

Supplementary Table 1 Comparative efficacy of insecticides applied through drone and knapsack sprayer against *Helicoverpa armigera* in chickpea (I spray)

Treatment details	Dose (mL/ha)	Spray equipment	No. of larvae/meter row length					
			1 DBS	1DAS	5 DAS	7 DAS	10 DAS	15 DAS
Chlorantraniliprole 9.3% w/w + Lambda-cyhalothrin 4.6% w/w ZC	200	Drone	4.55	0.44	0.00	0.00	0.00	0.98
Chlorantraniliprole 9.3% w/w + Lambda-cyhalothrin 4.6% w/w ZC	400	Drone	4.21	0.00	0.00	0.00	0.00	0.00
Chlorantraniliprole 9.3% w/w + Lambda-cyhalothrin 4.6% w/w ZC	200	Knapsack sprayer	3.89	2.10	1.10	1.38	1.70	1.90
Emamectin benzoate 5% + Lufenuron 40% WG	60	Drone	3.99	1.55	0.00	0.00	0.00	1.00
Emamectin benzoate 5% + Lufenuron 40% WG	120	Drone	4.02	0.00	0.00	0.00	0.00	0.98
Emamectin benzoate 5% + Lufenuron 40% WG	60	Knapsack sprayer	4.00	2.21	1.88	1.52	1.80	1.98
Untreated check	-	-	3.97	4.05	4.41	4.89	5.01	5.26
SEM±	-	-	NS	0.07	0.06	0.06	0.07	0.08
CD ($p=0.05$)	-	-	NS	0.22	0.18	0.19	0.20	0.23
CV (%)	-	-	10.07	10.30	9.16	8.47	9.79	10.01

The original values were subjected to $\sqrt{x} + 0.5$ transformation before analysis.

DBS, Day before spray; DAS, Days after spray; NS, Not significant.

Supplementary Table 2 Comparative efficacy of insecticides applied through drone and knapsack sprayer against *Helicoverpa armigera* in chickpea (II spray)

Treatment details	Dose (mL/ha)	Spray equipment	No. of larvae per meter row length				
			1DAS	5 DAS	7 DAS	10 DAS	15 DAS
Chlorantraniliprole 9.3% w/w + Lambda-cyhalothrin 4.6% w/w ZC	200	Drone	0.00	0.00	0.00	0.00	0.25
Chlorantraniliprole 9.3% w/w + Lambda-cyhalothrin 4.6% w/w ZC	400	Drone	0.00	0.00	0.00	0.00	0.20
Chlorantraniliprole 9.3% w/w + Lambda-cyhalothrin 4.6% w/w ZC	200	Knapsack sprayer	0.99	1.00	1.32	1.45	1.45
Emamectin benzoate 5%+Lufenuron 40% WG	60	Drone	0.00	0.00	0.00	0.65	0.88
Emamectin benzoate 5%+Lufenuron 40% WG	120	Drone	0.00	0.00	0.00	0.25	0.25
Emamectin benzoate 5%+Lufenuron 40% WG	60	Knapsack sprayer	1.11	1.21	1.45	1.45	1.77
Untreated check	-	-	4.49	4.82	4.99	4.98	4.85
SEM±	-	-	0.11	0.09	0.09	0.06	0.08
CD ($p=0.05$)	-	-	0.33	0.27	0.26	0.19	0.24
CV (%)	-	-	9.87	8.98	9.16	9.77	10.07

The original values were subjected to $\sqrt{x} + 0.5$ transformation before analysis.

DBS, Day before spray; DAS, Days after spray.

Supplementary Table 3 Phytotoxic effects of newer insecticides applied via drones on chickpea

Treatments (g a.i./ha)	Spray equipment	Symptom	I spray					II spray				
			1 DAS	5 DAS	7 DAS	10 DAS	15 DAS	1 DAS	5 DAS	7 DAS	10 DAS	15 DAS
Chlorantraniliprole 9.3% w/w + Lambda- cyhalothrin 4.6% w/w zC	Drone application @200 mL/ha	Leaf injury	0	0	0	0	0	0	0	0	0	0
		Wilting	0	0	0	0	0	0	0	0	0	0
		Vein clearing	0	0	0	0	0	0	0	0	0	0
		Necrosis	0	0	0	0	0	0	0	0	0	0
		Epinasty	0	0	0	0	0	0	0	0	0	0
		Hyponasty	0	0	0	0	0	0	0	0	0	0
Chlorantraniliprole 9.3% w/w + Lambda- cyhalothrin 4.6% w/w zC	Drone application @400 mL/ha	Leaf injury	0	0	0	0	0	0	0	0	0	0
		Wilting	0	0	0	0	0	0	0	0	0	0
		Vein clearing	0	0	0	0	0	0	0	0	0	0
		Necrosis	0	0	0	0	0	0	0	0	0	0
		Epinasty	0	0	0	0	0	0	0	0	0	0
		Hyponasty	0	0	0	0	0	0	0	0	0	0
Emamectin benzoate 5% + Lufenuron 40% WG	Drone application @60 mL/ha	Leaf injury	0	0	0	0	0	0	0	0	0	0
		Wilting	0	0	0	0	0	0	0	0	0	0
		Vein clearing	0	0	0	0	0	0	0	0	0	0
		Necrosis	0	0	0	0	0	0	0	0	0	0
		Epinasty	0	0	0	0	0	0	0	0	0	0
		Hyponasty	0	0	0	0	0	0	0	0	0	0
Emamectin benzoate 5% + Lufenuron 40% WG	Drone application @120 mL/ha	Leaf injury	0	0	0	0	0	0	0	0	0	0
		Wilting	0	0	0	0	0	0	0	0	0	0
		vein clearing	0	0	0	0	0	0	0	0	0	0
		Necrosis	0	0	0	0	0	0	0	0	0	0
		Epinasty	0	0	0	0	0	0	0	0	0	0
		Hyponasty	0	0	0	0	0	0	0	0	0	0

DAS, Days after spray.