

# Evaluating Yellow Pea Intercrops in an Organic System

While increasing seeding rates of organic intercrops reduced weed pressure, net returns were greater when peas were grown alone or with only a low seeding rate of the companion oat, barley or mustard crop.

**INTERCROPPING PEAS WITH** other crops offers the opportunity for organic pea producers to maximize profitability and mitigate risk. While many farmers are experimenting with intercrops, intercropping seeding rates for organic production systems have not been well established and most studies have used peas as the companion crop rather than the principal cash crop. This research aimed to evaluate different companion crop seeding rates for three pea intercrops in an organic system.

At Carman in 2019 and 2020, yellow peas were intercropped with oats, barley or oriental mustard evaluating low, medium and high seeding rates and compared with monocrop peas. In 2020, the intercrop experiments further compared an early seeding date (May 7) and a late seeding date (May 21).

Peas were seeded to a target plant population of 120 plants/m<sup>2</sup>. Companion crop seeding rates were 10% (low), 25% (medium) or 50% (high) of their recommended monocrop target plant populations. For barley, these were 40, 75 and 150 plants/m<sup>2</sup>, for mustard, these were 43, 87 and 131 plants/m<sup>2</sup> and for oats, target populations were 48, 80 and 160 plants/m<sup>2</sup>. The trial site had been managed organically since 2004 and was tilled twice

to a depth of 6 cm immediately before seeding. Intercrops were seeded together in the same row at the same depth (2-5 cm) on 6-inch row spacing.

Weed pressure in these experiments was considered above average when compared with 41 organic green manure fields across southern Manitoba and eastern Saskatchewan. Dominant weed species were green foxtail, lambsquarters, smartweed and wild buckwheat.

Compared to the monocrop peas, intercrops reduced weed biomass at maturity from 17-44% when using medium or high seeding rates (Table 1). Oat and barley intercrops were more effective at suppressing weeds than mustard. In these experiments, oats and barley emerged before peas, resulting in earlier ground cover and a size advantage over weeds. The lack of competitive impact of mustard against weeds may have been due to flea beetle pressure limiting early-season growth.

Pea yields ranged from 24.6-33.3 bu/ac, reflecting the water-limited growing conditions of 2019 and 2020 in Carman. In these experiments, intercropping with oats and mustard consistently reduced pea yields by 6-26%, while when intercropping with barley, pea yield was reduced by 15% only at the highest barley seeding rate

(Table 1). Barley produced the greatest companion crop yield, but the lower economic value of the companion crops limited their return on investment. In 2020, the later seeding date resulted in lower pea yields than the early seeding date.

Since intercropping both suppressed weed growth and reduced pea yield, it was worth investigating this trade-off from the lens of how much pea yield was lost for the weed control benefit in an organic system. Expressed as kg of weed biomass reduced per kg of pea yield lost, the highest seeding rate of companion crops averaged 0.87 for mustard, 1.29 for oats and 2.62 for barley, meaning that the greatest amount of weed suppression for the lowest amount of pea yield reduction was with the barley intercrop. The cost of seeding companion crops may be considered the price of weed management in an organic system in this scenario. The seed cost for the highest rate of barley, oats and mustard were \$11.05, \$13.20 and \$30.62 per acre, respectively. By comparison, research from Saskatchewan found the cost of using a rotary hoe, harrow or inter row cultivator for weed control in organic peas to be \$19.10, \$12.14 and \$13.76 per acre, respectively. In this research, intercropping showed promise as a weed control strategy in organic systems. ▶

**Table 1. Weed biomass (kg/ha), pea yield and companion crop yield (bu/ac) of three intercrops compared to monocrop peas at Carman in 2019 and 2020.**

	Pea-Barley			Pea-Oat			Pea-Mustard		
	Weed biomass	Pea Yield	Barley Yield	Weed biomass	Pea Yield	Oat Yield	Weed biomass	Pea Yield	Mustard Yield
	kg/ha	-----bu/ac -----		kg/ha	-----bu/ac -----		kg/ha	-----bu/ac -----	
Pea monocrop	1952 a	31.7 a	-	2085 a	33.3 a	-	1804 a	31.7 a	-
Low seeding rate CC	1544 ab	29.6 ab	1.5 c	1753 ab	29.4 b	4.2 c	1680 ab	29.7 b	0.3 c
Medium seeding rate CC	1261 bc	28.7 ab	2.6 b	1549 b	27.8 b	5.9 b	1472 b	29.1 b	1.0 b
High seeding rate CC	1092 c	26.8 b	6.0 a	1322 c	24.6 c	9.2 a	1498 b	26.5 c	1.5 a

Means followed by different letters within the same column are significantly different at  $p < 0.05$ .

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