The impact of the chemical insecticide Malyphos and the vegetable oil of Neem on the aphid

Abderrahmane Kassimi[1], Lahcen El watik[2], Moumni Mohammed[3], Chaouki Hamid[4]

[1,2,3,4]Laboratory natural substances, synthesis and molecular dynamics, Department of Chemistry, Faculty of Science and Technology of Errachidia, University My Ismail, BP 509 Boutalamine, Errachidia, Morocco.
Email: kass_abde97@yahoo.fr

Abstract— *To see the impact of insecticide vegetable oil (Neem) on aphid of the green alfalfa, we conducted tests to compare with the synthetic product Malyphos most used by farmers in our region. Because of these, we treated the plants alfalfa infested by aphids with doses of product and the vegetable oil of Neem. In spring-summer or there is a significant number of plant louses and after a controlled time we determines the percentages dead of this parasite in order to obtaining the mortality according to time and dose of the synthetic product and of this oil. The comparison of the aphid mortality between the Malyphos product and the vegetable oil made it possible to reveal the role of this natural extracts on the limitation of manpower of these parasites and their possible use as plant health naturalness without side-effect on the human health and the environment.*

Keywords— aphid, chemical, insecticide, malyphos, mortality, Neem, vegetable.

I. INTRODUCTION

Most months of the year aphid alfalfa are present on crops. Of winters to summer in the neck and then colonized the stems and leaves. In the green alfalfa, such pests as aphids cause damage, in particular to the leaves, which cause discoloration. They attack the young shoots and buds. A severe attack led to the falling leaves. In our region, some species of aphids have been found in large quantities on the green alfalfa fields. Aphids, of the larvae to adults feed on the underside of the leaves.

According to studies, the most important parasitic diseases leading to the development of leaf spots are symptoms of alfalfa that appear first on the lower leaves. The spots are circular, brown to dark brown with irregular margin (finely serrated). On the upper side of the spots, the fungus produces a fruit that is in the form of a small point raised brown, located in the center of the spot. The affected leaves turn yellow and fall (Michel Lacroix, 2002).

We know that pesticides have contributed to increased crop yields in particular the fight against pests, but the side effects of pesticide use are many: effects on the health of the people, the wildlife and flora; contamination of the water, soil and air. The World Health Organization advance the impressive figure of 3 million poisonings each year in the world due to pesticides with 220 000 dead in total (Bouguerra, 1986).

The growing interest in the use of pesticides based on plant extracts in the world is motivated by their effects comparable to those of chemical pesticides (Mouffok et al., 2007-2008). This work has for objective to make a comparison the impact of insecticide chemical Malyphos and the vegetable oil of Neem on the aphids of alfalfa green in order to reduce the damage caused by these parasites in protecting the environment and in assessing the effect of insecticide natural products used in this study.

II. MATERIALS AND METHODS

2.1 Malyphos (synthetic insecticide)

Lot: 35100.

Active ingredient: Malathion.

Field of action: flies, aphids, codling moth.
Dose of use: 200 ml / hl.
Product Company: Agri Chemistry (Morocco).

Nature of product: toxic insecticide and acaricide universal.

2.2 Alfalfa

The common name is Alfalfa (Lucerne) and latin name is Medicago sativa.This name is derived from the Greek: Medike which designated the origin of this plant, introduced of the Medes after the expedition of Darius, cited by Theophrastos in his book: Research on the plants (Remi Coutin, 2001).

Alfalfa has many environmental benefits as the subtraction of inorganic nitrogen in the process of leaching, the treatment of effluents rich in nitrogen and the positive impact on biodiversity. It is also a strategic stake in economic independence and protein for the feeding (Thiebeau et al., 2003).

2.3 Substance used as natural insecticide

Reagents used in this work have been provided by Herb'Atlas, supplier of natural products, organic and conventional essential oils.

Neem vegetable oil (VO): The botanical name of Neem, also known as Indian Lilac, is Azadirachta indica. Neem is an evergreen tree native to India, Burma, Java and the Lesser Sunda Islands (Mouffok et al., 2007/2008). Neem oil is obtained by cold pressing and sand filtration. The active molecule is azadirachtin (0.29 %).

2.4 Description and characterization of the aphids

2.4.1 Name and identification of aphid

The Latin names are Adelgides, Aphidides, Eriosomatides, Phylloxerides and the Common name is Aphids. Aphids belong to the insects, more precisely to the Homoptera order and Aphididae family.

They were identified with a magnifying glass of 8x and they present the characteristics: 0.25 mm – 2.5 mm long, dark and light green head, dark and light green chest, yellow-green and light green abdomen.

2.4.2 Aphids in the alfalfa

Different species of aphids found in green alfalfa are often the following: The aphids in the alfalfa are the alfalfa aphid (Macrosiphum creelii), blue alfalfa aphid (Acyrthosiphon kondoi), green peach aphid (Myzus persicae), pea aphid (Acyrthosiphon pisum) and spotted alfalfa aphid (Therioaphis maculata) (Knowles, 1998).

2.5 Experimental conditions and method

2.5.1 Conditions

The experiments are carried out from May to July in the green alfalfa fields. The selected geographical area is in the area of Errachidia (Morocco). The area of fields ranged from 0.1 to 0.5 hectare. In order to carry out these experiments random plots of 1 m² were taken, mutually separated by 10 m.

2.5.2 Experiments and procedures

The testes consist of evaluating the mortality of aphids in the presence of dilute solutions of oils using a methodology inspired by the protocol of the World Health Organization (WHO, 1985). In that way, aphids parasitizing fields of 1 m² surface were taken immediately after treatment in 25×40 cm² clear plastic bags for later counting in the laboratory.

According to this, stock solutions of each oil sample were prepared in pure water, and from these solutions the final test dilutions were made at different concentration percentages (v/v) (0, 5 % and 1 % oil in pure water).

Each plot was sprayed with 100 ml of a solution (oil + water + 1 ml of liquid soap per liter of solution as an emulsifier) by use of a manual sprayer. In order to verify the reproducibility of the results each test was repeated four times. A control sample of 100 ml of pure water and emulsifier enables to measure the natural mortality at the same experimental conditions. The count of dead aphids on the last 20 cm of plants taken in a 1 m^2 surface area has been accomplished by means of a magnifying glass 8x, and this 3,5 and 7 hours after treatment. The same procedure was conducted for the other plots and concentrations (0, 5 % and 1 %).

III. RESULTS

Each mortality percentage (m ± SEM where m is the mortality and SEM is the Standard Error of Measurement) presented in table 1 is the average of sixteen tests which have the unavoidable uncertainty of the measurement. The table shows that after hours of experience the control did not exceed 13.5 % mortality in all tests.

TABLE 1.
APHID MORTALITY PERCENTAGE (%) IN TERMS OF TIME AFTER EXPOSURE AND OIL SOLUTION CONCENTRATION

	Concentration 0.5 % (v /v)			**Concentration 1 %** (v /v)		
Time (h) / Product	**3**	**5**	**7**	**3**	**5**	**7**
Malyphos	39.04±0.8	65.95±1.1	70.31±1.02	52.77±0.7	66.1±0.9	71.49±0.95
EV Neem	26.94±0.9	68.5±1.3	78.6±1.7	36.94±0.81	75.2 ±0.54	88.26 ±0.64
Control	6.25 ±1.08	08.6 ±0.99	13.5 ±1.05	7.8 ±0.41	9.89 ±0.85	11.06 ±1.01

We see that by the dose 0.5 % or 1 % mortality is low from the 7 hours for the Malyphos and it is strong for the Neem. These mortality rates are almost stabilized at the end of each test, which proves that the effect of the products is fast compared with that of other extracts such as Melia volkensii or the effect is observed on two weeks (Diop and Wilps, 1997).

From these results, the vegetable oil of Neem to be the less active in first hour. Also the Neem is still active but the Malyphos become active in the long term. It is observed that the mortality varies little even at a high dose and long duration. To evaluate more precisely the insecticide activity of these products against aphids, it was calculated the $TL_{50,}$ the TL_{90} and the LC_{90} defined in table 2.

TABLE 2
TL_{50} and TL_{90} FOR 0.5 % AND 1 % PRODUCT CONCENTRATION LC_{50} and LC_{90} FOR 7 HOURS AFTER TREATMENT

	TL_{50}		**TL_{90}**		**LC_{50}**	**LC_{90}**
	0.5 %	**1 %**	**0.5 %**	**1 %**	**After 7 hours**	**After 7 hours**
Malyphos	5 h	4.5 h	10.75 h	10.5 h	----	1.25 %
EV Neem	5.5 h	4.5 h	10 h	9 h	----	1.5 %

3.1. Lethal time causing 50 % and 90% of mortality (TL_{50} and TL_{90})

The mortality of aphids reached 50 % for the dose 0.5 % of Neem from 5.5 hours and then the Malyphos products from 5 hours. Also for the dose 1 % of Neem from 4.5 hours then the Malyphos from 4.5 hours. For the dose 1 % we have that the Neem gives a mortality rate of over 90 % from 9 hours then the Malyphos from 10.5 hours.

3.2. Lethal concentration causing 90 % of mortality (LC_{90})

We reached a 90 % mortality of aphids after seven hours of the treatment from the dose from 1.5 % of the Neem and then the Malyphos to 1.25 %. The activity or insecticidal vegetable oil Neem seems comparable to the chemical Malyphos.

IV. DISCUSSION

Aphids die quickly with the high dose and reached a value of almost 70 % in the green alfalfa, but still slower than the low-dose intake witness. It can be assumed that the mortality is mainly due to the various active compounds containing in these

products, the dose used and the processing time of aphids. The increase in dose makes the oil very active against aphids; this can lead to dilution and a modification of the metabolism. This is demonstrated by the assumption of Isman (Isman, 1999).

Compared the LC_{90}, TL_{50} and TL_{90}, the insecticidal activity of Neem oil is closer to the synthetic product Malyphos often used by farmers in our country. These results are found proven by Butler and Henneberry (Butler and Hennberry, 1990) who tested a solution of 5 to 10 % of the oil from cotton seeds on aphids of the cabbage, , the couple, the thrips and the to legionnaire in the beet. The oil from the seeds of cotton has reduced up to 91 % the number of larval legionaries on the bette to carde.

V. CONCLUSION

The attack by vegetable oil Neem on aphids of green alfalfa is also affected in the same way by the chemical Malyphos. These shows that the vegetable oil with concentrations were sufficient to cause death of the insect can replace the chemical product Malyphos. The oils of Oregano, Basil, Marjoram, Thyme, Sage, Laurier, Rosemary, Lavender, of Anise, Mint, Celery, Cumin, Citrus Fruit, Coriander and Fennel have been tested and several have caused up to 100 % of mortality in the small borer of cereals (Shaaya et al., 1991).

We obtained in our study the results which have to say that the doses of 0.5 and 1% of products applied to aphids have a lot of impact and enough insecticide action. So the natural insecticide will have great importance on human, animal health and the environment. The high dose of 1 %, all samples showed an interesting activity on aphids. Hour after hour, the extract of Neem in the green alfalfa being the most effective sample and reaches a mortality rate of over 70 % for the high dose in less time.

These results are consistent with Isman, natural plant extracts are a true wealth and can give many substances used insecticides in the fight against parasites (Isman, 2001). It follows that the use of natural molecules ecological and economic interest to the insecticidal properties of lesser toxicity in humans, proves to be an alternative approach to the use of synthetic insecticides.

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