

# Intercropping with Yellow Peas

Pea-canola, pea-mustard and pea-oat intercrops resulted in the greatest net revenue. Pea-mustard reduced weed pressure and pea-canola had potential root disease suppression.

**INTERCROPPING, OR THE** pairing of two crop species in the same field, has been gaining popularity. This research aimed to identify the best companion crop partners and their seeding rates for yellow peas through two experiments in western Manitoba.

## PEA MULTI-CROP STUDY

In the first study, an intercrop trial was established at Melita, Reston and Roblin (2019-2021) evaluating yellow peas intercropped with flax, oats, wheat, canola and mustard versus monocrops of each. In the intercrops, peas were seeded at a full rate while companion crop partners were seeded at a 50% rate.

The greatest pea yields resulted from the pea-mustard intercrop at Melita (32.9 bu/ac) and the pea-canola intercrop at Roblin (23.3 bu/ac) and Reston (5.9 bu/ac). Pea yields at Reston were exceptionally low due to *Aphanomyces* and *Fusarium* root rots. Weed pressure did not differ between intercrops and monocrops in these experiments.

Total land equivalence ratio (TLER) is the relative land area under monocrops that would be required to produce yields equivalent to intercrops, accounting for the productivity of both partners in an intercrop (Table 1). For example, a TLER value of 1.18 means 18% more land would be required to achieve the same yield under a monocrop as has been achieved by the intercrop. At Melita, there was no significant difference in TLER among intercrops and monocrops. At Roblin and Reston, pea-canola resulted in the greatest TLER.

Pea-oats generally resulted in the lowest pea yields at each site, but the success of the oats more than offset the low pea yield. The pea-flax intercrop at Roblin was the only intercrop that resulted in a three-year average TLER

less than 1, likely due to poor flax performance in 2021. The pea-flax intercrop often resulted in low quality peas since the high threshing speed required to properly thresh flax bolls was too high for peas, leading to damage.

Net revenues for each intercrop and monocrop were calculated by subtracting operating costs from gross revenue based on 2019 cost of production assumptions and market prices. At Melita, net revenues did not differ between intercrops and the pea monocrop. At Reston and Roblin, net revenues of pea-mustard, pea-canola and pea-oat intercrops were significantly greater than the pea monocrop.

## BRASSICA SEEDING RATES WITH PEAS

In the second study, peas were intercropped with different rates of mustard, canola and camelina on land with known *Aphanomyces* and *Fusarium* root rot pressure. At Reston in 2019 and 2020, peas were intercropped with mustard or canola at three seeding rates (70:30, 50:50 or 30:70 ratios of % normal seeding rate for peas:mustard or canola). In 2021, canola was replaced with camelina.

Pea-mustard intercrops reduced weed biomass compared to monocrops, and pea-mustard consistently out-yielded

peas alone. TLERs were greater than 1 for all pea-mustard seeding rates (ranging 1.6-1.8).

Pea-canola intercrops out-yielded pea monocrops in both 2019 and 2020 with TLERs of 2.0-2.4. When pea-canola intercrops were seeded at a 70:30 ratio, less *Aphanomyces* DNA was present in the pea roots than in the monocrop, indicating the potential for root disease suppression. Pea-camelina intercrops grown in 2021 also out-yielded pea monocrops. TLERs of the 50:50 and 30:70 pea-camelina seeding rates (1.5 and 1.4, respectively) were greater than the 70:30 ratio (1.3), suggesting an economic benefit of high camelina density in this intercrop pairing.

Due to the heavy root rot disease pressure at Reston, TLERs may be inflated. Monocrop pea yields were low due to disease. Intercrops in this situation allowed for reasonable net revenues in the field thanks to the production by the companion crop making up for the lack of pea yield.

Pea intercrops show promise in terms of yield potential, reducing weed pressure and disease mitigation. Further investigation of different partners and regions will fine-tune recommendations. ▶

**Table 1. Average total land equivalence ratio (TLER) and net revenue (\$/ac) of pea intercrops grown at Melita, Reston and Roblin from 2019 to 2021.**

	Melita		Roblin		Reston	
	TLER	Net Revenue	TLER	Net Revenue	TLER	Net Revenue
Pea Monocrop	1.00 a	\$60 ab	1.00 b	-\$147 b	1.00 d	-\$263 b
Pea-Flax	1.00 a	\$23 ab	0.89 b	-\$177 b	1.13 cd	-\$34 ab
Pea-Oat	1.10 a	\$80 ab	1.25 ab	\$94 a	1.63 ab	\$275 a
Pea-Wheat	1.09 a	-\$16 b	1.11 ab	-\$19 ab	1.40 bc	\$99 ab
Pea-Canola	1.18 a	\$81 ab	2.03 a	\$124 a	1.84 a	\$221 a
Pea-Mustard	1.20 a	\$91 a	1.49 ab	\$111 a	1.46 bc	\$316 a

Within each column, means followed by different letters are significantly different at  $p < 0.05$ . TLER is the relative land area under monocrops that would be required to produce yields equivalent to intercrops, when TLER is >1 the intercrops have out-yielded the monocrops.

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