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Standardization of borehole method of resin tapping and technology demonstration in Meghalaya and Arunachal Pradesh

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Standardization of bore hole method of resin extraction for *Pinus kesiya*

Borehole method of resin extraction was optimised at ICAR RC for NEH Region for extraction of resin from *Pinus kesiya* from Meghalaya. In this method holes of 2.5 cm in diameter were drilled to a depth of 10 cm depth. The holes are drilled with slight slope towards the opening to allow free flow of oleoresin. Three bole-holes were made around the tree circumference. Chemical spray of 1:1 mixture of 10 percent 2-chloroethyl-phosphonic acid (CEPA commercially known as Ethephon) and 20 percent sulphuric acid were applied inside boreholes with a spray bottle. A spout was used to connect boreholes with polylthene bags. Polythene bags were attached to the spout with the help of a tie for collection of oleoresin (Fig 1). It was replaced when filled with oleoresin during the period of tapping. It is a closed system having the advantages of capturing volatile monoterpenes and prevents premature solidification of the resin acid. Using the standardized technique, trees from three different provenances of the species were tapped to assess its resin production potential. Tapping was done monthly from April 2018 to Jan 2019 using standardized bore hole method

Resin yield was found to be maximum for Shagpung provenance in all the diameter classes. Oleoresin was distilled through steam distillation process to separate turpentine and rosin from the oleo-rosin. Turpentine was separated in all three provenances.

Processing of crude resin

Resin was processed and turpentine was separated using distillation process. Turpentine oil is essential oil lighter than water and specific gravity of oil was found to be 0.90. Known amount (about 20-25 g) of resin was mixed with 50 ml distilled water. Distillation was carried out at 60° C. To reduce bumping stones/ glass beads were used. Temperature was set initially as 40°C and gradually increased to 60°C. Turpentine yield in resin decreases drastically during storage period. To study the effect of storage length on turpentine yield resin was processed at different duration viz. within one month, 6 months and one year after tapping. Fresh distillation of resin yielded very high amount of turpentine oil and turpentine oil in different trees ranged between 23.90 – 54.15 per cent (mean 36.84 per cent).

Fig. 1: a: Selected stand of *Pinus kesiya*; b: resin extraction using bore hole method; c: turpentine separated from oleoresin; d: variations in *Pinus kesiya* rosin colour

The turpentine oil reported in these samples as compared to other species of pine is very high. However, the turpentine oil content decreased in when stored for long time. In the samples distilled after 3-6 months, the average turpentine oil was reduced to 22.10 per cent and oil content in different trees ranged between 20.48 – 24.60 percent. In the samples stored for 1 year average turpentine yield was found to be very low 15.07 per cent and yield in different trees ranged between 10.38-21.72 per cent.

Commercial extraction of Resin in North East India

Most of the forest in north east region is owned by local community. Few private owners are engaged in commercial resin tapping in North East Region. Commercial extraction of resin from chir pine is mostly done on lease basis. Arunachal Pradesh has a suitable area under chir pine which are high resin yielder. In Nafra Valley, West Kameng, Arunachal Pradesh about 85000 tins (12,75,000 kg) of resin (each tina consist of 15 kg oleoresin) is collected every year using cup and lip method of resin tapping from chir pine (*Pinus roxburghii*). Every year resin is tapped from April to October each year. Resin is commercially extracted from community forest and collected resin is transported to Nafra chemical pvt Ltd. situated at Bhalukpong, West Kameng, Arunachal Pradesh. Resin is separated into rosin and turpentine (Fig 2). The small-scale factory is run by one manager, two mistri (supervisor) and six labourers. Resin is processed and rosin and turpentine are collected. However, most of the trees in the community forest are severely damaged due to indiscriminate resin extraction from trees of all sizes using rill method of resin extraction.

Fig. 2: Visit to Nafra chemical pvt Ltd. situated at Bhalukpong, West Kameng, Arunachal Pradesh (a: distillation unit; b:turpentine seprated from oleoresin c: Rosin)

Trainings Programmes on Improved methods of resin extraction:

One day training programme was organized on 18th March, 2019 with the help of local NGO, at Nafra village of West Kameng District of Arunahcal Pradesh. A total of 40 resin extractor attended training programme and they were given hand on training on borehole method of resin tapping. Another training programme was organized. at Shangpung Mission Village of Jaintia Hill District of Meghalaya. A total of 40 persons participated in the training programe who were given hand on training on bore hole method (Fig 3). In Jaintia hills, villages peel and slice bark of the trees to collect resin and resinous firewood to initiate fire in the fire places during winters. Most often the trees die because of severe injury to the trees. The

villagers were demonstrated about the alternate method of using the extracted resins for their domestic use while avoiding fatal injury to the standing trees (Fig. 3).

Fig. 3: Training programme organized for in Nafra village, Arunachal Pradesh (a & b) and Shangpung Mission village, Jaintia Hills Meghalaya (c & d)

Conclusions

Resin yield was recorded highest for Shanpung provenance. Total resin yield was low as compared to *Pinus roxburghii*. However, turpentine content of resin extracted from *Pinus kesiya* is very high (upto 54.15 percent) as compared to resin extracted from *Pinus roxburghii* resin which contains around 20 per cent turpentine.

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