

Evaluation of Insect Repellents and Barriers as Methods to Control Cucumber Mosaic Virus of Bell Peppers

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Cucumber Mosaic Virus

- CMV has been afflicting peppers in Kern County for 5 years.
- Appears most heavily in the southern end of the county near Mettler.
- Some years worst than others.
- The earlier it appears in the season, the more damage occurs.
- Is aphid transmitted.





Control of CMV

- Essentially none-remove weeds around field and reflective mulches
- Plants are treated with imidacloprid as seedlings in greenhouses.
- Imidacloprid treatments continue through season.
- Organic fields treated with biologicals.
 - Lady bug release
 - Lacewing, etc

Control of CMV

- Even with insecticide treatments, aphids will probe and transmit the virus before it is killed.
- Must prevent aphids from landing on plants.

2008 Trial

1. Control
2. Citronella Oil
3. Citronella/Clove/Geranium
4. Clove/Rosemary
5. Garlic Oil
6. Garlic/Citronella
7. Floating Row Cover
8. Silver Reflective Mulch

2009 & 2010 Trial

1. Control
2. Black
3. Silver reflective
4. Silver
5. White
6. Green
7. Red
8. Surround Canopy
9. Surround Soil



White

Control

Silver Reflective



Silver

Green

Red



Surround on Soil Surface





Surround Canopy

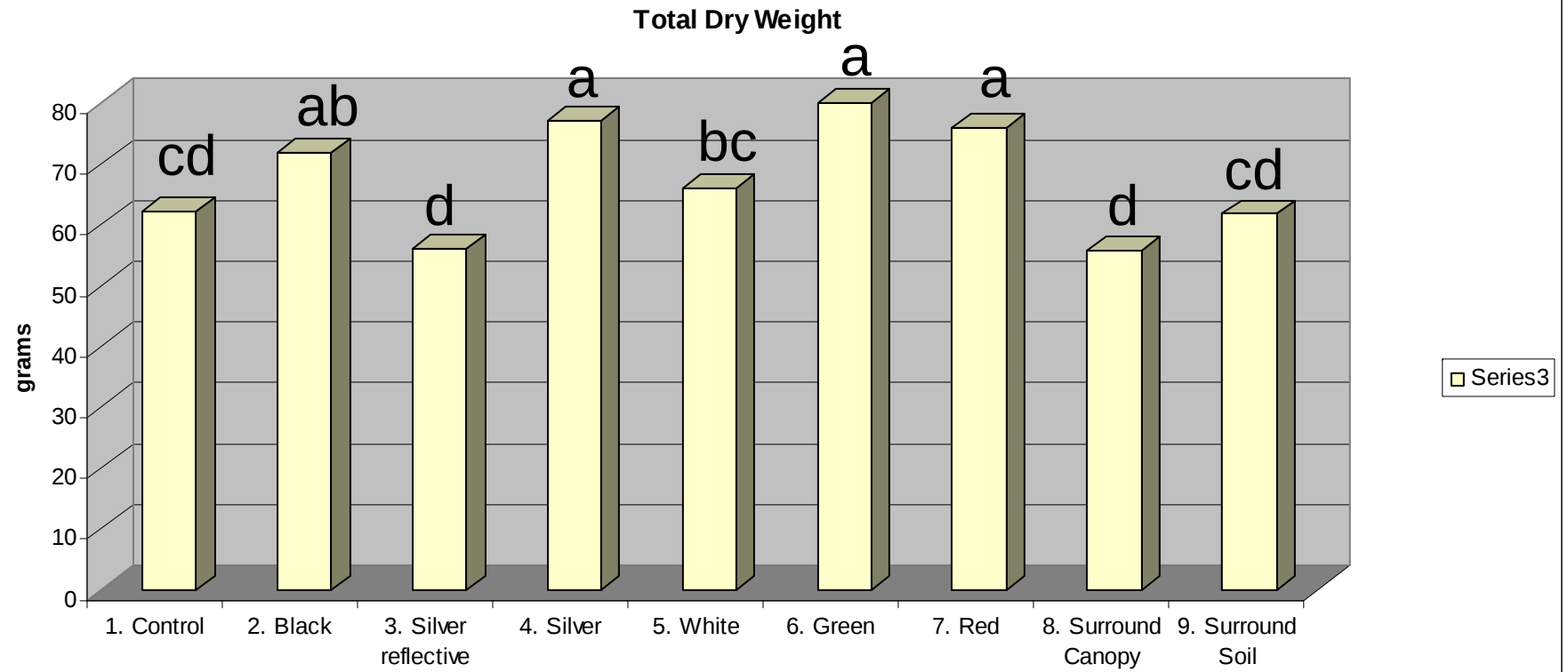
Surround Soil



2010



2010

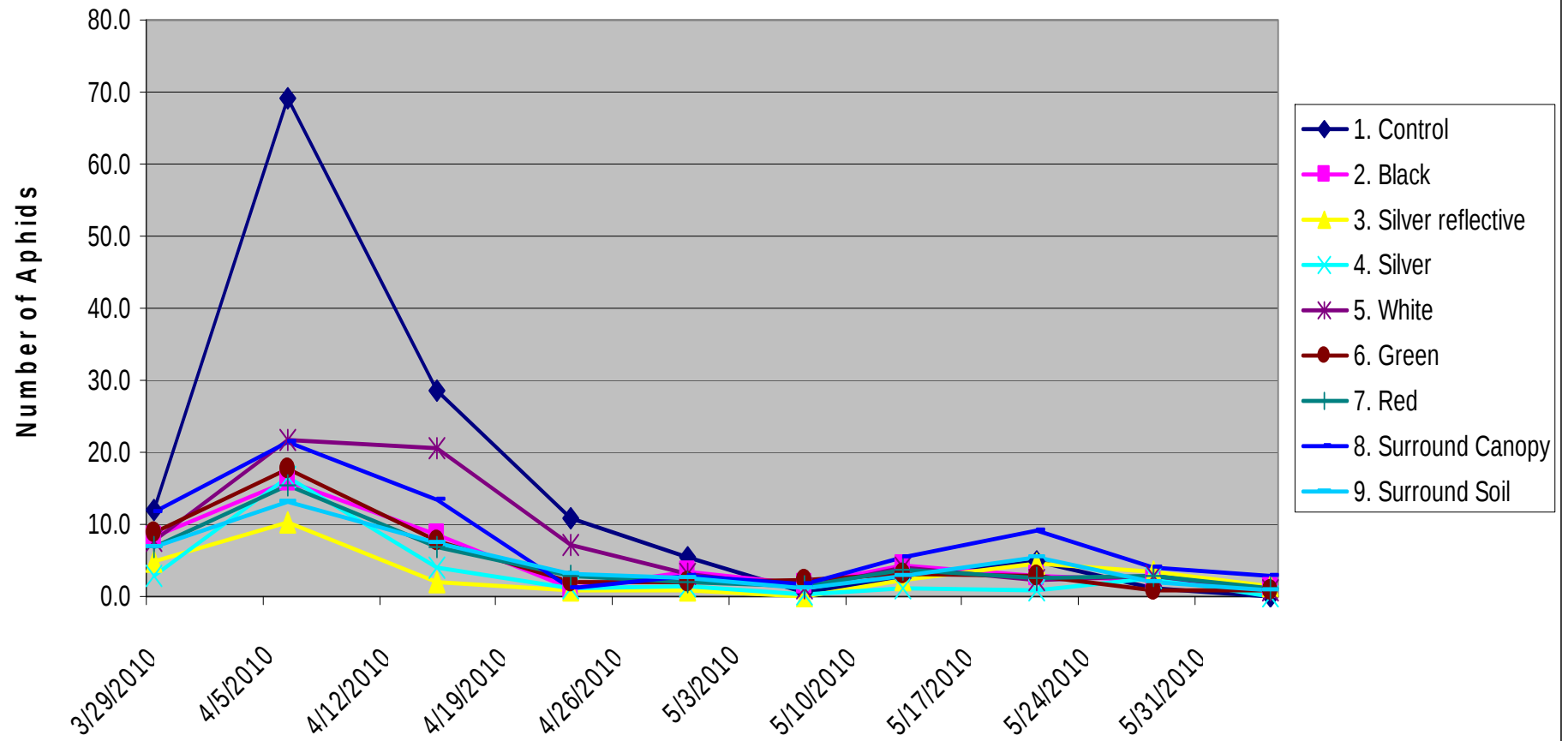


Yellow Sticky Cards – placed above canopy
Weekly aphid and thrips counts

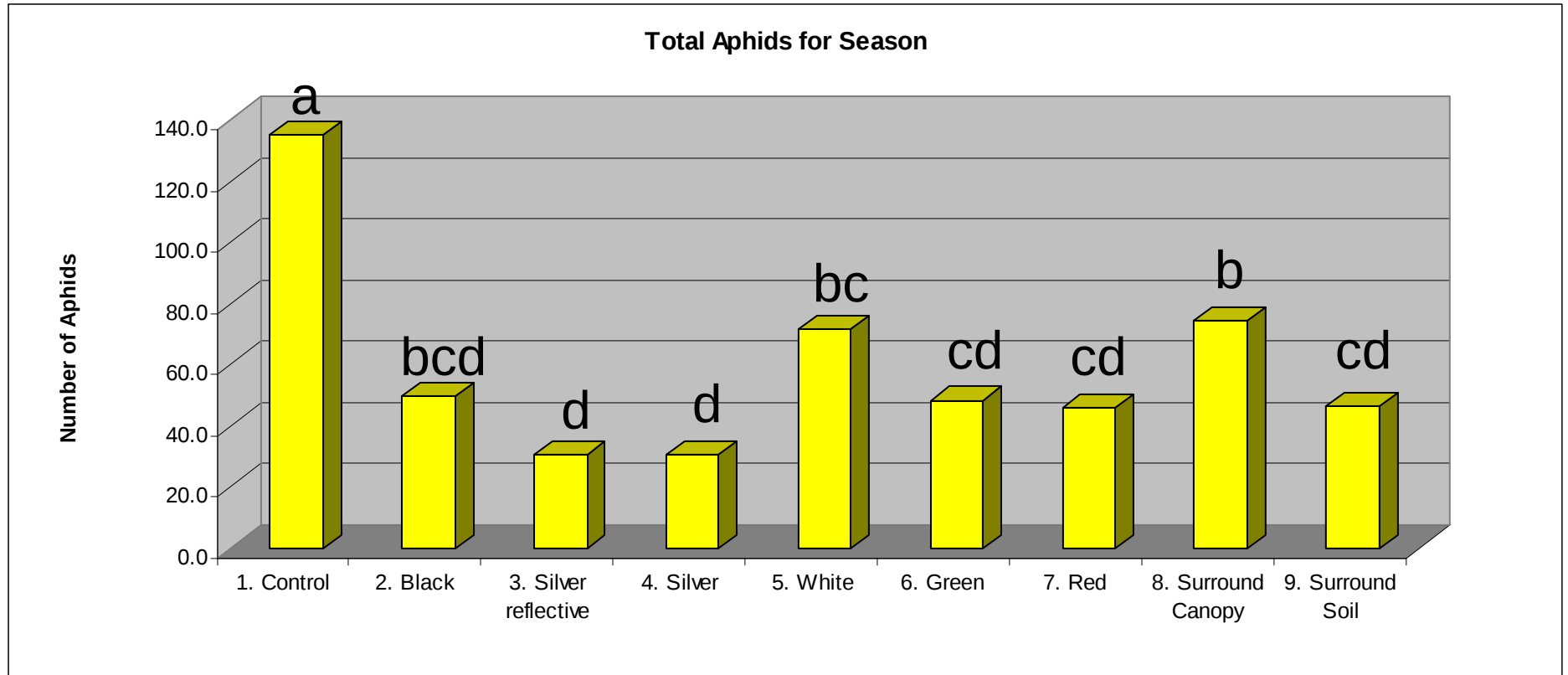


2010

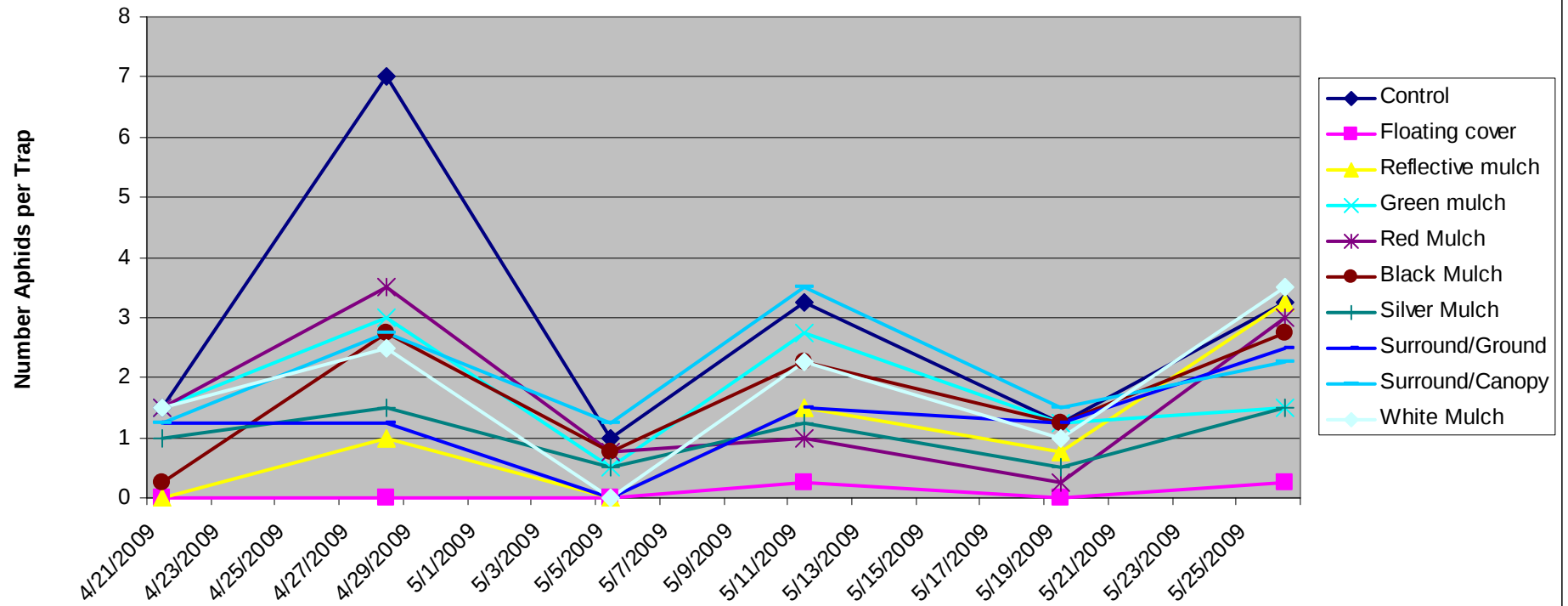
Aphid Trap Counts



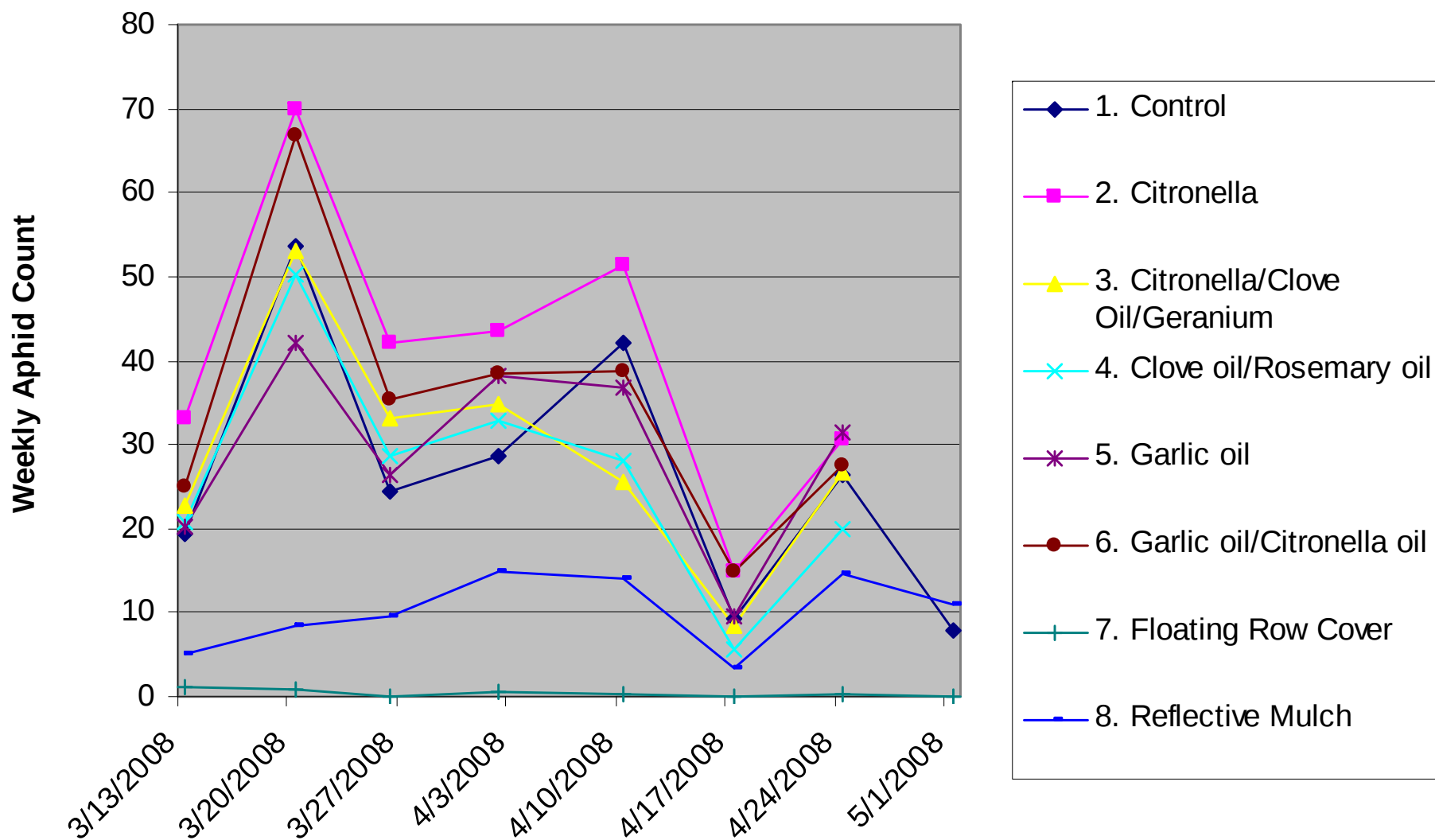
2010



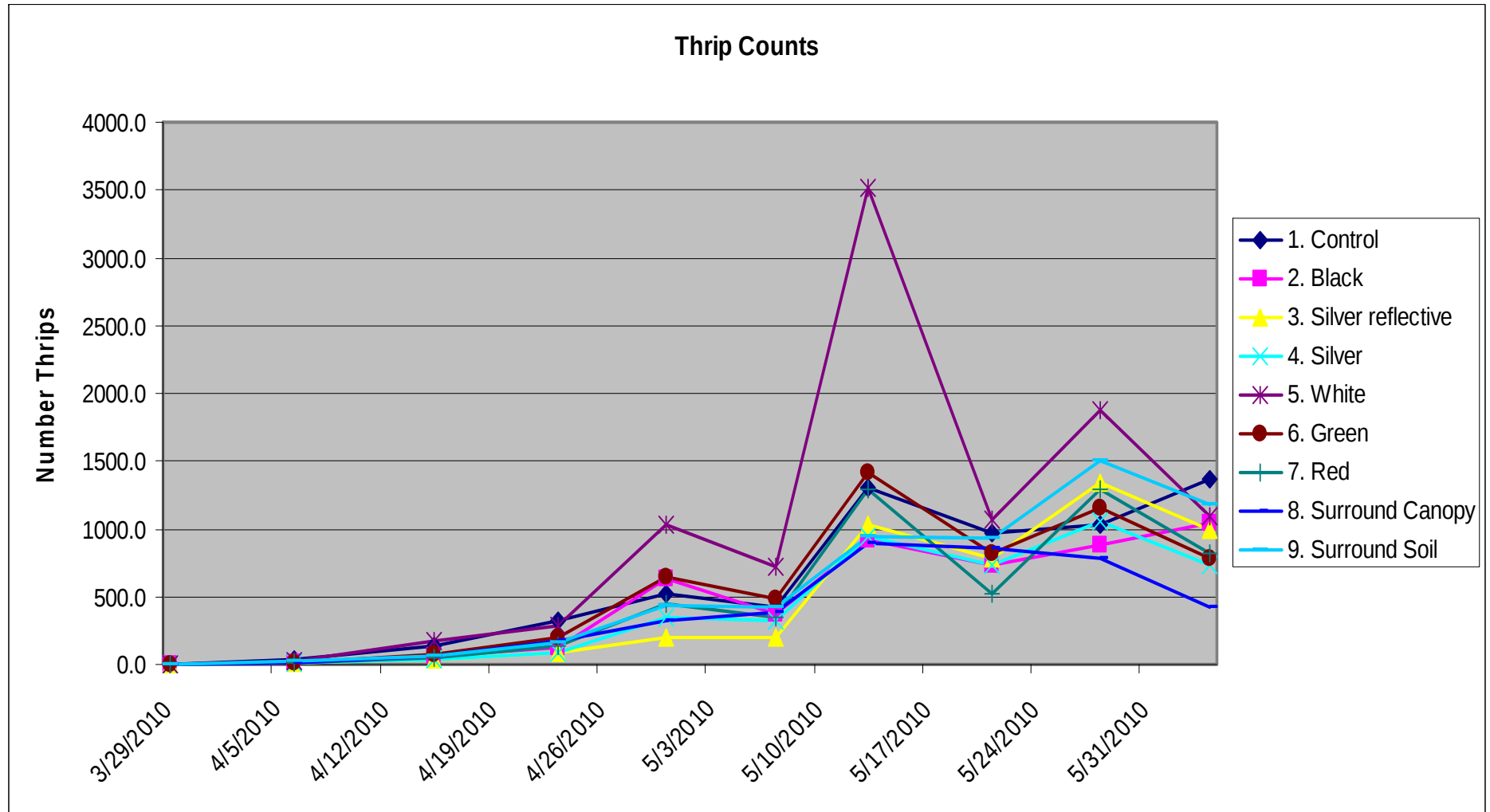
Weekly Aphid Counts 2009



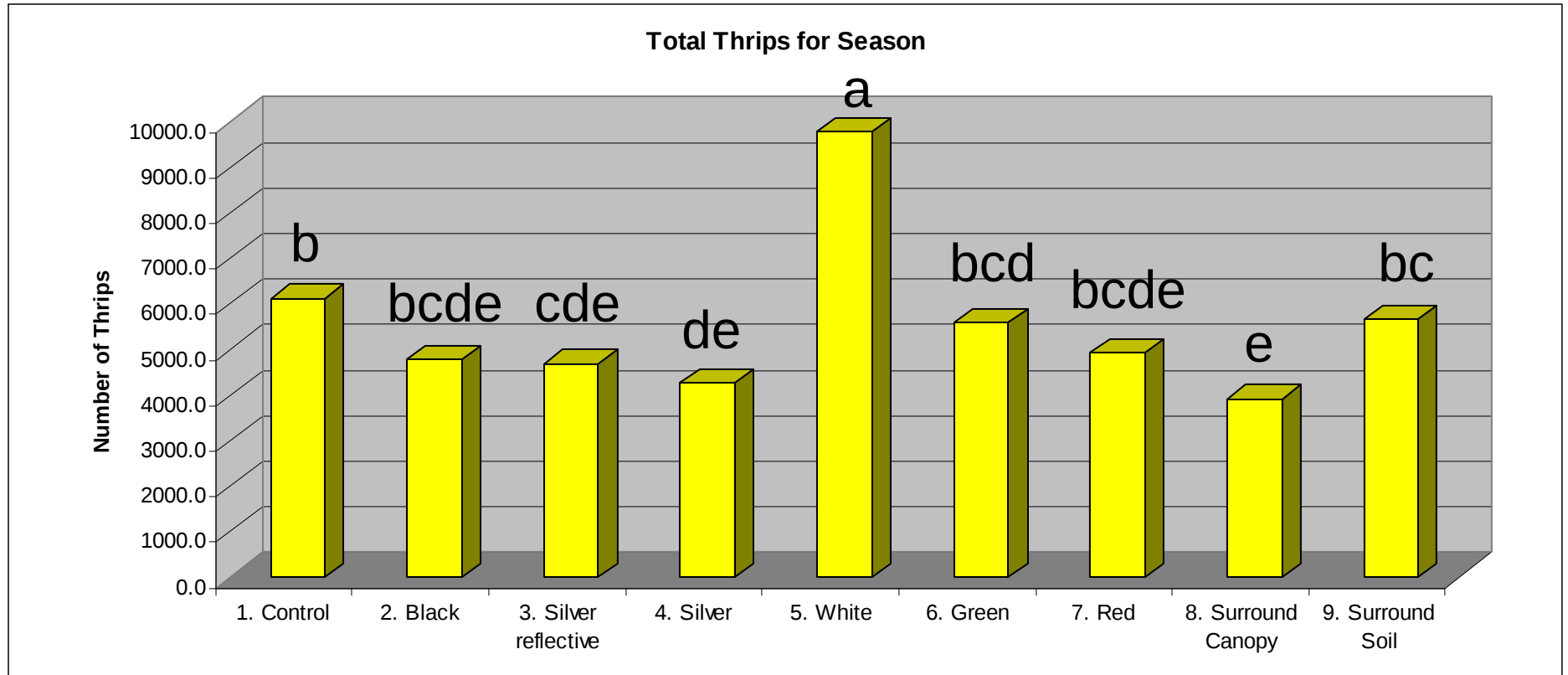
2008 Aphid Counts



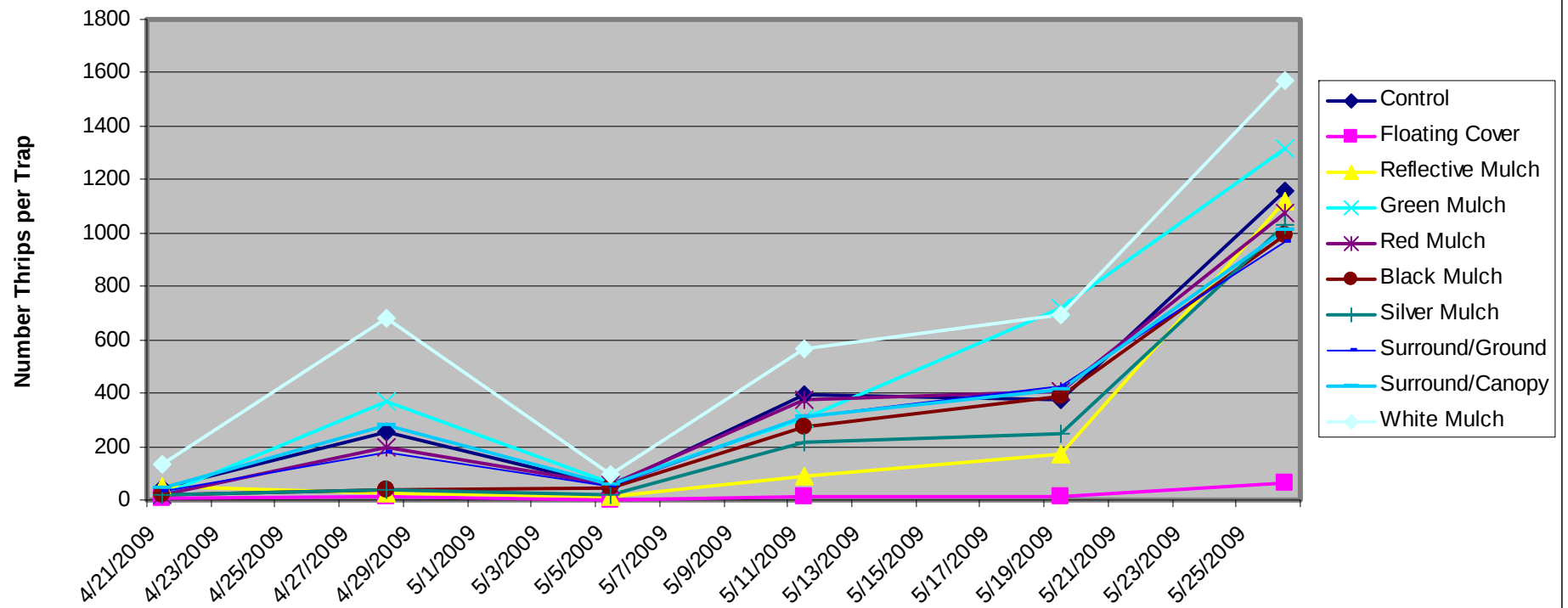
2010



2010



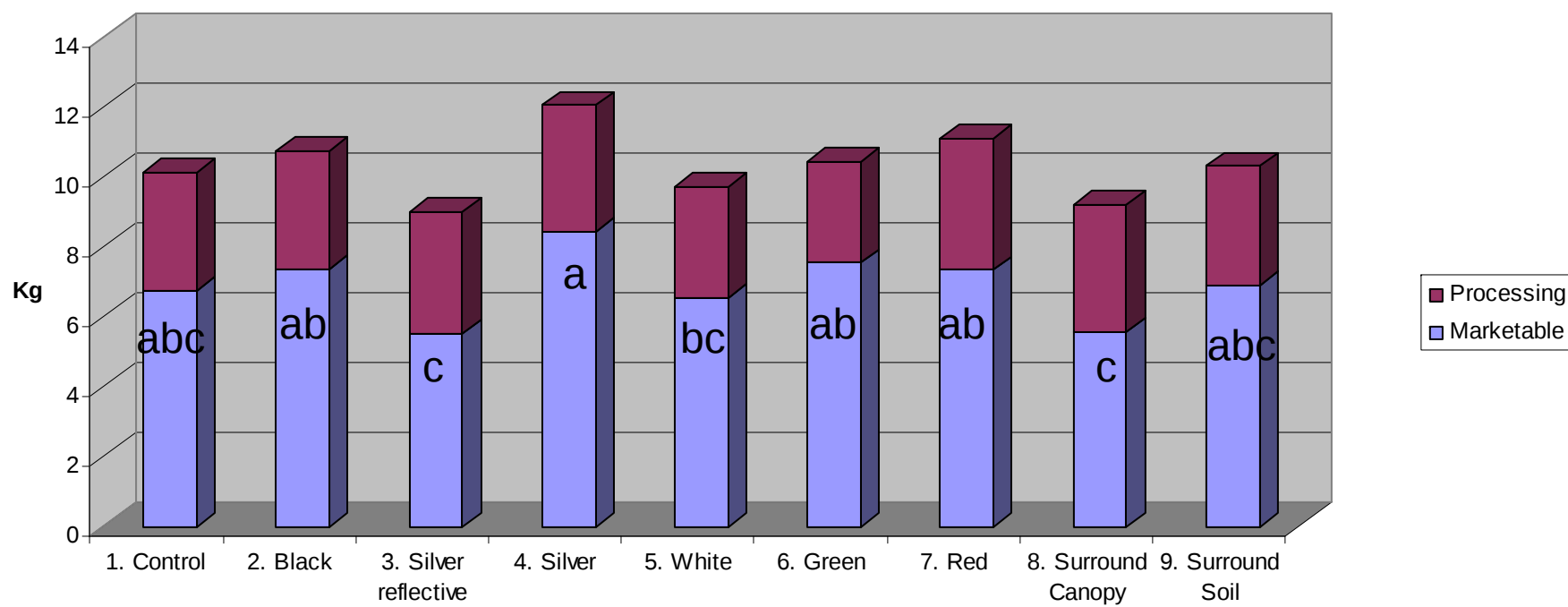
Weekly Thrip Counts 2009



2010 Harvest Data

Treatment	Market	<u>Totals</u>	
		Process	Total
1. Control	6.7 abc	3.4	10.1
2. Black	7.4 ab	3.4	10.7
3. Silver Reflective	5.5 c	3.5	9.0
4. Silver	8.4 a	3.6	12.0
5. White	6.5 bc	3.2	9.7
6. Green	7.5 ab	2.9	10.4
7. Red	7.3 ab	3.8	11.1
8. Surround Canopy	5.6 c	3.6	9.2
9. Surround Soil	6.9 abc	3.4	10.3
P=	0.0425	0.9167	0.2145
%CV=	17.31	24.09	15.06
LSDp=0.05	1.737	NS	NS

Harvested Weights of 12 plants



2009 Harvest Weights (lbs)

	BB's Marketable Wt	Cull Wt	Total Marketable Wt	Total Processing Wt	Total Wt.
1. Control	1.14	0.12	16.61 BC	5.53 BC	22.14 BC
2. Row Cover	1.16	0.00	4.91 D	2.66 C	7.58 D
3. Silver Reflective Mulch	1.11	0.00	16.49 BC	4.56 C	21.04 C
4. Green Mulch	0.76	0.41	18.26 ABC	9.63 AB	27.89 A
5. Red Mulch	0.69	0.76	22.68 A	6.49 ABC	29.16 A
6. Black Mulch	1.15	0.59	20.33 AB	5.09 BC	25.11 ABC
7. Silver Mulch	0.64	0.10	18.60 ABC	5.51 BC	24.11 ABC
8. Surround Mulch	0.55	0.33	15.20 BC	10.81 A	26.66 AB
9. Surround Whitewash	0.87	0.26	17.80 ABC	6.75 ABC	24.55 ABC
10. White Mulch	0.95	0.26	14.73 C	7.08 ABC	21.80 BC
P=0.05	0.5772	0.2142	0.0001	0.0454	0.0000
% CV	56.11	146.59	21.93	48.81	16.47
LSD, P=0.05	NS	NS	5.299	4.547	5.516

2008

	<u>Harvest Dates</u>			
	<u>06/04/08</u>	<u>06/17/08</u>	<u>06/25/08</u>	<u>Total</u>
1. Control	9.1 lb	28.3 lb	14.7	52.5 ABC
2. Citronella	4.8	21.7	16.0	42.5 CD
3. Citronella/Clove/Geranium	6.0	27.5	16.4	49.9 ABCD
4. Clove/Rosemary	4.4	27.3	17.1	48.9 BCD
5. Garlic Oil	5.7	30.0	18.2	54.0 AB
6. Garlic/Citronella	7.7	23.1	20.1	50.9 ABC
7. Floating Row Cover	6.5	16.1	17.7	40.4 D
8. Reflective Mulch	9.6	26.6	24.1	60.2 A
P=0.05	0.2547	0.1434	0.5756	0.0831
%CV=	47.43	27.01	35.38	17.20
LSD, P=0.05	4.702	9.969	9.402	12.625
LSD, P=0.10				10.450

Conclusions from 2010 Trial

- All mulches, plastic or kaolin clay, can reduce aphid flights into peppers.
- Silver reflective, Silver & Kaolin clay on canopy reduce thrips populations in plant canopy.
- Silver, Green & Red mulches increase plant growth of peppers.
- CMV was not a problem in 2010

Summary for the 3 year study

- Reducing aphid flights into pepper fields reduces the incidence of CMV.
- Reducing incidence of CMV increases yields.
- Plastic mulches, especially silver reflective, are very effective at reducing aphid and thrips populations in a field.
- Red and Green plastic mulch increase plant size and pepper yields.

Summary for the 3 year study

- Kaolin clay as a mulch may be less expensive, easier, and more environmentally sound method to reducing aphid populations.
- Botanical oils sold as insect repellents are not effective.

Thanks to:

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