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Hopea odorata Roxb (telsur) is a timber species of the family Dipterocarpaceae. It is available in Bangladesh, India, Myanmar, Cambodia, Laos, Malaysia, Thailand and Vietnam. In Bangladesh, telsur occurs naturally in the forests of Cox's Bazar, Chittagong and Chittagong Hill Tract (CHT), and also planted in forest plantations and as road side avenue trees (Hossain 2015). The tree reached up to 45m in height with the base of stem diameter of 4.5m. The timber is valued for its durability, resistance to insects and use for weight-bearing construction. Telsur is a commercially valuable species, but significantly disappearing from the natural habitats. Therefore, *Hopea odorata* is currently assessed as vulnerable in IUCN red list of threatened species. Therefore mass plantation of telsur is necessary for the national aspect.

Telsur seeds generally mature between the months of May-June and seeds fall on the ground as soon as they mature. Seeds are collected from mother tree but virtually most of the fresh seeds are collected from the ground but it rapidly loses viability because of its recalcitrant nature. The germination of seed starts soon after falling on the forest floor. During germination, the tip (apex) of the fruits splits longitudinally and the radicle emerges from the apex of the seed. Cockburn and Wong (1969) stated that germination rate of telsur seed depended on the size and age of the trees.

However, seed sowing position is an important factor for the germination shown by many researchers (Singh *et al.* 1975). Because defective sowing position showed low germination rate. Moreover due to lack of proper selection of sowing position raised seedlings were mostly shown abnormal in shape viz. bent, spiral, forked, crooked, etc. (Banik 1980). Thus the present investigation was undertaken to determine the effect of sowing position on germination of seed.

The present experiment was carried out in the month of May, 2015 in Dulahazara Seed Orchard Centre, Bangladesh Forest Research Institute. Telsur seeds were collected from 30 selected plus trees of four field stations of Seed Orchard Division viz. (1) Dulahazara (Cox's Bazar), (2) Ukhiya, (3) Hyakhoo (Chittagong), (4) Kaptai (Rangamati). Four hundred and fifty seeds were taken from each telsur plus tree. After that the seeds were dewinged and kept under cold water for 5-10 minutes. Then the seeds were sown in 25 cm diameter round polybags filled with a mixture of soil and cow dung in a ratio of 3:1. Fifty seeds were sown in polybags in each of the three positions viz. vertical, horizontal and inverted with three replications of each between 1.0--1.5 cm deep in the soil as shown in Fig 2. Data on telsur seed germination rate at the three different sowing position were recorded every day until germination had ceased.

Table: 1. Germination rate of *Hopea odorata* seed in three sowing positions collected from four field stations.

Seed sources	Sowing position	Germination rate of tselur seeds								Mean Germination percent
		1	2	3	4	5	6	7	8	
Dulahazara	vertical	65.5	62.0	70.5	60.0	68.0	80.0	65.0	72.0	67.8**
	horizontal	60.5	58.5	68.0	62.4	65.6	75.0	62.0	70.5	65.3**
	inverted	8.5	13.6	14.0	15.3	10.0	11.5	14.2	10.5	12.2
Ukhiya	vertical	67.5	65.4	61.6	66.0	70.2	68.0	63.5	62.5	65.5**
	horizontal	62.5	61.0	58.5	63.0	64.5	61.5	57.0	55.0	60.3**
	inverted	16.0	17.3	12.6	11.3	12.0	14.0	14.6	13.3	13.8
Hyakhoo	vertical	69.5	67.2	68.5	72.5	43.0	70.5	75.0	---	66.5**
	horizontal	59.6	60.4	63.0	65.5	40.5	66.0	68.5	---	60.5**
	inverted	12.0	15.2	16.0	13.5	15.0	16.5	14.5	---	14.6
Kaptai	vertical	63.5	50.0	64.5	64.2	52.2	67.4	54.5	---	59.4**
	horizontal	56.0	64.6	46.0	52.6	63.3	61.0	61.3	---	57.8**
	inverted	15.0	15.3	20.6	10.0	14.2	14.0	19.6	---	15.5

* means significant at $P=0.01\%$



Figure 1. Immature seeds of tselur

From the Table, it was found that the germination rate of tselur seed was higher in vertical and horizontal positions in comparison to the inverted

position. Zerebecor (1969) and Banik (1980) both also observed best and maximum rate of germination in horizontal sowing position. In the present observation, germination rate of tselur seed in vertical sowing position of all the four collection sites varied from 43.0% - 80.0% and it showed similar with the horizontal sowing position, which varied from 40.5%-75.0%. But in inverted sowing position showed 8.5% to 20.6% and in this position, the radical remained in the soil but the plumule did not emerge normally. It ran in different directions producing abnormal seedling. Similar defective and abnormal seedlings also observed by Banik (1980) in the inverted sowing position. Therefore, it is concluded that for raising a successful plantation of tselur better sowing positions are vertical and

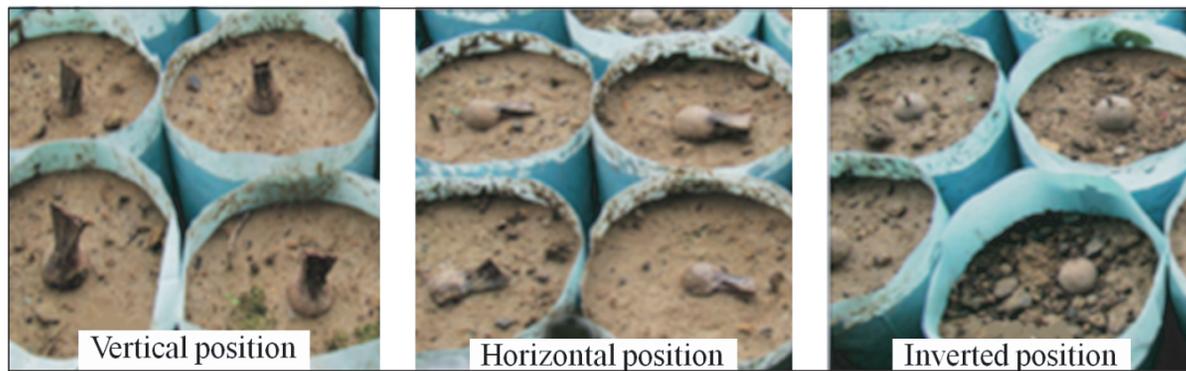


Figure 2. Different sowing positions of telsur seeds

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