Using BioIPM Tools To Reduce Crop Inputs For Processing Snap Beans and Carrots

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Goals of "BioIPM" Project

- **Increased adoption of advanced IPM technology**
  - ✓ **pest tolerant cultivars**
  - ✓ **soil testing for pathogens**
  - ✓ **pest prediction**
  - ✓ **use of biologicals**
- **Monitoring of pesticide toxicity for each spray**
- **Substitution with lower toxicity pesticides**
- **Reductions in toxicity of season-long pest control**
- **Greater awareness of available tools**

Funding from EPA, American Farmland Trust, MWFPA

Case Examples of "BioIPM" Project

- **Carrot Project**
  - ✓**Two growers – sand vs. muck soil**
  - ✓ **Pest management consultant**
  - ✓ **Processor staff**
  - ✓ **UW team**
- **Snap Bean Project**
  - ✓ **Two growers**
  - ✓ **Processor staff**
  - ✓ **UW team**

Field-scale Trials

Two Main Culprits in WI

- Susceptible = foliar decline
- Yield, quality and value reduced
- Harvest difficulty
- Chemical inputs needed

What does this mean for WI Growers ?

2005 Summary (Muck)	Heritage (susceptible)			
	Ai lb/Acre	# of Sprays	Est. Chem. Cost ($)	Toxicity Units
Chlorothalonil Standard	7.6	6	58.80	566.6
15 DSV Chlorothalonil/ Azoxystrobin	2.6	4	53.60	202.6
2005 Summary (Muck)	**Bolero (resistant)**			
Chlorothalonil Standard	5.8	5	49.00	472.0
20 DSV Chlorothalonil/ Azoxystrobin	2.5	2	26.90	101.2

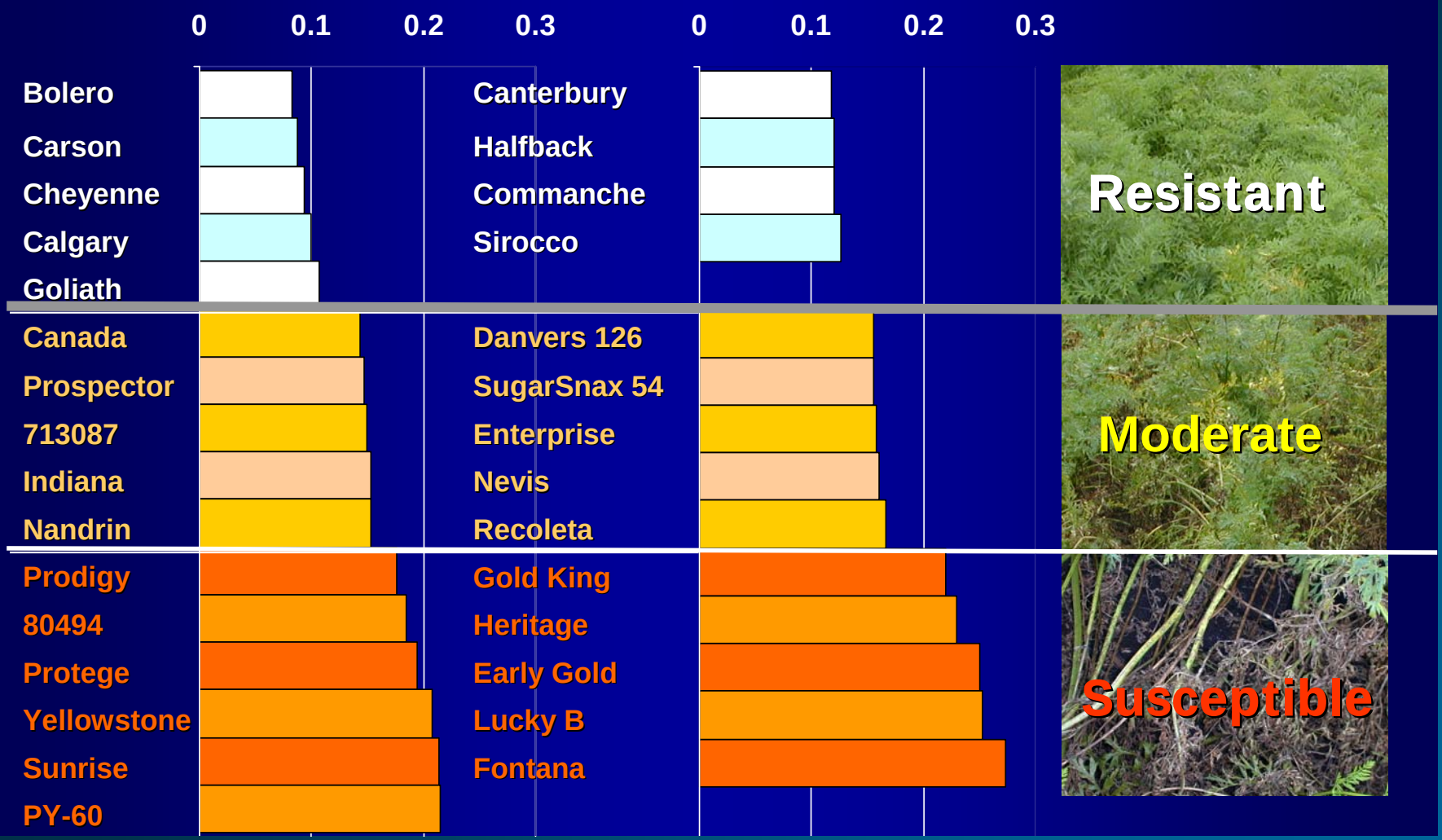
- ✓ Fungicide inputs limited
- ✓ Fewer applications
- ✓ Program cost is reduced
- ✓ Program toxicity decreased

What does this mean for WI Growers ?

2006 Summary -SAND	Enterprise (mod. susceptible)			
	Ai lb/Acre	# of Sprays	Est. Chem. Cost ($)	Toxicity Units
Chlorothalonil Standard	6.5	6	63.00	527.5
15 DSV Chlorothalonil/ Azoxystrobin	2.5	4	55.20	189.3
20 DSV Chlorothalonil/ Azoxystrobin	2.3	3	38.10	182.5

2006 Summary-SAND	Carson (resistant)			
Chlorothalonil Standard	4.3	4	42.00	351.7
15 DSV Chlorothalonil/ Azoxystrobin	2.3	3	28.30	182.5
20 DSV Chlorothalonil/ Azoxystrobin	1.2	2	22.70	94.8

Processing Varieties and Disease Reaction



Cultivar	Scouting & Monitoring	Chemistry	Fungicide Schedule
 Resistant	- 10 days - 1- 5 % severity threshold	- Low Rate chlorothalonil alt. strobilurin	- 20 DSV ~ 14-17 days
 Moderate	- 10 days - 1 % severity threshold	- Low Rate chlorothalonil alt. strobilurin	- 15 DSV ~ 10-14 days
 Susceptible	- 7 days - <1 % severity threshold	- Mid Rate chlorothalonil alt. strobilurin	- Weekly or 15 DSV ~ 7-10 days

Regardless of cultivar: **- Crop rotation** **- Optimum fertility**
- Irrigation management

Carrot Growers – Shift in cultivars

Cultivar Susceptibility	2001	2005
Susceptible cultivars	1221 acres (70% of acreage)	70 acres (9% of acreage)
Moderate susceptible to resistant cultivars	517 acres (30% of acreage)	1767 acres (91% of acreage)

Carrot Growers – Use of disease forecasting tools

Response	2001	2005
Yes	0	4 (57%)
No	9	3 (43%)
Respondents	9	7

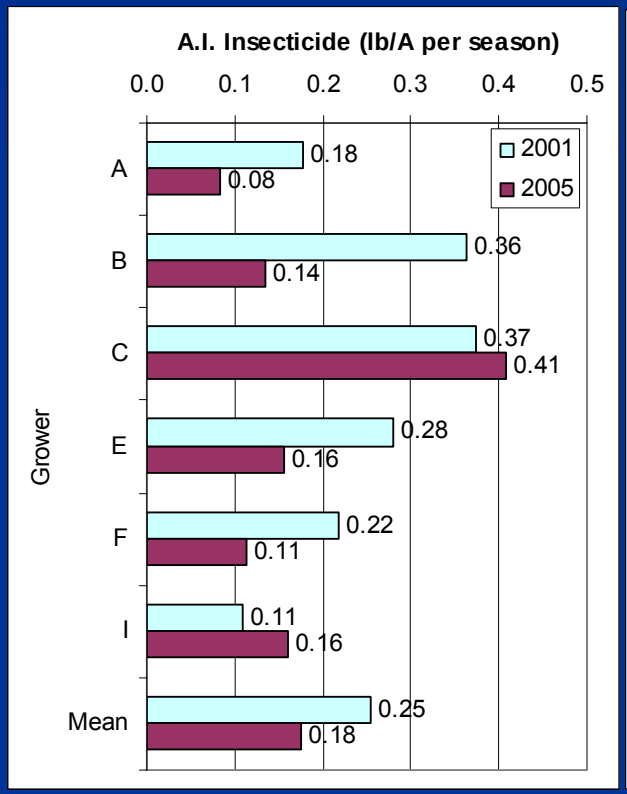
Carrot Growers – Block varieties according to disease resistance

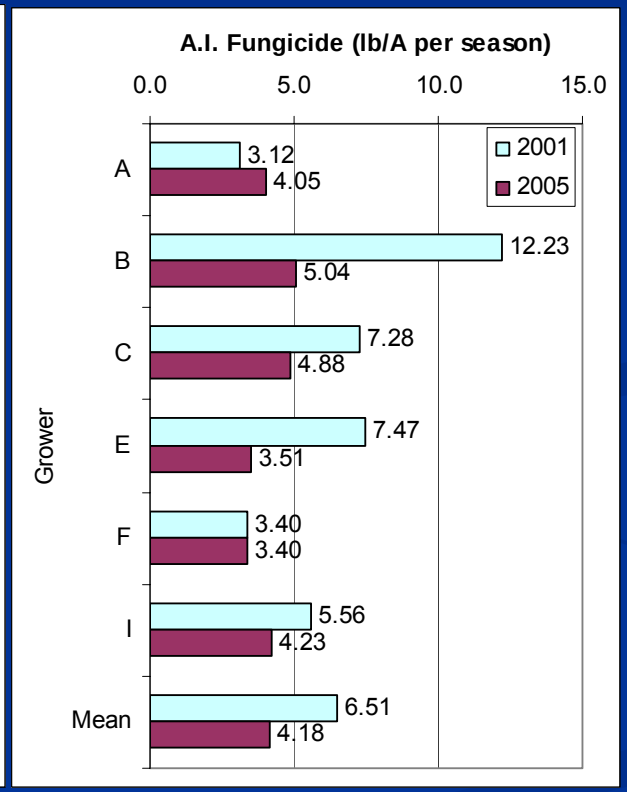
Response	2001	2005
Yes	7 (78%)	5 (71%)
No	2 (22%)	2 (29%)
Respondents	9	7

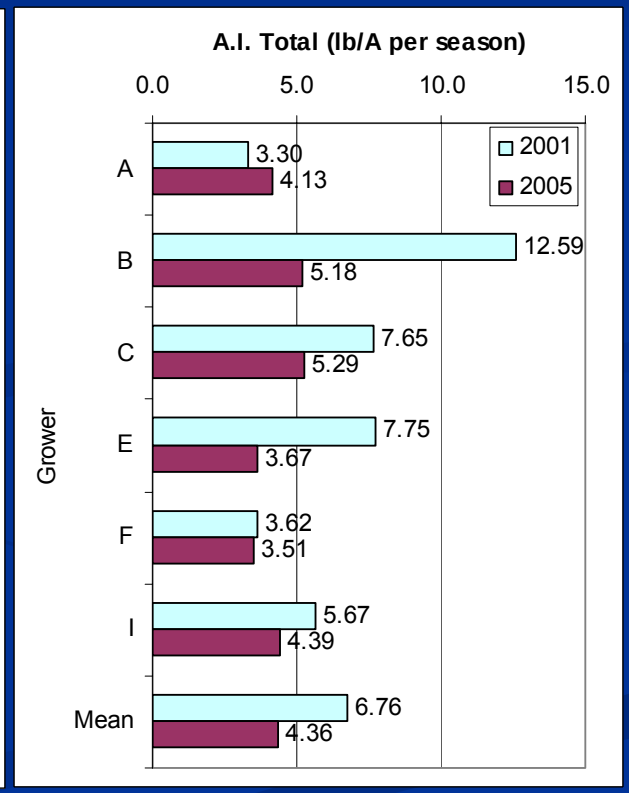
Carrot Growers – Adjust fungicides according to disease resistance

Response	2001	2005
Yes	5 (56%)	6 (86%)
No	4 (44%)	1 (14%)
Respondents	9	7

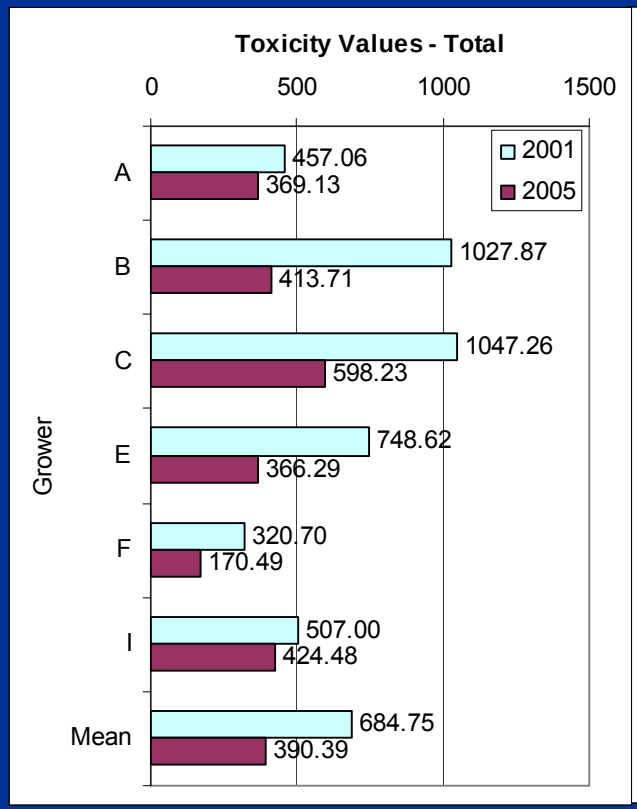
Carrot use of insecticide and fungicide – 2001 vs. 2005

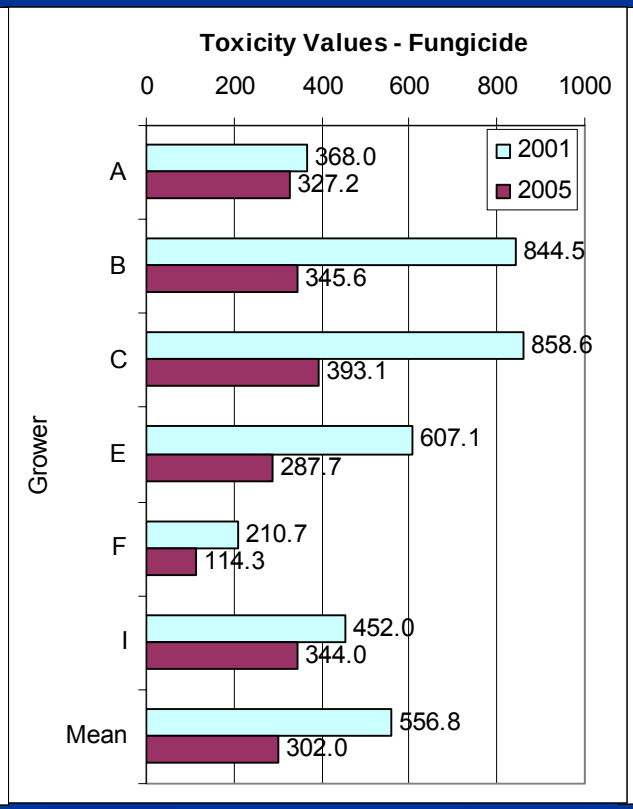


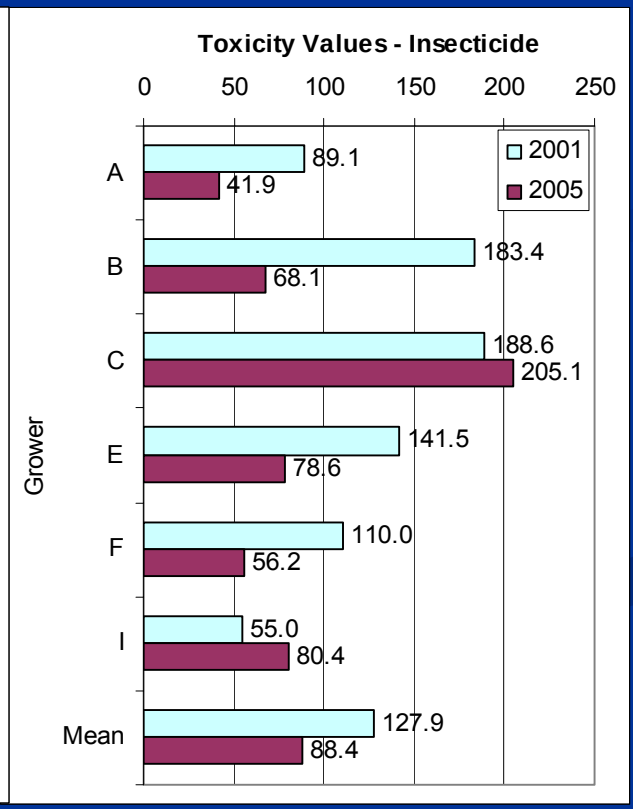




Changes in the toxicity of carrot pest management programs 2001 - 2005







Change in use of pesticides by the Wisconsin carrot industry - 2001 to 2005

Pesticides Applied – 6 Growers		LB AI Applied			
Chemical Name	Brand Name	2001	2005	Change	% Reduction
esfenvalerate	Asana	1.52	1.03	0.49	32.33
cyfluthrin	Baythroid	0	0.03	0.03	--
chlorothalonil	Bravo, Echo, Equus	30.97	20.90	10.07	32.51
benomyl	Benlate	0.50	0.00	0.50	100.00
fixed copper	Kocide, Champ	7.65	3.37	4.28	55.92
azoxystrobin, pyraclostrobin	Quadris, Cabrio	0.00	0.13	0.13	--
boscalid	Endura	0.00	0.59	0.59	--


White Mold
Snap Beans

Processing Bean Production System Evaluation

Two growers

- **Central WI, sand**

Factors compared alone and in combination to determine their contribution:

Cultivars

- **Standard cultivar currently grown, selected by processor**
- **Pest tolerant cultivar (white mold, root rot, bacterial leaf blight) selected by processor**

Fungicide

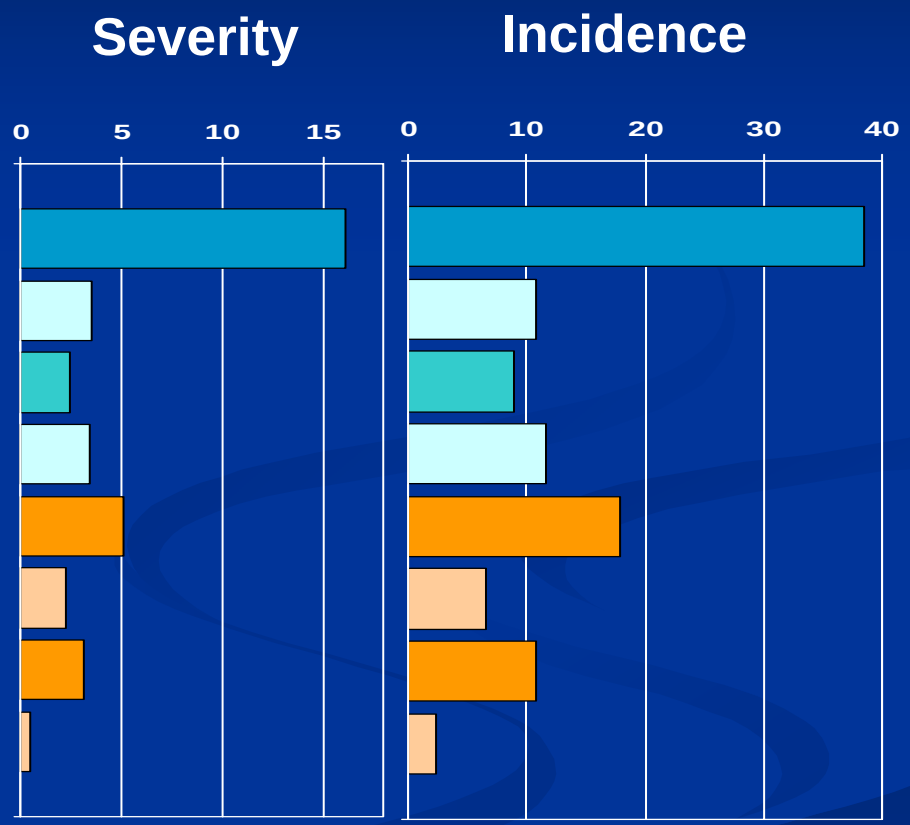
Biological control

Scouting

- **To determine need/timing of insecticide, fungicide, herbicide application**

Effect of treatment on incidence and severity of white mold on snap beans (Grower 1)

Cultivar	Fungicide	Intercept ®
WM susceptible	No	No
		Yes
	Yes	No
		Yes
WM tolerant	No	No
		Yes
	Yes	No
		Yes



Pesticide used in snap bean production on typical WI acreage in 2003

Chemical	Formulation /acre	Formulation ai	Total lb ai applied
Eptam 7E	0.375 gal	7 lb/gal	2.625 lb ai
Dual II Magnum	1 pt	7.64 lb/gal	0.955
Capture 2EC	4.0 oz	2 lb/gal	0.062
Capture 2EC	6.4 fl oz	2 lb/gal	0.1
Benlate	1.5 lb	50%	0.75
			4.492

Pesticide used in snap bean production on test WI acreage (Grower B) in 2005

Chemical	Formulation /acre	Formulation ai	Total lb ai applied
Roundup	1 gal	0.502 lb/gal	0.502 lb ai
Sandea	0.08 oz	0.75 lb/gal	0.06
Assure II	6 oz	0.88 lb/gal	0.041
Discipline 2EC	3 oz	2 lb/gal	0.046
Contans (Biological)	2 lb	5.3%	0.106
			0.755

Snap Bean Growers – Changes in IPM scores – 2003 vs. 2005

Section	Grower A 2003	Grower B 2005	Grower C 2005
I: Specific Field Info	6 points	11 points	14 points
II: Field Scouting	30	309	450
III: Weed Control	8	22	20
IV: Insect Control	0	20	22
V: Disease Control	6	28	22
VI: Soil Fertility	4	4	4
TOTAL PPP Scores:	54	394	532

Overall Conclusions

Techniques explored:

- **Crop rotation**
- **Frequent field scouting**
- **Cultivar tolerance to key pests**
- **Use of treatment thresholds for insect management**
- **Use of weather-based thresholds for disease management**
- **Integration of reduced-risk pesticides for treatment**

Overall Conclusions

Benefits:

- **Reduced:**
  - **Input costs**
  - **Amount of pesticide applied**
  - **Toxicity of season-long pest management programs**
- **While maintaining:**
  - **Crop health**
  - **Product quality**
  - **Yield**

Project Summary

- **Carrots**
  - **Shift in cultivars grown – more pest resistance**
  - **Reduction in pesticide tox scores – 43%**
  - **Reduction in use of FQPA pesticides**
  - **Greater use of advanced IPM tools**
- **Snap Beans**
  - **Decrease use of pesticides**
  - **Increase use of advanced IPM tools**
  - **Increase use of biocontrols and pest resistant cvs.**


Questions??

Grower IPM – Spray Program Results