Selective Toxicity of Certain Recent Insecticides and Botanical Extracts to *Diaeretiella rapae* Parasitoid and Its Host, *Brevicoryne brassicae*

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Abstract: Several pesticides from neonicotinoid and spinosyn groups were recently introduced for controlling several insect pests in Egypt. Plant materials contain numerous powerful insecticidal components; these are a promised alternative safe candidate to harmful synthetic insecticides. The neonicotinoids (thiamethoxam, acetamiprid), spinetoram, and botanical extracts (sausage, rosemary, canola) toxicity was tested toward apterous aphids, *Brevicoryne brassicae* (L.) as well as mommies and parasitoid adults, *Diaeretiella rapae* (M'Intosh)under controlled laboratory conditions using leaf dip and dry residue film of Potter Tower. The carboxylestrases activities of the two insect species adults were also determined using α-naphthyl acetate (α-NA) by colorimetric technique. Spinetoram revealed aphicidal activity similar to the tested neonicotinoids against cabbage aphid. The insecticides as well as extracts except rosemary were more toxic against mommies than aphids after 24 hrs from dipping exposure. Seven days later, the insecticides and sausage extract treatments were less toxic to parasitoid that emerged from treated mommies compared to aphids. The insecticide and extract treatments except sausage treatments were less toxic in parasitoid adults using dry contact residue film compared to aphids. The caboxylestrase enzymes showed lower affinity in aphids than in parasitoids by 11.66 folds. On contrary, the maximal activity (V_{max}) was higher in the aphids than the parasitoid by 2.57 folds. To sum up, thiamethoxam, acetamiprid, spinetoram, sausage extract, and canola extract were higher toxic to parasitoid mommies than aphids after 24 hrs from dipping exposure; these effects were not recognized in the emerged parasitoid adults. The insecticides as well as extracts were less toxic to the parasitoids than aphids using dry residue film. The caboxylestrases should be considered as one limited factor for the selectivity of tested compounds in aphid and their parasitoid.

Keywords: Neonicotinoids, spinetoram, selective toxicity, Botanical extracts, *Diaeretiella rapae*, *Brevicoryne brassicae*, caboxylesterases enzyme.

1. Introduction

Aphids (Homoptera: Aphididae) are one important insect that cause severe damage by direct feeding as well as indirect by transmission of plant virus diseases. Aphids weaken plants by removal saps cause bleaching and distortion of the leaves in very severe cases the plants die. The cabbage aphid, *Brevicoryne brassicae* (L.), is one of the major pests of vegetable Brassicaceae crops such as cabbage and canola in many regions. This aphid is a vector of several viruses including cabbage black ring spot, cabbage ring necrosis, cauliflower mosaic, radish mosaic and turnip mosaic virus (Ellis *et al*., 1998). *Diaeretiella rapae* (M'Intosh) is very important for limiting the populations of many aphid species (Desneux *et al*., 2005; Hafez, 1961).

Insecticides are still used as prime control method for aphid. To maximize the advantages of these insecticides, selective insecticides should be chosen in integrated pest management programs (IPM). Selective insecticides defined as compounds which are more toxic to pests than its natural enemies. In last decades, many new selective insecticide groups are introduced to the world pesticide market. In Egypt, neonicotinoidinsecticides were recommended to several arthropod pests(Anonymous, 2016), it affects on neuron nicotinic acetylcholine receptors of insect (Tomizawa and Casida, 2003), moreover, spinosyn is another insecticide one (Anonymous, 2016), it hyper excites the neuron acetycholine as well as affects on GABA receptors (Salgado *et al*., 1997).

Terrestrial plants produce several secondary products such as terpenoids, phenolics, glucosinates, and alkaloids likely exceeding 100,000 novel chemical structures. The Brassicaceae plants have the myrosinase-glucosinolate system, one of the defense barriers towards insect pests and pathogens (Jones *et al*., 2002), therefore, the canola (*Brassica napus* L.) extract was chosen to screen for insecticidal toxicity. Sausage plant tree, *Kigelia africana* and rosemary plant, *Rosmarinus officinalis* were also selected for screening because it was noticed that no any insect attack it. Few commercialized botanical insecticides are available in the pesticide market compared with synthetic insecticides. Therefore, the screened toxicity of the new botanical extracts is essential not only in developing countries where farmers could used the crude extracts as direct cheap control, but also in the industrial ones where the insecticide producers could discover new active ingredient molecules.

Mommies as well as parasitoid adults of *D. rapae* are usually exposed directly or indirectly to insecticides in the field insect control programs. Lack information about

the selective toxicity of these selected insecticides and extracts to *D. rapae* parasitoid stages was available.

The objectives of the current study are to assess the toxicity of acetamprid, thiamethoxam, spinetoram, and canola extract, sausage extract and rosemary extract toward the cabbage aphid and their mommies and parasitoid adults and under laboratory controlled conditions. Moreover, for partially explanation the selectivity of the tested compounds, carboxylesterases as a metabolic system detoxification were in vitro determined in cabbage aphid and their parasitoid.

2. Materials and Methods

2.1. Insects

The cabbage aphids, *Brevicoryne brassicae* (L.) were collected from March to April 2016 during 2015-2016 seasons at heavily infested canola, *Brassica napus* L. variety Bactol that were cultivated in Plant Protection Farm, Faculty of Agriculture, Assiut University, Egypt. All batches canola plants were cut by scissors and transferred to the optimum laboratory conditions (22±2 ºC, 55±5% RH, and a 12:12 light to dark photoperiod). They were kept in glass gars that contain small amount of water. Canola parts that heavy mommies of *D. rapae* were kept on large glass bottles (2 liter volume) until emergence the parasitoid adults. As soon as possible the *D .rapae* parasitoid adults emerged, the feeding solution (honey bee: distilled water (1:1)) was introduced until the bioassay initiation.

2.2. Chemicals and equipments

2.2.1. Chemicals/ Insecticides

Three insecticides were tested; each one had the trade name, percentage and active ingredient formulation type and manufacture label users, as well as the producing company. They included acetamiprid (Mospilan®SP 20%, 25 g/100 liter, Shoura Chemicals, Egypt and thaimethoxam (Actara®SC 25 %, 40 g/100 liter, Syngenta Crop Protection, Switzerland) and one from spinosyn group, spinetoram (Radient®SC 12 %, 60 cm^3/100 liter, Dow AgroSciences Co.). Alpha-naphthyl acetate, potassium ferricyanide, 4-amino antipyrine, acetylthiocholine iodide (ATChI), 5,5 dithiobis - (2-nitrobenzoate) (DTNB), and $triton_{X\text{-}100}$® (purity 100 %, BDH Chem, Ltd. poole England) were bought from Aldrich Chem. Co.

2.2.2 Plant Extractions

Seeds of *Brassica napus* L. variety Bactol and leaves of the sausage plant tree, *Kigelia africana* and rosemary plant, *Rosmarinus officinalis* were completely dried under constant sunless laboratory conditions (25±2 ºC, 30±5% RH).To each plant, dried forty grams of plant were crushed by blender, then put in dark bottle (500 ml), and then freshened by distilled water for 5 minutes. The extraction was shacked for 30 min, and then sieved, cleaned, kept on the dark bottle at the 4 ºC until start the tests. Just the extraction was prepared; it was freshly used in the testes, the maximum stored period is 48 hrs at 4 ºC.

2.3. Experiments

2.3.1. Leaf dip bioassay

2.3.1.1. First trial: Five serial concentrations from 2.5 to 200 for thaimethoxam, 6.25 to 100 for acetamiprid, 9 to 144 for spinetoram, and 5 to 50000 µg a.i./ml for plant extracts were prepared. The distilled water was used as control with 0.05% triton as a surfactant. The aphids and their mommies that hold on the plant parts were dipped for 5 sec in the tested concentrations, then put in the Petri dishes, then left for half-hour for drying, then incubated on the optimum condition (25±2°C; 30±5% RH) on dark for 24 hrs (Nasser *et al*., 2000). Aphid, mommies, parasitoid adults mortalities were recorded after 24 hrs. By a binocular microscope, aphid was considered dead if it was incapable of coordinated forward movement when touched by hair camel brush, the mommy that have no parasitoid hole, it was considered dead.

2.3.1.2. Second trial: The same treatments of first trial were continually kept on the same above conditions for seven days post exposure. Mortalities percentages of emerged Parasitoid adults were recorded after 7 days; the numbers of dead and live emerged parasitoid adults was detected using microscope.

The experiments were twice repeated with triplicates.

2.3.2. Potter Tower bioassay

Serial concentrations starting by maximum field rate (MFR) as manufacture insecticide labels (from 0.25 to 1 MFR) of the commercial formulations were prepared using triton solution. While for the botanical extracts were 0.25 to 1.00 % gram of extracts/100 ml distilled water. The triton solution was used as control. To each concentration, 2 ml was sprayed in Petri dishes (diameter 7 cm) with Potter Tower equipment (DIRY ARD MFG Co. LTD, RICK MANSWORTH, and ENGLAND). It was adjusted at pressure15 bar/in^2 for preparing residue film that was left for 30 min for drying. Ten parasitoid adults were exposed to the residue film for 24 hrs at the optimum conditions. The dead and alive of parasitoids were recorded after exposed period. The experiment was performed twice with triplicate.

2.3.3. Caboxylesterases activity experiment

2.3.3.1. Enzyme preparation

Parasitoid adults and healthy aphids were chosen similarly sized. To each insect species, chosen individuals were homogenized in sodium phosphate buffer (0.1 M, pH 7.2) using a glass homogenizer at a concentration of 5.18 mg aphids/1ml buffer and 8 mg parasitoid /1ml, then centrifuged at 6,000 r.p.m. for 10 min at 20°C. The supernatant was prepared for carboxyelestrase assay, in addition for determining protein content using biuret solution according to the Gornall method (Gornall *et al*., 1949).

2.3.3.2. Enzyme activity assessments

The carboxylesterase activity was determined colorimetrically according to the method of (Bracha and Bonard, 1966) with little modifications using α -naphthyl

acetate (α-NA) as follows: In the colorimeter tube, 1.85 ml sodium phosphate buffer (0.1 M, pH 7.2) followed by 0.5 ml of enzyme solution were added, then the tube kept in water bath at 30°C. After suitable time for equilibrium, 0.05 ml of the substrate (α-NA dissolved in acetone at final concentration of 0.2 mM) was added, and then incubated for 10 min. At the end of incubation period, 0.05 ml of 4-amino antipyrine (0.1% in distilled water) followed by 0.05 ml of potassium ferricyanide (0.14% in distilled water) were added. Absorbance at 500 nm was recorded exactly 5 min after the addition of potassium ferricyanide. The control tube containing everything except the enzyme solution was used to correct for non-enzymatic hydrolysis of the substrate. The absorbance data were converted from a calibration curve prepared using several concentrations of α-naphthol under the same conditions. The experiment was twice repeated with triplicates. All experiments were done at Plant Protection Department Laboratories, Faculty of Agriculture, Assiut University,Egypt.

2.4. Data Analysis

The LC_{50}, slope and $\chi 2$ values were calculated by probit analysis using SPSS 16 software for Windows, mean mortality percentages corrected by (Abbott, 1925) formula. Selective ratios (SR) = LC_{50} of *B. brassicae* adult / LC_{50} of *D. rapae* mummy, ratios >1 indicate compound more toxic to the parasitoid than to the pest, ratios < 1 indicate compounds more toxic to pest than to the parasitoid.

3. Results

The presented results in Table1 showed that the commercial tested insecticides were more potent as aphicidal than the tested extracts, those also less safe than extracts to the parasitoids. Thiamethoxam insecticide was the highest aphicidal activity, with LC_{50} 17.08, while acetamiprid was the lowest one; with LC_{50} 30.92 µg/ml. Acetamiprid was the highest toxic among tested insecticides to parasitoid mommies, with LC_{50} 4.69 µg/ ml, while spinetoram was the least one with LC_{50} 16.58 µg/ ml. The selectivity ratios (SR^1) were above 1, ranged from 1.55 to 6.59 for all insecticides. On the other hand, these values for sausage and rosemary extracts were 6.13 e^{-4} and 0.28, respectively (Table 1& Figures 1-2).

Conversely the above results, based on the selectivity ratios (SR^2) that calculated based on % lived emerged parasitoid adults. The tested insecticides were harmony with the parasitoids with SR^2 less than 1, from 0.43 to 0.86. Also, sausage keeps the same trend in safety with SR^2, 0.007, however, rosemary and canola extracts were high toxic one (Table 2 & Figures1-2).

Insecticides treatment showed the same safety trend toward parasitoid adults that touched the dry residue film compounds, the highest SR^3 values were recorded with acetamiprid, with 0.40 followed by thiamethoxam with 0.54, where spinetoram has the least selective one, with 0.63, while SR values were 20 to104554 for rosemary and canola extracts, in respective treatment (Table3 & Figures 1-2).

The current data showed that the same insecticide was varied in toxicity in the two insect species using the same bioassay technique, this distinctive may be referring to biochemical difference between host and wasp parasitoid. So that the esterases activity were determined

The results in Table 4 and figure 3 showed kinetic parameters of esterses in whole body of *B. brassicae, D. rapae* adults(Lineweaver and Burk, 1934).The K_m values in the two insect species for explanation the present results. The K_m values for *B. brassicae*, and *D. rapae* were recorded 0.00035 and 0.000030 M, respectively. This indicates that caboxylestrases from *B. brassicae* aphid has lower affinity from α-NA than its *D. rape* wasp parasitoid by11.66 folds. On the other hand, *B. brassicae* aphid homogenate has a higher maximal activity (V_{max}) than *D.rape* homogenate by 2.57 folds. The $T_{0.50}$ values for *B. brassicae* and *D. rape* were 0.089 and 0.020, respectively (Table 4 & Figue3).

4. Discussion

The tested extracts of sausage, rosemary, and canola were less toxic than thiamethoxam, acetmaprid, and spinetoram from 135 to 135000 folds. The higher toxicity of the synthetic insecticides than crude water extracts to the aphids and parasitoids could be explained by several factors e.g. polar compounds, molecular weight of active ingredient, insecticide formulation, adjutants, purity. These factors may affect the penetration properties, insecticides persistence and the fast reaching to the target site of action. Thiamethoxam was more aphicidal activity to *B. brassicae* than its analogues acetmaprid by about 2 folds using leaf dip bioassay. Spinetoram revealed aphicidal activity similar to the tested neonicotinoids against cabbage aphid, although it recommend for control new hatched eggs and small neonate larvae in Egypt (Abdu-Allah, 2011; Abdu-Allah, 2015; Abdu-Allah, 2010a; Anonymous, 2016).The systematic properties of spinetoram give it potentiating against certain sucking insect pest (Abdu-Allah, 2010b). Although, the tested crude extracts have not higher aphicidal activity compared with synthetic insecticides; these extracts could be promised in IPM aphid control programs, moreover, these extracts could be purified to have the aphicidal active ingredients for insecticide industry.

In leaf dip bioassay, five seconds is the dipping period for aphids or wasp parasitoid mommies in liquid diluted treatments. The solidity of shell of mommies is distinguished due to the mommy's age, subsequently, the insecticide/extract diffuses or penetrates through the mommies shell is not similar. The toxicant can be reached to embryos of parasitoid mommies. The stability of poison on the *D. rape* mommies shell until the adults is emergence after 7 days post exposure is another factor can affect the toxicity of the tested compounds. To the wasp parasitoid adult emerge, it had to cut the mommies shell by mouth to make an external hole emergence, so

Table (1). Toxicity parameters of three neonicotinoids insecticides and three botanical extracts to cabbage aphid, *Brevicoryne brassicae* adults and *Diaeretiella rapae parasitiod* mummies using leaf dip bioassay.

Compounds	*Brevicoryne brassicae* adults			*Diaeretiella rapae* mummies			
	LC_{50} (95 % CL) (µg a.i./ ml)	Slope ±SE	χ^2	LC_{50} (95 % CL) (µg a.i./ ml)	Slope ±SE	χ^2	SR[1]
Insecticides							
Acetamiprid	30.92(19.95-51.47)	1.50±0.15	6.30	4.69 (-)	1.11±0.17	15.96	6.59
Spinetoram	25.72(20.94-30.94)	1.48±0.15	4.28	16.58(15.47-17.77)	7.42±0.79	0.94	1.55
Thiamethoxam	17.08(4.06-29.67)	0.78±0.19	1.76	5.53(2.54-8.16)	2.12±0.39	1.03	3.09
Botanical extracts							
Canola extract	3.77e+8(1.56e+6–1.76 e+10)	0.13±0.04	2.08	4.71e+5(9.20e+4-8.30 e+6)	0.32±0.05	2.81	800
Sausage extract	4.18e+3 (6.83e+2– 1.42 e+5)	0.45±0..05	9.58	6.82e+6(3.14e+5-5.89 e+8)	0.29±0.10	1.47	0.006
Rosemary extract	1.21 e+5(-)	0.48±0.10	4.49	4.31e+5(1.06e+5-6.42 e+6)	0.43±0.08	3.70	0.28

[1] Ratios >1 indicate compound more toxic to the parasitoid than to the pest. Ratios < 1 indicate compounds more toxic to pest than to the parasitoid.
(-): the values undetected.

Table (2). Toxicity parameters of three neonicotinoids insecticides and three botanical extracts to cabbage aphid, *Brevicoryne brassicae* adults and *Diaeretiella rapae* emerged parasitoid adults from treated mommies after 7 days.

Compounds	*Brevicoryne brassicae* adults			*Diaeretiella rapae* adults			
	LC_{50} (95 % CL) (µg a.i./ ml)	Slope ±SE	χ^2	LC_{50} (95 % CL) (µg a.i./ ml)	Slope ±SE	χ^2	SR^2
Insecticides							
Acetamiprid	30.92(19.95-51.47)	1.50±0.15	6.30	35.96 (-)	0.46±0.13	9.16	0.86
Spinetoram	25.72(20.94-30.94)	1.48±0.15	4.28	30.69(-)	1.53±0.15	97.3	0.84
Thiamethoxam	17.08(4.06-29.67)	0.78±0.19	1.76	39.41(24.79-52.93)	1.04±0.19	0.12	0.43
Botanical extracts							
Canola extract	3.77e+8(1.56e+6–1.76 e+10)	0.13±0.04	2.08	2.13e+3(5.46e+2-1.53 e+4)	0.19±0.04	4.38	17.70 e+4
Sausage extract	4.18e+3 (6.83e+2– 1.42 e+5)	0.45±0..05	9.58	6.30e+6(2.84e+5-1.86 e+8)	0.90±0.05	5.21	0.007
Rosemary extract	1.21 e+5(-)	0.48±0.10	4.49	2.34e+4(-)	0.59±0.07	9.89	5.17

[2]Ratios >1 indicate compound more toxic to the parasitoid than to the pest. ratios < 1 indicate compounds more toxic to pest than to the parasitoid.
(-): the values undetected.

Table (3). Toxicity parameters of three neonicotinoids insecticides and three botanical extracts to cabbage aphid, *Brevicoryne brassicae* adults and *Diaeretiella rapae parasitoid* adults exposed to dry residue film.

Compounds	*Brevicoryne brassicae* adults			*Diaeretiella rapae* adults			
	LC_{50} (95 % CL) (µg a.i./ ml)	Slope ±SE	χ2	LC_{50} (95 % CL) (µg a.i./ ml)	Slope ±SE	χ2	SR[3]
Insecticides							
Acetamiprid	30.92(19.95-51.47)	1.50±0.15	6.30	76.95(-)	1.23±0.19	11.58	0.40
Spinetoram	25.72(20.94-30.94)	1.48±0.15	4.28	40.88(33.43-50.63)	1.80±0.20	1.87	0.63
Thiamethoxam	17.08(4.06-29.67)	0.78±0.19	1.76	31.52(12.61-52.49)	0.65±0.18	0.02	0.54
Botanical extracts							
Canola extract	3.77e+8(1.56e+6–1.76 e+10)	0.13±0.04	2.08	3.61e+3(2.02e+3-4.91 e+3)	1.07±0.30	0.78	10.46 e+4
Sausage extract	4.18e+3 (6.83e+2– 1.42 e+5)	0.45±0..05	9.58	2.59e+3(1.74e+3-3.27 e+3)	1.78±0.31	0.02	01.60
Rosemary extract	1.21 e+5(-)	0.48±0.10	4.49	5.88e+3(3.81e+3-1.21 e+4)	0.84±0.29	1.30	20.57

[3] Ratios >1 indicate compound more toxic to the parasitoid than to the pest. ratios < 1 indicate compounds more toxic to pest than to the parasitoid.
(-): the values undetected.

Table (4). Kinetics of caboxylestrases , the enzymes were from the whole adults of cabbage aphid, *Brevicoryne brassicae* and *Diaeretiella rapae* parasitoid adults.

Kinetic parameter	*Brevicoryne brassicae* adults	*Diaeretiella rapae* adults	
	Esterases[c]		Ratios[d]
V_{max} [a]	0.027	0.011	2.57
K_m (Molar)	0.00035	0.000030	11.66
$T_{0.50}$ [b] (minute/mg/protein/ml)	0.089	0.020	4.44

[a]. µmoles substrate hydrolyzed/mg protein/min
[b]. the is defined as 0.693 K_m/V_{max}
[c].α- naphthyl acetate (α-NA) used as substrate; [d].Kinetic value to *B.brassicae* / the same kinetic to *D.rapae*.

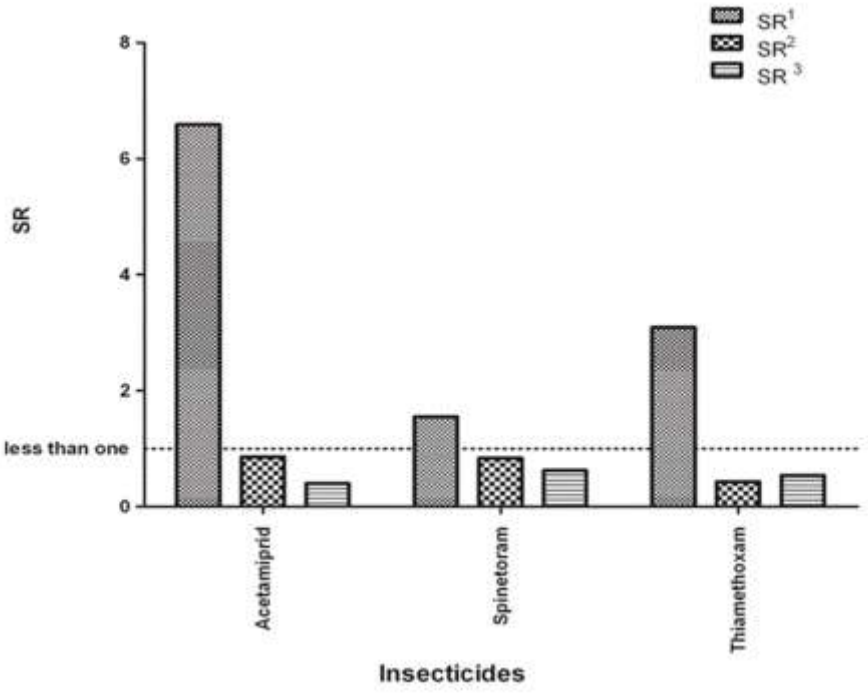

Fig. 1 The selective ratios (SR) of acetamprid, sipnetoram, thiamethoxam.

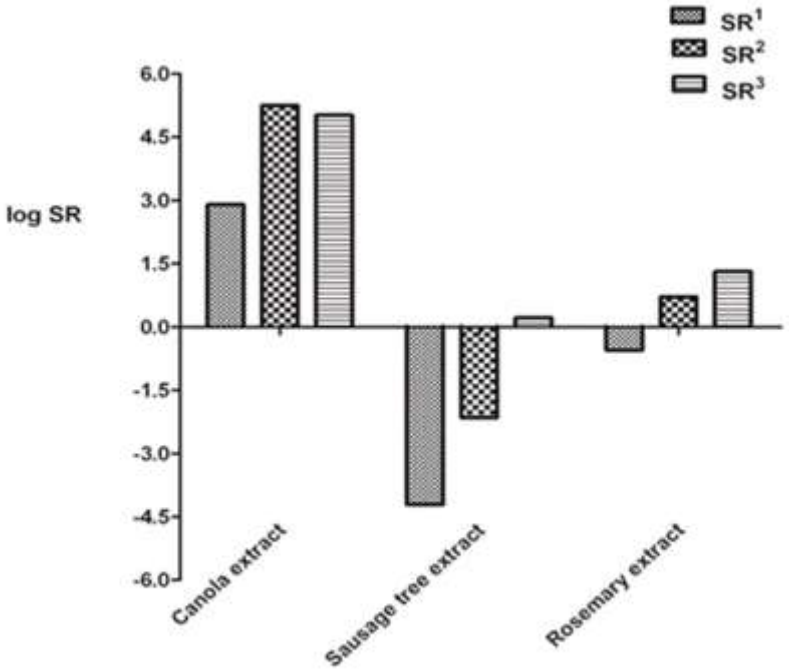

Fig. 2 The log selective ratios (SR) of canola extract, sausage extract and rosemary extracts.

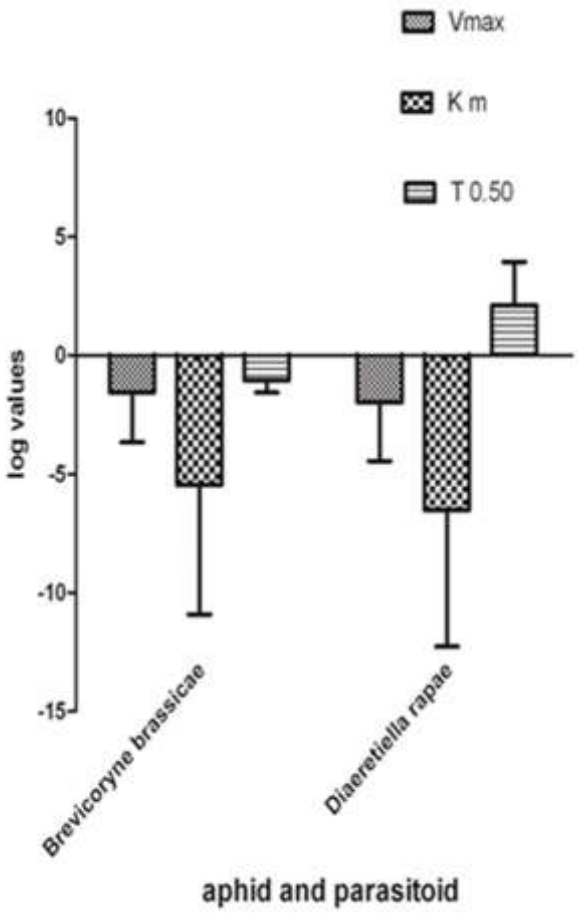

Fig. 3 Kinetic constants for α– naphthyl acetate (1-NA) as substrate hydrolyzing carboxylesterases in the adults of *Brevicoryne brassicae* and *Diaeretiella rapae*.

V_{max}, µmoles substrate hydrolyzed/ mg protein/min; K_m (Molar) is defined as 0.693 K_m/V_{max}; $T_{0.50}$ (minute/mg/ protein/ml).

that the toxic material can be touched orally to the parasitoid.

In the potter tower bioassay, although the parasitoids were exposed to poison for long period (24 hours) continuously in treated Petri dishes. The less toxicity of the tested insecticides on parasitoid it could be explained as parasitoid adults may avoid the treated plate to untreated cover of Petri dishes depending on the repellent or attractant potentiality of tested insecticides. Several studies showed that dry contact insecticide has less toxicity and less penetration than liquid one toward beneficial insects (Abdu-Allah *et al*., 2011; Besard *et al*., 2012; Besard and Smagghe, 2011).

Based on the presented toxicity results, the author can be suggested that spinetoram insecticide was a higher penetration, persistence and oral position to *D. rapae* mommies than thiamethoxam and acetamiprid (Salgado *et al*., 1997).

In general, parasitoids may be adversely affected by neonicotinoidinsecticides because wide their applications e.g. seed treatment, foliar drench or granular. In addition, parasitoid female may avoid egg laying on insecticidal contaminated host. Parasitoid behavior may be changed on sublethal dose of insecticide active ingredients. Moreover, other factors such as type of plant tissues that the active ingredients accumulation, neonicotinoids metabolites on plant species are varied (Cloyd and Bethke, 2011).

The toxicity variation of the same insecticide/plant extracts in cabbage aphid phytophagous versus *D.rape* parasitoid entomophagous may be further explained by differences in the relative importance of hydrolytic and oxidation enzymes (Plapp, 1980).This was convinced by differentiations in carboxylestrases titration between two insect species. Inspection the kinetic data, the author can suggest that K_m and V_{max} values suggest that two distinct patterns of enzymes which hydrolyzed α- NA those in the *D. rape* wasp parasitoid with higher affinity and low enzymatic activity (V_{max}), and those in *B. brassicae* aphid with low affinity and higher enzymatic activity. Based on $T_{0.50}$ values, the caboxylesterases in *B. brassicae* aphid is more quantitatively active than that of *D. rape* parasitoid by 4.44 folds.

The present study is supported by (El-Ghareeb, 1992) who found that the carboxylestrases activity in *Spodoptera littoralis* larvae more active than that of the carboxylestrases in its predator *Coccinella undecimpunctata* by 5.38 folds. In the case of neonicotinoids, these compounds may be metabolized by esterases and oxidases enzymes. For spinetoram from spinosyns group, the metabolic factors may not the key factors for the toxicity to the two species, these give explanation for the differences of activity of the tested

compounds in aphids and its wasp parasitoid, subsequently the selectivity ratios of these compounds. In conclusion, liquid application of thiamethoxam, acetamiprid, spinetoram, sausage extract, and canola extract were high toxic to parasitoid mommies of *D. rapae* than aphids after 24 hrs from exposure by leaf dipping. On the other hand, thiamethoxam, acetamiprid, spinetoram, and sausage extract were less toxic to *D. rapae* emerged parasitoid adults than which aphids after 7 days from exposure. Dry contact residue films of the tested compounds were less toxic to parasitoid adults than aphids. The tested liquid insecticides contact was less safe for the parasitoid than dry contact residues. The caboxylestrases titrations and activations in aphid and their parasitoid may be one limited factor for the selectivity of tested compounds.

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السمية الأختيارية لبعض المبيدات الحديثة وبعض المستخلصات النباتية على طفيل الديراتيلا رابيى وعائله من الصليبيات(بريفكوراين براسيكا)

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المخص العربى

فى الاونه الاخيرة تم أدخال العديد من مبيدات الافات من مجموعات النيونيكوتينويد والاسبينوساين الى السوق المصرية لمكافحة العديد من الافات. تحتوى النباتات على العديد من المواد الفعالة والتى كانت وماتزال مصادر واعدة وبدائل أمنة عن المبيدات المصنعة الضارة. تم اختبار السمية لثلاثة مبيدات (الثيامسام واسيتمابريد واسبينوترام)وثلاثة مستخلصات مائية نباتية(مستخلص المشطورة ومستخلص حصالبان(روزميرى) ومستخلص الكانولا) ضد المومياوات والحشرات الكاملة لطفيل الديراتيلا رابيى والحشرات الكاملة لمن الصليبيات(بريفكوراين براسيكا) بأستخدام طريقتى الغمرفى محلول المبيد وطريقة التعرض للمتبقى الجاف من المبيد والمعد بأستخدام جهاز البوترتور وذلك تحت ظروف معملية محكمة، كذلك تم تقديرنشاط أنزيم الكربوكسيل استيريز لونيا بأستخدام مادة الفا- نفثيل أسيتيت فى كلا من الحشرات الكاملة لكلا من نوعى الحشرات تحت الدراسة. اظهر النتائج ان مبيد سبينوترام له سمية عالية كمبيد ضد من الصليبات مثل مبيدات نيونيكوتينويدز(الثيامسام واسيتمابريد)بطريقة الغمر. كذلك أوضحت النتائج ان المبيدات والمستخلصات النباتية المختبرة ماعدا مستخلص الروزميرى كان لهم سمية عالية على مياوميات الطفيل مقارنة بالحشرات المن بطريقة الغمر وذلك بعد 24 ساعة من المعاملة. بينما أظهرت معاملات المبيدات ومستخلص المشطورة سمية منخفضة على الحشرات الكاملة للطفيل والخارجة من المومياوات بعد 7 ايام مقارنة بحشرات المن. أوضحت نتائج تعريض الطفيليات الكاملة للمتبقى الجاف من المعاملات أن كل من المبيدات والمستخلصات ماعدا مستخلص المشطورة لهم سمية منخفضة على الطفيل مقارنة بحشرة المن. أظهرت النتائج قلة فى تطابق مادة التفاعل(الفا نفثيل اسيتيت) على سطح انزيم الكربوكسيل استيريز المسخلص من حشرات من بريفكوراين براسيكا عن الأنزيم المستخلص من الطفيل الديراتيلا رابيى بمقدار 11.66 مرات، فى حين كان نشاط انزيم الكربوكسيل استيريز لحشرة المن على عن أنزيم الطفيل بمقدار 2.57 مرات. فى النهايه أظهرت مبيدات الثيامسام واسيتمابريد واسبينوترام ومستخلص المشطورة ومستخلص الكانولا سمية عالية على مومياوات طفيل الديراتيلا رابيى بعد 24 ساعة بالغمر المباشر فى محاليل المعاملات، هذه التأثيرات لم تؤثر على معدل خروج الصفيليات الكاملة بعد 7 أيام من المعاملة بالغمر. كل المركبات المختبرة عدا مستخلص المشطورة تظهر سمية منخفضة للطفيليات عند تعرضها المباشر على المتبقى الجاف للمعاملات مقارنة بالتعرض لمحلول المبيد مباشرة بالغمر. قد يكون انزيم الكابوكسيل استيريز عامل محدد للسمية الاختيارية للمركبات المختبرة ضد طفيل الديراتيلا رابيى وعائله من الصليبيات(بريفكوراين براسيكا).

كلمات افتتاحية:

نيونيكوتينويدز- سبينوترام- المستخلصات النباتية -السمية الأختيارية للمبيدات- الديراتيلا رابيى- بريفكوراين براسيكا- انزيم الكربوكسيل استيريز.