



## Intercropping chickpea-flax reduces *Ascochyta* blight

CATEGORY [disease](#) | July 6, 2023

A seeding rate of 50% chickpea and 50% flax resulted in maximum combined yield and land productivity, and reduced *Ascochyta* blight disease severity by 50 to 67% compared to monocrop chickpea, but flax competed with chickpea and reduced chickpea yield.

*Ascochyta* blight, caused by *Ascochyta rabiei*, is a serious disease for chickpea growers on the Northern Great Plains. While foliar fungicide application is usually necessary to control the disease, intercropping with a non-host crop like flax has the potential to reduce the disease impact on chickpea.

The objectives of this study were to evaluate the effects of seeding rate and row configuration on yield, protein, and land equivalent ratio (LER), and to investigate how seeding rate and row configuration impact *Ascochyta* blight incidence and severity.

Field trials were conducted at the Eastern Agricultural Research Center (EARC) in Sidney, Montana on dryland in 2020, and with supplemental irrigation in 2021 with 3.9 inches (100 mm) applied to improve germination and stand establishment during the drought year. A second location at the

Southern Agricultural Research Center (SARC) in Huntley, Montana was under irrigation with 4.7 inches (120 mm) applied in 2020 and 7 inches (180 mm) in 2021.

For this intercrop study, moderately susceptible CDC Leader and susceptible Royal chickpea varieties were compared in sole cropping and intercropping with Glas flax. Glas flax has a maturity close to chickpea, and is a non-host for *A. rabiei*.

Monocrop seeding rates were 4 seeds/ft<sup>2</sup> (40 seeds/m<sup>2</sup>) for chickpea and 73 seeds/ft<sup>2</sup> (730 seeds/m<sup>2</sup>) for flax. Intercrop rates were expressed as a percentage of the monocrop rate. Various intercrop seeding rates were grown, in either mixed or alternate rows. Seed was treated with an insecticide and fungicide, and chickpea was inoculated with a rhizobial inoculant.

The treatments included:

1. chickpea grown as a monocrop,
2. as mixed rows with 30% chickpea and 70% flax (30C/70F mixture),
3. as mixed rows with 50% chickpea and 50% flax (50C/50F mixture),
4. with 50% chickpea and 50% flax in alternate rows (50C/50F alternate rows),
5. as mixed rows with 70% chickpea and 30% flax (70C/30F mixture), and
6. flax planted as a monocrop.

### **Lower disease with intercrops**

At the Huntley site, disease severity (DS) was measured only in 2020. All intercrop in mixed rows had significantly lower DS than the monocrop chickpea, with 50C/50F (DS 20%) and 30C/70F (DS 18%) having the lowest DS. However, the 50C/50F in alternate rows (DS 30%) had statistically similar DS as the monocrop chickpea (DS 36%) indicating that intercropping in alternate rows was not a good strategy to try to reduce disease levels.

At Sidney in 2020, DS on Royal was low, ranging from 2.2 to 5.5% depending on treatment. The lowest DS was on 50C/50F in mixed rows. On CDC Leader DS in 70C/30F mixed rows and 30C/70F mixed rows significantly reduced DS compared to the monocrop, but DS was very low in all treatments, and these reductions would have had minimal production impact.

In 2021 at Sidney, the DS of CDC Leader in monocrop chickpea was 12.7%, but was reduced to 2.4% with the 50C/50F and 30C/70F mixed intercrop. For Royal, all intercrops reduced DS from 10% for the monocrop down to around 5% for the intercrops.

Overall, under relatively higher disease pressure, 50% chickpea–50% flax in the mixed rows was more effective in suppressing *Ascochyta* blight than in the alternate rows for both varieties.

### **Yield and LER impacted by seeding ratios**

The highest chickpea yield was for monocrop chickpea, and as the proportion of flax in the mixed row treatments increased, chickpea yield decreased. For example at Sidney in 2021, the chickpea yield ranged from 1000 lbs/ac (1120 kg/ha) for the 30C/70F up to 1900 lbs/ac (2128 kg/ha) for the 70C/30F, while monocrop chickpea was about 3200 lbs/ac (3584 kg/ha).

At the Sidney site alternate rows with a 50C/50F seeding rate had the highest LER (1.13), improving productivity by 13% when compared with the monocrop site.

At the Huntley site in 2020, mixed rows with 50C/50F had a LER of 1.58, which was higher than alternate rows with the same seeding ratio with an LER of 1.30. Similarly in 2021, the LER in the 50C/50F mixed rows was higher at 1.23 compared to 1.07 in the 50C/50F alternate rows.

Overall, the LER had improved land productivity that was 2% to 23% greater than monocropping.

The research showed that chickpea–flax intercropping could be used to suppress *Ascochyta* blight. The 50% chickpea–50% flax and 30% chickpea–70% flax intercrop in mixture configurations reduced the DS at Huntley by 50%, and by 67% at Sidney compared to monocrop chickpea. However, flax suppressed chickpea yield more in the mixed row than in the alternate row configurations.

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