POTENTIAL OF NON- INSECTICIDAL SYNERGISTS

Dr. A. Regupathy
Professor of Entomology
Tamil Nadu Agricultural University
Coimbatore-641003
India

Synergistic effect of Pungam oil (PO) with SP on *Helicoverpa armigera* (Topical application)

	LD 50	SR
Fenvalerate	1.91	-
Fenvalerate + Pungam oil (50 µg)	0.15	12.6
Fenvalerate + Pungam oil (100 µg)	0.11	18.1
Cypermethrin	1.03	-
Cypermethrin + Pungam oil (50 µg)	0.25	4.1
Cypermethrin + Pungam oil (100 µg)	0.14	7.4

(SR-Synergistic Ratio)

Effect of different synergist with SP on *Helicoverpa armigera* (Topical application)

	Fenvalerate		Cypermethrin	
	LD50(1.69)	SR	LD50 (1.0)	SR
PBO (50µg)	1.0	17.1	0.2	5.2
PO (50µg)	0.12	14.0	0.6	6.1
PP (25µg)	0.10	17.9	0.2	4.9
PRF (0.1µg)	0.34	5.0	0.4	2.2
DEF (20µg)	1.4	1.2	0.6	1.5
TPP (50µg)	2.5	0.7	2.4	0.4
DEM (50µg)	2.5	0.7	2.3	0.4

Effect of different synergists with SP on *Helicoverpa armigera* (Larval dip method)

Larval dip method		
	LC 50	**SR**
Fenvalerate	**714**	**-**
Fenvalerate + Pungam oil	**17**	**41.4**
Cypermethrin	**502**	**-**
Cypermethrin + Pungam oil	**23**	**21.5**

Relative susceptibility of different larval instars of *Helicoverpa armigera* to fenvalerate+ Pungam oil

Instar	Topical					Larval dip				
	Fenvalerate		Fenvalerate + PO			Fenvalerate		Fenvalerate + PO		
	LD 50 (µg)	RS	LD 50 (µg)	RS	SR	LC 50 (ppm)	RS	LC50 (ppm)	RS	SR
III	1.7	5.0	0.12	69	14	714	3.9	17	161	42
IV	4.7	1.8	0.16	53	29	1266	2.5	26	103	47
V	5.7	1.5	0.17	49	33	1806	1.8	34	80	53
VI	8.4	1.0	0.25	33	33	2790	1.0	50	55	55

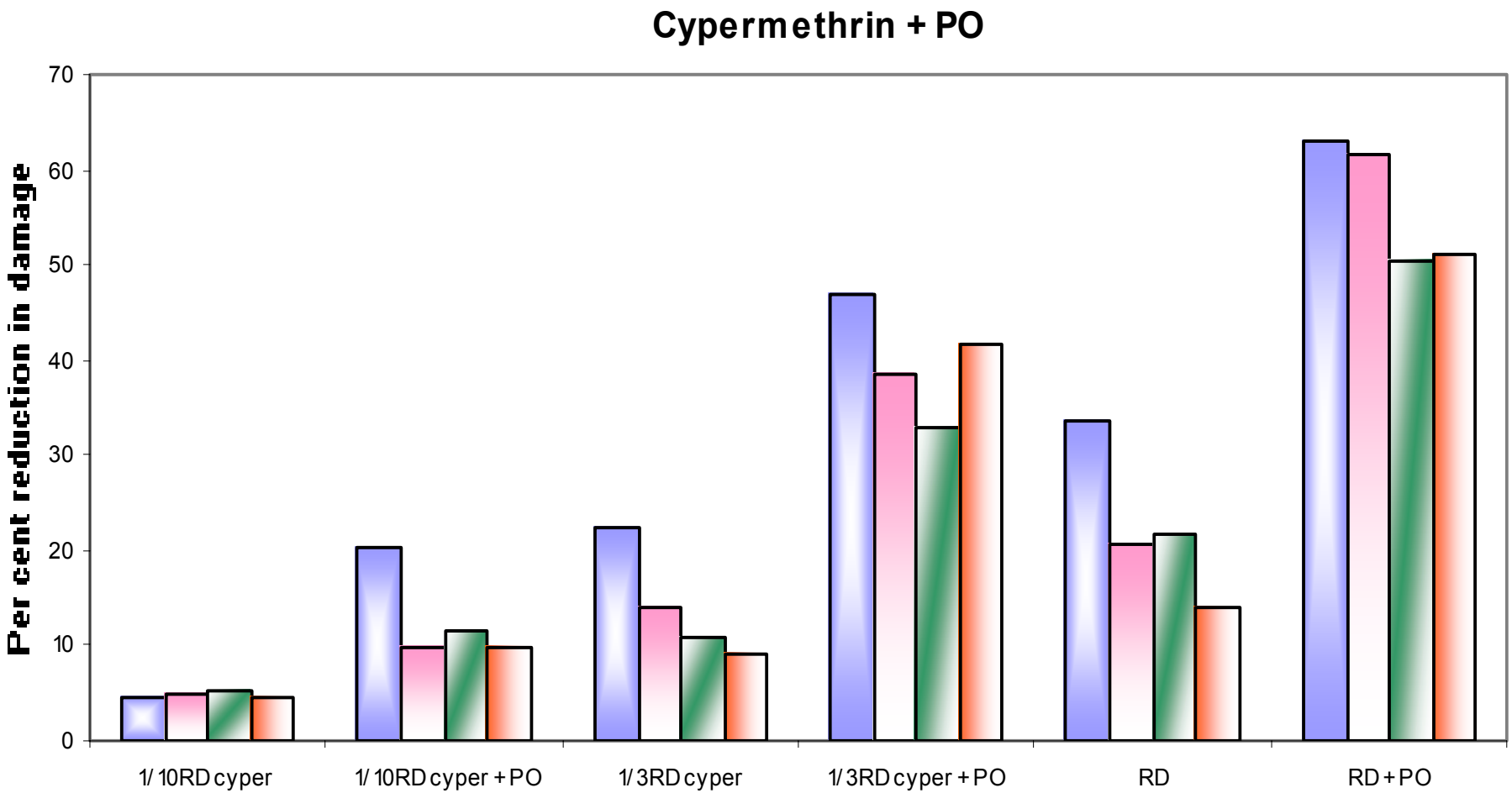
Effect of Pungam oil in the toxicity of OPs and Endosulfan

%Survival			
	Alone	**+ Pungam oil**	**% Suppression**
Chlorpyriphos(1.0 µg)	**25.0**	**56.5**	**-126**
Quinalphos (0.75µg)	**41.7**	**72.9**	**-75**
Phasalone (10µg)	**50.0**	**87.5**	**-75**
Endosulfan (10 µg)	**77.8**	**66.7**	**14**

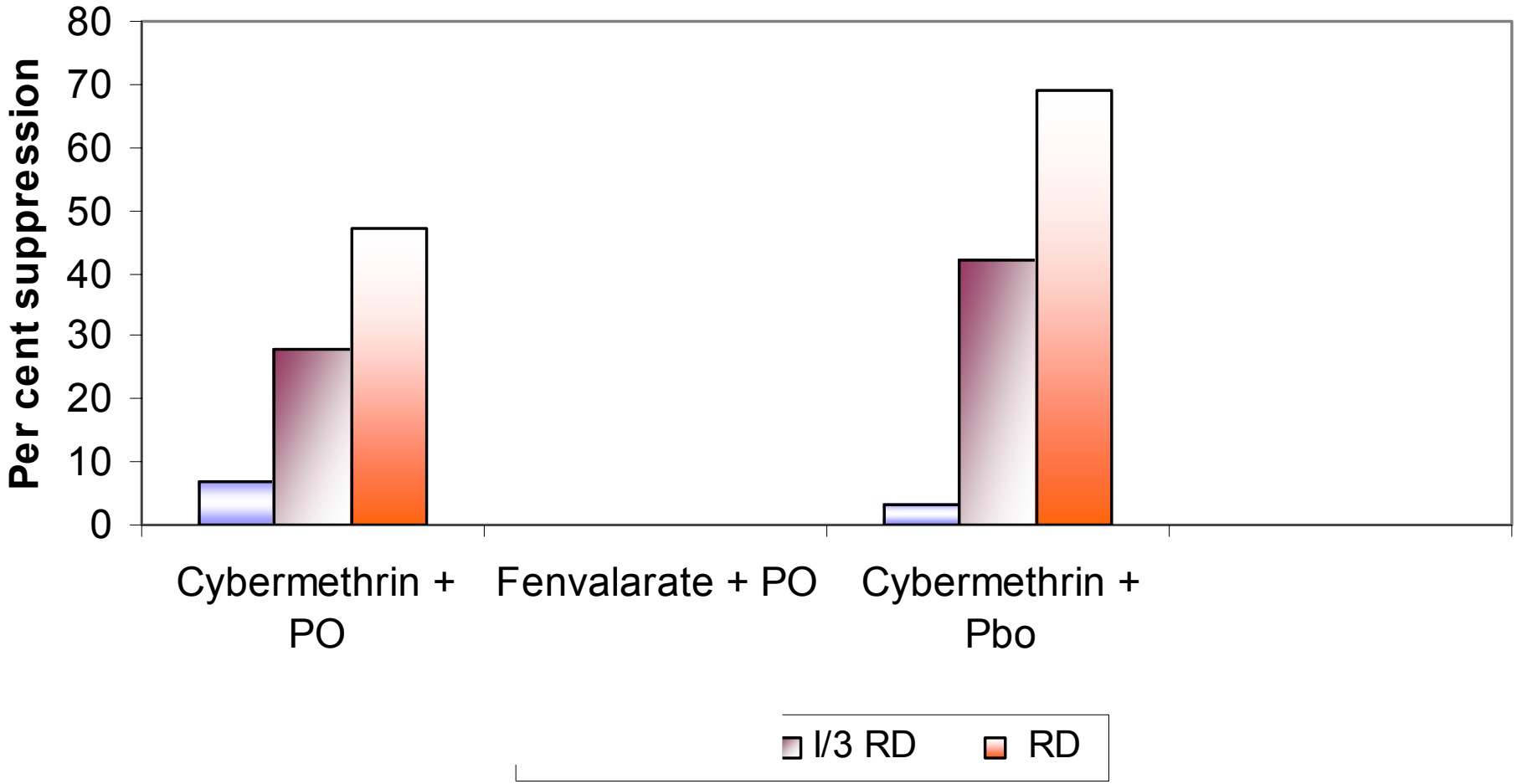
- PO was antagonistic with Chlorpyriphos, Quinalphos and Phosalone.
- PO had synergistic action marginally with endosulfan (Ca 14 % suppression).
- PO plus synthetic synergists further increased the susceptibility to SPs

PO+ PRF> PO+PP>PO+PBO.

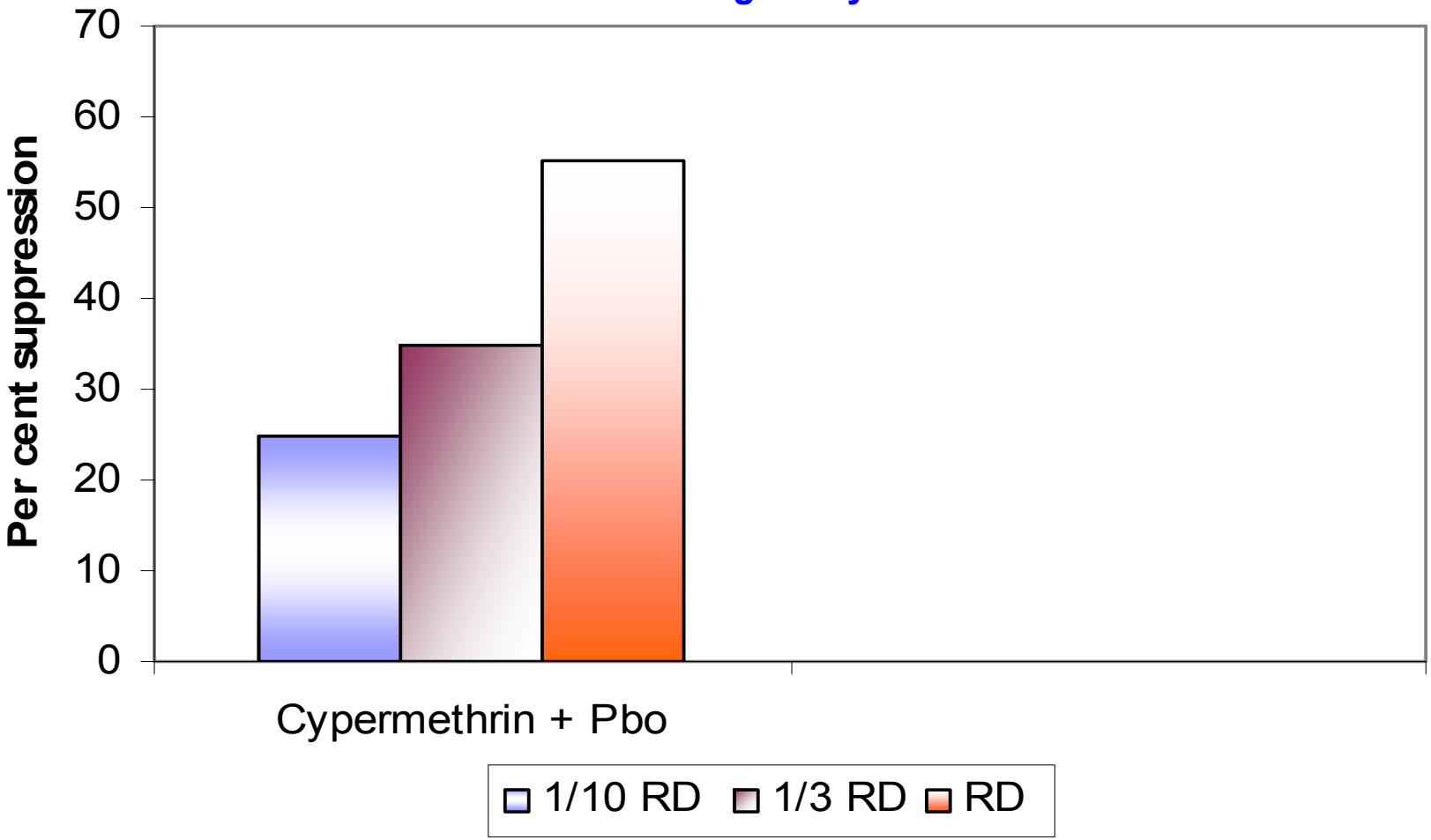
Synergistic action of Pongamia oil with cypermethrin on bollworm incidence



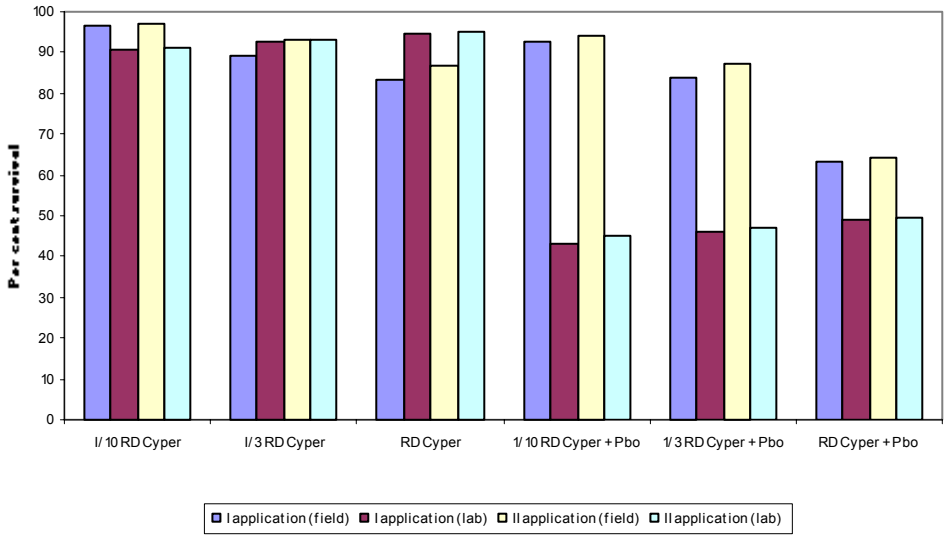
Per cent suppression of MFO activity in cypermethrin treated *H. armigera* by PO and Pbo



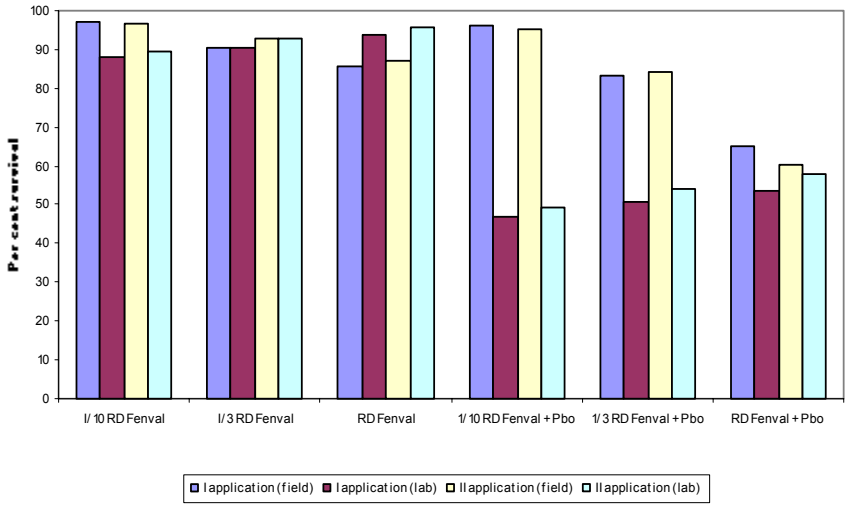
Per cent suppression of CE activity in cypermethrin treated *H. armigera* by Pbo



Per cent survival of cypermethrin / fenvalerate with Pbo treated *H. armigera* larvae in the field vs laboratory

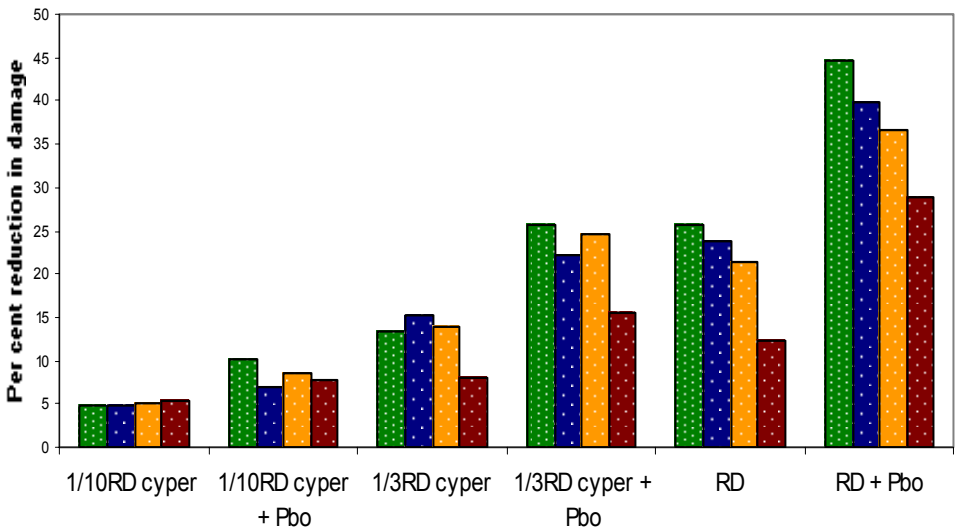


4b. Fenvalerate + Pbo

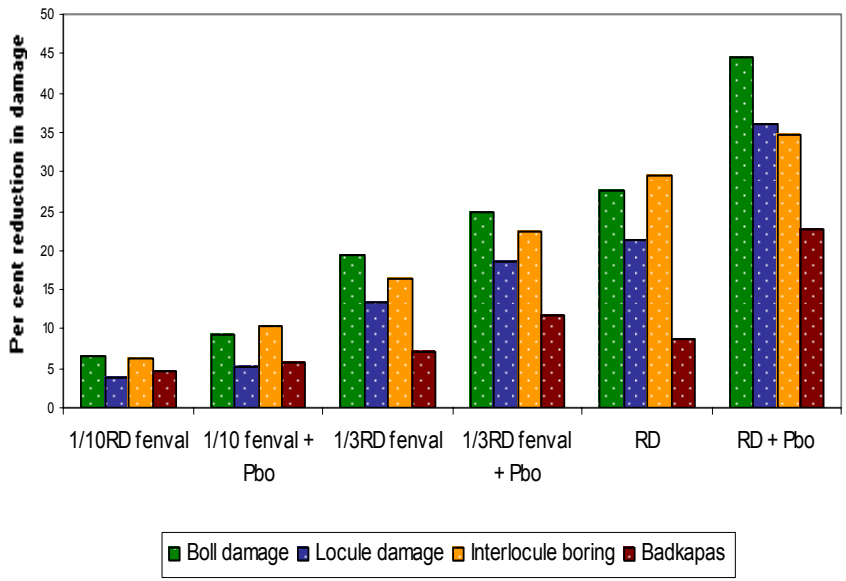


Synergistic action of Pbo with cypermethrin/fenvalerate on bollworm incidence

Cypermethrin + Pbo



Fenvalerate + Pbo



CONCLUSION

- Addition of Pbo/PO improved the efficacy of cypermethrin/fenvalerate
- The synergistic suppression was maximum at RD > 1/3 RD > 1/10 RD
- Pbo and PO suppressed MFO activity
- Pbo but not PO suppressed CE activity
- Suppression was maximum at RD > 1/3 RD > 1/10 RD

No control mortality due to any oils tested upto 150 µg / larvae

No control mortality- synthetic synergist (at µg / larvae).

MFO inhibitors – PBO (50 µg), PP (25 µg)

Esterase inhibitors –DEF (20 µg), TPP (50 µg), PRF (0.1 µg)

GST inhibitors-DEM (50 µg)

- **Among oils ,PO markedly suppressed resistance of fenvalerate and cypermethrin**
- **Sesamum and Niger oils suppressed resistance marginally.**
- **Sunflower,Neem,Palmrosa,Palm,Castor and Maduca oils were antagonistic.**
- **PBO and PP suppressed resistance of fenvalerate and cypermethrin significantly.**
- **PRF had synergistic effect to some extent.**

- **The synergistic effect was PP>PBO>PO>PRF for fenvalerate and PO>PBO>PP>PRF> for cypermethrin**
- **The relative susceptibility of *H.armigera* was negatively related with stages**
- **The synergistic ratio increased marginally with larval stages.**
- **Effect was more with larval dip**
- **TPP and DEM were antagonistic with SP**