Int.J.Curr.Microbiol.App.Sci (2020) *9*(9): 1826-1831

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 9 Number 9 (2020)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2020.909.229

Influence of De-navelling and Bunch Stalk Feeding on Vegetative Parameters of Banana cv. Grand Naine

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Keywords

De-Navelling, Bunch feeding, Banana, Grand Naine, Northern dry zone, Vegetative parameters

Article Info

Accepted:
15 August 2020
Available Online:
10 September 2020

A B S T R A C T

A field experiment was conducted at farmer field to determine the effect of De-navelling and different bunch stalk feeding on vegetative parameters of banana cv. Grand naine under Northern Dry zone (Zone- 3) of Karnataka state. The experiment was laid in RCBD with ten treatments, replicated thrice. Cow dung slurry solution, ammonium sulphate (5%, 10%, 15% and 20%), sulphate of potash (5%, 10%, 15% and 20%) and in combination of ammonium sulphate, sulphate of potash and cow dung slurry solution and compared with control (Male bud retention on the bunch till harvest). Results revealed that, early harvesting (122.77 days) was recorded in treatment T_9 where, the bunch fed with dipping the cut end in the cow dung slurry + 100 ml of water+ 15 g of ammonium sulphate and 10 g of SOP. There were no significant differences among the treatments with respect to height of the plant, pseudostem girth and in number of leaves per plant before bunch feeding and also after the bunch feeding.

Introduction

Banana (*Musa* spp.) is the world's largest monoecious, monocarpic and monocotyledonous perennial herb belongs to the family Musaceae. It is one of the major commercial fruit crops grown in tropics, subtropics and considered as the most economical sources of food. Banana is known for its antiquity that is interwoven with Indian heritage and culture and it is one of the most important fruits grown and consumed worldwide. They are rich in easily digestible carbohydrates with a calorific value of 67-137/100 g fruit (Samson, 1986). It is the most important fruit next to mango in the world trade. It is also a valuable earner of export income (Kerry, 1999). India leads the world in banana production. In India, bananas are cultivated in an area of 8,02,600 hectares and producing 29.72 million tonnes and Karnataka has 1,02,710 hectares and a

production of 2.67 million tonnes, with national average and state productivity of 37.0 MT/ha and 26.10 MT/ha, respectively (Anonymous, 2015).

Banana is a heavy feeder of nutrients and requiring continual supply of nutrients and water in large quantities for its growth, development and yield. In banana, total amount of nitrogen taken up by the plant is closely related to total dry matter production (Lahav, 1995), other than by using the nutrient for growth, the banana plant cannot store nitrogen. Therefore, this nutrient is considered to be in short supply even when the crop is grown on highly fertile soils (Robinson, 1996). Potassium and nitrogen are the most used nutrient in plant growth, development and fruit production. Turner and Barkus (1980) found that, while low potassium supply halved the total dry matter produced, the bunch dry matter was reduced by 80 per cent and the roots were unaffected. It was suggested that of the various organs competing for potassium, those nearest the source of supply is the most successful in obtaining their requirements (Sathiamoorthy and Jeyabaskaran, 2011).

Banana plant is supplied with nutrients through soil and foliage, *denavelling* (removal of male inflorescence for nutrient diversion) and post-shooting feeding nutrients through the distal stalk-end of rachis (Venkatarayappa *et al.,* 1976; Ancy *et al.,* 1998; Ancy and Kurien, 2000; Sreekanth *et al.,* 2014) to achieve high yields. De-navelling serves dual purposes of saving mobilization of food into unwanted sink of banana plant as well as earning additional income when excised male bud is used as a vegetable (Singh, 2001). Therefore, an attempt was made to know the influence of de-navelling and bunch stalk feeding on vegetative parameters feeding cow dung slurry, Ammonium Sulphate and Sulphate of Potash alone and in combination through the excised distal stalk-end of rachis after de-navelling and to determine influence of treatments on vegetative parameters of "Grand Naine" banana.

Materials and Methods

The experiment was conducted in the farmer field during the year 2015-2016 at Tulisigere village, near Gaddanakeri cross (Bagalkot Tq., and Dist., Karnataka state) is situated at 16° 09' North latitude and 75° 36' East longitude at an altitude of 536.75 m above Mean Sea Level (MSL), in the Northern Dry zone (Zone- 3) of Karnataka state. Bagalkot which comes under zone-3 of region-2 among the agro climatic zones of Karnataka has benefited by both South-West and North-East Monsoons. The mean maximum temperature during the period of experimentation was 32.02 ^{0} C. Whereas, the mean minimum temperature was 20.44 ^{0} C. The mean maximum relative humidity during the period of experimentation was 72.52% whereas, the mean minimum relative humidity was 58.15%. The total rainfall of 424.5 mm was received in 34 rainy days during crop growth period from December 2014 to November 2015.

The experiment was laid by panting the tissue culture plants of banana cv. Grand Naine were procured from the State Department of Horticulture, Hulimavu, Bengaluru and planted during 15th December 2014, spaced at by maintaining 1.8 X 1.8 m. Before the week of planting, the land was ploughed twice and harrowed to bring the soil to a fine tilth, about 30 kg well decomposed farm yard manure (FYM) was added to each pit. Inorganic fertilizers were applied at applied at monthly intervals after planting to till two months before shooting with recommended dose per plant NPK (200:100:300 g), They were supplied in the form of 19:19:19, 12:61:0, 54:32:0 through drip irrigation. The plots

were kept free from weeds by regular hand weeding. Irrigation schedule was followed according to the requirements. Earthing up was followed whenever soil became compact. De-suckering was done regularly till shooting and a single sucker was allowed to grow after shooting. Along with de-suckering, other cleaning activities were also carried out accordingly.

The experiment was laid out in a Randomized Complete Block Design (RCBD) with ten treatments, replicated thrice. Four plants were selected randomly for recording observations from each treatment. The details of different treatments imposed in the present investigation are presented in the Table 1.

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 pistillate (female) flowers had set fruits. *i.e*., after four bracts were shed (about 15 days after flower emergence).

The prepared 200 ml solution was placed in a thick polythene bag and tied securely by dipping the excised rachis and maintained till harvest according to the treatments

Preparation of cow dung slurry

The fresh cow dung of 500 g is dissolved in 1lt water and mixed thoroughly to prepare slurry and 100 ml is taken.

Preparation of combination of ammonium sulphate and cow dung slurry solution

The ammonium sulphate solution was prepared by weighing 05 gram of ammonium sulphate accurately and dissolving in 100 ml water, accordingly 10, 15, 20 gram solutions were prepared and then these solutions were mixed with 100 ml of cow dung slurry.

Preparation of combination of ammonium sulphate, sulphate of potash and cow dung slurry solution

Ammonium sulphate and sulphate of potash were used to supplement N, K and S combined nutrient solution. For preparation of combination of ammonium sulphate and sulphate of potash, both are weighed separately at 05 g and then dissolved in 100 ml of water respectively. Accordingly 10 g and 7.50 g, 15 g and 10 g, 20 g and 12.50 g solutions of ammonium sulphate and sulphate of potash were prepared. Then these solutions were dissolved in 100 ml cow dung slurry.

In this study, fully water soluble soluble ammonium sulphate containing 21 per cent nitrogen and 24 per cent sulphur and sulphate of potash containing 50 per cent potash and 17.50 per cent sulphur was used for bunch feeding treatments.

Study parameters included

Plant height (m), Pseudostem girth (cm), Number of leaves/plant, Days taken from shooting to harvest, Plant height was recorded from base of pseudostem leaving 30 cm from the ground up to bifurcation of leaves finally the 30 cm was compensated by adding it to the total height of the plants at the time of shooting. Pseudostem girth was measured circumference at 5cm above the ground level. Number of leaves/plant was recorded in tagged plants at the time of shooting. Days taken from shooting to harvest was recorded by number of days required from initiation of shooting to harvesting. The data was statistically analyzed by method of analysis of variance using RBD as described by Fisher and Yates (1963).

Results and Discussion

The number of days taken from shooting to maturity was found to differ significantly among the treatments. An early harvesting (122.77 days) was recorded in treatment T_9 where, the bunch fed with dipping the cut end in the cow dung slurry + 100 ml of water+ 15 g of ammonium sulphate and 10 g of SOP, which was on par with $T_{8,}$ T_{10} and T_7 whereas, more numbers of days were taken to harvest (127.43) in control (T_1). There were no significant differences among the treatments with respect to height of the plant, pseudostem girth and in number of leaves per plant before bunch feeding and also after the bunch feeding (Table 2).

Table.1 Details of the treatments imposed during the experimentation

Treatment No.	Treatment
T_1	Control: Male bud retention on the bunch till harvest
T_2	Dipping the cut end in the cow dung slurry and 100 ml water
T_3	T2+05 g of Ammonium Sulphate
T_4	T2+10 g of Ammonium Sulphate
T_5	T2+15 g of Ammonium Sulphate
T_6	T2+20 g of Ammonium Sulphate
T_7	T3+05 g of Sulphate of Potash
T_8	T4+7.50 g of Sulphate of Potash
T_9	T5+10 g of Sulphate of Potash
T_{10}	T6+12.50 g of Sulphate of Potash

Note: Bunch stalk feeding after opening of last hand

Table.2 Effect of bunch feeding on vegetative parameters of banana cv. Grand Naine

Treatment	Height of the plant (m)	Pseudostem girth (cm)	Number of leaves/ plant	Days taken from shooting to harvest
T_1: Control: Male bud retention on the bunch till harvest	2.53	55.97	13.83	127.43
T_2: Dipping the cut end in the cow dung slurry and 100ml water	2.58	54.90	14.50	126.70
T_3: T2 + 05 g of Ammonium Sulphate	2.49	55.27	13.50	126.10
T_4:T2 + 10 g of Ammonium Sulphate	2.55	56.33	13.17	125.43
T_5:T2 + 15 g of Ammonium Sulphate	2.58	56.17	14.50	125.77
T_6:T2 + 20 g of Ammonium Sulphate	2.52	56.53	14.17	126.53
T_7: T3 + 05 g of Sulphate of Potash	2.61	56.30	14.17	125.43
T_8: T4 + 7.50 g of Sulphate of Potash	2.45	55.10	13.50	124.03
T_9: T5 + 10 g of Sulphate of Potash	2.66	56.80	13.83	122.77
T_{10}:T6 + 12.50 g of Sulphate of Potash	2.61	55.63	13.83	124.70
S.Em.±	0.10	0.77	0.46	0.54
C.D. at 5 %	NS	NS	NS	1.62

NS= Not significant

The reduction in duration from shooting to maturity might be due to the presence of nitrogen in Ammonium Sulphate, increased the auxin concentration in plant, which might have helped in cell elongation and inturn enhanced the faster growth rate of the banana spadix, efficient source sink relationship may be attributed for minimum number of days for maturity. The above finding was in conformity with Bhalerao *et al.,* (2009) in cv. Grand Naine. Similar results also recorded by Nandan Kumar *et al.,* (2011) in cv. Nanjangudu Rasbale, Ramesh and Kumar, 2007 and 2010 in cv. Neypoovan.

There was a reduction of 22-29 days in the total crop duration where nitrogen level was increased from 100 to 300 g plant^{-1}. Nitrogen reduced the phyllochron and increased the leaf area in a short span of time thereby, helping the plant to attain early physiological maturity. Nitrogen plays an important role in hastening the process of initiation and emergence of inflorescence as reported by Lahav (1983); Singh *et al*., (1990); Parida *et al*., (1994) and Geetha (1998).

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How to cite this article:

Pavan Kumar, H. S., Kulapati Hipparagi, S. N. Patil, G. Manjunath and Tanveer Ahmed. 2020. Influence of De-navelling and Bunch Stalk Feeding on Vegetative Parameters of Banana cv. Grand Naine. *Int.J.Curr.Microbiol.App.Sci.* 9(09): 1826-1831.
doi: https://doi.org/10.20546/ijcmas.2020.909.229