EVALUATION OF STAN (NEMATICIDE SEED TREATMENT) FOR NEMATODE CONTROL ON CUCUMBER

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Introduction

Cucumbers are very susceptible to parasitism by the southern root-knot nematode, *Meloidogyne incognita*. Severe infection reduces the root system and galled roots with a disorganized vascular system are impeded in water and nutrient uptake. Delaying nematode penetration during the highly sensitive seedling stage is often sufficient for establishment of a vigorous root system. Syngenta Crop Protection has been developing the use of a microbially derived nematicide, abamectin, as a seed treatment for control of nematodes. STAN is an acronym for Seed Treatment Against Nematodes and is based on abamectin. The following test was initiated to evaluate the potential of different application rates of STAN to provide early growth protection against root-knot nematode on cucumber.

Materials and Methods

The study was located at the Blackshank Farm, CPES, Tifton, GA. The area had a history of soybeans, tobacco, and assorted vegetables. The area was prepared using all current University of Georgia Extension Service recommendations. Plots were arranged in randomized complete blocks consisting of single bed plots replicated five times. Each plot was 30 feet long and 30 in wide. All test plots were covered with black polyethylene mulch with drip tape in the center of the bed approximately 1 in. deep. Seed treatments were applied by Syngenta and included abamectin (A14024) and fungicide (Apron and Maxim) coatings (Table 1). Nematicide standards (Vydate and Nemacur) were applied through the drip irrigation system shortly after planting (August 23), using a CO_2-powered injection unit coupled to a proportioning valve that mixed dilute chemical solution into lines connected to individual plots.

Cucumber seeds, 'Vlasic, were seeded by hand on 20 August, 2004. Holes were made in plots next to the drip tape with a transplanting wheel equipped with 3" hole-openers spaced 12" apart; soil was added to holes to bring depth to ~ 1 in., after which seeds were planted and covered.

As per the recommendation of the University Of Georgia Extension service, all plots received 700 lbs. of fertilizer (10-10-10) incorporated prior to planting. Additional fertilizer was added biweekly in the form of liquid fertilizer (4-0-8 at 4 lbs N/day) injected through the irrigation tubing during the growing season. All plots were sprayed with Bravo 720 (2 pts/A on 15 April, 7 and 17 May), Quadris (10 oz/A on 26 April) for control of foliar diseases, and Avaunt (3 oz./A on 15 April), Lannate (1 pt/A on 26 April

and 7 and 28 May) and Asana XL (10 oz./A on 17 May) for insect control. Ridomil Gold was applied at 1 pt/A to suppress root diseases caused by *Pythium* spp.

Stand counts were made to record live plants and plant vigor ratings were done starting at 14 days after planting. Plant vigor was rated on a 1 to 10 scale, 10 representing live and healthy plants and 1 representing dead plants.

Root gall evaluations were done at 2, 4 and 8 weeks after planting (WAP) on 3-6 plants per plot using a 0 to 10 scale, whereby, 0 = no galls, 1 = very few small galls, 2 = numerous small galls, 3 = numerous small galls of which some are grown together, 4 = numerous small and some big galls, 5 = 25 % of roots severely galled, 6 = 50 % of roots severely galled, 7 =75 % of roots severely galled, 8 = no healthy roots but plant is still green, 9 = roots rotting and plant dying, 10 = plant and roots dead.

All cucumber fruits were hand-harvested from the 10-ft center area of each bed (10 plants per plot). Each harvest was separated into marketable and cull fruits, counted, and weighed. There were two harvests, on 7 and 13 October.

All data collected was analyzed with an analysis of variance (P = 0.05) and means were separated using Duncan's Multiple range test.

Summary

The trial was initially seeded in early May, 2004. Heavy rainfall in June resulted in a complete loss of the trial to root and fruit rot caused by *Pythium aphanidermatum*; therefore, the trial was re-planted in late August. The area in which the trial was conducted had a moderate-to-high population of *Meloidogyne incognita*. In early root evaluations, A14024 (0.45 mg a.i./seed) + Apron/Dynasty had significantly less root galling than the untreated check and all rates of the A14024 + Apron/Maxim treatment, and did not differ from Vydate L (Table 1). Nemacur 3EC gave the greatest suppression of nematode galling, and did not differ from Vydate L. In subsequent evaluations, made at approximately 4 and 8 weeks after seeding, only Vydate L and Nemacur had significantly lower gall ratings or higher yields (marketable fruit) than the untreated control (Tables 1-2). Plant vigor at harvest was greater for Vydate L, Nemacur, and Apron/Maxim + A14024 (0.45 mg a.i./seed) compared to the untreated control. No differences in vigor were observed for these treatments and seed treated with Apron + Maxim (no A14024). Moderate phytotoxicity was observed with the two drip-applied nematicides at 2 weeks after seeding; however, plants had recovered by 4 weeks after seeding. No phytotoxicity was observed for any of the seed-applied materials at any application rate. In general, it appears that, at the rates tested, A14024 does not provide adequate levels of control of *M. incognita* on cucumber.

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Table 1. Effect of A14024 on Meloidogyne incognita on 'Vlasic' cucumber, Fall 2004, Tifton, GA.

Number	Treatment	Application		Gall Rating (0-10)	
		Type	Rate/A	Sept 14	Sept 24
1	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	6.0 a	7.0 abc
	Maxim 4FS	Seed	2.5 g a.i./100 kg seed		
2	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	5.7 a	7.6 a
	Maxim 4FS	Seed	2.5 g a.i./100 kg seed		
	A14024	Seed	0.3 mg a.i./seed		
3	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	4.9 a	6.8 abc
	Maxim 4FS	Seed	2.5 g a.i./100 kg seed		
	A14024	Seed	0.45 mg a.i./seed		
4	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	5.6 a	7.5 ab
	Maxim 4FS	Seed	2.5 g a.i./100 kg seed		
	A14024	Seed	0.60 mg a.i./seed		
5	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	3.1 b	6.2 bc
	Dynasty 0.83FS	Seed	2.5 g a.i./100 kg seed		
	A14024	Seed	0.45 mg a.i./seed		
6	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	2.1 bc	5.9 c
	Maxim 4FS	Seed	2.5 g a.i./100 kg seed		
	Vydate L	Soil	64 fl oz		
7	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	0.7 c	2.0 d
	Maxim 4FS	Seed	2.5 g a.i./100 kg seed		
	Nemacur 3EC	Soil	2 gal		
8	Untreated	-	-	5.7 a	7.4 ab

Table 2. Effect of A14024 on yield and vigor of 'Vlasic' cucumber, Fall 2004, Tifton, GA.

Number	Treatment	Application		Marketable Yield/plot	
		Type	Rate/A	Number	Weight
1	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	26 c	13.4 c
	Maxim 4FS	Seed	2.5 g a.i./100 kg seed		
2	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	24 c	13.4 c
	Maxim 4FS	Seed	2.5 g a.i./100 kg seed		
	A14024	Seed	0.3 mg a.i./seed		
3	Apron XL 3LS	Seed	7.25 g a.i./100 kg seed	49 abc	20.9 abc
	Maxim 4FS	Seed	2.5 g a.i./100 kg seed		
	A14024	Seed	0.45 mg a.i./seed		

4	Apron XL 3LS Maxim 4FS A14024	Seed Seed Seed	7.25 g a.i./100 kg seed 2.5 g a.i./100 kg seed 0.60 mg a.i./seed	36 bc	15.4 bc
5	Apron XL 3LS Dynasty 0.83FS A14024	Seed Seed Seed	7.25 g a.i./100 kg seed 2.5 g a.i./100 kg seed 0.45 mg a.i./seed	40 abc	18.4 abc
6	Apron XL 3LS Maxim 4FS Vydate L	Seed Seed Soil	7.25 g a.i./100 kg seed 2.5 g a.i./100 kg seed 64 fl oz	61 ab	31.0 ab
7	Apron XL 3LS Maxim 4FS Nemacur 3EC	Seed Seed Soil	7.25 g a.i./100 kg seed 2.5 g a.i./100 kg seed 2 gal	63 a	33.0 a
8	Untreated	-	-	24 c	11.3 c