

## Design and Fabrication of a Sugarcane Bud Chip Cutting Machine

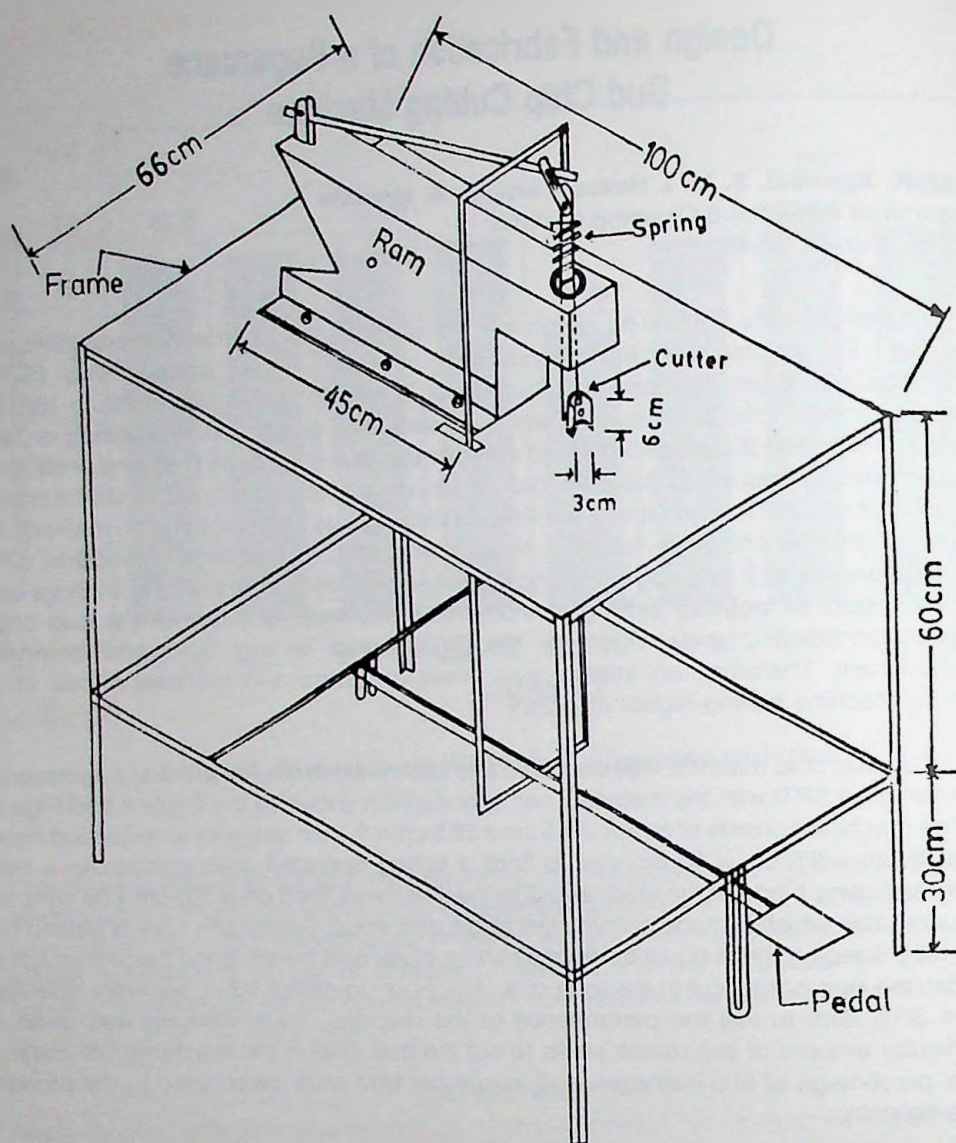
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In Bangladesh, 6-6.5 t/ha seedcane are used as seed material in conventional planting. To reduce seedcane requirement, recently spaced transplanting (STP) technique has been developed at Sugarcane Research & Training Institute (SRTI), Ishurdi, Pabna. In this technique usually pre-germinated single budded polybag or two budded soil bed settlings of 45-60 d old are transplanted in the main field, and seedcane requirement is reduced to 1.5-2.0 t/ha. To reduce the seedcane requirement further, Physiologists of SRTI tested the possibilities of utilizing bud chips as planting material. In this method, bud chips are cut by a small hand operated bud cutting machine, and settlings are raised in the polybags, and it has been reported that bud chip settlings are equally good as polybag settlings (Anon, 1989). However, efficacy of the bud chip machine developed and utilized by the physiologists is very poor and deserves improvement. Therefore, an attempt was made to design and fabricate a bud chip cutting machine having higher efficiency.

The bud chip machine was designed and fabricated in the Agricultural Engineering Workshop of SRTI with the materials and specification shown in the Table 1 and Figure 1. The machine consists of a ram of 45 cm x 25.5 cm x 9.5 cm size with an extended nose of 10.5 cm x 9.5 cm x 10 cm size to hold a spring operated shaft containing a half circular cutting blade at the lower end. The machine was fitted on a 100 cm x 66 cm x 90 cm size table which is made of mild steel angle and wood. Sugarcane stalk is placed on the table keeping the bud just below the cutting blade and pressing the blade through a pedal, the bud is then cut in the form of a chip. Four un-skilled labourers were selected from SRTI farm to test the performance of the machine. Each labourer was given a particular amount of sugarcane stalks to cut the bud chip in the machine. The cutting rate, percentage of bud damaged and weight per bud were determined in the present investigation.

The results obtained in present investigation are shown in the Table 2. The bud chip cutting rate was measured and found that 1168, 943, 1195 and 873 bud chips were cut by each labourer per hour engaged in the bud cutting performance test with an average of 1045 bud chips per hour. Thus, 8360 bud chips may be cut in a day. Therefore for the preparation of bud chip as a planting material for one hectare land area total 4.5 men-day are required by the machine. The weight of each bud on an average was found 3.9 g and seedcane requirement in the form of bud chip is approximately 116 kg. In the present investigation it has been found that an average 9.9% bud was found to be damaged, and the rest 90.1% bud was found uninjured and healthy. Bud damage may be reduced to 5% or less by using skilled labourers (Table 2). The fabrication cost of the machine was estimated as Tk. 2610.00 which was the total



**Figure 1. Pedal operated sugarcane bud chip cutting machine.**

fixed cost of the machine. The machine need not any repair except sharpening the cutting blade. Thus taking ten years as the machine life and 60 days as yearly operation, the cutting cost of 1000 bud chips would be Tk. 6-7. Therefore, the estimated cost of cutting of bud chips as planting material for one hectare land would be Tk. 250.00 only. Although the fabrication cost of the machine is as high as Tk. 2610.00, the bud chip cutting cost by the machine for one hectare land area is about Tk. 250.00. Thus Tk. 6000.00-6500.00 may be saved from seed for one hectare land area. Hence, the machine together with the bud chip technology of sugarcane plantation may be recommended for the sugarcane growers.

**Table 1. Material requirements and cost involvement for fabrication of the bud chip cutting machine.**

| Sl No. | Description   | Specification    | Quantity              | Cost involved (Tk.) |
|--------|---------------|------------------|-----------------------|---------------------|
| 1.     | M.S. angle    | 35mm × 35mm × 5m | 10 m                  | 1200.0              |
| 2.     | M.S. Sheet    | 2mm thick        | 1 × 0.5m <sup>2</sup> | 250.0               |
| 3.     | M.S. Flat bar | 25.4mm × 3mm     | 2.5 m                 | 150.0               |
| 4.     | M.S. flat bar | 25.4mm × 6.4mm   | 2 m                   | 150.0               |
| 5.     | Spring        | 150mm × 55mm Dia | 1 No.                 | 100.0               |
| 6.     | M.S. Shaft    | 25.4mm Dia       | 0.4 m                 | 50.0                |
| 7.     | Cutting knife | 50mm × 30mm Dia  | 1 No.                 | 25.0                |
| 8.     | Nut & bold    | 32mm × 6.4mm Dia | 42 No.                | 260.0               |
| 9.     | Flat wood     | 20 mm thick      | 0.02 m <sup>2</sup>   | 25.0                |
| 10.    | Making charge | —                | —                     | 400.0               |
| Total  | —             | —                | —                     | 2610.0              |

**Table 2. Performance and cutting rate of bud chip by bud chips cutting machine.**

| Sl. No. | Weight of cane (kg) | Total bud chip cut (No.) | Number of bud chips damaged | Weight of all bud chips (g) | Total time required (min) | Rate of cutting (number/h) |
|---------|---------------------|--------------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|
| 1.      | 8.5                 | 253                      | 26                          | 835.9                       | 13                        | 1168                       |
| 2.      | 8.0                 | 220                      | 14                          | 961.0                       | 15                        | 943                        |
| 3.      | 9.0                 | 219                      | 23                          | 782.1                       | 11                        | 1195                       |
| 4.      | 9.5                 | 160                      | 19                          | 737.4                       | 11                        | 873                        |
| Total   | 35.0                | 852                      | 82                          | 3316.4                      | 50                        | 4179                       |
| Average | 8.8                 | 213                      | 21 (9.9%)                   | 829.1 (3.9 g/chip)          | 12.5                      | 1045                       |

**REFERENCES**

- Anonymous, 1989. Comparative performance of different STP techniques under irrigated condition. SRTI Annual Report. pp. 23-24.
- Anonymous, 1989. Effect of different treatment on the germination percentage of single bud setts and bud chips. SRTI Annual Report. pp. 52-53.
- Imam, S.A.; Hossain, A.H.M.D.; Matin, M.A. and Ali, M. 1988. Effect of Row and Interplant Spacing on the Productivity of Transplanted Sugarcane. *Bangladesh J. Sugarcane*, **10** : 5-8.