Evaluation of insecticides for citrus thrips control, using blueberries as a crop surrogate

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During the past few years citrus thrips have become the most significant insect pest of blueberries in the San Joaquin Valley. Citrus thrips are found at high levels throughout the growing season from June through October, and cause significant damage by feeding on the new flush throughout this period. Since population levels in blueberries are consistently very high (much higher than are typically found in citrus), and the crop is harvested by mid-June, blueberries present an excellent opportunity to conduct insecticide efficacy trials for this pest without having to deal with crop destruct issues for unregistered products.

An insecticide trial was conducted in southern Tulare County during the summer of 2006 to evaluate the effects of 13 insecticides and an untreated control on the density of citrus thrips in blueberries. Data from these trials should parallel the results that would be seen if these products were used on non-bearing citrus, and give some insights into the relative effectiveness of these products on bearing citrus. Plot size in the trial was 44 ft (4 rows) by 88 feet long, replicated 5 times, and treatments were applied on 31 July, 2006 with a commercial over-the-top sprayer with wrap-around arms to cover two rows at a time. Initial thrips populations at the time of spraying were just over 30 thrips per beat sample (one tap of the terminal 6 inches of growth onto a 12 x 12 piece of black acrylic).

Table 1 and Figure 1 show the results of the trial, with the best products starting from the top and left respectively. Carzol, which had previously never been used at this site, provided the best control. This product is registered for use in citrus, though documented resistance and its propensity to flare other pests, such as mites, has led to reduced Carzol use. The next best treatments were Radiant, Success, and Assail. Radiant is a new macrocyclic lactone (same class of chemistry as Success and Agri-Mek) from Dow Agrosciences (that will be registered on citrus under the name Delegate). In multiple trials on several crops it has longer residual persistence than Success, and does so with only half the amount of active ingredient. Assail is a neonicotinoid that proved effective against thrips in this trial, and is registered on citrus. It has value in a resistance management program as a rotational product for Success. However, those that use this product should watch their red scale populations, as Assail appears to flare red scale. The next most effective product was Agri-Mek, which also has some value as a rotational product with Success in citrus, although preliminary data has suggested there may be cross resistance between these two materials – thus, Carzol and Assail are better rotation choices.

Insecticides with moderate effectiveness against thrips included Novaluron, Lannate, and Danitol. Novaluron (not registered) is a slow-acting insect growth regulator that produced results similar to that of Assail from 14 to 28 days after treatment. Lannate (a carbamate) and Danitol (a pyrethroid) both reduced thrips populations by about 50% for a couple of weeks.

Other insecticides currently registered for citrus, but that were not evaluated in this trial are Veratran D (sabadilla) and Baythroid (cyfluthrin). Each can be used in citrus as a rotation for Success. Veratran D is a botanical stomach poison that works best when mixed with molasses or

sugar to encourage feeding (formulated Veratran D is 80% sugar to begin with). Baythroid is a pyrethroid that can be effective against citrus thrips, but that is also known for its broad-spectrum effects on insects, regardless of whether they are beneficial or not. This is also true of Danitol but this pyrethroid has somewhat greater activity against many mite species.

Table 1.

Treatment/ Formulation	Rate Formulated Product Per Acre	Mean number of citrus thrips per beat sample													
		Pre		DAT 4		DAT 8		DAT 11		DAT 14		DAT 18		DAT 21		DAT 25	
Carzol 90SP	1 lb	30.0	a	1.5	a	1.2	a	1.2	a	1.1	a	0.8	a	1.8	a	2.6	a
Radiant SC	6 fl oz	33.0	a	9.2	bc	0.8	a	0.9	a	3.5	ab	5.2	b	8.2	b	8.4	b
Success 2SC	6 fl oz	31.3	a	9.3	bc	0.7	a	2.3	ab	8.2	bc	10.4	bc	10.2	bc	16.4	cd
Assail 30SG	6 oz	31.1	a	5.0	ab	3.1	ab	5.3	bc	5.8	bc	8.4	b	10.6	bcd	12.8	bc
Agri-Mek 0.15EC	15 fl oz+1%v/v oil	31.3	a	4.5	ab	5.2	b	8.7	cde	9.1	c	17.2	def	14.6	cde	23.2	de
Novaluron 0.83EC	12 fl oz	34.1	a	30.5	def	20.4	cd	8.4	cd	7.8	bc	10.5	bcd	7.6	b	12.5	bc
Lannate 90SP	1 lb	35.4	a	10.4	bc	14.2	c	14.4	ef	22.9	de	22.6	efg	20.4	ef	24.8	ef
Danitol 2.4EC	16 fl oz	36.8	a	17.5	cd	16.5	cd	13.5	def	20.2	d	16.3	cde	17.2	de	21.6	de
Actara 25WG	4 oz	23.8	a	21.4	de	23.2	d	23.8	gh	31.1	efg	36.0	h	28.1	fg	33.5	fg
Venom 70SG	3 oz	32.4	a	22.3	de	18.5	cd	19.0	fg	27.0	def	30.0	gh	39.0	g	28.6	efg
Diazinon 50WP	2 lb	34.8	a	32.6	efg	38.9	e	27.1	hi	35.3	fg	35.1	h	29.3	fg	36.3	g
Surround WP	25 lb	34.8	a	25.4	de	21.0	cd	28.3	hi	34.8	fg	26.6	fgh	37.1	g	26.5	efg
DPX-E2Y45	4 oz	29.7	a	49.6	g	41.4	e	36.0	i	41.0	g	37.7	h	31.9	g	33.2	fg
Untreated		31.3	a	46.9	fg	42.5	e	32.9	i	32.1	efg	27.6	gh	38.1	g	26.1	ef
F		0.53		13.16		30.58		33.18		23.84		16.90		21.08		14.59	
P		0.89		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	

Means in a column followed by the same letter are not significantly different ($P > 0.5$, Fisher's protected LSD) after square root (x + 0.5) transformation of the data. Untransformed means are shown.

Figure 1. Effects of insecticide treatments on citrus thrips in blueberries