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Effect of Foliar Application of Urea on Growth and Yield of Short Durative Lentil Variety (BARI Masur-9)

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Abstract

An experiment was conducted at Regional Agricultural Research Station, Jashore, Bangladesh during rabi season of (2019-2020) to evaluate the effect of foliar application of urea on growth and yield of short durative lentil variety (BARI Masur-9). The experiment was conducted in split plot design with three replications where time of urea spraying, P1= at branching stage, P2= at pod initiation stage were distributed in main plots and doses of urea spraying T1= application of 100% recommended fertilizers as basal except urea, T2= application of 100% recommended fertilizers as basal, T3= application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying, T4= application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of urea by spraying, T5= application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying were distributed in sub plots. The highest plant height, number of pods per plant were obtained from application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea spraying at pod initiation stage. The highest seed yield was also found from application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea spraying at pod initiation stage followed by application of 100% recommended fertilizers as basal and application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying at branching stage. Plant height, pods per plant and days to maturity showed positive correlation with seed yield. On the other hand days to flower and plants per m^2 has no linear relationship with seed yield. The highest marginal benefit cost ratio (3.29) was recorded from application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at pod initiation stage. So based on findings to increase the yield potential of BARI Masur-9 foliar application of urea may be a tool and hence application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at pod initiation stage may be consider as the best treatment.

Keyword: foliar urea spray, lentil, pulses, BARI Masur-9

1. Introduction

Besides the main crops pulses also play a major role to minimize the human food needs. Lentil (Locally Masur) is an important food source for the people especially in the subcontinent (Hamayun et al., 2011). Pulses are important source of protein particularly for the poor people and provides nutritional security (Das and Jana, 2015). In the year 2018-19, Bangladesh produced about 0.17 million tons of lentil from its 0.14 million hectares land (BBS, 2019) and average productivity was only 1.3 tons ha^{-1} (AIS, 2020). BARI Masur-9 is a recent released variety of lentil in Bangladesh by Bangladesh Agricultural Research Institute which is a short durative variety whose average life cycle is about 90 days. A huge number of cultivable land became remain fallow in between transplanted Aman and Boro rice in Bangladesh but after releasing this variety this problem may be solved somehow (Azad et al., 2019). But as this varieties average yield (1.19-1.52 tha^{-1}) is very much lower than the other on season varieties, adaptation and acceptance of this variety to the farmer's is not satisfactory. Moreover the area of lentil cultivation in the country is decreasing day by day because of it's poor yield (Salam et al., 2019). In addition farmers are growing lentil under resource constraints situation.The major constraints are being poor crop establishment and drought in the later stages of crop growthand it affects the productivity. Farmers are very much habituated to apply basal dose of fertilizer in lentil, which ultimately results in poor yield (Ram and Punia, 2018). So time to time measures have to apply to increase the yield of released variety.

Foliar application is regarded as a preferred solution when quick supply of nutrients is hindered or the soil conditions are not conducive for the absorption of nutrients (Salisbury and Ross, 1985). Pods and seeds development are mainly dependent on nitrogen and carbon accumulation, prior to podding (Davies et al., 2000) but root fails to absorb nitrogen from dry soil. This technique helps the nutrients to reach the site of food synthesis directly, leading no wastage and quick supply of food and thereby reduce the requirement of fertilizers. Photosynthesis gets reduced due to depletion of nitrogen in leaves, senescence starts earlier in lentil before completion of maturity which break the source to sink relation, thereby the yield reduces. Foliar nutrition can hasten the growth of a crop by delaying senescence. The positive effect of supplying lentil with supplementary nitrogen was found to have beneficial effects on enhancing growth and increasing seed yield by quick supply of nitrogen (Das and Jana, 2015).

Therefore foliar application of water soluble fertilizers like urea as supplementary nitrogen or a balanced dose of nutrients may be a very good option to increase the yield of BARI Masur-9 as well as other cultivars.

2. Materials and Methods

The experiment was conducted at Regional Agricultural Research Station, Jashore, Bangladesh during Rabi 2019-2020 to investigate the "effect of foliar application of urea on growth and yield of short durative lentil variety (BARI Masur-9)". The methods and materials that had been used in the experiment will be described in this chapter:

Experimental Site: The site where the experiment has conducted is located on 23°18' latitude and 89°18' longitude with an elevation of 19 m from sea level (Kobir et al., 2020). The experimental site is undergoes the Agro Ecological Zone (AEZ-11) namely 'High Ganges River Floodplain' (BBS, 2019).

Soil: Textural class of the experimental site's soil was sandy clay loam in nature and general soil type of the site is 'Calcareous Dark Grey Floodplain' soil. The soil contain 1.7% organic matter and the soil is slightly alkaline in reaction (Table 1).

Table 1. Particle size distribution, textural class, bulk density, pH and soil organic matter of initial soil of the experimental field

Soil depth (cm)	Particle size distribution			Textural class	Bulk density (g cm^{-3})	pH	SOM (%)
	Sand%	Silt%	Clay%				
0-15	53.00	24.28	22.72	Sandy clay loam	1.42	7.6	1.7

Source: Soil science division, Bangladesh Agricultural Research Institute

Climate: Annual average temperature of the experimental site is 15.4^{0}c to 34.6^{0}c and annual rainfall is 1537 mm (Wikipedia). The prevailed average temperature, average humidity and total rainfall during the operation of the experiment is showed in (Fig 1):

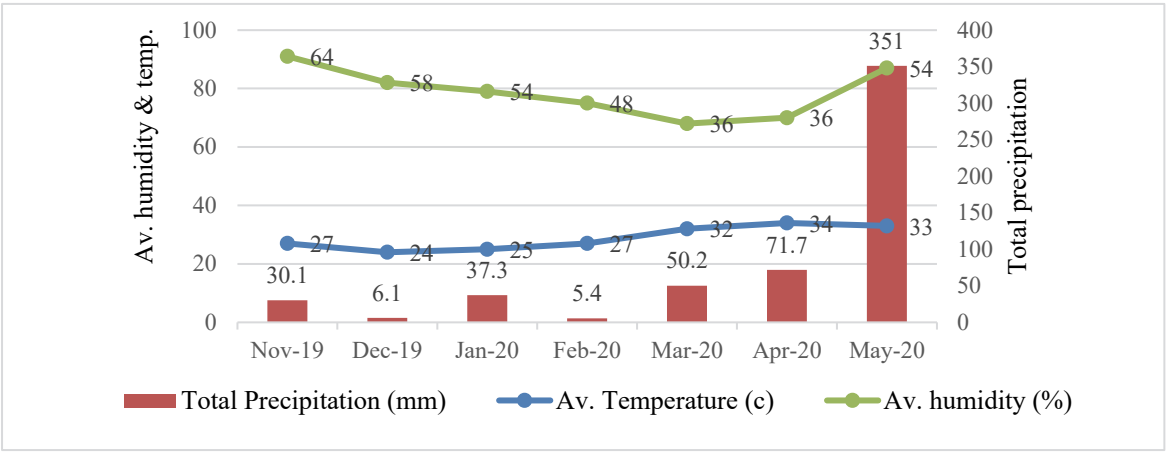

Figure 1. Weather data of Jashore from November 2019- May 2020

Planting material: The planting material that had been used in this experiment was BARI Masur-9. BARI Masur-9 is a short durative lentil variety that can be cultivated in the fallow period of between transplanted Aman and Boro rice. Seeds of the planting material was collected from pulses research centre, Ishurdi, Pabna. Average life cycle of this variety is 85-90 days, in addition this variety is tolerante to Stemphylium blight disease and average yield is 1.19-1.52 tha^{-1}. The most special character of this cultivar is that it is Fe and Zn enriched in nature (Azad et al.,2019).

Experimental treatment: The experiment was conducted considering the following factors

Factors		Details of the treatments
Factor A: Phases of urea spraying	P1	Urea spraying at branching stage
	P2	Urea spraying at pod initiation stage
Factor B: Doses of urea spraying	T1	T1= application of 100% recommended fertilizers as basal except urea
	T2	T2= application of 100% recommended fertilizers as basal
	T3	T3= application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying
	T4	T4= application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of urea by spraying
	T5	T5= application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying

Experimental design and layout: The research was conducted in split plot design where various stages of urea spraying distributed in main plots and different doses of urea spraying distributed in sub plots. Thus total number of plot was (2*5*3) = 30 and each plot size was (1.5*4) m^2 = 6 m^2.

Crop husbandry: At first the land was ploughed three times by tractor drawn cultivator followed by rotavator till the soil appeared as fine tilth. Then collected seeds of BARI Masur-9 was treated with a fungicide Provax-200 WP@2.5 gkg^{-1} seed. Seeds were sown in continuous line sowing method @ 70-80 $kgha^{-1}$ where line to line distance was 30 cm. Fertilizers were applied as per the proposed treatments method and doses (Table 2).

Table 2. Different doses of urea spray as per proposed treatments

Treatment	Urea basal ($kgha^{-1}$)	Urea spray ($kgha^{-1}$)	TSP ($kgha^{-1}$)	MOP ($kgha^{-1}$)	Gypsum ($kgha^{-1}$)	Boric acid ($kgha^{-1}$)
T1	0	0	80	30	50	7
T2	40	0	80	30	50	7
T3	30	10	80	30	50	7
T4	10	30	80	30	50	7
T5	20	20	80	30	50	7

Two times weeding was done at 30 days after sowing and 60 days after sowing, respectively. Crops were harvested at proper harvest maturity and harvested crops were sun dried for three days and then threshed on floor.

Collection of experimental data and analyzing statistically: Data of days to flower, days to maturity, plants per m^2 at harvest, pods per plant at harvest, plant height at harvest and grain yield was collected from each plot and then collected data were converted to per hactre. Then the collected data were tabulized and a statistical software statistix-10 was used to calculate analysis of variance and means of the measured parameters were compared using LSD at alpha = 0.05.

3. Results

Effect of different phases of urea spraying: Different phases of urea spraying showed significant variation among the parameters except plants per m^2, pods per plant and yield (table 3). The highest days to flower (40), days to

maturity (94), plant height (32.93 cm) was recorded from P1 (at branching stage), P2 (at pod initiation stage) and P2 (at pod initiation stage) phases respectively (Table 3). On the other hand the lowest days to flower (39), days to maturity (92) and plant height (32.43 cm) was recorded from P2 (at pod initiation stage), P1 (at branching stage) and P1 (at branching stage) phases, respectively (Table 03).

Table 3. Yield and yield contributing characters of lentil affected by different phases of spraying

Phases	Days to flowering	Days to maturity	Plant height (cm)	Plants m^{-2} (No.)	$PodsPlant^{-1}$ (No.)	Yield ($kgha^{-1}$)
P1	40	92	32.43	161	28	1326
P2	39	94	32.93	161	30	1274
CV (%)	0.80	0.68	7.45	1.68	13.33	6.54
LSD (0.05)	0.49	0.99	3.82	NS	NS	NS

P1= at branching stage, P2= at pod initiation stage

Effect of different doses of urea spraying: Different doses of urea showed significant variation among the parameters except plants per m^2 (Table 4). The highest days to flower (40) were found from T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying) treatment which is similar to T4 (application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of urea by spraying) and T5 (application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying) treatments. On the other hand the lowest days to flower (39) were recorded from T1 (application of 100% recommended fertilizers as basal except urea) and T2 (application of 100% recommended fertilizers as basal) treatments. The highest (94) and the lowest (92) days to maturity was found from T5 (application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying) and T1 (application of 100% recommended fertilizers as basal except urea) treatment respectively (Table 04). The highest plant height (34.75 cm) was observed from T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying) treatments and the lowest (28.33) from T5 (application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying) treatment. The highest pods per plant (34) was observed from T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying) treatments and the lowest (21) from T5 (application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying) treatment (Table 04). The highest yield (1517.3 $kgha^{-1}$) was recorded from T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying) treatment followed by T2 (application of 100% recommended fertilizers as basal) and T5 (application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying) treatments (Table 04). On the other hand the lowest yield (1160.8 $kgha^{-1}$) was found from T1 (application of 100% recommended fertilizers as basal except urea) treatment (Table 4).

Table 4. Yield and yield contributing characters of lentil affected by different doses of urea spraying

Treatments	Days to flowering	Days to maturity	Plant height (cm)	Plants m^{-2} (No.)	$PodsPlant^{-1}$ (No.)	Yield ($kgha^{-1}$)
T1	39	92	33.20	158	26	1160.8
T2	39	93	33.16	160	32	1400.2
T3	40	93	34.75	164	34	1517.3
T4	40	93	33.96	160	30	1170.7
T5	40	94	28.33	161	21	1252.0
CV (%)	0.95	0.75	10.84	3.96	14.34	7.22
LSD (0.05)	0.46	0.85	4.33	NS	5.01	114.85

T1= application of 100% recommended fertilizers as basal except urea, T2= application of 100% recommended fertilizers as basal, T3= application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying, T4= application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of

urea by spraying, T5= application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying.

Effect of different interactions: Interaction effect of different phases of urea spraying and different doses of urea spraying showed significant variation among the parameters except days to flower (Table 5). The highest plants per m^2 (168) and the lowest (152) was found from P2T4 (application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of urea by spraying at pod initiation stage) and P1T4 (Basal application of 25% of the urea recommended dose + full dose of other fertilizers during final land preparation and rest of the 75% of urea recommended dose by spraying at branching stage) interaction effect, respectively (Table 05). The highest days to maturity (95) was observed from P2T5 (application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying at pod initiation stage) and P2T4 (application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of urea by spraying at pod initiation stage) interaction effect which is statistically similar to P2T1 (application of 100% recommended fertilizers as basal except urea), P2T2 (Basal application of 100% recommended fertilizers as basal) and P2T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at pod initiation stage) interaction effect. On the other hand the lowest (91) days to maturity was observed from P1T1 (application of 100% recommended fertilizers as basal except urea) interaction which is statistically similar to P1T2 (application of 100% recommended fertilizers as basal), P1T3 (Basal application of 75% of the urea recommended dose + full dose of other fertilizers during final land preparation and rest of the 25% of urea recommended dose by spraying at branching stage) and P1T4 (application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of urea by spraying at branching stage) interaction effect (Table 05). The highest (39 cm) and the lowest (23 cm) plant height were observed from P2T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at pod initiation stage) and P2T5 (application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying at pod initiation stage) interaction effect respectively. The highest (38) and the lowest (21) pods per plant was recorded from P2T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at pod initiation stage) and P2T5 (application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying at pod initiation stage) interaction effect respectively (Table 05). The highest yield (1625.7 $kgha^{-1}$) was observed from P2T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at pod initiation stage) interaction effect followed by P1T5 (application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying at branching stage), P1T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at branching stage) and P2T2 (application of 100% recommended fertilizers as basal) interaction effect. On the other hand the lowest yield (1006.3 $kgha^{-1}$) was observed from P2T4 (application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of urea by spraying at pod initiation stage) interaction effect (Table 05).

Table 5. Yield and yield contributing characters of lentil affected by different interaction

Interactions	Days to flowering	Days to maturity	Plant height (cm)	Plants m^{-2} (No.)	$PodsPlant^{-1}$ (No.)	Yield ($kgha^{-1}$)
P1T1	39	91	33.20	156	25	1124.3
P1T2	40	91	29.00	161	32	1302
P1T3	40	92	30.50	165	29	1409
P1T4	40	92	35.80	152	30	1334.7
P1T5	40	92	33.67	167	21	1460.7
P2T1	39	94	33.20	159	28	1197.3
P2T2	39	94	37.33	159	32	1498.3
P2T3	39	94	39.00	162	38	1625.7
P2T4	39	95	32.13	168	30	1006.3
P2T5	40	95	23.00	155	21	1043.3
CV (%)	0.95	0.75	10.84	3.96	14.34	7.22
LSD (0.05)	10.51	NS	6.43	3.91	8.28	184.42

P1= at branching stage, P2= at pod initiation stage were distributed in main plots and doses of urea spraying, T1= application of 100% recommended fertilizers as basal except urea, T2= application of 100% recommended fertilizers as basal, T3= application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying, T4= application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of

urea by spraying, T5= application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying

Correlation co-efficient and regression equation: Plant height (r = 0.65) showed strong positive correlation with grain yield (Fig 4), pods per plant (r = 0.5) showed moderate positive correlation with grain yield (Fig 5), days to maturity (r = 0.21) showed small positive correlation with grain yield (Fig 3). On the other hand days to flower and plants per m^2 have non-linear relationship with grain yield (Fig 2, 6).

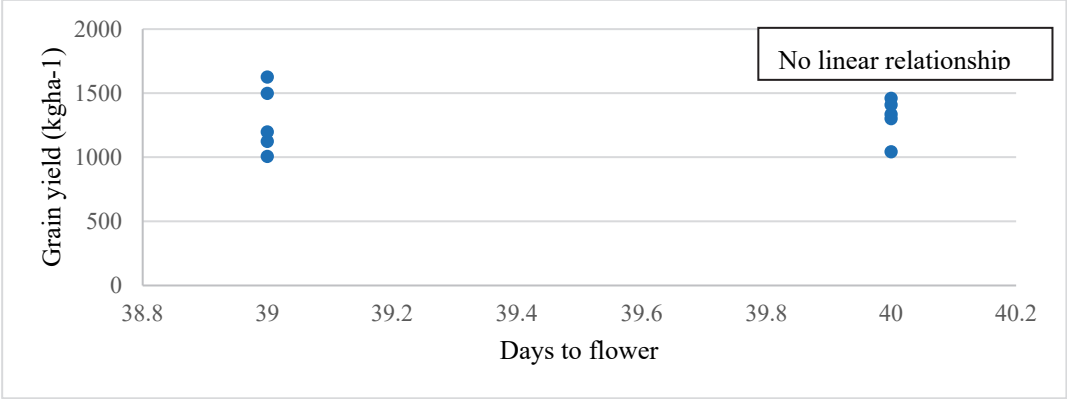

Figure 2. Correlation co-efficient of days to flower Vs Grain yield ($kgha^{-1}$)

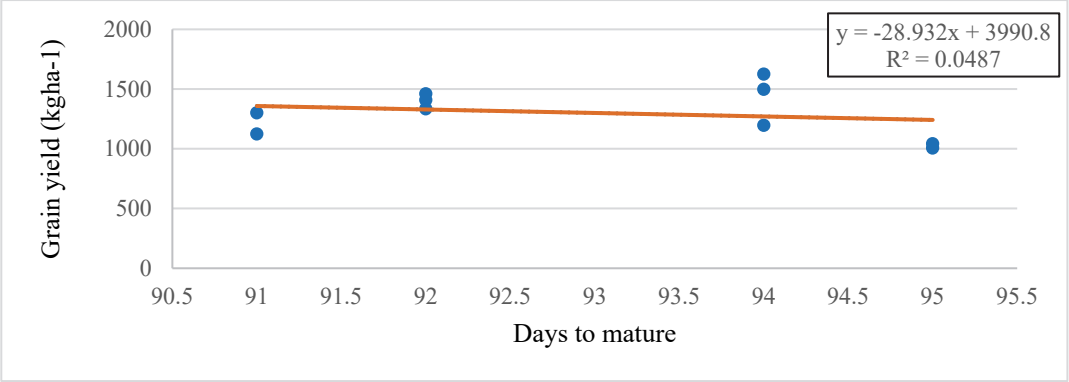

Figure 3. Correlation co-efficient of days to mature Vs Grain yield ($kgha^{-1}$)

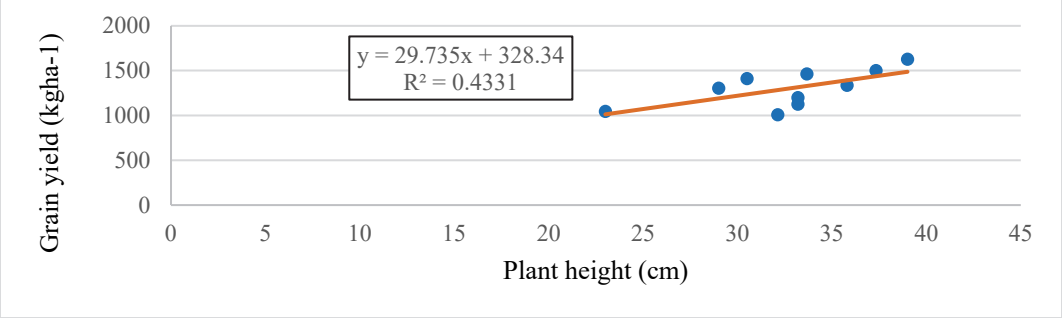

Figure 4. Correlation co-efficient of plant height (cm) Vs Grain yield ($kgha^{-1}$)

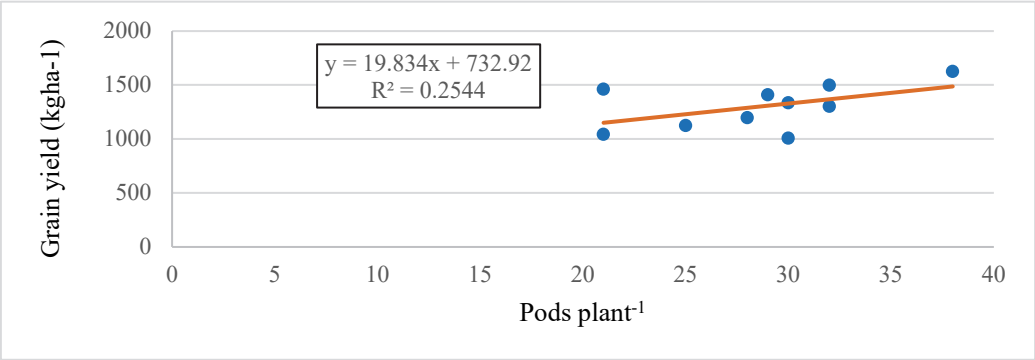

Figure 5. Correlation co-efficient of pods plant-1 Vs Grain yield (kgha-1)

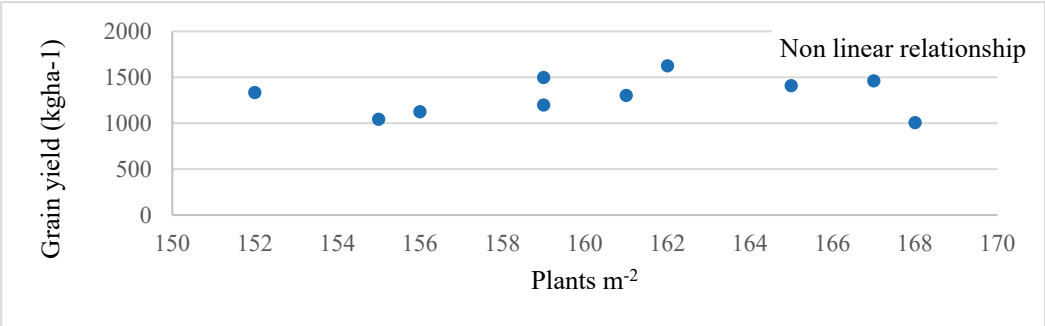

Figure 6. Correlation co-efficient of plants m^{-2} Vs Grain yield ($kgha^{-1}$)

Economic analysis: The highest amount of grain yield (1625.7 $kgha^{-1}$), the highest additional yield over practising method (225.7 kg ha^{-1}), the highest additional return (11736.4 BDT ha^{-1}) as well as the highest marginal benefit cost ratio (3.29) was recorded from P2T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at pod initiation stage) interaction effect (Table 6).

Table 6. Partial cost analysis of interactions for different time of urea spraying and different doses of urea spraying in lentil

Interactions	Grain yield (kg ha^{-1})	Additional Yield (kg ha^{-1}) over practising method	Additional Return (BDT ha^{-1})	Variable cost (BDT ha^{-1})		Total variable cost (BDT ha^{-1})	MBCR (over practising method)
				(Labour + sprayer)	Urea		
P1T1	1124.3	-	-	0	0	0	-
P1T2	1302	-	-	0	560	560	-
P1T3	1409	107	5564	3000	560	3560	1.56
P1T4	1334.7	32.7	1700.4	3000	560	3560	0.47
P1T5	1460.7	158.7	8252.4	3000	560	3560	2.31
P2T1	1197.3	-	-	0	0	0	-
P2T2	1400	-	-	3000	560	3560	-
P2T3	1625.7	225.7	11736.4	3000	560	3560	3.29
P2T4	1006.3	-	-	3000	560	3560	-
P2T5	1043.3	-	-	3000	560	3560	-

P1= at branching stage, P2= at pod initiation stage were distributed in main plots and doses of urea spraying, T1= application of 100% recommended fertilizers as basal except urea, T2= application of 100% recommended fertilizers as basal, T3= application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying, T4= application of 25% of urea with 100% of other fertilizers as basal and rest of the 75% of urea by spraying, T5= application of 50% of urea with 100% of other fertilizers as basal and rest of the 50% of urea by spraying

Input price: Urea- BDT 16 kg^{-1}, labour: BDT 400 day^{-1} 08 $hours^{-1}$, Sprayer- BDT 200 ha^{-1}, lentil seed- BDT 100 kg^{-1} *Output price:* lentil- BDT 52 kg^{-1}

4. Discussions

Yield and yield contributing characters or growth parameters values were increased due to adequate supply of nutrient like nitrogen in proper time incase of basal application of urea with spraying later as in pod initiation stage which is revealed in this present study and this result also similar to (Kuttimani and Velayutham, 2011). (Hossain et al., 2018) reported that maximum grain yield was found when DAP was applied in both branching and pod initiation stages as spray. But in the present study urea was applied only either in branching stage or in pod initiation stage as lentil is a very sensitive to over fertilizer dose and two time spray will increase the production cost ultimately BCR value will be lesser than the recommended method of basal urea application in Bangladesh. In addition incase of two time spray there is a possibility of increasing days to maturity that will destroy the purity of the variety as this variety has released to fit under the fallow period of Aman and Boro rice in Bangladesh. However urea spraying at pod initiation stage with T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying) method of fertilizer application gives maximum result in yield and yield contributing character in the present study. Moreover in P2T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying) interaction 14% yield has increased over recommended method of basal urea application. Simlarly (Ram and Punia, 2018) revealed that two time spray is on par with one time spray either in branching or pod initiation stage for seeds/pod which is directly involved in increasing seed yield.

From the above result chapter it is clear that fertilizer management in T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying) method along with urea spraying in pod initiation stage significantly increase the yield and growth parameters over no spray or basal application. (Ashour and Thalooth, 1983; El-Karmany et al., 2003; Das and Jana, 2015) reported that 2% urea spray has positive effect on growth and yield attributes of lentil. Though in the present experiment the doses of urea spraying did not calculated in (W/V) or in percent basis, rather in weight (kg/ha) basis but indirectly our doses fits in the @2% urea spray as about 500 litre water is required to spray one hactre of land and 10 kg of urea was sprayed in T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying) treatment at pod initiation stage which showed the best result among the all interactions. Similar result was also found by (Ram and Punia, 2018). They reported that urea spraying by @ 2% yielded maximum grain which was 25.4 per cent higher over no spray. The reason behind that is additional nitrogen application may delay the senescence of plants then the plants are getting more time to carbon assimilation in the sink parts so that positive effect implies on plant height, pods/plant as well as in seed yield. Delayed maturity also increases the time to store food material into sink.

In correlation analysis it is found that more number of pods/plant facilitate more seeds and thus it can boost seed yield. Similar trend also found by (Nandan and Pandaya, 1980; Rahman and Sarwar, 1982; Balyan and Singh, 1986; Luthra et al., 1990). Plant height also showed positive correlation and it may be as vigourous growth increases the chances of more number of pods/plant, hence it can increase the seed yield also. (Latief et al., 2015) recorded that pods/plant and plant height and biological yield of lentil is directly involved in increasing seed yield so far.

In economic analysis maximum benefit cost ratio was observed in P2T3 (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying) interaction. Though in urea spraying treatments total variable cost is higher than no spray but in foliar urea spray there was 14% yield improvement over no spray which ultimately results in higher BCR over no spray. So urea spray as T3 method of application at pod initiation stage may be beneficial for yield improvement in BARI Masur-9.

5. Conclusion

From the above results and discussions it may be concluded that seed yield of BARI Masur-9 may be boosted up by the application of fertilizer like nitrogen containing urea as foliar spray at the later stage of plant growth as pod initiation stage. Fertilizer application in the method of (application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at pod initiation stage) gives the maximum result incase of seed yield as well as other yield contributing characters. Correlation coefficient showed that there is positive correlation between seed yield and most of the other yield contributing characters. Economic analysis also reveled that foliar spray of urea as per the above mentioned doses and time gives the highest economic return over other treatment. So application of 75% of urea with 100% of other fertilizers as basal and rest of the 25% of urea by spraying at pod initiation stage may be recommended for yield increasing of BARI Masur-9.

6. Acknowledgement

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