July 31, 2024

LIVING MULCH PROJECT (2021-2026)

- ✓ **Undersowing cash crops with living legume mulches could be a sustainable strategy for improving the quality of non-legume grain or forage crops**
- ✓ **Living legume mulches could provide an alternative to the lack of economic returns of green manure and the poor weed suppression ability of legumes**

Main objectives:

- To determine if living mulch can reduce weeds compared to sole crops, and in the following sole crop
- To determine the N benefit from legumes in a living mulch to the following sole crop
- To determine if crops grown with a living mulch have less disease than monocrops, and their effect on diseases in the following crop
- To determine biomass and grain yield/quality of crops in intercrops with a living mulch at various ratios compared to monocrops and of the following sole crop
- To determine the optimal seeding ratio of intercrops with a living mulch for achieving the greatest agronomic/economic benefit

Both clovers and cereals were seeded at the same time at different ratios:

Up to 2022: crimson clover (x100 to x150) + oat (x60 to x100)
crimson clover (x100 to x150) + wheat (x60 to x100)
subterranean clover (x150 to x200) + oat (x60 to x100)
subterranean clover (x150 to x200) + wheat (x60 to x100)

In 2023: Clover rates were increased, and a mixture of crimson and subterranean clovers was added.

In 2024: ***After the 2023 hail storm!***

Data from the 2022 trial:

Cereals/Clovers	Weed biomass (kg/ha)	Clover biomass (kg/ha)	Grain yield of cereals (kg/ha)
Oat x60	**47 cd**		**1860 c**
Crimson Clover x150 + Oat x60	33 cd	71 cd	1973 c
SubClover x200 + Oat x60	99 b-d	159 b	1784 c
Oat x100	**35 cd**		**1985 c**
Crimson Clover x100 + Oat x100	52 cd	24 d	2119 bc
SubClover x150 + Oat x100	14 d	121 bc	2748 a
Wheat x60	**192 ab**		**2533 ab**
Crimson Clover x150 + Wheat x60	114 b-d	102 bc	2062 bc
SubClover x200 + Wheat x60	118 bc	253 a	2242 a-c
Wheat x100	**283 a**		**2247 a-c**
Crimson Clover x100 + Wheat x100	91 cd	14 d	2252 a-c
SubClover x150 + Wheat x100	61 cd	120 bc	2241 a-c

- **No yield penalty for Oat or Wheat at x60 compared to x100 seeding ratio**
- **Clovers did not result in lower Grain yield or Crop biomass (not presented) of Oat or Wheat**
- **Fewer weeds in Oat than Wheat**
- **Both Clovers were associated with a lower Weed biomass in Wheatx100 than in its monocrop**
- **Subcloverx150 + Oatx100 had among the lowest Weed biomass and Weed density**
- **In most cases, Clover biomass (esp. Subclover) was ≥ than Weed biomass**
- **Grain yield of Oat in Subcloverx150+Oatx100 was highest (38% increase over the Oatx100)**

2024 trial

Crop	Full rate (kg/ha)
Bread Wheat (AAC Brandon)	**120**
Oat (AAC Oravena)	**140**
Subterranean Clover	**9**
Crimson Clover	**9**

Seeding ratios:

Wheat x100
Wheat x100 + Subclover x150
Wheat x100 + Crimson x150
Wheat x60
Wheat x60 + Subclover x200
Wheat x60 + Crimson x200
Wheat x60 + Subclover x100 + Crimson x100
Oat x100
Oat x100 + Subclover x150
Oat x100 + Crimson x150
Oat x60
Oat x60 + Subclover x200
Oat x60 + Crimson x200
Oat x60 + Subclover x100 + Crimson x100

A few early observations from the 2024 trial:

- **Oat x100 + Subclover x150 had fewer weeds (4%) than Oat x100 (6%) - similar to 2022.**
- **Oat x100 + Subclover x150 flowered 8.1 days later than Oat x100.**
- **Oat x60 + Subclover x200 flowered 7.5 days later than Oat x60.**

Pictures of some plots in the 2024 trial – as of end of June, and July 18:

oat100 + sub150 -END JUNE

oat60 + sub200 -END JUNE

wheat100 + crim100

wheat100 + crim100

oat100 + sub150

oat60 + sub200

oat60 + sub200

wheat60 + crim150

For more information on this project, please contact our Organic Research Program at SCRDC (myriam.fernandez@agr.gc.ca)

We greatly acknowledge funding for this project from: Western Grains Research Foundation, Prairie Oat Growers' Association, and Agriculture and Agri-Food Canada