

An Economic Injury Level for Thrips in California Timothy

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Project Goals



– Physical controls for thrips



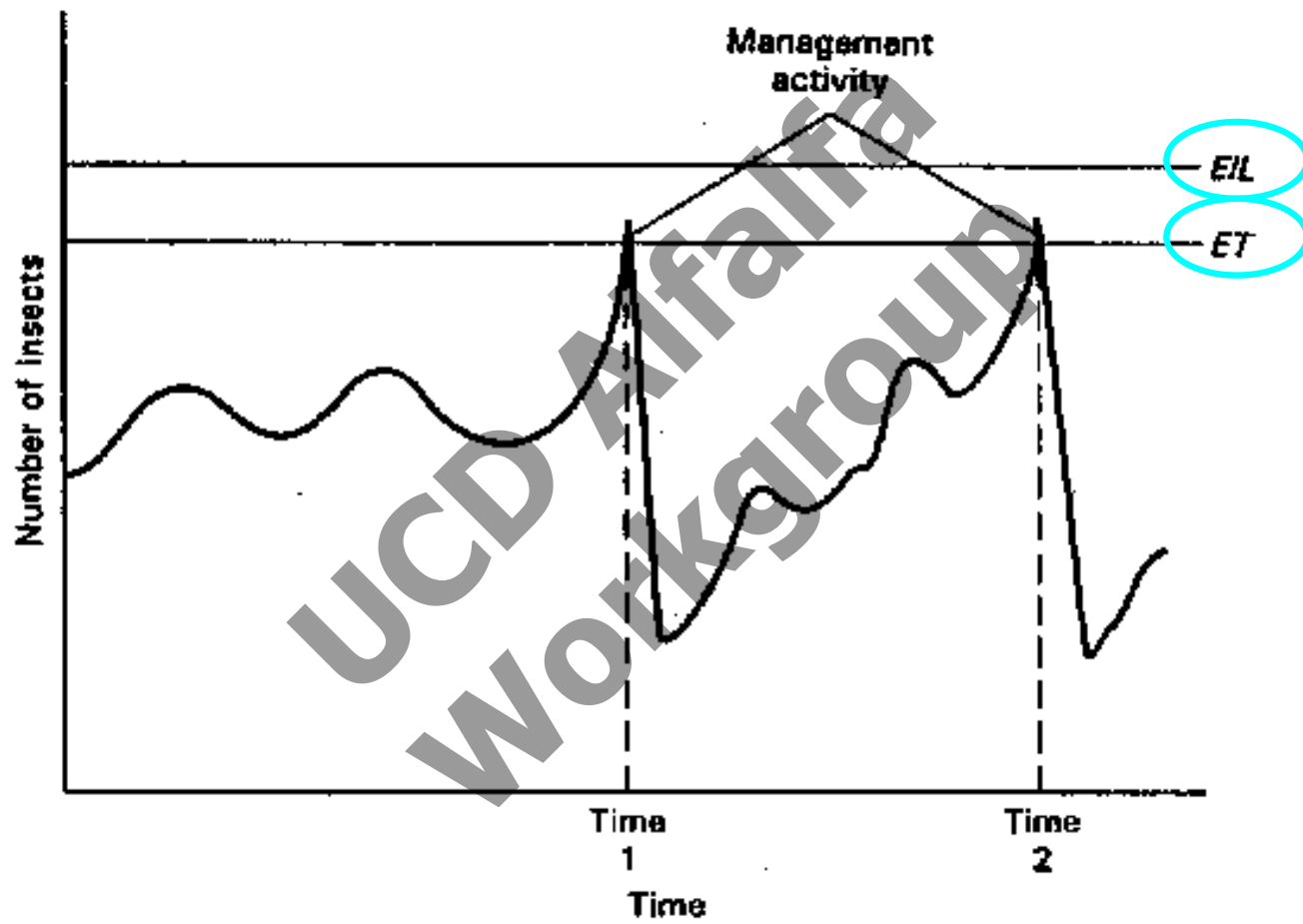


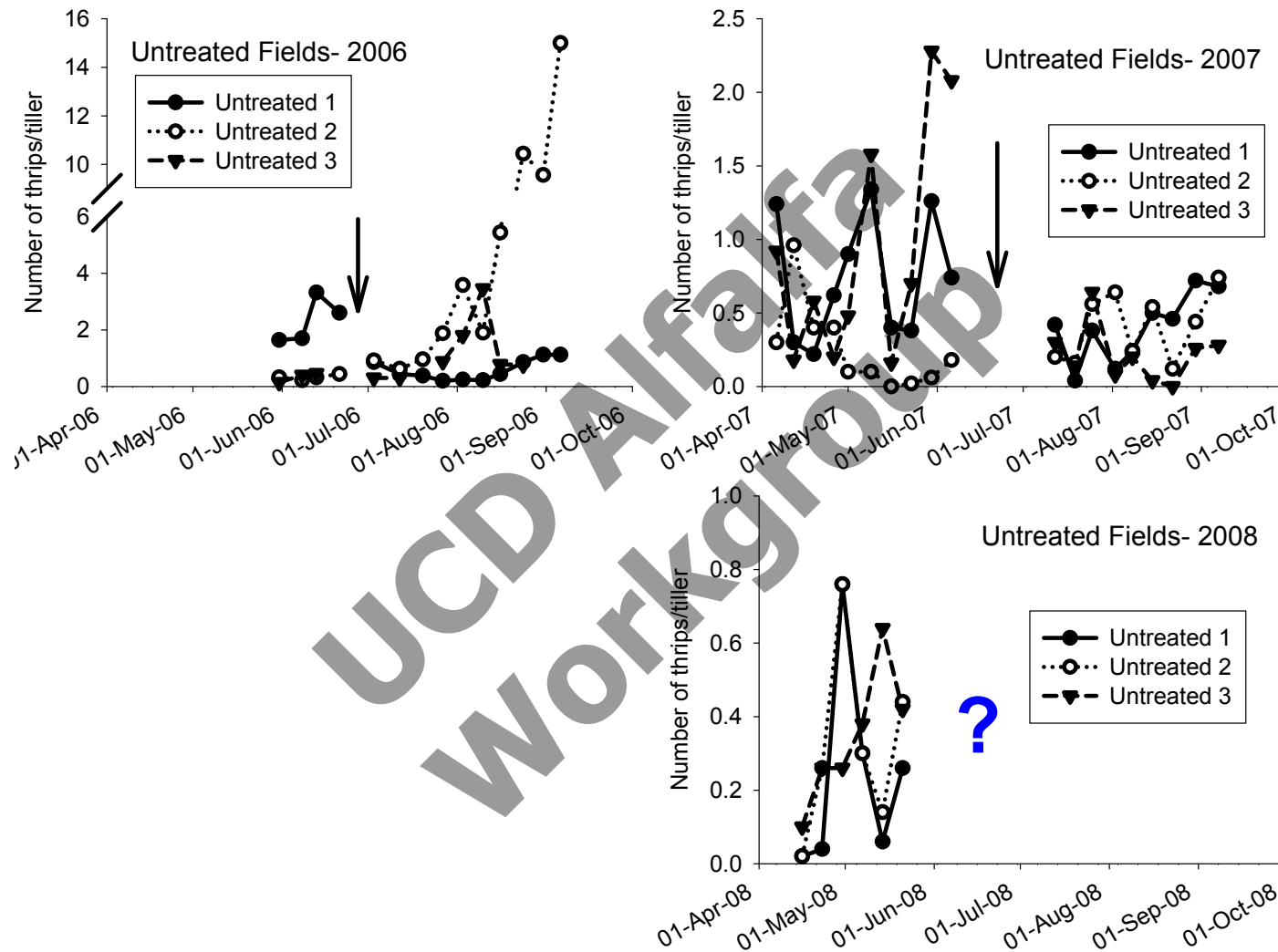


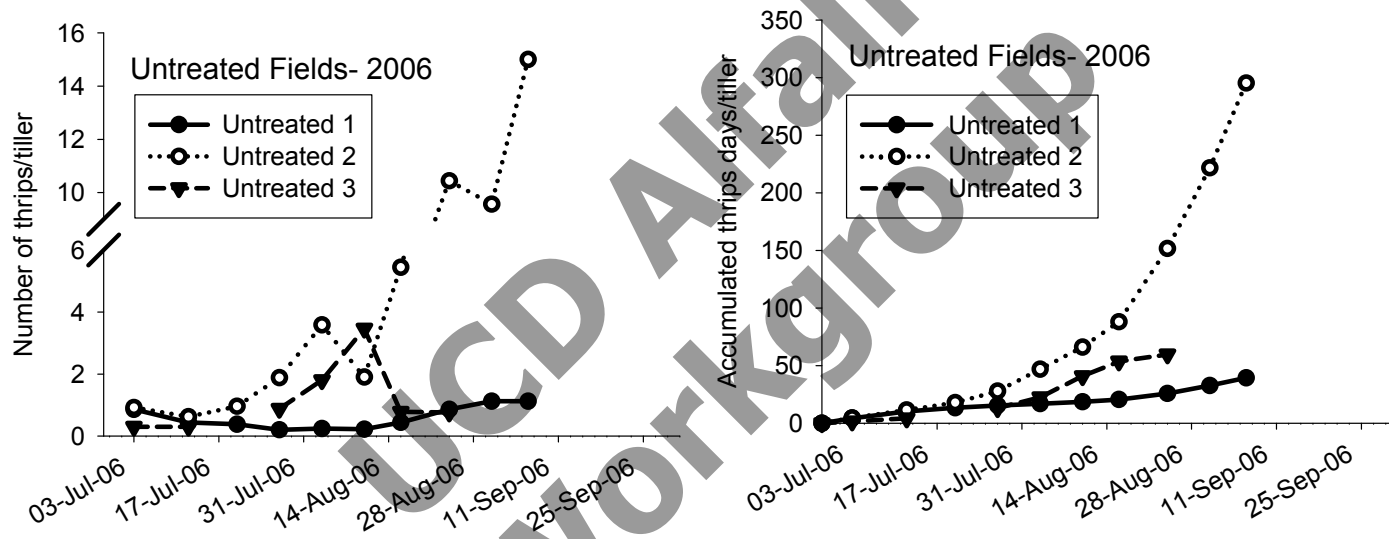
- Chemical Treatment Options
 - Methidathion
 - Malathion
 - Cyfluthrin



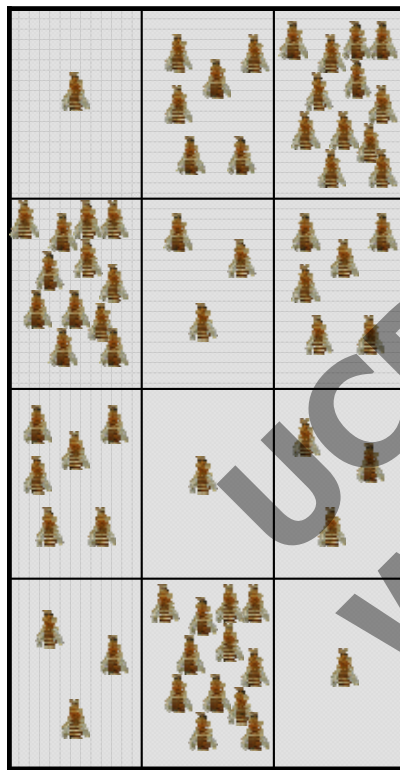
No Thresholds







How Do Thrips Levels Affect Hay Quality?



- Range of thrips levels
- Randomized Complete Block Design
- 2 cuttings

How Do Thrips Levels Affect Hay Quality?

Calendar sprays- Monthly

Date	Malathion (Malathion 8 Aquamul at 80 oz/A)	Cyfluthrin (Baythroid 2 at 1.9 oz/A)	Spinosad (Success at 10 oz/A)*
2/10/2006	X		
2/24/2006	X	X	
3/28/2006	X	X	X
4/26/2006	X	X	X
5/24/2006	X	X	X

Harvested 6/12/2006

* 2.5x registered label rate

How Do Thrips Levels Affect Hay Quality?

Calendar sprays- Monthly

Date	Malathion (Malathion 8 Aquamul at 80 oz/A)	Cyfluthrin (Baythroid 2 at 1.9 oz/A)	Spinosad (Success at 10 oz/A)*
7/4/2006	X	X	X
8/3/2006	X	X	X
8/30/2006	X	X	X

* 2.5x registered label rate

Harvested 9/7/2006

Date	Malathion (Malathion 8 Aquamul at 80 oz/A)	Cyfluthrin (Baythroid 2 at 1.9 oz/A)	Spinosad (Success at 10 oz/A)*	Spinosad (Entrust at 2 oz/A)*	Methidathion (Supracide at 64 oz/A)
4/6/2007 ^a	X	X		X	X
5/10/2007 ^a	X	X		X	X
6/7/2007 ^a	X	X		X	X
7/4/2007 ^b	X	X		X	X
8/3/2007 ^b	X	X		X	X
9/6/2007 ^b	X	X		X	X
4/10/2008 ^c	X	X	X		X
5/6/2008 ^c	X	X	X		X
6/4/2008 ^c	X	X	X		X

^aHarvested 6/21/2007- 2 fields

^bHarvested 9/10/2007- 1 field

^cHarvested 6/13/2008- 2 fields

All treatments with silicone
surfactant (Sylgard 309 at 0.25%
spray volume)


Field	Cutting	Year	Multiple Regression Models	F	df	R ²	P
1	1 st	2006	$\ln(\text{Yield}) = -0.00013(\text{AccT}^a) - 0.02836\sqrt{(\text{AccM}^b+1)} + 0.11215(\text{Block}) + 1.22483$	2.13	11	0.44	0.1744
1	2 nd	2006	$\text{Yield} = -0.00712(\text{AccM}) + 3.48089$	4.31	11	0.30	0.0647
1	1 st	2007	$\text{Yield} = 0.07221(\text{AccM}) + 6138.5$	0.35	29	0.01	0.5572
2	1 st	2007	$\text{Yield} = -3.47445(\text{AccM}) + 5426.6$	1.06	29	0.04	0.3121
1	2 nd	2007	$\sqrt{(\text{Yield})} = -0.01609(\text{AccT}) + 54.639$	2.37	29	0.08	0.1347
1	1 st	2008	$\text{Yield} = 0.72980(\text{AccT}) + 3767.8$	0.24	29	0.01	0.6316
2	1 st	2008	$\text{Yield} = -0.88127(\text{AccT}) + 4060$	3.37	29	0.11	0.0771

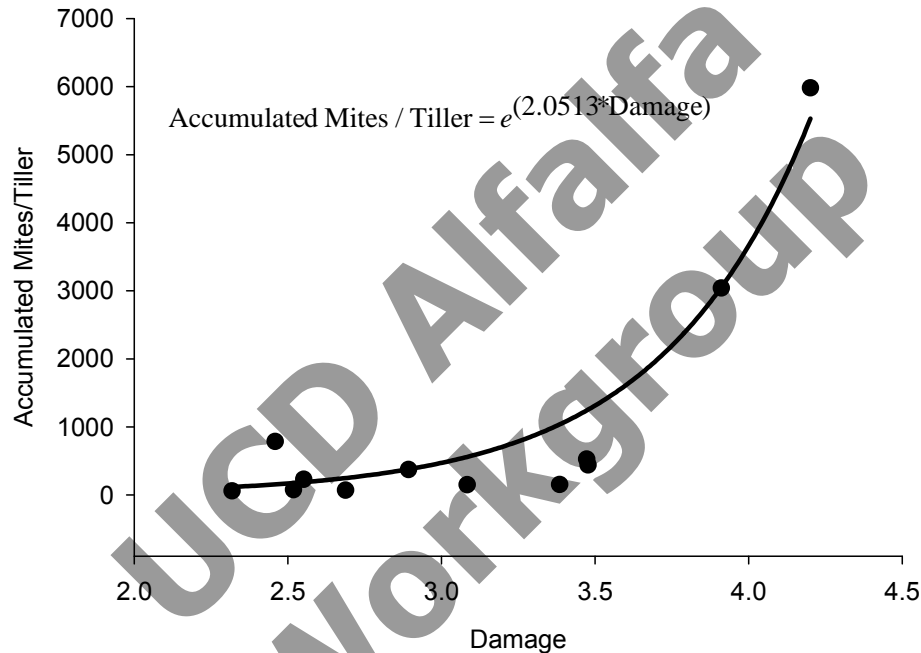
^aAccT= Accumulated thrips

^bAccM= Accumulated mites

Yield Model



Field	Cutting	Year	Multiple Regression Models	F	df	R ²	P
1	1 st	2006	$\text{Ln}(\text{Damage}) = 0.00032(\text{AccT}^a) + 0.47568$	3.93	11	0.28	0.0754
1	2 nd					c	0.0078**
1	1 st					0.48	0.0015**
2	1 st					0.38	0.0016**
1	2 nd					0.03	0.4335
1	1 st					0.67	<0.0001***
2	1 st	2008	$\text{Damage} = 0.00031(\text{AccT}^{1.5}) + 2.88299$ 	5.34	29	0.16	0.0284*

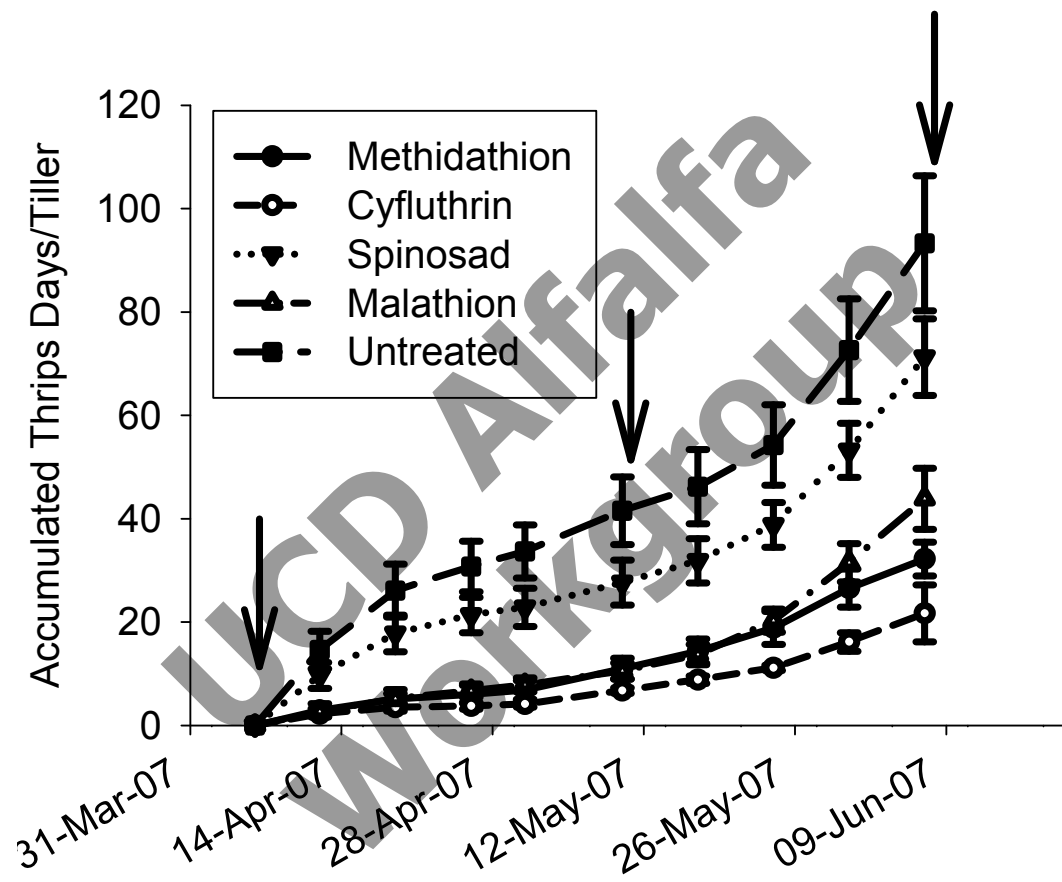


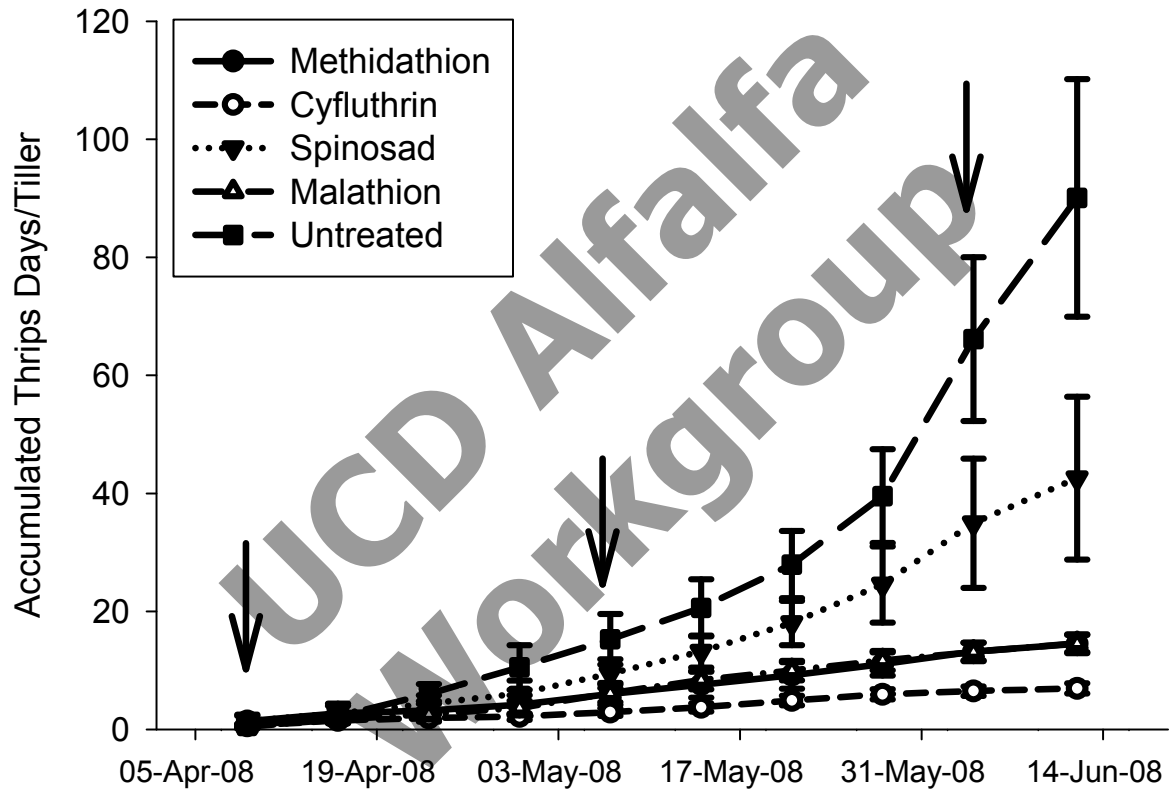
^aAccT= Accumulated thrips

^bAccM= Accumulated mites

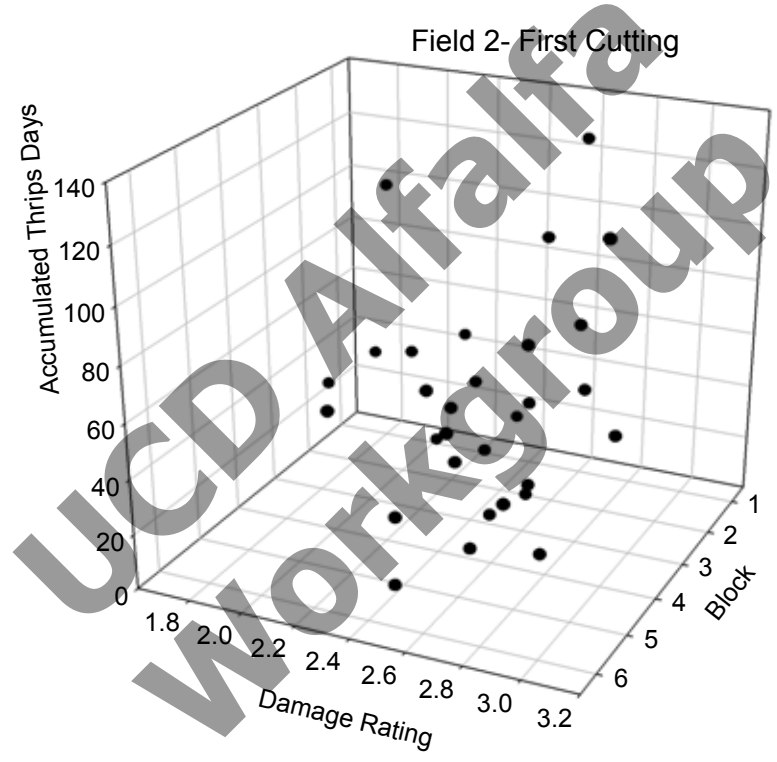
^cPROC GLIMMIX was used

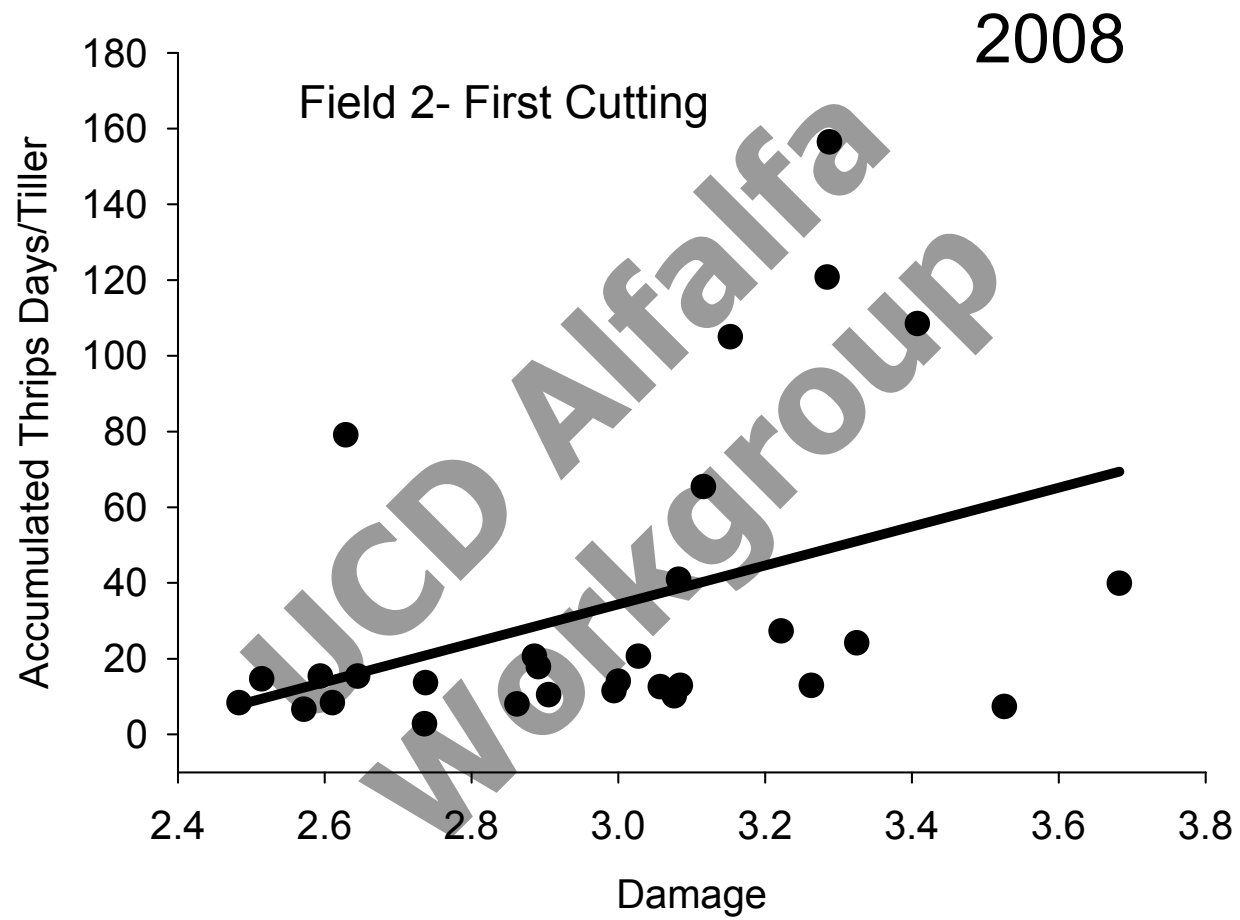
Damage Model





2007







Hybrid Economic Injury Level

$$\text{hybrid EIL} = C / (V \times I \times D)$$

Cost of control → C
 price of undamaged crop → V
 unit injury / (pest) → I
 (unit loss) / (unit injury) → D

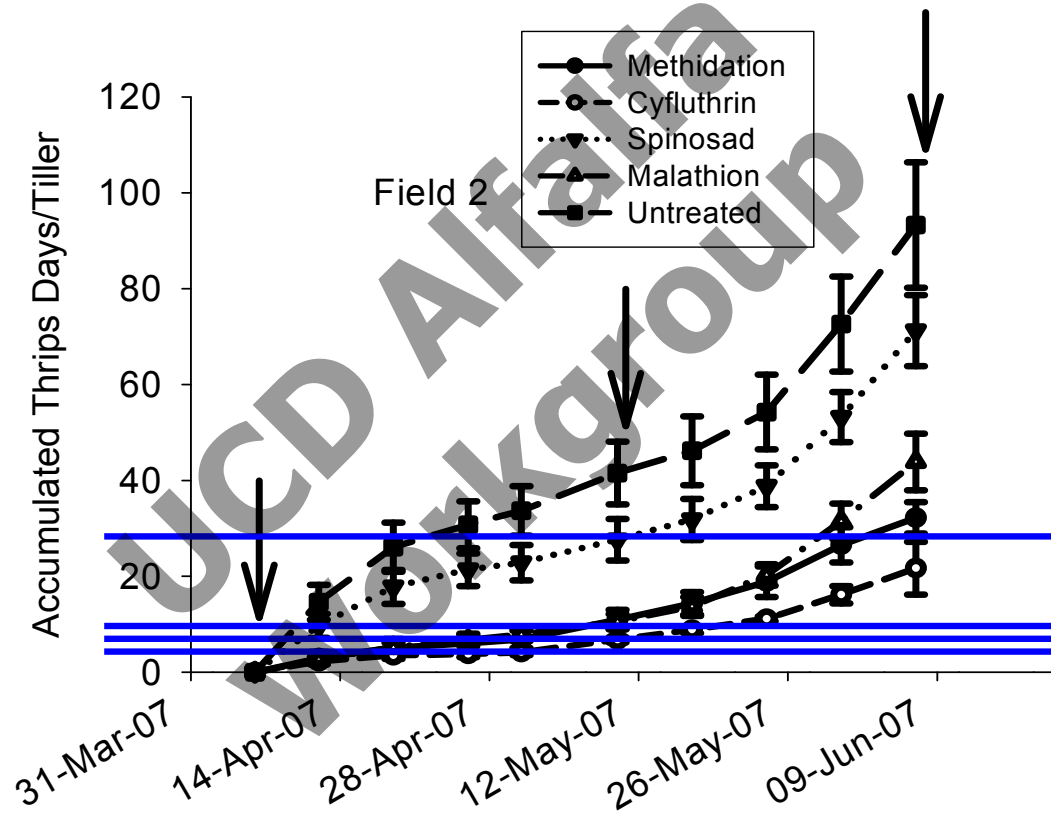
$$\text{hybrid EIL} = \frac{\text{(\$ / A)}}{\text{_____}}$$

(\$ top quality hay x A/ ton) x (% brown leaf / accumulated thrips days/tiller)
 x (ton top quality hay lost / % brown leaf)

Hybrid EIL (Accumulated Thrips Days/Tiller)

Year	Cutting	Chemical	Yield (tons/A)					
			7	6	5	4	3	2
2007	1	Methidathion	6	7	8			
2007	2	Methidathion				12	16	23
2008	1	Methidathion	7	8	9			
2008	2	Methidathion				13	17	26
2007	1	Cyfluthrin	3	4	4			
2007	2	Cyfluthrin				6	8	12
2008	1	Cyfluthrin	3	4	5			
2008	2	Cyfluthrin				6	9	13

Hybrid EIL (Accumulated Thrips Days/Tiller)



Economic Thresholds

- Thrips/tiller/week
 - Cyfluthrin
 - First cut = 2-3
 - Second cut = 4-8
 - Methidathion
 - First cut = 6-8
 - Second cut = 11-22