Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(2): 2415-2419
Received: 21-01-2019
Accepted: 23-02-2019

Nagaraja KS
Scientist (Horticulture), ICAR-Krishi Vigyan Kendra, Kolar, University of Horticultural Sciences, Bagalkot, Karnataka, India

Praveen Jholgiker
Asst. Professor (Fruit Science), College of Horticulture, Bidar, Karnataka, University of Horticultural Sciences, Bagalkot, Karnataka, India

Raghunath Reddy RL
Scientist (Soil Science & Agriculture Chemistry), ICAR-Krishi Vigyan Kendra, Kolar, University of Horticultural Sciences, Bagalkot, Karnataka, India

Correspondence
Nagaraja KS
Scientist (Horticulture), ICAR-Krishi Vigyan Kendra, Kolar, University of Horticultural Sciences, Bagalkot, Karnataka, India

Standardization of fertilizer adjustment equations in banana cv. Ney Poovan (AB) following Targeted yield concept

Nagaraja KS, Praveen Jholgiker and Raghunath Reddy RL

Abstract
Standardization of optimum nutrient requirement in banana cv. Ney Poovan (AB) by adopting target yield concept was evaluated for validation of fertilizer adjustment equations. Optimum doses of fertilizers were worked by using fertilizer adjustment equations based on soil nutrient status. The results of the investigation revealed that, the banana cv. Ney Poovan plants applied with 150.75 g N: 17.81 g P: 344.5 g K achieved the highest (33.69 t/ha) but negative yield than expected target yield of 38 t/ha with minimum per cent deviation (-11.35) in plant crop and plants applied with 132.17 g N: 16.02 g P: 377.02 g K achieved the highest (29.96 t/ha) but negative yield than expected target yield of 40 t/ha with minimum per cent deviation (-25.10) in ratoon crop. The maximum TSS, total sugars and reducing sugars were recorded in fruits in T_6 (target yield-38 t/ha) in plant crop and ratoon crop. The highest benefit cost ratio of 4.14 and 5.59 respectively recorded in the treatment T_6 (target yield-38 t/ha) in plant crop and T_7 (target yield-40 t/ha) in ratoon crop.

Keywords: Banana, Ney Poovan, fertilizer adjustment equations and target yield

Introduction
India is the largest producer of banana in the world covering an area of 0.80 million hectare with a production of 29.72 million tonnes and productivity of 35.90 metric tonnes per hectare (Anon., 2014). The important banana growing states of India are Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh, Kerala, Assam and West Bengal. However, Karnataka state alone has 0.10 million hectares of area and production of 2.67 million tonnes with the productivity of 20.40 metric tonnes per hectare. Even though India is the largest producer, its share is negligible in the export market. To tackle this problem, in recent years more emphasis is being given to higher production of banana per unit area by adopting various techniques, one of such method is improved fertilizer management. Banana is a heavy feeder and requires huge quantity of nutrients which must be supplied through fertilization to obtain optimum yield on sustainable basis. It requires nitrogen, phosphorus and potassium in large amounts for its proper growth and production as fertilization improve soil nutrient status and their by increases plant productivity (Guo *et al.*, 2009) [4]. To deal with nutrition problems and determine the role of management practices, nutrient analysis of soil is rather accurate, reliable and quantitative approach to diagnose and precisely correcting nutrient deficiencies or toxicities. A study on Standardization of NPK requirement in banana cv. "Njalipoovan" (*Musa* AB group: Syn. Ney Poovan) was conducted by Indira and Nair (2008) [4] in Onattukara soil of South Kerala and observed that increasing the rate of application of nitrogen, phosphorus and potassium improved the growth, yield and quality of Ney Poovan banana. Banana is a responsive crop for nutrition management, transforming it into good yields. There are several approaches of nutrition management in banana, one of them is application of nutrition based on target yield concept. This concept was pioneered by Ramamoorthy (1967) [12] in banana. He also developed mathematical equations for formulating fertilizer doses to achieve a pre-determined target yield. To test and validate these equations in banana cv. Ney Poovan an experiment was conceived and implemented in the present study.

Material and Methods
The present investigation was carried out in the field of All India Coordinated Research Project (AICRP) on Fruits, Kittur Rani Channamma College of Horticulture, Arabhavi during the year (2013-14 and 2014-15). The experiment was laid out in randomized block design with eight treatments replicated four times in a plot. The land was properly ploughed and harrowed to bring it to fine tilth. The field was made free from weeds. Pits of size 45 × 45 × 45 cm were dug two months before the planting at a spacing of 1.8 × 1.8 m.

The healthy suckers of banana cv. Ney Poovan were dipped in cow dung slurry and sprinkle with corbofuran-3G granules (40 g/ sucker) around the basal portion of sucker and planted in the pits. All the cultural operations were done at the proper time as per Package of Practices, UHS, Bagalkot.

Fertilizer application

The fertilizer doses for different treatments were worked out by using the fertilizer adjustment equation which was developed by Ramamoorthy (1967) [12] and suggested by Jeyabhaskar (2012-13) [6] for banana cv. Ney Poovan by following the 'Targeted yield concept'.

Fertilizer adjustment equations of Ney Poovan- For plant crop

FN = (19.0 x T) – (0.84 x SN) – (0.28 x ON)

FP = (2.41 x T) – (0.76 x SP) – (0.20 x OP)

FK = (33.10 x T) – (0.50 x SK) – (0.45 x OK)

Here, FN, FP and FK are nitrogen (N), phosphorous (P_2O_5) and potassium (K_2O) requirement (kg/ha) for banana cultivation in one hectare, respectively, through fertilizers to achieve banana yield target, T (tons/ha) with initial soil nitrogen-N (SN), soil phosphorous-P_2O_5 (SP) and soil potassium-K_2O (SK) in kg/ha. ON, OP and OK are quantity (kg/ha) of N, P_2O_5 and K_2O contribution from the recommended dose of organic manures applied to banana crop. The initial soil NPK contents were estimated through soil testing (samples analysed in Soil Science laboratory of UAS, Dharwad) and the banana yield target was fixed, the NPK balance to be applied through fertilizers to achieve the fixed target was calculated using the above equation. Based on soil analysis report of experimental plots [Nitrogen (N) = 280 kg/ha, Phosphorous (P_2O_5) = 40 kg/ha and Potassium (K_2O) = 348 kg/ha].The following fertilizers dosage were worked out by using the fertilizer adjustment equation formula given by Ramamoorthy (1967) [12] and suggested by Jeyabhaskaran (2012-13) [6]. The below fertilizer dosages were applied in five splits at 2 months intervals.

Fertilizer schedule for Ney Poovan banana (Plant crop)

Treatment	Urea (g/plant)	SSP(g/plant)	MOP(g/plant)
T_1	434.78 (200 g N)	312.50 (50 g P)	333.30 (200 g K)
T_2	220.00 (101.5 g N)	72.25 (11.56 g P)	431.13 (258.68 g K)
T_3	247.00 (113.8 g N)	82.06 (13.13 g P)	466.88 (280.13 g K)
T_4	274.00 (126.13 g N)	91.81 (14.69 g P)	502.63 (301.58 g K)
T_5	300.95 (138.44 g N)	101.56 (16.25 g P)	538.38 (323.03 g K)
T_6	327.70 (150.75 g N)	111.31 (17.81 g P)	574.16 (344.5 g K)
T_7	354.00 (163.07 g N)	121.06 (19.37 g P)	610.00 (366 g K)
T_8	382.00 (176.01 g N)	130.81 (20.98 g P)	645.66 (388 g K)

FYM of 5 kg was commonly applied to all the plants along with scheduled fertilizer dosage.

Fertilizer adjustment equations of Ney Poovan –For ratoon crop

FN = (18.2 x T) – (0.88 x SN) – (0.25 x ON)

FP = (2.17 x T) – (0.81 x SP) – (0.23 x OP)

FK = (31.40 x T) – (0.52 x SK) – (0.51 x OK)

The soil NPK contents after harvest of main crop were estimated through soil testing and the banana yield target was fixed, the NPK balance to be applied through fertilizers to achieve the fixed target was calculated by using above equation. Based on soil analysis it has been found that, the research plot area contains- Soil Nitrogen (N) = 340 kg/ha, Soil Phosphorous (P_2O_5) = 37.3 kg/ha and Soil Potassium (K_2O) = 132.8 kg/ha. The following fertilizers dosage were obtained after calculation on the basis of soil analysis by using the fertilizer adjustment equation formula given by Ramamoorthy (1967) [12] and suggested by Jeyabhaskaran (2012-13) [6] in banana cv. Ney Poovan. The below fertilizer dosages were applied in five splits at 2 months intervals.

Fertilizer schedule for Ney Poovan banana (Ratoon crop)

Treatment	Urea (g/plant)	SSP(g/plant)	MOP(g/plant)
T_1	434.78 (200 g N)	312.50 (50 g P)	333.30 (200 g K)
T_2	160.28 (73.73 g N)	56.25 (9 g P)	458.80 (275.3 g K)
T_3	185.93 (85.52 g N)	65.00 (10.38 g P)	492.70 (295.6 g K)
T_4	211.60 (97.32 g N)	73.80 (11.8 g P)	526.62 (315.97 g K)
T_5	237.22 (109.12 g N)	82.60 (13.21 g P)	560.53 (336.32 g K)
T_6	262.87 (120.91 g N)	91.38 (14.62 g P)	594.45 (356.7 g K)
T_7	288.50 (132.17 g N)	100.17 (16.02 g P)	628.37 (377.02 g K)
T_8	314.13 (144 g N)	108.95 (17.43 g P)	662.30 (397.3 g K)

FYM of 5 kg was commonly applied to all the plants along with scheduled fertilizer dosage.

The targets were fixed based on fertilizer doses applied: T_1 = Blanket Recommendation (200:50:200 g/plant), T_2 = 30 t/ha target, T_3 = 32 t/ha target, T_4 = 34 t/ha target, T_5 = 36 t/ha target, T_6 = 38 t/ha target, T_7 = 40 t/ha target and T_8 = 42 t/ha target. The observations were recorded for yield and quality parameters. The per cent deviation of bunch yield from target was calculated by dividing actual yield obtained by expected yield (targeted yield) and expressed in percentage. Benefit cost ratio was worked out by dividing gross returns (Rs/ha) by cost of cultivation (Rs/ha). The statistical analysis of the data was done by following the Fisher's analysis of variance (ANOVA) technique as given by Panse and Sukhatme (1967) [10]. The level of significance used in 'F' and't' tests was P=0.05.

Results and Discussion

The results of the study revealed that, there was a significant differences for bunch yield per plant, bunch yield per plot and bunch yield per hectare plant crop as well as in ratoon crop. The treatment T_6 (target yield- 38 t/ha) in plant crop and T_7 (target yield- 40 t/ha) in ratoon crop recorded higher bunch yield (10.92 and 9.71) per plant (Table 2), bunch yield per

plot (131.0 and 116.52) and bunch yield per hectare (33.69 and 29.96) with plants applied with a nutrient dosage of 150.75 g N: 17.81 g P: 344.5 g K (plant crop) and 132.17 g N: 16.02 g P and 377.02 g K (ratoon crop) respectively. The minimum bunch yield parameters was observed in T_2 (target yield-30 t/ha) in plant crop as well as in ratoon crop. The treatment T_6 (target yield- 38 t/ha) recorded minimum per cent deviation (- 11.35 %) from the target yield in plant crop (Fig. 1) while T_5 (target yield- 36 t/ha) recorded minimum per cent deviation (- 20.80 %) from the target yield in ratoon crop (Fig. 2). The increase in yield in T_6 and T_7 with minimum per cent deviation from the target yield was associated with corresponding increase in the number of hands, total number of fingers per bunch and fruit weight. Based on statistical studies on the influence of biometric characters on yield, it is reported that number of fingers per bunch is having the maximum direct effect. It is also probable that the number of fingers per bunch is influenced more by the quantity of fertilizers up to a certain level than the time of application (Beena *et al.*, 1993) [2]. Application of potassium exerted a significant influence on bunch weight (Geetha *et al.*, 1990) [3]. The study on standardizing nutrient requirement in banana in the cultivar Njalipoovan (Syn. Ney Poovan) conducted by Indira and Nair (2008) [4] opined that, increasing the rate of application of nitrogen, phosphorous and potassium improved the yield and yield attributes of banana. Kumar *et al.* (2008) [7] observed that application of different doses of nitrogen and potassium influenced the yield of banana. Nalina *et al.* (2009) [8] opined that the frequency of application of N, P and K fertilizers exerted a positive influence on yield of Robusta banana. Ramesh *et al.* (2006) [13] reported that, application of higher dose of potassium improves fruit weight and number of fruits per bunch and their by higher yield of banana. The present results endorse these findings.

The results of the study related to quality parameters revealed that, there was a significant difference for TSS, total sugars and reducing sugars in plant crop and ratoon crop. The maximum TSS, total sugars and reducing sugars was recorded in the treatment T_6 (target yield-38 t/ha) in plant crop and ratoon crop with a nutrient doses of 150.75 g N: 17.81 g P: 344.5 g K and 120.91 g N: 14.62 g P: 356.7 g K respectively. The treatment T_6 was statistically on par with T_7 (target yield-40 t/ha) for quality parameters. The maximum non-reducing sugar was observed in the treatment T_3 (target yield-32 t/ha) in ratoon crop (Table 3). The improvement of quality parameters in the treatment T_6 and T_7 may be attributed to increased level of nutrients especially K. Nitsos and Evans (1969) [9] proved that, adequate K supply ensured optimal functioning of enzyme sucrose synthetase and suppressed the activity of hydrolytic enzymes like amylase and saccharase. The net result of these action lead to build up of greater quantity of sugars in the proplastids. Ramesh *et al.* (2006) [13] reported that, the quality of banana is strongly influenced by K nutrition. The studies of Indira and Nair (2008) [4] found that, increasing the level of nitrogen and potassium improved the quality attributes such as TSS, total sugars and reducing sugars of banana. Nitrogen and potassium influenced the quality of banana fruits in cultivar Rasthali (Kumar *et al.*, 2008) [7]. The present results are in agreement with these findings.

In the present experiment, the highest benefit cost ratio of 4.14 recorded in the treatment T_6 (target yield-38 t/ha) in plant crop where as in ratoon crop the treatment T_7 (target yield-40 t/ha), T_5 (target yield-36 t/ha) and T_6 (target yield-38 t/ha) recorded higher benefit cost ratio of 5.59, 5.57 and 5.56 respectively (Table 4). The increased benefit cost ratio in the treatment T_5, T_6 and T_7 is due to increased yield in these treatments which received better quantity of nutrients. The higher benefit cost ratio of ratoon crop over plant crop may be attributed to reduction in cost of cultivation with respect to land preparation, opening of pits, cost of planting material and planting *etc*. The study on standardizing nutrient requirement in banana in the cultivar Njalipoovan (Syn. Ney Poovan) conducted by Indira and Nair (2008) [5] opined that, increasing the rate of application of nitrogen, phosphorous and potassium may have influence on benefit cost ratio. The marginal benefit cost ratio due to N fertilizer applying till reproductive period in banana cv. Nendran was very high (Pradeep *et al.*, 1997) [11]. Thangaselvabai *et al.* (2009) [14] reported that, high yield of better quality fruits with higher benefit cost ratio was noted in split application of high levels of nitrogen. The present investigation results endorse these findings.

Table 1: Effect of different fertilizer doses on bunch characters of banana cv. Ney Poovan (AB)

Treatment (Target)	Bunch length (cm)		Bunch width (cm)		No. of hands per bunch		Fingers in 3rd hand		Total fingers	
	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop
T_1 : Blanket Recommendation (200:50:200 g NPK per plant)	56.20	51.70	31.56	26.73	11.00	10.17	15.27	12.53	164.18	160.34
T_2 : 30 t/ha	56.38	51.77	30.70	27.63	10.84	9.33	13.21	14.17	147.17	159.87
T_3 : 32 t/ha	54.06	49.03	31.20	28.80	10.57	9.00	13.90	13.70	152.51	151.30
T_4 : 34 t/ha	55.64	51.17	31.91	29.17	11.55	10.23	15.37	15.01	167.08	164.17
T_5 : 36 t/ha	58.18	54.77	30.85	29.33	11.68	11.07	15.87	15.13	168.23	164.47
T_6 : 38 t/ha	59.41	60.80	32.27	31.17	11.83	11.00	15.91	15.50	181.34	176.30
T_7 : 40 t/ha	58.69	56.67	32.64	30.83	12.17	11.23	15.72	14.83	172.94	162.54
T_8 : 42 t/ha	58.44	55.97	31.65	28.97	11.68	10.43	16.13	15.60	166.33	158.40
S.Em±	1.73	1.05	0.72	1.04	0.12	0.22	0.18	0.13	2.21	4.31
CD (P=0.05)	NS	3.19	NS	NS	0.36	0.67	0.54	0.39	6.64	NS
CV (%)	14.21	13.37	12.78	10.91	14.23	13.73	10.21	9.98	18.62	18.91

Table 2: Effect of different fertilizer doses on bunch yield characters of banana cv. Ney Poovan (AB)

Treatment (Target)	Bunch Yield (kg / plant)		Bunch Yield (kg / plot)		Bunch Yield (t/ha.)		Per cent deviation from the Target	
	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop
T_1 : Blanket Recommendation (200:50:200 g NPK per plant)	8.72	7.73	104.57	92.80	26.90	23.86	0.00	0.00
T_2 : 30 t/ha	8.52	7.37	102.20	88.40	26.28	22.73	(-) 12.40	(-) 24.24
T_3 : 32 t/ha	8.95	7.67	107.36	92.00	27.60	23.65	(-) 13.75	(-) 26.10
T_4 : 34 t/ha	9.66	8.10	115.96	97.20	29.82	24.99	(-) 12.30	(-) 26.50
T_5 : 36 t/ha	10.05	9.25	120.64	111.00	31.02	28.54	(-) 13.84	(-) 20.80
T_6 : 38 t/ha	10.92	9.44	131.00	113.32	33.69	29.14	(-) 11.35	(-) 23.32
T_7 : 40 t/ha	10.40	9.71	124.76	116.52	32.08	29.96	(-) 19.8	(-) 25.10
T_8 : 42 t/ha	10.07	9.07	120.80	108.80	31.06	27.98	(-) 26.05	(-) 33.53
S.Em±	0.16	0.13	2.31	1.19	0.81	0.41	0.77	0.71
CD (P=0.05)	0.48	0.40	6.95	3.58	2.44	1.24	2.34	2.15
CV (%)	12.18	14.42	18.32	17.12	16.18	15.26	9.76	10.27

Table 3: Effect of different fertilizer doses on quality attributes of banana cv. Ney Poovan (AB)

Treatment (Target)	TSS (^{0}B)		Total sugars (%)		Reducing sugars (%)		Non-Reducing sugars (%)		Acidity (%)	
	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop
T_1 : Blanket Recommendation (200:50:200 g NPK per plant)	25.68	25.50	23.05	22.02	19.50	18.50	3.55	3.52	0.50	0.42
T_2 : 30 t/ha	25.05	23.52	20.52	19.51	17.50	15.50	3.02	4.01	0.49	0.40
T_3 : 32 t/ha	25.22	24.50	18.54	22.51	14.50	15.20	4.04	7.31	0.49	0.32
T_4 : 34 t/ha	25.55	24.51	20.56	20.50	16.56	15.50	4.00	5.00	0.43	0.31
T_5 : 36 t/ha	26.56	23.50	22.06	20.56	18.50	16.26	3.56	4.30	0.42	0.35
T_6 : 38 t/ha	28.52	26.20	24.54	23.54	21.54	20.50	3.00	3.04	0.40	0.38
T_7 : 40 t/ha	29.00	26.00	23.52	24.58	20.20	18.50	3.32	6.08	0.40	0.40
T_8 : 42 t/ha	26.50	22.00	20.53	18.50	16.50	12.00	4.03	6.50	0.43	0.45
S.Em±	0.77	0.35	0.34	0.32	0.42	0.57	0.62	0.43	0.05	0.05
CD (P=0.05)	2.31	1.05	1.03	0.96	1.26	1.74	NS	1.3	NS	NS
CV (%)	7.15	6.15	6.12	6.08	6.23	7.88	8.97	8.88	9.21	7.90

Table 4: Effect of different fertilizer doses on benefit cost ratio of banana cv. Ney Poovan (AB)

Treatment	Cost of cultivation per hectare		Cost of fertilizer per hectare		Total cost per hectare		Banana Sale (Returns)		B:C Ratio	
	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop	Plant crop	Ratoon crop
T_1 : Blanket Recommendation (200:50:200 g NPK per plant)	83,322	40,673	34,671	34655	117993	75329	403350	357900	3.42	4.75
T_2 : 30 t/ha	83,322	40,673	31255	31014	114577	71687	394050	340950	3.44	4.75
T_3 : 32 t/ha	83,322	40,673	33067	32711	116389	73385	414000	354750	3.56	4.83
T_4 : 34 t/ha	83,322	40,673	34903	34440	118225	75113	447150	374850	3.78	4.99
T_5 : 36 t/ha	83,322	40,673	36739	36167	120061	76841	465300	428100	3.88	5.57
T_6 : 38 t/ha	83,322	40,673	38560	37926	121882	78600	505200	437100	4.14	5.56
T_7 : 40 t/ha	83,322	40,673	40380	39655	123702	80328	481200	449400	3.88	5.59
T_8 : 42 t/ha	83,322	40,673	42232	41414	125554	82087	465900	419700	3.71	5.11

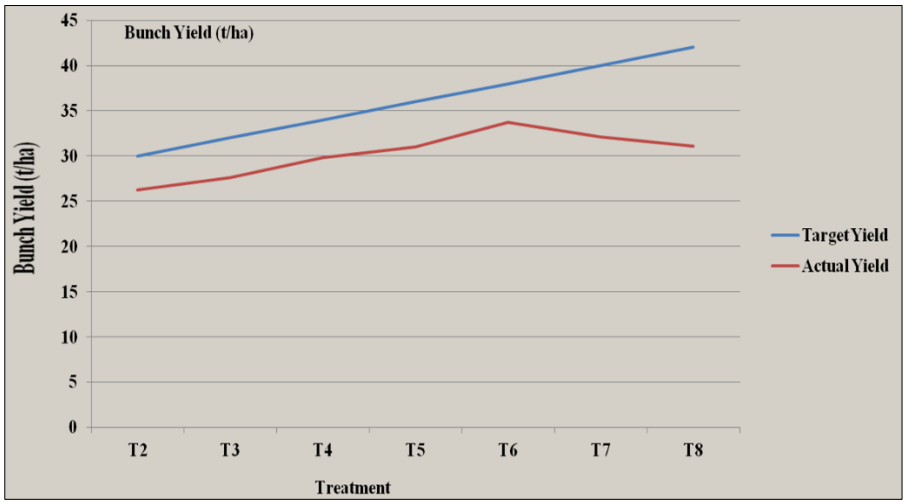

Fig 1: Comparison of target yield and actual yield obtained at different fertilizer doses in banana cv. Ney Poovan (plant crop)

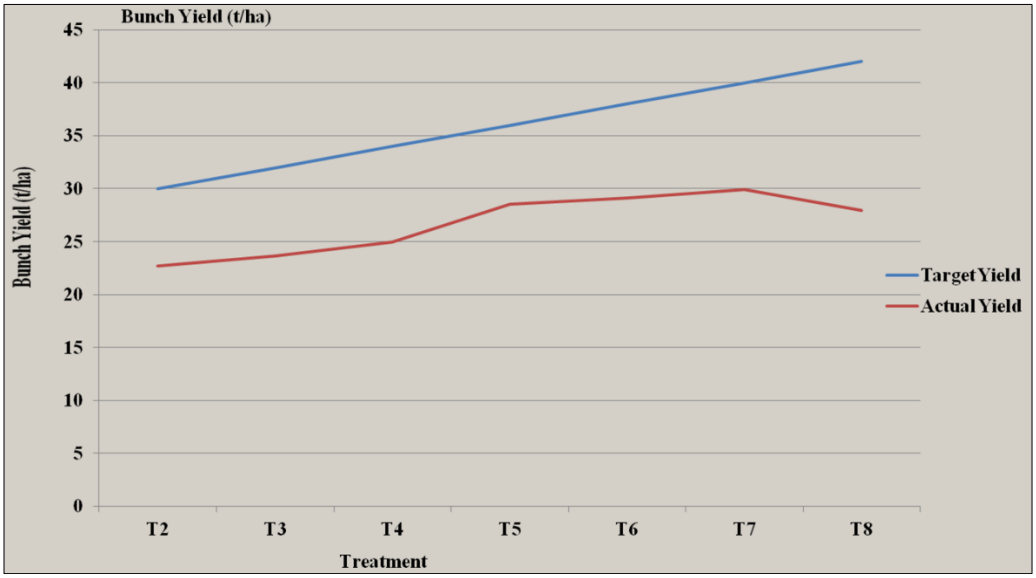

Fig 2: Comparison of target yield and actual yield obtained at different fertilizer doses in banana cv. Ney Poovan (ratoon crop)

References

1. Anonymous. NHB_Database. 2015. nhb.gov.in/area prodcuction.html.
2. Beena NB, Aravindakshan M, Valsala K. Effect of split application of fertilizers in banana, *Musa* AAB (Nendran). South Indian Horticulture. 1993; 41(2):67-73.
3. Geetha VN, Nair SR, Sulekha GR. Effect of nitrogen, potassium and their split applications on yield and yield components of Nendran banana grown in rice fields. South Indian Horticulture. 1990; 38(2):58-62.
4. Guo HC, Ding T, Mahmood QC, Zhang, Wang GH. Responses of soil microbial community to phosphate rock and annual ryegrass (*Lolium multiflorum*). Pak. J Bot. 2009; 41(6):3149-3157.
5. Indira M, Nair CS. Standardization of NPK requirement in banana cv. Njalipoovan (*Musa* AB group: Syn. Ney Poovan) in Onattukara soil of South Kerala. Journal of Horticultural Science. 2008; 3(2):127-131.
6. Jeyabhaskaran. Fertilizer adjustment equation for banana cv. Ney Poovan. Research Scholar, 2012. www.google.co.in.
7. Kumar D, Pandey V, Anjaneyulu K. Effect of planting density and nutrient management on growth, yield and quality of micro-propagated banana Rasthali Pathkapoora (AAB). Indian J Hort. 2008; 65(3):272-276.
8. Nalina L, Kumar N, Soorianathasundram K, Jeyakumar P. Effect of different nutrient levels on growth and development of tissue cultured banana cv. Robusta (AAA). Indian J Hort. 2009; 66(2):169-174.
9. Nitsos RE, Evans HJ. Effect of univalent cations on the activity of particulate starch synthetase. Plant Physiol. 1969; 44:1260-1266.
10. Panse VG, Sukhatme PV. Statistical methods for Agricultural Workers, ICAR, New Delhi, 1967.
11. Pradeep KP, Zachariah G, Charles JSK, Estelitta S. Response of banana to nitrogen application at vegetative and reproductive phases of growth. Indian Journal of Horticulture. 1997; 54(4).
12. Ramamoorthy B. Fertilizer application for specific yield target of Banana. Ind. Farm. 1967; 17(5):43-45.
13. Ramesh AN, Kumar, Kavino M. Role of potassium in fruit crops - a review. Agric. Rev. 2006; 27(4):284-291.
14. Thangaselvabai TC, Justin GL, Johnson SBN, Jayasekhar M. Influence of nutrients on the quantitative and qualitative traits of banana. Indian J Agric. Res. 2009; 43(4):274-278.