Greenhouse Whitefly Management in Strawberries

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Knowns

- Large populations of greenhouse whiteflies can cause a yield reduction
- Greenhouse whiteflies produce large amounts of honeydew and associated sooty mold, which can reduce the market value of strawberries
- Greenhouse whiteflies have the potential to transmit plant virus diseases
- Greenhouse whitefly eggs and nymphs are generally on the underside of the leaves and the nymphs are covered with a wax. This makes them difficult to kill with conventional insecticide sprays
- Insecticides are most effective against adults and early instar whiteflies and not effective against eggs

Objective of our research

- To test the effectiveness of insecticides with novel modes of action for control of greenhouse whitefly
- Test the insecticides available for use by strawberry growers for their effectiveness in controlling whiteflies

Duration of activity of neonicotinoid and IGR insecticides for control of the greenhouse whitefly

Insecticide	Rate/ac	When Applied	Reduction in Whiteflies (%Range in Days)			Duration of Whitefly Suppression in weeks
			Adults	1-2nd	3-4th	
Admire 2F	32 oz	3 weeks post plant	58-90	78-93	42-86	All stages-11
Admire 2F	32 oz	pre-plant	71-83	58-74	52-74	All stages-11
Platinum	11 oz	3 weeks post plant	58-80	78-93	48-80	Adult & 1-2nd -6 3-4th-10
Applaud 70 WP	8 oz	6 weeks post plant	25-81	61-92	45-100	All stages-7
Esteem 0.86 EC		6 weeks post plant	40-73	51-100	37-87	All stages-7

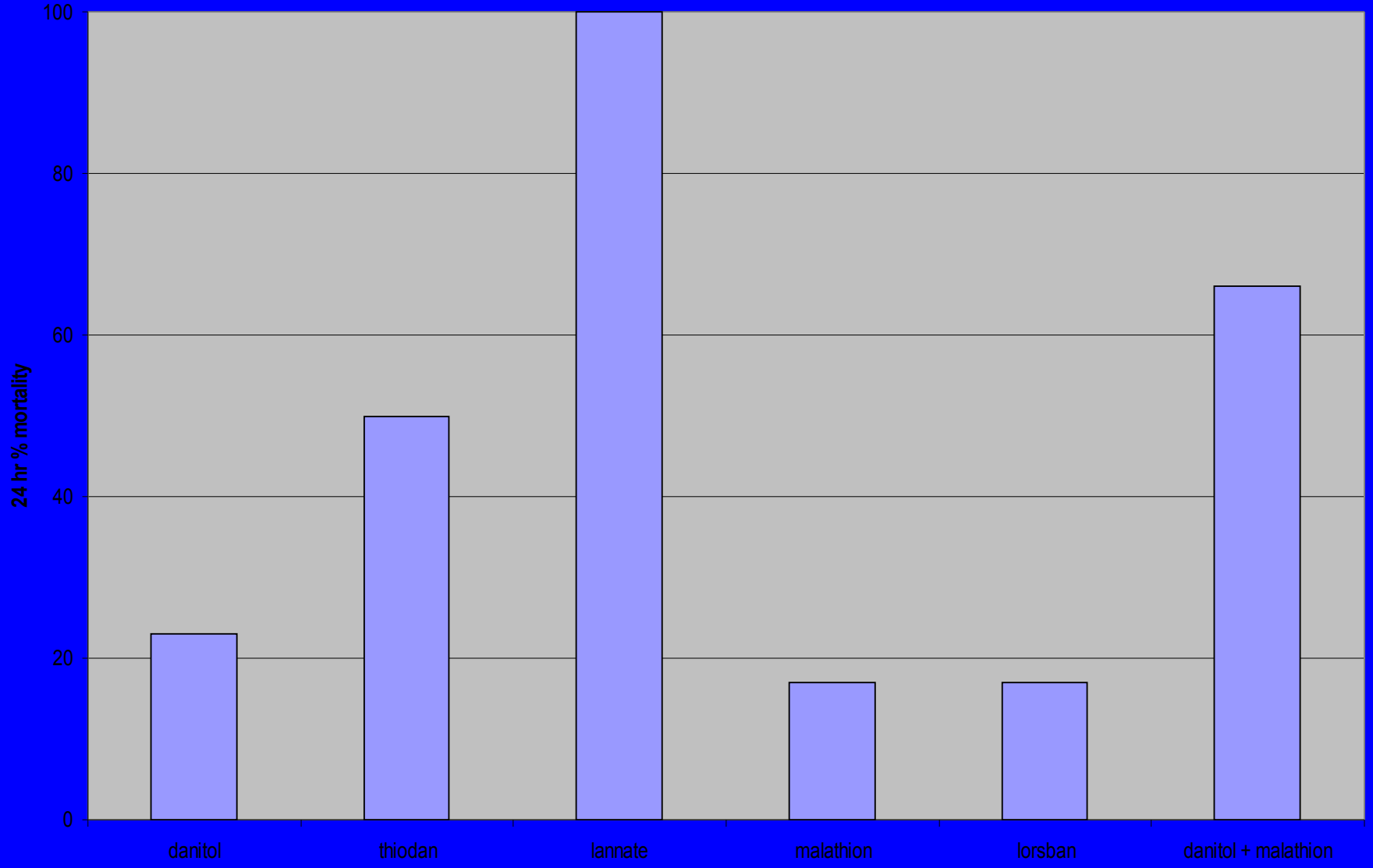
Adult Whitefly Bioassays

- Danitol
- Thiodan
- Lannate
- Malathion
- Lorsban
- Danitol + Malathion

Adult Whitefly

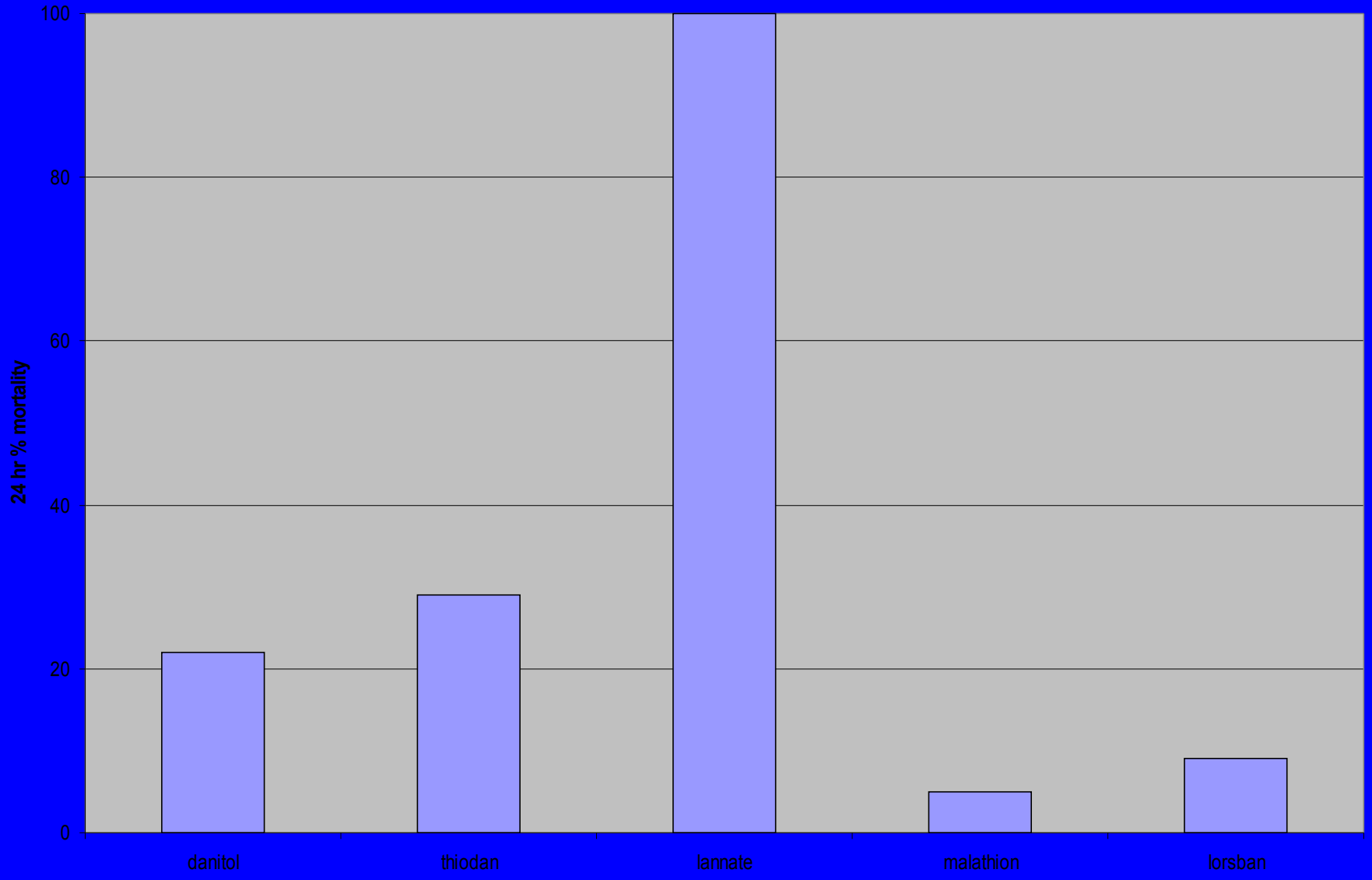
Sticky Trap

Relative efficacy of six chemical formulations against adult greenhouse whitefly
Irvine

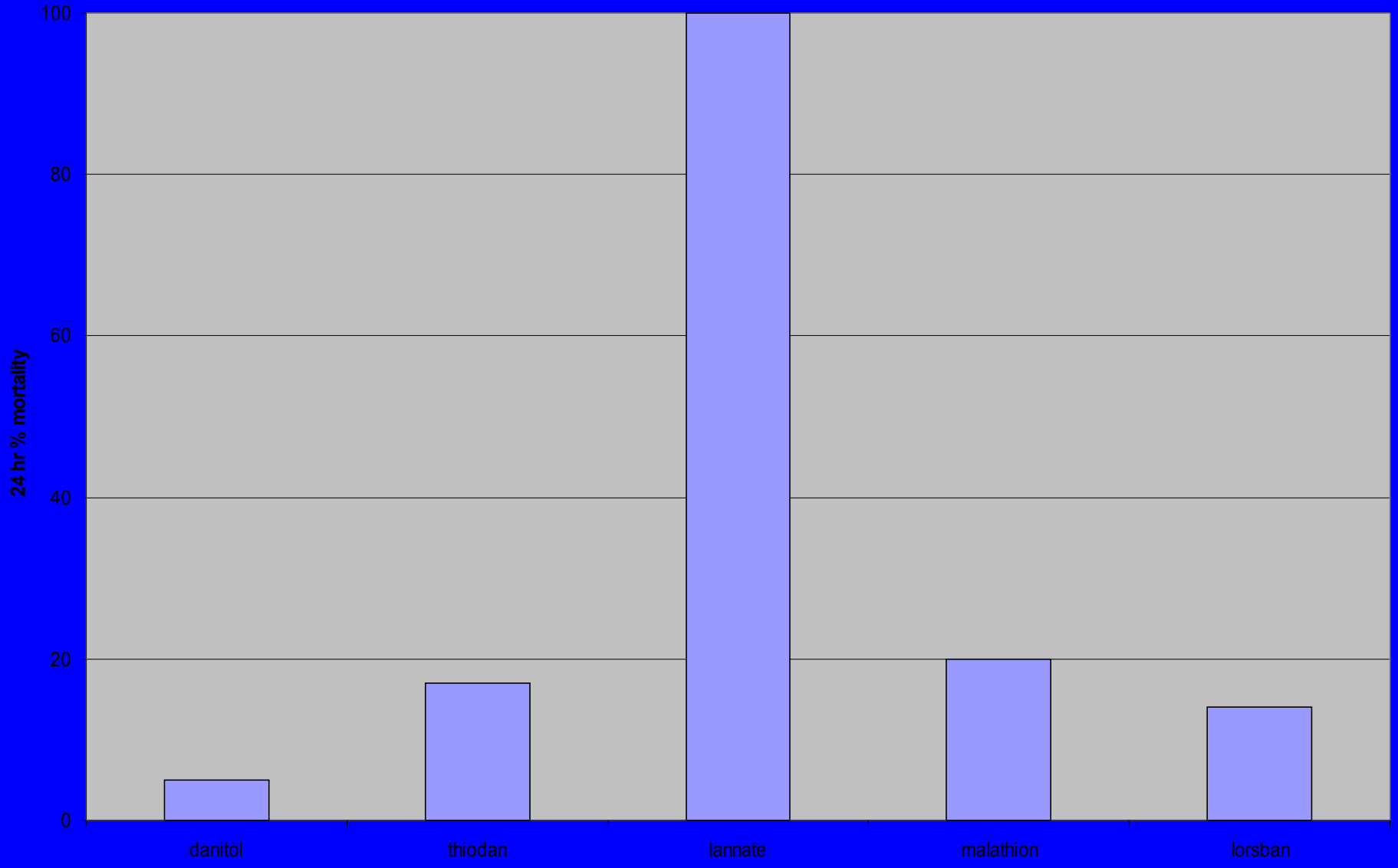



Relative efficacy of six chemical formulations against adult greenhouse whitefly
Oxnard - Hailes Rd.
24 hr % mnortality
100
80
60
40
20
0
danitol
thiodan
lannate
malathion
lorsban

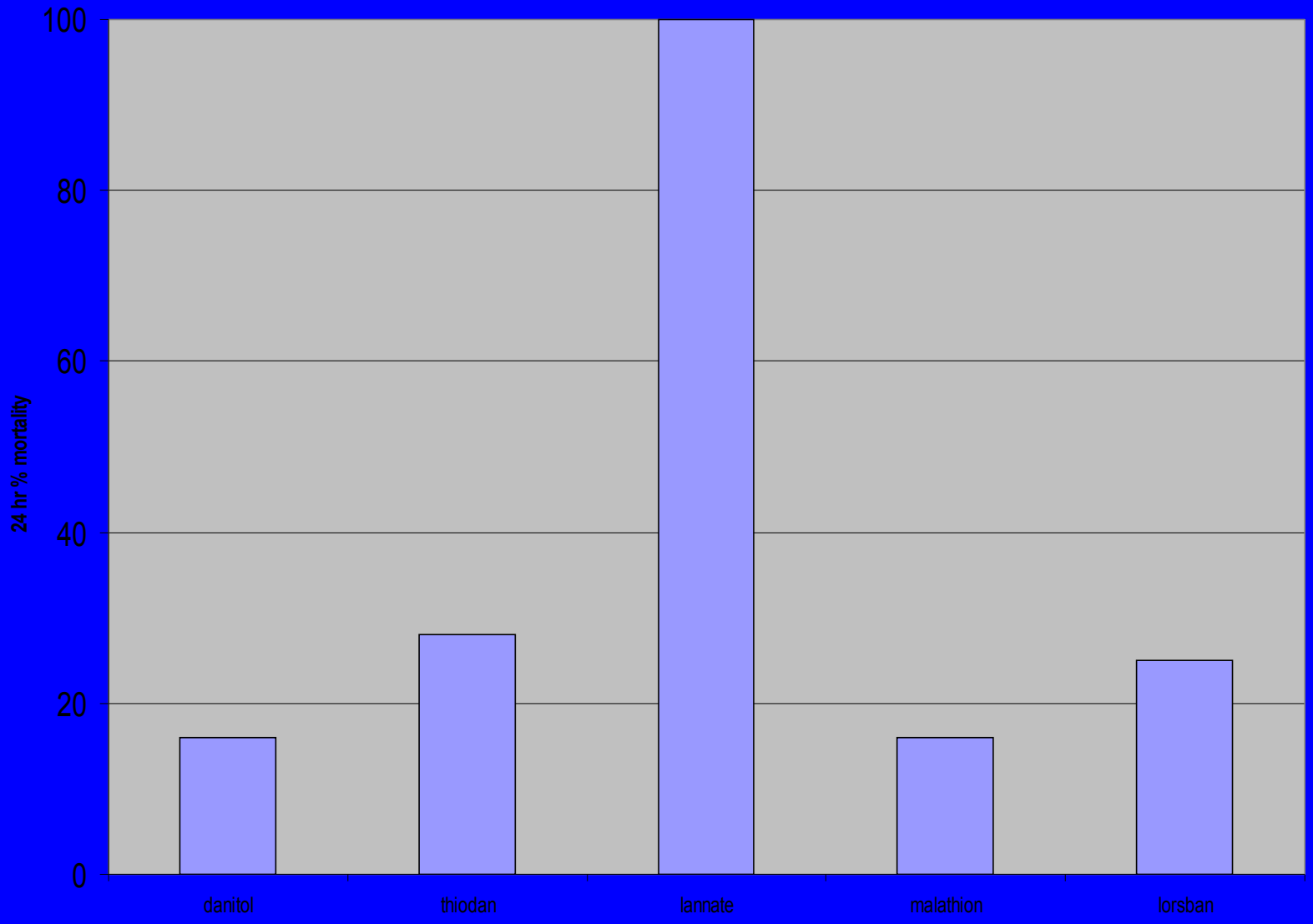
Relative efficacy of six chemical formulations against adult greenhouse whitefly
Oxnard - Laguna Rd.



Relative efficacy of six chemical formulations against adult greenhouse whitefly
Oxnard - Hueneme Rd.



Relative efficacy of six chemical formulations against adult greenhouse whitefly
Vista



Results

- The effectiveness of Admire and Platinum against the whiteflies lasted about 3 months
- Admire gave better control of the whitefly than Platinum
- Admire applied pre-planting had better efficacy than when applied at post-planting of berries
- Only Admire is registered for use on strawberries at present

Results

- Lannate was the only insecticide 100% effective against greenhouse whiteflies
- Danitol + Malathion gave 62% control
- Thiodan, Malathion, Lorsban and Danitol were not effective
- The regional differences in the insecticides was insignificant

Lygus Bug Insecticide Resistance Studies

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Lygus Bug Adult

Cat Facing in Berries-Caused by Lygus Bugs

Knowns

- Lygus bugs are a serious pest in growing areas where strawberries are grown past May and through the summer months
- Lygus bugs can be occasional problem in southern California berries
- Lygus bugs are one of the causes of irregularly-shaped, cat-faced strawberries

Knowns (Cont)

- Lygus bug populations in California have shown resistance/tolerance to organochlorine, organophosphate, carbamate and pyrethroid insecticides
- There are no new insecticides of different chemistries that are effective against lygus bugs
- Strawberry growers are still dependent upon organophosphate, carbamate and pyrethroid insecticides for lygus management

Objective of our research

- Develop a combined toxicological and biochemical approach to understanding and managing lygus bug insecticide resistance problems

The approach

- This approach can provide valuable information on the complexity of lygus bug insecticide resistance, leading ultimately to improved insecticide recommendations for their management in strawberries
- The bioassay—this determines lygus bug susceptibility and/or tolerance to an insecticide

The Petri dish-filter paper bioassay

- we are developing a bioassay system for lygus bugs which overcomes some of the problems associated with the plastic baggie and vial system
- In the "Petri dish-filter paper" bioassay, a filter paper disk is impregnated with the formulated insecticide that is available to the strawberry grower

Scoring Bug Mortality

Toxicity of Brigade/Capture and Lorsban to Lygus bug adults in the Petri dish filter paper bioassay

Insecticide	LD_{50} (ppm)	95% Conf. Limits	Slope	S. E.
Brigade/Capture	166	130-208	5.2	1.3
Lorsban	297	242-359	3.1	0.8

Conclusion

- The Petri dish-filter paper bioassay worked well for both Brigade/Capture and Lorsban
- It's adaptability for use with formulated insecticides enables a direct comparison to be made between LD_{50} data and field rates