

Control of chlorpyrifos in run-off: PAM and pesticide formulation effects

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Acknowledgement

Dow Agrosciences

Chlorpyrifos

Used for control of soil insect pests in cole crops

Water quality TMDL proposed for Lower Salinas watershed (chlorpyrifos, diazinon), January 2010

Proposed water quality targets:

Acute toxicity, 25 ppt (ng/L)

Chronic toxicity 15 ppt (ng/L)



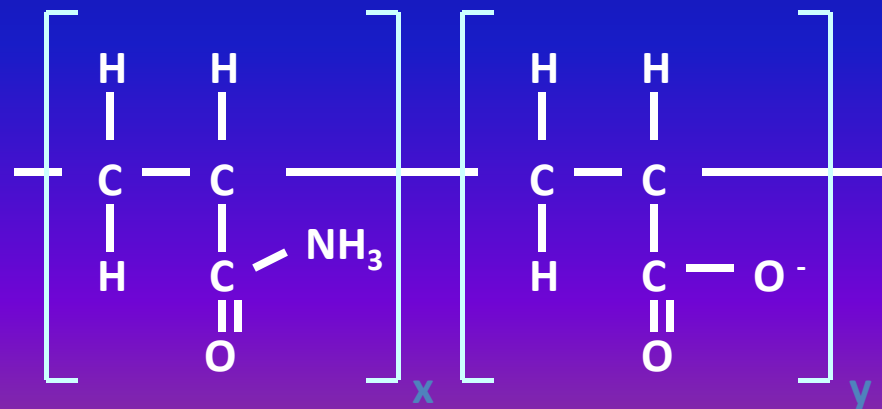


Germination Water

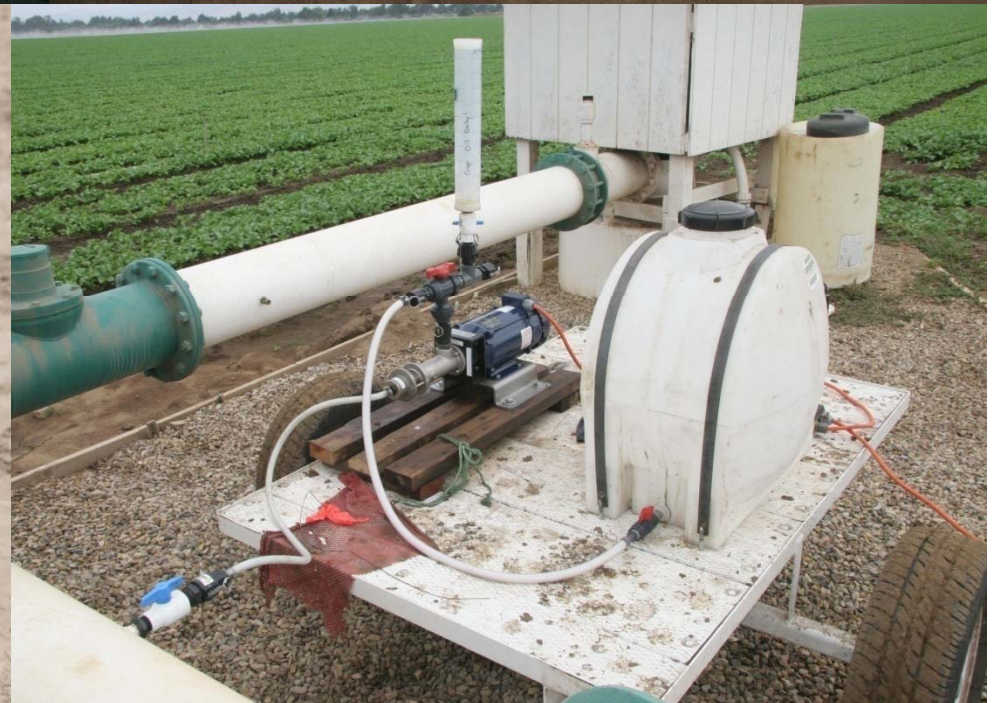
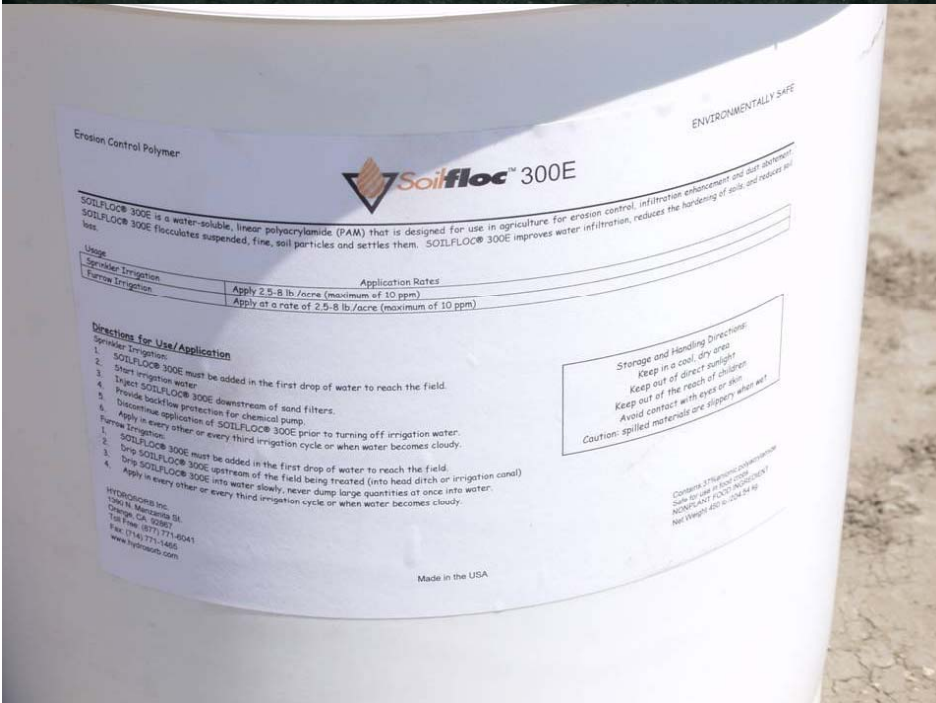
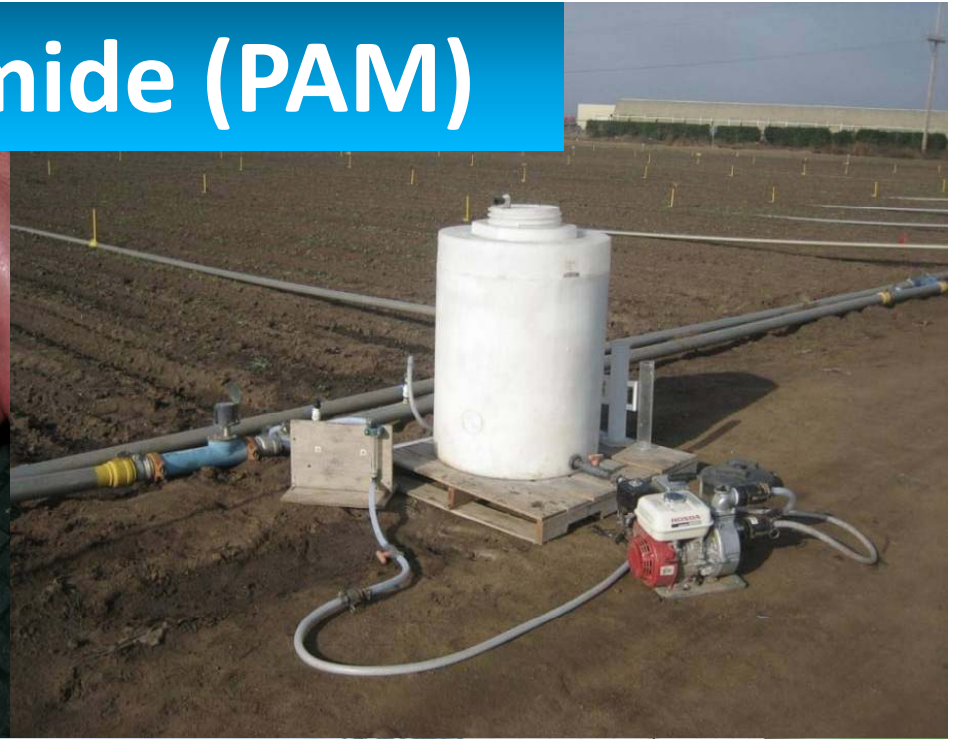
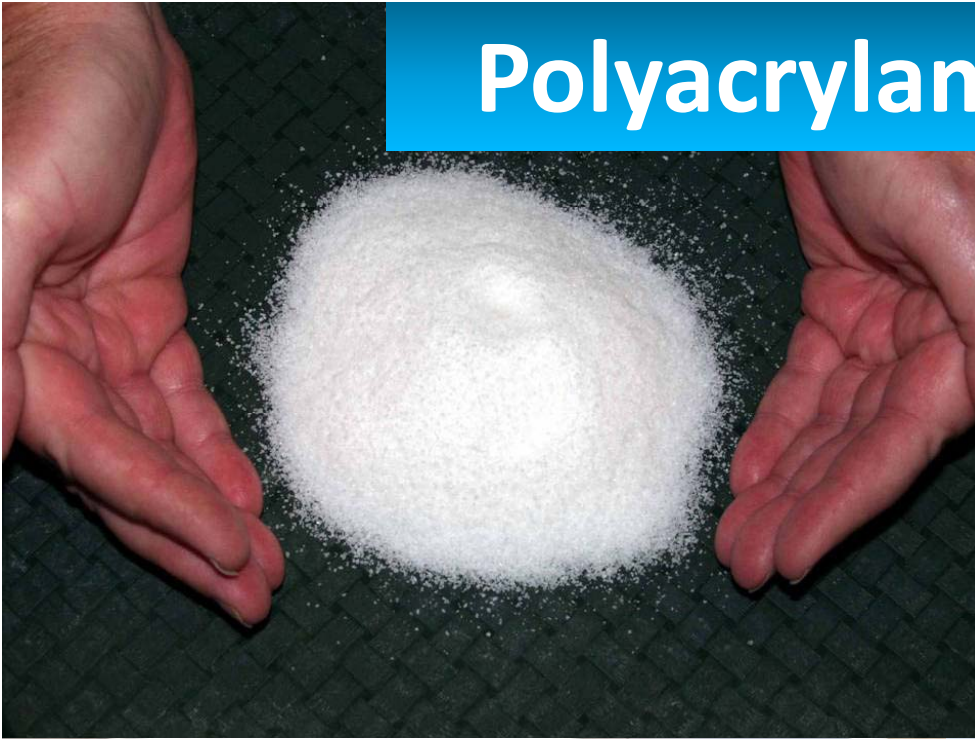
Polyacrylamide used in Soil Conservation Technology

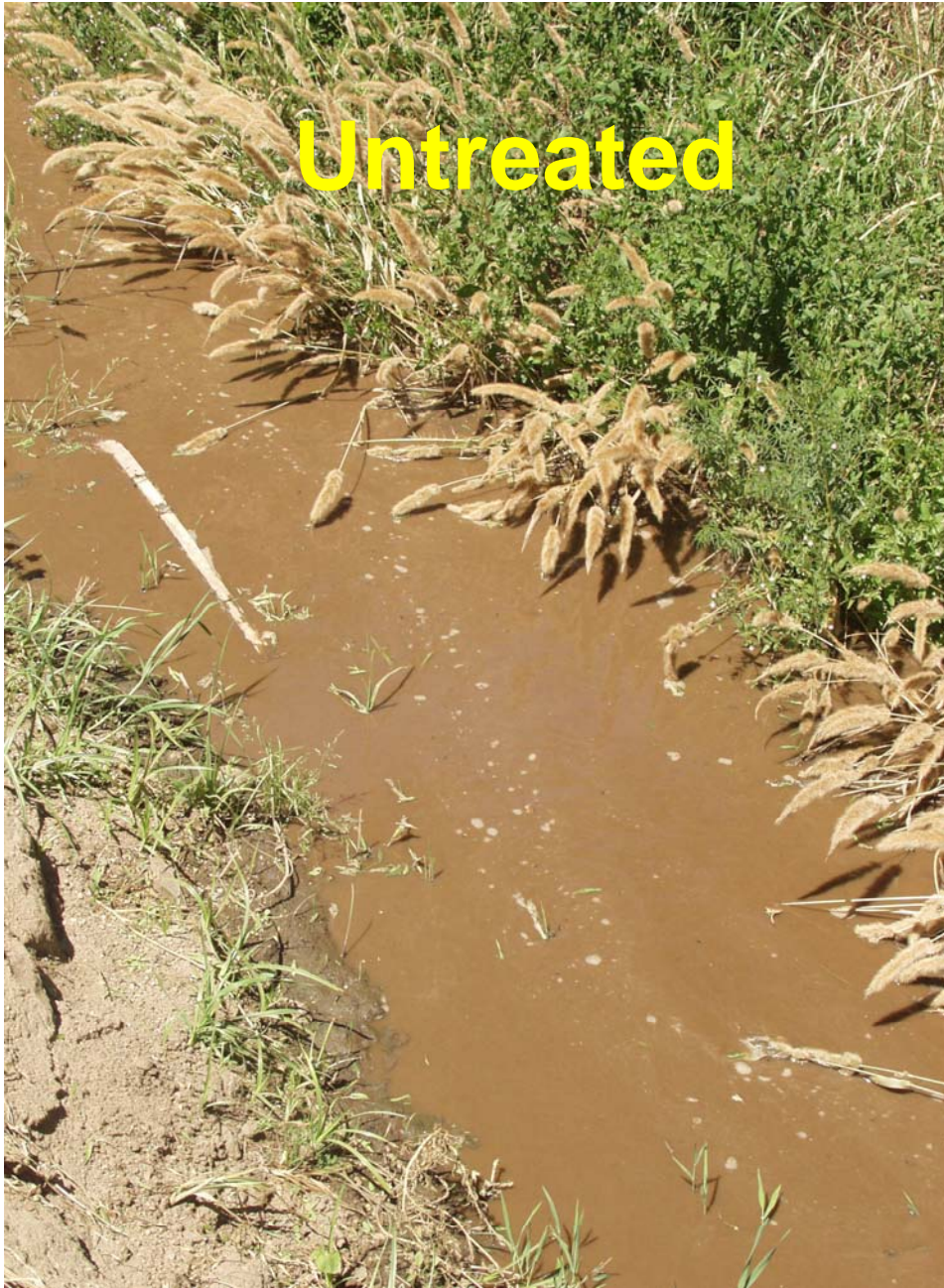
Linear PAM

- Water soluble
- Molecular weight: 12-15 Mg mol⁻¹;
- Charge: moderately anionic (15-20%)



Polyacrylamide (PAM)





Untreated



PAM-treated

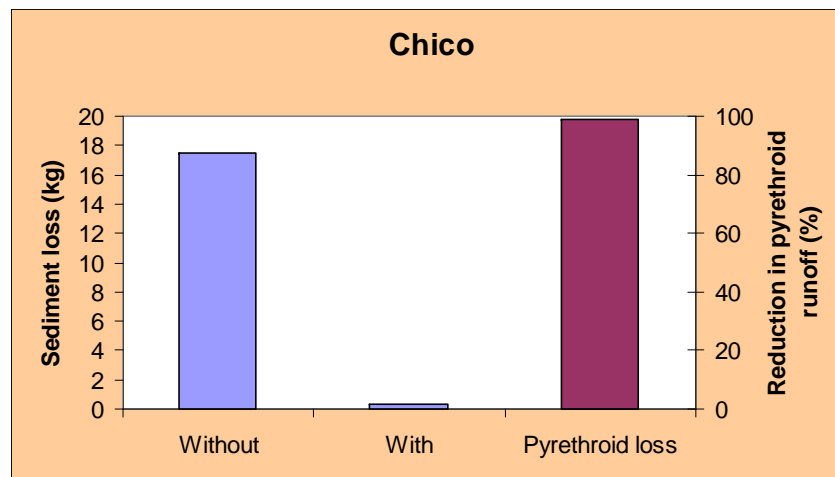
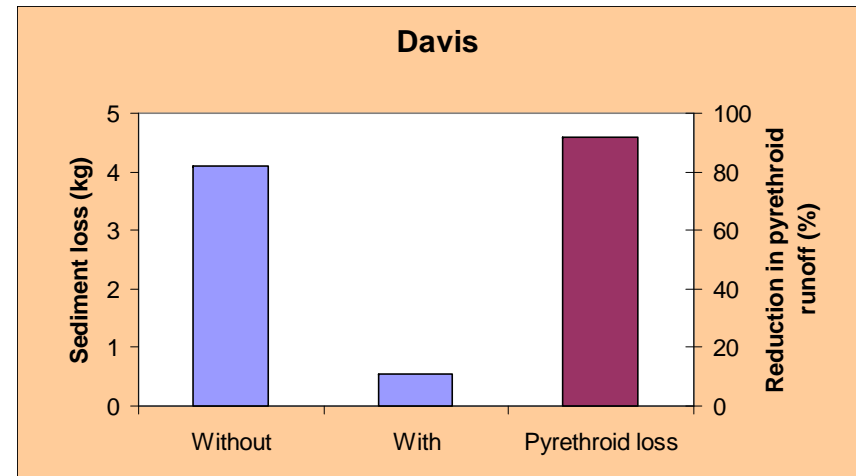
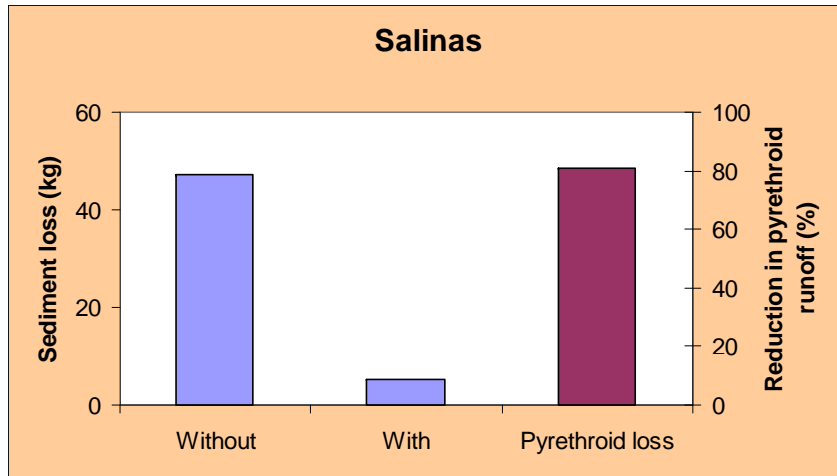


Split-Field Comparisons Using PAM (6 sites, overhead sprinklers, 2005)

Reduction in Nutrient and Sediment Concentration

Range	Total Kjeldahl N	NO3-N	P (Total)	P (Soluble)	Total Suspended Solids	Turbidity
	----- % reduction -----					
Average	69.5	9.0	72.0	25.3	91.8	91.0
Min	51.4	-24.3	42.5	-32.8	83.3	56.6
Max	80.5	58.9	94.1	60.6	99.0	99.7

PAM Effects on Suspended Sediments and Pyrethroid Conc.



Questions

What are typical concentrations of chlorpyrifos in sprinkler run-off?

Can PAM reduce chlorpyrifos in run-off?

Does pesticide formulation affect concentration of chlorpyrifos in run-off?

Field Trial

- Commercial Field, Broccoli planted 8/13/09
- Sandy loam soil
- Lorsban rate at planting: 1 lb/acre
- Field length plots x 8 beds, ~0.5 acres
- 3 replications of treatments

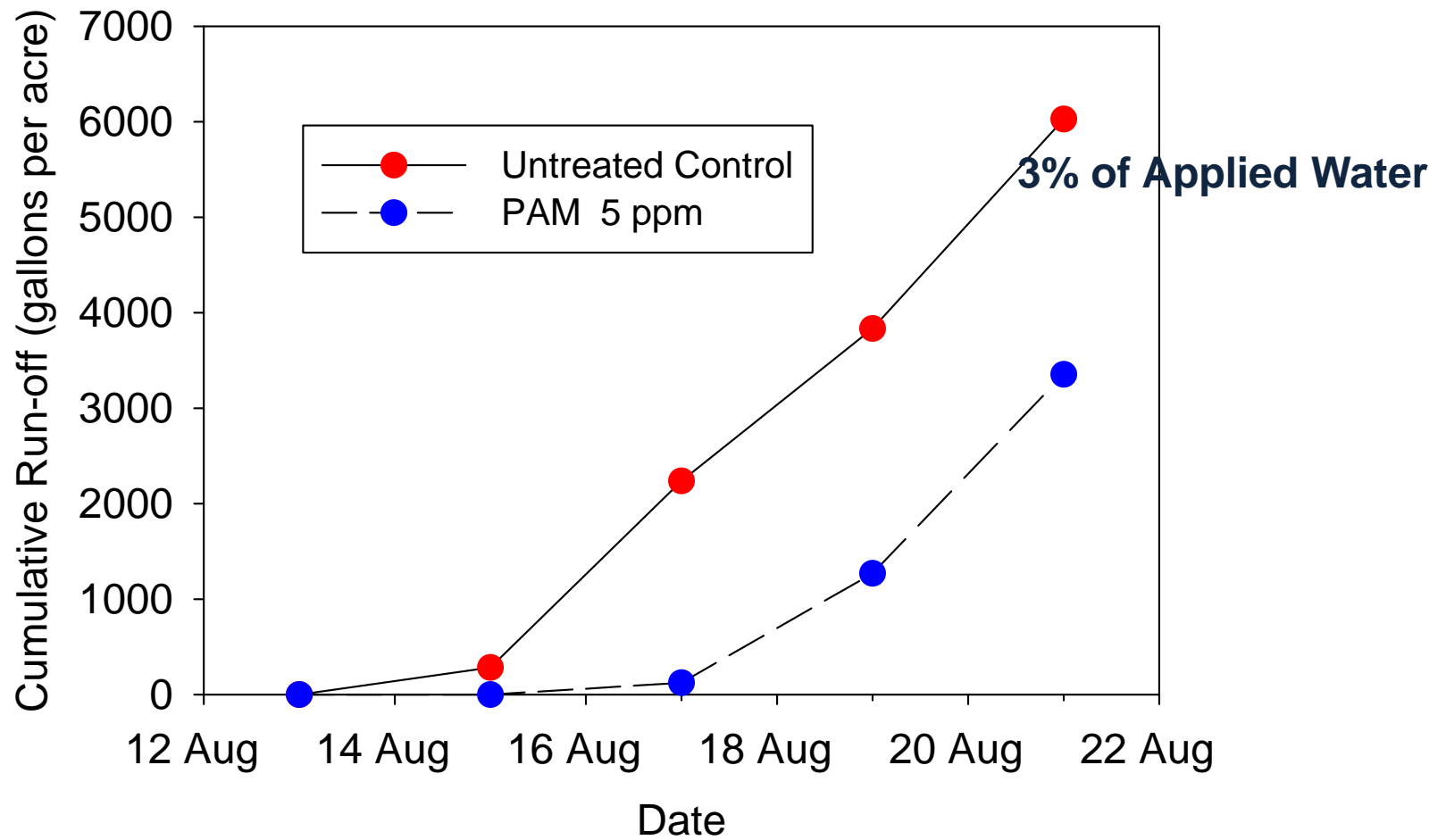
Treatments:

1. PAM + Lorsban 15G
2. PAM + Lorsban 4E
3. No PAM + Lorsban 15G
4. No PAM + Lorsban 4E

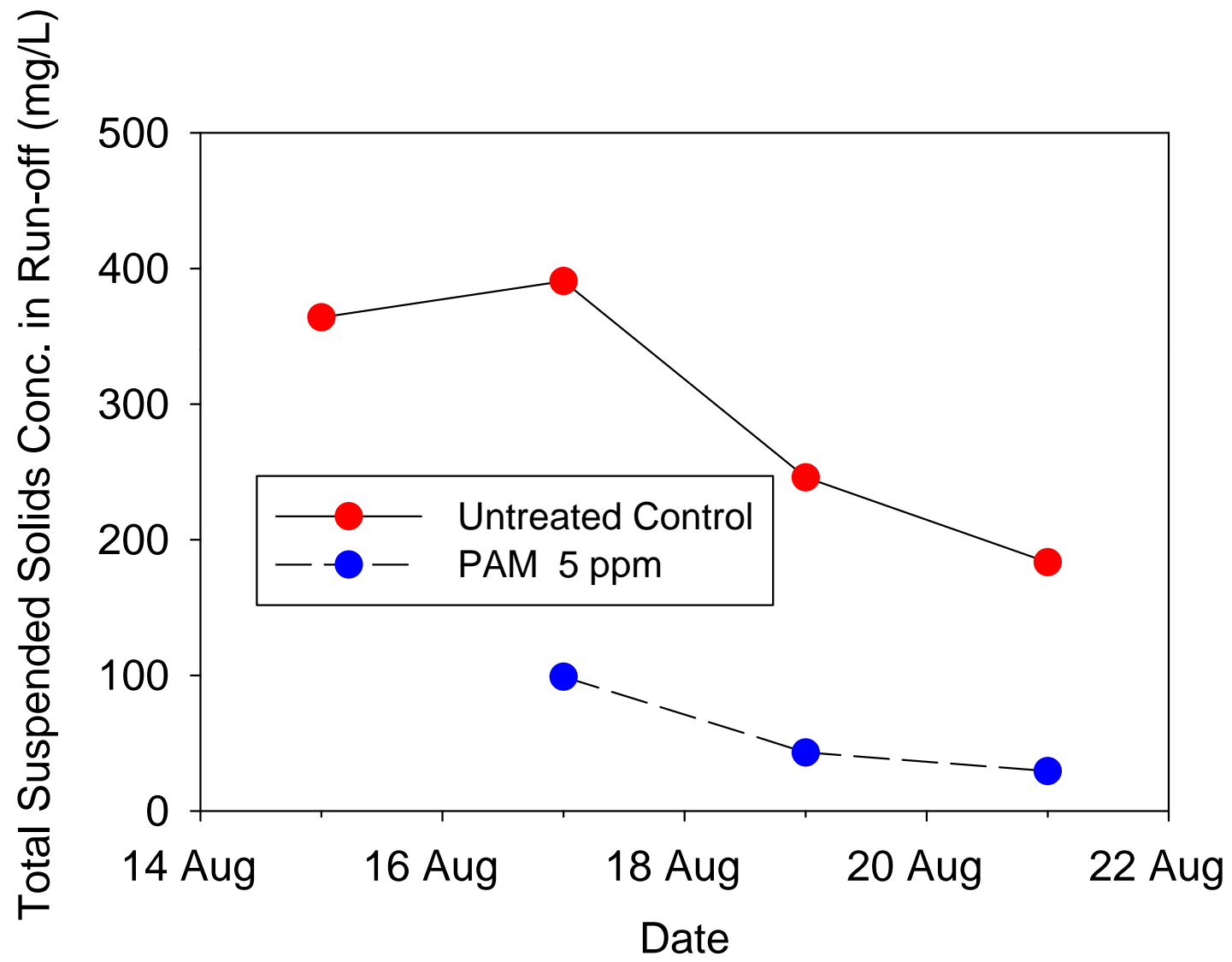




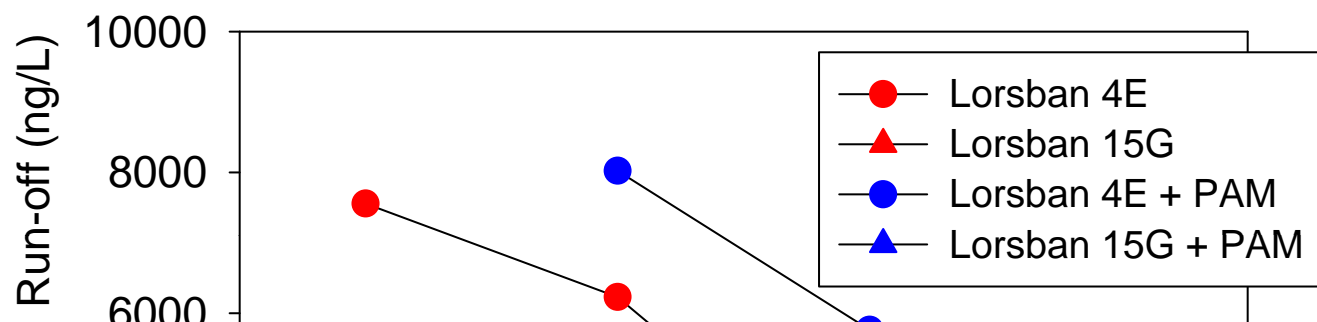
PAM effects on cumulative run-off in broccoli



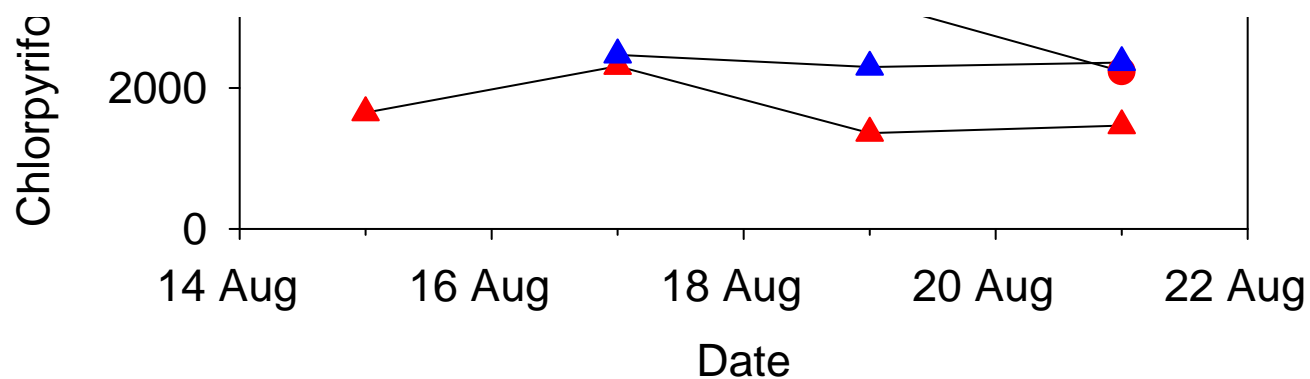
PAM effects on suspended sediments in run-off



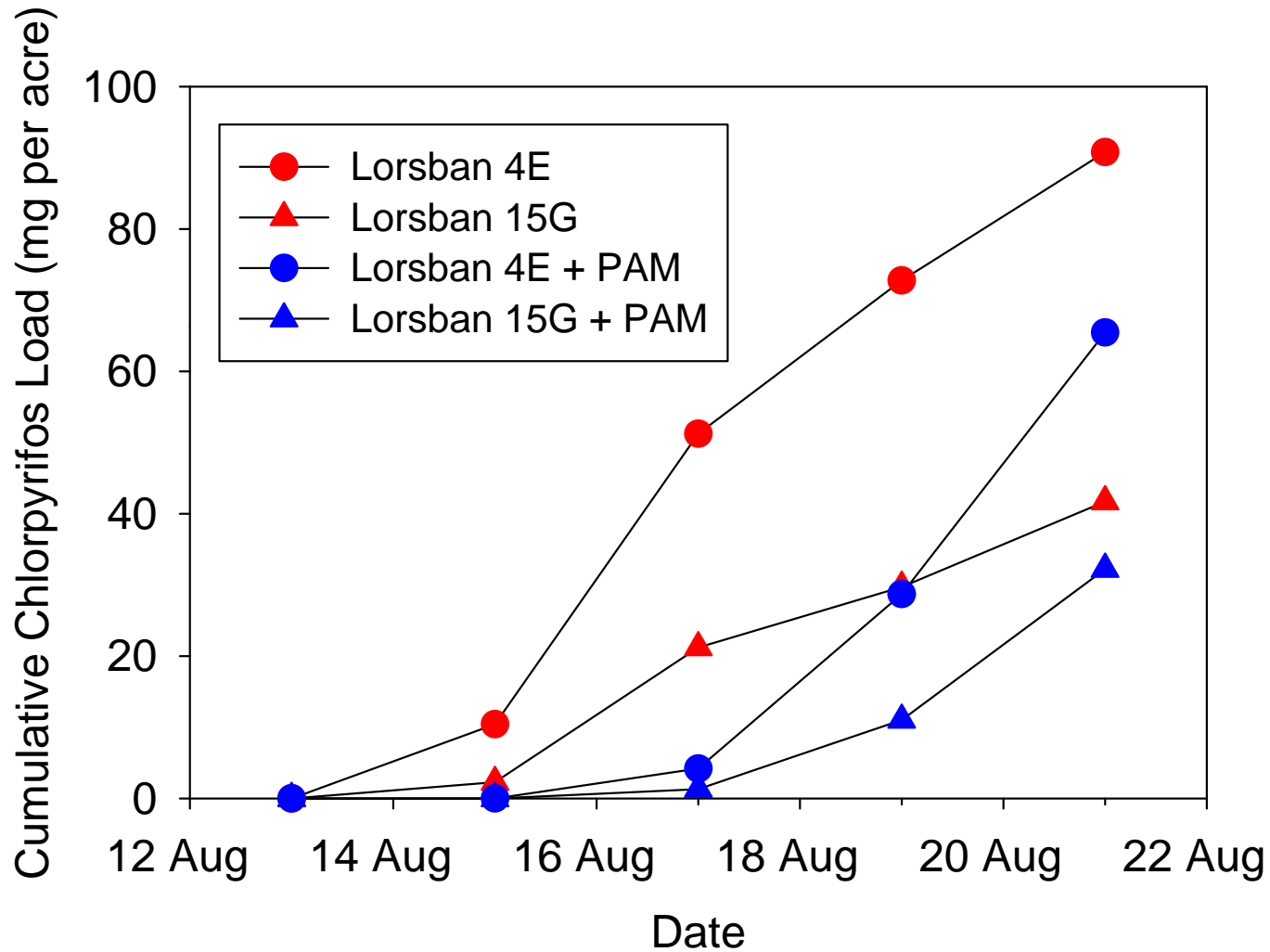
PAM and pesticide formulation effects on chlorpyrifos concentration in run-off



Fraction of chlorpyrifos in run-off on sediments = 3.6%



PAM and pesticide formulation effects on cumulative chlorpyrifos load in run-off



Summary

PAM reduced load of chlorpyrifos in run-off from broccoli.

PAM did not reduce concentration of chlorpyrifos in run-off.

Highest concentration of chlorpyrifos was measured in run-off from plots treated with the liquid Lorsban formulation.