Use of Cover Crops and Other Sustainable Practices in Field Production Nurseries

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Overall goal: To increase the adoption of cover crop and other sustainable practices in MD nurseries to improve pest management, soil quality, and plant health.

Background: Use of cover crops and other sustainable practices has become increasingly popular in traditional agriculture. Nursery professionals need research based information on best management practices that encourage sustainability and economic profit. Therefore, in collaboration with **Raemelton Farm**, **Ruppert Nursery**, and **D.R. Snell Nursery** we conducted research projects that evaluated and demonstrated the use of various sustainable practices.

Forage radish is a winter annual that alleviates soil compaction, suppresses weeds and nematodes, and adds organic matter to soil.

Specific practices evaluated:

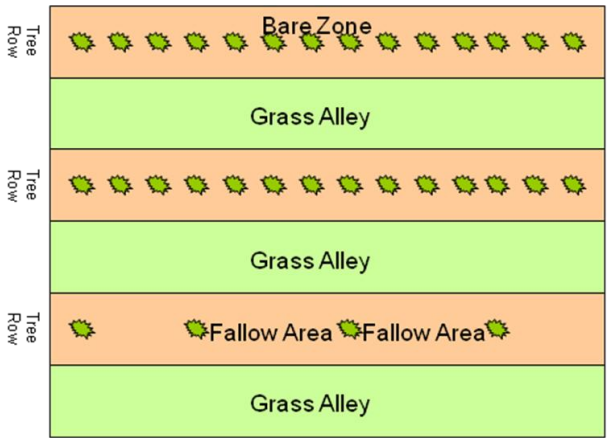
1. The use of cover crops and insectary plants in tree row bare zones, fallow areas of tree rows, and open fields (pest management of insects and weeds, soil quality).

2. The use of varying turfgrass types in grass alleys (establishment, mowing frequency).

3. Rotation of tree rows and grass alleys at field replant (soil quality)

Areas in nurseries where cover crops were evaluated:

1. Tree row bare zone areas
2. Tree row fallow areas
3. Open fields where trees will eventually be planted
4. Grass alleys



Cover Crop Evaluation – Fall 2008 - 2010

Potential benefits of cover crops and insectary plants:

- Attract and retain natural enemies and beneficials by providing alternative food such as floral resources and prey, and vegetation complexity for refuge
- Reduce pest insect / mite abundance and damage
- Suppress plant parasitic nematodes
- Weed suppression via living cover crops and crop residues
- Increase organic matter for soil improvement
- Provide root penetration to alleviate soil compaction
- Improve water infiltration
- Reduce soil erosion
- Addition of nitrogen (N) by N-fixing legume cover crops
- Alters nitrogen cycling by taking up N in the fall (likely reducing N leaching) and releasing it in the spring when trees and shrubs need N

Crimson clover is a winter annual legume that blooms in early spring, attracts pollinators and natural enemies, suppresses weeds, and fixes nitrogen in the soil.

Cover Crop Species Evaluated

Forage Radish, *Raphanus sativus*

- Winter annual (plant by Aug 30th)
- Alleviate soil compaction
- Weed suppression
- Adds organic matter for soil improvement
- Use N in fall, release in spring
- Tops grow ~ 18-24", roots up to 6'



Austrian Winter Pea, *Pisum arvense*

- Cool season annual legume
- Attracts natural enemies early in season
- Fixes N
- Weed suppression
- Grows to 3' with support, or hugs ground

Cowpea, *Vigna unguiculata* 'Iron & Clay'

- Warm season annual legume
- Attracts natural enemies, extra-floral nectaries
- Weed suppression
- Some nematocidal effect
- Adds N (N-fixing)
- Adds organic matter
- Grows to 18-24"

Crimson Clover, *Trifolium incarnatum* 'Dixie'

- Winter annual legume, early spring bloom
- Attracts natural enemies
- Weed suppression (fall and spring)
- Source of N summer, OM break down
- Increased P availability
- Grows to ~18", reseeds

Buckwheat, *Fagopyrum esculentum*

- Warm season annual, long bloom
- Attracts natural enemies, high nectar
- Weed suppression
- Adds organic matter
- Increased P and Ca availability
- Grows 1-3'


Alysum, *Lobularia maritima*

- Annual, small white flowers in summer
- Low growing, ~4-8" height
- Known to attract to natural enemies

Low Growing Clover mix

- New Zealand white clover (70%)
- Strawberry red clover (30%)
- Perennial legume (fall or spring seed)
- Attracts natural enemies
- Reduces soil compaction and erosion
- Adds N (N-fixing)
- Tolerates equipment wear
- Grows to 16"

Low Growing Good Bug Blend

- Mix of annuals and perennials
- Attracts natural enemies (extended bloom)
- Adds N and organic matter
- Grows to 2'

Sudex (Sudan x Sorgham hybrid)

- Highly branched roots
- High biomass, max 15-20,000 lb/acre
- Accumulates nitrate
- Fibrous biomass accumulates late in summer season

Sunnhemp, *Crotalaria juncea* 'Tropic Sun'

- Summer annual legume
- Grows up to 6' tall
- Adds N (N-fixing) and organic matter
- Loosens subsoil
- Reduces soil erosion
- Weed suppression
- Prevents plant parasitic nematodes

Dwarf Sunflower, *Helianthus annuus* 'Sunspot'

- Attracts beneficials
- Annual, blooms mid-summer to early fall
- Grows to ~ 2' - 2.5'

Coriander (Cilantro), *Coriander sativum*

- Attracts beneficials
- Annual, blooms mid-summer, reseeds
- Grows to ~ 20" – 30"
- Herb for cooking

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GRASS ALLEYS:

- Tall fescue mix
- Fine fescue mix
- No-mow mix (5 varieties)
- w/ and w/out NZ white clover
- w/ and w/out Birds foot trefoil

Cover Crop Summary:

- Seeding method, establishment and weed competition are issues to be addressed
- Tree row bare zones –
    - Forage radish (fall) followed in spring by buckwheat, or cowpea
        - FR little residue in spring, weed suppression through early spring
    - Crimson clover (fall planting) followed by early summer planting of buckwheat
        - CC flowers in spring, and heavy residue by early summer, weed suppression
- Fallow areas of tree rows –
    - Long term cover - Perennial grass mixed with clover or birds foot trefoil
    - Temporary cover - Austrian winter pea (annual w/ spring cover), cowpea (summer annual), buckwheat (summer annual), or forage radish(fall cover, winter killed)
- Open fields – both Sudex and Sunnhemp performed well, needs cutting; fall forage radish

Grass Alley Summary (Raemelton Nursery):

- All established well
- Tall fescue required more mowing than fine fescue mix or no-mow mix
- Seed heads – No-mow mix had 5 varieties / cultivars and seed heads present at varying times. More mowing to remove seed heads.
- S. Black –
    - Year 1 requires additional mowing to reduce weeds
    - Single species or cultivar of a fine / hard fescue is better than a mix (seed heads present all at one time, one mowing to remove.
    - Fall 2010 Creeping Red Fescue 'Foxfire' (2 mows to date vs 4 mows in tall fescue alleys)

Soil Quality in Grass Alley vs Tree Rows (after 5 years) Summary:

- Higher organic matter and soil carbon
- Faster infiltration rate
- Better soil structure / aggregate stability
- More earthworms

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