

Table 1. Toxicity of chlorantraniliprole, emamectin benzoate, imidacloprid and *Bacillus thuringiensis* against the 2nd, 3rd and 4th *S. littoralis* larval instars at different times of treatment

Insecticide	Time (hrs)	Larval instars					
		2 nd		3 rd		4 th	
		LC ₅₀ (ppm)	Slope	LC ₅₀ (ppm)	Slope	LC ₅₀ (ppm)	Slope
		Confidence limits		Confidence limits		Confidence limits	
Chlorantraniliprole	24	462.55	0.50	28314.90	0.39	--	--
		131.48-9013.38	±0.12	99.91-739.35E+5	±0.17	--	--
	48	2.87	0.87	583.46	0.38	23215.83	0.40
		1.66-4.69	±0.13	117.43-96595.49	±0.11	36.92-2979.03E+5	±0.16
	72	0.93	1.19	6.71	0.68	17.52	0.71
0.64-1.33		±0.14	3.29-12.45	±0.11	9.66-34.18	±0.11	
96	0.17	0.89	0.51	0.66	1.53	0.98	
		0.06-0.30	±0.20	0.29-1.45	±0.24	0.69-2.58	±0.17
Emamectin benzoate	24	0.0244	1.22	72.20	0.99	--	--
		0.0153-0.0548	±0.23	30.70-1509.80	±0.30	--	--
	48	0.0033	1.44	16.50	1.24	88.10	0.92
		0.0025-0.0045	±0.16	11.00-30.60	±0.22	34.70-1341.30	± 0.25
	72	0.0014	1.32	8.30	1.31	10.70	1.39
0.0010-0.0019		±0.14	5.90-12.60	±0.21	7.70-16.50	± 0.22	
96	0.0004	1.30	2.00	1.57	4.80	1.32	
		0.0002-0.0005	±0.18	1.20-2.80	±0.29	3.30-6.90	± 0.21
Imidacloprid	24	75.96	0.70	10045.75	0.73	--	--
		42.50-158.18	±0.10	2788.07-6.93E+5	±0.21	--	--
	48	9.75	0.97	853.58	0.94	5793.69	0.93
		6.36-15.18	±0.12	490.64-1892.47	±0.15	2211.51-1.64E+5	±0.28
	72	3.04	1.38	258.06	1.06	2505.17	0.84
2.20-4.21		±0.16	166.13-425.06	±0.13	1167.33-9481.03	±0.15	
96	1.19	1.22	43.65	1.03	1085.69	0.66	
		0.77-1.71	±0.18	26.79-69.84	±0.15	500.82-3849.24	±0.11

Con. Table 1.

Insecticide	Time (hrs)	Larval instars					
		2 nd		3 rd		4 th	
		LC ₅₀ (ppm)	Slope	LC ₅₀ (ppm)	Slope	LC ₅₀ (ppm)	Slope
		Confidence limits		Confidence limits		Confidence limits	
<i>Bacillus thuringiensis</i> subsb. aizawi	72	980.08	1.56	5387.22	1.50	--	--
		636.08-1416.05	±0.37	2986.78-38970.68	±0.45	--	--
	96	754.65	1.8	1205.67	1.37	2279.91	1.10
		573.82-1013.13	±0.24	850.27-1917.95	±0.22	1395.18-6341.55	±0.27
	120	436.88	2.32	929.75	1.43	1938.46	1.09
		343.78-550.39	±0.28	670.42-1374.67	±0.22	1210.12-4838.54	±0.27
	144	328.80	2.19	731.90	1.23	1562.12	0.89
		252.18-418.13	±0.28	503.06-1115.38	±0.21	924.98-3989.10	±0.20
	168	251.53	1.85	606.78	1.13	1157.60	0.91
		178.60-332.09	±0.27	400.43-933.47	±0.20	709.69-2466.76	±0.20

Table 3. Joint toxic action of chlorantraniliprole in combination with emamectine benzoate, imidacloprid and *Bacillus thuringiensis* against 4th instar *Spodoptera* larvae at different concentrations

Combination	Concentration levels ¹	Expected (%) mortality ²			Observed (%) mortality ³			Cotoxicity factor ⁴		
		After 48 hr.	After 72 hr.	After 96 hr.	After 48 hr.	After 72 hr.	After 96 hr.	After 48 hr.	After 72 hr.	After 96 hr.
Chlorantraniliprole + Emamectin benzoate	LC ₅₀ + LC ₅₀	16.67	53.33	106.67	13.33	30.00	56.67	-20.00	-43.75	-46.88
	LC ₂₅ + LC ₂₅	3.33	10.00	43.33	3.33	6.67	23.33	0.00	-33.33	-46.15
	LC _{12.5} + LC _{12.5}	0.00	6.67	20.00	0.00	6.67	13.33	--	0.00	-33.33
Chlorantraniliprole + imidacloprid	LC ₅₀ + LC ₅₀	20.00	56.67	100.00	13.33	30.00	46.67	-33.33	-47.06	-53.33
	LC ₂₅ + LC ₂₅	10.00	13.33	46.67	6.67	10.00	23.33	-33.33	-25.00	-50.00
	LC _{12.5} + LC _{12.5}	0.00	6.67	23.33	0.00	6.67	13.33	--	0.00	-42.86
Chlorantraniliprole + <i>Bacillus thuringiensis</i>	LC ₅₀ + LC ₅₀	3.33	30.00	96.67	3.33	20.00	56.67	0.00	-33.33	-41.38
	LC ₂₅ + LC ₂₅	3.33	10.00	46.67	3.33	6.67	23.33	0.00	-33.33	-50.00
	LC _{12.5} + LC _{12.5}	0.00	3.33	16.67	0.00	3.33	13.33	--	0.00	-20.00

¹Concentration level of each insecticide in the paired combination was calculated from its corresponding LC-p lines at 4th day of exposure.

²Expected (%) mortality = Sum of % mortalities of each insecticide alone at the same level of concentration used in combination.

³Observed (%) mortality = % mortality of combination.

⁴Cotoxicity factor = [(observed (%) mortality - expected (%) mortality) / expected (%) mortality] × 100 (Mansour *et. al.*, 1966).