

Millet Cover Crops in a Potato Rotation

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In an effort to improve soil health in potato production systems, Michigan State University Extension (MSUE) and the Upper Peninsula Research and Extension Center (UPREC) have been investigating cover cropping. Previous research has shown including Pearl millet in a potato rotation may help control root lesion nematode (Sritharan, R. et al, 2006), a common pest in potatoes. Millet also produces a tremendous amount of biomass, contributing carbon to soil organic matter.

In 2018, MSU Extension, UPREC and a cooperating farm evaluated millet biomass accumulation across varieties and mowing regimes. Three pure millet varieties and two mixtures were planted on June 9, 2018 at Cousineau Potato Farm in Hardwood, MI. Three mowing regimes, Early + Late (7/6/18 + 8/31/18), Mid + Late (8/9/18 + 8/31/18) and Late (8/31/18) were replicated three times across a field previously in potatoes. The Early + Late and Mid + Late plots were mowed twice, but regrowth was negligible after the Mid mowing time. The Late mow time also terminated the cover crop. Nematode soil samples were taken at Late mowing with a soil probe, in a zig-zag sampling pattern with three samples taken per variety.

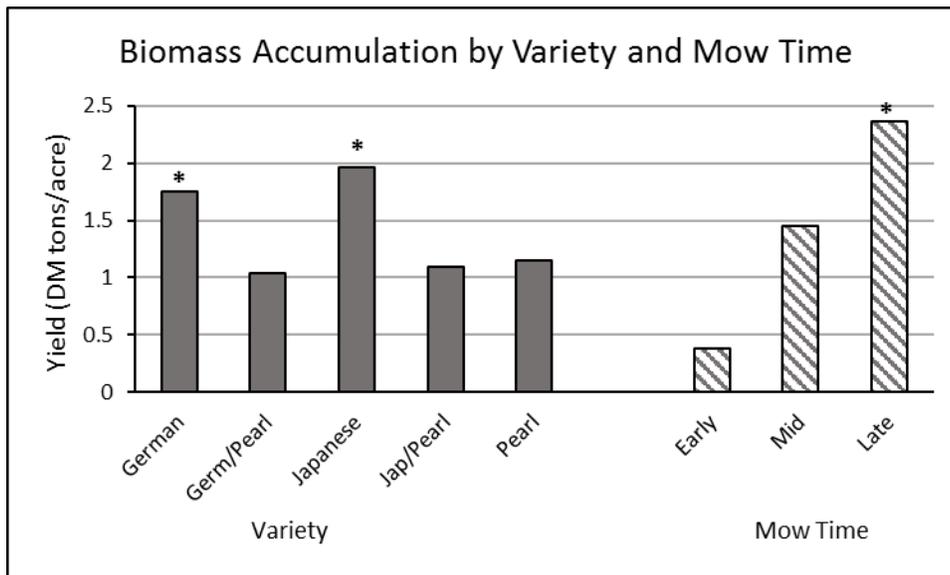


Figure 1. Biomass accumulation of millet by variety and time of mowing. *indicates best performing variety at a 5% level of significance

Averaged across all mow times, German and Japanese millet were the highest biomass producers (Figure 1). Evaluating yield by mow time across all varieties, the highest biomass accumulation was achieved by letting the cover crop grow all season (2.35 DM tons/acre; Figure 1).

RESEARCH AT A GLANCE

PURPOSE:

Compare millet cover crop varieties and mow times as a tool for nematode suppression and soil health improvement in Michigan potato production systems.

TRIAL LOCATION:

Cousineau Potato Farm
Hardwood, MI

Soil type: Emmet fine sandy loam

EXPERIMENTAL DESIGN:

Randomized complete block design with four replications

TRIAL ESTABLISHMENT:

- 3 millet varieties, 2 mixtures
- Planted June 9 at 30 pounds per acre, equal representation in mixtures by using seeds/lb.

RESULTS:

- Large varietal differences
- Consider residue management and seed cost

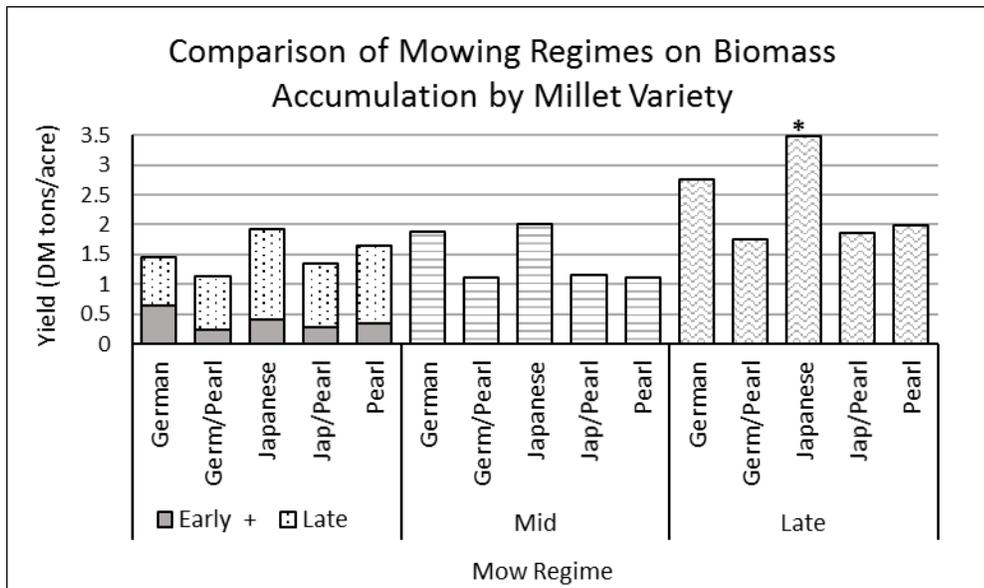


Figure 2. Biomass accumulation by variety and mowing regime used. *indicates best performing treatment at a 5% level of significance

Figure 2 summarizes the interaction of variety by the mowing regime used. The Japanese millet variety that grew all season yielded the greatest amount of biomass (3.47 DM tons/acre; Figure 2). Very little regrowth occurred with the Mid + Late mow treatment, so only Mid mowing biomass was measured (Figure 2). At the late-mowing, lodging was observed in the Japanese Millet plots. Residue management must be considered when planting millet as a cover crop. If less biomass is desired, then Pearl millet and mowing are

recommended. Note that growing degree day accumulation was slightly above normal, and precipitation was below normal for this site in 2018.

Root Lesion (RL) and Northern Root Knot (NRK) nematodes are detrimental to potato growth and development. No particular millet variety was found to have significantly lower RL or NRK nematode populations (Figure 3). Beneficial nematodes including Tylenchs, Aphelenchus, Bacterial Feeders and Oligochaetes were also evaluated by millet variety. Japanese and German millet varieties had a greater amount of beneficial nematodes than Pearl Millet (Figure 3). The mixtures were not included in the nematode soil testing.

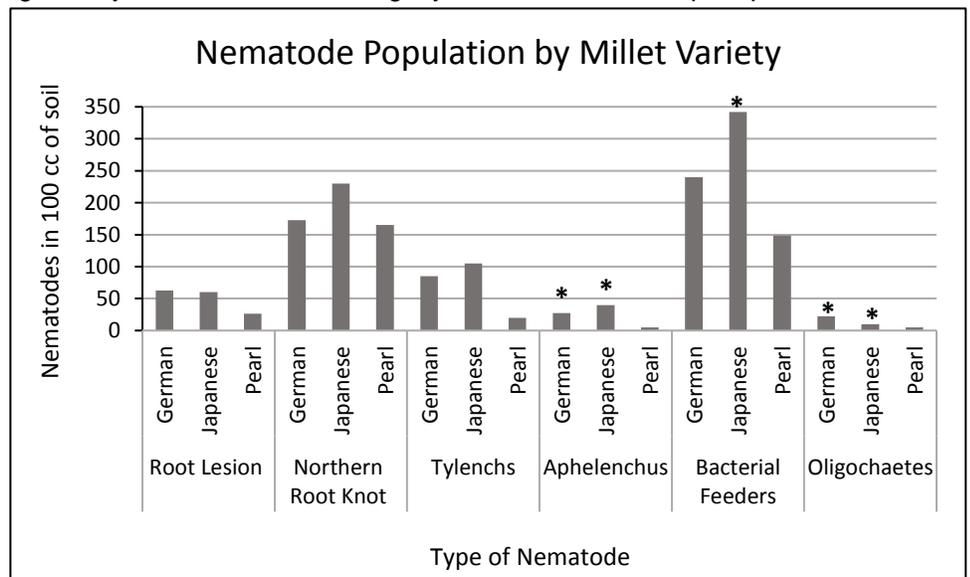


Figure 3. Summary of nematode populations including beneficial nematodes (Tylenchs, Aphelenchus, Bacterial Feeders and Oligochaetes) by millet varieties. *indicates significantly greater nematode population, Tukey method at 95% confidence.

Continuing to evaluate the impact cover crops have on soil health and Michigan cropping systems is a priority. This study will be continued in 2019, including yield and quality of potatoes planted into millet residue. We will also plant new millet plots and add a fallow control plot for evaluation in 2020.

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