



# LIVING LAB - ATLANTIC

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## Does manure and cover cropping alter weed pressure?

Soil building practices such as cover cropping and manure application can improve soil structure, alter nutrient cycling, and build cropping system resiliency

Generally assumed, manure adds weed seeds and therefore may increase weed pressure in-season

Soil amendments such as manure can alter crop-weed competition dynamics through changes in nutrient availability

Cover crops can reduce the number of weed seeds returned to the seedbank by competing with weeds

Perennial cover crops and reduced tillage can promote declines in annual weed populations by preventing their establishment in rotation

We sought to evaluate the effects of manure application combined with annual and perennial cover crops on weed community dynamics both in season and in the weed seedbank

## Materials & Methods

Established 8, 3-year rotations (Table 1) consisting of annual and perennial cover crops sown in 2019

Cover crops were sown with and without 20 T ha<sup>-1</sup> of cattle manure applied in 2019 only. Forage was left to regrow in 2020 or annual crops were sown. Potato was planted to all plots in 2021 (Table 1).

We sampled the weed seedbank each year in the spring and crop and weed biomass during the cover crop phase in mid-August

Table 1: List of 3-year rotations evaluated with and without manure. Manure was applied in 2019 only. \*u.s. – underseeded; f.b. – followed by

2019	2020	2021
Barley u.s. Annual ryegrass	Sorghum f.b. Mustard	Potato
Barley u.s. Orchard grass & Alfalfa	Forage regrowth	Potato
Barley u.s. Orchard grass & Common vetch	Forage regrowth	Potato
Barley u.s. Annual ryegrass	Sorghum-sudangrass	Potato
Bromegrass, Orchard grass & Hairy vetch	Forage regrowth	Potato
Barley u.s. Red clover	Forage regrowth	Potato
Sorghum-sudangrass & Alfalfa	Forage regrowth	Potato
Barley u.s. Annual ryegrass	Pearl millet	Potato

## Results

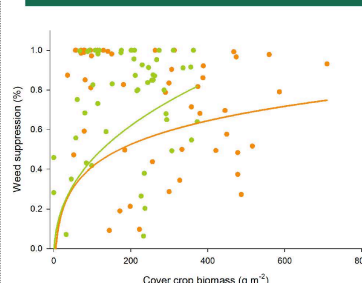


Fig 1. Relationship between cover crop biomass and weed suppression with (green) and without (orange) manure

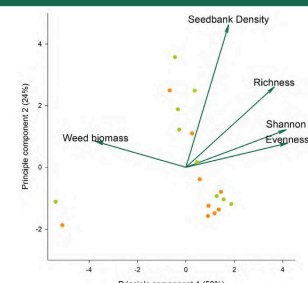


Fig 2. The relationship between weed biomass, seedbank density and seedbank diversity measures of richness, Shannon diversity and species evenness. Vectors in opposite directions indicate negative correlation. Perpendicular vectors indicate no correlation

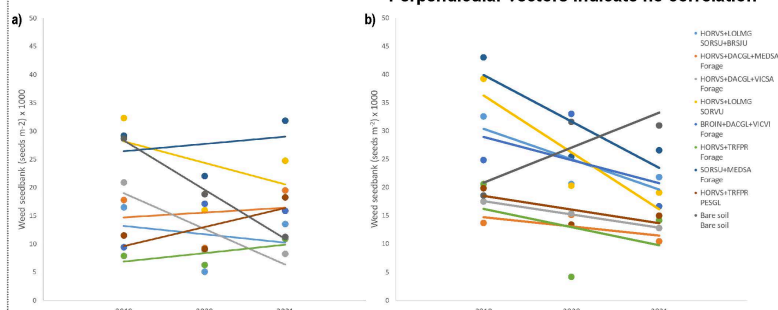


Fig 3. Weed seedbank density through time in (a) no manure and (b) manure plots. Treatments are labeled with EPPO codes

## Results

Manure added weed seeds and increased weed species richness

Manure did not increase weed pressure but improved competitive ability of cover crops (Fig 1)

Higher seedbank diversity was associated with decreased weed biomass in-season (Fig 2)

Without manure, weed seedbank density varied with cover crop treatment (Fig 3a)

Regardless of cover crop identity, weed seedbank density declined over time with the addition of manure (Fig 3b)

## Conclusions

Manure increases cover crop competitive ability, improving weed suppression to overcome added weed seeds

In the absence of herbicides, cover crops and manure can decrease weed pressure in subsequent seasons

