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**CONTACT TOXICITY OF BOTANICAL INSECTICIDE, DAYABON
BASED ON PLANT ESSENTIAL OILS THYME (*THYMUS VULGARIS*) ON
BREVICORYNE BRASSICAE (HEMIPTERA: APHIDIDAE)**

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ABSTRACT

Cabbage aphid *Brevicoryne brassicae* (L.) is an important pest of cruciferous plants that cause economic losses. Reduce of chemical pesticides in order to minimize pesticide residues on these products is one of the basic requirements of food security. Therefore, in this study, the effects of Dayabon[®] (EC10%) based the thyme essential oil *Thymus vulgaris* was investigated on the cabbage aphid. The bioassay experiments were conducted at 20±2 °C, 60±5% RH and photoperiod of 16:8h (light: dark). In this research water was used as control. LC50 and LC90 values were 25.14 and 85.75 ppm, respectively. Therefore, it could be recommended that Dayabon as a suitable control measure for low-risk pest management of *B. brassicae*.

Keywords: Dayabon, Cabbage Aphid, Bioassay, Formulation of EC10%, Sensitivity

INTRODUCTION

Today, the existence of hazardous materials and the effects of pesticides and pesticide chemical residues in food is becoming more popular (Jahromi talebi, 2007). Cabbage aphid that, also known as canola aphid is one of the most important of pest of cruciferous plants and causes direct damage by feeding on sap and indirect damage caused by the transmission of various plant diseases (Khanjani, 2005). According to Plant Protection Organization, cabbage aphid control in toxins such as Malathion, Reksyon, Somysydyn and Primicarb recommended (Faqih *et al.*, 2002). After 50 years has proven that chemical pesticides just to clear up the problem and the problem remains in addition, new problems are added (Baniameri, 2007). So, today the demand for vegetable insecticides for agricultural products is increasing the risk remaining. The use of herbal ingredients instead of synthetic chemical pesticides has many advantages including low toxicity to humans and other mammals, as well as lower environmental impact (Shahkarami *et al.*, 2004). So it seems that in the near future plant compounds can be used as a suitable alternative or complementary chemical pesticides to protect crops have a special place. Thyme scented plant family Lamiaceae is valuable and common in traditional medicine and medicinal plants in the world (Jamzad, 2009). The yields of this essential oil 2 to 3% and the combination of thymol in oil have been reported about 40 to 65% (Omidbeigy, 2000). So far, the effects of essential oils extracted from plants extracts on various pests have been studied. The preparation of suitable formulations of these compounds is important, because the possibility of using these products as commercial applications and provides. According to studies, it can be said that the research on the use of essential oils formulated thyme in the control of agricultural pests has not been done. Thus, this study is the first to the effects of lethal effect of Dayabon composition based on essential oils thyme (EC 10%) on the cabbage aphid was investigated.

MATERIALS AND METHODS

Survey Cabbage Aphid Susceptibility into Dayabon Composition in Bioassay

To assess the cabbage aphid susceptibility to combine Dayabon in bioassay, leaves dipping method was used. As aphids tested received an insecticide-treated surface (Koziol and Semtner, 1984). In this experiment, preliminary tests to determine the effective concentration of the insect was done that to determine the highest and lowest concentrations, intermediate concentrations were calculated based on the

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logarithmic intervals (Robertson and Preisler, 1992). In this regard, cabbage leaves for 5 seconds to 5 cm in diameter and were immersed in a solution prepared by toxic (Roh *et al.*, 2011). Then the upper surfaces of leaves on wet filter paper in Petri dishes with a diameter of 5.5 cm were kept in the leaves to dry completely. Part of the door of petri was covered with nets for ventilation. Experiment with four replications and seven counts of performing live and dead people were examined after 24 hours. To determine LC50 and LC90 insects, was placed the numbers 10 and 15 adult aphids by age on each leave then in growth chamber with temperature °c 2 ± 20 , relative humidity: $5 \pm 60\%$, photoperiod of 16: 8 (L: D) was held and the death toll was estimated after 24 hours. In this study, distilled water was used to control. A Dayabon concentration for cabbage aphid was 10 ppm 60 and doses of 10, 15, 30, 35, 45, 55 and ppm60 was used in these experiments.

RESULTS AND DISCUSSION

Statistical Analysis

Bioassay data were analyzed using SPSS software. The theory of parallel software and the equivalent of LC50 and LC90 regression lines are automatically tested and the amount was calculated.

Dayabon combined Impact on Mortality Cabbage Aphid in vitro

Based on the results of the tests showed that LC50 and LC90 of Dayabon was 25.143 and 85.751ppm that due to low of LC50 and LC90 for cabbage aphid It can be concluded that Dayabon contains thyme essential pest is toxic acceptable (table 1). Also, the slope of the regression line Dayabon (Slope \pm SE) of $33/0 \pm 40/2$ was estimated. This amount represents less likely cabbage aphid resistance in the population (Figure 1). In this study, given that the leaf dipping method is used, So that 2 hours after soaking and drying the solution on the surface of leaves, aphids were placed on leaves and while the insect is feeding on plant sap, So Dayabon containing thyme can be used as anti-nutritional factors, in other words, preventing the feeding act. On the other hand, Dayabon contains with 10% thyme essential oil and before the effect of the respiratory toxicity of contact of thyme essential oil has been proven on many pests. The toxicities of thyme Shirazi (ZatariamultifloraBoiss) The cowpea weevil adults was conducted that results showed the respiratory toxicities of concentration of essential oil showed a significant positive correlation with oil concentration and duration of giving essential oil (Pvalue<0.05). LC50 values for the essential oil of 329 against males and females were calculated and it was good insecticidal effects (Moravaj *et al.*, 2011). So part of the mortality observed in this experiment could be due to toxicities.

Table 1: Estimated LC50 and LC90 Dayabon containing essential oil thyme on the cabbage aphid population

Insecticide	¹⁾ Number	slope \pm SE	LC ₅₀ (ppm) ²⁾	LC ₉₀ (ppm) ²⁾	df	Chi-square	P- value
Dayabon	360	2.40 \pm 0.33	25.143 (20.507-29.293)	85.751 (67.655-126.249)	5	8.5	0.131

1. The number of insect in each bioassay
 2. 95percentin brackets

In addition the inhibitory effect of nutrition and thyme oil repellency by other researchers has been proven. Moharramipour *et al.*, (2009) through experimentation, examined the effect of mountain thyme essential oil on the spawning deterrence and repellency of cowpea beetles and found essential study reduced the spawning pest significantly. So 500 microliter of solution thyme essential oil ppm1800 cause 86.36% spawning deterrence on adult cowpea beetles. Therefore it can be said that some of the deaths were caused by starvation and hunger aphids on the leaves because pesticides Dayabon cause of 10% thyme essential oil can be respiratory and feeding deterrent function. In addition the pesticides based on insect body

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contact can be found through the cuticle and damage the cell wall, leading to dehydration and death of the insect. Based on observations made during the dead insects were counted, it was found that the insects were wrinkled and their body water lost. Due to the combined effect of the essential oil of thyme Dayabon to control cabbage aphid as a major pest of crops and vegetables can be said this combination can be considered as a control option and must be regarded as an appropriate way, the integrated pest management programs low risk.

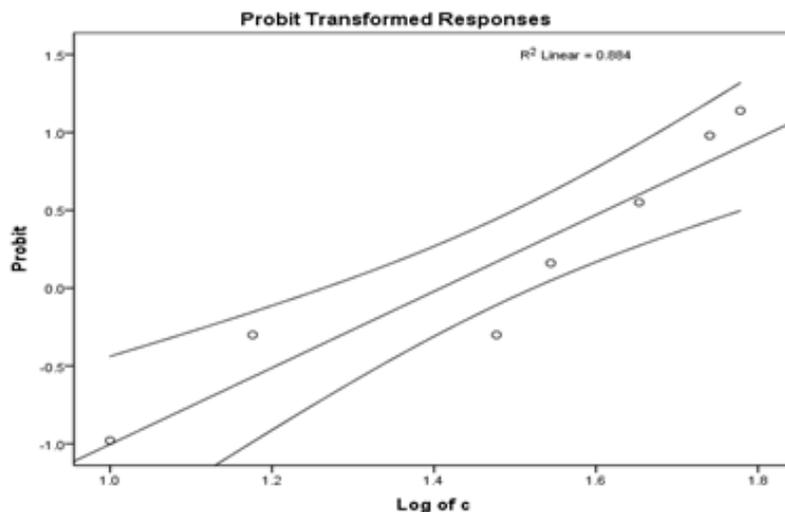


Figure 1: Regression line Dayabon containing essential oil theme on the cabbage aphid

However, since, in practice, insecticides studied were the insect body spray, therefore it is better to other tests to determine the effect of direct contact insecticide spraying due on the body. Also considering that the pesticide plant is new and so far the problem has not been tested for resistance to pests, the cabbage aphid susceptibility of different populations in the coming years in order to pursue the development of resistance to Dayabon research programs seems necessary.

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