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INFLUNCE OF SOME ADJUVANTS ON PHYSICO-CHEMICAL PROPERTIES, EFFICTIVENESS, AND PERSISTENCE OF SOME INSECTICIDES FORMULATIONS

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ABSTRACT

In this study, interactions of all combinations of two insecticides and eight candidate adjuvants on physico-chemical properties, insecticidal activity and persistence were studied. Physical compatibility between two insecticides and adjuvants were studied by the effect of adjuvants on emulsion stability of insecticides. Also, physico-chemical properties of spray solution of insecticides alone and mixed with adjuvants were studied, which were: viscosity, surface tension, pH, conductivity, salinity and foaming layer. A combination of adjuvants with tested insecticides showed physical compatibility compared with either component alone, when they added at 0.3% as they changed some physico-chemical properties of insecticides spray solution. Toxicological studies proved that synergistic action of esfenvalerate appeared when mixed with glue and phosphoric acid. Also, glue, gum and acetic acid caused highly synergistic effect when they added to profenofos, however the other adjuvants showed additive and antagonistic effects. Results of bioassays of mixtures indicated increase the effectiveness of esfenvalerate and profenofos, in decreasing average weight of pupa and number of eggs for cotton leafworm.

The inclusion of some adjuvants in spray emulsions of esfenvalerate and profenofos at their full and half recommended field rates, enhanced the activity of tested insecticides at half recommended rate. Moreover, the castor oil was highly effect in improving the persistence at low rate. It increased persistence of esfenvalerate at half recommended rate to be already similar to full recommended rate also, to be more than full recommended rate in cause of profenofos. No phytotoxicity was observed on cotton plants. Results of these studies should be useful in planning of future field trials to increase the effectiveness and to manage the rate of field applications.

INTRODUCTION

Synthetic organic chemicals are important components of modern agriculture (Meller and Adams 1984, Croft 1990). However, their heavier use is increasingly criticized because of problems associated with undesirable environmental hazards and low performance or efficacy properties, besides increasing rates of application. The increasing awareness of safety to public health has led to a rationalization of pesticides use in its true sense. Several tactics have been adopted in this respect.

Consequently, use of certain adjuvant agents with synthetic pesticides may provide a tool to improve their performance and increase pesticides bioactivity with decrease in their rates of application (El-Metwally *et al.* 1991).

Although Adjuvant agents are improving the properties of pesticide formulations and their persistence (Brady *et al.* 1980), these agents when

combined with insecticide caused greater mortality than did the insecticide alone (Matteson and Taft 1964).

The 1st objective of our study was to determine insecticide-adjuvant physical and biological compatibility against cotton leafworm, *Spodoptera littoralis* , as well as determination the physico-chemical properties of spray solution.

The 2nd objective was to investigate the role of certain adjuvants in decreasing the rate of application for insecticides by measuring the residual effect of insecticides separately and their blends with adjuvants and observing the visual phytotoxicity on the cotton plant.

MATERIALS AND METHODS

1- Insecticides used:

1st. Profenofos (Curacron 72% EC), produced by Syngenta Co. the recommended field rate 750 ml =30 g. a.i./Feddan

2nd. Es-fenvalerate (Sumi-alfa 5%EC), produced by Sumitomo Co., Ltd. the recommended field rate 600 ml =520 g. a.i./Feddan

2- Local additive used:

Lipophilic agents:

1st. Castor bean oil: crude castor bean oil (plant oil) supplied by El-Salam Co. for oil, Cairo.

2nd. CAPL-2 : local mineral oil prepared as emulsifiable concentrate contained 96.62%(v/v), produced by Central Agricultural pesticides Laboratory

Surface active agent:

1st. Polyethylene glycol 600 dilaurate (PEG 600 DL) produce by the National Co. for Starch, Yeast and Detergents, Alexandria.

Acidifying agents:

1st. Posphoric acid (6.6 N) mineral acid, supplied by El-Gomhoriya Co., Cairo, Egypt.

2nd. Acetic acid 6% organic acid supplied by Egyptian Co. for Sugar and Refining.

Thickening agents:

1st. Glue (granules) supplied by El-Sabaa Co., Cairo.

2nd. Arabic gum; plant gum supplied by El-Gomhoriya Co., Cairo.

3rd. Lignosulfonate: The basic functional constituent of the products is lignosulfonate which an anionic polyelectrolyte whose molecular weight varies between 5000 to10000, supplied by BASF Co., Germany.

Physical compatibility:

Physical compatibility between the used insecticides and additives was studied by determination of their effect on emulsion stability of esfenvalerate and profenofos according to WHO (1979) specifications but at recommended rates of insecticides and 0.3% of additives.

Effect of combinations on physico-chemical properties of spray solutions:

The physico-chemical properties of insecticide solution separately or blends with additives were determined as the following:

The pH value using Schott Gerate pH-meter. Viscosity using Ostwald viscometer where m poise the unit of viscosity measurement and surface tension using Du Nouy tensiometer where dyne/cm is the unit of surface tension measurement. Conductivity and salinity was measured using the conductmeter YSI model 33S-C-T meter (m MHOS is the unit of electrical conductivity measurement).

Insects.

Cotton leafworm, *Spodoptera littoralis* (Boisd.) eggs from a colony cultured continuously for several years, without insecticide pressure. After hatching the larvae reared on clean and dry castor bean, *Ricinus communis* leaves. Fourth instars were used for the bioassays. Rearing was started in the laboratory at room temperature (25±2°C with 65± 5% RH) and at a 12:12 h (light:dark) photoperiod, using technique described by El-Defrawi *et al.* (1964).

Toxicity studies.

Castor bean leaves were dipped in a series of prepared solution with varying concentrations for 10 seconds. Treated castor bean leaves were left to air-dry at room temperature. Fourth instars were placed with treated leaves into petri dishes and held at room temperature. Mortality was recorded after 24 h. of treatment. Mortality was corrected for mortality of control using Abbott's formula (1925). The LC_{50}'s values of various insecticides were estimated by POLO program (1987). The joint action between pesticides and adjuvants was determined by studying the LC_{50} toxicity of insecticides (Table 1) with 0.3% of the adjuvants. Also, latent effect was studied by transferring the rest survival larvae after 24 h. into new cups provided daily with fresh untreated leaves until larvae either dead or successfully pupated, mean pupation, pupal weight (after 48 h. pupation) and adult emergence were recorded for each treatment. Emerged moths were sexed in pair (1:1). Egg-masses deposited on Tafla, *N. oleander* leaves were collected daily. Fecundity was subsequently estimated by counting total eggs within egg-masses deposited in each treatment. Fertility percentage was then used as indicator of the tested insecticides and adjuvants on resulting egg-masses of *S. littoralis* .

Design for persistence study.

Cotton seeds were sown into 20-cm plastic pots at the beginning the first week of March of 2003. Plants were kept under field conditions and received water daily. After 7 weeks from seeding, the insecticides and their combinations with different candidate adjuvants were applied at full and half-recommended rates. A hand sprayer equipped with one nozzle was used for spraying (spray volume was 200 liter/faddan). Random samples of treated leaves (2-3 leaves) from each treatment were taken at various intervals (0, 1, 3, 5, 7, 9, 11, 13, 15, 17 and 19 days) after spraying. Each sample was placed in separate labled plastic bag and directly transferred to the laboratory and introduced to ten 4^{th} instar larvae placed in petri dishes (10-cm diameter) and 3 replicates were used for each treatment. All treatments were placed in a controlled environment room at 25°C, 65 – 70% RH and photoperiod of 12:12 (L:D). The larvae were fed on treated leaves for 24 hours and then mortality was recorded. The obtained data were corrected by Abbott's

formula (1925). The half-life time values were computed by POLO program (1987).
Phytotoxicity of all treatments was determined by recording any flaming, curl, and color change on cotton leaves.

RESULTS

Data in Table (1) clearly indicated that all tested adjuvants affected the physico-chemical properties of water that will be used for dilution of insecticides when they added at 0.3%. Phosphoric acid caused the highest decreasing in pH values followed by acetic acids and DL600 while, the other adjuvants did not cause significant change. Phosphoric acid followed by acetic acids caused a slight increase in viscosity. DL600 and castor oil followed by CAPL-2 caused decrease in surface tension. Phosphoric acid followed by sodium lignosulfonate increased the conductivity of water. Also, no any foam was formed as a result of mixing adjuvants with water.

Table 1. Physico-chemical properties of some certain additives at concentration 0.3% in water.

Additives	Solution type	pH	Viscosity mps	Surface tension dyne/cm	Conductivity mS/m	% Salinity	Foam
Glue	true	7.68	10.6	63.0	350	0.2	_
Arabic gum	true	7.69	9.7	72.0	370	0.2	_
Phosphoric acid	true	1.64	11.2	84.0	6000	4.0	_
Acetic acid	true	4.86	11.0	84.0	320	0.2	_
Sodium lignosulfonate	true	7.74	10.1	84.0	800	0.4	_
DL-600	emulsion	5.75	9.7	36.9	300	0.2	_
CAPL-2	emulsion	7.73	10.2	54.0	330	0.2	_
Castor oil	separated	7.35	10.7	36.9	340	0.2	_
Water	true	7.24	10.0	72.0	320	0.1	_

mps: milipoise
mS/m: illisiemens/metre

Data concerning the effect of tested adjuvants on physico-chemical properties of esfenvalerate and profenofos are tabulated in Tables (2 & 3) to clarify the role of adjuvants in improving the insecticide spray performance. The results indicated that adjuvants in their combinations with esfenvalerate were not showed appreciable foaming except in case of glue, also there are a physical compatibility among all additives and insecticides since they gave good emulsion for esfenvalerate and profenofos mixtures. The most additives used decreased pH value of spray solution, except thickening agents (glue and Arabic gum). Phosphoric acid caused the highest decrease followed by acetic acid, sodium lignosulfonate, DI600, CAPL-2 and castor oil. DI600 followed by CAPL-2 and castor oil decreased the surface tension of the spray solution of esfenvalerate and profenofos. Phosphoric acid caused the highest increase in conductivity followed by CAPL-2, sodium lignosulfonate and glue.

Table 2. Effect of certain additives on physico-chemical properties of esfenvalerate spray solution at recommended rate.

Additive (0.3 %)	Emulsion stability test	pH	Viscosity mps	Surface tension dyne/cm	Conductivity mS/m	% Salinity	Foam
Esfenvalerate +	P	7.9	10.2	57.6	360	0.2	_
Glue	P	7.92	10	72	480	0.4	3 ml
Arabic gum	P	7.97	9.6	68.7	380	0.2	_
Phosphoric acid	P	0.79	10.6	79.6	6000	4	_
Acetic acid	P	4.15	9.5	84	410	0.3	traces
Sodium lignosulfonate	P	6.75	9.7	79.6	900	1	_
DL 600	P	5.96	10.8	34.4	370	0.3	_
CAPL2	P	4.46	9.1	37.8	1000	1	_
Castor oil	P	4.32	9.7	56	410	0.3	_
Water	_	7.24	10	72	320	0.1	_

mps: ilipoise **p: passed emulsion stability test**

mS/m:millisiemens/metre

On the other hand, there are a physical compatibility between profenofos and adjuvants. Also, there are some effects on physico-chemical properties of spray solution. Phosphoric acid caused the highest decrease in pH values followed by acetic acid, CAPL-2 and castor oil. Arabic gum, Phosphoric acid and acetic acid caused a slight increase in viscosity. DL600, CAPL-2 and castor oil decreased surface tension. Phosphoric acid, sodium lignosulfonate increased conductivity.

Table 3: Effect of certain additives on physico-chemical properties of profenofos spray solution recommended rate

Additive(0.3%)	Emulsion stability test	pH	Viscosity mps	Surface tension dyne/cm	Conductivity mS/m	% Salinity	Foam
Profenofos +	P	7.59	9.9	75.6	330	0.2	_
Glue	P	7.53	10	56	340	0.2	_
Arabic gum	P	7.49	11.2	68.7	330	0.2	_
Phosphoric acid	P	0.97	10.9	79.6	5300	3.5	_
Acetic acid	P	4.10	10.8	79.6	320	0.1	_
Sodium lignosulfonate	P	6.33	9.8	60.5	800	0.8	_
DL 600	P	6.06	9.7	30.2	300	0.2	_
CAPL2	P	6.17	9.4	37.8	330	0.2	_
Castor oil	P	6.33	9.5	52.1	430	0.5	_
Water	_	7.24	10	72	320	0.1	_

Mps:milipoise
mS/m:millisiemens/metre
p: passed emulsion stability test

Table 4: Toxicity data for esfenvarlate and profenofos against 4th instar larvae of cotton leafworm

Insecticides	LC_{50} (%95 CL) ppm	LC_{90} (%95 CL) ppm	Slope ± SE
Esfenvalerate	2.09 (1.15 - 2.90)	14.20 (8.27 - 57.74)	1.54 ± 0.38
Profenofos	12.91 (10.40 -14.83)	24.39 (19.72- 43.95)	4.64 ± 1.21

Toxicity both of insecticide and adjuvants against 4th instar larvae of cotton leafworm was determined. All adjuvants at 0.3% did not show any toxic effect, while the toxicity of two tested insecticides is shown in Table (4). Data in Table (5) show the joint action between the two insecticides at their LC_{50} and adjuvants at 0.3%. Esfenvalerate was highly enhanced after its application in blending with phosphoric acid and Glue, whereas DL 600 CAPL-2 and sodium lignosulfonate caused antagonistic and showed additive effect with Arabic gum and acetic acid. Similar results were obtained by Hussein (2002) reported that the adjuvants greatly enhanced the biological activity of pesticide applications. Also, the same table indicated that glue, Arabic gum and acetic acid exhibited synergistic effect for profenofos. On contrary castor oil apparent antagonistic effect, whereas phosphoric acid and sodium lignosulfonate exhibited additive effect.

The latent effect of tested adjuvants and insecticides at LC_{50}, in their combinations against 4th larval instar of cotton leafworm is shown in Table (6). The results proved that most esfenvalerate with additives treatments induce slightly different in the main weight of larvae. A significant reduction caused with glue when mixed with esfenvalerate. Whereas, profenofos and its adjuvants caused highly increasing in the main weight of larvae, except with castor oil. The highly latent effect was obtained on the pupae stage, which decreased in the main weight of pupae in both male and female with esfenvalerate. However, most treatment increased the main weight of pupae with profenofos and its adjuvants. Also, the data presented in Table (6) showed that the pupae female was generally heavier than that male resulted from all treatments. Moreover, an effect on fecundity was noted in moths, developing from larvae exposed to those treatments. The number of eggs deposited per female highly reduces and reached to non-produce eggs in some treatments with profenofos. Also, the results in table (6) showed clearly the effect of treatments on sex ratio of the pupa survivors, the dramatic effect caused with acetic acid and sodium lignosulfonate when mixed with esfenvalerate. Also, profenofos when treated alone and its mixture with sodium ligno-sulfonate caused dramatic effect on sex ratio.

The effects of the candidate adjuvants on the persistence of esfenvalerata at full and half-recommended field applications are shown in Table (7). The evaluation of 8 adjuvants indicated that three of them (gum, CAPL-2 and castor oil) which, combined with esfenvalerate at recommended rate resulted in 100% mortality, up to 5 days from spraying. The half time (LT_{50}) increased only in case of mixing physphoric acid with esfenvalerate at full recommended rate. Moreover, castor oil and acetic acid caused greater persistence on cotton plants than esfenvalerata alone at half-recommended rate.

Table 5: Effect of some certain additives on the esfenvalarate and profenofos against 4th instar larvae of cotton leafworm

Additives	Insecticides	esfenvalarate		profenofos		
	% mortality	Co-toxicity factor	Final effect	% mortality	Co-toxicity factor	Final effect
Glue	60.0	38.6	synergism	70.0	23.5	synergism
Arabic gum	43.3	0.0	additive	86.7	52.9	synergism
Phosphoric acid	63.3	46.2	synergism	66.7	17.6	additive
Acetic acid	46.7	7.9	additive	70.0	23.5	synergism
Sodium lignosulfonate	23.3	-46.2	antagonism	60.0	5.8	additive
DL600	8.6	-80.1	antagonism	N.A	N.A	N.A
CAPL-2	33.3	-23.1	antagonism	N.A	N.A	N.A
Castor oil	N.A	N.A	N.A	26.7	-52.9	antagonism
Insecticide alone	43.3	-	-	56.7	-	-

Co-toxicity factor = (observed mortality % - expected mortality % / expected mortality %) x 100. Mansour *et al.*(1966).
N.A.: Not applied

Table 6: Latent effect for insecticides alone and mixed with additives against cotton leafworm, when fourth instar larvae exposure to treatments at LC_{50} for insecticide plus 0.3% additive.

Additives	Esfenvalerate						Profenofos					
	A.W.L.	A.W.P. Female	A.W.P. Male	A.E.	% S.R. Female	% S.R. Male	A.W.L	A.W.P. Female	A.W.P. Male	A.E.	% S.R Female	% S.R Male
Glue	41.2	350.1	325.1	554	40	60	46.3	344.9	309.4	_	51	49
Arabic gum	46.9	358.5	316.9	1308	43	57	71.3	298.2	262.2	_	48	52
Phosphoric acid	48.4	361.3	355.6	472	50	50	57.0	305.0	300.5	_	50	50
Acetic acid	49.3	312.8	302.4	591	80	20	51.1	316.5	292.6	15	43	57
Sodium lignosulfonate	51.0	348.3	327.9	583	22	78	41.0	350.5	311.5	_	80	20
DL600	49.5	367.6	319.1	237	56	44	81.6	340.3	301.0	69	45	55
CAPL-2	42.7	343.1	320.1	491	42	58	71.2	312.1	285.5	10	33	67
Castor oil	52.1	322.7	319.4	458	64	36	42.0	322.1	315.0	219	62	38
Insecticide alone	47.9	371.3	357.1	638	45	55	45.4	311.5	271.3	_	80	20

A.W.L.: Average weight of larva mg
A.E.: Average number of eggs
A.W.P: Average weight of pupa mg
S.R.: Sex ratio

Table 7: Persistence of esfenvalerate on cotton sprayed with its half and recommended rates separately and mixed with 0.3% of the experimental additives against 4 th instar larvae of *S. littoralis* .

Insecticide and additive	Rate/feddan g. a.i.	Days after treatment (mean % corrected mortality) 1	3	5	7	9	11	13	15	17	Half-life time LT_{50}(% 95 CL days)
Esfenvalerate +	30	100	100	95	90	75	30	15	10	0	11.63 (11.16 - 12.12)
Glue		100	100	100	90	70	60	45	20	15	11.63 (11.16 - 12.12)
Arabic gum		100	90	85	70	40	30	25	20	0	8.40 (7.86 - 8.99)
Phosphoric acid		100	100	95	85	60	55	50	45	30	12.55 (11.66 - 13.73)
Acetic acid		100	95	90	85	60	50	35	10	0	10.11 (8.58 - 12.23)
Sodium lignosulfonate		100	100	95	80	70	50	25	10	0	10.21 (9.76 - 10.69)
DL-600		100	100	100	90	70	45	10	0	0	10.12 (9.77 - 10.49)
CAPL-2		100	100	100	85	65	40	20	10	0	10.07 (9.69 - 10.47)
Castor oil		100	100	100	80	75	50	35	10	0	10.71 (9.80 -11.74)
Esfenvalerate +	15	90	80	70	40	30	15	5	–	–	5.31 (3.15 - 7.55)
Glue		85	75	60	50	25	10	0	–	–	4.99 (_)
Arabic gum		85	80	60	50	20	0	0	–	–	5.66 (_)
Phosphoric acid		90	75	65	50	40	30	5	–	–	5.29 (_)
Acetic acid		95	90	80	75	40	15	5	–	–	7.16 (_)
Sodium lignosulfonate		95	90	75	40	20	5	0	–	–	5.73 (_)
DL-600		85	80	70	30	20	10	0	–	–	4.77 (_)
CAPL-2		70	60	55	40	20	10	0	–	–	3.42 (_)
Castor oil		100	90	80	75	55	30	20	–	–	8.67 (7.37 - 10.58)

Table 8. Persistence of profenofos on cotton sprayed with its half and recommended rates separately and mixed with 0.3% of the experimental additives against 4 th instar larvae of *S. littoralis* .

Insecticide and additive	Rate/feddan g. a.i.	Days after treatment (mean % corrected mortality) 1	3	5	7	9	11	13	Half-life time LT_{50} (% 95 CL days)
Profenofos +	540	100	85	70	50	40	10	0	6.71 (5.71 - 8.11)
Glue		100	80	75	35	25	15	0	6.23 (5.89 - 6.60)
Arabic gum		100	70	55	50	35	25	5	6.13 (5.04 - 7.50)
Phosphoric acid		100	90	80	60	40	20	10	7.38 (6.99 - 7.81)
Acetic acid		100	100	70	50	35	30	10	7.34 (6.28 - 8.62)
Sodium lignosulfonate		100	100	90	60	40	20	0	7.93 (5.55 - 8.36)
DL-600		100	100	90	65	30	25	5	7.83 (7.48 - 8.19
CAPL-2		100	100	100	75	40	20	5	8.49 (8.17 - 8.81)
Castor oil		100	100	90	80	75	55	20	10.48 (_)
Profenofos +	270	100	65	35	15	10	5	0	4.66 (4.46 - 4.88)
Glue		100	75	55	20	10	0	0	5.21 (4.96 -5.46)
Arabic gum		100	60	35	25	10	0	0	4.72 (3.78 - 5.85)
Phosphoric acid		100	70	50	35	25	15	0	5.49 (5.14 -5.86)
Acetic acid		100	65	35	15	10	5	0	4.70 (4.49 - 4.93)
Sodium lignosulfonate		100	85	75	35	20	5	0	6.06 (5.77 - 6.36)
DL-600		100	75	40	30	20	10	0	5.26 (4.59 - 6.04)
CAPL-2		100	90	60	35	15	10	0	5.91 (5.63 - 6.22)
Castor oil		100	100	90	60	45	25	0	8.21 (7.78 - 8.70)

These results indicated that the investigated adjuvants play a good role in increasing pesticidal activity of insecticide then possibility of decreasing the rate of application for pyrethroid insecticide. As, the LT_{50} for esfenvalerate alone was 4.99 days increased in its combination with castor oil and acetic acid to 8.67 and 7.16 days, respectively. Similar trend was obtained with profenofos and its adjuvants mixtures are given in Table (8).

The results showed that CAPL-2, when combined with profenofos at recommended rate caused increasing of its mortality to 100%, after 5 days from spraying. All adjuvants increased the toxicity of profenofos from 10% to more than 55% after 11 days post-treatment. Based on LT_{50} values, the highest values were obtained with castor oil and CAPL-2. The LT_{50} increased from 6.71 for profenofos alone to 10.5 and 8.5 days in its combinations with castor oil and CAPL-2, respectively.

At half-recommended field rate, half-life for profenofos alone increased from 4.66 d to 8.21d for castor oil/profenofos mixture. It means that the half recommended rate of pesticide/castor oil mixture showed higher half life time than insecticide at full recommended rate, followed by sodium lignosulfonate which showed LT_{50} value similar that insecticide at recommended rate, CAPL-2, phosphoric acid, and DL600.

It is considered that, because of the persistent of adjuvant/insecticide mixture evaluated on cotton plants against 4th instar larvae of *S. littoralis* oils when combined with chemical insecticides were more effected than other ones. On the other hand, the data presented herein show that oils (castor oil and CAPL-2) are the most effective of the candidate adjuvants with tested insecticides at full and half field rates. These data similar to obtained by Wolfenbarger (1964). Adjuvants were generally slightly effect at full and half recommended field rates posttreatment.

No visual phytotoxicity up to one month post-treatment adjuvant /insecticide mixtures was observed on cotton plants.

DISCUSSION

The data showed that adjuvants increased toxicity of candidate insecticides and decreased the rate of field applications, perhaps due to the basic physical and chemical characteristics of spray solutions. There are ion exchanges between the water and its soluble materials, altering pH and conductivity contribute to toxicity. El-Attal *et al.* (1984) reported that the increase of electric conductivity of insecticide spray solution would lead to deionization of insecticide and increase its deposit and penetrate in the treated plant surfaces, then cause increase in insecticidal efficiency. It is therefore concluded that oils alone possess some type of insecticidal properties.

While adjuvants which cause decreasing in surface tension of spray solution, cause improving in wettability and spreading on the treated surface then increasing deposit and activity of pesticides (Fumidge 1962; Wolefenbarger and 1964 and Fahmy *et al.* 1991).

Regardless to addition of tested thickening and sticking agents (glue and Arabic gum) to esfenvalerate and profenofos increased their pesticidal

activity against *S. littoralis*. Similar results were reported by several investigators, i. e. El-Attal *et al.* (1984); El-Sisi *et al.* (1988); Radwan *et al.* (1994) and Hussein (2002). Also, they reported that the proper adjuvants greatly affected the biological activity of pesticides and may be contribute in decreasing the rate of insecticide applications.

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تأثير بعض الإضافات على الخواص الطبيعية والكيميائية والكفاءة الإبادية وفترة بقاء بعض مستحضرات المبيدات

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المعمل المركزى للمبيدات - مركز البحوث الزراعيه - الدقى-جيزة

تم في هذه الدراسة معرفة الفعل المتداخل بين اثنين من المبيدات (اسفنفليرات والبروفينفوس) وثماني إضافات مختلفة على الخواص الطبيعية والكيميائية والنشاط الإبادى وطول فترة بقاء مستحضرات المبيدات على سطح أوراق النبات.

تم دراسة التوافق الطبيعي بين المبيدات والإضافات حيث تم دراسة تأثير الإضافات على ثبات استحلاب المبيد. كما تم أيضا دراسة الخواص الطبيعية والكيماوية لمحاليل رش المبيدات منفردة ومخلوطة مع الإضافات والخواص التي تم دراستها هي اللزوجة- التوتر السطحي- درجة الحموضة- التوصيل الكهربي- نسبة الملوحة- تكوين طبقة رغاوى.

أظهرت هذه الدراسة توافق في جميع خلائط الإضافات بتركيز ٣و % مع كلا المبيدين (اسفنفليرات والبروفينفوس) عند التركيز الموصى به. كذلك أدى بعضها إلى تغير في الخواص الطبيعية والكيميائية لمحلول رش المبيدات.

أظهرت نتائج اختبارات السمية الفعل التنشيطي مع مبيد اسفنفليرات عند خلطة بالغراء وحمض الفسفورك. أما مع مبيد البروفينفوس زاد الفعل التنشيطي عند الخلط بالغراء والصمغ وحمض الخليك بينما كان الفعل إضافي أو تثبيطي في الخلائط الأخرى. عند دراسة التأثير المتأخر وجد زيادة في تأثير المبيدين مع الإضافات وذلك بانخفاض وزن العذارى وانخفاض نسب وضع البيض لفراشات دودة ورق القطن.

عند دراسة فترة بقاء المبيد على سطح أوراق القطن وذلك باستخدام التركيز الموصى به والنصفي له. أتضح من النتائج زيادة فترة بقاء المبيدين عند التركيز النصفي مخلوطا مع بعض الإضافات ٣و % ، كما أظهرت النتائج تأثير مرتفع لزيت الخروع في زيادة فترة بقاء المبيدين بالتركيز النصفي والتي أصبحت تقارب المبيد منفردا في حالة اسفنفليرات وأكثر من المبيد في حالة البروفينفوس، بالإضافة إلى عدم ملاحظة أي تأثير ضار على أوراق القطن. وعلى هذا يمكن أن تفيد مثل هذه الدراسة في التخطيط المستقبلي للمعاملات الحقلية بزيادة الكفاءة و إدارة معدلات التطبيقات الحقلية التي من شأنها ترشيد استخدام المبيدات.