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CONTROL OF *SITOPHILUS ORYZAE* IN WHEAT GRAINS USING SOME EGYPTIAN OIL FRACTIONS

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Abstract

The petroleum oil fractions, kerosene, solar and a lubricant were tested against *Sitophilus oryzae* L. infesting grains . The residual effect of such oil fractions was also studied . Results showed that the medium fraction (solar) produced higher residual effect than the lower (kerosene) and the higher fraction (lubricant). Rate of 15ml fraction/ kg wheat could be recommended for the control of *S. oryzae* (L.) in wheat grains. This dose gave 100% mortality up to 20 weeks after treatment. for kerosene, 22 weeks for solar and 18 weeks for the lubricant. Grain germination was not affected by oil treatments.

INTRODUCTION

Sitophilus oryzae (L.) is considered the main pest infesting wheat grains in Egypt. Petroleum oil fractions, being more cheap and more safe than synthetic pesticides, could play a role in the control of this important pest . The purpose of the current work is to evaluate the effect of petroleum oil fractions on *S. aryzea*, germination of wheat grains, and their persistence at different storage periods.

MATERIALS AND METHODS

The petroleum oil fractions, kerosene , solar and a lubricant were supplied by the Egyptain Co. for Petroleum. Solar was treated with concentrated sulfuric acid to reduce the unsaturated contents which are injurious to plants until the unsulfonated residue became less than 92% (De Ong, 1928). The procedure was carried out according to A. S. T. M. method No. 483 (Anon., 1928). On the other hand, kerosene and the lubricant were trested according to the procedure followed by the Egyptian Co. for Petroleum.

According to distillation, specific gravity and viscosity; kerosene is considered the lighter fraction followed by solar and the lubricant.

Each oil was tested at the rates of 15, 20 and 25 ml/kg, and every treatment was replicated 3 times . For each rate of application, the calculated amount of oil was dissolved in 10 ml acetone and then added over 10g of wheat in a glass jar, while the jar with the contents was mechanically shaken at a moderate rate to just tumble the wheat. A stream of air was then blown gently over the surface of the tumbling wheat for 5 - 10 minutes to evaporate and remove the acetone.

Twenty seven sets of the different treatments beside the control (treated with acetone) were carried out to test the efficiency at 1 week intervals and up to 27 weeks after the initial treatment.

Wheat variety Giza 150 having 13.6% m. c. was used. The test insect was *Sitophilus oryzae.* Adults of 1-2 weeks old were taken from a laboratory culture reared on wheat under controlled conditions ($27 \pm 1^{o}C$ and 65-70% R.H.).

At each interval one set of jars was taken and twenty five adults of the rice weevil were introduced into each jar. The jars were then kept in an incubator held at $27 \pm 1^{o}C$ and 65-70% R.H. for one week after which mortality counts were recorded and mortality percentages were corrected according to abbott (1925).

Treated seeds were kept until the end of the storage period (27 weeks) free from infestaton . Germination test was carried out at eight - week intervals . Samples of 25 seeds were placed in a Petri-dish lined with cotton and filter paper soaked in water. Four replicates were made for each treatment . Germination was recorded 4 days later.

RESULTS AND DISCUSSION

The insecticidal efficiency of the tested fractions were determined against the adults of *S. oryzae* after different periods from treatments . As shown in Table 1, all fractions gave good residual effect against *S. oryzae* in wheat grains since they produced 100% mortality up to 17 weeks after treatment. Solar showed the highest residual effect and produced 100% mortality up to 22 weeks after treament, followed by kerosene (20 weeks) then the lubricant (17 weeks). For economical consideration, the concentration 15ml fraction /kg wheat grains could be recommended as a control rate because it gave good control for a long period. It showed 100% mortality up to 20 weeks after treatment for kerosence, 22 weeks for solar and 18 weeks for the lubricant.

The shorter residual effect produced by kerosene than with solar is possibly due to the high volatility of kerosene as a result of its lower distillation, viscosity and specific gravity (De Ong 1928; Smith 1932) On the other hand , the shorter residual effect of the lubricant might be attributed to its higher distillation, viscosity and specific gravity leading to reduced penetration through trachae of the insect (De ong and Chamberlin 1927; Ebeling 1936).

Germination of wheat seeds treated with oils at the rate of 15, 20 and 25 ml remained almost equal to those of the control throughout all the experimental periods of storage which were checked every 8 weeks after treatment . Similar findings were also observed by Doharey *et al.* (1983) who showed that vegetable and mineral oils did not affect the germination of cereal grains .

Table 1. Effect of some petroleum oils against *Sitophilus oryzae* (L.) after periods from treatment.

Tested fraction	Conc. ml/kg	Corrected Kill % after periods of storage (in weeks)																									
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Kerosene	15	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	70	30	3.3	3.3	0		
	20	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	76.6	30	0			
	25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	6.6	30	22	3.3		
Solar	15	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	90	73.0	30	13.3	0
	20	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	52	20	0
	25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	70	22	0
Lubricant	15	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	90	78	30	0					
	20	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	90	73	30	0						
	25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	70	31	0				
Control		4	2	2	0	4	4	0	4	4	2	1	2	4	4	2	2	0	3	3	2	3	4	0	2	0	3	3

Table 2. Effect of petroleum oil fractions on the germination of wheat.

Fraction	Conc. ml/kg	Germination %		
		8 weeks	16 weeks	24 weeks
Kerosene	15	91.5	87.0	86.0
	20	87.4	87.0	83.0
	25	82.0	82.0	80.0
Solar	15	90.1	88.6	87.0
	20	91.2	87.0	84.6
	25	89.0	84.8	82.5
Lubricant	15	90.6	87.6	84.6
	20	90.0	87.0	84.2
	25	87.4	83.0	82.5
Control		91.7	92.0	89.0

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مكافحة سوسه الأرز في حبوب القمح باستعمال قطفات زيت البترول المصرية

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إختبرت قطفات زيت البترول الكيروسين، السولار، زيت التشحيم ضد سوسة الأرز التي تصيب حبوب القمح . وتم دراسة التأثير المتبقي لها بعد فترات مختلفه من معامله الحبوب بالقطفات . ولقد بينت النتائج أن قطفة السولار كان لها تأثير متبقي أطول من القطفه الأخف منها (الكيروسين) أو الأثقل منها (زيت التشحيم) ، وأن معدل ١٥ مل / كجم حبوب قمح يمكن التوصيه به من هذه القطفات لمكافحة سوسه الأرز علي حبوب القمح ولقد أعطت هذه الجرعة نسبه موت ١٠٠٪ لمدة ٢٠ أسبوعاً بعد المعاملة بالنسبة للكيروسين ، ٢٢ أسبوعا مع السولار، و١٨ أسبوعا مع زيت التشحيم . كذلك اثبتت الدراسة أنه لم يحدث تأثير يذكر علي نسبه الإنبات لحبوب القمح بعد هذه المعاملات.