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TERRACE CULTIVATION OF TISSUE CULTURE RAISED DWARF CAVENDISH BANANA AT DIFFERENT ELEVATIONS IN A HILL SIDE REGION OF TRIPURA

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The present study was conducted at Tripura University Campus, Suryamaninagar, during 2005 – 2007 to assess the performance of tissue culture raised Dwarf Cavendish banana plantation at different elevations of terrace cultivation on laterite soil under Tripura condition. Plantation was assessed in terms of percentage of survival and fruiting characters such as bunch size, number of fingers per bunch and size of banana fingers. Plantation was influenced by the different elevations with a variation in the yield and fruit characters. Possible role of water regime on the yield of banana crop was also discussed in the light of hill side land resource utilization.

Keywords: Dwarf cavendish banana; Terrace cultivation; Tissue culture; Yield.

Introduction

The banana belongs to *Musa*, of the family Musaceae. Among a large number of cultivars of bananas, Dwarf Cavendish (AAA) is known to constitute one of the most subtropical banana trade. Plantation aimed to experiment on various factors influencing yield and growth of banana have been reported by different workers [1-5]. Banana plantlets derived from tissue culture micro-propagation technique are widely used as a commercial source of disease free and healthy propagules for plantation [6, 7]. Report on plantation of tissue culture raised Dwarf Cavendish in terrace cultivation system of hilly slope under Tripura condition is very much lacking. Vast area of hill side land resource could be utilized for establishment of horticultural crop plantation and production since the state is topographically covered with 60% hilly regions. Cultivation practices of horticultural crops in the hill side area could also be an useful alternative for socio-economic upliftment of rural poor and in particular tribal people of the state. Most of the hilly slope region of West Tripura is laterite in nature with high percentage of iron and alumina along with 45.65% insoluble silicious matter[8]. Therefore, in the present investigation, an experiment was conducted in two consecutive years during 2005 – 2007 to evaluate the performance of Dwarf Cavendish banana production and also to assess the feasibility of such plantation in the laterite soil under terrace cultivation system of a hilly slope region.

Materials and Methods

Tissue culture raised semi-hardened Dwarf Cavendish banana (*Musa* sp) plantlets were procured from West Bengal State Council for Science and Technology (W.B.S.C.S.T.) and used in the present experimental studies. The plantlets were further hardened to an optimum size (39.20 ± 2.79 cm) in a net-house (Fig. 2) before transplantation to experimental field. Healthy and uniform size plantlets were finally selected and transplanted to experimental field of Tripura University. Terrace cultivation system was adopted at three different elevations of a hilly slope adjacent to a water body. The different elevations of terrace land from the surface of the water body were 190cm, 260cm and 370cm respectively. Banana plantlets were also planted at 1.0 × 1.0 m spacing in Randomized Block Design. The fertilizer was applied in the soil in a circular band 50 cm away from the centre of the plant. Application of N, P, K in the proportion of 2:1.5:1.5 per plant was done once at the stage of three months old from the date of plantation. This was followed by further application of fertilizers in the proportion of 1:1:1.5 at the six months old maturity stage. Finally another three months interval only urea (100g / plant) was applied to the growing plant. The sources of N, P, K, fertilizers were urea, single super phosphate and muriate of potash.

Result and Discussion

Experimental design adopted for terrace cultivation of tissue culture raised Dwarf Cavendish banana at different

Table 1. Performance of tissue culture raised Cavendish banana in terrace cultivation of a hilly slope under Tripura condition.

Elevation of terrace land at *experimental site	% of plant survival	Mean size of banana bunch in length	No. of fingers per bunch		Size of fingers at different parts of the bunch		
			Mean ± SD	CV	Upper fingers (Length × Girth) (cm ± SD)	Middle fingers (Length × Girth) (cm ± SD)	Lower fingers (Length × Girth) (cm ± SD)
Upper terrace 310 cm	50	55.80 ± 8.44	93.40 ± 24.33	26.05%	16.80 ± 1.62 × 12.00 ± 0.58	17.22 ± 0.93 × 11.73 ± 0.30	15.13 ± 0.73 × 11.50 ± 0.32
Middle terrace 260 cm	70	62.00 ± 6.89	90.40 ± 26.18	28.96%	21.00 ± 1.05 × 12.29 ± 0.22	18.73 ± 0.85 × 11.91 ± 0.39	15.52 ± 2.14 × 10.46 ± 0.50
Lower terrace 190 cm	80	63.70 ± 5.47	120.20 ± 39.64	32.98%	17.50 ± 1.21 × 11.65 ± 0.59	19.63 ± 1.23 × 12.28 ± 0.55	19.67 ± 1.41 × 12.18 ± 0.46

*Experiment conducted at Tripura University Experimental Garden, Suryamaninagar, Tripura.
Study is based on two consecutive years.

elevations of a hilly slope under Tripura condition is presented in Fig. 1. Dwarf Cavendish banana plantation raised at different elevations (Fig. 3) showed varying percentage of plant survival and growth with a maximum of 80% survival in the lower terrace region. Decline of plant survival (50%) was recorded in the upper most terrace of 370 cm elevation from the water body level. Banana bunch production recorded in the present study was analyzed in terms of number and size of banana fingers per bunch. Different sizes of bunches with varying number of fingers were observed depending on the nature of elevation at plantation site (Table 1). Variation in finger number per bunch of banana produced in lower terrace is high with CV value 32.98% as compared to middle and upper terrace. However, there is no significant variation in sizes of banana bunches and fingers produced in different elevations of terrace cultivation. Frequent watering to the plants at least once in a week was done during initial establishment of plantation and summer time. This was found to be essential to keep the culture raised plants survive and grow healthy since most of the water rapidly drained off to the lower land due to sloping nature of the present experimental field. Application of fertilizers as N, P, K in definite proportion at different intervals of their vegetative phase of growth were found to be essential for proper growth and yield of crop. Availability of optimum moisture and fertilizer in the field soil are known to play critical role in the growth and yield of banana crops in many plantation experiments[1, 4, 9]. Flowering and fruiting was found to complete within 11 – 13 months from the date of sapling transplantation to the experimental field. However, early flowering and fruiting was recorded (11 months) in the lower row of terrace with a maximum number of banana fingers per bunch 120.20 ± 39.64 (Fig. 4). On the other hand late flower and fruiting (12 – 13 months) were recorded in upper and middle terrace of cultivation with minimum number of fingers 93.40 ± 24.33 and 90.40 ± 26.18 respectively. Early flowering and higher banana fingers production per bunch recorded in the lower terrace of cultivation could be due to better moisture condition of the soil[10]. Thus, present study highlights the possibility of plantation of tissue culture raised Dwarf Cavendish banana at certain elevations of terrace cultivation in hilly slope region of Tripura.

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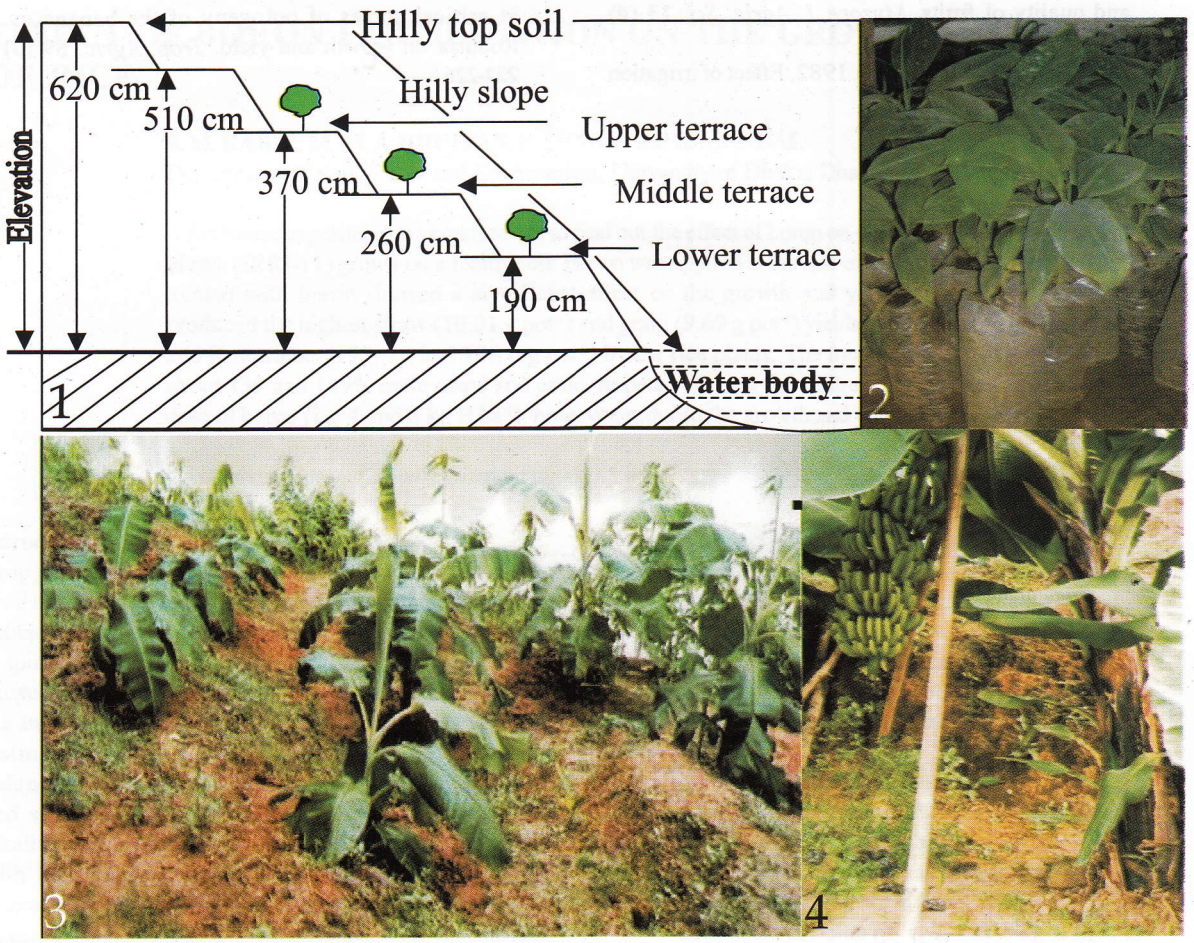

Fig.1. Experimental design adopted for plantation of tissue culture raised Dwarf Cavendish banana at hilly slope region of Tripura. **Fig. 2.** Hardening of tissue culture raised banana plantlets in net house. **Fig. 3.** Dwarf Cavendish banana raised at different elevations of experimental field. **Fig. 4.** Early fruiting of Dwarf Cavendish banana in the lower terrace region.

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