OMAFRA
Crop Technology

Managing Cover Crops for Nematode Suppression

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Introduction

The root lesion (*Pratylenchus penetrans*) nematode is considered the most economically important plant parasitic nematode in fruit and vegetable production in Ontario. Economic threshold levels range from 1000 root lesion nematodes/kg soil for vegetable to as few as 500/kg of soil in strawberry. Damage caused by root lesion nematodes can provide an infection site for other pathogenic organisms which further reduce yields.

Chemical fumigation of soil effectively controls nematode populations in high valued crops. However, soil fumigants may be significantly restricted or eliminated in the future due to their negative impact on the environment. The use of nematode suppressing cover crops has been shown to reduce plant parasitic nematode soil populations when grown in rotation with high valued horticulture crops.

1999 and 2000 Trials

Marigold cv. Crackerjack*, Canadian forage pearl millet 101** and Canadian hybrid forage sorghum 17** (Figure 1) were planted in Randomized blocks at 7 sites (2 replications/site) in 1999 and 3 sites (3 replications/site) in 2000 located across southern and eastern Ontario. The cover crops were planted in late May or early June with various grain drills available to growers (Table 1). The pearl millet and sorghum were fertilized with 50 kg/ha actual nitrogen during mid July.

Table 1. Seeding rate and planting depth of cover crops with 7 inch row spacing.

Cover Crop	Seeding Rate kg/ha (lbs./acre)	Seeding Depth cm (inches)
Canadian hybrid forage sorghum 17	15 (13.5)	2-2.5 (1)
Canadian forage pearl millet 101	12 (10)	1.5 (0.5)
Marigold cv. Crackerjack	1.3 (1.1)	1 (0.25 – 0.5)

Planting

Sorghum and pearl millet flowed easily through the grain drill tubes resulting in uniform plant stands. Excellent results have also been achieved with a grass seeder attachment at the front of grain drills. The stick-like marigold seed did not flow consistently through the grain drill tubes resulting in uneven seed distribution and poor plant stands in 1999. Mixing the marigold seed with dried parboiled rice at one site in 1999 or adjusting the seed drill in 2000 helped the flow of the marigold seed through the seed tubes and resulted in more uniform marigold plant stands.

Planting into dry, friable soils during 1999 affected germination and reduced cover crop stand density (Figure 2). Wet conditions experienced during the spring of 2000 and planting the cover crops in a firm seedbed to improved seed depth placement, resulted in a more uniform crop stand than in the 1999 trails (Figure 2).

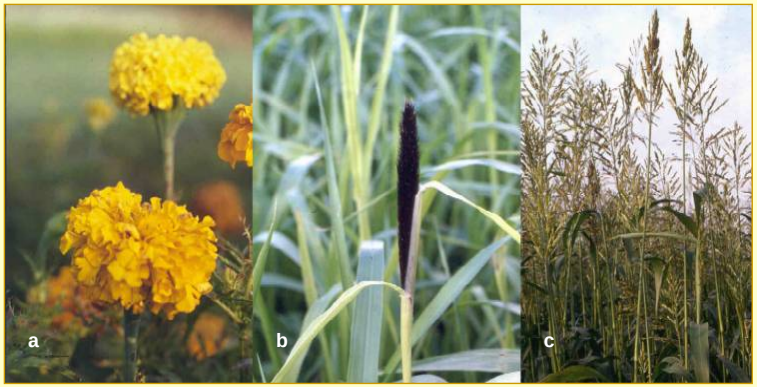

Figure 1. Marigold cv. Crackerjack (a), Canadian forage pearl millet 101 (b) and Canadian forage hybrid sorghum 17 (c) cover crops.

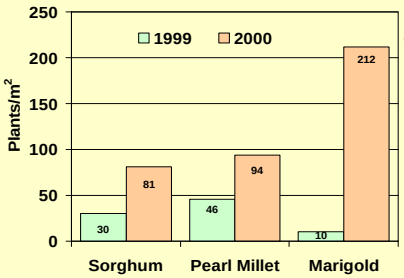

Figure 2. Plant density of cover crops planted in 1999 and 2000 trials.

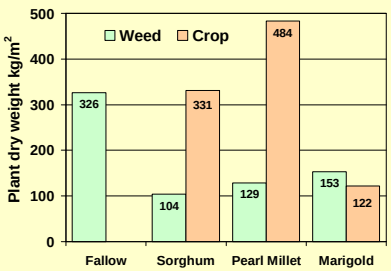

Figure 3. Biomass of cover crops and weeds in 1999 trials.

Figure 4. Pearl millet competing with dense weed population (a). A weed free stand of pearl millet is important for successful nematode suppression (b).

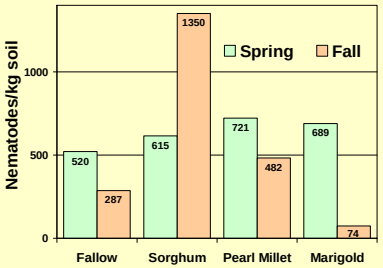

Figure 5. Root lesion nematode soil populations during the spring prior to planting and fall following fallow, sorghum, pearl millet and marigold.

Weed Control and Competition

Early weed control is challenging but necessary to achieve nematode suppression from these cover crops. A stale seedbed planting technique, where weeds were encouraged to germinate by spring tillage well in advance of seeding date, and killed off with glyphosate just before seeding, gave the best weed control during 2000. This is the only recommended system for marigolds as no postemergent herbicides are currently registered on this crop. Recently registered postemergent herbicides (Table 2.) will also give effective broadleaf weed control in forage sorghum and pearl millet.

Table 2. Post emergent herbicides registered for broadleaf weed control in forage pearl millet and sorghum.

Herbicide	Product Rate L or g/ha (L or kg/acre)	Growth Stage of Cover Crop	Weeds Controlled
IPCO 2,4-D Amine 600	0.5L - 1L (0.2L to 0.4L)	4 - 6 leaves	broadleaf weeds
Basagran Forte	1.75L - 2.25L (0.7L - 0.9 L)	3 - 6 leaves	broadleaf weeds and yellow nutsedge
Pardner	1.0L (0.4L)	> 4 leaves, but < 20 cm	broadleaf weeds
PeakPlus	13.3kg (5.3kg)	3 - 5 leaves	broadleaf weeds

Pearl millet and sorghum produced higher plant biomass than weeds in 1999 (Figure 3) and competed very well with weeds once they became established (Figure 4). Marigolds did not compete well with weeds. Sorghum and pearl millet were mowed to 20-25 cm (8–10 inches) when they reached 1 meters (3 ft.) in height, to stimulated tillering, rapid growth and further improved their competitiveness with weeds. Both forage sorghum and pearl millet are excellent for improving soil organic matter when used as a plough down crop.

Nematode Suppression

Nematodes soil population levels were assessed*** from soil sampled in the spring prior to seeding and during the fall. The low plant densities and high weed populations influenced the nematode suppression in the 1999 trials. Some broadleaf weeds observed in the 1999 trials are host for root lesion nematodes. Marigold cv. Crackerjack significantly reduced root lesion nematode populations in the 2000 trials (Figure 5). Forage pearl millet 101 and fallow also reduced root lesion nematode populations in the 2000 trials. Root lesion nematode soil populations increased in the forage sorghum.

Growing cover crops in rotation with high value crops should be integrated with other nematode management methods. Marigold cv. Crackerjack and Canadian Forage Pearl Millet 101 have great potential for root lesion nematode management when properly managed. Seeding rates, planting into a firm seed bed and early weed control are critical to achieve adequate plant density and successful nematode suppression.

Acknowledgements: Maribeth Fitts and Kevin Schooley formerly with OMAFRA; Ontario Berry Growers Association; Dr. John Potter, Agriculture and Agri-Food Canada, Vineland, Ontario; Dr. John O'Sullivan, University of Guelph, Simcoe, Ontario; *Stokes Seed Inc., St. Catharines, Ontario; **Dr. Om P. Dangi, Agriculture Environmental Renewal Canada Inc., Nepean Ontario; ***Christine Blaser, Pest Diagnostic Clinic, University of Guelph, Guelph, Ontario