

## Almond Nematode Sample Interpretation

per 500 cc soil  
(approx 12 ounces)

**ID SERVICES LLC**

Root Knot *Meloidogyne* spp, first 2 years and replant only.

Larvae active at 55° F after planting.

	Tolerant Population	Possible Economic	Probable Economic
	Level	Injury	Root Damage
	0-10	11-25	26+
Expect	10-20% Summer mortality disked soil with moisture below 6"		
	60-80% Summer mortality dry open fallow		
	80-90% Summer mortality dry and wet fallow		
	80% Winter mortality Oct. 1 to March 1.		
	Nut grass, Bermuda grass and other weeds will reduce mortality levels.		

Lesion (*Pratylenchus vulnus*), Pre-plant, all soil types.

	Tolerant Population	Possible Economic	Probable Economic
	level	Injury	Root Damage
Years 1-4	<10	11-20	21+
5+ years	<20	21-40	40+

Ring (*Criconemella*): Sandy to Sandy Loam soil only

	Tolerant Population	Possible Economic	Probable Economic
	level	Injury	Root Damage
Preplant	1-5	6-20	21+
1-4 years	1-10	11-40	41+
5+ years	<20	21-50	40+

Note: Ring can induce Bacterial Canker which if present in a field can reduce threshold levels.

Dagger *Xiphenema americanum*, Years 1-6

	Tolerant Population	Possible Economic	Probable Economic
	level	Injury	Root Damage
	0-10	10-25	26+

Bacterial and Fungal Feeding Beneficial Nematodes

Low Population	Moderate Population	High Population
0-100	101-300	300+

At 300 Bacterial + Fungal/500 cc, soil nutrient cycling may be sufficient for profitable production with reduced fertilizer input.

Nemaguard and Hybrid, ID Services levels only. Not documented by UC research.

Actual numbers nematodes SF extraction, no adjustments for extraction efficiency.

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## Grape Nematode Sample Interpretation

per 500 cc soil  
(approx 12 ounces)

	<u>Low Population</u> Oct-March; March-Oct.		<u>Medium Population</u> Oct-March; March-Oct.		<u>High Population</u> Oct-March; March-Oct.	
Root Knot <i>Meloidogyne</i>	<53	<18	53-358	18-143	>358	>143
Dagger X. <u><i>americanum</i></u>	<15		15-143	15-72	>143	>72
Dagger X. <u><i>index</i></u> *	<15		15-143		>143	
Lesion <u><i>Pratylenchus vulnus</i></u> ,	<15		15-72		>72	
Citrus Tylenchorhynchus	<37		37-358		>358	
Stubby Root <i>Trichodorus</i>	<15		15-143		>143	
Ring <i>Criconemella</i>	<37		37-358		>358	
Spiral <i>Helioctylenchus</i>	<37		37-358		>358	
Pin <i>Paratylenchus</i> ;			72-717		>717	
economic damage potential pre-plant only.						
Phylloxera; adults, nymphs, eggs			2-17		>17	

University of California, "Grape Pest Management Guidelines (age 286)". Table adapted to 500 cc.

\*Dagger *index*; vectors Fan Leaf Virus, if this nematode is detected then check the vineyard for symptoms of the virus.

If several different types of nematodes are recovered from the same sample there could be an additive effect upon the vines.

Weak vines may have low counts due to a depleted root carbohydrate nematode food source.

Samples taken from moderately growing vines near weak vines will frequently have higher counts.

The Sugar Flotation (SF) extraction method works best for Phylloxera, Root Knot, Citrus, Ring Dagger, and Needle nematodes.

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**Potato Nematode Sample Interpretation**  
per 500 cc soil  
(approx 12 ounces)

	Light Population	Moderate Population	Heavy Population
Lesion, <i>Pratylenchus</i> spp	0-5	5-15	15+
Root Knot, <i>Meloidogyne</i> spp	0-5	5-25	25+
Stubby Root, <i>Trichodorus</i> & <i>Paratrichodorus</i>	0-5	5-10	10+

These are ID Services, LLC nematode thresholds, they are not University of California thresholds. No adjustments for extraction efficiency.

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## Stone Fruit Nematode Sample Interpretation

per 500 cc soil  
(approx 12 ounces)

Root Knot *Meloidogyne* spp first 2 years and replant only.  
Larvae active at 55° F after planting.

Tolerant Population Level	Possible Economic Injury	Probable Economic Root Damage
0-10	11-25	26+

Based upon timing of pre-plant sampling expect:

10-20% Summer mortality disked soil with moisture below 6"

60-80% Summer mortality dry open fallow

80-90% Summer mortality dry and wet fallow

80% Winter mortality Oct. 1 to March 1.

Nut grass, Bermuda grass and other weeds will reduce mortality levels.

Lesion (*Pratylenchus vulnus*),

	Tolerant Population level	Possible Economic Injury	Probable Economic Root Damage
Years 1-4	<10	11-20	21+
5+ years	<20	21-40	40+

Ring *Criconebella* spp: Sandy to Sandy Loam soil only

	Tolerant Population level	Possible Economic Injury	Probable Economic Root Damage
Preplant	1-5	6-20	21+
1-4 years	1-10	11-40	41+
5+ years	<20	21-50	40+

Note: Ring can induce Bacterial Canker which if present in a field can reduce threshold levels.

Dagger *Xiphenema americanum*, Years 1-6

Tolerant Population level	Possible Economic Injury	Probable Economic Root Damage
0-10	10-25	26+

Bacterial and Fungal Feeding Beneficial Nematodes

Low Population 0-100	Moderate Population 101-300	High Population 300+
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At 300 Bacterial + Fungal/500 cc, soil nutrient cycling may be sufficient for profitable production with reduced fertilizer input.

Nemaguard and Hybrid rootstock, ID Services levels only. Not documented by UC research.

Actual numbers nematodes SF extraction, no adjustments for extraction efficiency.

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## Sweet Cherry Nematode Sample Interpretation

per 500 cc soil  
(approx 12 ounces)

Root Knot (*Meloidogyne* spp) first 2 years and replant only.  
Larvae active at 55° F after planting.

Tolerant Population	Possible Economic	Probable Economic
Level	Injury	Root Damage
0-10	11-25	26+

Based upon timing of pre-plant sampling expect:

10-20% Summer mortality disked soil with moisture below 6"

60-80% Summer mortality dry open fallow

80-90% Summer mortality dry and wet fallow

80% Winter mortality Oct. 1 to March 1.

Nut grass, Bermuda grass and other weeds will reduce mortality levels.

Lesion (*Pratylenchus thornei*), lesion root damage is magnified by diseases that they vector

	Tolerant Population	Possible Economic	Probable Economic
	level	Injury	Root Damage
Years 1-4	<10	11-20	21+
5+ years	<20	21-40	40+

Ring (*Criconebella* spp): Sandy to Sandy Loam soil only

	Tolerant Population	Possible Economic	Probable Economic
	level	Injury	Root Damage
Preplant	1-5	6-20	21+
1-4 years	1-10	11-40	41+
5+ years	<20	21-50	40+

Note: Ring can induce Bacterial Canker which if present in a field can reduce threshold levels.

Dagger *Xiphenema americanum*, Years 1-6

Tolerant Population	Possible Economic	Probable Economic
level	Injury	Root Damage
0-10	10-25	26+

Bacterial and Fungal Feeding Beneficial Nematodes

Low Population	Moderate Population	High Population
0-100	101-300	300+

At 300 Bacterial + Fungal/500 cc, soil nutrient cycling may be sufficient for profitable production with reduced fertilizer inputs.

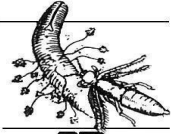
ID Services levels only. Not documented by UC research.

Using actual numbers nematodes by SF extraction, no adjustments for extraction efficiency.

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**ID**  
**SERVICES LLC**

**Field Grown Fresh Market Tomato  
Nematode Sample Interpretation**  
per 500 cc soil  
(approx 12 ounces)

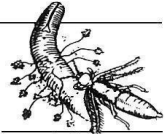
<u>Nematode</u>	<u>Economic Damage Potential</u>	<u>Detections per Field or Block</u>	<u>Nematodes per Sample</u>
Root Knot Meloidogyne spp larvae	<u>High</u> Resistant variety and/or fumigation required.	Greater than 1 positive sample	Greater than 10
	<u>Avoidable damage</u> Nematodes manageable by constant monitoring and timely applications of nematicides, or biological suppressants. Resistant varieties recommended.	1 positive sample	1-9
	<u>Safe</u> Non resistant varieties without fumigation, unless prior experience or field histories have indicated Root Knot damage potential. It is prudent to monitor root system development up to peak flower to catch any potential problems.	0 positive samples	0
Lesion spp Pratylenchus Lesion nematodes are associated with the Corky Root complex.	Economic Damage 10-15% yield loss Fumigate for Corky Root pathogens and nematodes, if Corky Root has been a problem in the past.	50% or more samples positive	Greater than 20
	Economic Damage 1-10% Timely apply contact nematicides at first Corky Root symptom detection	15-49% of samples positive	10-20
	<u>Safe</u> Monitor Root system development up to peak flower.	<15% positive	0-9

\*\*Fresh market tomatoes should be sampled at 1 sample per 6-8 acres. One sample consists of 16 cores, taken in a zig-zag pattern across the sample area. Cores are obtained from 0-15" deep near center of bed. Avoid hitting drip tape when sampling.

These are ID Services Nematode Laboratory thresholds. They are not University of California thresholds.

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## Walnut Nematode Sample Interpretation

per 500 cc soil  
(approx 12 ounces)

**ID**  
**SERVICES LLC**

Root Knot *Melodogyne* spp, first 2 years and re-plant only.  
Larvae active at 55° F after planting.

Tolerant Population Level	Possible Economic Injury	Probable Economic Root Damage
0-10	11-25	26+

Based upon timing of pre-plant sampling expect:

10-20% Summer mortality disked soil with moisture below 6"

60-80% Summer mortality dry open fallow

80-90% Summer mortality dry and wet fallow

80% Winter mortality Oct. 1 to March 1.

Nut grass, Bermuda grass and other weeds will reduce mortality levels.

Lesion (*Pratylenchus vulnus*), Pre-plant, all soil types.

	Tolerant Population level	Possible Economic Injury	Probable Economic Root Damage
Years 1-4	<1	1-20	21+
5+ years	<20	21-40	40+

Ring criconemella spp: Sandy to Sandy Loam soil only

	Tolerant Population level	Possible Economic Injury	Probable Economic Root Damage
Preplant	1-5	6-20	21+
1-4 years	1-10	11-40	41+
5+ years	<20	21-50	40+

Dagger *Xiphinema americanum*, Years 1-6

	Tolerant Population level	Possible Economic Injury	Probable Economic Root Damage
	0-10	10-25	26+

Bacterial and Fungal Feeding Beneficial Nematodes

Low Population	Moderate Population	High Population
0-100	101-300	300+

At 300 Bacterial + Fungal/500 cc, soil nutrient cycling may be sufficient for profitable production with reduced fertilizer input.

Nemaguard and Hybrid rootstock, ID Services levels only. Not documented by UC research. Actual numbers nematodes SF extraction, no adjustments for extraction efficiency.

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## Spiral Nematode *Helicotylenchus* spp

Almonds and Permanent Plantings

Almonds are a host and can be damaged by high numbers of Spiral nematodes. Spiral nematodes are generally considered migratory ectoparasites although some may enter the roots and stay still and feed. They have a short stylet which allows them to feed upon root hairs in the epidermal layers. Their feeding results in cortical lesions upon the roots.

The feeding of the Spiral nematode may not result in visual root symptoms. Feeding by high numbers of Spiral nematodes can cause reduced growth and stunting.

Spiral nematodes are spotty in their distribution throughout California. They are found in both permanent and annual crops. High numbers can be found in almonds, grapes, pomegranates and tomatoes.

Preplant management should be conducted upon populations greater than 10/500 cc or when a general distribution is found in the field, for example 3 or more positive samples per 10 samples taken per field.

Post plant management should be conducted upon populations greater than 25/500 cc. Since Spiral nematodes are mainly located in the soil, they are susceptible to contact materials that are applied through the water.



## Pin Nematode Information

Paratylenchus Sp.

Pin nematodes are a small slow moving nematode. They have a large stylet that looks like a sewing pin. They can reproduce fast.

Many times I asked Dr. McKenry, retired Extension Nematologist, about the affects of Pin nematodes. He said that in his trials he could not demonstrate economic injury caused by Pin nematodes.

Pin nematodes are very common in the Central Valley and Central Coast. I have seen populations as high as 12,000 per 500 cc in wine grapes. Pin nematodes are obligate parasites. They must feed upon roots to survive. For the most part, they do not live on annual weeds, Nutgrass or Bermuda Grass. They can live on alfalfa.

Pin nematodes in almonds and stone fruit are very common. Due to Dr. McKenry's comments, I do not recommend preplant fumigation solely for Pin nematodes.

Pin nematodes may indicate the potential of 'Replant Syndrome'. Replant Syndrome is a moving target that cannot be accurately predicated by sampling. High levels of Pin nematodes are associated with a mature soil ecosystem. Complexities in a soil ecosystem are sometimes blamed for Replant Syndrome'.

Pin nematode population levels:

	High	Medium	Low
Bearing Almonds and Stone Fruit	200+	50+	less than 50
Bearing Table Grape	200+	50+	less than 50
Bearing Raisin, Wine Grape	300+	200+	less than 50
Preplant Woody Crop	50+ Potential for Replant Syndrome		

There is no threshold for Roses, for export. Many countries consider Pin a quarantine pest and refuse shipments of plants when Pin nematodes are recovered.

Pin nematodes can be found two years after Methyl Bromide and Telone fumigants. They are though little buggers.