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THE OPTIMUM RATIO OF N, P AND K ADDED THROUGH FERTIGATION FOR WILLIAMS BANANA

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ABSTRACT

This study was initiated during 1999 /2000 and 2000 /2001 seasons to select the optimum rate of N, P and K through fertigation for Williams banana. Fifteen N : P : k ratios were applied.

Results showed that there was great differences on growth aspects, yield and finger characteristics with varying N : P : K ratios. Since increasing N and K rates from 100 to 500 g /plant and P from 100 to 300 g /plant caused a remarkable promotion on all studied parameters. Meaningless promotion on all the tested characters was ascribed due to raising N and K from 400 to 500 g /plant and P from 200 to 300 g /plant.

The best results with regard to growth, nutritional status of the plants, yield and fruit quality of Williams banana were obtained due to fertilizing the plants with N : P : K at 400 : 200 : 400 g /plant via fertigation (at 14 equal batches for N and four equal batches for both K and P).

INTRODUCTION

Excessive amount of irrigation water was applied in the traditional surface irrigation in Egypt. Losses of water through evaporation, surface runoff and deep percolation are enormous and consequently large amounts of fertilizers are also lost. New irrigation and fertilization practices and new agricultural techniques, especially in reclaimed sandy and calcareous soils, would be necessary to produce high rewarding. Improving irrigation technology is an urgent need for water and fertilizations management. Fertigation is the frequent application of appropriate amounts of dissolved fertilizers through irrigation systems. In this system, fertilizers are added at a time when the crops need it and at the suitable position for the highest uptake of nutrients by the roots. Therefore, fertigation in bananas adds a new dimension to irrigation technology where the irrigation system becomes a multifunction unit able to supply crops with the necessary water and nutrients at the same time (El-Gindy *et al*., 1991 and Ibrahim, 1993).

Fertigation was very effective in improving growth, yield and fruit quality in different banana cvs (Lahav and Kalmar, 1988; Robinson, 1992; Robinson and Fraser, 1993; Lahav and Kalmar, 1995; Ibrahim and Mayaz, 1996; Guerrero-Riascos *et al*., 1996; Mayaz, 1997; Srinivas, 1997; Berad *et al*., 1998; Smith and Hoffman, 1998 and Saad and Attaweya, 1999).

This study aimed to study the optimum N : P : K ratio applied via fertigation responsible for producing an economical yield and fruits with fairly good quality of Williams banana fruits.

MATERIALS AND METHODS

This investigation was carried out during the two consecutive seasons of 1999/2000 and 2000/2001 in a private orchard at Kom Ombo district, Aswan Governorate. The experimental work started on the second and third ratoons. The stools are planted at a spacing of 2.25 meters and were thinned

to leave one ratoon for fruiting in the following season beside the ratoon that would give the crop of the current season.

Mechanical, physical and chemical analysis of the soil were carried out according to Wilde *et al.* (1985) and the obtained data are given in Table (1).

Table (1): Analysis of the tested soil

Particle size distribution (%):		
Sand %	:	30.0
Silt %	:	13.0
Clay %	:	57.0
Texture grade	:	clay
E.C (mmhos /1cm 25 C)	:	0.71
O. M. %	:	2.11
$CaCO_3$ %	:	1.25
Total N %	:	0.11
Available P (ppm, Olsen)	:	18.0
Available K (ppm, ammonium acetate)	:	411.0

The experiment involved the following treatments:

	N : P : K
1-	100 : 100 : 100 g /plant
2-	100 : 200 : 100 g /plant
3-	100 : 300 : 100 g /plant
4-	200 : 100 : 200 g /plant
5-	200 : 200 : 200 g /plant
6-	200 : 300 : 200 g /plant
7-	300 : 100 : 300 g /plant
8-	300 : 200 : 300 g /plant
9-	300 : 300 : 300 g /plant
10-	400 : 100 : 400 g /plant
11-	400 : 200 : 400 g /plant
12-	400 : 300 : 400 g /plant
13-	500 : 100 : 500 g /plant
14-	500 : 200 : 500 g /plant
15-	500 : 300 : 500 g /plant

The experiment was set in a randomized completely blocks design with three replicates, each was represented with row containing 20 stools. The stool contained one plant for fruiting in the current season plus one for fruiting in the second one. Sources of N, P and K were urea (46.5 %) or Orthophosphoric acid (80.5 % P_2O_5) and Potassium sulphate (48.0 % K_2O), respectively. Fertilizers at the applied rates were applied through drip irrigation. All treatments received approximately the same amount of water. Nitrogen was added at 14 equal batches starting at the first week of April, two weeks intervals. Both P and K were added at four equal batches starting at the first of April and at one month intervals.

Pseudostem height and circumference (cm) as well as number of functional leaves per plant at bunch shooting stage were recorded. Leaf blade area (m^2) at the third full sized leaf from each plant was calculated according to Ahmed and Morsy (1999) method.

At bunch shooting stage, a transverse band 20 cm wide was cut from the central part of the third full sized leaf below the inflorescence (according to Gacia *et al.*, 1977) to determine N, P and K (in dry weight basis) according to methods outlined by Wilde *et al.* (1985).

Bunches were picked at the first week of November 2000 and 2001 when fingers reached the full mature stage. Since, weight of bunch (kg) was recorded. Also number of hands per bunch and number of fingers per bunch were determined. After artificial ripening, weight of finger, total soluble solids %, total and reducing sugars %, starch % and total acidity % (expressed % as g malic acid /100 g pulp) were determined (A.O.A.C, 1985).

The obtained data were tabulated and statistically analyzed according to Steel and Torrie (1980) using New L.S.D test.

RESULTS AND DISCUSSION

1- Effect of N, P and K fertilization on growth:-

Data in Table (2) clearly show that increasing N, P and K levels via fertigation gave a higher effect on growth aspects namely, height and circumference of pseudostem, number of leaves per plant and leaf area. However, meaningless the increase on these characters were observed due to raising N and K levels from 400 to 500 g /plant and P levels from 200 to 300 g /plant. The maximum values were detected on the plants received N, P and K at 400, 200 and 400 g /plant, respectively. Fertilization of banana plants with N, P and K at 100 g /plant resulted in the minimum values during both seasons.

The positive action of N, P and K on the biosynthesis of organic foods and both cell division and cell enlargement could explain the present results. In this respect, our results are in coincidence with those obtained by Mayaz (1997), Srinivas (1997) and Saad and Attaweya (1999).

2- Effect of N, P and K fertigation on the percentages of N, P and K in the leaves:-

It is evident from the obtained data that increasing N and K levels from 100 to 500 g /plant was followed by a gradual increase in the percentages of N and K in the leaves. Yet, percentage of phosphorus significantly tended to reduce with increasing both N and K levels, while increased with increasing the applied rate of P. Increasing the applied rate of N and K from 100 to 500 g /plant and P from 100 to 300 g /plant in the irrigation water significantly changed the leaf chemical composition. Fertigation of N, P and K at 500 : 300 : 500 g /plant was responsible for maximizing the percentages of N and K and minimizing the percentage of P in the leaves. These results were true in both seasons (Table 3).

These results are in agreement with those obtained by Robinson (1992) and Smith and Hoffman (1998).

Table (2): Effect of N, P and K fertigation on some growth aspects of Williams banana during 1999/2000 and 2000/2001 seasons.

Treatment (N : P : K) g/plant/year	Pseudostem height (cm)		Pseudostem circumference		N. of green leaves /plant		Leaf area (m^2)	
	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001
100 : 100 : 100	326.0	332.3	85.3	84.5	12.0	12.7	1.27	1.29
100 : 200 : 100	332.0	340.0	86.5	85.7	12.5	13.1	1.28	1.30
100 : 300 : 100	333.2	341.0	87.7	86.0	12.6	13.2	1.29	1.30
200 : 100 : 200	341.0	347.3	88.8	88.0	13.0	13.7	1.30	1.32
200 : 200 : 200	346.0	353.0	89.9	89.0	13.4	14.1	1.31	1.33
200 : 300 : 200	346.3	353.5	90.0	89.1	13.5	14.2	1.31	1.34
300 : 100 : 300	352.0	359.0	91.0	91.6	13.8	14.6	1.33	1.35
300 : 200 : 300	357.0	366.0	92.0	92.7	14.0	15.0	1.34	1.35
300 : 300 : 300	357.3	366.1	92.3	93.0	14.1	15.0	1.34	1.36
400 : 100 : 400	363.0	372.0	93.0	94.0	13.8	14.6	1.33	1.37
400 : 200 : 400	370.0	378.0	93.9	95.1	14.0	15.0	1.34	1.38
400 : 300 : 400	370.3	378.1	94.0	95.2	14.2	15.0	1.34	1.36
500 : 100 : 500	363.3	372.3	93.0	94.1	13.8	14.6	1.33	1.38
500 : 200 : 500	370.5	378.0	94.0	95.2	14.0	15.0	1.34	1.38
500 : 300 : 500	370.8	378.7	94.2	95.3	14.3	15.0	1.35	1.38
New L.S.D 5%	4.3	5.0	0.9	1.0	0.3	0.4	0.01	0.01

Leaf area = Length X Width X 0 . 86 (Obiefiuna & Undubizu 1979)

3- Effect of N, P and K fertigation on bunch weight:-

Data in Table (4) show that varying N : P : K ratios produced by significant differences on bunch weight of Williams banana. Results further reveal that there was a progressive increment on bunch weight with increasing the applied rate of N, P and K through irrigation water. A slight and insignificant increase on bunch weight was observed due to raising N and K rates from 400 to 500 g /plant and P rates from 200 to 300 g /plant. Fertigation of N, P and K at 400 : 200 : 400 g /plant, respectively gave satisfactory promotion on bunch weight. Such promising treatment produced bunch weight reached about 29.0 and 25.7 kg in both seasons, respectively. The minimum values on bunch weight were recorded on the plants received 100 g /plant from N, P and K. These results were true in 1999/2000 and 2000/2001 seasons.

The beneficial influence of the optimum rate of N, P and K on the yield might be attributed to their positive action on growth and nutritional status of the plants.

These results are in harmony with those obtained by Ibrahim and Mayaz (1996); Guerrero-Riascos *et al*. (1996), Mayaz (1997), Srinivas (1997) and Berad *et al*. (1998).

Table (3): Effect of N, P and K fertigation on percentages of N, P and K in the leaves and starch of Williams banana during 1999/2000 and 2000/2001 seasons.

Treatment (N : P : K) g/plant/year	Leaf N %		Leaf P %		Leaf K %		Starch (%)	
	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001
100 : 100 : 100	2.22	2.32	0.41	0.46	2.01	2.06	1.36	1.37
100 : 200 : 100	2.15	2.23	0.55	0.52	1.92	1.97	1.36	1.40
100 : 300 : 100	2.10	2.15	0.59	0.58	1.85	1.89	1.32	1.40
200 : 100 : 200	2.41	2.62	0.38	0.41	2.15	2.21	1.32	1.40
200 : 200 : 200	2.35	2.54	0.50	0.48	2.09	2.14	1.41	1.40
200 : 300 : 200	2.29	2.46	0.55	0.53	2.02	2.07	1.42	1.40
300 : 100 : 300	2.55	2.79	0.32	0.36	2.33	2.40	1.45	1.51
300 : 200 : 300	2.48	2.70	0.46	0.43	2.27	2.33	1.55	1.51
300 : 300 : 300	2.43	2.62	0.49	0.48	2.18	2.24	1.57	1.60
400 : 100 : 400	2.72	2.89	0.27	0.30	2.45	2.52	1.57	1.59
400 : 200 : 400	2.65	2.82	0.40	0.38	2.38	2.45	1.57	1.59
400 : 300 : 400	2.58	2.75	0.43	0.42	2.33	2.40	1.58	1.59
500 : 100 : 500	2.85	2.99	0.22	0.24	2.66	2.74	1.58	1.60
500 : 200 : 500	2.79	2.92	0.36	0.33	2.61	2.69	1.59	1.60
500 : 300 : 500	2.73	2.85	0.18	0.37	2.52	2.64	1.58	1.60
New L.S.D 5%	0.05	0.07	0.03	0.04	0.05	0.06	NS	NS

4- Effect of N, P and K fertigation on physical properties of figures:-

Number of fingers per bunch as well as finger weight were varied significantly according to differing N : P : K ratios. They were tended to increase gradually with increasing the levels of N, P and K applied through fertigation. Raising the levels of N and K from 400 to 500 g /plant and P levels from 200 to 300 g /plant failed to show any measurable increment on such two physical traits. Fertigation of N, P and K at 400 : 200 : 400 g /plant resulted in the greatest increase on number of fingers per bunch as well as finger weight. Under such promising treatment, bunch produced 227 and 236 fingers in both seasons, respectively. In addition, finger weight reached 125 and 113 g in first and second seasons, respectively. Application of three nutrients at 100 g /plant per each produced the minimum values. One can say the present treatments had no effect on number of hands per bunch. These results were true in both seasons (Table 4).

The present influence of N, P and K was attributed to their positive action on the biosynthesis of proteins and carbohydrates (Nijjar, 1985).

These results are nearly in the same line with those obtained by Lahav and Kalmar (1988), Ibrahim and Mayaz (1996) and Guerrero-Raiscos *et al*. (1996).

Table (4): Effect of N, P and K fertigation on number of hands, fingers snd finger as well as bunch weight of Williams banana during 1999/2000 and 2000/2001 seasons.

Treatment (N : P : K) g/plant/year	No. of hands /bunch		No. of fingers /bunch		Av. Finger weight (g)		Buch weight (kg)	
	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001
100 : 100 : 100	11.1	12.2	198.0	197.8	101.0	96.0	21.3	19.9
100 : 200 : 100	11.2	12.4	204.0	206.0	105.0	101.0	22.5	21.8
100 : 300 : 100	11.3	12.4	204.3	206.3	105.0	101.6	22.6	21.9
200 : 100 : 200	11.3	12.5	204.0	207.0	112.0	102.0	24.0	22.0
200 : 200 : 200	11.4	12.5	211.0	214.0	118.0	102.6	26.0	22.8
200 : 300 : 200	11.3	12.5	211.0	215.0	118.6	103.0	26.3	22.9
300 : 100 : 300	11.4	12.5	211.0	222.0	118.0	103.9	26.0	23.0
300 : 200 : 300	11.5	12.3	218.0	228.0	118.0	104.0	26.5	24.8
300 : 300 : 300	11.5	12.3	218.0	228.0	118.3	104.3	26.5	25.0
400 : 100 : 400	11.6	12.3	219.0	228.6	125.0	108.0	28.6	23.3
400 : 200 : 400	11.6	12.3	227.0	236.0	125.0	113.0	29.0	25.7
400 : 300 : 400	11.7	12.3	227.0	236.0	125.0	113.0	29.0	25.8
500 : 100 : 500	11.3	12.0	227.0	229.0	125.5	113.6	28.6	23.4
500 : 200 : 500	11.3	12.3	227.3	236.0	126.0	114.0	29.0	26.0
500 : 300 : 500	11.3	12.7	228.0	236.0	126.0	114.0	29.0	26.0
New L.S.D 5%	NS	NS	6.0	5.5	4.0	4.4	1.8	1.7

5- Effect of N, P and K fertigation on finger chemical properties:-

It is evident from the data in Tables (4 and 5) that varying N : P : K ratios caused an announced and significant effect on chemical parameters of Williams fruits. Increasing N, P and K levels was very effective in improving chemical fruit quality in terms of increasing the total soluble solids as well as total and reducing sugars and in reducing the total acidity. No material promotion on fruit quality was observed due to raising both N and K levels from 400 to 500 g /plant and P levels from 200 to 300 g /plant. Starch content did not change with varying N, P and K ratios. The best results with regard to fruit quality were recorded due to fertigation of N, P and K each at 400 : 200 : 400, respectively. The vice versa on fruit quality was detected due to fertigation of the three nutrients each at 100 g /plant. These results were true in both seasons.

The positive action of N, P and K on the biosynthesis and translocation of carbohydrates (Nijjar, 1985) led to advance maturity and this could explain the present results.

Similar results were achieved by Mayaz (1997), Srinivas (1997) and Saad and Attaweya (1999).

Table (5): Effect of N, P and K fertigation on some chemical properties of Williams banana during 1999/2000 and 2000/2001 seasons.

Treatment (N : P : K) g/plant/year	TSS %		Total sugars %		Reducing sugars %		Total acidity %	
	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001	1999/ 2000	2000/ 2001
100 : 100 : 100	18.0	18.3	15.2	15.4	6.1	7.0	0.379	0.381
100 : 200 : 100	18.4	18.7	15.5	15.7	6.3	7.2	0.350	0.348
100 : 300 : 100	18.5	18.8	15.6	15.7	6.3	7.2	0.348	0.345
200 : 100 : 200	18.9	19.0	15.9	16.1	6.3	7.2	0.348	0.341
200 : 200 : 200	19.5	19.3	16.3	16.5	6.6	7.2	0.322	0.301
200 : 300 : 200	19.6	19.4	16.3	16.6	6.6	7.5	0.321	0.301
300 : 100 : 300	20.0	19.8	16.7	16.7	6.9	7.5	0.295	0.299
300 : 200 : 300	20.4	20.2	17.0	16.9	7.0	7.7	0.260	0.257
300 : 300 : 300	20.5	20.3	17.1	17.0	7.0	7.7	0.259	0.255
400 : 100 : 400	21.2	20.6	17.5	17.0	7.3	7.7	0.259	0.251
400 : 200 : 400	21.8	20.9	17.9	17.4	7.3	7.7	0.258	0.250
400 : 300 : 400	22.0	21.0	18.0	17.5	7.3	7.7	0.255	0.247
500 : 100 : 500	21.2	20.7	17.5	17.1	7.3	7.8	0.259	0.247
500 : 200 : 500	21.8	21.0	18.0	17.4	7.3	7.8	0.257	0.245
500 : 300 : 500	22.1	21.1	17.5	17.4	7.5	7.8	0.250	0.241
New L.S.D 5%	0.2	0.2	0.2	0.3	0.2	0.2	0.022	0.031

As a results of this study, fifteen equal additions of N at 400 g /plant, four K additions at 400 g /plant and four additions of P at 200 g /plant through fertigation are recommended under the conditions of this study and the resembling conditions for obtaining high yield with the best quality of Williams banana. This recommendation seemed to be logical from the economic point of view, since the differences between the higher two levels of each nutrients were insignificant in most cases.

REFERENCES

Ahmed, F. F. and M. H. Morsy (1999). A new method for measuring leaf area in different fruit species. Minia J. Agric. Res. and Develop., 19: 97-105.

Association of Official Agricultural Chemists (1985). Official Methods of Analysis. Benjamin Franklin Station, Washington, D. C., U. S. A. 490-510.

Berad, S. M.; S. H. Shinde and S. D.Dahiwalkar (1998). Effect of drip fertigation and paired planting on productivity and economics of banana. J. of Maharoshtra Agric. Univ. Publ., 23(3): 288-290.

Gindy, A. M.; A. A.. Ibrahim; A. F. Abouhadid and H. El-Sayed (1991). Irrigation and fertigation management in Egypt. Proc. Expert Consultation on fertigation /Chemigation, 8-11 Sept. Rom, Italy, 278-279.

Garcia, V.; E. F. Caladas; A. Diaz and J. J. Bravo (1977). Leaf analysis of banana at two stages of flowering. Fruits, 32 (9): 525-534.

Guerrero-Riascos, R.; J. Gadban-Reyes and J. Ospina-Aguirre (1996). Response of banana (clone Grand Nain) to fertigation with different potassium sources at Cienaga (Magdalena), Agronomia-Colombiana, 13 (1): 43-49.

Ibrahim, E. G. (1993). Studies on irrigation of banana . Ph.D. Thesis Fac. Agric. Zagazig Univ.

Ibrahim, E. G. and M. Mayaz (1996). Studies on some fertigation treatments on Williams banana in sandy soil Zagazig. J. Agric. Res., 23 (6): 1095-1111.

Ibrahim, E.G.; M . Mayaz and I. Mousa(1997). Growth and yield of some banana cultivars propagated in vitro in the newly reclaimed sandy soil Egypt , J . Abbl , Sci., 12 (12): 1997

Lahav, E. and D. Kalmar (1988). Response of banana to drip irrigation water amounts and fertilization regimes. Common Soil Sci. Plant Anal. 19 (1): 25-46.

Lahav, E. and D. Kalmar (1995). Fertigations and water regimes on a banana plantation. Dahlia Greidinger Inter. Symposium on Fertigation: Technion – Israel Inst. of Technology, Haifa, Israel, 26 March – 1 April, 25-33.

Mayaz, M. (1997). Effect of organic and inorganic forms of potassium fertilization on productivity of Dwarf cavendish banana plants (Hindi cv.) in sandy soil. Egyptian J. of Applied Science, 2 (6):187 – 205.

Nijjar, G. S. (1985). Nutrition of Fruit Trees. Mrs Usha Raj Kumar for Kalyani Publishers, New Delhi, India, 306- 308.

Obiefuna , J.C . and T. O . Ndubizu (1979). Estimating leaf area of plantain . scientia Horticulturae ; 11(1) : 31: 36 (Hort ; Abst ; 50: 604)

Robinson, J. C. (1992). Phenology of the banana plant in the subtropics. Inligtingsballetin Institut vir Tropiese en subtropiese Gewasse, 243: 26 – 32.

Robinson, J. C. and C. C.Fraser (1993). Banana cultivar trial at Burgershall. Inligtingsbulletin Instituul vir Tropiese en subtropiese Gewasse, 255: 5.

Saad, M. M. and A. A. R. Attaweya (1999). Effect of potash application on growth, yield and fruit quality of Grand Nain banana in sandy soil under drip irrigation system. Alex. J. Agric. Res., 44(1):171 – 180.

Smith, B and E. Hoffman (1998). Comparing drip and micro spray fertigation. Nel tropika – Bulletin, 302: 14-16.

Srinivas, K. (1997). Growth, yield and quality of banana in relation to N fertigation. Tropical Agric., 74(4): 260 – 264.

Steel, R. G. D. and J. H. Torrie (1980). Principles and Procedures of Statistics. A Biometrics Approach Sec. Ed. Mc-Grow Hill Book Company, New York, 377 - 400

Wilde, A. A.; R. B. Corey; J. G. Lyer and G. K.Voigt (1985). Soil and Plant Analysis For Tree Culture. 3rd Ed. Oxford IBH Publishing Co., New Delhi, 93-105.

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تحديد النسبة المناسبة من النتروجين والفوسفور والبوتاسيوم المضافة من خلال مياه الري للموز الوليامز

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أجريت هذه الدراسة خلال موسمي ١٩٩٩/٢٠٠٠ ، ٢٠٠٠/٢٠٠١ وذلك لإيضاح الكميات المناسبة من النتروجين والفوسفور والبوتاسيوم المضافة من خلال مياه الري للموز الوليامز. وقد تم استخدام خمسة عشر معدلاً من النتروجين : الفوسفور : البوتاسيوم.
أشارت نتائج الدراسة أن هناك اختلافات كبيرة في صفات النمو والمحصول وخصائص الثمرة باختلاف نسب العناصر الثلاثة.
وكانت هناك زيادة تدريجية واضحة في كل الصفات تحت الدراسة عند زيادة المعدلات المضافة من النتروجين والبوتاسيوم من ١٠٠ إلى ٥٠٠ جرام للنبات وزيادة معدل الفوسفور من ١٠٠ إلى ٣٠٠ جرام للنبات وذلك خلال مياه الري. ولم يكن هناك زيادة يعتد بها على الصفات السابقة عند زيادة التركيز المستخدم من البوتاسيوم والنتروجين من ٤٠٠ إلى ٥٠٠ جرام للنبات وكذا عند زيادة الكميات المستخدم من الفوسفور من ٢٠٠ إلى ٣٠٠ جرام للنبات.
أمكن الحصول على أفضل النتائج بخصوص النمو والحالة الغذائية للنباتات والمحصول وجودة الثمار للموز الوليامز عند تسميد النباتات بالنتروجين والفوسفور والبوتاسيوم بنسبة ٤٠٠ : ٢٠٠ : ٤٠٠ جرام للنبات وذلك من خلال مياه الري (بمعدل ١٤ مرة متساوية للنتروجين و٤ مرات متساوية للفوسفور والبوتاسيوم)٠