Relative Efficacy Index *(REI)* for Biopesticides on Desert Produce

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Arizona growers have established a reputation for providing high quality produce for the fresh market. This is especially critical for the organic industry as expectations from the shippers/ buyers and consumers is that organically grown leaf vegetables be of the same high-quality standards as conventionally produced crops. Consequently, production of organically-certified leafy vegetables is very challenging in Arizona due to the multitude of insect pests that growers must control to ensure a cosmetically acceptable product that meets the industry and consumer standards. Unfortunately, their options for controlling insects are limited.

Many of the biopesticide manufacturer's claim that their organic products will safely provide broad spectrum insect control that is "as good as or better" than conventional pesticides. Many local PCAs and organic growers are skeptical of these claims, largely because local scientific information to support the manufactures claims is not currently available. Given the demands for high-quality organic vegetables from Arizona, applied research providing this information would clearly benefit Arizona organic growers.

This project was initiated because the research knowledge necessary for implementing effective insect management approaches in local organic vegetables must be developed specifically for Arizona's unique desert growing conditions, leafy vegetable crops and pest spectrum. Our goal was to develop a ***Relative Efficacy Index (REI)*** for biopesticides used in organic-certified leafy vegetables that will provide growers and PCAs with information on the relative efficacy of organic active ingredients used against the key insect pests.

Data for generating information on the relative efficacy of biopesticides was collected from small plot efficacy trials. These trials were conducted in the fall for whiteflies, flea beetles, and Lepidopterous larvae and in spring crops for aphids and thrips. Biopesticides were applied a minimum of 2 times at 7-10 day intervals in each trial using standard applications (30-40 gpa) where knockdown and residual control was estimated. Using the data collected from each trial, a Relative Efficacy Index for the biopesticides tested was created for each pest*crop situation. Results of efficacy trials used to develop these indices can be found in the associate bulletin: **Biopesticide Efficacy in Desert Produce Crops.** Below are several tables and graphs that serve as an index (REI) for the relative efficacy of several commonly used biopesticides against key insect pests found on desert produce crops.

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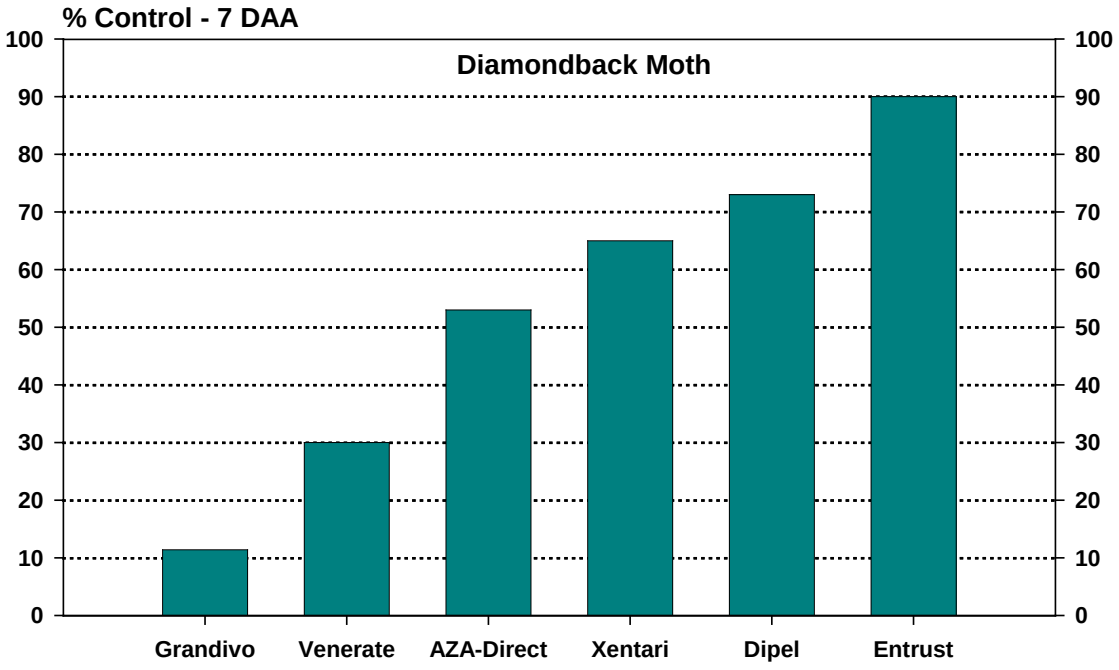
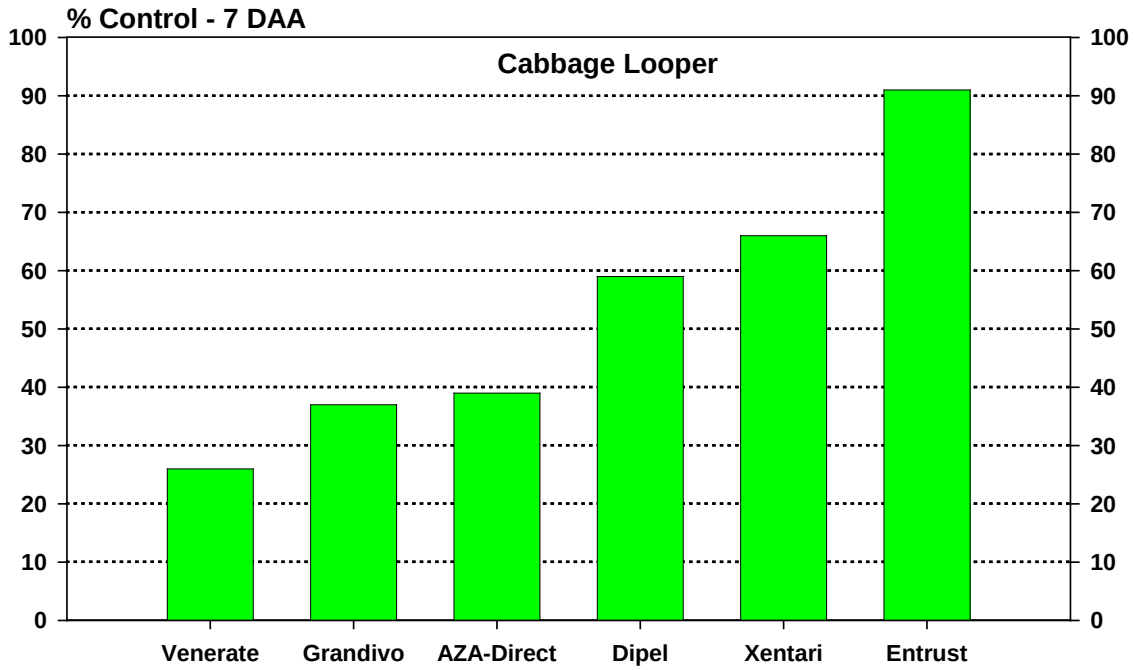
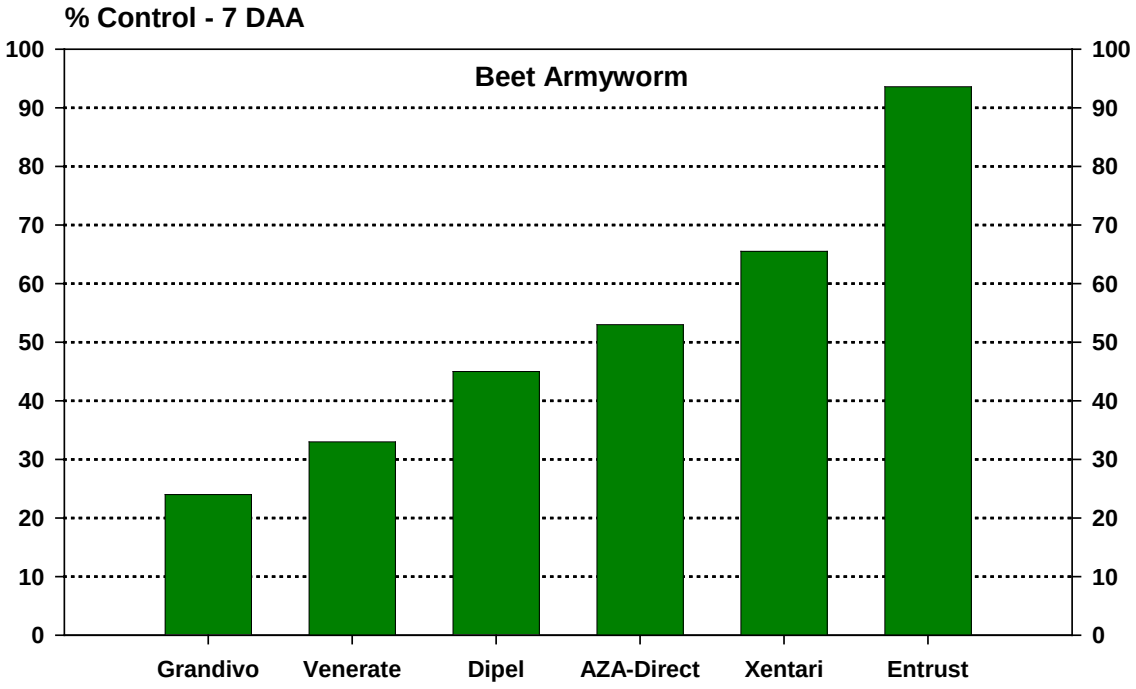
				% CONTROL		
Biopesticide	***Trials***	***Sprays***	***DAA***	***Cabbage looper***	***Beet armyworm***	***Diamondback moth***
Entrust	*11*	*29*	3	97.0	96.4	89.5
			7	91.2	93.6	87.0
Entrust+M-Pede	*3*	*8*	3	86.4	94.0	100
			7	95.2	93.4	100
Xentari	*9*	*22*	3	50.3	71.9	59.9
			7	66.0	60.7	64.8
Dipel	*5*	*11*	3	37.9	60.9	73.8
			7	59.1	45.7	73.1
Aza-Direct	*3*	*6*	3	53.3	58.4	31.8
			7	38.7	52.8	53.5
Azera	*3*	*7*	3	30.0	42.1	0
			7	79.5	60.1	45.5
Pyganic	*2*	*5*	3	29.7	48.1	19.6
			7	37.8	46.7	42.8
Venerate	*4*	*10*	3	13.0	28.3	8.2
			7	25.7	32.6	30.4
Grandivo	*5*	*13*	3	12.5	31.1	0
			7	37.0	23.9	11.4
AZAGuard	*1*	*3*	3	39.2	34.2	-
			7	51.4	17.4	-

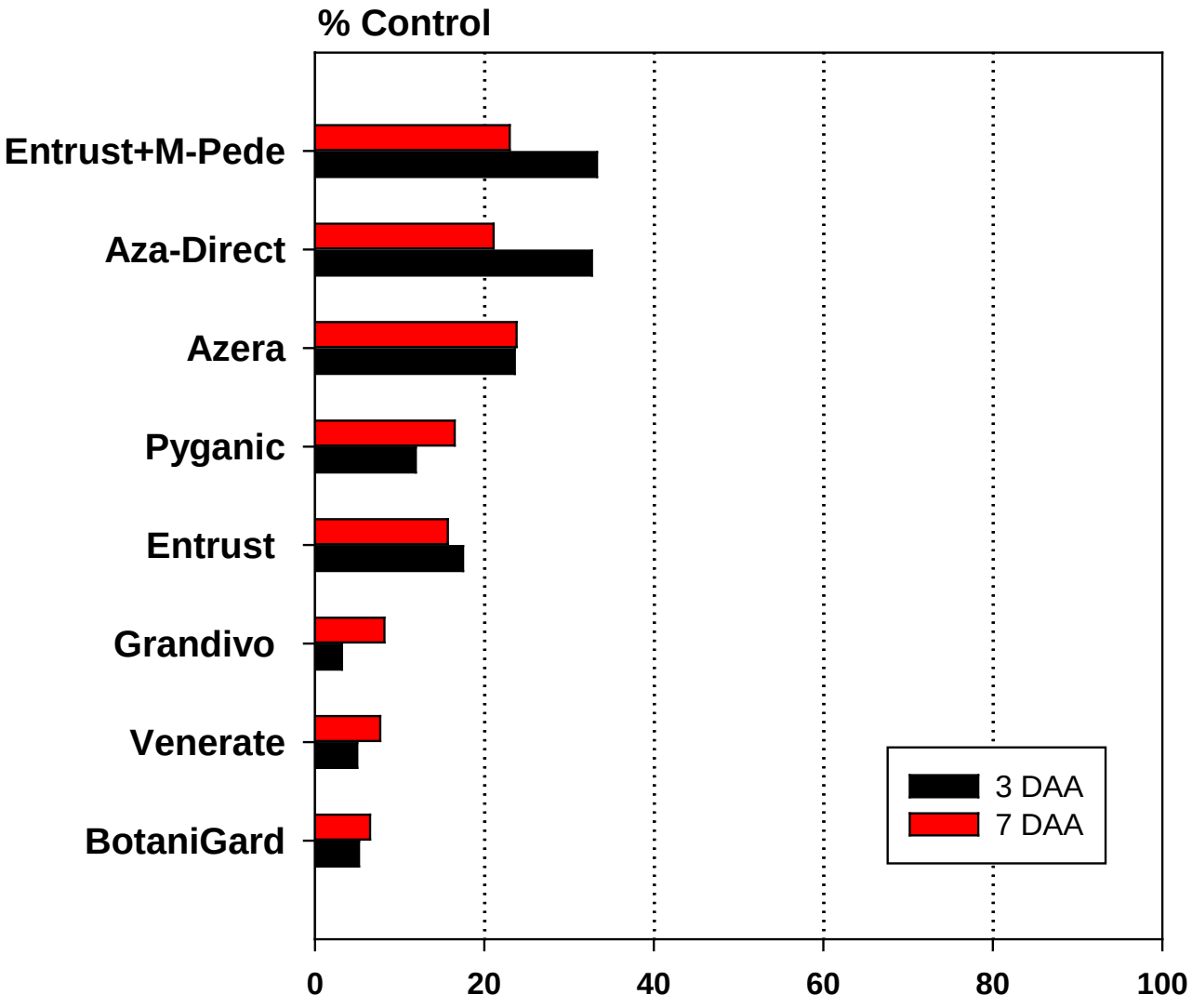



% Control - 7 DAA
Cabbage Looper
100
90
80
70
60
50
40
30
20
10
0
Venerate
Grandivo
AZA-Direct
Dipel
Xentari
Entrust


% Control - 7 DAA
Beet Armyworm
100
90
80
70
60
50
40
30
20
10
0
Grandivo
Venerate
Dipel
AZA-Direct
Xentari
Entrust

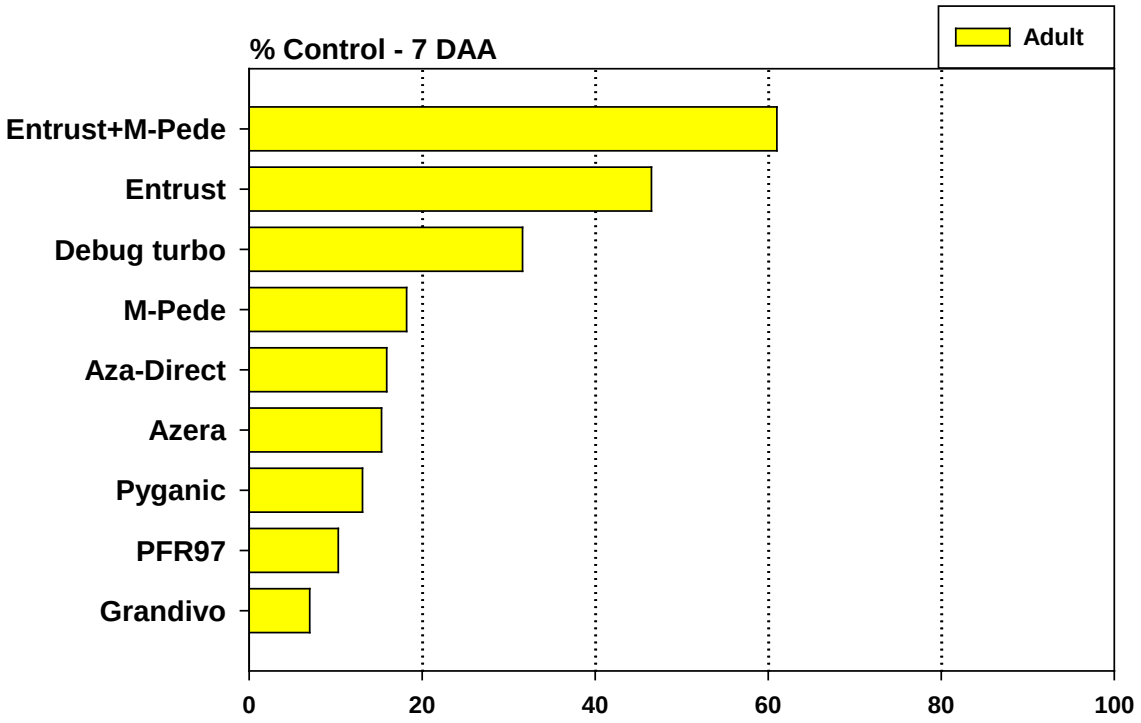
				% CONTROL
Biopesticide	**Trials**	**Sprays**	**DAA**	**Whitefly Adults**
AZA-Direct	2	4	1	20.9
	2	4	3	32.7
	2	4	7	21.1
Azera	3	6	1	19.0
	3	6	3	23.6
	3	6	7	23.8
Botanigard	1	2	1	21.1
	1	2	3	5.2
	1	2	7	6.2
Entrust+M-Pede	2	4	1	48.7
	2	4	3	33.3
	2	4	7	23.9
Entrust	2	4	1	32.5
	2	4	3	17.5
	2	4	7	15.7
Grandivo	2	4	1	11.8
	2	4	3	3.2
	2	4	7	8.2
Pyganic	1	2	1	20.8
	1	2	3	11.9
	1	2	7	16.5
Venerate	2	4	1	11.8
	2	4	3	5.0
	2	4	7	7.7

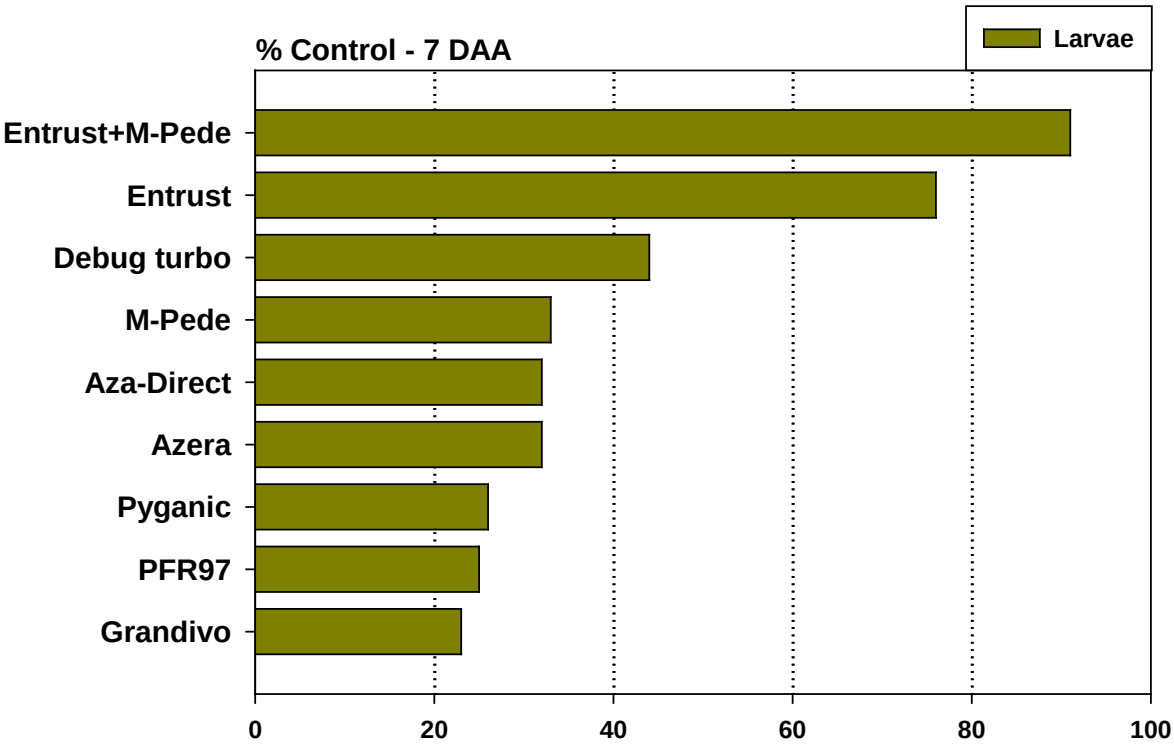
Whitefly Adults



				% CONTROL	
Biopesticide	**Trials**	**Sprays**	**DAA**	**Adult**	**Larvae**
Entrust	9	17	3	49.6	72.0
	10	24	7	46.5	75.5
Entrust+M-Pede	9	18	3	68.1	82.3
	9	20	7	61.0	91.2
Met52	0	0	3	-	-
	1	4	7	23.5	46.9
Grandivo	5	8	3	10.2	21.9
	5	10	7	7.0	26.4
Trilogy	2	3	3	7.1	27.0
	3	8	7	6.6	12.4
M-Pede	3	5	3	8.3	39.7
	4	10	7	18.2	23.1
Aza-Direct	8	15	3	11.2	39.7
	10	25	7	15.9	43.9
Venerate	1	2	3	0.0	8.0
	1	2	7	20.5	16.8
Azera	4	7	3	10.3	30.2
	5	14	7	15.3	32.5
Pyganic	3	5	3	6.7	43.8
	4	11	7	13.1	31.9
AZAGuard	1	2	3	9.1	19.3
	4	10	7	13.5	40.5
Debug turbo	3	6	3	4.1	22.4
	4	10	7	11.8	31.6
Ecozin	1	6	3	1.2	12.0
	1	10	7	24.8	31.4
Neemix	1	2	3	9.0	38.4
	2	5	7	12.1	24.8
PFR97	2	3	3	0.0	12.2
	3	10	7	10.3	24.5

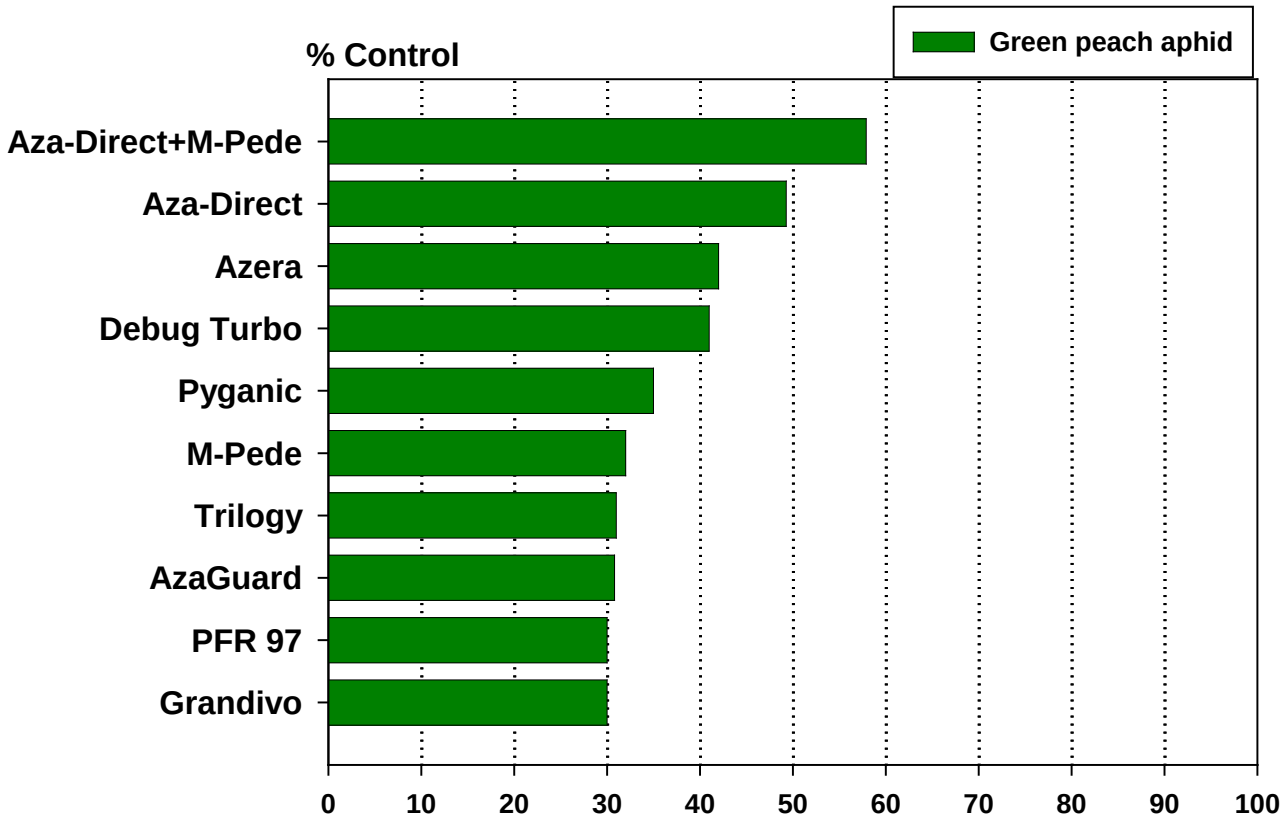
Western flower thrips



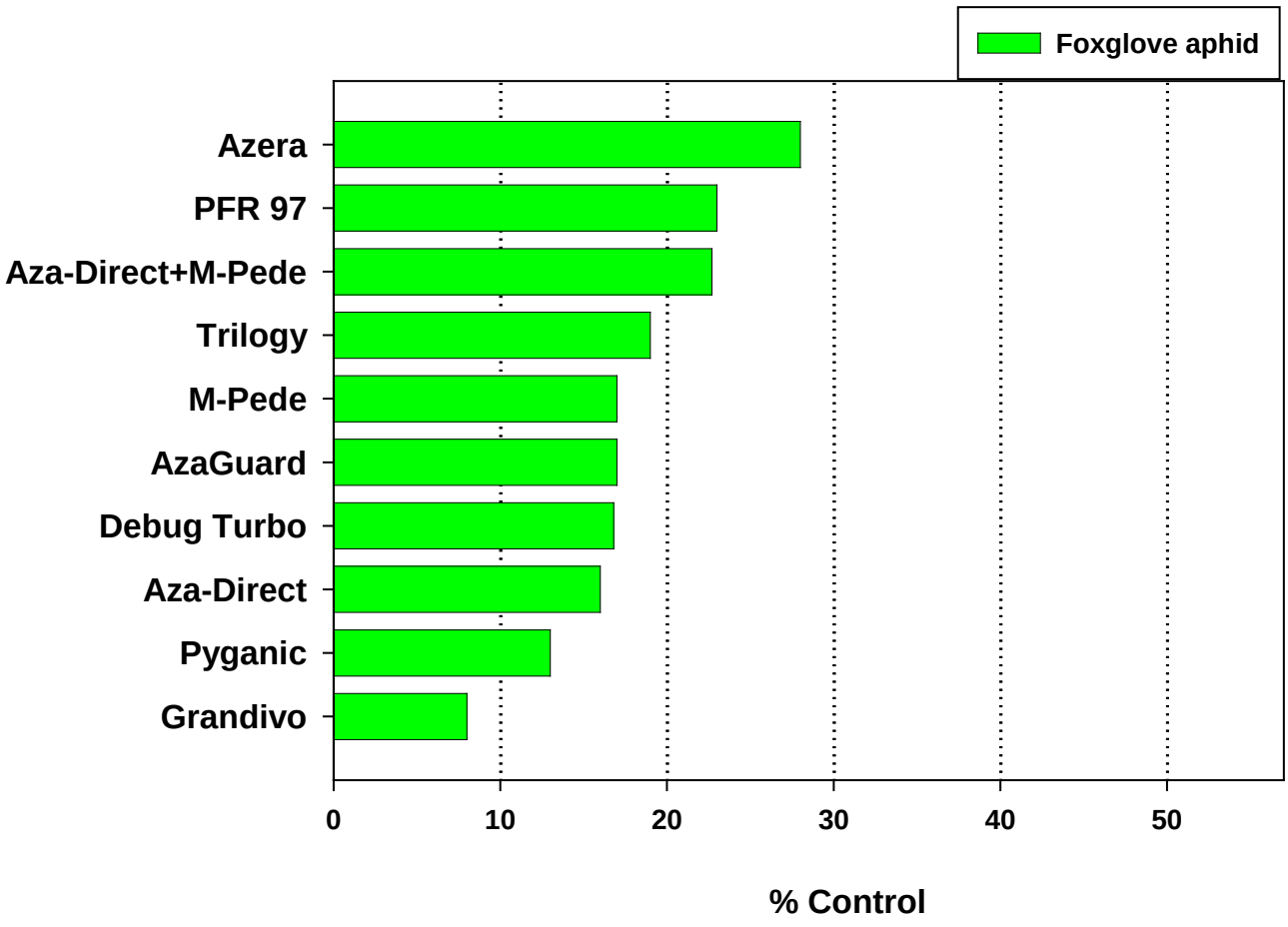


Aphids

				% CONTROL	
Biopesticide	**Trials**	**Sprays**	**DAA**	**GPA**	**FGA**
Aza-Direct+M-Pede	3	6	6	57.9	22.7
Aza-Direct	8	27	6	49.3	15.7
Azera	6	21	6	41.8	28.3
Debug Turbo	3	13	6	41.8	16.8
Ecozin	1	6	6	35.8	-
Neemix	1	4	6	34.9	6.5
Pyganic	5	15	6	34.6	13.3
M-pede	7	22	6	31.5	17.6
AzaGuard	3	11	6	30.8	17.2
Trilogy	3	10	6	30.7	18.7
Grandivo	4	13	6	30.5	-
PFR 97	6	21	6	29.7	23.7
Entrust	2	3	6	1.3	-



Aphids


Foxglove aphid
Azera
PFR 97
Aza-Direct+M-Pede
Trilogy
M-Pede
AzaGuard
Debug Turbo
Aza-Direct
Pyganic
Grandivo
0
10
20
30
40
50
% Control