

Uton Charoendat 2012: Efficacy of Synthetic Eugenol as Anesthetic for Fish Transportation. Master of Science (Aquaculture), Major Field: Aquaculture, Department of Aquaculture. Thesis Advisor: Associate Professor Nontawith Areechon, Ph.D. 206 pages.

Efficacy of synthetic eugenol as fish anesthetic was investigated in tilapia fry, tilapia juvenile (*Oreochromis niloticus* Linn.) and silver shark (*Balantiocheilos melanopterus*) with average weight of  $0.30 \pm 0.01$  g,  $70.85 \pm 1.03$  g and  $3.01 \pm 0.48$  g, respectively and compared with clove oil and MS-222. The study emphasized on the application of synthetic eugenol for transportation and other activities that caused stress and harmful effect on fish health. For safe application, acute toxicity test of three anesthetics was conducted with 0.3 g tilapia fry. The results of 24 hr  $LC_{50}$  values were 16.98, 16.95 and 72.59 mg/l for synthetic eugenol, clove oil and MS-222, respectively. Study on efficacy as anesthetic revealed that 5 mg/l of synthetic eugenol induced stage 1 anesthesia (sedation stage) in tilapia fry and silver shark and 10 mg/l for tilapia juvenile. For stage 4 anesthesia, 20 mg/l synthetic eugenol was required for tilapia fry and silver shark and 30 mg/l for tilapia juvenile. Study on the effect of synthetic eugenol on stress response in tilapia juvenile indicated that this anesthetic could effectively reduce the negative response to stress determined by stress indicators including serum cortisol and glucose. Similar result was found with non-specific immunity including spontaneous superoxide anion and percent phagocytosis. However, application of synthetic eugenol to anesthetize tilapia before vaccination of formalin-killed *Streptococcus agalactiae* by intraperitoneal injection did not show any significant difference on specific immune response determined by serum antibody. Benefits of synthetic eugenol during transportation of tilapia fry were detected. Induction of sedation stage by 5 mg/l synthetic eugenol could significantly reduce the water quality deterioration and improve the survival of tilapia fry during and after transportation. The results from this study clearly demonstrated the positive effect of synthetic eugenol as an effective anesthetic for fish which can be used for transportation and also to reduce the response to stressful condition in aquaculture. Tilapia fry can be safely transported with density of 1,000 fry per 3 liters of water for 6 hr transportation and 75 silver shark per 3 liters of water for 24 hr transportation with additional of 5 mg/l synthetic eugenol in the water.

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Thesis Advisor's signature