

Tesfay Tekelhymanot 2010: Effects of Meta-topolin and Gamma Irradiation on Pineapple under Three *In Vitro* Systems. Master of Science (Tropical Agriculture), Major Field: Tropical Agriculture, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Surawit Wannakrairoj, Ph.D. 66 pages.

A proper dose of multiplication-inducing plant growth regulators, an appropriate culture method and an appropriate dose of mutagen are of primary importance for *in vitro* mutation induction. The present investigation assessed effects of meta-topolin (mT), a new promising cytokinin for micropropagation, and gamma irradiation on shoots of *Ananas comosus* 'Patawia' in shaking liquid media (with 13 μM $\mu\text{mol. m}^{-2}.\text{s}^{-1}$ PPF), solid media (with 26 μM $\mu\text{mol. m}^{-2}.\text{s}^{-1}$ PPF) and non-airflow temporary immersion system (TIS) (with 8 $\mu\text{mol. m}^{-2}.\text{s}^{-1}$ PPF). In each culture system, 2.5 or 5 μM mT with or without 2.5 μM NAA were compared with the MS basal medium for the shoot proliferation rate. After six weeks, the liquid medium with 2.5 μM mT led to the highest shoot multiplication rate of 15.75 plantlets per half-shoot explant in shaking system. Whilst the one with 5 μM mT was best for solid medium, with 6.75 plantlets per explant. The hourly immersion time of 4 minutes for TIS gave similar result to that of 6 minutes. However, the hourly immersion time of 4 minute with 2.5 or 5 μM mT containing media yielded the highest shoot proliferation rate for TIS. When the best culture condition of the three systems were compared for six weeks, it was revealed that the shaking liquid medium yielded the highest multiplication rate of 11.96 folds with the best growth. Six-weeks old plantlets from the three *in vitro* systems were subjected to acute gamma irradiation of 0, 40, 50, 60 and 70 Gray (Gy) at the rate of 5.58 Gy per minute. After six weeks, the 50% growth reduction dose (GRD_{50}) was determined to be approximately at 51.52 and 63.8 Gy for TIS and shaking liquid culture, respectively. However, GRD_{50} for the solid media was outside in the tested range.

Student's signature

Thesis Advisor's signature