

Happy Seeder Technology in Jute Cultivation:

A Successful Attempt in Terai Region of West Bengal

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Jute is a major cash crop in terai region of West Bengal. Use of combine harvester in preceding wheat crop forced the farmer to go for burning in order to clean the field earlier to sow the succeeding jute crop. The scientists of UBKV tried to use happy seeder technology for jute seeding and successfully demonstrated this technology through farmers' participatory trial. It was probably the first attempt in India to sow jute with happy seeder. The results showed the feasibility of this technology in terms of productivity as well as profitability for further adoption of the technology. Sowing of jute without burning wheat straw makes it an eco-friendly climate smart technology.

Key words: Jute, Happy seeder technology, Terai region

JUTE (*Corchorus* spp.) is one of the major cash crops grown in the state of West Bengal sharing about three-fourth of the total production of the country. It plays an important role in our country's economy, particularly in eastern and north eastern states. It has been reported that jute and allied fibre farming, trading and industry provide sustenance to more than five million people in our country. It is the second most important commercial fibre crop next to cotton grown mostly in humid tropical or sub-tropical climate under rainfed condition and it is predominantly cultivated by marginal and small farmers of Indo-Bangladesh subcontinent.

Jute was initially regarded as “Golden Fibre” considering its national importance. However, the area under this crop in the state of West Bengal is gradually declining and at present around 5.15 lakh ha was under cultivation with an annual production of 75.11 lakh metric tonnes. Though the warm humid climate with occasional rainfall during pre-monsoon season in the *terai* region of West Bengal is very suitable for the crop, but with ever increasing area under *rabi* maize throughout this northern part of West Bengal, area under jute gets lowered down each year. Again, under the scenario of labour migration and less preference of

agricultural work due to greater drudgery and risk involvement, the farmers are not interested to grow jute in which a lot of man-days required for weeding in a broadcasted crop as well post-harvest operation like steeping, retting and fibre extraction. Further the marketing of the fibre is substantially controlled by middlemen who sometimes deprive the farmers in getting remunerative price. However, the crop is gaining popularity under the context of environment pollution and the preference of the people to use natural products instead of man-made synthetic substitutes which are non-biodegradable.

Conservation agriculture (CA) is



Fig. 1.a. Jute sowing through happy seeder in wheat residues



Fig. 1.b. Jute crop is coming out through residues



Fig. 1.c. Thicker stem obtained under happy seeder sowing



Fig. 1.d. Happy jute farmer in happy seeder sown field

perceived as the system which could meet the ever increasing food demand worldwide with sustainable intensification of crops and various resources. CA is characterized by three major principles: i) minimum soil disturbances ii) maintaining and managing crop residues (at least 30% of the total crop load) and iii) diversification of crop species (may be spatial or temporal) including legumes. These principles are to be applied based on a particular environment and have to be linked with the specific agronomic, environmental and social aspect of that region in particular, making it more site specific approach. In eastern *Gangetic* plains, most of the CA research work was conducted on cereal crops, wheat in particular where it was demonstrated that CA-based management can enhance yields with reduced cost of cultivation. Uttar Banga Krishi Viswavidyalaya (UBKV) is trying hard to popularize CA practices among the farmers in northern districts of West Bengal and for last couple of years a good number of farmers of this region are getting the benefit of CA technologies. With the active support of Department of Agriculture, Government of West Bengal and Satmile Satish Club and Pathagar (SSCOP), a local NGO working on agriculture, good numbers of farmers of this region are getting the benefits of zero tillage technology in jute since last 2-3 years. It was very challenging to convince the farmers initially to trial jute crop without tillage operation using multi crop planter, but

successful demonstration in their field attracted them to stick to this beneficial technology particularly when the farmers desperately need labour-reducing technologies under the current scenario of labour shortage.

Development of CA-jute protocols

Initiated in 2014-15, the scientists of Uttar Banga Krishi Viswavidyalaya (UBKV) in collaboration with CIMMYT under an Australian Centre for International Agriculture Research (ACIAR) funded project entitled “Sustainable and Resilient Farming System Intensification in Eastern Gangetic Plains (SRFSI)” carried out more than 400 participatory trials on popularising conservation agriculture (CA) practices in various crops *viz.*, rice, wheat, maize, lentil, rapeseed-mustard and accordingly standardised the protocols for CA-jute in 2017-18 (Table 1).

This protocol has been demonstrated successfully in various

farmers’ fields over the region during next two years.

Why happy seeder in jute cultivation?

With increased mechanization, the farmers of this region also started the use of combine harvester in wheat for last couple of years. Use of combine harvester in preceding wheat crop forced the farmer to go for burning for cleaning the field earlier to sow succeeding jute crop. As in this part of the state, wheat straw is not being fed to the cattle; the cheapest and easiest way is to go for residue burning. All of us have witnessed the hazardous effects of residue burning for paddy straw which is a big problem now in northern India. Keeping in mind the benefits of happy seeder, the scientists of UBKV tried to calibrate the happy seeder for jute seeding and made it successful. It was probably the first attempt in India to sow jute with happy seeder. The details of demonstration in last three years under CA-jute (both under multi crop planter and happy

Table 1. CA-jute protocols developed by UBKV and CIMMYT

Days of activities	Details of activities
6 days before seeding	Spraying of Glyphosate @ 1 kg a.i./ha
On the day of seeding	Sowing with zero-till-drill/multi crop planter (seed rate @ 7.5 kg/ha) after mixing with dry vermicompost (60 kg/ha)
On the day of seeding	Fertilizer application through multi-crop planter @ N-P-K(10-26-26) @ 150 kg/ha; seeds to be treated with Carbendazim @ 2-3 g/kg of seeds/Trichoderma @ 5 g/kg of seeds
1-2 days after seeding	Spraying of pretilachlor @ 0.5 kg a.i./ha
15-20 days after seeding	Irrigation + first top dressing (urea @ 90 kg/ha)
20-25 days after seeding	Spraying of propaquizalofop @ 50 g a.i./ha + ethoxysulfuron @ 18 g a.i./ha
30-35 days after seeding	Irrigation + second top dressing (urea @ 60 kg/ha + MOP @ 30 kg/ha)
40-45 days after seeding	Spraying of carbendazim @0.1%

Table 2. Details of demonstration on CA-jute since last 3 years

Year	No. of Demo.	No. of farmers involved	Area (ha)	Variety used
2018(MCP)	15	22	3	JBO 2003H
2019(MCP)	85	240	28.80	JBO 2003H
2020(HS)*	10	25	3	JBO 2003H

*Only area under happy seeder was taken; MCP-Multi Crop Planter; HS-Happy Seeder

seeder sown) have been depicted in Table 2.

Before putting demonstration, group meetings were conducted in each and every village where problems associated with jute cultivation were discussed and the advantages of growing jute under conservation agriculture was described. Initially a list of interested farmers was prepared from the meeting through intervention of the officers of Department of Agriculture, Government of West Bengal, being a partner in SRFSI project. Further, team of scientists from UBKV and government grass root level extension officials visited the land of the selected farmer in presence of the villagers. Before implementing the programme, the skill development trainings were organized involving the selected farmers. Field days and other extension programmes were also organized inviting the farmers of the demonstrated and nearby villages. For demonstration of happy seeder (HS) in 2020 season, those farmers were selected who were practicing multi crop planter (MCP)-jute under zero tillage condition since last two years (Fig. 2).

Results of demonstration

The results of demonstration indicated a significant yield increase under CA-jute over conventional tillage (CT) technology in last three years (Table 3) (Fig. 3). The demonstration yield was quite higher under both MCP and HS and it was noted that there was yield enhancement to the tune of 23.47-27.53% under CA practices over the conventional practices. The yield performance of the crop sown with

HS during 2020 was very similar to the yield achieved with MCP in earlier years. It was attributed to maintenance of desired plant



Fig. 2. Jute sowing through multi crop planter in wheat residues

population with increased plant height and basal diameter both under MCP and HS sown crop (Table 4) as compared to CT crop.

The plant height and basal diameter of the stem recorded under MCP and HS-jute was quite similar and much higher than CT jute. Moreover, the plant population maintained in the under machine sown crop (MCP and HS) was quite close to 5-5.5 lakh/ha, the optimum plant population for jute. Due to

higher plant population beyond the optimum one under CT practices, there was higher competition between plants for which the basal diameter as well as plant height were recorded lesser. With greater precision in calibrating machines over the years, it was possible to maintain optimum plant population in the field for which the crop performed better with increased utilization of resources.

As far as production economics were concerned, the data clearly indicated the advantages of CA technology over the conventional practices (Table 5). The higher gross and net returns with reduced cost of cultivation under CA technology helped to register a higher profit. Though the returns were quite similar in MCP-jute and HS-jute, but the B:C ratio was much higher in HS-jute (3.29) due to curtailment in cost of cultivation towards land preparation and weed management. No application of pre-plant or pre-emergence herbicides under HS technology resulted in further saving over MCP-jute. Manual weeding alone contributed a high proportion of total cost of cultivation for CT crops.

Benefits of happy seeder technology in jute cultivation

- Sowing of jute without burning wheat straw makes it an eco-friendly climate smart technology

Table 3. Yield performances of CA-jute under demonstration

Year	Potential yield (kg/ha)	Demo. (ZT) yield (kg/ha)	Local check (CT) yield(kg/ha)	% yield increase
2018 (MCP)	3800	3020	2400	25.83
2019 (MCP)	3800	3150	2470	27.53
2020(HS)	3800	3025	2450	23.47

MCP-Multi Crop Planter; HS-Happy Seeder; CT-Conventional Tillage

Table 4. Comparison between CA and CT-jute in relation to major yield attributing characters

Yield parameters	MCP-Jute	HS-Jute	CT-Jute
Plant height (cm)	290-340(310)	280-320(295)	250-280 (285)
Basal diameter (mm)	19-23(20)	18-22 (20)	15-18(17)
Plant population/m ²	45-55 (50)	45-52 (48)	55-80 (70)

Figures in the parenthesis are mean values;MCP-Multi Crop Planter; HS-Happy Seeder; CT-Conventional Tillage

- Timely sowing is assured
- Crop residues help to retain moisture and helps in temperature regulations
- Less weed emergence for which pre-plant or pre-emergence herbicides application may be skipped (which is compulsory for MCP-jute)
- Reduced cost of cultivation without yield penalty
- Gradual decomposition of crop residues helps to improve physical properties of soil in addition to adding a substantial quantity of nutrients which otherwise lost by burning.

Few points to be considered for better performance of happy seeder in jute cultivation

- Calibration of happy seeder is very important for uniform seeding
- To obtain good stand, left over wheat residues should uniformly be distributed in the field by straw management system (SMS), a device attached to combine harvester
- If SMS is not available, distributing loose straw over the field may be done manually
- Vermicompost mixed with the tiny jute seeds should be very dry
- Seeding depth has to be adjusted properly
- Soil moisture at the time of seeding should be optimum



Fig. 3. Good crop stand achieved through happy seeder technology

Table 5. Production economics of jute under various establishment techniques (2020)

Production economics	MCP-Jute	HS-Jute	CT-Jute
Cost of cultivation	55575.00	50625.00	63825.00
Gross Return	173250.00	166375.00	134750.00
Net return	117675.00	115750.00	70925.00
B:C ratio	3.12	3.29	2.11

MCP-Multi Crop Planter; HS-Happy Seeder; CT-Conventional Tillage

- Happy seeder runs very well in laser levelled fields

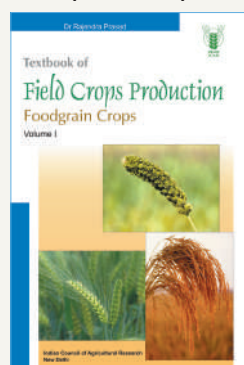
SUMMARY

Happy seeder technology in jute is bringing huge satisfaction to Hosenara Bibi, Bijay Roy, Ramen Barman, Bhabatosh Patwary and many more demonstration farmers in *terai* region of West Bengal in terms of good yields and higher profits along with significant positive effects on environmental impacts. Even under this covid 19 pandemic, the demonstration plots were visited by

many nearby and distant jute farmers. The cost of cultivation has been substantially reduced in this technology which attracted many more farmers and we hope in subsequent years, this technology would reach many jute farmers of the region with active support from the Government.

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