

ABSTRACT

Due to an increase of uses of essential oil in Thailand, elite clone selection is necessary for commercial eucalyptus plantation for eucalyptus oil production. To select the elite clones of eucalypt to be planted for essential oil production in Thailand, leaf samples of 22 eucalypt clones which were widely planted in Thailand were collected and analyzed for their essential oil contents. Statistical analysis was employed to determine differences of essential oil content among them. The results showed that BS8 clone significantly contained the highest amount of essential oil at 2.25% ($p < 0.05$) followed by BS2 at 1.55% and P6 at 1.52%. On the contrary, H8, H10 and BS10 were the clones having the lowest essential oil contents at 0.25, 0.23 and 0.22%, respectively. Therefore, P6 clone was recommended for being planted for essential oil production in Thailand due to its high content of essential oil and high 1,8-Cineole at 72.14%. 1,8-Cineole have moderate antimicrobial activity which could be used in various products.

From the preliminary survey of Cajuput (*Melaleuca cajuputi* subsp. *Cumingiana* (Turcz) Barlow) in Thailand, its leaf samples were collected from 19 genetic resources including which located in the eastern sea coast Andaman shore (the western sea coast of the south) and the eastern sea coast of the south of Thailand. The leaf samples were extracted from their essential oil. The results showed that RY01 and TR01 sources provided the highest essential oil content than the other ($p \leq 0.05$). Their essential oil content distributed to 1.36 and 1.33% of leaf fresh weight respectively. Thus, RY01 and TR01 were classified into high essential oil ecotype. According to essential oil content, TT01 and KB02 were arranged into medium essential oil ecotype whereas TR02 represented low essential oil ecotype. Mature fresh leaves were collected from 10 Cajuput sample trees representing each member in each ecotype and defined their new codes. From the second collection, it was found that TNG 4 provided the highest essential oil content which were 2.45% followed by TNG6 1.85%. The chemical composition of essential oils were characterized by GC-MS, the main constituents of TNG4 and TNG6 were α -Terpinolene and α -Terpinene, the main constituents of KB5 were α -Phellandrene, Limonene and p -Cymene. Therefore, TNG4, TNG6 and KB5 were selected for the further study. Stem cutting was firstly employed for their propagation and then by tissue culture technique. Sterilized axillary nodal segments were cultured on Murashige and Skoog (MS) basal supplemented with 0.5 mg/l 6-Benzylaminopurine (BAP) and 0.5 mg/l gibberellin (GA3). Sprouting buds were subsequently transferred to shoot initiation culture medium containing 0.25 mg/l BAP and 0.25 mg/l GA3 for 4

months with subculture interval of 4 weeks. BA at 0.25-1 mg/l was required for the optimal shoot proliferation. The shoots cultured in MS medium without plant growth regulator rooted about 90% within 8 weeks of inoculation. TC plantlets originated from selected clones of seedling were used as growing materials for plantation due to limit number of mother plants.

Seedlings from seed germination were used for being planted in provenance trial. The provenance trial was located in Lad Krating plantation, Sanam Chaikhet district, Chachoengsao province. Seedlings from the selected sources in Thailand (3 Clone), *Melaleuca cajuputi* sub sp. *cajuputi* seedlings from Indonesia seed source and tea (*Melaleuca alternifolia*) tree seedlings from 3608 seed source in Australia were planted in the provenance trial with randomized completely block design (RCBD). Survival rate and diameter at ground level of the seedlings at 6 months were not significantly different among provenances ($p > 0.05$). Seedlings from Indonesia provenance significantly presented the highest height 92.5 cm ($p \leq 0.05$) followed by KB5 82.41 cm whereas TGN 6 was the shortest 64.21 cm.

Key words: Selection, *Eucalyptus* spp., *Melaleuca cajuputi*, essential oils