

Saowaluck Bua-in 2009: Genetic Diversity, Active Compounds and Antioxidant Activity in *Zingiber montanum* (Koenig) Link ex Dietr. and Its Relatives. Master of Science (Agriculture), Major Field: Horticulture, Department of Horticulture. Thesis Advisor: Associate Professor Yingyong Paisooksantivatana, Ph.D. 99 pages.

The genetic relatedness among 51 accessions, 14 species of the genus *Zingiber* and genetic variability of a clonally propagated species, *Zingiber montanum*, from Thailand were studied using random amplified polymorphic DNA (RAPD) profiles. Twenty eight random primers gave reproducible amplification banding patterns of 607 polymorphic bands out of 611 scored bands accounting for 99.40 % polymorphism across the genotypes. Jaccard's coefficient of similarity varies from 0.119 to 0.970, indicative of distant genetic relatedness among the genotype studied. UPGMA cluster revealed eight distinct clusters and two subclusters of *Zingiber*, with the high cophenetic correlation ( $r=1.00$ ) value. Genetic variability in *Z. montanum* was exhibited by the collections from six regions of Thailand. The high molecular variance (87%) within collection regions of *Z. montanum* accessions was displayed by AMOVA and also explained the significant divergence among the samples from six collection regions.

Essential oils of *Z. montanum* rhizomes were obtained using a microwave extraction method. Samples collected from western Thailand contained the highest volume of essential oil (1.107 %w/v), the accession from Kanchanaburi province gave the highest volume (2.1% w/v), whereas those from the eastern part contained the lowest volume (0.495 %w/v). The constituents of the essential oil samples was determined by GC analysis. This technique identified at least 15 compounds in *Z. montanum* essential oils. The major constituents of the oil consisted of sabinene, terpinen-4-ol and DMPBD ((*E*)-1(3', 4'-dimethylphenyl)butadiene). No significant differences in essential oil components among original sources of rhizomes were found. The antioxidant activities of the ethanolic extracts were screened by DPPH assay. Samples from different sources showed significantly different DPPH scavenging activities ( $p \leq 0.05$ ). The antioxidant activities of the rhizome extract obtained from the north showed the highest activity (80.88%), followed by those from the east (76.47%), south (72.51%), northeast (67.38%), west (66.66%) and central region (57.63%). However, there was no correlation between major components and antioxidant activity of *Z. montanum* rhizomes collected from various locations in Thailand. The results from this study indicate the potential to produce a *Z. montanum* rhizome rich in natural antioxidant for improving human nutrition by selecting suitable accessions for large-scale production in selected areas.

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Thesis Advisor's signature