

Insecticidal Effect of Ethanol Extract of *Phellodenron amurense* Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum* against House Dust Mite

Jin-Soun Jung
Semyung University, Korea
E-mail : boejin@semyung.ac.kr

1. Introduction

Allergic diseases such as bronchial asthma, perennial rhinitis, and atopic dermatitis caused by the house dust mites *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*, which are dominant species in homes, have recently become serious health problems. Reducing the number of and exposure to mites and mite allergens are the most important factors in preventing allergic diseases. Recently, the effects of essential oils plants on house dust mites have received much attention with a view to producing natural mite-killing agents[1]. Essential oils are natural plants that contain natural flavours and fragrances grouped as monoterpenes, sesquiterpenes and aliphatic compounds that provide characteristic odours. Many essential oils isolated from various plant species belonging to different genera contain relatively high amount of monoterpenes[2]. Insecticidal properties of numerous essential oils and some monoterpenes have been extensively studied against to various insect species[3-12].

In this study, the insecticidal effect of the ethanol extract of *Phellodenron amurense* Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum*, which contained many kind of monoterpenes, against the house dust mite, *Dermatophagoides pteronyssinus*.

2. Experimental

Materials

Phellodenron amurense Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum* were purchased from online at <http://www.homerose.co.kr>. House dust mite, *Dermatophagoides pteronyssinus*[1] used for experiment was received from parasitology laboratory at college of veterinary medicine in Chungbuk national university.



Figure 1. *Dermatophagoides pteronyssinus* [13]

Methods

Phellodenron amurense Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum* were extracted by being soaked in 100% ethanol for 24hrs at room temperature and sequentially filtered. This procedure was repeated 2 times. The liquor extracts were concentrated at 40 °C under reduced pressure with a vacuum rotator evaporator and obtained ethanol crude extract. That was used as sample for insecticidal effect. House dust mite, *Dermatophagoides pteronyssinus* was reared on Ebioze powder and mouse feed(2:1) in complete darkness. Stock jars were kept in an incubator at an average temperature(25±2) °C and relative humidity of 70%. Ethanolic *Phellodenron amurense* Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum* extracts were applied by direct contact method at different concentrations(1.0, 0.5, 0.25, 0.125, 0.0625 mg/40 µl) and exposure time of 24hours.

3. Results and discussion

Insecticidal effect of *Phellodenron amurense* Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum* ethanol extract against house dust mite

As shown in Table 1, the 1.0 mg/40 µl and 0.5 mg/40 µl concentration of *Phellodenron amurense* Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum* ethanol extract all produced mortality rates of 100% against house dust mite, *Dermatophagoides pteronyssinus*. *Phellodenron amurense* Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum* ethanol extract at 0.125 mg/40 µl concentration produced insecticidal effect of 90.18%, 79.13%, and 90.75%, respectively, against house dust mite, *Dermatophagoides pteronyssinus*. These results proved the insecticidal activity of *Phellodenron amurense* Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum* ethanol extract against house dust mite, *Dermatophagoides pteronyssinus*.

[Table 1] Insecticidal effect of ethanolic *Phellodenron amurense* Rupr., *Coptis japonica* Makino and *Chelidonium majus* var. *asiaticum* extract against house dust mite

Natural dye	Concentration (mg/40 μ l)	Mortality(%) ^a
<i>Phellodenron amurense</i> Rupr.	1	100
	0.5	100
	0.25	90.18
	0.125	84.72
	0.0625	19.88
<i>Coptis japonica</i> Makino	1	100
	0.5	100
	0.25	79.013
	0.125	56.95
	0.0625	15.16
<i>Chelidonium majus</i> var. <i>asiaticum</i>	1	100
	0.5	100
	0.25	90.75
	0.125	44.29
	0.0625	7.37

^a(Remained mites/Total mites) x 100.

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4. References

- [1] H. Yasushi, S. Satoshi, and M. Yoshifumi, "House Dust Mites and their sensitivity to wood oils and volatiles", J. Wood Sci., 54, 2008, pp.1-9.
- [2] S. Kordali, M. Kesdek, and A. Cakir "Toxicity of monoterpenes against larvae and adults of Colorado potato beetle, *Leptinotarsa decemlineata* Say", Industrial Crops and Products, 26, 2007, pp. 278-297.
- [3] K.N. Don-Pedro, "Investigation of single and joint fumigant insecticidal action of citruspeel oil components", Pestic. Sci., 46, 1996, pp. 79-84.
- [4] S. Lee, R. Tsao, C. Peterson, and J.R. Coast, "Insecticidal activity of monoterpenoids to western corn rootworm, twospotted spider mite", J. Econ Entomol, 90, 1997, pp. 883-892.
- [5] S. Lee, C.J. Peterson, and J.R. Coast, "Fumigation toxicity of monoterpenoids to several stored product insects", J. Stored Prod. Res., 39, 2003, pp.77-85.
- [6] H.T. Prates, J.P. Santos, J.M. Waquil, J.D. Fabris, A.B. Oliveria, and J.E. Foster, "Insecticidal activity of monoterpenes against *Rhyzoperha dominica*(F.) and *Tribolium castaneum*(Herbst)", J. Stored Prod. Res., 34, 1998, pp.243-249.
- [7] M.B. Isman, A.J. Wan, and C.M. Passreiter, "Insecticidal activity of essential oils to the tobacco cutworm, *Spodoptera litura*", Fitoterapia, 72, 2001, pp.65-68.
- [8] D.H. Kim and Y.J. Ahn, , "Contact and fumigant activities of constituents of *Foeniculum vulgare* fruit against three Coleopteran stored-product insect", Pest Manag. Sci., 57, 2001, pp.301-306.
- [9] I.K. Park, S.G. Lee, D.H. Choi, J.D. Parj, and Y.J. Ahn, , "Insecticidal activity of constituents identified in the essential oil from leaves of *Chamaecyparis obtuse* against *Callosobruchus chinensis*(L.) and *Sitophilus oryzae*(L.)", J. Stored Prod. Res., 39, 2003, pp.375-384.
- [10] I. Aslan, H. Ozbek, S. Kordali, O. Calmasur, and A. Cakir, "Toxicity of essential oil vapours obtained from *Pistacia* spp. to the granary weevil, *Sitophilus granarius*(L.)", J. Plant Dis. Protect, 111, 2004, pp.400-407.
- [11] D.P. Papahristos, K.I. Karamanoli, D.C. Stmopoulos, and U. Menkissoglu-Spiroudi, "The relationship between the chemical composition of three essential oils and their insecticidal activity against *Acanthoscelides obtectus*(Say)", Pest Manag. Sci., 60, 2004, pp.514-520.
- [12] S. Kordali, I. Aslant, O.Calmasur, and A. Cakir, "Toxicity of essential oils isolated from three Artemisia species and some of their major components to granary weevil, *Sitophilus granarius*(L.)", Ind. Crops Prod., 23, 2006, pp.162-170.
- [13] http://en.wikipedia.org/wiki/House_dust_mite