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EFFECT OF FOLIAR FERTILIZATION ON GROWTH AND YIELD OF JUTE

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ABSTRACT

A field experiment was conducted at Jute Research Regional Station, Bangladesh Jute Research Institute, Rangpur, Bangladesh in the year of 2018 to find out the efficiency of foliar application of different fertilizers for growth and yield of jute. There were different fertilizers application treatments were like T_1= RDF (traditional method); T_2= RDF+(7.0g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron)/L water; T_3= RDF+(9.5g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron)/L water; T_4= RDF+(10.0g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron)/L water. Yield contributing characters were significantly affected by the different treatments. The highest plant height, base diameter, fibre and stick yield was recorded in T_4 (3.11m, 13.43mm, 3.42 and 8.03 tha^{-1}, respectively) treatment and the lowest was recorded in T_1 (2.46m, 12.63mm, 2.18 and 6.25 tha^{-1}, respectively) (control) treatment.
Key words: Foliar application, fertilizers, growth, yield, jute.

Introduction

Jute (*Corchorus sp*.) is one of the most important fiber crops of this country. It accounts for 6% of the foreign currency earnings from exports (Islam, 2009). Bangladesh, the second largest producer of jute, produces the best quality jute in the world and leads the export market (Rayhan *et al.,* 2008). In addition, this crop is particularly important in Bangladesh where many small families depend on the income from growing and selling jute (Ghosh *et al.,* 2013). Bangladesh is the largest supplier of jute and jute goods in the international markets and meets up nearly 95% of world raw jute demand and about 60% of jute goods demand (Rahman, 2010). The green leaves of jute contain minerals and proteins, which are edible and popular as a leafy vegetable. Now a day's attempt is being made to popularize the jute plants also for making pulp in paper industries (Dastogeer *et al*., 2011). Judicious application of fertilizer is one of the most effective means for maximizing jute yield. Foliar fertilization, that is nutrient supplementation through leaves, is an efficient technique of fertilization which enhances the availability of nutrients. Several researchers justified the idea that nutrients may be taken up through roots and leaves and may spray within the plant (Ahmed and Ahmed, 2005). The efficiency of different fertilizers assimilation through foliar however depends upon several factors including varieties or genotypes. Basically, jute is the Kharif-1 (March-June) seasonal crop. Weather of this season is hot, humid and rainy (Mollah *et al*., 2017). Fertilizers are loosed through denitrification, volatilization, and leaching. From the above facts, the experiment was designed to find out the efficiency of foliar application of different fertilizers to be assured the better growth and yield of jute.

Materials and Methods

A field experiment was conducted at the Jute Research Regional Station, BJRI, Rangpur during the period from April to August, 2018 to study the efficiency of foliar application of different fertilizers on growth and yield of jute. The experimental field was medium high land belonging to Tista Meander Flood-plain (AEZ-3) having silt loam soil with pH 5.6. Jute variety viz., O-9897 used as test crop and there were four different treatments viz., T1= RDF (traditional method); T2=TDF+(7.0g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron)/L water; T3=TDF+(9.5g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron)/L water; T4=TDF+(10.0g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron)/L water. The experimental field was prepared with three ploughing and cross ploughing

followed by laddering. A randomized complete block design (RCBD) was used for this experiment with three replications. The unit plot size was 4m x 5m. The line to line and plant to plant spacing were 30 cm and 5 cm, respectively. The crop was sown on 15 April, 2018. The climatic condition was hot and humid with frequent rain during the study period (Table 1). The crop was fertilized with urea, triple superphosphate, muriate of potash and gypsum (200, 50, 60 and 95 kg/ha, respectively) at final land preparation. Treatments T2, T3 and T4 were applied three times during cultivation period started from 30 days after sowing @ 2% (w/v). The foliar application was done at full sunny day on the stem as well as a dorsal and ventral portion of the leaf. All intercultural operations were done accordingly for the production technique. Weeding was done by hand at 30 and 50 days after sowing (DAS). The crop plants were infested by caterpillar at vegetative stage. Insects were successfully controlled by spraying Ripcord 10 EC @2 ml L-1 of water at an interval of 10 days. Removal of excessive rainwater was done as and when necessary. The crop was harvested at 120 days after sowing and plant characters were recorded from 10 randomly selected plants of each plot. Recorded data were analyzed by using the Analysis of Variance Technique and difference among the treatment means were adjudged by Duncan's Multiple Range Test (DMRT) followed by statistical computer package program MSTAT-C (Gomez and Gomez, 1984).

Table 1. Meteorological data recorded at the experimental site during the study period

Month	Air temperature		Rainfall (mm)	Relative Humidity (%)	Sunshine (hrs/day)	Cloudy (hrs/day)
	Min	Max				
April	24ºC	32 ºC	185	92.54	7.53	4.13
May	25 ºC	33 ºC	121	91.62	5.65	6.17
June	26 ºC	32 ºC	243	93.64	4.49	7.44
July	25 ºC	32 ºC	396	90.23	5.16	6.45
August	25 ºC	31 ºC	288	88.56	4.56	6.88

Results and Discussion

Plant population: Plant population of all treatments was statistically similar. Highest plant population was recorded in T_1 (23.5) treatment which was statistically identical with other treatments (Table 2).

Table 2: Comparison among different fertilizer treatments on growth and yield of jute

Treatments	Plant Population m^{-2}	Plant height (m)	Base diameter (mm)	Fiber yield (tha^{-1})	Stick yield (tha^{-1})	Yield increase over control
T1	36.67a	2.46b	12.63b	2.18c	6.25d	-
T2	36.33a	2.97a	12.80b	2.73b	6.65c	25.23
T3	36.67a	3.04a	12.87b	2.93b	7.57b	34.40
T4	36.67a	3.11a	13.43a	3.42a	8.03a	56.88
CV%	4.65	4.90	2.48	8.86	3.47	-
LSD (5%)	2.72	0.226	0.510	0.395	0.395	-

Here: T_1= RDF (traditional method); T_2= TDF + (7.0g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron)/L water; T_3= TDF + (9.5g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron)/L water; T_4= TDF + (10.0g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron)/L water

Plant height: Plant height is an important growth and yields contributing character of jute. Significant results were found among treatments (Table 2). The Highest plant height was recorded (3.11m) in T_4

treatment which is statistically identical with T_3 and T_2 treatments whereas the lowest plant height was recorded (2.46m) in T_1 treatment. A similar result was reported by Khan and Tareq (2018).

Base diameter: Base diameter is an important growth and yields contributing character of jute. Significant results were found among treatments (Table 2). The highest base diameter was recorded (13.43mm) in T_4 treatment and the lowest was recorded (12.63mm) in T_1 which is statistically identical with T_3 and T_2 treatments. A similar result was reported by Khan and Tareq (2018).

Fiber yield: Fiber yield is the ultimate yield contributing character of jute. Significant results were found among treatments (Table 2). The highest fiber yield was recorded (3.42 tha^{-1}) in T_4 treatment and the lowest was (2.18 tha^{-1}) in T_1 treatment. Treatments T_3 (293 tha-1) and T_2 (273 tha^{-1}) remain in the middle position and which are statistically identical. Similar results were reported by Khan and Tareq (2018) in jute, Hasanuzzaman *et al*. (2009) and Islam *et al*. (2015) in rice.

Stick yield: Stick yield is also an important yield contributing character of jute. Significant results were found among treatments (Table 2). The highest stick yield was recorded (8.03 tha^{-1}) in T_4 treatment and the lowest was (6.25 tha^{-1}) in T_1 treatment. Treatments T_3 (293 tha^{-1}) and T_2 (273 tha^{-1}) remain in the middle position and which are statistically identical. Similar results were reported by Khan and Tareq (2018) in jute, Hasanuzzaman *et al*. (2009) and Islam *et al*. (2015) in rice.

Yield increase over control: Result revealed that foliar application of fertilizer has a significant effect on growth and yield of jute production over control. The highest fiber yield increase (56.88%) over control was recorded by using T_4 treatment (Table 2).

Conclusion

From the above results it can be concluded that 10.0g Urea+5.0g MoP+1.0g Theovit+0.50g Chillated Zinc+0.50g Boron fertilizer combination provide the highest growth and yield among all other treatments over control.

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