JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

# A Study of Water Soluble Fertilizers and Micronutrients on maturity of fruits during growing periods of Banana (CV. Grand Nain)

**Dr. Patil S A**
**Yeshwant Mahavidyalaya, Nanded – 431602 (M.S.), India**

## ABSTRACT

During the present studies Different water soluble treatments with and without micronutrients treatments were applied to the banana plants of cv. grand nain cultivar. The treatments were applied for two years. The fertilizer treatment applied by conventional methods was served control. During two trial years, pooled analysis and statistical analysis were worked out.

From the results it is evident that the period of maturity after flowering in banana cultivar grand nain under the treatments of water soluble fertilizers and micronutrients was found to be reduced during both the trial years. It was observed that the test cultivar under the treatment of $M_2$ (75 % RDF through WSF (12:61:00, 13:0:45 and Urea)) came earlier than the test cultivar under conventional method of application of fertilizers and micronutrients. The period of fruit maturity was reduced in the test cultivar under $M_4$ treatment (75% RDF through WSF (Urea, Orthophosphoric acid and White potash)). It was followed by $M_1$ (50 % RDF through WSF (12:61:00, 13:0:45 and Urea)) and $M_3$ treatments (100 % RDF through soil application (Urea, SSP and MOP)) as compared to the control. It was calculated from the results that the test cultivar under water soluble fertilizer treatments showed shorter period of fruit maturity than the test cultivar under conventional method of application of fertilizers.

## Introduction:

The banana (*Musa paradisiaca* L.) an important fruit crop of the world. It is consumed by human beings since centuries long back. It is known to be man's first food and hence called it as Adams fruit. It is highly nutritious. It is cheap and hence nicknamed as **poor man's apple**.Apart from using banana as food, the fruit, leaves and other plant parts are used in several occasions and religious purposes.It is evident from the literature that there are about 250-300 cultivated banana varities in India. About 90 per cent farmers in Nanded district used to grow grand nain cultivar. Grand Nain is suitable for Nanded region in terms of vigour, yield, quality and long shelf-life.The yield and quality of banana requires vegetative growth and good vegetative growth requires recommended dose of macro and micronutrients. The macronutrients (Nitrogen, Phosphorous and Potassium) promote vegetative growth and production. The micronutrients in small dose promote enzymatic activities and synthesis resulting into high yield and quality (Kumar, 2002, Das, 2003)

Considering these facts the research topic entitled A Study of Water Soluble Fertilizers and Micronutrients on Phosphorous content of leaves during growing periods of Banana (CV. Grand Nain) was carried out.

**Materials and Methods**

During the present investigation fruit maturity in grand nain cultivar of banana was studied after flowering for two trial years for these observations on changes in colour of the fruit peel from green to pale green and changes in angular fruit shape to round. The fruits observed with pale green colour and blunt angles were considered as mature fruits. The period in days required for fruit maturity after flowering was also recorded during both the trial years. The days required for fruit maturity and harvesting were noted. The bunch of mature fruits was harvested manually by using sickle. A 20 cm stalk of the bunch was maintained for easy handling. The results with pooled and statistical analysis are presented in table – 1, 1a and figure – 1.

## Treatment Details

**The details of application of fertilizers scheduled during the research work is**

**Details of application schedule of fertilizers**

| Treatmetns | Treatment Details |
|---|---|
| **I. Main Plot treatments** | |
| $M_1$ | 50 % RDF through WSF (12:61:00, 13:0:45 and Urea) |
| $M_2$ | 75 % RDF through WSF (12:61:00, 13:0:45 and Urea) |
| $M_3$ | 50% RDF through WSF (Urea, Orthophosphoric acid and White potash) |
| $M_4$ | 75% RDF through WSF (Urea, Orthophosphoric acid and White potash) |
| $M_5$ | 100 % RDF through soil application (Urea, SSP and MOP) |
| **II. Sub-Plot treatments** | |
| $S_0$ | Without micronutrients |
| $S_1$ | With micronutrients |
| **Replications** | 4 (Four) |
| **Design** | Split plot Design (SPD) |
| **Year (Seasons)** | Two (2015-16 and 2016-17) |
| **Location** | A/P Pardi (Mukta) Tq. Ardhapur Nanded district of Maharashtra state |
| **Crop and Cultivar** | Banana Cv. Grand Nain |
| **Spacing** | Row to row 1.8 meters and plant to plant 1.5 meters |
| **Number of plants/treatment** | 16 |
| **Total number of plants** | 640 |
| **Total number of treatments** | 10 (Main plot treatments 5 x Sub-plot treatments 2) |

**WSF** = water soluble fertilizers through fertigation
**RDF** = Recommended Dose of Fertilizer (200:160:200 grams NPK per plant)
**NPK**=Nitrogen, Phosphorous and Potasssium
**SSP**=Single Super Phosphate
**MOP**=Murate of potash

## Results

From the results presented in table - 10 10a, and figure - it is evident that the period of maturity after flowering in banana cultivar grand nain under the treatments of water soluble fertilizers and micronutrients was found to be reduced during both the trial years. It was observed that the test cultivar under the treatment of $M_2$ came to maturity 38 days earlier than the test cultivar under conventional method of application of fertilizers and micronutrients. The period of fruit maturity was reduced by 31 days in the test cultivar under $M_4$ treatment. It was followed by $M_1$ and $M_3$ treatments as compared to the control. It was calculated from the results that the test cultivar under water soluble fertilizer treatments ($M_1$, $M_2$, $M_3$ and $M_4$) showed shorter period of fruit maturity than the test cultivar under conventional method of application of fertilizers.

**Table-1:** Studies on application of water soluble fertilizers and micronutrients in relation to Maturity Period of fruit during growing period of Grand Nain cultivar of Banana.

| Treatments | Fruit maturity after flowering (days) | | |
|---|---|---|---|
| | I$^{st}$ year | II$^{nd}$ year | Pooled |
| **Main Plot treatments: Water soluble fertilizer treatments (M)** | | | |
| **$M_1$** | 109.88 | 111.13 | 110.50 |
| **$M_2$** | 91.75 | 94.13 | 92.94 |
| **$M_3$** | 118.25 | 119.88 | 119.06 |
| **$M_4$** | 98.75 | 100.88 | 99.81 |
| **$M_5$** | 129.75 | 130.75 | 130.25 |
| **S.Em. ±** | 2.37 | 2.46 | 1.43 |
| **CD@5%** | 7.31 | 7.57 | 4.05 |
| **Sub Plot treatments: Micronutrient treatments (S)** | | | |
| **$S_0$** | 111.90 | 113.60 | 112.75 |
| **$S_1$** | 107.45 | 109.10 | 108.28 |
| **S.Em. ±** | 1.04 | 1.18 | 0.91 |
| **CD@5%** | 3.13 | 3.57 | 2.56 |
| **Interactions** | | | |
| **M×S** | | | |
| **S.Em. ±** | 2.32 | 2.65 | 2.02 |
| **CD@5%** | NS | NS | NS |
| **Y×M** | | | |
| **S.Em. ±** | | | 2.02 |
| **CD@5%** | | | NS |
| **Y× S** | | | |
| **S.Em. ±** | | | 1.28 |
| **CD@5%** | | | NS |
| **Y×M×S** | | | |
| **S.Em. ±** | | | 2.86 |
| **CD@5%** | | | NS |
| **CV.** | 9.17 | 9.49 | 9.18 |
| **GM.** | **109.68** | **111.35** | **110.51** |

**Table-1a**: Significance and at par values of maturity period based on statistical analysis resulted by the treatments of water soluble fertilizers and micronutrients during growing periods of Banana cultivar Grand Nain

| Period of fruit maturity after flowering | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year/ Pooled** | **Main Plot** | | | | | **Sub Plot** | | **Interactions** |
| I Year | $M_2$ | $M_4$ | $M_1$ | $M_3$ | $M_5$ | $S_1$ | $S_0$ | NS |
| | 91.75 | 98.75 | 109.88 | 118.25 | 129.75 | 107.45 | 111.90 | |
| II Year | $M_2$ | $M_4$ | $M_1$ | $M_3$ | $M_5$ | $S_1$ | $S_0$ | NS |
| | 94.13 | 100.88 | 111.13 | 119.88 | 130.75 | 109.10 | 113.60 | |
| Pooled | $M_2$ | $M_4$ | $M_1$ | M3 | $M_5$ | $S_1$ | $S_0$ | NS |
| | 92.94 | 99.61 | 110.50 | 119.06 | 130.25 | 108.28 | 112.75 | |

Indicates values at a par with each other

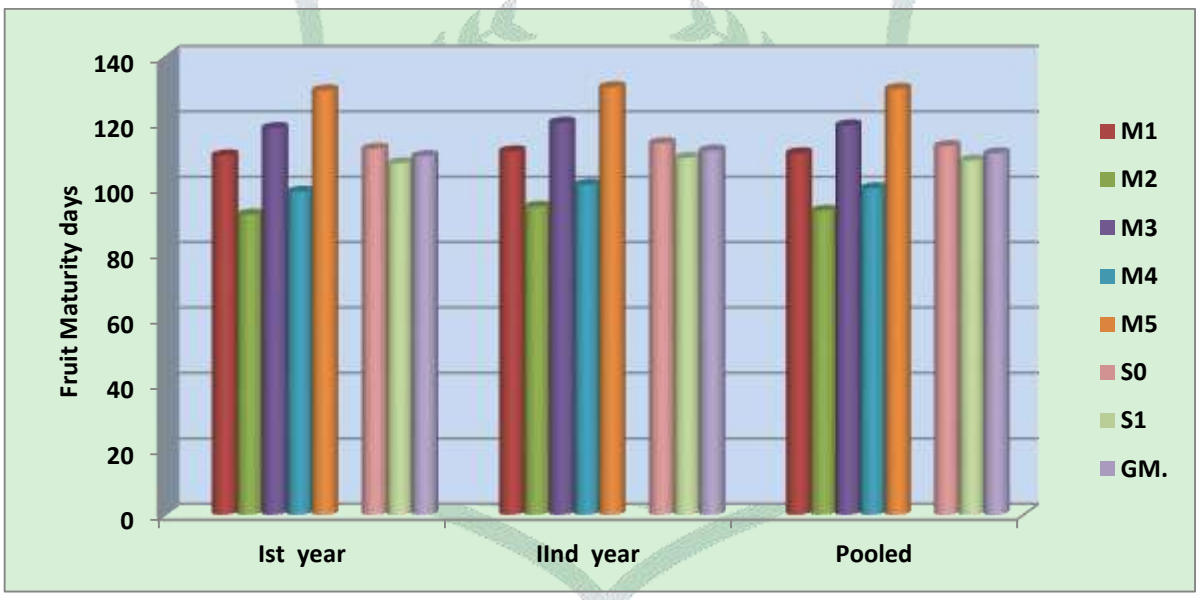


**Figure-1:** Studies on application of water soluble fertilizers and micronutrients in relation to Maturity Period of Fruit during growing period of Grand Nain cultivar of Banana.

## Discussion:

During the present studies the effect of water soluble fertilizers and micronutrients on fruit characters of grand nain cultivar of banana was observed during the period of two years. The fruit character in terms of period of maturity of fruits were found to be greatly influenced by the application of dose of water soluble fertilizers through drip fertigation. The test cultivar under the fertilizer treatments found to be showed early flowering as compared to the flowering as compared to the flowering in the test cultivar under conventional method of application of fertilizers. It was also observed that the finger length, diameter, fruit firmness and maturity of fruits in the test cultivar under fertilizer treatments with micronutrients was increased during both trial years as compared to control. The significant results may be due to timely supply of nutrients with appropriate amounts. The early flowering and maturity of the test cultivar, increase in finger length and diameter may be due to

increase cell division, enzyme action and reactions, etc. stimulated by the dose of water soluble fertilizer with micronutrients. Similar results were found to be observed by different workers in different plants under different conditions by the application of fertilizers and micronutrients.

**Summary:**

1. The test cultivar under the treatment of $M_2$ came to maturity 38 days earlier than the test cultivar under conventional method of application of fertilizers and micronutrients.
2. The period of fruit maturity was reduced by 31 days in the test cultivar under $M_4$ treatment.
3. It was calculated from the results that the test cultivar under water soluble fertilizer treatments ($M_1$, $M_2$, $M_3$ and $M_4$) showed shorter period of fruit maturity.

**Conclusion:**

The fertilizer treatment $M_2$ $S_1$ 75 % RDF through WSF (12:61:00, 13:0:45 and Urea) with micronutrients was found to be greatly influenced on maturity period of fruits.

## REFERENCES

**Afria B.S., Pareek C.S., Garg D.K. and K. Singh (1999)**:Effect of foliar spray of micronutrients and their combinations on yield of Pomegranate. *Ann. Arid Zone***38(2)**:189-190.

**Aggarwal R.K., Panday S.K.N. and O.P. Pareek (1975)**:Foliar application of micronutrients on Thompson seedless grape. *Ann. Arid Zone* **14(2)**:191-193.

**Arora J.S. and J.R. Singh (1970)**:Some effects of iron spray on growth, yield and quality of guava fruits (*Psidium guajava* L.). *J. Japan Soc. Hort. Sci*.**39 (2)**: 139-142.

**Awasthi R.P., Tripathi B.R. and A. Singh (1975)**: Effect of foliar sprays of zinc on fruit drop and quality of litchi. *Punjab Hortic.J.***15**:14-16.

**Belen M.A., Mary R.M.C., Almudena B., Francisco L. and Q. Ana (2016)**: Liquid organic fertilizers for sustainable agriculture: Nutrient uptake of organic versus mineral fertilizers in citrus trees. *J. Pon.***11(10)**: e0161619.

**Bhambota J.R., Azad K.C., Kanwar J.S. and D.R. Dhingra (1962)**:Study of the effect of sprays with micronutrients of the chorosis of citrus. *Hortic. Adv*.**6**:168-172.

**Chongtham S.K., Patel C.K., Patel R.N., Patel J.K., Patel J.M., Zapadiya D.M., Patel D.H., H. and C.R. Patel (2016)**:Growth, yield, economics, water and nutrient use effeciency of potato as influenced by different methods of drip fertigation and varieties. *Int. J Agric. Sci.,***8(38)**:1787-1790.

**Das D. K.(2003)**: Micronutrients: their behavaiour in soils and plants. Kalyani Publications., Ludhiana, pp.1-2.

**Das P.K., and N.K. Mohan (1993)**:Effect of micronutrient of growth nad development of banana cvs. Chenichampa,Jahafi and Barjahafi. *South Indian Hortic*.**41(4)**:192-197.

**Durgadevi D., Srinivasan P.S., and K .Balakrishna (1997)**:Leaf nutrient composition, chlorosis and yield of Sathgudi orange as affected by micronutrient applications. *South IndainHortic*.**45(1-2)**:16-29.

**Eiada A.O. and E.A.A.H. Mustafa (2013)**:Effect of Foliar Application with Manganese and Zinc on Pomegranate Growth, Yield and Fruit Quality. *J. Hort. Sci. & Ornamental Plants,***5(1)**:41-45.

**Ghanta P.K., and S.K. Mitra (1993)**:Effect of micronutrients on Growth, flowering, leaf nutrient content and yield of banana cv. Giant Governor. Crop Res. **6(2)**:284-287.

**Haneef M., Kaushik R.A., Sarolia D.K., Mordia A. and M. Dhakar (2014)**: Irrigation scheduling and fertigation in pomegranate cv. Bhagwa under high density planting system. *Indian J. Hort.***71(1)**: 45-48.

**Hussain F.S., Reddy L. and V. Ramudu (2017)**: Growth and leaf nutrient status in banana cv. Grand Nain (AAA) as influenced by different organic amendments. *Int. Curr. Microbial.* App. Sci. **6(12)**: 2340-2345.

**Jackson M. L. (1973)**: "Soil Chemical Analysis". Prentice-Hall of India Pvt. Ltd., New Delhi, India, pp: 39-415.

**Kanisewski S, Rumpel J. and J. Dysko (1999)**:Effect of drip irrigation and fertigation on growth and yield of celeriac (*Apium graveolens*L.var. *rapaceum* (Mill.) Gaud). *Veg Crops Res Bulletin.***50**:31-39.

**Kapoor R., Sanadal S.K., Sharma K., Kumar S. and Saroch. (2014)**:Effect of varying drip irrigation levels and NPK fertigation on soil water dynamics, productivity and water use efficiency of cauliflower (*Brassica oleracea* var. *Botrytis*) in wet temperate zone of Himachal Pradesh. *Indian J Soil Cons.*, **42**:249-254.

**Krishnamurthy D., Bhaskar S. and H.S. Shivaramu (2013)**: influence of distillery spentwashferti-irrigation on productivity, economics and nutrient uptake in banana (Musa paradisiaca). *Indian J.Agro.***58 (2)**: 251-255.

**Krishnasamy S., Mahendran P.P., Gurusamy A. and R. Babu (2012)**: Effect of subsurface drip fertigation on growth and yield of banana. *Madras Agric. J.***99(10-12)**:803-806.

**Kumar D. and N. Ahmed (2014)**: Response of nitrogen and potassium fertigation to warisalomond (Prunus dulcis) under north western himalayan region of India. **Sci. Wor. J.** http://dx.doi.org/10.1155/2014/**14148.**

**Kumar D., Pandey V. and V. Nath (2012)**: growth yield and quality of vegetable banana Monthan (Banthal-AAB) in relation to NPK fertigation. *Indian J. Hort.***69(4)**: 467-471.

**Kumar P. (2002)**: Managing micronutrient deficiency in ornamental crops. *Indian Hort*., **46(4)**: 30-31.

**Kumar R., Chauhan K.S., and S. Sharma (1988)**:A not on the effect of zinc sulphate on berry set, panicle drying and quality of grapes cv. Gold. *Haryana J. Hortic. Sci.***17(3-4)**:213-215.

**Marina T. S., Olga N. and S. Monika (2016)**: The effect of foliar fertilizing on the chemical composition of leaves of Primorski almond cultivar grown in Valandovo. Int. *J. Rec. Sci. Res.***7(4)**: 10247-10250.

**Modi P.K., Varma L.R., Bhalerao P.P., Verma P. and A. Khade (2012)**: Micronutrient spray on growth, yield and quality of papaya (Carica papaya L.) cv. Madhu Bindu. *Madras Agri*.J., **99(7-9)**:500-502.

**Patil V.K. and B.N. Shinde (2013)**: studies on integrated nutrient management on growth and yield of banana cv. Ardhapuri (Musa AAA). *J. Hort. For.***5(9)**: 130-138.

**Ram R.A. and T.K. Bose (2000)**: Effect of foliar application of magnesium and micronutrients on growth, yield and fruit quality of mandarin orange (Citrus reticulata Blanco). *Indian Journal of Horticulture*, **57(3)**:215-220.

**Ranganna S. (1980**): Manual of analysis of fruits and vegetable. Tata Mc Graw Hill Pub. Co. Ltd., New Delhi.

**Selim E. and A.A. Mosa (2012)**: Fertigation of humic substances improves yield and quality of broccoli and nutrient retention in a sandy soil. *Journal of Plant Nutrition and Soil Science*. **175(2)**:273-281.

**Shrivastava S.S. (1969)**:Effect of foliar application of zinc on growth, fruiting behaviours and quality of pineapple. *Indian J. Hortic.* **26(1-2):**146-150.

**Shrivastava S.S. (1970)**:Foliar application of boron on Pineapple: Its Effect of growth, yield and fruit quality. *Madras Agric. J. Sci*.**57**:146-151.

**Silva J. A. and R. Uchida (2000)**: Essential nutrients for plant growth: nutrient functions and deficiency symptoms. Plant nutrient management in hawaii's soils, approaches in tropical and subtropical agriculture. Pp: 31-55.

**Singh R.R. and C.B.S. Rajput (1976)**: Effect of various concentrations of zinc on vegetative growth characters, flowering, fruiting and physicochemical composition of fruits in mango cv. Chausa, *Haryana J.Hortic. Sci*.**5(1-2)**:10-14.

**Subramanian V. and Pillai A.A. (1997)**:Studies on the zinc deficiency in banana growing soils of Tamil Nadu. *Indian J. Agric. Res.* **31(3):**105-188.

**Supriya L. and R.K. Bhattacharyya (1993)**:Effect of foliar application of chelated and non-chelated zinc on growth and yield of Assam lemon. *Hortic.J.***6(1)**35-38.

**Turner D.W. and B. Barkus** (**1983)**: The uptake and distribution of nutrients in the banana in response to supply of K, Mg and Mn. *Fert. Res*.**4**: 89-99.

**Venkataramana K.T., Mukundalakshmi L., Gopal K., Sivaramakrishna V.N.P., Nagalakshmi T., Sarada G., Gopi V. and T. Gourishankar (2014)**: Nitrogen and potassium based fertigation response on plant growth, yield and quality of sweet orange (*Citrus sinensis* Linn. Osbeck) cv. Sathgudi. *Res. rev. J. Agric. All. Sci*. **3(3)**: 7-10.