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BIOLARVICIDAL POTENTIAL OF CYCLAMEN ALPINUM EXTRACT AGAINST CULEX PIPIENS

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Mosquitoes, especially *Culex pipiens* L. (Diptera: Culicidae) species, are medically important and are vector animals carrying disease to humans from animals (1). In recent years, researchers have been investigating natural insecticides rapidly, and extracts from plants have been found to be effective for different periods of harmful insects, because of the presence of some compounds in plant extracts (2).

Cyclamen genus from the Primulaceae family are using as medical treatment, ornamental and in folk medicine (3, 4). Although *Cyclamen alpinum* Dammann ex. Sprenger was defined as *Cyclamen trochopteranthum* O. Schwarz in 1975, it is nowadays called *Cyclamen alpinum* again (5).

The aim of in this study the larvicidal effect with ethanol solvent extract of *C. alpinum* was investigated against larvae of *C. pipiens* as a biolarvicidal.

Leaves and tubers of *C. alpinum* were collected from their habitats in Denizli, Turkey, in March-April 2015, identified from the book of Flora of Turkey (3). Each parts (tubers and leaves) were dried at the shadow, room temperature and low humidity. Plant parts were first separated into small pieces and dissolved in ethanol. After filtering, the remaining alcohol and water were evaporated. Extracts were stored at -20 °C. The larvicidal effect of *C. alpinum* ethanol extract against *C. pipiens* was tested according to Cetin and Yanikoglu (1) method. The experiment was performed at 12:12 photoperiod, at room environment. 24-, 48- and 72- h later, records were taken looking at the dead larvae then results calculated with STATPLUS Pro 5.9.8 and SPSS Version 23.0 (6).

The effect of *C. alpinum*'s ethanol extract *C. pipiens* on the second and third larval stages was examined. 100% death occurred larvae at 0.25 mg/mL concentration after 72 h of exposure. Percent mortality rates are given in Table 1. Tuber part (0.151 mg/mL) was found the more lethality than leaf part (0.534 mg/mL) according to LC50 value of 72 h. This lethal effect may have been caused by saponins in the plant.

Table 1: Average mortality rates (%) of the *C. alpinum* concentrations at the time of exposure to *C. pipiens* ± S.E. and statistical values.

	Leaf Part		Tuber Part	
	24- and 72- h later		24- and 72- h later	
0.1 mg/mL	0 ax, Ay	0 a, A	0 ax, Ay	10 ± 3.33 a, B
1 mg/mL	70 ± 0.88 a, B	90 ± 1.33 a, B	10 ± 3.33 a, A	100 ± 0.00 b, C
Control (dH ₂ O)	0 a, A	0 a, A	0 a, A	0 a, A
LC ₅₀ (mg/mL)	0.924	0.534	1.383	0.151
x ²	8.28	6.93	3.35	0.59

x: If lower cases are same in a line, there is no statistical difference in Duncan's multiple range test ($p \leq 0.05$).

y: If lower cases are same in a column, there is no statistical difference in Duncan's multiple range test ($p \leq 0.05$).

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