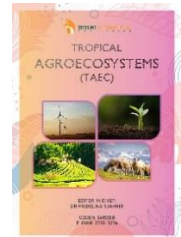


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## RESEARCH ARTICLE

# EFFECT OF NITROGEN IN DIFFERENT YIELD ATTRIBUTING CHARACTERS OF MAIZE IN BAITADI

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## ARTICLE DETAILS

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## ABSTRACT

This research was conducted in Agronomy farm of Gokuleshwar College from 27<sup>th</sup> April to 1<sup>st</sup> September 2017 in order to determine the effect of Nitrogen in different yield attributing character of maize. Single factor randomized complete block design was used with seven treatments and three replication. Plant height, Leaf length, Leaf breadth, Number of leaves, days to 50% tasseling and silking, number of cob, cob length, 1000 grain weight, productivity and harvest index were investigated. Manakamana-3 variety of maize was planted with 7 doses of nitrogen (0 to 120kg/ha) were employed. When Nitrogen level increases grain yield also increases up to 60kg/ha and was 2.17 ton/ha and lowest 1.56 ton/ha from control plot (0 Kg/ha) the effect of different nitrogen rates were significant on plant height, leaf length, leaf breadth, number of leaves and cobs, cob length, 1000 grain weight, productivity and harvest index were significant and positive whereas days to 50% tasseling and silking were negative and insignificant. The productivity of maize ranged from 1.56 to 2.17 ton/ha. The result showed that 60 Kg N/ha. Yield best (2.17 ton/ha) among other treatments.

## KEYWORDS

Maize, Nitrogen, Treatment, Gokuleshwar and Significant.

## 1. INTRODUCTION

Maize is the important cereal crop in the world, growing everywhere in irrigated as well as in rain-fed condition. Botanically it is known as *Zea mays* L. and belongs to Poaceae family. It is annually cross pollinated crop. Its stem or stalk is thick and strong. The leaf consists of a sheath and a broad large leaf blade and sheath covers the stem. Male part is tassel and female part is silk (Khalil, 2002). It is second most important staple food crop in terms of area and production after rice in Nepal (MoAD, 2013). Maize contributes 23.29% of total cereal crop production (MoAD, 2013). The average annual productivity of maize is 2.84 Mt/ha (statistical information on nepalese agriculture 2018/19).

Nitrogen is essential nutrient for growth and physiological characteristics. Nitrogen is essential for carbohydrate use and to stimulate root growth and development and is constituent of enzymes, chlorophyll and protein. Nitrogen is one of the important element required for normal plant growth. It is important for chlorophyll and protein synthesis. As a result nitrogen deficiency is normally related to pale green due to lack of chlorophyll, stunted growth as a result of reduced cell division and cell enlargement due to lack of protein synthesis. Nitrogen deficiency also delayed maturity and premature death of lower leaves. Nitrogen fertilization play significant role in improving soil fertility and increasing crop productivity. Nitrogen fertilization results in increase in grain yield (43-68%) and biomass (25-42%) in maize (Ogola et al., 2002). Chemical fertilizer application could not be avoided completely since they are the potential source of high amount of nutrient in easily available form and maize it responsive to it (Statistical Information on Nepalese Agriculture, 2018). To overcome the problems related to fertilizer doses to be applied this research was conducted in this area.

## 2. MATERIAL AND METHODS

### 2.1 Site selection, preparation and layout

The research was conducted in Gokuleshwar college in mid hill region of Baitadi District with an altitude of 700 meter above the sea level. The soil of the experimental site was sandy loam and single factor randomized complete block design with three replications and seven treatments. The treatment combinations were given below:

| Table 1: Treatment combinations |                                |
|---------------------------------|--------------------------------|
| Treatment Number                | Treatment combination          |
| 1                               | Farm yard manure (10 ton /ha.) |
| 2                               | Poultry manure (15 ton/ha.)    |
| 3                               | 60:30:30 Kg NPK/ha.            |
| 4                               | 100:30:30 Kg NPK/ha.           |
| 5                               | 120:30:30 Kg NPK/ha.           |
| 6                               | 50:30:30 Kg NPK/ha.            |
| 7                               | 40:30:30 Kg NPK/ha.            |

Field was ploughed 15 days before seed sowing and layout was done with ropes, pegs, spade and measuring tape. Each plot was 2\*2.5meter dimension, 30 centimeter space was maintained between the treatments and 1 meter between the replication. Treatments were assigned randomly.

### 2.2 Seed and Sowing

Seeds of manakamana-3 was sown on 12<sup>th</sup> may by soaking overnight. Line sowing was done with the spacing of 50\*20 cm. Treatments were assigned

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randomly, applied on the plot and tagged.

### 2.3 Intercultural operations

Basal application of full dose of phosphorus and potassium and one third dose of nitrogen and remaining doses of nitrogen were applied during knee height stage (30 days after sowing) and during second earthing up (45 days after sowing), followed by weeding and earthing up. Since maize was grown as rain-fed crop so no irrigation was given but climatic condition was favorable during entire growing period.

### 2.4 Biometric observation

Five random plants were selected by leaving the border and they were tagged.

Plant height: Plant height was measured from base to upper most leaf base from above selected plants in cm and average was determined.

Leaf length: Three leaves from the selected plants were taken and they were measured from base to tip in cm and average was determined.

Leaf breadth: Three leaves from the selected plants were taken and they were measured at base, middle and tip in cm and average was determined.

Number of leaves: Fully opened leaves from selected plants were counted and average was determined.

Days to 50% tasseling: Plots were observed and number of tassel bearing plants were counted and converted into percentage.

Days to 50% silking: Plots were observed and number of silk bearing plants were counted and converted into percentage.

Number of cob: Number of cob from the selected planted was counted and average was determined.

Cob length: Cob length from the selected plant was measured in cm with the help of scale and average was determined.

Harvest index: Both economic yield and biological yield were weighed separately with the help of digital balance and calculated by using formula

Harvest index = (Economic yield / biological yield) \* 100%

1000 grain weight: 1000 grains were counted and they were weighted by digital balance.

Productivity: It was determined with the help of following formula

Productivity = Yield / Area

## 3. RESULT AND DISCUSSION

For the statistical analysis of the observed data, we used Gen Stat version 15.1. The analysis of observed was done in One Factor Randomized Complete Block Design. Trend line analysis was done in Excel version 2103.

### 3.1 Plant height

| Treatment             | Plant height at 7days | Plant height at 21 days | Plant height at 42 days | Plant height at 49 days |
|-----------------------|-----------------------|-------------------------|-------------------------|-------------------------|
| 1                     | 6.24a                 | 31.00 a                 | 142.4a                  | 197.1a                  |
| 2                     | 6.46a                 | 34.07 a                 | 151.1ab                 | 207.5a                  |
| 3                     | 6.99a                 | 34.45a                  | 164.5ab                 | 230.0a                  |
| 4                     | 6.04 a                | 30.67a                  | 152.3ab                 | 208.6a                  |
| 5                     | 5.54a                 | 33.21a                  | 170.1b                  | 201.4a                  |
| 6                     | 6.10 a                | 32.57a                  | 163.2ab                 | 212.1a                  |
| 7                     | 6.52a                 | 31.04a                  | 168.7ab                 | 206.7a                  |
| LSD <sub>(0.05)</sub> | 1.725                 | 6.445                   | 24.23                   | 33.06                   |

The highest and lowest plant height was observed from third treatment (6.99) and fifth treatment (5.54) respectively and others were statistically at par with plant height of other treatments at 7 days after sowing.

Similarly, second (34.07), fifth (170.1) and third (230) treatment had highest and fourth (30.67), first (142.4) and first (197.1) were lowest

respectively in 21, 42 and 49 days and other treatments were statistically at par in these days of plant height.

### 3.2 Number of leaves

| Treatment             | No. of leaf at 7days after sowing | No. of leaf at 21 days after sowing | No. of leaf at 49 days after sowing |
|-----------------------|-----------------------------------|-------------------------------------|-------------------------------------|
| 1                     | 3.66a                             | 6.13ab                              | 12.20a                              |
| 2                     | 3.66a                             | 6.80b                               | 11.93a                              |
| 3                     | 3.46a                             | 6.53ab                              | 13.07a                              |
| 4                     | 3.40a                             | 6.33ab                              | 12.87a                              |
| 5                     | 3.33a                             | 6.60ab                              | 12.33a                              |
| 6                     | 3.33a                             | 6.13ab                              | 12.47a                              |
| 7                     | 3.26a                             | 5.93a                               | 12.33a                              |
| LSD <sub>(0.05)</sub> | 0.816                             | 0.7673                              | 2.387                               |

The highest and lowest number of leaves was observed from first, second treatment (3.66) and seventh treatment (3.26) respectively and others were statistically at par with number of leaves in other treatments at 7 days after sowing.

Similarly, second (6.80) and third (13.07) treatment had highest and seventh (5.93) and second (11.93) were lowest respectively in 21 and 49 days and other treatments were statistically at par in these days with number of leaves.

### 3.3 Leaf length

| Treatment             | Leaf length at 7 days (cm) | Leaf length at 28 days (cm) | Leaf length at 42 days (cm) |
|-----------------------|----------------------------|-----------------------------|-----------------------------|
| 1                     | 13.12a                     | 69.27a                      | 116.1ab                     |
| 2                     | 12.93a                     | 70.69a                      | 107.9ab                     |
| 3                     | 12.99a                     | 83.07b                      | 119.5b                      |
| 4                     | 11.10a                     | 70.47a                      | 105.1a                      |
| 5                     | 13.11a                     | 72.27ab                     | 110.4ab                     |
| 6                     | 11.60a                     | 67.67a                      | 109.4ab                     |
| 7                     | 12.81a                     | 76.2ab                      | 110.7ab                     |
| LSD <sub>(0.05)</sub> | 5.416                      | 10.37                       | 12.17                       |

The highest and lowest leaf length was observed from first treatment (3.12) and fourth treatment (11.1) respectively and others were statistically at par with leaf length in other treatments at 7 days after sowing.

Similarly, third (83.07) and third (119.5) treatment had highest and sixth (67.67) and fourth (104.6) were lowest respectively in 28 and 42 days and other treatments were statistically at par in these days with leaf length.

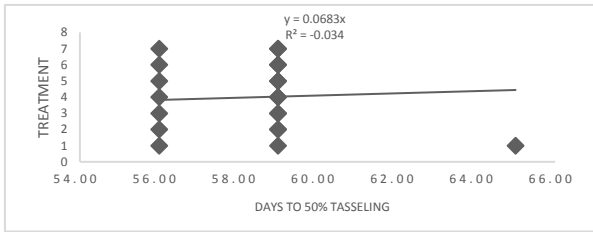
### 3.4 Leaf breadth

| Treatment             | Leaf breadth at 7 days (cm) | Leaf breadth at 42 days (cm) | Leaf breadth at 49 days (cm) |
|-----------------------|-----------------------------|------------------------------|------------------------------|
| 1                     | 1.54a                       | 6.28a                        | 6.82a                        |
| 2                     | 1.39a                       | 7.27ab                       | 7.91b                        |
| 3                     | 1.63a                       | 7.18ab                       | 7.78ab                       |
| 4                     | 1.35a                       | 6.81ab                       | 7.30ab                       |
| 5                     | 1.29a                       | 7.52b                        | 8.00b                        |
| 6                     | 1.37a                       | 7.24ab                       | 7.58ab                       |
| 7                     | 1.31a                       | 7.14ab                       | 7.61ab                       |
| LSD <sub>(0.05)</sub> | 0.374                       | 0.921                        | 0.876                        |

The highest and lowest leaf breadth was observed from third treatment (1.63) and fifth treatment (1.29) respectively and others were statistically at par with leaf breadth in other treatments at 7 days after sowing.

Similarly, seventh (7.52) and fifth (8.0) treatment had highest and first (6.28) and first (6.82) were lowest respectively in 42 and 49 days and other treatments were statistically at par in these days with leaf breadth.

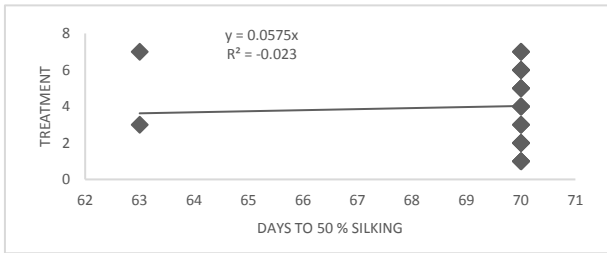
**3.5 Days to 50% tasseling**



**Figure 1:** Effect of treatment on days to 50% tasseling

Data were defined 3.4% by trend line analysis and days to 50% tasseling were postponed by treatments.

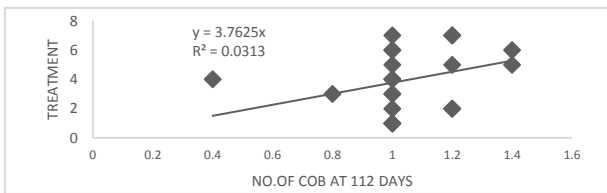
**3.6 Days to 50% silking**



**Figure 2:** Effect of treatments on days to 50% silking

Data were defined 2.3% by trend line analysis and days to 50% silking were postponed by treatments.

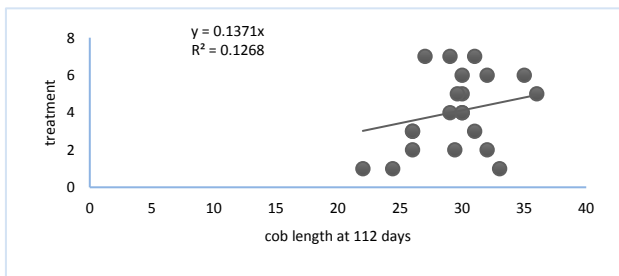
**3.7 Number of cob**



**Figure 3:** Effect of treatment on number of cob

Number of cobs at 112 days after sowing was governed 3.13% only by treatments.

**3.8 Cob length**



**Figure 4:** Effect of treatment on cob length

Cob length at 112 days after sowing was governed 12.6% only by the treatments.

**3.9 1000 grain weight, harvest index and productivity**

| Table 6: 1000 grain weight, productivity and harvest index |                       |                       |                   |
|--|-----------------------|-----------------------|-------------------|
| Treatment  | 1000 grain weight (g) | Productivity (ton/ha) | Harvest index (%) |
| 1  | 307.9ab               | 1.56a                 | 34.32a            |
| 2  | 283.5a                | 1.60a                 | 32.92a            |
| 3  | 317.5ab               | 2.17c                 | 38.97b            |
| 4  | 348.2b                | 1.93b                 | 33.56a            |
| 5  | 326.5ab               | 1.83b                 | 33.33a            |
| 6  | 333.5ab               | 1.87b                 | 31.11a            |
| 7  | 323.5ab               | 1.92b                 | 33.55a            |
| LSD <sub>(0.05)</sub>                                      | 48.07                 | 0.124                 | 3.1               |

1000 grain weight: The highest and lowest 1000 grain weight was observed from treatment four (348.2) and two (283.5) respectively while, other treatments were statistically at par.

Productivity: The highest and lowest productivity was found from treatment three (2.17) and one (1.56) respectively, while other treatments were statistically at par.

Harvest index: The highest and lowest productivity was found from treatment three (38.97) and six (31.11) respectively, while other treatments were statistically at par.

**5. CONCLUSION**

From the result of the experiment performed in Gokuleshwor college of Baitadi district, the productivity of Manakamana-3 variety with third treatment can be concluded best combination of fertilizer dose in the maize at the field condition of this college.

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