# natural systems agriculture

## *The Hicksons: Fababeans*

### Farm

Darcy Hickson
Brandon, Manitoba

See also The Hicksons: Barley

### Field: Fababeans

### Background

**Crop Rotation:**
2006: Fababeans
2005: RS wheat
2004: Oat/pea green manure
2003: Flax

Harrowing was used in an attempt to remove competition from wild oat and high green foxtail populations in the fababean crop. Initially, the wild oat population appeared unaffected and only limited success was visible on green foxtail.

## Sampling

On June 6, 2006, 20 samples were taken with a 0.25 $m^2$ quadrat. Quadrat samples were taken in a "W" pattern in an attempt to cover the entire field. All seedlings in the quadrat were counted and identified to species.

On August 1, 2006, 6 samples were taken with a 1 $m^2$ quadrat. Quadrat samples were taken in an attempt to represent the whole field. All plants within the quadrat were cut at ground level, bagged and dried at 70ºC for 48hrs. Plants species were separated and dry weights recorded.

## Findings

**Figure 1. Fababean seedling with tractor tire damage.**

### Fababean Seedling Density

Total fababean seedling density averaged 50 plants/$m^2$ (Table 1), but emergence was uneven. Some leaf damage was also evident, which appeared to be from tractor tires (Figure 1).

**Table 1. Average seedling plant density (plants/$m^2$) and mature dry matter (kg/ha) in fababean on the Hickson farm in Manitoba, 2006.**

| Crop/weed species | Density | Dry Matter |
|---|---|---|
| **Green foxtail** | 222 | 347 |
| **Wild oat** | 25 | 133 |
| **Stinkweed** | 6 | 4 |

**Table 1. Average seedling plant density (plants/$m^2$) and mature dry matter (kg/ha) in fababean on the Hickson farm in Manitoba, 2006.**

| Crop/weed species | Density | Dry Matter |
|---|---|---|
| **Red root pigweed** | 4 | 5 |
| **Wild mustard** | 2 | 2 |
| **Wild buckwheat** | 0 | 1 |
| **WEED TOTAL** | 258 | 504 |
| **Fababean** | 50 | 5270 |

Seedling density ranged from 33 to 71 plants/$m^2$ and was generally higher closest to the NE corner (beside house). As discussed, past manure management may have increased available soil nutrient levels encouraging crop emergence. Down slope, fababean seedlings were sparser, seeds appeared to be deeper, which may have influenced emergence (Figure 2).

**Figure 2. Fababean seedlings were larger and at a greater density at NE corner (left) and smaller and sparser down slope (right).**

**Weed Seedling Density**

Average weed seedling density was 258 weeds/$m^2$. All weeds were annuals, which is common for organic cropping systems due to increased tillage for weed control. The two key weeds were green foxtail and wild oat at densities of 222 and 25 weeds/$m^2$.

As evident in figure 2, green foxtail seedling density, similar to faba bean, was generally higher at the NE corner of field. Less foxtail germinated in low areas where wild oat was more abundant (Figure 3).

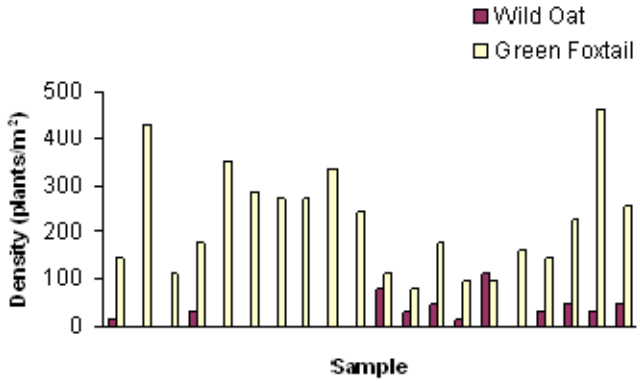


**Figure 3. Variation in weed seedling samples taken June 6, 2006.**

This may be influenced by moisture and seed depth. Green foxtail may be buried deeper in the low slope positions decreasing emergence, whereas wild oat prefers wet areas and can germinate successfully at greater depths. It's possible that harrowing was less successful on wild oat than the green foxtail since harrowing does not control weed seedlings that emerge from deep in the soil.

**Plant Performance**

At maturity, fababeans contributed to 91% of total plant dry matter. Green foxtail accounted for 70% of total weed dry matter. Green foxtail germinates whenever conditions are favourable, thus smaller flushes of germination throughout the summer contributed to total dry matter.

Both fababean and green foxtail did better in the same areas which had high seedling densities (Figure 4, Table 2). In other areas, foxtail was abundant, but thin bodied and appeared to be out-competed by the fababean canopy (Figure 5). Dry season conditions may have hindered fababean production due to its affinity for moisture. However, this green foxtail has shallow roots, which also inhibit its success in dry conditions.

**Figure 4. Area of higher fababean and green foxtail dry matter production.**

**Figure 5. Area of poorer green foxtail performance.**

Wild oat increased in proportion throughout the summer. It was only 10% of total weed density, but ended up as 26% of total weed dry matter at maturity. It thrived where fababean seedlings were sparse. Wild oat does well in cool conditions, thus the fababean canopy may not have affected its performance as much as it did for green foxtail.

**Table 2. Mature dry matter (kg/ha) for six samples taken from fababean field on the Hickson farm in Manitoba, 2006.**

| Weed/crop species | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **Foxtail** | 592 | 329 | 15 | 302 | 301 | 542 |
| **Wild oat** | 298 | 297 | 0 | 55 | 131 | 18 |
| **Red root pigweed** | 0 | 0 | 0 | 0 | 0 | 29 |
| **Stinkweed** | 0 | 0 | 0 | 0 | 9 | 16 |
| **Barnyard grass** | 2 | 0 | 2 | 0 | 14 | 10 |
| **Lamb's quarter** | 5 | 0 | 0 | 0 | 0 | 16 |
| **Wild mustard** | 0 | 0 | 0 | 0 | 12 | 0 |
| **Wild buckwheat** | 0 | 0 | 0 | 0 | 8 | 0 |
| **Volunteer wheat** | 0 | 0 | 0 | 0 | 9 | 0 |
| **Unknown** | 0 | 0 | 0 | 0 | 9 | 0 |
| **TOTAL WEED DRY MATTER** | 897 | 626 | 17 | 357 | 493 | 631 |
| **Fababean** | 6314 | 3744 | 6468 | 6597 | 3354 | 5143 |

## Summary:

Although suppressed, green foxtail plants may produce enough seed to infest the following year. The current rotation contains both broadleaf and grass crops with the addition of cool season crops. This kind of diversity has shown success in reducing green foxtail populations. In one study, green foxtail also showed reduction under rotations using more winter than spring crops (Derksen et al. 2002). Since foxtail is a summer annual, fall-seeded crops may help break its life cycle.

High crop dry matter production was possible in areas with more weeds, and where nitrogen levels were lower, the crop thrived and weeds were kept in check.

Be cause fababean produces a quick canopy, and green foxtail is not very shade tolerant and is a later germinating weed, early seeding can help reduce competition. Using another broadleaf crop in rotation with a quick and large, shade producing canopy could be beneficial. Tillage can also bury seeds resulting in delayed and reduced emergence (Bullied & Van Acker 2003).

Wild oat patches should also be monitored and seeds prevented from spreading.

## References

Bullied, WJ, and RC van Acker. 2003. *Conventional- and conservation-tillage systems influence emergence periodicity of annual weed species in canola*. Weed Science, 51:886-897.2003.

Derksen DA, RL Anderson, RE Blackshaw, and B Maxwell. 2002. *Weed dynamics and management strategies for cropping systems in the Northern Great Plains* . Agron. J. 94:174–185.



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