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EFFICACY OF EXTRACTS OF BISHOP'S FLOWER AMMI MAJUS AGAINST BLACK BEAN APHID *APHIS FABAE* SCOPOLI

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ABSTRACT

Experiments were performed in the laboratory of the Biological Control Department at the Al-Mussaib Technical College during February-July, 2023 for evaluating the efficacy of crude aqueous and alcoholic extracts of flowers and leaves of Bishop's flower *Ammi majus* against the black bean aphid, *Aphis fabae* Scopoli, results revealed that the hot water extract proved superior to cold water extract and hot water extract of flowers was superior compared to leaf extract with mortality of 29.7% nymphs and adults 19.6% respectively.

Key words: *Aphis fabae*, *Ammi majus*, nymph, adults, Bishop's flower, leaf, pest control, extracts, mortality rate, phytochemical, hot water, cold water, alcohol extracts, bioassay

Chemical control was given priority because it produces rapid results in combating pests. With the emergence of resistance to insecticides and the residual toxic effects it was necessary to use safe control methods, such as phytochemical, and study their effect on controlling pests (Mohamed et al., 2019). The toxicity of plant extracts can be used for control of pests. Phytochemicals are natural toxins extracted from plant parts (roots, leaves, stems, flowers) that contain active substances such as terpenoids, terpenes, and carbonyl, all of that can be explore as insecticides. Phytochemicals have been used to control insects and their effect is to kill or repel pests that affect economic plants (Mkindi et al., 2020).The black bean aphid *Aphis fabae* Scopoli causes direct damage to the plant through the absorption of plant sap, as well as causing wilting of the plant, causing economic loss; besides its secretion of honeydew that collects dust and helps the growth of fungi (Bennour et al., 2020). There is an urgent need for a new and effective agents to control pests to prevent adverse effects on humans, animals, and the environment. Using botanical extracts of Bishop's flower (Almogdad and Semaškienė, 2021) *Ammi majus* that grows wild and belongs to the family Apiaceaeis is an opinion. It is widely spread in Europe, the Mediterranean, and Asia. Because of its medicinal value, people now widely cultivate *A. majus* in India and some tropical countries. Hossain and Al Touby (2020) evaluated the biological activities of the crude extract of this plant. However, there is a lack of large-scale work on crude plant extracts with polar solvents. Earlier studty evaluated *A. fabae* control using leaf and flower plant extracts of *A. majus* (Barhi and Rashid, 2022). This study aimed to extract the crude secondary compounds and test them in control of *A. fabae.*

MATERIALS AND METHODS

Several adult and nymph of *A. fabae* samples were collected from the agricultural fields in the Al-Mussaib Technical College in November. These were reared and propagated on bean plants planted in cork tubs 30x30 cm in the glasshouse. Taxonomic keys diagnosed it in the Museum of Natural History, University of Baghdad (Singh and Singh, 2021). Plant samples –flowers and leaves *A. majus* were brought from the agricultural fields in Al-Mussaib District, Iraq. The leaves and flowers were washed to get rid of dust, and leaves and flowers were dried. It was ground into a coarse powder form, and stored in sealed plastic containers in the refrigerator until used. The plant was got identified from the College of Science for Women/ University of Babylon. Preparation of cold water extract of leaves and flowers followed the Salami method (7611) (Velavan, 2015). In preparing the aqueous extract 10 grams of plant leaves and flower powder were used placed in a beaker (500 ml) and the volume was add to 200 ml sterilized water; mixed the extract with a magnetic tornado for 19 min; then, the sample was left for 24 hr and covered tightly. The solution was filtred with filter paper (Whatman No. 1) in a Buchner funnel. The filtrate was a centrifuged

at 3000 rpm for 11 min the precipitate was lax, and the filtrate dried at 45 °C. The extract was kept refrigrated from which 10 g was dissolved in 100 ml of sterilized water, so that the concentration of the basic solution is 100 mg/ ml or the equivalent of 10%, of which the concentrations (1, 1.5, and 2). The control treatment was sterilized water. Preparation of the hot water extract from the leaves and flowers followed the same steps except for replacing the cold water with hot water. Ten nymphs adults in three replications were subjected to different concentrations. Exposure period was followed by 13 hr of darkness, after which the mortality rate was recorded after 25 hr (Matthews, 2014). Preparation of the crude alcoholic extract followed Samurai and Harborne and Harborne (1973). Ten grams of the dry powder was dissolved in (200) ml of 99% ethyl alcohol added to the mixture, and the process of the extraction continued for 24 hr using the Soxhlet extractor at 45°C. The concentrations (1, 1.5, and 2%) were prepared. Control treatment used 5% ml of ethyl alcohol and a volume of (100) ml of sterilized water. Ten nymphs and adults were taken in three replications and different concentrations were treated with a hand sprayer with a capacity of 100 ml for each concentration. After 12 hr of light followed by 12 hr of darkness, the mortality of nymph and adults recorded after 25 hr and this mortality rate was corrected according to Abbott's formula (Rosenheim and Hoy 1989). Statistical analysis was done using CRD ($p>0.05$) in Software Genstat (Al-Rawi and Khalaf Allah, 2000).

RESULTS AND DISCUSSION

The results in Table 1 show that of 2% flower extract in cold water was superior to those of leaves (mortality of 21.1 nymphs and 10.7 adults, respectively); at 1% mortality was 9.3 nymphs and 5.1 adults, respectively. In the flower extract of cold water, the mortality reached 11.2 nymphs and 7.3 adults, respectively. Flower extract with hot water at 2% gave highest mortality (25.7 nymph and 11.3 adults respectively); leaves extract at same concentration gave motality of 24.1 nymphs and 10.4 adults, respectively. Thus, gave more mortality compared to that of flower extract leaf extract. Hot water extract led to an increase in mortality. Alcoholic extract showed more mortality compared to aqueous extracts. Thus, alcoholic extract at 2% gave more mortality at a concentration of 2%. The cause may be an array of the secondary compounds in the plant being more concentrated in the flowers than in the leaves. Alcoholic extract from a leaf at concentration of 2% gave mortality (27.3 and 18.1). Another reason might be *A. majus* leaf and flower extracts have phytochemical of high antioxidants and flavonoids, tannins, and coumarins, which led to control of *Aphis fabae* (Kaboodi et al., 2017; Barhi and Rashid 2022).

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AUTHOR CONTRIBUTION STATEMENT

HHD and YDR conceived of the original idea. HHD and YDR developed the theoretical and performed the statistical analysis for experimental data. HHD and YDR verified the analytical methods. HHD and YDR

Table 1. Effect of cold, hot water, and alcoholic extracts leaves and flowers of *A. majus* on *A. fabae*

Mortality rate %								
	Cold water extract				Hot water extract			
Water	Flowers		Leaves		Flowers		Leaves	
extract concentration %	Adult	Nymph	Adult	Nymph	Adult	Nymph	Adult	Nymph
Control	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	7.3	11.2	5.1	9.3	8.0	14.4	5.7	12.6
1.5	9.5	16.5	9.0	14.2	10.1	22.7	10.3	18.3
2	10.7	21.1	10.0	15.2	11.3	25.7	10.4	24.1
LSD (p at 0.05)= 1.810	Hot and cold water extract					Plant parts		
	LSD (p at 0.05)= 1.100					LSD 0.05= 1.420		
	Alcoholic extract							
Alcoholic	Flowers		Leaves					
extract concentration %	Adult	Nymph	Adult	Nymph				
Control	0.0	0.0	0.0	0.0				
1	16.0	18.1	15.4	17.5				
1.5	18.6	25.5	17.0	24.0				
2	19.6	29.7	18.1	27.3				
LSD (p at 0.05)= 1.377	LSD (p at 0.05)= 1.189							

worked for lab analysis and supervises the project. HHD and YDR discussed the results and contributed to wrote the manuscript.

CONFLICT OF INTEREST

No conflict of interest.

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