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PEPPER: *Capsicum annuum* (L.) 'X3R Lancelot'

MANAGEMENT OF PESTS OF BELL PEPPER WITH HORTICULTURAL MINERAL OIL, 2004

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Beet armyworm: *Spodoptera exigua* (Hübner)

Broad mite: *Polyphagotarsonemus latus* (Banks)

Green peach aphid: *Myzus persicae* (Sulzer)

Silverleaf whitefly: *Bemisia argentifolii* (Bellows & Perring)

Southern armyworm: *Spodoptera eridania* (Cramer)

A ladybeetle *Cycloneda sanguinea* (L.)

Bacterial spot *Xanthomonas campestris* pv. *vesicatoria* (ex Doidge)

Horticultural mineral oil is inexpensive, environmentally safe, pest management alternative, acceptable, in the case of the product tested here, for organic production. However, there is yet insufficient efficacy information for vegetables, including peppers in south Florida. Greenhouse-raised pepper plants were transplanted on 20 Sep at 10 inch spacing in single rows on 2 beds 240 ft in length and covered with polyethylene film mulch. Water and fertilizer were provided through Netafim® drip tape with 12-inch emitter spacing. Each bed was divided into 8 plots 30 ft long making 2 reps for a total of 4 replications. The treatments were assigned in an RCB design. Sixteen weekly applications of the HMO , PureSpray Green Oil® tank mixed with Kocide 2000 @ 2.25 lb/acre and Maneb @ 1.75 qt/ acre, were made starting 21 Sep using a high clearance sprayer operating at 200 psi. Spray was delivered through two vertical booms, each fitted with 2 ceramic yellow Albuz® hollow cone nozzles for a total of 44 gpa. Seven weekly evaluations of whitefly adults were made beginning 11 Oct by beating 1 side of 6 plants at 3 locations per plot with a 9 x 13 inch pie pan painted black and coated with a 9:1 mixture of vegetable oil and liquid detergent. Bacterial spot was rated weekly for 7 weeks on 25 plants from 4 Oct to 19 Nov. Ratings of 0-3 were assigned based on the following criteria per plant, 0 = no damage; 1 = 1-2 spots, light damage; 2 = 3-5 spots, moderate damage; 3 = > 5 spots, severe damage. Numbers of Southern and Beet armyworm larva were recorded on 25 plants in 4 weekly evaluations from 15 Oct to 4 Nov. Green peach aphids and broad mite infestations were evaluated in 3 weekly samplings from 28 Oct to 18 Nov on 25 plants per plot. The number of

plants with a total of 10 or more aphids from 3 expanded leaves per plant was recorded. Broad mites were evaluated by recording the number of plants that were showed moderate or severe broad mite damage. On 18 Nov a count from 25 plants per plot for ladybeetle adults and larvae was made. All fruit larger than 2 inches was harvested from 30 plants per plot on 3 Dec and again on 10 Jan 2005 from the same plants. Fruit was graded as marketable, unmarketable insect, unmarketable disease and unmarketable shape.

Pressure from whiteflies and armyworms was light. No significant treatment effects were observed in numbers of adult whiteflies over all sample dates. Most armyworms were observed on untreated plants, with none seen on plants receiving the highest (2%) rate of PureSpray Green Oil. However, about 10 times more untreated plants were seen with moderate to heavy broadmite damage than treated plants, with no significant differences between rates of oil. Fewest aphids were seen on plants treated with the 2% rate of oil, but there was no difference between the 1% rate and the untreated check. That may have been because the lack of treatment was compensated by a higher ladybeetle population on untreated plants compared to treated plants. Most bacterial spot was seen on plants treated with 2% oil, with no difference among the other rates or between them and the check. In terms of number, greatest yield came from plants treated at the 2% rate, and fewest from plants treated at the 1% rate. In terms of weight, plants treated at 0.5% produced most, but not different from other treatments accept 1% oil. Culls considered unmarketable because of disease were least prevalent from plants treated with 2% oil.

Table 1

Treatment/ formulation	Rate amt form/acre	Mean over all dates						
		Whitefly Adults	Armyworms ²	Broad mites ³	Aphids ⁴	Ladybeetle larvae ⁵	Ladybeetle adults ⁴	Bacterial Spot
Untreated Check		1.2a	1.7a	35a	66a	0.35a	0.38a	0.27b
PureSpray Green Oil	0.5 % v/v	1.7a	0.7b	3b	33b	0.02b	0.02b	0.26b
PureSpray Green Oil	1.0 % v/v	1.7a	0.2b	7b	60ab	0.05b	0.02b	0.31b
PureSpray Green Oil	2.0% v/v	1.8a	0.0b	3b	18c	0.00b	0.02b	0.56a

Means in columns followed by the same letter are not significantly different (LSD, P<0.05)

¹Total from beating 1 side of 6 plants

²Total per plant, total over 4 dates

³Percentage of plants with moderate or more damage, mean over 3 dates

⁴Percentage of plants with 10 or more aphids, mean over 3 dates

⁵Number of larva observed from 3 leaves per plant, 18 Nov

⁶Number of adults observed from 3 leaves per plant, 18 Nov

Table 2

Treatment/ formulation	Rate amt form/acre	Harvest ¹				
		Marketable		Insect	Disease	Shape
		number	weight (lbs)	number	number	number
Untreated Check		98.3bc	36.0ab	0.0b	5.8ab	14.3ab
PureSpray Green Oil	0.5 % v/v	129.8ab	48.7a	0.8ab	4.0bc	11.5ab
PureSpray Green Oil	1.0 % v/v	93.3c	29.3b	1.5a	7.5a	9.8b
PureSpray Green Oil	2.0% v/v	132.5a	41.3ab	0.8ab	3.5c	22.0a

Means in columns followed by the same letter are not significantly different (LSD, P<0.05)

¹Combined totals from 2 harvests

Part II: Materials Tested for Arthropod Management

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Common name	Trade name/ Cultivar	Concentration/ Formulation	Chemical name/resistance	Manufacture/source
horticultural oil	PureSpray Green Oil	100%L	Mixed hydrocarbons, principally aliphatic derived from petroleum (mineral sources) or vegetable matter; largely saturated they may include a percentage of unsaturated or of aromatic hydrocarbons	Petro-Canada P.O. Box 2844 Calgary, Alberta T2P 3E3