



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; SP2: 611-613

P Kamalakannan
Department of Soil Science and
Agricultural Chemistry,
Annamalai University,
Annamalainagar, Tamil Nadu,
India

D Elayaraja
Department of Soil Science and
Agricultural Chemistry,
Annamalai University,
Annamalainagar, Tamil Nadu,
India

S Sathiyamurthi
Department of Soil Science and
Agricultural Chemistry,
Annamalai University,
Annamalainagar, Tamil Nadu,
India

Effect of recommended dose of nitrogen, phosphorus and various levels of potassium on growth and yield of banana CV. poovan (AAB)

P Kamalakannan, D Elayaraja and S Sathiyamurthi

Abstract

The field experiment was carried out at Chinnathanakuppam village, Kurinjipadi taluk, Cuddalore district during November 2016 to September 2017. The experimental soil having sandy clay loam in texture (Typic Haplustalf) had the value of pH-7.0 and EC of 1.2 dsm^{-1} . The soil analysed low in organic carbon, low in alkaline KMnO_4 -N, and low in Olsen-P and medium in NH_4OAC -K. The treatment consisted of four levels of potassium viz., K_{500} , K_{550} , K_{600} and K_{650} gram plant^{-1} . The treatments were evaluated with recommended dose of Nitrogen, phosphorus along with SOP foliar spray twice at 15 days interval after bunch emergence. The fertilizer schedule of 120: 45: 390 g of NPK plant^{-1} were taken as control. Nitrogen and phosphorus were applied for all the treatment through urea and single superphosphate. The experiment was conducted in Randomized Block Design (RBD) with three replication. The growth characters viz., pseudo stem height, pseudo stem girth, number leaves plant^{-1} and yield parameters viz., bunch weight and number of hands per bunch were recorded. The results of study clearly revealed that increase the K level from 500 gm plant^{-1} to 650 gm plant^{-1} consistently increased the growth and yield characters of poovan banana. By considering all the benefits application of potassium@ 600 gm^{-1} , recommended dose of nitrogen (120 gm plant^{-1}), phosphorus (45 gm plant^{-1}) along with Sulphate of Potash(SOP) foliar spray @ 2% recorded highest pseudo stem girth (56.25,60.25,68.29 and 72.34 cm), pseudo stem height (296.08, 385.77,490.45 and 505.22 cm) at 150, 210, 270 and 330 DAP, respectively. Regarding maximum number of leaves plant^{-1} . (50.75), maximum number of bunch weight (20.48) and highest number of hands per bunch (13.46) was recorded in treatment T₈. The lowest growth and yield characters values are noticed in T₁ (control) treatment.

Keywords: Banana, sulphate of potash, sandy clay loam soil and RDF

Introduction

Banana requires a large quantity of nutrients and banana is the cheapest, plentiful and most nourishing of all fruits. Banana belongs to the family musaceae, of the order scitaminae. It is being cultivated in four lakh hectares with total annual production of 13.5 million tonnes. Bananas bring a heavy feeder of Potassium required nearly 1500 kg K_2O of per hectare. Nearly 6 lakh tonnes of K_2O is required for banana production in India which in terms of K fertilizer comes to be about 10 lakh tonnes of KCl or 12 lakh tonnes of K_2O fertilizer per year. Though, the India soils in banana belts growing are very rich in Potassium minerals, the Potassium availability to banana crop is restricted due to various soil factors.

Potassium in Banana Plant System

Potassium is a key element in banana nutrition. The earliest reference to analysis of banana plant SOP showed a high concentration of Potassium in the plant. This observation has fine been continuous for many researchers all over the world (Twfors, 1967).

Banana absorbs more nutrients per unit area than almost any other crops (martin, 1984) [5]. Banana required more K for its growth, production and quality compared to N and P with bananas, being a Potassium loving crop, the farmers in India are applying K @ 8000 to 1600 kg ha^{-1} depending upon the availability soil K. Muriate of potash is commonly used as the source of K, chloride toxicity is often seen in bananas, hindering the crop growth, yield and quality (Nalina, 2002) [7].

Poovan banana being a heavy feeder of potassium requires nearly 1500 kg of K_2O per hectare. An optimum supply of K must be essential in maintaining normal growth and Development, especially during the later stages of fruit development (Munson, 1985) [6]. The increase in the N and K fertilizer levels improves the growth parameter of plant and had positive response to higher k application after flowering (Chandra Kumar *et al.*, 2001) [1].

Correspondence

P Kamalakannan
Department of Soil Science and
Agricultural Chemistry,
Annamalai University,
Annamalainagar, Tamil Nadu,
India

Materials and Methods

The field experiment carried out at Chinnathanakuppam Village, Kurinjipadi taluk, Cuddalore district, during November 2016 to September 2017. The experimental soil having sandy clay loam in texture (Typic haplustalf) had the value of pH-7.0 and EC 1.2 dsm^{-1} . The soil analyses low in organic carbon, low in alkaline $\text{KMnO}_4\text{-N}$, and low in Olsen-P and medium in $\text{NH}_4\text{OAc-K}$. The treatment consisted of four levels of potassium viz., K_{500} , K_{550} , K_{600} and K_{650} gram plant^{-1} . The treatments were evaluated with recommended dose of Nitrogen, Phosphorus along with SOP foliar spray twice at 15 days interval after bunch emergence. The banana cultivar namely poovan were grown as test crop. The fertilizer schedule of 120:45: 350g plant^{-1} were taken as control. Nitrogen and Phosphorus applied through urea and single super phosphate. The experiment was conducted as Randomized Block Design (RBD) with three replications. The growth characters viz., pseudo stem girth and pseudo stem height and yield characters viz., bunch weight and number of hands per bunch were recorded.

Results and Discussion

Yield Characters

In the present study, the yield characters like bunch weight and number hands per bunch (Table-1) increased due to different levels of potassium, recommended dose of Nitrogen, Phosphorus and SOP foliar spray. The application of potassium, recommended dose Nitrogen, Phosphorus along with sulphate of potash foliar spray @ 2% recorded higher bunch weight and number of hands per bunch. Among the different levels of Potassium, application of k @k600 g plant^{-1} (K 600), recommended dose of Nitrogen @ 120g plant^{-1} , Phosphorus @ 45 kg ha^{-1} along with Sulphate of Potash foliar spray @ 2% registered the maximum bunch weight of 20.48 kg and highest number of 13.46 hands bunch in poovan banana.

Enhancement of yield due to higher levels of K application observed in present study is in line with reports of Singh *et al.*, 1974 [8] and Baruah and Mohan, 2001. Fruit growth is conspicuously restricted by low Potassium supply in two days. Further, Potassium is the macronutrient extracted in greater amounts by banana plants 162% of the total macronutrient and 41% of the plant nutrients, which directly affects photosynthesis, the translocation of photosynthesis, and water balance in plants and fruits (kumar and kumar, 2008) [3].

Growth Characters

The results of the experiment revealed that the growth characters viz., pseudo stem girth, pseudo stem height and number of leaves plant^{-1} were favourably enhanced by the treatment, application of Potassium @ 600gm plant^{-1} , recommended dose of Nitrogen @ 120gm plant^{-1} , Phosphorus @ 45 gm plant^{-1} along with Sulphate of potash (SOP) foliar spray @ 2% recorded the highest pseudo stem girth (56.25, 60.25, 68.29 and 72.34cm), pseudo stem height (296.08, 385.77, 490.45 and 505.22cm) at 150, 210, 270 and 330 DAP respectively (Table-2 & 3). This finding is in agreement with the findings of Jambulingam (1975) [2] and Chandra Kumar *et al.*, (2001) [1] who reported improvement in the growth characters of plants due to K levels.

Ultimately combined application of soil and foliar K enhanced the growth. This enhancement in growth might be due to reason that Potassium is important to maintain

respiration and improve photosynthesis (Martin-prevel, 1973) [4] leaves are the photosynthetic part of plant which plays an important role on the growth of the plants.

Table 1: Effect of recommended dose of Nitrogen, Phosphorus and different levels of Potassium on number of hands bunch⁻¹ and bunch weight (kg) in banana cv. Poovan

Treatments	Number of hands bunch ⁻¹ and Bunch weight ⁻¹	
	Number of hands bunch ⁻¹	Bunch weight ⁻¹
T ₁ -RDNPK (Control)	7.52	14.05
T ₂ -RDNP + K @ 500 (g plant^{-1})	7.80	15.05
T ₃ -RDNP + K @ 550 (g plant^{-1})	8.89	15.82
T ₄ -RDNP + K @ 600 (g plant^{-1})	9.09	16.74
T ₅ -RDNP + K @ 650 (g plant^{-1})	10.52	17.33
T ₆ -RDNP + K @ 500 (g plant^{-1}) + SOP 2% Foliar Spray	11.45	18.60
T ₇ -RDNP + K @ 550 (g plant^{-1}) + SOP@ 2% Foliar Spray	12.46	18.92
T ₈ -RDNP + K @ 600 (g plant^{-1}) + SOP@ 2% Foliar Spray	13.46	20.48
T ₉ -RDNP + K @ 650 (g plant^{-1}) + SOP@ 2% Foliar Spray	12.46	18.29
S.Ed	0.15	0.46
CD (P=0.05)	0.38	0.93

Table 2: Effect of recommended dose of Nitrogen, Phosphorus and different levels of Potassium on pseudo stem height (cm) in banana cv. Poovan

Treatments	Pseudo stem height (cm)			
	150 DAP	210 DAP	270 DAP	330 DAP
T ₁ -RDNPK (Control)	193.50	212.35	270.04	336.45
T ₂ -RDNP + K @ 500 (g plant^{-1})	220.06	275.44	340.44	410.05
T ₃ -RDNP + K @ 550 (g plant^{-1})	240.45	300.45	370.45	440.45
T ₄ -RDNP + K @ 600 (g plant^{-1})	250.45	320.45	400.45	470.14
T ₅ -RDNP + K @ 650 (g plant^{-1})	265.46	335.00	430.45	490.05
T ₆ -RDNP + K @ 500 (g plant^{-1}) + SOP @ 2% Foliar Spray	270.45	360.00	455.11	520.11
T ₇ -RDNP + K @ 550 (g plant^{-1}) + SOP @ 2% Foliar Spray	290.45	380.02	490.66	530.22
T ₈ -RDNP + K @ 600 (g plant^{-1}) + SOP 2% Foliar Spray	296.08	385.77	490.45	505.22
T ₉ -RDNP + K @ 650 (g plant^{-1}) + SOP@ 2% Foliar Spray	275.36	356.87	455.29	519.78
S.Ed	3.26	5.09	6.83	6.67
CD (p=0.05)	10.44	16.27	21.85	21.23

Table 3: Effect of recommended dose of Nitrogen, Phosphorus and different levels of Potassium on Pseudo stem girth (cm) in banana cv. Poovan

Treatments	Pseudo stem girth (cm)			
	150 DAP	210 DAP	270 DAP	330 DAP
T ₁ -RDNPK (Control)	25.03	30.54	38.76	40.24
T ₂ -RDNP + K @ 500 (g plant^{-1})	32.11	39.93	45.67	49.32
T ₃ -RDNP + K @ 550 (g plant^{-1})	40.61	49.39	53.55	57.89
T ₄ -RDNP + K @ 600 (g plant^{-1})	47.21	54.11	59.33	65.22
T ₅ -RDNP + K @ 650 (g plant^{-1})	54.81	59.23	64.30	69.72
T ₆ -RDNP + K @ 500 (g plant^{-1}) + SOP@ 2% Foliar Spray	50.22	55.13	60.90	67.88
T ₇ -RDNP + K @ 550 (g plant^{-1}) + SOP@ 2% Foliar Spray	55.26	59.24	65.00	70.49
T ₈ -RDNP + K @ 600 (g plant^{-1}) + SOP @2% Foliar Spray	56.25	60.25	68.29	72.34
T ₉ -RDNP + K @ 650 (g plant^{-1}) + SOP @2% Foliar Spray	50.75	55.61	61.48	67.56
S.Ed	0.74	0.73	0.76	0.79
CD (p=0.08)	2.36	2.34	2.44	2.53

References

1. Chandra Kumar SS, Thimegouda S, Srinivas K, Reddy BMC. Performance of Robusta Banana under Nitrogen and potassium Fertilization. South Indian Horti. 2001; 49:92-94.
2. Jambulingam AR, Ramaswamy N, Muthukrishnan CR. Studies on the effect of potassium on Robusta banana. Potash Review Faculty of Agric. Annamalai University, India NO. 27/49, 1975, 6.
3. Kumar AR, Kumar N. Potassium nutrition in Banana. The Asian J of Horticulture. 2008; 3(2):479-482.
4. Martin-Prevel P. Influences of potassium nutrition on physiological functions and productions of plantains in tropical region. In: 10th colloquium on the international potash institute, Abidjan, Ivory Coast, 1973, 233-248.
5. Martin. Influence of potassium nutrition on physiological functions and production of plantains in tropical region. In 10th colloquium on the international potash institute, Abidjan, Ivory coast, 1984, 233-248.
6. Munson RS. Potassium in Agriculture Madison, Wisconsin USA, 1985, 550.
7. Nalina L. Standardization of fertilizer requirement for tissue cultural Banana. Cv. Robusta (AAA). Ph.D. (HORT) Thesis, Tamil Nadu Agric. University, Coimbatore, 2002.
8. Singh SS, Kalyanasundaram P, Muthukrishnan CR. Studies on the effect on nitrogen and potash on the physico-chemicals of Robusta banana. Auara. 1974; 415:23-43.
9. Twyford LT. Nutrition, a Review of principles and practice. J Sci. and Food Agric. 1947; 18:177-183.