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Seed Production of Jute (*Corchorus olitorius*) as influenced by Potassium, Sulphur and Decapitation

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ABSTRACT

A field experiment was conducted for 2 years during May-November of 1995 and 1996 at the Instructional Farm (22.93°N, 88.53°E, 9.75 m AMSL) of Bidhan Chandra Krishi Viswavidyalaya, Mohanpur to evaluate the effect of potassium (K), sulphur (S) and decapitation on the seed production of *olitorius* jute (cv. JRO-524). Application of K, S and decapitation at 55 DAS significantly influenced the seed production of jute. The higher seed yield due to different treatments was obtained through the increase in number of branches/plant, number of pods/plant and number of seeds/pod. The highest seed yield of 759 kg ha^{-1} was obtained with 40 kg K_2O along with 40 kg S ha^{-1} which was at par with 40 kg K_2O along with 20 kg S ha^{-1} yielding 747 kg of jute seed ha^{-1}. Application of S reduces the benefit: cost ratio due to high cost of the material. Therefore, to get maximum profit per unit of investment, S application is not suggested for jute seed production in the plains of West Bengal.

***Key words*:** Potassium; sulphur; decapitation; jute; seed production.

INTRODUCTION

Jute plays a predominant role in the country's economy particularly for that of the eastern region (Basu, 1999) and at the same time this natural fibre jute conserves and also improves the environment right from the production to industrial processing and even up to the disposal of waste due to its biodegradability (Mahapatra and Saha, 1999). For production of such a useful fibre the eastern region of our country needs about 5000 t of jute seed for 8 million ha of jute area. Surprisingly such a huge quantity of jute seed is not produced in the eastern part of India rather it comes from other regions of India. But it is worth to mention that the agro-climatic condition of some part of the eastern region is very much suitable for jute seed production. So, balanced use of fertilizers can increase the productivity of jute seed. If these seeds could be produced in the jute growing region itself by using suitable agro techniques, the huge transportation cost may be eliminated. Therefore, for jute seed production in the southern plains of West Bengal the present investigation was undertaken to study the effect of potassium, sulphur and decapitation on the seed production of jute.

MATERIALS AND METHODS

A field experiment was conducted for 2 years during May-November of 1995 and 1996 at the Instructional Farm, Jaguli, (22.93º N, 88.53º E, 9.75 m AMSL), Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal to study the effect of potassium, sulphur and decapitation on the seed production of olitorius jute (*Corchorus olitorius*) cv. JRO-524 (Navin). The experimental soil was sandy-loam having pH 7.2, organic carbon 0.35%, total N 0.36%, available P 22 kg ha^{-1}, available K 187 kg ha^{-1} and available S 8.4 ppm. The trial was laid out in a split-split plot design with 18 treatments replicated thrice. The treatments were 3 levels of potassium at 0, 20 and 40 kg K_2O ha^{-1} (in the main plots), three levels of

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sulphur at 0, 20 and 40 kg S ha^{-1} (in the sub plots) and 2 methods of decapitation i.e., without decapitation and decapitation at 55 days after sowing (in the sub-sub plots). Nitrogen (20 kg N ha^{-1}) and phosphorus (30 kg P_2O_5 ha^{-1}) were applied as basal and the remaining 20 kg N ha^{-1} was applied after first weeding (35 DAS) for all the plots. Potassium in the form of muriate of potash and sulphur in the form of elemental S (80% WP) was applied as per the treatment details. Biometrical observations were recorded at harvest.

RESULTS AND DISCUSSION

Number of branches/plant

Application of potassium increased the number of branches significantly and the maximum number of branches (6.05/plant) was recorded with the application of 20 kg K_2O ha^{-1} (Table 1). Sulphur application also significantly influenced the number of branches and the highest number of branches (6.38/plant) was recorded with 40 kg S ha^{-1}. Decapitation (at 55 DAS) was superior as compared to no decapitation regarding the production of branches. Similar result of increasing the number of branches by pruning of apical meristems was reported earlier (Dey *et al.*, 1998).

Table 1. *Effect of K, S and decapitation on number of branches/plant, pods/plant, seed/pod, 1000 seed weight and seed yield of olitorius jute (Pooled data of 2 years)*

Treatments	No. of branches per plant	No. of pods per plant	No. of seeds per plant	1000 seed weight (g)	Seed yield (kg ha^{-1})
Level of K (Kg ha^{-1})					
K_0	5.77	23.66	180.78	1.76	666.27
K_{20}	6.05	25.22	186.25	1.79	700.05
K_{40}	5.66	25.38	187.85	1.82	734.94
CD at 5%	0.11	1.11	3.98	NS	14.60
Level of S (Kg ha^{-1})					
S_0	5.16	23.99	183.13	1.77	678.72
S_{20}	5.77	25.16	185.86	1.79	705.10
S_{40}	6.38	25.10	187.84	1.80	719.40
CD at 5%	0.24	0.55	1.60	NS	7.86
Method of seed production					
No decapitation (D_0)	4.59	21.55	181.19	1.80	663.66
With decapitation (D_1)	6.96	27.95	188.71	1.78	738.51
CD at 5%	0.40	0.41	1.42	NS	5.38

Number of pods/plant

Number of pods differed significantly with different levels of K, S and decapitation. In case of K, the maximum number of pods (25.38/plant) was recorded with 40 kg K_2O ha^{-1}, which was at par with 20 kg K_2O ha^{-1} resulting 25.22 pods/plant. Similar result was also observed in case of S. Sulphur at 20 kg ha^{-1} produced the maximum number of pods (25.16/plant) and which was at par with 40 kg S ha^{-1}. Decapitation also gave significantly higher number of branches as compared to no decapitation. Earlier report supports this observation (Dey *et al*., 1998).

Number of seeds/pod

Potassium significantly influenced the number of seeds per pod and the maximum number of seeds (187.85/pod) per pod was observed with 40 kg K_2O ha^{-1} and which was at par with 20 kg K_2O ha^{-1} resulting 186.25 seeds/pod. Sulphur also significantly increased the number of seeds. The maximum number of seeds (187.84/pod) was recorded with 40 kg S

ha^{-1}. Decapitation also followed the same pattern of result like K and S. Decapitation gave the higher number of seeds/pod as compared with the seeds/pod in the non-decapitated plots.

Test weight (1000 seed weight)

The test weight not varied significantly with different levels of K, S or decapitation. However, the highest test weight of 1.82 g was recorded with 40 kg K_2O ha^{-1}.

Seed yield

Application of K significantly influenced the jute seed yield and the highest seed yield (734.9 kg ha^{-1}) was recorded with 40 kg K_2O ha^{-1}. Sulphur also increased the seed yield of jute significantly and the highest jute seed yield (719.4 kg ha^{-1}) was observed in the treatments receiving 40 kg S ha^{-1}. Similar result also reported earlier (Porch and Islam, 1986). It was previously reported that gradual increase in the levels of fertilization increase seed yield of *olitorius* jute (Bhattacharjee *et al.*, 2000). The seed yield of jute varied significantly with the 2 methods of decapitation. Decapitation at 55 DAS produced the highest seed yield of 738.5 kg ha^{-1}.

Interaction effect of K and S on the yield attributing character and seed yield

The interaction effect of K and S on the number of branches, number of seeds/pod and 1000 seed weight were not significant. However, the number of pods per plant and jute seed yield differed significantly with the interaction effect of K and S (Table 2).

The highest number of pods (26.33/plant) was observed with 40 kg K_2O and 40 kg S ha^{-1} which was at par with 40 kg K_2O ha^{-1} along with 20 kg S ha^{-1} resulting 26 pods/plant. The lowest number of pods (23.66/plant) was recorded were no K or S was applied.

The highest seed yield of *olitorius* jute (759 kg ha^{-1}) was recorded with 40 kg K_2O and 40 kg S ha^{-1} which was at par with 40 kg K_2O and 20 kg S ha^{-1} producing 747 kg of jute seed ha^{-1}.

Table 2. *Interaction effect between K and S on number of pods/plant in olitorius jute*

Treatment	Number pods/plant		
	K_0	K_{20}	K_{40}
S_0	23.66	24.50	23.83
S_{20}	24.16	25.33	26.00
S_{40}	23.16	25.83	26.33
CD at 5%		1.35	

Table 3. *Interaction effect between K and S on the seed yield and benefit: cost ratio of olitorius jute*

Treatment	Seed yield (kg ha^{-1})			Benefit: cost ratio		
	K_0	K_{20}	K_{40}	K_0	K_{20}	K_{40}
S_0	658.33	679.00	698.83	2.67	2.69	2.71
S_{20}	667.66	700.66	747.00	2.35	2.44	2.60
S_{40}	698.83	720.50	759.00	2.18	2.22	2.33
CD at 5%		15.61				

Benefit: cost ratio

The economic considerations of the results from the experiment showed that the highest benefit: cost ratio (2.71) was obtained with 40 kg K_2O ha^{-1} along with no application of sulphur (Table 3). In all the cases irrespective of potassium doses, it had been observed that benefit: cost ratio reduced gradually with the increasing levels of sulphur; this is attributed to the high cost of elemental sulphur in the market.

Hence, it may be inferred from the result of this experiment that highest amount of seed production of *olitorius* (JRO-524) jute could be obtained if the crop is fertilized with 40 kg K_2O ha^{-1} along with 20 kg S ha^{-1} besides basal application of nitrogen and phosphorus and decapitation at 55 days after sowing. Whereas, by considering the economic aspects of jute seed production, it had been observed that application of elemental sulphur reduces the value of benefit: cost ratio due to high market price of the material. Hence, to obtain maximum monetary benefit per unit of investment application of elemental sulphur is not suggested although it can produce the highest quantity of jute seed.

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