

# STUDY ON JUTE CULTIVATION TECHNIQUES TO ESTABLISH THE RAW JUTE MATERIAL AREA FOR PULP PRODUCTION IN THE PLAIN OF REEDS

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## BACKGROUND

Currently, the largest jute growing area is in Long An province. In 2006, the jute growing area in Long An occupied 64.6% of the total land areas. The raw jute material production has been low efficiency due to weak linkage between producers and processing industry and consumption.

Presently, the Southern pulp factory invested by Vietnam Government is located in Long An province with pulp production capacity of 100,000 tons/year (equivalent to 600,000 tons fresh jutes). Provide that to meet the raw jute material, the Long An government has constructed the jute material production area with the purpose of changing from producing fiber to pulp.

However, jute for pulp production needs high biomass yield which differs from jute for fiber. Therefore, research to set up optimal jute cultivation techniques for pulp jute material production in the Plain of Reeds, Long An province is needed.

## MATERIALS AND METHODS

Material : jute varieties  
Location : Thanh Phu-Thanh Hoa-Long An and Binh Hoa Dong-Moc Hoa-Long An  
Crop : Summer-Autumn 2010 and Summer-Autumn 2011.

Method:

- Varietal trial of promising jute varieties
- NPK fertilizers application rates
- Land preparation methods

The experiment was randomized complete with three replications. The comparison experiment of sowing densities, fertilizer rates, fertilizing splits and harvest time were designed in large plot without replication. The final research result was carried out on demonstration field.

Table 1. Jute cultivation practices

		Jute cultivation technique for pulp production	Farmer's practice
1	Land preparation	With soil turning over	Without soil turning over
2	Sowing density (kg/ha)	14 kg	16 kg
3	Fertilizer	180 N - 60 P <sub>2</sub> O <sub>5</sub> - 120 K <sub>2</sub> O	150N - 54 P <sub>2</sub> O <sub>5</sub> - 4 K <sub>2</sub> O
4	Fertilizer application times	1 day BS; 10, 35, 55 days AS	10, 30, 50 days AS

(BS: before sowing, AS: after sowing)

## RESULTS AND DISCUSSION

### Yield of jute varieties.

The research results showed that Tainung jute variety exhibited better characteristics than the others. The trunk height was 3.3-3.5m, higher than that of local varieties by 0.3-0.5m and the trunk

diameter was 6.3-6.5mm with significant difference compared to local ones. The yield of Tainung variety was 85-93 tons/ha higher than that of local varieties by 43.3-48.3%. The profits from Tainung jute was higher than that of local variety by 86.1-91.1%

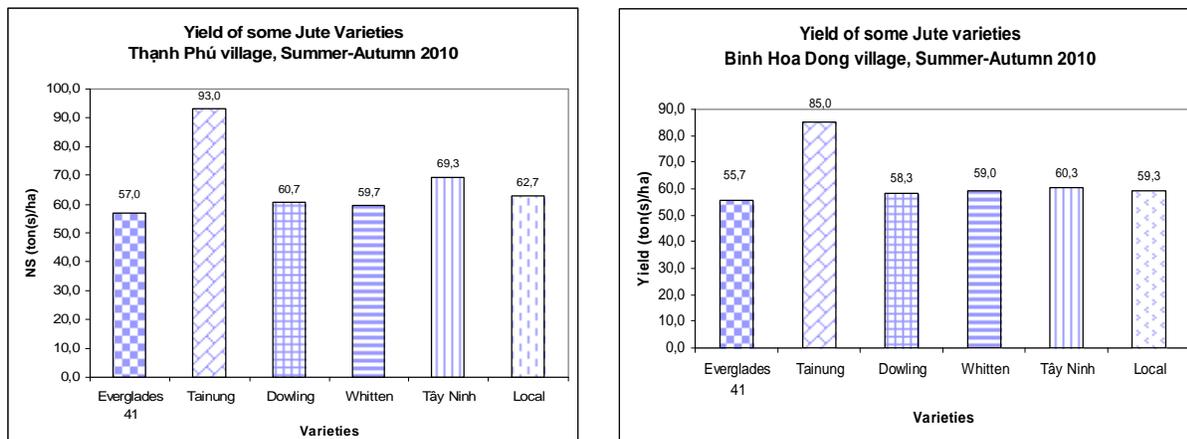


Figure 1. Yield of jute varieties

### Land preparation method

Sowing without land preparation has the advantage of right time for crop and enough moisture for jute growth up in the early crop stage. With this method, farmer could save the cost of irrigation, but in the late crop stage, the jute would slowdown the growth speed. The soil turing over method combining with irrigation had an effect on speed up the growth of jute, consequently increased the yield in comparison with farmer's practice, but this practice should consider the irrigation cost. There is difference of yield but not economic efficiency between the two methods.

### Sowing density

The sowing rate of 10-12 kg/ha of seed gave a sparse plant density, so that it gave low yield. With the rate of 16-18 kg/ha of seed gave high plant density leading to unefficient light for photosynthesis, so that it decreased the yield. Optimal sowing rate was 14 kg/ha giving high yield of 71.2 tons/ha, increased 3.19% of yield and 6.26% of economic efficiency in comparison with farmer's practice.

### Effect of N fertilizer on yield and fertilizer use efficiency

With the rate of 0N - 60P<sub>2</sub>O<sub>5</sub> - 60K<sub>2</sub>O gave short and stunted trunk, and throughout the crop stage leaf colour was light yellow, as a result, jute gave low biomass yield. With the rate of 30N - 60P<sub>2</sub>O<sub>5</sub> - 60K<sub>2</sub>O and 60N- 60P<sub>2</sub>O<sub>5</sub> - 60K<sub>2</sub>O, the leaf colour was light yellow, consequently jute gave low biomass yield. With the rate of 90N - 60P<sub>2</sub>O<sub>5</sub> - 60K<sub>2</sub>O and 120N- 60P<sub>2</sub>O<sub>5</sub> - 60K<sub>2</sub>O, The growth of jute although was better, but the yield was not improved. With the rate of 150N to 180N, jute exhibited well growth, high trunk height and big trunk diameter of 5.9-6.9m, consequently gave high yield. At the rate of 210N, the yield stop increasing. In summary, with the rate of 180N, jute gave highest yield (62.7 -79.0 tons/ha), an increase of 161.25-195.88% over than control.

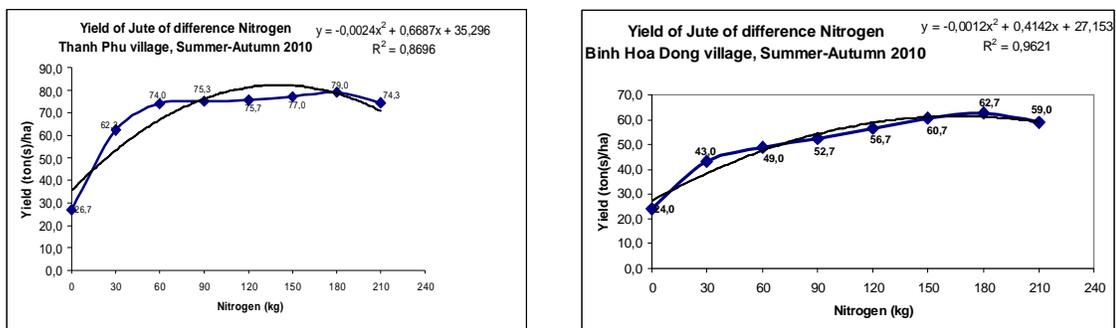


Figure 2. Yield of jute at different N rate

### Effect of P fertilizer on yield and fertilizer use efficiency

With the rate from  $30P_2O_5$  to  $120P_2O_5$  had increased yield in comparison with non-phospahte dose, but it was not significant difference. This result was coincided with Dang Kim Son's report (1991). The assessment result of fertilizer use efficiency indicated that at the rate of  $60P_2O_5$  gave highest fertilizer use efficiency (0.07-0.17 tones of jute/kg  $P_2O_5$ ).

### Effect of K fertilizer on yield

On acid sulfate soil, increasing application rate of K gave an improvement of yield, but it was not significant difference between K levels. The research results showed that applying  $120K_2O$  had increased 12.81- 47.17% of yield over than farmer's practice.

### Fertilizer application time

In the periods of 30-35 days and 50-55 days after sowing, the plants grow strongly, if the fertilization was stopped on the day 35 AS or just only 2 times of fertilizer applications, the nutrients would not respond promptly and fully for jute growth and development, consequently jute gave a low biomass yield. With 4 or 5 splits fertilization, jute gave the same biomass yield, and increased by 4.92-12.65% compared to farmer's practice. The research results showed that with 4 splits applications (1 day BS and 10, 35, 55 days AS) gave high yield and saved production cost.

### Haversting time

Harvesting at 105 days AS is too early, because of at this time the plants still keeping growth and development, thus the yield does not reach to the potential and pulp quality is not good due to foam. At 150 and 165 days AS, jute gave high yield of 62 -75 tons/ha over by 5.1-21.0% of yield and 9.57-37.86% of economic efficiency compared to farmer's practice.

In the fact, the jute growing areas are prone to floods, the harvest time would be better taking place at 150 days AS, and at this time, jute is matured for giving high productivity and good quality of pulp.

### Economic efficiency of jute cultivation techniques for pulp production in large plot

Application of new techniques in jute cultivation gave higher pulp production with an increase of 14.2-20.8 tones/ha (or 22.8%-33.3%) over than control, and an economic efficiency increase of VND 8,830,000-VND 13,120,000/ha (or 38.5%-57.1%) over than farmer's practice. The production cost of jute cultivation for pulp production was VND 217-236/kg of jute compared to VND 282-283/kg of farmer's practice or 38.5-57.1% over compared to farmer's practice.

Table 2. Yield of jute cultivation techniques in large plots (*Thanh Phu, Summer-Autumn 2011*)

Practice methods	Yield (tons/ha)	Increase over farmer' practice (tons/ha)	Increase over farmer' practice (%)	Production cost (VND/kg jute)
Jute cultivation technique for pulp production	83.3	20.8	33.3	217
Farmer's practice	62.5	-	-	282

Table 3. Yield of jute cultivation techniques in large plots (*Binh Hoa Dong, Summer-Autumn 2011*)

Practice methods	Yield (tons/ha)	Increase over farmer' practice (tons/ha)	Increase over farmer' practice (%)	Production cost (VND/kg jute)
Jute cultivation technique for pulp production	76.6	14.2	22.8	236
Farmer's practice	62.4	-	-	283

Table 4. Profit of jute cultivation techniques in large plots (*Thanh Phu, Summer-Autumn 2011*)

Practice methods	Total income (VND/ha)	Total production cost (VND/ha)	Profit (VND/ha)	Increase over farmer' practice	
				(VND/ha)	(%)
Jute cultivation techniques for pulp production	54,145,000	18,050,000	36,095,000	13,120,000	57.1
Farmer's practice	40,625,000	17,650,000	22,975,000	-	-

*Jute Price: 650 VND / kg*

Table 5. Profit of jute cultivation techniques in large plots (*Binh Hoa Dong, Summer-Autumn 2011*)

Treatment	Total income (VND/ha)	Total production cost (VND/ha)	Profit (VND/ha)	Increase over farmer' practice	
				(VND/ha)	(%)
Jute cultivation techniques for pulp production	49,790,000	18,050,000	31,740,000	8,830,000	38.5
Farmer's practice	40,560,000	17,650,000	22,910,000	-	-

*Jute price: VND 650 / kg*

## CONCLUSIONS

Tainung jute variety gave high biomass yield of 85-93 tons/ha, with an increase of 43.3-48.3% compared to local varieties.

The application rate of 180N - 60P<sub>2</sub>O<sub>5</sub> - 120K<sub>2</sub>O with split fertilization of 1 day BS and 10, 35, 55 days AS gave high yield and good economic efficiency.

Seeding rate of 14 kg/ha of seed was the appropriate density.

Tuning over the soil was the better sowing method giving higher yield than that of without soil preparation.

Harvest time at 150-165 days AS gave highest economic efficiency.

Jute cultivation techniques method for julp production had an effect to increase jute biomass yield by 22.8-33.3% and income by 38.5-57.1% in comparison with farmer's practice.



Experiment on Jute Tainung variety



Experiment on Jute Everglade variety



