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CHEMICAL AND PHYSICAL STABILITY OF CARBAMATE INSECTICIDES ALONE OR WHEN MIXED WITH FOLIAR FERTILIZERS UNDER THE RECOMMENDED KNAPSACK SPRAYING RATE WITH NILE WATER

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Abstract

Successful mixtures between foliar fertilizers and carbamate insecticides should pass through physical and chemical stability tests. The results showed that the carbamate insecticides Lannate, Larvin and-Sevin alone or in combination with the foliar fertilizers Bayfolan, Bayfolan super, Metalosate, Actigil, Ligatrin and Pholaz-chelated, had passed successfully through the physical stability. Results of chemical stability revealed that diluted pesticides if are left in the Nile water for 24 h, they undergo different rates of degradation.

The fertilizers Bayoflan , Metalosate, Actigil and Ligatrin reduced degradation of carbamate insecticides when mixed with them in the presence of Nile water as a diluting agent.This was more evident with Bayflan Super/ Larvine mixture. The stability of cabamate insecticide / Foliar fertilizer mixtures left in Nile water for 24h was more evident than with insecticides alone. However the foliar fertilizer 3-pholaz caused degradation for all carbamates studied.

INTRODUCTION

In order to get good vegetative growth and more yield, several attempts were made to combine insecticides and foliar fertilizers (El-Attal *et al.* , 1981, 1984; Osman *et al.*, 1987; Tawfic and El-Sisi 1987) . Since this procedure became nowadays a common practice in agriculture, the present work was undertaken to study the chemical stability of carbamate insecticide/foliar fertlizer mixtures in the presence of Nile water as a diluting agent.

MATERIALS AND METHODS

The following carbamate insecticides were used : Lannate (methomyl) 20% SL (1.25 L/f), Larvin (thiodicarb) 80% DF (0.5 kg/ f) and Sevin (carbaryl) 85% WP (1.5kg/f) . The foliar fertilizers used contained the major elements N,P,K and the rare elements Mg, chelated Fe, chelated Zn, chelated Mn, Bo, Cu and Co as well as salts of different percentages . The fertilizers were Bayfolan (1 L/f) , Bayfolan Super (1 L/f), Actigil (1 L/f), Ligatrin (1 L/f) , Metalosate (200 cm3/f) and Pholaz (0.5 kg/f).

Mixing insecticides with foliar fertilizers was carried out by diluting and solubilizing foliar fertilizers in Nile Water then the insecticides were added (tank mixing). Suspensibility test: Percentage foam and pH using pH meter CG 818 were carried out for Larvin and Sevin and their blends with foliar fertilizers according to WHO (1979) specifications but under knapsack sprayer dilution rate in Nile water, i.e. the calculated amount of insecticide required for one feddan was diluted with 200 liter of Nile water Miscibility, precipitation and foam for Lannate and its blends with foliar fertilizers were determined under the above mentioned conditions.

The tests were undertaken at zero time directly after blending , then repeated after 24h from dilution with Nile water .

The effect of foliar fretilizers initially and after leaving them in the Nile water dilution for 24h on chemical stability of carbamate insecticides was determined according to Soliman *et al.* (1977).

RESULTS AND DISCUSSION

Data tabulated in Table 1 showed no significant separation or precipitation for insecticides or their blends with foliar fertilizers under knapsack sprayer dilution rate either after immediate dilution or after 24 h. This indicated a physical compatibility between carbamate insecticides and foliar fertilizers.

The results of Chemical stability are shown in Table 2. Leaving diluted pesti-

Table 1. Physical stability for insecticides alone and their blends with foliar fertilizers at zero time and after 24h of mixing with the Nile water.

Insecticide	Property Interval (h)	Insecticide alone		Insecticide combined with :													
				Bayfolan		Bayfolan Super		Metalosate		Actigil		Ligasin		Prolas			
		0h	24h	0h	24h	0h	24h	0h	24h	0h	24h	0h	24h	0h	24h		
Lannate 20 % SL	Foam (cm3)	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Precipitation(ml)	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Separation (ml)	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Ph	7.41	7.95	6.67	6.88	7.04	7.09	7.08	7.21	6.76	6.88	7.67	7.75	6.99	6.74		
Larvin 80 % DF	Foam	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Suspen. (%)*	94	92	91	92	93	92	91	91.5	92	93	91	91	90	89		
	Ph	7.20	7.20	6.66	6.69	6.69	7.03	7.00	7.17	6.56	6.79	7.52	7.52	6.79	6.72		
Sevin 85 % WP	Foam	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Suspen. (%)*	80	78	80	79	79	81	81	80	81	80	80	80	79	78		
	Ph	7.29	7.31	6.66	6.67	6.69	6.95	6.98	7.08	6.46	6.47	7.35	7.50	6.94	6.83		
Foliar fertilizer along Ph		6.63		6.64		7.02		7.05		6.61		7.53		7.02		7.03	

* Suspen = % Suspensibility
Ph of Nile water = 7.47

Table 2. Degradation of carbamate insecticides as a result of dilution with Nile water and blending with foliar fertilizers.

Insecticide	Property Interval (h)	Insecticide alone		Insecticide combined with :											
				Bayfolan		Bayfolan Super		Metalosate		Actigil		Ligatsin		Pholaz	
		0h	24h	0h	24h	0h	24h	0h	24h	0h	24h	0h	24h	0h	24h
Lannate	E.C.%*	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279
20 % SL	O.C.%	0.1279	0.1104	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1279	0.1071	0.1071
	Deg.%	0.0	13.68	0.0	0.0	0.0	24.39	0.0	0.0	0.0	0.0	0.0	0.0	16.26	16.26
	E.C.%	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375
Larvin	O.C.%	0.6375	0.5578	0.6375	0.6375	0.6375	0.5977	0.6375	0.6375	0.6375	0.6375	0.6375	0.6375	0.5578	0.5578
80 % DF	Deg.%	0.0	12.50	0.0	0.0	0.0	6.24	0.0	0.0	0.0	0.0	0.0	0.0	12.5	12.5
	E.C.%	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
Sevin	O.C.%	0.2000	0.1875	0.2000	0.2000	0.2000	0.1750	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1750	0.1750
85 % WP	Deg.%	0.0	6.25	0.0	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	12.5	12.5

E.C. = Expected concentration (conc. of active ingredient under Knapsak spray dilution).
O.C. = Observed (determined) concentration.
Deg. = Degradation percentage.

cides in Nile water for 24 h caused different percentages of degradation. Lannate showed the highest percentage of degradation followed by Larvin, while Sevin was the most stable insecticide.

Mixing Bayfolan, Metalosate, Actigil and Ligatrin with carbamates avoided their degradation up to 24h after dilution . Mixing Bayfolan Super with Larvin reduced percentage of degradation for 24h after mixing than with Larvin alone. Pholaz however, reacted with insecticides immediately after mixing and caused a marked increase in percentage of degradation which did not enhance after 24h from dilution.

As shown in Table 1, no correlation was found between the chemical stabilitly of insecticides and pH values of Nile water, insecticide solutions, foliar fertilizer solutions and mixtures of foliar fertilizer / insecticides solutions . The chemical stability or decomposition of insecticides might be due to the existence of certain salts in foliar fertilizers.

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ثبات المبيدات الكربماتية بمفردها ومخاليطها مع الأسمدة الورقية تحت التخفيف الحقلى للرشاشة بماء النيل

أحمد غازى السيسي

المعمل المركزى للمبيدات ، مركز البحوث الزراعية - الدقى

يجب أن تجتاز خلائط الأسمدة الورقية مع المبيدات الكربماتية بنجاح إختبارات النبات الطبيعى والثبات الكيماوى ، وطبقاً للدراسة التى اجريت على المبيدات الكربماتية لانيت ٢٠٪ ، لارفين ٨٠٪ ، سيفين ٨٥٪ بمفردها وخلائطها مع الأسمدة الورقية بايفولان ، بيفولان سوبر ، ميتالوسيت ، اكتاجيل ، ليجاترين ، الفولاذ المخلبى ، فلقد إجتازت بنجاح إختبار النبات الطبيعى بعد التخفيف بالماء مباشرة وبعد ٢٤ساعة من التخفيف . وأثبتت دراسة النبات الكيماوى أن تخفيف المبيدات بماء النيل وتركها لمدة ٢٤ساعة قد نتج عنه تدهور للمبيدات بدرجات مختلفة كان أكثرها تدهوراً هو اللانيت يليه اللارفين ، وكان السيفين أكثرها ثباتاً . كذلك أثبتت الدراسة أن خلائط الأسمدة الورقية بايفولان ، ميتالوسيت ، اكتجيل ، ليجاترين قد منعت تدهور المبيدات الكربماتية تحت الدراسة ، وأن خلائط البايفولان سوبر مع اللارفين قد قلل من درجة تدهوره حتى ٢٤ساعة بعد التخفيف بالمقارنة بالمبيد بمفرده . وأوضحت النتائج أن سماد الفولاذ المخلبى قد سبب تدهورا بنسبة معينة للمبيدات بمجرد الخلط وأن هذه النسبة لم تزد عند تركها لمدة ٢٤ساعة . لذلك نوصى بمراعاة هذه النتائج عند التطبيق الحقلى .