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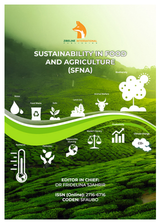

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RESEARCH ARTICLE

EFFECT OF DIFFERENT DOSES OF NITROGEN ON PRODUCTION OF SPRING MAIZE (*Zea mays*) IN GULMI, NEPAL

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ABSTRACT

The field experiment was carried out to study the effect of different doses of nitrogen on production of spring maize (Arun-2) in Ishma rural municipality, Chaurashi, Gulmi from February to June 2018. The experiment was laid out in single factor Randomized complete Block Design (RCBD) comprising of five levels of nitrogen (0, 30, 60, 90 and 120 kg/ha) as treatment with four replications. The results showed that the different levels of nitrogen significantly affected the biometrical, phenological, yield attributes and yield of maize. The biometrical observations (plant height and leaves number) increased with increased level of nitrogen and found the highest at 120 kg N/ha which were stasticially similar with 90 kg N/ha. The phenological observations (tasseling, silking, physiological maturity, seed fill duration) showed significant relationship with doses of nitrogen but days of emergence and anthesis-silking interval were non-significant with nitrogen dose. The longest days to tasseling and silking were found with control (0 kg/ha) whereas, days to physiological maturity and seed fill duration were the highest at 120 kg/ha dose of nitrogen. Similarly, increasing soil nitrogen favored both plant growth, and the survival of stem-borers. Hence, the highest maize borer infestation was found with 120 kg N/ha followed by the lower doses. Likewise, yield attributing characteristics (cob length, cob diameter, number of kernel/rows, number of kernel row, test weight) were the highest at 120 kg/ha but was similar with 90 kg/ha. Treatment 120 kg/ha produced the highest yield (2.481 t/ha) which was similar with 90 kg/ha (2.394 t/ha). The increment in yield over control was maximum with 120 kg N/ha (44 %) followed by 90 kg N/ha (39 %), 60 kg N/ha (25%), 30 kg N/ha (15 %). Thus, this research showed that the treatment with 90 kg N/ha was the most appropriate for the production of spring maize Arun-2.

KEYWORDS

Maize, Nitrogen doses, Maize borer, Yield.

1. INTRODUCTION

Maize (*Zea mays* L.) is the world's widely grown highland cereal and primary staple food crop in many developing countries and *ranked third among major cereal crops in world* (Ayisi and Poswall, 1997). Its global production area is about 187 million hectares, of which approximately 63 million hectares are in Asia (9 million hectares in south East Asia). World maize production is about 1 billion tons, although 34% land area is in Asia, only 30% of the world's maize production is produced here (FAO, 2016). The major Maize producing countries in the world are United States of America, China, Mexico, Ukraine, India and Brazil (FAO, 2016). The productivity of maize in Asian countries are 5.94, 7.3, 4.22, 5.37, 2.58 and 2.50 in China, Bangladesh, Thailand, Indonesia, India and Nepal (FAO, 2016).

Maize is the second most important crop after rice in terms of area and production in Nepal (Upadhyay et al., 2007). The total maize production area is 891,583 ha having production of 2,231,517 metric tons and yield of 2503 kg/ha (MoAD, 2015/16). It contributes about 25% in total cereal production, 6.54% in AGDP and 3.15% in GDP (MoAD, 2013). Nepal occupies about 5% maize producing land area of South-East Asia and only 3% of the South-East's maize production is produced here (FAO, 2016). Maize has got highest production potential among the crop plants and has wide variability in plant morphology. The present yield of maize in Nepal is quite lower than that of other Asian countries. There is a wide gap between attainable yield of maize (5.7 t/ha) and actual yield of maize at farm level (2.45 t/ha) (MoAD, 2015/16).The seed replacement rate is also low (11.3%) in Nepal (Pokharel, 2013). Both biotic and abiotic constraints have played a major role in limiting grain production per unit area as compared to other developed nations.

Maize being the heavy feeder crop, a balanced dose of organic and inorganic application of fertilizer is needed for increased productivity (Adhikari et al., 2016). Yield is a function of genotypes, environments and crop managements. Fertilizer management is crucial for maize cultivation (Baral et al., 2015). Nutrients supplied by FYM/compost may not be sufficient to exploit the genetic potential of improved varieties (Subedi and Sapkota, 2002). Chemical fertilizer especially nitrogen fertilizer is

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universally accepted as a key component to high maize yield and optimum economic return (Gehl et al., 2005). N is very important because this element is responsible on major activities for growth and development of maize crop (Jat et al., 2013). It plays important role in metabolism, growth, reproduction and heredity of plant (Jain, 1990).

Plant growth is adversely affected due to nitrogen deficiency as it restricts the formation of enzymes, chlorophyll and proteins necessary for growth and development (Reddy and Reddi, 2002). Generally, tasseling and silking stages are critical stages of maize for nitrogen application. On the other hand crop growth rate reduces under nitrogen stress that leads to decrease in kernel number and grain yield (Uhart and Andrade, 1995). Similarly, maize is attacked by nearly 55 species and among them 8-10 species are found to be more effective. Numerous factors enhance the insect pest problem in field either by manipulating the environment that favors the growth, reproduction and development of insects including traditional cultural practices, unscientific management and use of fertilizers (Karimullah et al., 1986).Insects and pathogen possibly reduce yield up to 75% and even total crop failure might happen in case of severe infestation (Kumar, 2002). So, nitrogen application in proper time and proper dose is crucial for phenological and yield attributing characteristics of maize.The present study was thus undertaken to study the effect of Nitrogen dose on production of spring maize along with insect pest incidence of maize.

2. Materials and Methods

2.1 Experimental site

The experiment was conducted at Ishma rural municipality -6 Chaurashi, Gulmi, during spring season from February to May, 2018. It is located about 20 km west of Tamghas (headquarter of Gulmi district). Chaurashi is located at 28^0 9' N latitude to 83^0 10' E longitude lying at an altitude of 950 meters to 1000 meters above sea level.

2.2 Soil properties

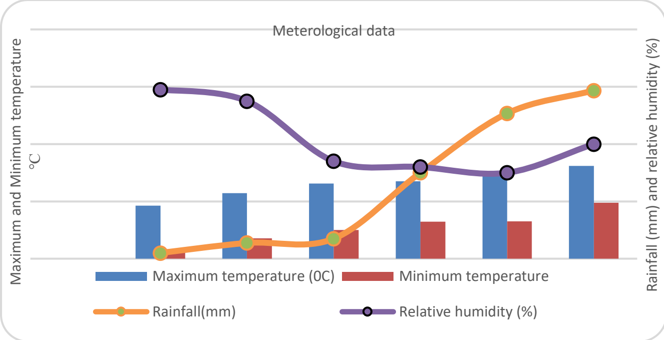
Initial soil samples were taken randomly from each replication before application of FYM and chemical fertilizers. Soil samples were collected from the field using shovel from 0 to 15cm and were air dried, grounded and made fine. Finally, analysis was done using Soil Kit-Box method.

Table 1: Physio-Chemical analysis of soil

S.N.	Soil properties	Values	Methods
1	Textural Class	Sandy silt loam	Textural Triangle Method
2	Chemical properties		
	PH	6.2(Slightly Acidic)	Soil Kit-Box method
	Total nitrogen (%)	Low (< 0.10)	Soil Kit-Box method
	Soil available Phosphorus P_20_5 (kg/ha)	High (>55)	Soil Kit-Box method
	Soil available potassium K_2O (kg/ha)	Medium (110-280)	Soil Kit-Box method

2.3 Weather data

Monthly mean weather data was recorded during the crop growing season from January 2018 to May 2018. The mean maximum temperature 30^0C and minimum temperature 3.3^0C were recorded. Maximum temperature ranged from 18.54^0C (January 2018) to 30^0C (May 2018). The minimum temperature ranged from 3.3^0C (January 2018) to 13^0C (May 2018). Similarly, relative humidity ranged from 59% during January to 29% during June 2018. The highest rainfall (58.7 mm) during June 2018, the lowest rainfall (2 mm) during January 2018 were recorded. The total rainfall during crop growing season was 153.9 mm.



2.4 Experimental design

The experiment was conducted in Completely Randomised Block Design (RCBD) with five different doses of nitrogen as treatment and four replications. Treatments were laid perpendicular to replication.

Table 2: Treatment combination used in field

	Treatment	Treatment combinations (kg/ha)		
		Nitrogen	Phosphorus	potassium
1	T1	0	60	40
2	T2	30	60	40
3	T3	60	60	40
4	T4	90	60	40
5	T5	120	60	40

2.5 Plot size, layout and crop sowing

The size of individual plot was 4.75*3.5m^2 (16.62 m2) with total 20 plots. Each treatment had single row of 14 plants each with spacing of R-R 75cm and P-P 25 cm and each plot has 84 plants. 10 plants were taken as sample. Plot to plot spacing and plot to border spacing was 100 cm each. Seed sowing was done with the help of Jab-planter after final land preparation. Seeds were treated with Bavistin 2g/kg of seeds one day prior of sowing. Sowing was done in 9^{th} February.

2.6 General cultural practices

The field was ploughed 15 days prior of seed sowing by using mini tiller to bring the soil under good tilth. The FYM @10kg/plot area (16.62 m^2) was applied in all experimental plots and it was uniformly incorporated into the soil during the first land preparation. The recommended amount of Phosphatic and Potassic fertilizers @ 60:40 kg/ha, were calculated and weighed separately for all treatment. SSP @ 623.25 g/plot and MOP @ 110.8 g/plot were applied in all experimental plots. The required amount of nitrogen fertilizer was calculated separately for each treatment. The nitrogen @ 0 g, 108.39 g, 216.78 g, 325.17 g and 433.56 g/plot were applied for treatments of 0,30, 60, 90 and 120 kg N/ha, respectively. Firsthand weeding and earthing up were done at 45 days after sowing (DAS). After that secondhand weeding were performed at 75DAS. Harvesting was carried out on June 16, 2018 manually.

3. Observation Recorded

Biometrical observation like plant height, number of leaf/plant; Phenological observation like emergence, days to 75% tasseling, days to 75% silking, days to 75% physiological maturity, anthesis silking interval, seed fill duration and insects infestation; yield attributing characteristics like shelling %, thousand grain weight, cob length, cob diameter, number of kernels per row, number of kernel row per ear, number of kernel per cob and grain yield were calculated. Grain yield (kg/ha) at 15% moisture content was calculated using fresh ear weight with the help of the below formula:

$$\text{Grain yield}\left(\frac{\text{kg}}{\text{ha}}\right) = \frac{\text{F.W.}\left(\frac{\text{kg}}{\text{plot}}\right) \times (100 - \text{HMP}) \times \text{S} \times 10000}{(100 - \text{DMP}) \times \text{NPA}}$$

Where,

F.W. = Fresh weight of ear in kg per plot at harvest
HMP = Grain moisture percentage at harvest
DMP = Desired moisture percentage, i.e. 15%
NPA = Net harvest plot area, m^2
S = Shelling coefficient, i.e. 0.8

This formula was also adopted to adjust the grain yield (kg ha^{-1}) at 15% moisture content. This adjusted grain yield (kg ha^{-1}) was again converted to grain yield (t ha^{-1}) (Carangal et al., 1971; Shrestha et al., 2019; Shrestha et al., 2018; Gurung et al., 2018; Sharma et al., 2019; Sharma et al., 2016; Bartaula et al., 2019).

4. Statistical Analysis

The experimental data were processed by using Excel 2010 and analyzed by using Genestat 13.2. The experimental data were processed by using Excel 2010 and analyzed by using Genestat 13.2. All the analyzed data were subjected to Duncan's Multiple Range Test (DMRT). The treatment means were compared by the Least Significant Difference (LSD) test at 5% level (Gomez and Gomez, 1984; Shrestha, 2019; Devkota et al., 2019; Kandel et al., 2019).

5. Results and Discussion

5.1 Plant height

Plant height was observed increasing with increasing dose of N from 0 kg /ha to 120 kg/ha. At 15 DAE, plant height was statically similar with all the doses of nitrogen. It may be due to low soil moisture and low soil temperature so that plant was not able to uptake the available Nitrogen in soil. At 30, 45, 60 and 75 DAE, plant height was the lowest under 0kg N/ha and was the highest with 120 kg/ha Finally, at 90 DAE, the highest plant height was found in 120 kg N/ha (140.40 cm) and 90 kg N/ha (135.80cm) followed by 60 kg N/ha (132.20 cm), 30 kg N/ha (130.30 cm) and the height was lowest with 0 kg N/ha (127.40 cm). Shrestha reported that nitrogen rate significantly increased plant height up to 150 kg/ha (Shrestha, 2007). Some researchers also concluded that the increased plant height with increasing nitrogen levels from 0 kg ha^{-1} to 180 kg ha^{-1} (Bangarawa et al., 1988). Increase in plant height due to the positive effect of nitrogen on plant growth lead to progressive increase in internodes length and consequently the plant height (Elelib et al., 2006)

Table 3: Effect of different doses of nitrogen on plant height at indicated days after emergence of Arun-2 at Chaurashi, Ishma-6, Gulmi, 2018.

S.N.	Treatments	Plant height (cm)					
		15 DAE	30 DAE	45 DAE	60 DAE	75 DAE	90 DAE
	Nitrogen levels						
1	0 kg N/ha	18.74	26.70^b	38.76^b	70.80^c	104.30^d	127.40^c
2	30 kg N/ha	19.16	27.24^b	40.91^b	73.20^c	111.90^{cd}	130.30^{bc}
3	60 kg N/ha	19.34	28.14^{ab}	43.05^{ab}	77.40^{bc}	117.60^{bc}	132.20^{bc}
4	90 kg N/ha	19.94	29.21^{ab}	46.11^a	84.40^{ab}	122.30^{ab}	135.80^{ab}
5	120 kg N/ha	20.88	30.65^a	47.84^a	87.20^a	128.50^a	140.40^a
	$LSD_{(0.05)}$	-	2.417	4.926	9.03	7.84	7.14
	SEm (±)	-	0.784	1.59	2.93	2.54	2.32
	CV (%)	-	5.5	7.40	7.50	4.4	3.5
	Mean	19.61	28.39	43.33	78.60	116.9	133.33

Note: DAE, Days after Emergence; LSD, Least Significant Difference; SEm (±), Standard Error of Mean; CV (%), Coefficient of Variation. Means followed by the common letter within each column are not significantly different at 5% level of significance by DMRT.

5.2 Number of leaves/plant

The number of leaves/plant of maize was significantly influenced by the nitrogen levels at different dates of observation (Table 3). Number of leaves/plant were observed increasing with increasing dose of N from 0 kg /ha to 120 kg/ ha. At all doses of nitrogen, number of leaves/plant were the highest at 120 kg/ha and were lowest at control. The increase in leaf number with increased nitrogen rates agrees with the finding of Shrestha that nitrogen influences multiplication and elongation of leaves (Shrestha, 2007). If Nitrogen became scarce, plant would reallocate N from older tissue (leaves, stalk) to younger tissue (leaves, grain), leading to early senescence of the older and lower leaf tissue resulting in lower accumulation of assimilates. High N availability resulted in increased leaf cell number and cell size with an overall increment in number of leaf production (Devlin and Witham, 1986).

Table 4: Effect of different doses of nitrogen on number of leaves/plant at indicated days after emergence of Arun-2 at Chaurashi, Ishma-6, Gulmi, 2018.

S.N.	Treatments	Number of leaves/plant					
		15 DAE	30 DAE	45 DAE	60 DAE	75 DAE	90 DAE
	Nitrogen levels						
1	0 kg N/ha	4.40^b	5.97^c	8.97^b	11.77^c	11.62^c	9.38^c
2	30 kg N/ha	4.25^b	6.22^{bc}	9.47^b	12.55^b	12.25^b	9.80^{bc}
3	60 kg N/ha	4.35^b	6.32^{abc}	9.25^b	13.50^a	13.12^a	10.75^{ab}
4	90 kg N/ha	4.45^b	6.42^{ab}	9.52^b	13.65^a	13.17^a	10.88^{ab}
5	120 kg N/ha	4.75^a	6.72^a	10.25^a	13.97^a	13.35^a	11.50^a
	$LSD_{(0.05)}$	0.2869	0.3958	0.6811	0.5057	0.4155	1.266
	SEm(±)	0.0931	0.1817	0.221	0.2321	0.1349	0.411
	CV (%)	4.2	4.1	4.7	2.5	2.1	7.9
	Mean	4.44	6.335	9.495	13.09	12.705	10.46

Note: DAE, Days after Emergence; LSD, Least Significant Difference; SEm (±), Standard Error of Mean; CV (%), Coefficient of Variation. Means followed by the common letter within each column are not significantly different at 5% level of significance by DMRT.

6. Crop Phenology

Phenology is the study of the time period like events, dissimilar events, or the duration of a process. The nitrogen levels had non-significant effect on emergence and had significant effect on tasseling, silking, anthesis silking intervals, physiological maturity. Days to 75% emergences was not significantly influenced by the nitrogen levels (Table 5). However, it was found longer in 0 kg/ha and shorter in 90 kg/ha. This result indicated that during germination seeds did not depend upon external nutrition much and used their own reserved food materials (Akhtar et al., 1996).

Similarly, days to 75% tasseling decreased with increasing nitrogen level from 0 kg/ha to 120 kg/ha. Days to tasseling was found significantly earlier in nitrogen level of 120 kg/ha (88.75 days) and 90 kg/ha (89.75 days) and were at par. It was significantly higher in control. Normally, tasseling occurs in 35 days after planting in normal maize belt conditions. Here in the results, it prolonged due to low temperature stress as spring maize (Arun-2) was planted earlier (February 9) than the normal season (last week of March). Likewise, days to 75% Silking was found significantly earlier in 120 kg N/ha (93.25 days) than other nitrogen levels. Application of 120 kg N/ha resulted earlier silking by 7.18 days as compared to no nitrogen application. Some researchers observed decreased silking days with increasing N doses from 0 to 250 kg ha^{-1} N application (Gokmen et al., 2001).

Days to physiological maturity was significantly earlier with no nitrogen treatment. A researchers reported that short vegetative growth stage and early senescence with nitrogen deficiency probably related to the increased ABA content and reduced synthesis and translocation of cytokinin (Kirkby, 1996). These above results are in line with the findings of Shrestha who reported the shortest period to physiological maturity (130.44 days) at 0 kg ha^{-1} and the longest period (133.66 days) at 200 kg ha^{-1} N application (Shrestha, 2007). Likewise, effect of nitrogen management practices on anthesis silking interval was non-significant (Table 6). However, ASI was found earlier in 120 kg N/ha (4.50 days) and was found longest in 0 kg N/ha (5.42 days) as compared to other levels of nitrogen. Seed fill duration was found highest in 120 kg N/ha and was lowest at control.

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Table 5: Effect of different doses of nitrogen on Phenology of Arun-2 at Chaurashi, Ishma-6, Chaurashi, Gulmi, 2018

SN.	Treatments	Penology of the crops					
		Days to 75 % Emergence	Days to 75% Tasseling	Days to 75% Silking	Physiological Maturity(days)	ASI (Days)	Seed Fill duration(Days)
	Nitrogen levels						
1	0 kg N/ha	14.75	95.00[a]	100.43[a]	124.50[c]	5.42	29.50[c]
2	30 kg N/ha	14.50	93.75[b]	99.03[b]	125.50[bc]	5.27	31.75[c]
3	60 kg N/ha	14.00	91.50[c]	96.40[c]	126.50[b]	4.90	35.00[b]
4	90 kg N/ha	14.00	89.75[d]	94.45[d]	128.50[a]	4.70	38.75[a]
5	120kg N/ha	14.25	88.75[d]	93.25[e]	129.25[a]	4.50	40.50[a]
	$LSD_{(0.05)}$	-	1.004	0.868	1.834	-	2.281
	SEm(±)	-	0.326	0.282	0.595	-	0.74
	CV (%)	-	0.7	0.6	0.9	-	4.2
	Mean	14.30	91.75	96.71	126.85	4.96	35.1

Note: LSD, Least Significant Difference; SEm (±), Standard Error of Mean; CV (%), Coefficient of Variation. Means followed by the common letter within each column are not significantly different at 5% level of significance by DMRT.

7. Insect Infestation

The number of infected plants by maize stem borrer was found significantly different among different dose of nitrogen. The infected plants number at 120 kg/ha (50) was similar with 90 kg/ha (35). Similarly, infected plants number at 60 kg/ha (43.50) was statically similar with 30 kg/ha (42.20) and minimum number of infected plants were found in 0 kg/ha (35.80). Likewise, Number of dead heart significantly increased with increasing nitrogen dose. It was found to be maximum in 120 kg/ha (37) followed by 90 kg/ha (35), 60 kg/ha (33.25), 30 kg/ha (32) and 0 kg/ha (27.50). The number of dead heart at 90 kg/ha and 60 kg/ha was at par with each other.

Table 6: Effect of different doses of nitrogen on infected plant number and dead heart number of Arun-2 at Chaurashi, Ishma-6, Gulmi, 2017/18.

S.N.	Treatments	Number	
		Infected plants	Dead heart
	Nitrogen levels		
1	0 kg N/ha	35.80[b]	27.50[c]
2	30 kg N/ha	42.20[ab]	32[b]
3	60 kg N/ha	43.50[ab]	33.25[ab]
4	90 kg N/ha	45.00[a]	35[ab]
5	120 kg N/ha	50.00[a]	37[a]
	$LSD_{(0.05)}$	8.06	3.602
	SEm(±)	2.62	1.169
	CV (%)	12.1	7.1
	Mean	43.3	32.95

8. Yield and Yield Attributes

Yield and yield attributing characteristics were found to be maximum with 120 kg N/ha and was par with 90 kg N/ha. Higher doses of nitrogenous fertilizer increase the chlorophyll content, enzymes and rate of photosynthesis. Therefore, number of kernel rows per ear increases with increasing nitrogen level. Similar result was also reported with nitrogen level up to 150 kg/ha (Shrestha, 2007).

Table 7: Effect of different doses of nitrogen on yield attributes of Arun-2 at Chaurashi, Ishma-6, Gulmi, 2018.

S.N.	Treatments	Cob length (cm)	Cob diameter (cm)	Number of Kernel/row	Number of Kernel row	Number of kernel/cob
	Nitrogen levels					
1	0 kg N/ha	11.31[c]	4.1[d]	25.00[c]	10.38[c]	258.0[d]
2	30 kg N/ha	11.88[bc]	4.351[cd]	26.88[bc]	11.19[bc]	301.8[cd]
3	60 kg N/ha	12.38[ab]	4.43[bc]	28.88[ab]	11.9[abc]	343.3[bc]
4	90 kg N/ha	15.12[a]	4.699[ab]	30.25[a]	12.25[ab]	370.6[ab]
5	120 kgN/ha	15.62[a]	4.938[a]	31.38[a]	12.93[a]	406.0[a]
	$LSD_{(0.05)}$	1.943	0.2983	3.084	1.594	58.67
	SEm(±)	0.630	0.0968	1.001	0.517	19.04
	CV (%)	9.2	4.3	7.3	8.8	11.5
	Mean	13.75	4.504	28.48	11.73	336.0

Note: LSD, Least Significant Difference; SEm (±), Standard Error of Mean; CV (%), Coefficient of Variation. Means followed by the common letter within each column are not significantly different at 5% level of significance by DMRT.

Similarly, yield per unit area of a crop depends on four main factors: sunlight, water, carbon dioxide and minerals. The data on the grain yield is presented in Table 8 where average grain yield was observed 2.146 t/ha. Grain yield was significantly influenced by the nitrogen levels (Table 8). The increasing nitrogen levels from 0 kg/ha to 120 kg/ha increased the grain yield of maize. The grain yield was found highest in 120 kg/ha (2.481 t/ha) and 90 kg/ha (2.394 t/ha) and were statically similar with 60 kg/ha (2.151 t/ha). Similarly, lowest yield was observed under control (1.720 t/ha) and was at par with 30 kg/ha (1.982 t/ha). Yield at 120 kg/ha, 90 kg/ha, 60 kg/ha and 30 kg/ha was 44 %, 39 %, 25 % and 15 % more than that of control. Since, Arun-2 is an early variety so yield response was found significantly effective in lower dose of Nitrogen (90 kg/ha and 60 kg/ha).

Table 8: Effect of different doses of nitrogen on yield (t/ha) at different growth stages of Arun-2 at Chaurashi, Ishma-6, Gulmi, 2018

S.N.	Treatments	Shelling (%)	Test weight(gm)	Yield ton/ha	Yield over control(%)
	Nitrogen Levels				
1	0 kg N/ha	62.12	237.50[c]	1.720[c]	-
2	30 kg N/ha	64.50	248.00[bc]	1.982[bc]	15
3	60 kg N/ha	66.75	258.80[bc]	2.151[ab]	25
4	90 kg N/ha	69.50	271.00[ab]	2.394[a]	39
5	120kg N/ha	72.00	283.50[a]	2.481[a]	44
	$LSD_{(0.05)}$	-	22.7	0.3889	
	SEm(±)	2.25	7.38	0.1262	
	CV (%)	6.7	5.7	11.8	
	Mean	67.00	259.8	2.146	30.75

Note: LSD, Least Significant Difference; SEm (±), Standard Error of Mean; CV (%), Coefficient of Variation. Means followed by the common letter within each column are not significantly different at 5% level of significance by DMRT.

9. Conclusion

The positive relationship between nitrogen levels and biometrical observations (plant height and leaves number) was found to be highest in 120 kg/ha and lowest in control. Likewise, phenological characteristics (Tasseling, Silking, Physiological maturity, Seed fill duration, infected plant number and dead heart number) showed significant relationship with Nitrogen levels. Days to Tasseling and Silking were found to be longest in control followed by 30 kg/ha, 60 kg/ha, 90 kg/ha and 120 kg/ha whereas physiological maturity and seed fill duration were highest in 120 kg/ha followed by lower nitrogen doses. Different yield and yield attributes (cob length, cob diameter, kernel row, kernel/row, kernel/cob, test weight, shelling %), was found to be increased with increasing Nitrogen dose. The highest yield was found at 120 kg N/ha which was statistically similar with 90 kg N/ha. The increment in yield over control was maximum with 120 kg N/ha (44 %) followed by 90 kg N/ha (39 %), 60 kg N/ha (25%), 30 kg N/ha (15 %). Maize stem borrer infestation was found to be increased with increasing nitrogen dose. Thus, for the cultivation of Arun-2, 90:60:40 NPK kg/ha can be used as recommended dose.

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