CHAPTER IV

CONCLUSION

During the course of this research focusing on the search for bioactive agrochemicals, seventeen Thai plants were accumulated for preliminary antifeedant screening study against common cutworm, *Spodoptera litura* (Fabricius). As the results, the dichloromethane extract from heartwood of *Xylia xylocarpa* exhibited highly antifeedant activity against *S. litura* and low phytotoxicity against lettuce seedling. Therefore, chemical constituents and biological activity of *X. xylocarpa* were thoroughly examined. After fractionation and purification of the dichloromethane extract, eight pure compounds, a synthesized compound (**7**) and two mixtures (Fractions IIC and IIF) were obtained. All isolated substances were further elucidated their structures by means of physical properties, chemical reactions and spectroscopic evidences. The structures of all isolated substances are summarized as shown in Table 4.1.

Table 4.1 Isolated substances from the dichloromethane extract of the heartwood of *Xylia xylocarpa*

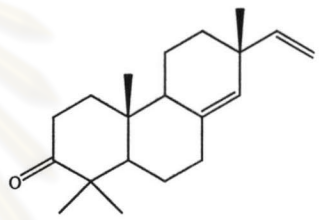
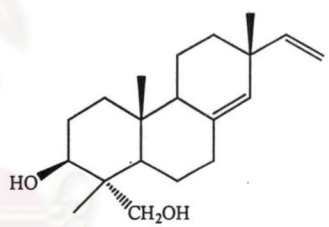
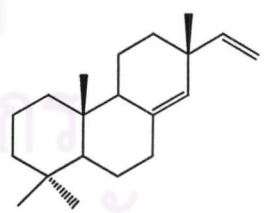
Substance	Weight	% yield*	Structure	Remarks
Compound 1: 8(14),15-isopimaradiene-3-one (sandaracopimaradiene-3-one)	6.5 g	16.25		White platelet
Compound 2: 8(14),15-isopimaradiene-3β,18-diol (sandaracopimaradiene-3β,18-diol)	0.69 g	1.72		Colorless crystal
Compound 3: 8(14),15-isopimaradiene (sandaracopimaradiene)	44.2 mg	0.11		Colorless oil

Table 4.1 (Continued)

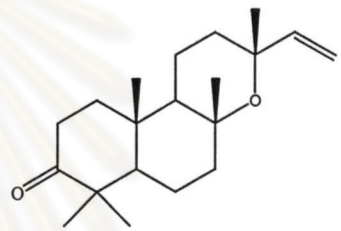
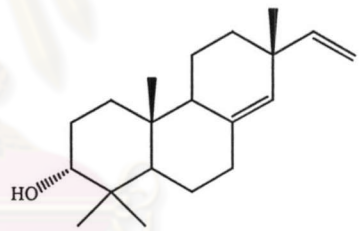
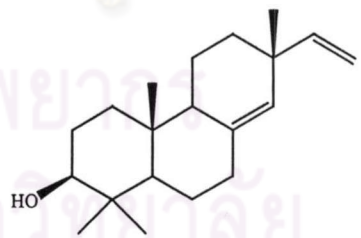
Substance	Weight	% yield*	Structure	Remarks
Compound 4: 3-oxomanoyl oxide	0.43 g	1.07		White needle crystal
Compound 5: 8(14),15-isopimaradiene-3α-ol (sandaracopimaradiene-3α-ol)	67.2 mg	0.17		Colourless oil
Compound 6: 8(14),15-isopimaradiene-3β-ol (sandaracopimaradiene-3β-ol)	2.49 g	6.22		White solid

Table 4.1 (Continued)

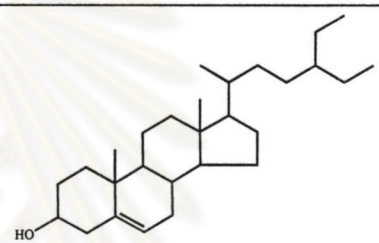
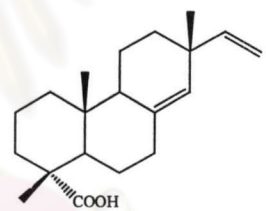
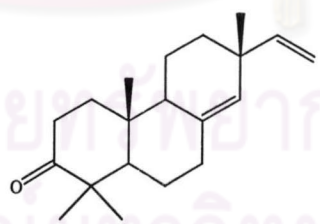
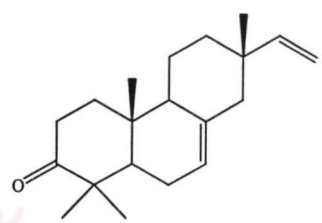
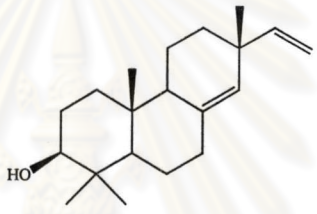
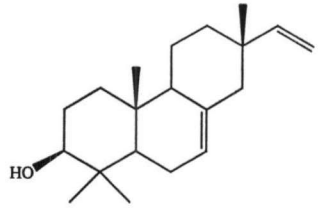
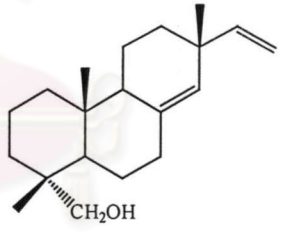
Substance	Weight	% yield*	Structure	Remarks
Compound 8: β-sitosterol	18.2 mg	0.04		White crystal
Compound 9: 8(14),15-isopimaradiene-18-oic (sandaracopimaric acid)	0.25 g	0.63		White needle crystal
Fraction IIC: sandaracopimaradiene-3-one and 7,15-isopimaradiene-3one	2.65 g	6.62	 sandaracopimaradiene-3-one  7,15-isopimaradiene-3one	Pale yellow solid

Table 4.1 (Continued)

Substance	Weight	% yield*	Structure	Remarks
Fraction IF: 8(14),15-isopimaradiene-3β-ol, 7,15-isopimaradiene-3β-ol and 8(14),15-isopimaradiene-18-ol	2.25 g	5.50	 sandaracopimaradiene-3β-ol  7,15-isopimaradiene-3β-ol  8(14),15-isopimaradiene-18-ol	Yellow brown oil

*The percentage yield of all isolated substances was calculated based on CH_2Cl_2 extract (75.03 g).

All isolated substances were further bioassayed. The bioactivity assay that selected for determination in this research are antifeedant activity against both the common cutworm (*S. litura*) and termite plus phytotoxicity against lettuce seedlings. Compound **1** (sandaracopimaradiene-3-one) obtained as a major component exhibited low antifeedant acitivity against common cutworm. While compounds **4** and **9** afforded as minor components, exhibited moderate and high activity, respectively. Besides, the other compounds were inactive. This implied that compound **9** (sandaracopimaric acid) should be one of active principles in this plant. All of the isolated compounds was subjected to antifeedant activity against termite. All of them displayed excellent feeding inhibition. In addition, they were inactive for growth lettuce seedlings.

It is worth mentioning here that the chemical constituents and biological activity of the dichloromethane extract from the heartwood of *Xylia xylocarpa* was addressed for the first time.

In conclusion, it could be clearly seen that the isolated compounds from the heartwood of *Xylia xylocarpa* could be used as a good source of insect antifeedant with no toxicity to crops. The outcome from this research work lucidly clearified that the heartwoods of this plant which commonly used in constructions constituted many diterpenoids possessing antifeedant activity, particularly against termites. This study strongly supported the importance of studying the chemical constituents of plants along with performing bioassay experiments to achieve biologically active principles. Moreover, this plant could be recommended as a rich source for pimarane substances including manoyl oxide.

Proposal for the future work

The incidence of the heartwood of *Xylia xylocarpa* revealed excellent antifeedant acitivity against common cutworm. This work provided the possibility to use this plant as a raw material for insect repellent. The active ingredient, sandaracopimaric acid (compound **9**), may be used as a lead compound to examine what parts of the molecule really displayed an influence on the antifeedant activity against the common cutworm as well as termites. In addition, the exploration of structure activity relationship of isolated substances (pimarane compound) should be further studied on the antifeedant activity. Another aspect that would make this research fulfill is to investigate the chemical constituents and biological activity of

ethyl acetate and methanol crude extracts from the heartwood, and other parts of *Xylia xylocarpa*.