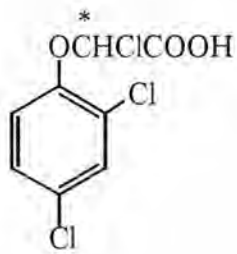
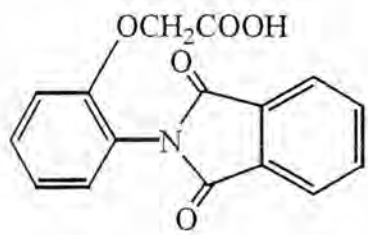
CHAPTER IV
CONCLUSION

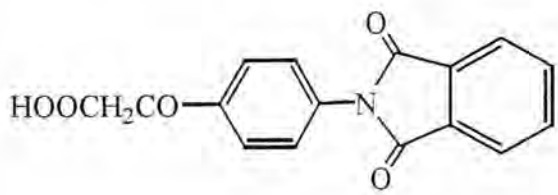
This research was carried out with the purpose to comprehend the structure-activity relationship (SAR) of synthesized substituted phenoxyacetic acids, *N*-(2,4-dichlorophenoxyacetyl)-amino acids, their analogues and their weed growth inhibition against *Mimosa pigra* Linn. and plant growth promotion against *Coleus atropurpurreus* Benth. The synthesized products were derived from the condensation of appropiate phenols with chloroacetic acids or other chlorocarboxylic acids in the presence of a sodium hydroxide. Forty-five substituted phenoxyacetic acids were achieved in moderate to high yield. The derivatives of 2,4-dichlorophenoxyacetic acids were also synthesized including three esters, three amides, four sodium salts and three calcium salts. In addition, eleven *N*-(2,4-dichlorophenoxyacetyl)-amino acids and their methyl esters were manipulated. All of these synthesized compounds were comfirmed and identified the structure elucidation by their physical properties and spectroscopic data such as IR, ^{1}H- and ^{13}C-NMR. There are three compounds including **41**, **50** and **51** that have not been reported in chemical literatures. The structure of new compounds are shown below:



41



50



51

Concerning with the biological activity testing, in the case of weed growth inhibition against *M. pigra* it was found that halogen groups were the best substitutent of phenoxyacetic acids for this study. In general, chloro showed higher activity than other halogen such as bromo or fluoro, especially 4-Cl exhibited the highest percent inhibition of 94%. Nitro and amino substituents decreased the inhibition activity as well as alkyl substituents revealed low activity except for 2-Me exhibiting 73% inhibition. Besides, 4-methoxy group exhibited high activity more than 85% inhibition. Testing the derivative of 2,4-dichlorophenoxyacetic acids, more than 85% inhibition was found for sodium salt of 4-chlorophenoxyacetic acid. Glycine and L-glutamic acid conjugated with 2,4-D also revealed the inhibition activity more than 85% inhibition. When comparing with commercial herbicides, it was obviously found that Compounds **6**, **32**, **45**, **56**, **62** and **63** may be utilized as an efficient herbicide to inhibit growth against *M. pigra*.

Considering with plant growth promotion of *C. atropurpurreus*, it was noticed that the appropriate concentration for testing activity was 10^{-6} ppm based on high number of roots, fresh and dry weight. Focussing on side chain of carboxylic acid, like inhibition activity, increasing carbon or chlorine atom on α-carbon, the activity was obviously dropped. This can be implied that its side chain should be a only two carbon atom as acetic acid. Contemplation with substituent on a benzene ring, the halogen group was found to be the best substituent to promote growth of root, particularly Compound **2**. *N*-Phenyl and *N*-cyclohexyl 2,4-dichlorophenoxyacetamide showed high growth promotion activity as good as DL-alanine and glycine conjugated with 2,4-D. Comparison with commercial substances, Compounds **2**, **46**, **47**, **52** and **56** were found to be more active than 2,4-D (a reference compound). This may imply that it can be developed to use as commercially root growth promotion substance.

The intriguing of this research is the relationship study between phenoxyacetic acids and their analogues and their growth inhibition-promotion activity. Although it was noticed that some compounds as mentioned above showed activity as good as commercial substances, this was merely a preliminary work, it was important to carry on this investigation by to test these substances in a field test.

Proposal for the Future Work

Due to the lacking knowledge about their activities against *Mimosa pigra* Linn. and *Coleus atropurpurreus* Benth., the investigation of the structures and activity relationship (SAR) between analogues of phenoxyacetic acid and their biological activity which is growth inhibition against *M. pigra* Linn. and growth promotion against *C. atropurpurreus* Benth. was still very interesting. Even though these two biological activities were performed in this research, the study of their structures was still attractive to be carried on to obtain complete results. Since certain functional groups substituted on these structures revealed good activity as commercial substances should behave, it should be further development to apply in a field for agrochemicals usage.