Introduction

- Dry edible beans are planted in early to mid-June in Michigan, allowing time for the spring growth of overwintering cover crops
- Cover crops have the potential to decrease weed pressure in subsequent cash crops by reducing weed germination, growth, and seed inputs

Objective

- Determine the influence of cover crops on weed pressure (density and biomass) in organic dry beans

Materials & Methods

- Cover crops planted prior to dry beans (Figure 1):
  - Medium red clover ‘Marathon’ (11 kg/ha)
  - Oilseed radish ‘Groundhog’ (12 kg/ha)
  - Rye ‘Wheeler’ (100-125 kg/ha)
  - No cover
- Two-level experiment (RCBD at each level):
  - Main sites:
    - MSU research locations (East Lansing and Hickory Corners, MI)
    - Included all cover crops treatments
    - Total 6 site-years
  - Satellite sites:
    - MI organic farms (9 sites)
    - Included one cover crop and a no cover control at each site
    - Total 18 site-years
- Cover crop + pre-season weed biomass was collected at peak production (i.e. late-fall for radish, prior to spring incorporation for rye, clover, and no cover)
- Weed measurements:
  - Within-row weed density and dry aboveground biomass
  - Three quadrats per plot (15 cm by 76 cm)
  - Sampling times (based on bean stages):
    - V2 (appearance of first trifoliate)
    - R1 (appearance of first open flower)
  - Soil nitrogen was sampled at V2 and R1 at all locations

Results (Main sites)

- Oilseed radish did not influence weed biomass or density relative to the no cover treatment at Hickory Corners and East Lansing
- Rye rarely affected weed pressure, but did reduce weed biomass at 2 of 12 sample times compared to the no cover treatment
- At 4 of the 12 sample times, plots following a clover cover crop had greater weed biomass than all other cover treatments (E. Lansing Figure 3 b, Hickory Corners not shown)
- At 6 of the 12 sample times, plots following clover had higher weed densities than the no cover crop treatment, especially when common lambsquarters was prominent in the seedbank (Figure 3d, Figure 2)
- Greater weed pressure following clover may be related to increased nitrogen availability (Figure 3f,h)
- Differences in clover biomass in East Lansing and Harper 1965; Blackshaw et al. 2003
- Differences in weed biomass and density at satellite plots following clover were negligible possibly due to the lower clover biomass (ranging from 1,000 to 6,000 kg/ha).

Results (Satellite Sites)

- The peak cover crop biomass at the satellite sites was lower than the main sites for clover and oilseed radish, due to later planting dates (data not shown).
- There were few differences among cover crop treatments at the satellite sites with regards to weed biomass and density (data not shown).

Conclusions

- Weed biomass and density increased in dry bean following clover only when cover crop dry biomass was greater than 7,000 kg/ha. Increased nitrogen availability may increase common lambsquarters germination and growth (Williams and Harper 1965; Blackshaw et al. 2003)
- Oilseed radish and rye rarely influenced weed pressure.
- Differences in weed biomass and density at satellite plots following clover were negligible possibly due to the lower clover biomass (ranging from 1,000 to 6,000 kg/ha).