

## Feasibility of growing intercrops with jute (*Corchorus olitorius* L.) grown for seed production in West Bengal, India

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Received: 17-11-2012, Revised: 25-4-2013, Accepted: 30-4-2013

### ABSTRACT

A field experiment was conducted for consecutive two years from 2007 to 2008 to study the feasibility of growing intercrops in the widely spaced seed crop of *olitorius* jute (cv. JRO 524) in Typic Ustochrept soil with neutral sandy-loam textured soil having medium fertility. Intercropping of black gram (*Vigna mungo*) for fodder in the widely spaced jute seed crop increased the jute seed equivalent yield by 31.3% (from 3.48 q to 4.57 q ha<sup>-1</sup>). Rice bean (*Vigna umbellata*) as intercrop in jute seed crop can also improve the JSEY by 30.5% (from 3.48 q to 4.54 q ha<sup>-1</sup>). Cowpea and green gram as intercrop in jute seed crop was also increased the JSEY by 15.8 and 15.2 %, respectively.

**Keywords:** Intercropping, jute seed crop, legume

Unlike most other crops, the seed crop of jute is different than the fibre producing crop from crop management point of view. Every year for production of jute fibre, about 5000 t of seed is required for 0.8 million ha of eastern India. Surprisingly such a huge quantity of jute seed is not produced in the eastern part of India rather it comes from distant regions of India (Andhra Pradesh, Maharashtra). But it is worth to mention that the agro-climatic condition of some part of the eastern region is suitable for jute seed production (Mondal *et al.*, 2003). Often the jute seeds are not available in time for sowing and the transportation component adds cost to the seed (Kumar *et al.*, 2010). Therefore, efforts need to be given to produce atleast some amount of jute seeds in the fibre producing areas itself. In case of jute seed production, farmers will have to forgo transplanted rice and, therefore, the cropping system needs to be remodelled including a pre-kharif crop. Intercropping in jute seed crop is likely to be a paying proposition in case the recommended wider inter-row spacing (45 cm) is utilized for growing additional crops without involving any extra land. Intercrops like sesame (*Sesamum indicum* L.), black gram [*Vigna mungo* (L.) Hepper], green gram [*Vigna radiata* (L.) Wilczek], cowpea [*Vigna unguiculata* (L.) Walp.] and rice bean [*Vigna umbellata* (Thunb.)] may conveniently accommodated within the inter-row space of jute seed crop with a plant population density of 2.2 lakh ha<sup>-1</sup>.

### MATERIALS AND METHODS

The field experiment was conducted for consecutive two years from 2007 to 2008 at the main farm of Central Research Institute for Jute and Allied Fibres (22.75°N, 88.43°E, 3.14 m AMSL) to study the feasibility of growing intercrops in the widely spaced seed crop of *olitorius* jute (cv. JRO 524). The experimental soil was Typic Ustochrept with sandy-loam texture having neutral pH 7.15 (1:2.5 w/v), organic carbon 5.50 g kg<sup>-1</sup>, medium in fertility (available N, P and K were 275, 34 and 128 kg ha<sup>-1</sup>, respectively). There were 6 treatments fitted in RBD with 4 replications. The six (6) treatments were: T<sub>1</sub>: Jute + sesame (one

weeding); T<sub>2</sub>: Jute + cowpea (one weeding); T<sub>3</sub>: Jute + greengram (one weeding); T<sub>4</sub>: Jute + blackgram (no weeding); T<sub>5</sub>: Jute + ricebean (no weeding) and T<sub>6</sub>: Jute alone (weeding twice). The intercrop varieties were B67 or Tilottama (sesame), Pusa Komal (cowpea), PS-16 (green gram), T-9 (black gram) and K-1 (rice bean). Seed crop of jute was sown in the first week of June and harvested at maturity in the 3<sup>rd</sup> week of November (165-170 days duration). Sesame (One weeding for T<sub>1</sub> T<sub>2</sub> & T<sub>3</sub>), cowpea (No weeding for T<sub>4</sub> & T<sub>5</sub>) and green gram (Two weeding for T<sub>6</sub>) were planted two weeks after jute sowing in lines in between the intercrop space of jute seed crop. Black gram and rice bean were sown as broadcast. The jute seed equivalent yield (JSEY) was calculated for comparison. The recommended dose of N: P: K (60:60:60 kg ha<sup>-1</sup>) was applied. 1/3<sup>rd</sup> N was applied as basal with the sowing of jute, 1/3<sup>rd</sup> N with the sowing of intercrops (i.e., after 15 days of jute sowing) and remaining N was applied at the time of topping of jute seed crop (45 DAS). The full dose of P and K fertilizer was applied as basal at the time of final land preparation. All other standard agronomic practices for *olitorius* jute seed crop were followed.

The experiment was actually designed to include 3 intercrops (sesame, cowpea and green gram) for grain or seed production and 2 intercrops for fodder (black gram and rice bean). But the fate of kharif legume grain crops remained uncertain due to inadequate flowering-cum-seed formation under the studied intercropped environment. The insignificant level of poor quality grain production was, therefore, ignored while calculating jute seed equivalent yield but the fodder yield was considered for all the legumes. The seed yield of sesame was very low and not considered for computing JSEY.

### RESULTS AND DISCUSSION

#### Plant height and basal diameter

The plant height and the basal diameter of jute seed crop were not affected by the intercropping treatments. The plant height varied between 98 and 110 cm, whereas, the basal diameter varied within a narrow

range of 0.938 to 1.035 cm. The number of branches also varied insignificantly between 3.15 and 3.32 (Table 1).

#### Jute seed yield parameters

Significant variation was recorded in the number of pods per plant. The highest number of pods (39/plant) was noted in the sole jute seed crop; whereas,

number of pods per plant in the intercrop treatments remained within a narrow range of 30-33 pods per plant. Number of seeds per pod varied between 203 and 225. The 1000 seed weight also not differed significantly and the values ranged from 1.88 to 2.00 g.

**Table 1: Effect of growing intercrops in jute seed crop and its impact on jute seed equivalent yield (JSEY)**

Treatments	Plant height of jute (cm)	Basal diameter (cm)	No. of branches	Pods plant <sup>-1</sup>	Seeds pod <sup>-1</sup>	1000 seed weight (g)	Jute seed yield (q ha <sup>-1</sup> )	Yield of intercrops (q ha <sup>-1</sup> )	JSEY of intercrop system (q ha <sup>-1</sup> )
Jute + sesame	107	0.975	3.15	33	211.2	1.94	2.93	0.50*	2.93
Jute + cowpea	98	0.948	3.26	31	225.3	1.90	2.91	78.23 (1.12)	4.03
Jute + green gram	109	1.035	3.25	31	203.2	2.00	2.50	105.44 (1.51)	4.01
Jute + black gram	110	0.945	3.32	30	218.9	1.95	2.34	156.46 (2.23)	4.57
Jute + rice bean	104	0.938	3.26	32	214.1	1.88	2.97	109.98 (1.57)	4.54
Jute alone	100	0.958	3.16	39	212.5	1.93	3.48	0	3.48
<b>LSD (0.05)</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>	<b>7.44</b>	<b>NS</b>	<b>NS</b>	<b>0.91</b>	<b>24.73</b>	<b>-</b>

Note: NS-Not significant; values in parenthesis represent the jute seed equivalent yield; rate of produce - jute seed (Rs.70 kg<sup>-1</sup>), fodder (Rs.100 q<sup>-1</sup>), lentil (Rs.2900 q<sup>-1</sup>). \*the insignificant seed yield was ignored while calculating the JSEY.

#### Jute seed yield

In the first year of the experiment, the weather remained aberrative during the flowering phase characterized with relatively higher temperature and 19% more rainfall (as compared to long term average of 291.51 mm for September) during late August and September and the healthy seed crop succumbed to severe infection of *Macrophomina phaseolina* (through aerial spores attacking from the top and gradually damaging downward) and the infection could not be controlled satisfactorily despite all possible measures and this affected the seed crop resulting comparatively lower seed yield of jute. Jute seed yield varied significantly among different intercrop treatments. The highest jute seed yield was obtained in sole jute (3.48 q ha<sup>-1</sup>). All the intercrops reduced the jute seed yield and the reduction was to the tune of 14.7 to 32.8% as compared to the sole jute crop. Islam *et al.* (1992) reported that intercropping in jute seed crop reduced the seed yield by 40-53% in Bangladesh. It was also reported that jute + *lalsak* (*amaranthus*) intercropping gave the maximum benefit: cost ratio (11.81) followed by the B: C ratio of 9.38 in jute + radish intercropping (Asaduzzaman and Hussain, 1990).

#### Intercrop yield

Among the legume intercrops, the highest green fodder yield was recorded in case of black gram (156.7 q ha<sup>-1</sup>) which in turn gave 2.23 q of JSEY. The other legume intercrops that performed well were rice bean (JSEY 1.57 q ha<sup>-1</sup>) and green gram (JSEY 1.51 q ha<sup>-1</sup>). Jute seeds equivalent yield enhanced with the intercropping of *khari* legume fodder crops like black gram (31.3 %) and rice bean (30.5%) as compared to the sole jute seed crop. In Bangladesh, jute seed could be grown profitable with early planted sugarcane (Islam *et al.*, 1993).

Intercropping of black gram or rice bean for fodder in the widely spaced jute seed crop may increase the jute seed equivalent yield by about 30%.

#### ACKNOWLEDGEMENTS

Authors are grateful to (Late) Dr. Ajit Kumar Bhattacharjee, Principal Scientist (Agronomy) and Head (Retd.), Crop Production Division of CRIJAF (ICAR), Barrackpore for conceptualizing the idea of intercropping with jute seed crop. We convey our sincere thanks to the Director, CRIJAF for providing all possible assistance for the study.

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