling and bunch feeding treatments on yield and quality of banana (*Musa* spp.) cv. Ney Poovan (AB). The experiment was laid out in a Randomized Block Design with eleven treatments and three replications. The treatment consisted with fresh cow dung slurry, vermicompost, urea, ammonium sulphate and sulphate of potash which were applied with different treatment combinations along with denavelling and bunch feeding *viz.,* T_1 - Fresh cow dung 500 ml + Urea 7.5 g, T_2 – Fresh cow dung 500 ml + Sulphate of potash 7.5 g, T_3 – Fresh cow dung 500 ml + Ammonium sulphate 7.5 g ,T_4 - Vermicompost 500 ml + Urea 7.5 g, T_5– Vermicompost 500 ml + Sulphate of potash 7.5 g , T_6 – Vermicompost 500 ml + Ammonium sulphate 7.5 g, T_7 - Fresh cow dung 500 ml + Urea 7.5g + Sulphate of potash 7.5g ,T_8 - Fresh Cowdung 500 ml + Urea 7.5 g + Ammonium sulphate 7.5 g ,T_9 – Vermicompost 500 ml + Urea 7.5g + Sulphate of potash 7.5 g , T_{10} – Vermicompost 500 ml + Urea 7.5 g + Ammonium sulphate 7.5 g and T_{11} - Denavelling alone (Control). The result revealed that the treatment T_7 - fresh cow dung slurry 500 ml with Urea + sulphate of potash each at 7.5 g registered maximum bunch weight (13.96 kg), number of hands per bunch (11.16 nos.), number of fingers per bunch (155.93 nos.), TSS (26.73 %), acidity (0.18 %), ascorbic acid (11.27 mg $100g^{-1}$) and total sugars (20.19 %). The treatment T_{11}(control) was the most ineffective of all the treatments regarding all the yield and quality parameters of banana (*Musa* spp.) cv. Ney Poovan (AB).

INTRODUCTION

Banana is an herbaceous flowering plant belonging to the genus Musa (Musaceae family). The name banana comes from the Arabic word 'BANANA', which means finger. Banana is also known by other synonyms like 'Adam's fig', 'Kalpataru', 'Tree of wisdom' and 'Apple of Paradise'. Banana is one of the major commercial fruit crop grown in tropics, subtropics and considered as one of the most economical source of food. Banana also known as 'Poor men's apple' and it is also the cheapest among all other fruits in the country (Saran *et al.*, 2024).

In India, banana is fourth important crop in terms of gross value and is exceeded only by paddy, wheat and milk products. It is also a dessert fruit for millions, apart from a staple food owing to its rich and easily digestible carbohydrates with a calorific value of 67-137/100g fruit. It is a good source of Vitamin A (190 IU per 100 g of edible portion) and Vitamin C (100 mg/100g) and fair source of Vitamin B_1 and B_2. Banana fruits are also rich source of minerals like magnesium, sodium, potassium, phosphorus and a fair source of calcium and iron. It makes healthy and salt free balanced diet than many other fruits. One hectare of banana yields 37.5 million calories of energy as compared to 2.5 million calories from wheat and multifarious uses. As a diet, it is highly satisfying, easy to digest, nearly fat free, rich source of carbohydrate with calorific value of 375 kJ per 100 g. It contains various vitamins and has therapeutic values for the treatment of many diseases (Gopu *et al.*, 2021).

Among all the commercial varieties of banana, owing to comparatively higher yield potential and better marketability both in domestic and export markets the cultivar Ney poovan are preferred over other cultivars of banana. Banana owing to its large size and rapid growth rate require relatively large amount of nutrients for high yield. To supplement nutrients applied to banana plant through soil and foliage, de-navelling (removal of male inflorescence) and post shooting feeding through the distal

stalk-end of the rachis have gained importance. De-navelling saves mobilization of food into the unwanted sink of banana plant (Singh, 2001)

Generally, photosynthesis move from the source to sink i.e. leaves to developing bunches determine the yield. Hence, any limitations in the supply of photosynthates at this crucial state affect the bunch size and quality. Because of this problem, poor filling and development of fingers is often reported in all most all cultivars of commercial importance. In addition to the soil application and foliar application of nutrients, the nutrients can also be supplied through direct feeding of the bunches through cut rachis after denavelling. This involves the use of various combinations of hormonal and nutrient resources as well as cultural operations in order to increase bunch yield and improve finger characters. Development of bunch feeding practices benefits the growers for increasing and sustaining productivity and income. Under commercial cultivation, bunch size in banana is manipulated to enhance the size of fingers to suit market demands in South-East Asian countries. Nutrients are supplied to the banana plant through soil and foliage, by de-navelling (removal of male inflorescence) and feeding nutrients post shooting through the distal stalk-end of rachis (Ancy and Kurein, 2000). De-navelling serves the twin purpose of saving mobilization of food into an unwanted sink plant and earning an additional income when the excised male bud is used as vegetable. Further, it also facilitates bunch feeding with nutrients through cut end of rachis (Singh, 2001). Moreover, the fruit quality is determined by size (finger length and finger girth), evenness of ripening, free from blemishes and defects and arrangement of hands are also favorably influenced by this technique. Hence, the technology of bunch feeding in banana is very useful in improving the yield and quality of the fruit.

In view of the above facts, the present investigation was carried out to study the "effect of post shooting bunch feeding of nutrients on yield and quality of banana (*Musa* Spp.) cv. Ney Poovan (AB)".

MATERIALS AND METHODS

The present investigation was carried out in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu and India. During the period 2022 - 2023 to assess the effect of denavelling and bunch feeding treatments on yield and quality of banana (*Musa Spp.*) cv. Ney Poovan. The trail was conducted in the progressive banana farmer field at Panaiyur village of Kulithalai block in Karur district, Tamil Nadu. The experiment was laid out in a Randomized Block Design with Eleven treatments and replicated thrice.

The treatment consisted with fresh cow dung slurry, vermicompost, urea, ammonium sulphate and sulphate of potash which were applied with different treatment combinations along with denavelling and bunch feeding *viz.*, T_1 - Fresh cow dung 500 ml + Urea 7.5 g, T_2 - Fresh cow dung 500 ml + sulphate of potash 7.5 g ,T_3 - Fresh cow dung 500 ml + Ammonium sulphate 7.5 g, T_4 - Vermicompost 500 ml + Urea 7.5 g ,T_5 - Vermicompost 500 ml + Sulphate of potash 7.5 g, T_6 - Vermicompost 500 ml + Ammonium sulphate 7.5 g, T_7 - Fresh cow dung 500 ml + Urea 7.5 g + Sulphate of potash 7.5 g , T_8 - Fresh Cow dung 500 ml + Urea 7.5 g + Ammonium sulphate 7.5 g, T_9 - Vermicompost 500 ml + Urea 7.5 g + Sulphate of potash 7.5 g , T_{10} - Vermicompost 500 ml + Urea 7.5 g + Ammonium sulphate 7.5 g and T_{11} - Denavelling alone (Control).

For bunch stalk feeding, uniform bunches from each treatment were selected. Rachis at the distal end of the bunch was excised along with male bud giving a slant cut. (De-navelling by excision of rachis 10 cm after the last hand) immediately after all the pistilate (female) flowers had set fruits i.e. after four bracts were shed (about 15 days after flower emergence). The prepared 500 ml solution was placed in a thick polythene bag and tied securely by dipping the excised rachis and maintained till harvest.

Observations were recorded on yield and quality characters viz., bunch weight (Kg), number of hands per bunch (nos.), number of fingers per bunch (nos.), TSS (%), acidity (%), ascorbic acid (mg100 g^{-1}) and total sugars (%).The data with respect to all the above parameters were tabulated and subjected to the Statistical analysis by using software WASP-Web Agri Stat Package for randomized block design. All means were computed was significant for comparing the means of two treatments the critical difference (5%) was worked out.

Results and Discussion

The data recorded on yield parameters *viz.*, bunch weight (Kg), number of hands per bunch (nos.), number of fingers per bunch (nos.) and quality parameters *viz.*, TSS (%), acidity (%), ascorbic acid (mg 100 g-1) and total sugars (%). showed significant difference among the different treatments (Table1.)

The treatment T_7 - bunch fed with dipping the cut end in the 500 ml of fresh cow dung slurry along with each at 7.5 g urea and Sulphate of potash registered the maximum bunch weight (13.96 kg), number of hands per bunch (11.16 nos.), number of fingers per bunch (155.93 nos.) whereas the minimum bunch weight (8.16 kg), number of hands per bunch (6.37 nos.), number of fingers per bunch (121.27 nos.) was noticed in T_{11}- control.

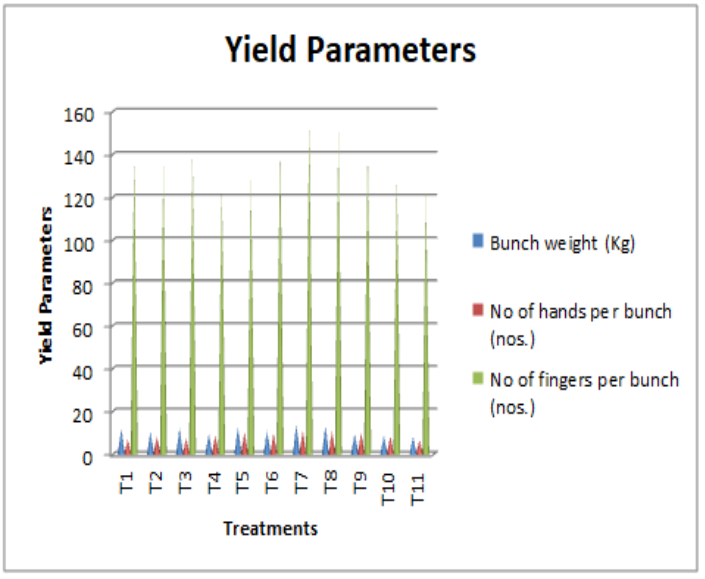

Fig.1 Effect of post shooting bunch feeding of nutrients on yield of banana (*Musa* Spp.) cv. Ney Poovan (AB)

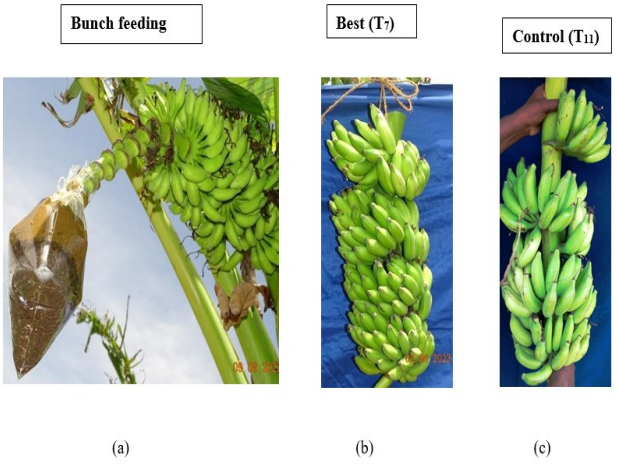

Table.1. Effect of post shooting bunch feedings on yield and quality characters of banana (*Musa* spp.) cv. Ney Poovan (AB)

Treatment	Bunch weight (Kg)	No of hands per bunch (nos.)	No of fingers per bunch (nos.)	TSS (%)	Acidity (%)	Ascorbic acid (mg 100 g^{-1})	Total sugars (%)
T_1	11.86	6.86	138.50	23.76	0.16	8.20	13.53
T_2	10.50	8.33	134.10	23.40	0.15	9.03	15.69
T_3	12.03	7.33	141.17	21.43	0.16	8.53	14.54
T_4	9.23	8.80	125.40	22.60	0.16	9.56	13.46
T_5	12.66	10.10	127.42	24.76	0.14	10.20	16.59
T_6	10.93	9.73	144.13	23.70	0.15	9.13	15.74
T_7	13.96	11.16	155.93	26.73	0.18	11.27	20.19
T_8	13.36	10.70	150.01	22.13	0.17	9.73	18.55
T_9	9.73	10.20	141.93	25.77	0.15	10.87	11.30
T_{10}	8.70	8.17	129.14	24.11	0.16	10.38	16.28
T_{11}	8.16	6.37	121.27	19.50	0.13	7.19	9.11
S.Ed	0.29	0.043	0.009	0.42	0.004	0.006	0.70
CD(0.05%)	0.054	0.090	0.021	0.89	0.008	0.013	1.47

Pandey and Sinha (1999) reported that the increase in weight of the bunch and yield per hectare are due to sulphur present in the Sulphate of potash which might be responsible for the formation of ferredoxin (iron-sulphur protein) in plants which might have a direct impact inactivating the catalase and peroxidase enzymes. Sulphur application increased the yield since it is a constituent of amino acid and protein production (Ahmed *et al.*, 1998). This was in corroboration with the findings of Sandhya *et al.*, (2016) in banana (*Musa* spp.) cv. Grand Naine. In bunch feeding of fresh cow dung slurry 500 ml + Urea 7.5 g + Sulphate of potash 7.5 g, higher urease activity coincided for better increase of bunch and finger characters. The enzyme activity in turn is related with the molecular absorption of urea (Ancy *et al.*, 2000). The released NH_3 would be incorporated into amino acids and then into protein via the glutamate synthase cycle (Kumar and Abrol, 1986). Similarly, this study was supported by Ancy and Kurien (2000) in cv. Nendran, Kotur and Keshava (2008) in cv. Robusta. The increase in finger weight by cow dung slurry 500 ml+ Urea 7.5 g+ Sulphate of potash 7.5 g can be supported with the findings by Calvin *et al.*,(1952) and Mothes (1961).

All the post-harvest quality parameters differed significantly among the treatments presented in (Table 1). The highest TSS (26.73 ^{0}Brix), acidity (0.18 %), ascorbic acid (11.27 mg 100 g-1) and total sugars (20.19 %) of fruits was noted in T_7 - Fresh cow dung slurry 500 ml along with each at 7.5 g Urea and Sulphate of potash.The lowest values of quality parameters *viz.*, TSS (19.50 ^{0}Brix), acidity (0.13 %), ascorbic acid (7.19 mg 100 g-1) and total sugars (9.11 %) were recorded in T_{11}– control.

Application of Sulphate of potash was also found to be good in increasing sugar percentage as potassium plays a major role in carbohydrates synthesis, breakdown, translocation and synthesis of protein and neutralization of physiologically important organic acids. This finding agreed with that of Tisdale and Nelson (1966). Going further, potassium when supplied in the form of Sulphate of potash favours conversion of starch into simple sugars during ripening by activating the sucrose synthetase enzyme thus resulting in higher sugar percentage.

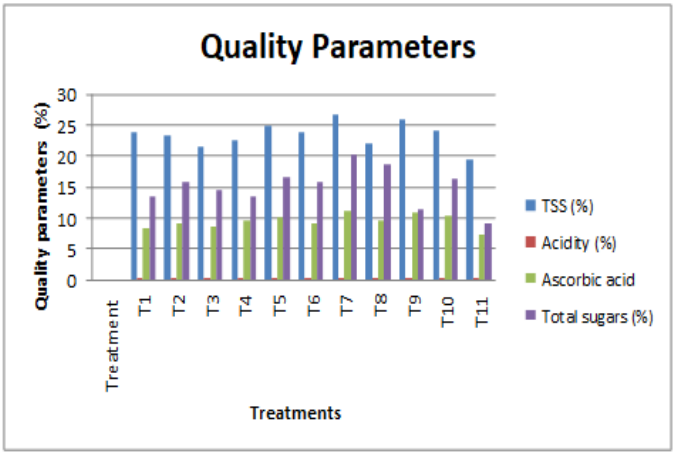

Fig.2. Effect of post shooting bunch feedings on quality characters of banana (*Musa* spp.) cv. Ney Poovan (AB)

Increased level of potassium application results in reduced acid content of fruits. This could be due to the fact that under low potassium regime, Phosphoenol pyruvate (PEP) was apparently shunted into alternate pathways resulting in a shortage of acetyl COA (Pattee and Teel, 1967). Hence, oxalo acetate appeared to be preferentially formed from PEP in plants with low levels of potassium and this organic acid derivative accumulated.

CONCLUSION

Banana (*Musa* spp.) is a very popular fruit due to its low price & high nutritive value. It is considered in fresh or cooked from both as ripe & raw fruit. Hence there is always a need for attempting to achive higher yield and better quality by adopting recent modern techniques. In the present investigation attempts was made to find out the effect of post shooting bunch feeding of nutrients on yield and quality of banana (*Musa* Spp.) Cv. Ney Poovan (AB). After, the excision of male bud (denavelling) bunch feeding of 500 ml fresh cow dung slurry along with each at 7.5 g urea and sulphate of potash (T_7) was found to give better results interms of the maximum yield parameters *viz.*, bunch weight (13.96 kg), number of hands per bunch (11.16 nos.), number of fingers per bunch (155.93 nos.) and quality parameters *viz.*, TSS (26.73 %), acidity (0.18 %), ascorbic acid (11.27 mg 100 g-1) and total sugars (20.19 %) in banana (*Musa* spp.) cv. Ney Poovan (AB). It is therefore concluded that the bunch feeding technique was found to be most effective to improve the yield and quality of banana (*Musa* spp.) cv. Ney Poovan (AB).

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