

# UNIVERSITY OF AGRICULTURAL SCIENCES, BANGALORE



## REPORT ON

### “Nano Nutrient Input Nualgi Foliar Spray for Maize”

(Ref: DR/STA/TT-19/2015-16 dtd: 18-05-2015)



#### Submitted to,

Mr. T. Sampath Kumar,

Proprietor,

M/s. Nualgi Nanobiotech,

#651, 11<sup>th</sup> Main Road, 5<sup>th</sup> Block,

Jayanagar, Bangalore - 560 041

#### Submitted by,

Dr. S. B. Yogananda,

Senior Farm Superintendent,

Zonal Agricultural Research Station,

V.C. Farm, Mandya-571 405

## **“Nano Nutrient Input Nualgi Foliar Spray for Maize”**

### **Research Objective:**

To evaluate the Nano Nutrient Input Nualgi Foliar as Photosynthesis Booster for Agriculture.

**Name of the principle Investigator:** Dr. S. B. Yogananda, Senior Farm Superintendent.

**Implementing organization:** ZARS, V.C. Farm, Mandya-571 405 (KN)

**Sponsoring Organization:** M/s. Nualgi Nanobiotech, Bangalore

**Sanction No. and Date:** DR/STA/TT-19/2015-16 dtd: 18-05-2015

### **1.0 Experimental Condition**

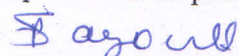
The experiment was laid out at Zonal Agricultural Research Station, V.C. Farm, Mandya which comes under Southern Dry Zone (Zone 6) of Karnataka. The trial was carried in Plot No. 202 (D) Agronomy unit at ‘G’ Block. The soil of the experimental plot was red sandy loam having soil pH of 7.05, medium in available nitrogen (232 kg/ha), available phosphorus (28.9 kg/ha) and potassium (183 kg/ha).

Maize is the third most important crop after rice and sugarcane in this zone and excellent work has been carried out at this station on development of maize varieties/hybrids, crop management practices and plant protection measures. The centre was well known for release of hybrid varieties in maize viz., Nityasree and Hema also carrying research work on various aspects of maize under AICRP on maize.

The station has well equipped infrastructures, qualified scientists, field staff and well laid out field with irrigation facilities from bore well as well as canal. Many farmers from neighbouring taluks of Mandya, Mysore and Chamarajanagar districts visit the Maize field to get firsthand information on scientific maize cultivation.

### **1.1 Weather during the study period**

**Rainfall:** The amount of rainfall received during the crop growing period (*i.e.* September to December) was to the extent of 305.4 mm and it was 18.0% lower than the normal rainfall received during same period (371.3 mm). The maximum rainfall was received in the month of November (168.6 mm) as against the normal rainfall of 55.4mm. Nevertheless the amount of rainfall received during the crop growth period is not sufficient to meet the crop water requirement of paddy and hence crop was raised fully under irrigated condition.

  
Dr. S.B. Yogananda, M.Sc. (Agri.), Ph.D  
Senior Farm Superintendent  
Zonal Agricultural Research Station  
V.C. Farm, Mandya - 571 405  
KARNATAKA  
email : sfsmandya@gmail.com

**Maximum Temperature:** The mean monthly maximum temperature was highest (29.6 °C) during the germination and establishment period (September) and decreased as crop matures and lowest mean maximum temperature (29.0°C) was recorded during harvesting month (December). As compared to normal, the actual mean maximum temperature was slightly higher leads to early maturity of the crop.

**Minimum temperature:** The mean monthly minimum temperature was lowest during the harvesting month (15.0 °C) while highest during the vegetative period *i.e.* in the month of October (19.4°C). The actual mean minimum temperature was more or less similar to normal except in the months of November and December leads to early maturity of the crop.

**Morning and Evening relative humidity:** At all the stages of crop growth, both morning and evening relative humidity was slightly higher as compared normal. This lead to higher incidence of blast disease and prophylactic measures were taken to control disease.

**Sunshine hours:** Good bright sunshine was noticed during the vegetative period (September and October). However, it was slightly less as compared to normal.

**Table 1: Observed (2015) and normal (1973-2014) values of monthly meteorological parameters of V. C. Farm, Mandya during crop growing period.**

Month	Maximum Temperature (°C)		Minimum Temperature (°C)		Morning RH (%)		Evening RH (%)		Rainfall (mm)		Sunshine Hours	
	A	N	A	N	A	N	A	N	A	N	A	N
September	29.6	28.3	18.5	18.9	91	84	55	53	82.6	154.6	5.1	5.8
October	29.5	28.2	19.4	18.6	90	86	59	54	47.0	146.9	5.1	5.4
November	29.4	26.7	15.3	16.4	91	81	59	49	168.6	55.4	1.4	5.6
December	29.0	26.3	15.0	14.1	89	80	66	41	7.2	14.4	4.6	6.3
<b>Total</b>									<b>305.4</b>	<b>371.3</b>		

*S. B. Yogananda*

Dr. S. B. Yogananda, M.Sc. (Agri.), Ph.D  
Senior Farm Superintendent  
Zonal Agricultural Research Station  
V.C. Farm, Mandya - 571 405  
KARNATAKA  
email : sfsmandya@gmail.com

## 1.2 Crop, Variety and Year:

**Crop** : Maize (*Zea mays* L.)

**Hybrid** : Hema

**Year** : Kharif 2015

## 1.3 Design and layout of the trial

### 1.4.1 Experiment Details

- **Date of planting:** 24-08-2015
- **Date of harvesting:** 22-12-2015
- **Design :** RBD
- **No. of Replication:** Four
- **No of treatments:** 05
- **Plot size:** 6.0 m X 5.0 m = 30 m<sup>2</sup>
- **Spacing:** 60 cm X 30 cm

## 1.4 Treatments Details

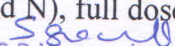
The trial consists of 5 treatments laid in Randomized Complete Block Design with four replications. The treatments details are furnished in Table 2.

**Table 2. Treatment details**

T <sub>1</sub>	Control
T <sub>2</sub>	Only Nualgi foliar spray 1.0 ml per litre no chemical fertilizers
T <sub>3</sub>	Only recommended dose of chemical fertilizers
T <sub>4</sub>	50% RDF + Nualgi foliar spray 1.0 ml per litre
T <sub>5</sub>	50% RDF

## 2. METHODOLOGY:

The recommended rate of seeds *i.e.* 6.0 kg/acre were soaked for about half an hour in a solution containing Nualgi @ 2 ml per litre of water. The test product Nualgi was supplied by the Nualgi Nanobiotech, Bangalore. The seeds were soaked in a Nualgi solution for the treatments T<sub>2</sub> and T<sub>4</sub>. Then the soaked seeds were dibbled in the well prepared field at a spacing of 60 cm between the rows and 30 cm between the plants as per the UAS, Bangalore recommendations. The depth of sowing followed was 5 cm. The recommended dose of fertilizers *i.e.* 150: 75: 40 kg NPK/ha was applied for the treatment T<sub>3</sub>. The nutrients were supplied through different sources like urea (46 % N) Single super phosphate (16% P<sub>2</sub>O<sub>5</sub>) and Muriate of Potash (60% K<sub>2</sub>O) as per the package. At the time of sowing, half dose of the N (50% recommend N), full dose of P<sub>2</sub>O<sub>5</sub> and

  
Dr. S.B. Yogananda, M.Sc.(Agri.), Ph.D  
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KARNATAKA  
email : sfsmandya@gmail.com

K<sub>2</sub>O were applied as basal dose and remaining nitrogen was applied as top dressing at knee height stage of the crop. While for T5 only 50% of the recommended dose of fertilizers were applied. No fertilizers were applied for the control *i.e.* T1. For the treatments T2 and T4 5 Nualgi spray was given @ 1.0 ml per litre of water as per the protocol *i.e.* 1<sup>st</sup> spray at when leaves are seen, 2<sup>nd</sup> spray at 15 DAS, 3<sup>rd</sup> at 45 DAS, 4<sup>th</sup> at 60 DAS and 5<sup>th</sup> at cob initiation stage. All the growth and yield observations were recorded as per the protocol given by the M/s. Nualgi Nanobiotech, Bangalore. Finally the data were analysed statistically and draw conclusion with 95% confident level.

### **3.0 Observations**

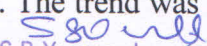
#### **3.1 Growth and yield attributes in maize**

- 3.2.1 Germination (%):** The number of plants germinated out of total number of plants were counted at 20 DAS and expressed in percentage.
- 3.2.2 Plant height (cm):** The average height of the 5 plants at the time of harvesting was measured in a linear scale from ground level to full opened collar of the leaf and expressed in cm.
- 3.2.3 Stalk girth:** The girth of the stalk was measured at bottom, middle and top and then averaged it and expressed in terms of cm.
- 3.2.4 Cob length:** The five cobs were selected randomly from individual treatment in the net plot area and the length was measured and expressed in cm.
- 3.2.5 No. of rows per cob:** Number of seed rows were counted from randomly selected 5 cobs in a net pot area.
- 3.2.6 Grain yield (kg/ha):** Grain weight from individual treatment in the net plot area was recorded at the time of harvest and expressed as kg ha<sup>-1</sup>.
- 3.2.7 Stalk yield (kg/ha):** Stalk weight from individual treatment in the net plot area was recorded at the time of harvest and expressed as kg ha<sup>-1</sup>.

### **4.0 Research findings**

The results of the testing trail are as furnished below.

- 1. Visual phototoxic/phytotoxic observations:** Spaying of Nualgi did not cause any phytotoxic effect on maize plants. However the treatment receiving the Nualgi spray found to enhance seedling vigour.
- 2. Germination %:** Spraying of Nualgi failed to influence the germination percentage.
- 3. Plant height and stalk girth:** Spraying of Nualgi with 50% RDF recorded on par plant height as that of 100% RDF only. While, spraying of only Nualgi without any chemical fertilizers failed to improve plant height of the maize plants as that of 100% RDF. While control *i.e.* without any fertilizers recorded lower plant height. The trend was also similar I stalk girth.

  
Dr. S.B. Yogananda, M.Sc. (Agri.), Ph.D  
Senior Farm Superintendent  
Zonal Agricultural Research Station  
V.C. Farm, Mandya - 571 405  
KARNATAKA  
email : sfsmandya@gmail.com

4. **Yield Parameters:** The yield parameters viz, cob length, number of rows per cob and 1000 seed weight were differed significantly due to foliar spray of Nualgi. Foliar spray of Nualgi @ 1.0 ml/litre with 50% RDF recorded significantly higher cob length (16.59 cm), number of rows per cob (18.17) and 1000 seed weight (33.16 g) over other treatments. However it was on par with 100% RDF (16.01 cm, 17.96 and 32.18 g, respectively). Application of only Nualgi through foliar spray without any chemical fertilizers enhanced the yield parameters in the face of 50% RDF. While, control recorded lowest yield parameters (11.24 cm, 14.86 and 20.95 g, respectively).
5. **Grain and stalk yield:** Grain yield of maize, was significantly influenced due to foliar spray of Nualgi. The treatment which received 50% RDF + Nualgi spray recorded significantly higher grain yield (8.51 t/ha) over other treatments. But, was at par with 100% RDF (8.19 t/ha). While, foliar spray of Nualgi without any chemical fertilizers recorded on par yield (5.51 t/ha) as that 50% RDF only (6.45 t/ha). While the lowest grain yield was observed in control (4.46 t/ha). A similar trend was observed with respect to stalk yield and harvest index also.

**Conclusion:** The results of the field trial confirmed that foliar spray of Nualgi @ 1.0 ml per litre of water saves 50% of the recommended dose of fertilizers and found to enhance the yield to an extent of 7.5% over 100% RDF and almost doubled the yield as compared to control. From the results it was also noticed that Nualgi spray was highly effective when maize is grown under nutrient deficient condition as compared to nutrient sufficient condition.

**COUNTERSIGNED**

  
**DIRECTOR OF RESEARCH**  
University of Agricultural Sciences  
@KVK, BANGALORE • 560 065

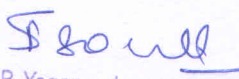

  
Dr. S.B. Yogananda, M.Sc. (Agri.), Ph.D  
Senior Farm Superintendent  
Zonal Agricultural Research Station  
V.C. Farm, Mandya - 571 405  
KARNATAKA  
email : sfsmandya@gmail.com

Table 3. Growth and yield of maize as influenced by Nualgi spray.

Treat	Germination %	Plant height at harvest (cm)	Stalk girth (cm)	Cob length (cm)	No rows per cob	1000 seed weight	Grain yield (t/ha)	Stalk yield (t/ha)	Harvest Index
T1	83.9	188.2	3.25	11.24	14.86	29.05	4.46	5.70	0.439
T2	85.2	213.7	4.59	15.35	15.57	30.95	6.51	7.27	0.472
T3	84.6	225.4	5.16	16.01	17.96	32.18	8.19	8.63	0.486
T4	82.8	230.4	5.25	16.59	18.17	33.16	8.51	8.71	0.494
T5	82.4	211.4	4.52	15.19	15.81	30.12	6.45	7.24	0.471
S.E.m±	0.90	3.34	0.14	1.56	0.38	0.81	0.28	0.25	0.01
CD (P= 0.05)	NS	10.30	0.42	4.79	1.16	2.50	0.86	0.77	0.02

Treatment details

- T1 Control
- T2 Only Nualgi foliar spray 1.0 ml per litre no chemical fertilizers
- T3 Only recommended dose of chemical fertilizers
- T4 50% RDF + Nualgi foliar spray 1.0 ml per litre
- T5 50% RDF

  
 Dr. S.B. Yogananda, M.Sc.(Agri), Ph.D  
 Senior Farm Superintendent  
 Zonal Agricultural Research Station  
 V.C. Farm, Mandya - 571 405  
 KARNATAKA  
 email : sfsmanaya@gmail.com



Only recommended dose of chemical fertilizer



50% RDF + Nualgi 1 ml per litre



Only Nualgi foliar spray 1 ml per litre no chemical fertilizer



Control

580 ml

Dr. S. B. Yogananda, M.Sc. (Agri), Ph.D.  
Senior Farm Superintendent  
Zonal Agricultural Research Station  
V.C. Farm, Mandya - 571 405  
KARNATAKA  
email : sfsmandya@gmail.com





**50% RDF + Nualgi 1 ml per litre**



**Only recommended dose of chemical fertilizer**



**Only Nualgi foliar spray 1 ml per litre no chemical fertilizer**



**Control**

*S. S. S. S.*  
Dr. S. B. Hegde, M.Sc. (Agri), Ph.D.  
Senior Farm Superintendent  
Zonal Agricultural Research Station  
V.C. Farm, Mandya - 571 405  
KARNATAKA  
email : sfsmandya@gmail.com



50% RDF + Nualgi 1 ml per litre



Only Nualgi foliar spray 1 ml per litre no chemical fertilizer



Only recommended dose of chemical fertilizer



Control

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Dr. S. B. Yogananda, M.Sc. (Agri), Ph.D  
Senior Farm Superintendent  
Zonal Agricultural Research Station  
V.C. Farm, Mandya - 571 405  
KARNATAKA  
email : sfsmandya@gmail.com