

CHAPTER 6

CONCLUSIONS

The aim of the present research was to assess the impact of pesticides used to the communities of benthic macroinvertebrates and to cholinesterase activity in chironomids from study site in order to imply the impact of pesticides used on macroinvertebrate community change in Ban Mae Sa Mai, Chiang Mai province. The physico-chemical and biomonitoring in Mae Sa Noi stream comparing with those in the control stream at elevations 1050, 900 and 700 mAMS L (meters Above mean Sea Level) in dry (April - May 1999), rainy (September – November 1999) and cold (January – February 2000) season was conducted.

Physico-chemical parameters that seasonally measured were stream velocity (m/s), temperature (°C), conductivity ($\mu\text{s}/\text{cm}$), TDS (mg/l) and pH. They were displayed the clearly seasonally change, while both streams had comparable physico-chemical parameters by cluster analysis. By comparing means, only stream velocity was the factor that significantly different between streams.

Total population density and chironomids population density were significantly different between streams ($p=0.03$). Community characteristics; richness, diversity and evenness were different between streams too. In the same time, cluster analysis of macroinvertebrates showed grouping by streams.

Although there was only stream velocity that the significantly correlated with total population density and chironomid population density. Changing pattern of physico-chemical parameters (seasonal difference) was not similar with biological

components (stream difference). Then it was concluded that there were other factors that affecting on total population density and chironomid population density.

The factor that hypothesized to have an impact on community changing was chironomid ChE activities. This in Mae Sa Noi were lower than in the control stream but not significantly different ($p=0.07$) and they were reduced following decreasing altitude. In cold season they were lower than in rainy season.

In vitro test, inhibition of chironomid ChE activity was shown better sensitive method than that was set for confirmation of the use of cholinesterase-inhibiting pesticides. The results showed the amount of methyl-parathion required to inhibit 50% of chironomid ChE activity sampled from the study and the control streams were 121.7 ± 24.8 and 202.5 ± 25.6 μM , respectively. This test showed that chironomids sampled from Mae Sa Noi were more susceptible than those from the control, especially from the sites in the agricultural. Moreover chironomids sampled from upstream (1050 mAMSL) from both streams had less susceptibility than those from lower elevations.

Concluding remarks

Results of the present studies on total and chironomids population densities, chironomid ChE activity and inhibition test that mentioned above together with cluster analysis in Fig 4.3 and 4.4 which showed grouping of these factors by streams. It can be concluded that pesticides used in Mae Sa Noi watershed resulting in reduction of the mean total population density of benthic macroinvertebrates and changing of the benthic community characteristics. Consequently, Mae Sa Noi stream was at risk of ecological imbalance from the use of pesticides.

This present research basically showed the impact of pesticides used on the community of aquatic benthic macroinvertebrate using the evaluation of ecological monitoring with toxicological tests. However, this work still has many points to be improved for more scientific reliable in the field of pesticides used impact on the environment. These points are show in next paragraph, which are divided due to their field.

In ecological field, the residue of pesticides in sediment or organisms may be monitored to confirm the using of pesticides in nearby area. In biological component study, the samples of organisms would be identified into species level for making clearer community characteristics between study sites. On the other hand, in field of toxicology, the toxicity tests such as adding serial of pesticides into container containing of alive organisms to test their survivorship or mortality. It will be help to explain the gap between impact on individual level, which continuously cause in population and community change. Moreover, the using of many types of pesticides and selection of test organism in species level will be upgrading the assessment is more scientific trustable, i.e., using of chironomid larva in a promising biomarker provided that more focus on identification to species level is studied and more toxicological test on other types of pesticides.