

Determination of Rhizome Rate of Ramie [*Boehmeria nivea* (L) Gaud.] for Commercial Planting

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ABSTRACT A field experiment conducted during 1997 (*pre-kharif*)-2000 (*rabi*) with the aim to ascertain the exact requirement of ramie rhizome per ha revealed that 900 kg of rhizome (55,000 numbers, with mean weight, length and breadth of 14.823 g, 12.05 cm and 1.08 cm respectively) was needed for planting one hectare area.

Keywords: Ramie, *Boehmeria nivea* (L.) Gaud., rhizome rate

Ramie [*Boehmeria nivea* (L.) Gaud.] is an important semi-perennial bast fibre crop of the country (NE India). Its fibre is strongest among all vegetable fibres of the world [1]. It can play a very important role as a textile material; it has excellent tenacity, enhanced wet strength, lustre and microbial resistivity [2]. In India ramie is grown mainly in Assam and other adjoining states including North Bengal [1]. Ramie is commercially propagated through rhizome cuttings of desirable sizes. Freshly uprooted rhizome gives better germination (sprouting). It can be stored for a short time (3-7 days) before planting if kept moist by sprinkling water [3]. The rhizome (10-15 cm long) requirement for planting one ha of land with a spacing of 60 cm X 30 cm reported by various workers is 350-400 kg [4, 5, 6, 7].

Recently commercial cultivation of ramie has been started in different parts of the NE India through the initiative of various Government and non-government organisations (NGO). It is proposed to cover large area in the tribal districts of Assam, Arunachal Pradesh etc. On the basis of the reports of the earlier authors, that Govt. organisations and NGOs are procuring rhizomes from Ramie Research Station, Sorbhog, Assam (presently the sole reliable source of ramie rhizomes in India), @ 350-400 kg ha⁻¹. However, most of these organisations have found and informed us at the Ramie Research Station,

Sorbhog that this reported quantity of rhizome is not sufficient to cover one ha of land with a spacing of 60 cm X 30 cm. Therefore, studies were conducted to ascertain the exact requirement of ramie rhizomes for commercial planting.

MATERIALS AND METHODS

A field experiment was conducted from 1997 (*pre-kharif*)-2000 (*rabi*) at Ramie Research Station (26.5°N, 91°E, 90 m AMSL), Sorbhog, Assam to determine the amount of rhizome required for one ha commercial planting and the fibre yield from the experimental rhizomes over 4 years, which is considered as the normal economic life span of ramie plantation under Indian condition. Ramie variety, R 1411, was used as it produces the finest fibre and covers large area. Rhizomes were uprooted from 5 years old pest free plantation and cut into pieces by transverse cutting. Four hundred pieces of rhizomes were selected randomly from the rhizome lot just before planting and cleaned. The rhizome parameters like length, diameter and fresh weight were recorded for all 400 samples. These cut rhizomes were planted immediately with 60 cm X 30 cm spacing in a plot of 72 m², having medium fertile soil (available N, P and K were 368, 24.6 and

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Table 1. Statistical variables of sample rhizome parameters

Statistical variables	Weight of rhizome (g)	Length of rhizome (cm)	Diameter of rhizome (cm)
Mean	14.823	12.050	1.085
Median	13.00	12.00	1.00
Mode	9, 10, 12	12.00	1.00
Range	41-6	17-8	1.8-0.7
Standard error	0.327	0.087	0.014
Standard deviation	6.534	1.736	0.280

Table 2. Frequency distribution of weight of rhizomes

Weight of rhizome (g)	Percentage of total rhizomes	Cumulative percentage
5-10	31.50	31.50
10-15	32.00	63.50
15-20	17.75	81.25
20-25	10.00	91.25
25-30	6.50	97.75
30-35	2.00	99.75
35-40	0.25	100.00

Table 3. Frequency distribution of length of rhizomes

Length of rhizomes (cm)	Percentage of total rhizomes	Cumulative percentage
8-10	16	16
10-12	44	60
12-14	32	92
14-16	7	99
16-18	1	100

Table 4. Frequency distribution of diameter of rhizomes

Diameter of rhizomes (cm)	Percentage of total rhizomes	Cumulative percentage
0.50-0.75	8.50	8.50
0.75-1.00	46.75	55.25
1.00-1.25	15.75	71.00
1.25-1.50	22.00	93.00
1.50-1.75	5.50	98.50
1.75-2.00	1.50	100.00

63 kg ha⁻¹, respectively) with acidic soil reaction (pH 5.35). The observed values of rhizome parameters had been analysed by standard statistical methods [8] and arrived the rhizome rate based on the statistical calculations. The fibre yields were also recorded cutting wise for 4 years from the plantation established with the experimental 400 rhizome pieces.

RESULTS AND DISCUSSION

Rhizome characteristics

Ramie rhizomes (mother) are the underground stem (30-50 cm long and 1-1.5 cm diameter) that arises from the main root, lie just below and parallel to the soil surface and are seldom found at a depth greater than 15 cm. They are pale brown to greyish brown in colour and are often mistaken as roots. Rhizome, more or less same diameter throughout their length having root like protuberances, called 'eyes' or buds, are the commercial propagating material for ramie. For planting, long mother rhizome is cut transversely in to pieces of 10-15 cm length with at least three buds per piece to have a uniform sprouting throughout the plantation. Rhizome pieces of lesser length (< 10 cm) does not contain 3 buds, so are not suitable for field planting on commercial scale.

Weight of rhizomes and its frequency distribution in the sample gave the mean value of 14.82 g (Table 1). The range of weights varied between 41 and 6 g i.e., the experimental material had been chosen from wide values of rhizome weight. About 81% of rhizomes were between 6 and 20 g weight and 97.75% of the samples were between 6 and 30 g (Table 2). The higher weight value rhizomes (>30 g) were with lesser frequencies (2.25%).

Length of the rhizome varied in the population from 17-8 cm. The mean value was 12.05 cm and the median and mode values were 12 cm each

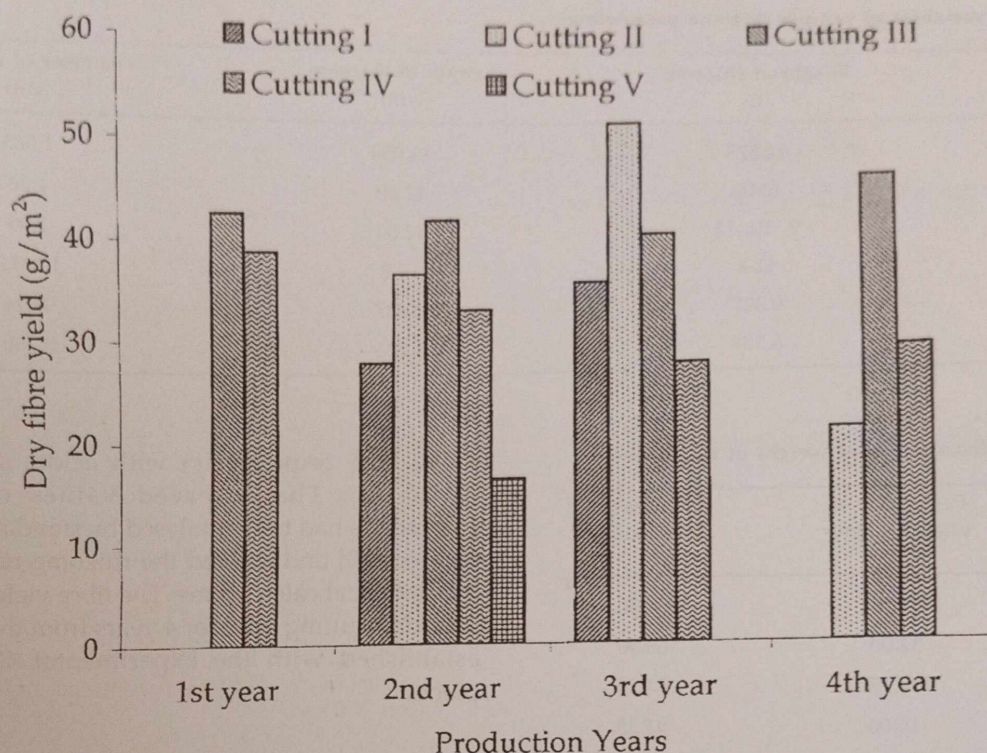


Fig. 1 Cutting and production year wise dry fibre yield (g m²)

(Table 1). About 92% of the rhizomes were between 8 and 14 cm and 99% of the rhizomes were between 8 and 16 cm length (Table 3). The diameter of rhizome also varied over a wide range. The mean value of rhizome diameter was 1.08 cm. The median and mode values of diameter were 1 cm each (Table 1). 93% of the rhizomes were between 0.7 and 1.5 cm diameter and 98.5% of the rhizomes were with diameter between 0.7 and 1.75 cm (Table 4).

Fibre yield

The dry decorticated fibre yield from the plantation of 400 sample rhizomes (which were planted in 72 m² area with a spacing of 60 cm X 30 cm) is presented in Figure 1. In the first year of the planting (1997) only 2 cuttings could be taken as usual. In the 2nd year, 5 cuttings had been obtained due to proper crop establishment with developed root system. In the 3rd and 4th year of the experiment 4 and 3 cuttings were obtained respectively. Second year of the experiment gave highest fibre yield (156.05 g m⁻²) followed by 3rd year yield (155.01 g m⁻²). The fibre yield obtained from the sample rhizomes was equal to the expected yield from this variety under standard growing condition [7]. Thus, the rhizome samples used in this

experiment was of standard quality and true representative of the rhizome population.

Calculated rhizome rate

The mean weight of rhizome was 14.82 g (Table 1). For one ha of land 55000 rhizomes are needed with a spacing of 60 cm X 30 cm [7]. So, the calculated rhizome rate was $(14.82 \times 55000 \times 10^{-3} \text{ kg})$ 815.26 kg/ha with 60 cm X 30 cm spacing. For lower or higher spacing the rhizome rate will vary accordingly.

Practical rhizome rate

It is necessary to add 10% of the calculated rhizome rate for determining the actual or practical rhizome rate by considering the facts that, a) soil particles adhere to the freshly uprooted rhizomes (this soil particles give protection of the rhizome from quick desiccation), b) root cuttings (other than rhizomes) may be there in the rhizome pieces by chance, c) loss of moisture from the rhizomes during storage for few days, d) transportation and other incidental handling damages etc. The specific value of 10% addition had been arrived by measuring the quantum of impurities in the sample and on the basis of field experience of the present investigators.

Therefore, from this study it can be concluded that the rate of rhizome for commercial planting is 900 kg/ha (calculated rate, $815.26 \text{ kg} + 10\% = 896.79 \text{ kg}$ or 900 kg) with 60 cm X 30 cm spacing. This finding support and agree with the observations of different Govt. organisations and NGOs engaged in ramie cultivation activities, that 350-400 kg of rhizome is not sufficient to cover one ha of land. The present investigation therefore, quantified the amount of rhizome needed as 900 kg ha^{-1} for commercial planting.

ACKNOWLEDGEMENTS

The authors are grateful to the Director, CRIJAF (ICAR), Barrackpore and the Scientist-in-Charge, Ramie Research Station, Sorbhog, Assam for providing all possible help for conducting the investigation. Thanks are due to Dr. A.K. Chakraborty, Scientist, Agricultural Statistics, CRIJAF, Barrackpore for his help in the statistical analysis.

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