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Double-Cropped Field Pea Crop Rotation Study

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Abstract
Farmers are continually searching for a third crop to complement the corn-soybean rotation. Field peas can be substituted for most of the soybean meal in swine rations and may be more economical than soybean meal, so there is a huge potential market for field peas in Iowa. Field peas are a short-season crop, which makes double cropping a possibility. There have been recent reports from Illinois of some success in planting field peas in the summer after a winter wheat harvest.

Disciplines
Agricultural Science | Agriculture

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Introduction

Farmers are continually searching for a third crop to complement the corn-soybean rotation. Field peas can be substituted for most of the soybean meal in swine rations and may be more economical than soybean meal, so there is a huge potential market for field peas in Iowa. Field peas are a short-season crop, which makes double cropping a possibility. There have been recent reports from Illinois of some success in planting field peas in the summer after a winter wheat harvest.

Materials and Methods

The research consists of a small-plot crop rotation trial located on the existing research farm and a large-field double-cropping trial located on the newly purchased tract. The small-plot research trial consists of three crop rotations that were established in 2005 and will continue through at least 2007. One of the crop rotations includes field peas double cropped after winter wheat and another rotation includes soybeans double cropped after field peas. These rotations will be compared with the standard corn-soybean rotation. The three crop rotations are 1) corn-soybean, 2) corn-field peas/soybean, and 3) corn-soybean-winter wheat/field peas. Each crop in each rotation will be grown in every year of the trial.

Two field pea varieties (Eclipse and WFP-0097) were grown in rotation 2, and three field pea varieties (Eclipse, WFP-0097, and Admiral) and three field pea planting dates (July 11, July 18, and July 28) were used in rotation 3. All treatments were replicated four times in a randomized complete block design. The field peas in rotation 2 were planted on March 28 and harvested on July 5. A desiccant was sprayed on June 27 before the spring pea harvest as a harvest aid. The double-cropped soybeans were planted on July 5 and harvested on October 26. The double-cropped field peas in rotation 3 were also harvested on October 26. All plots were 20 ft wide × 40 ft long. All other crops in all plots were also machine harvested for yield.

In the large-plot double-cropping trial, the entire 74-acre field was planted to two field pea varieties (Eclipse and WFP-0097) on March 14. The two varieties were planted in 120-ft-wide strips across the length of the field, with the strips being arranged in a randomized complete block design with three replications. The peas were sprayed with a desiccant about seven days before harvest. The field peas were machine harvested on June 29, the field planted to soybeans on July 1, and the soybeans harvested on October 18. The double-cropped soybean variety was Northrup King S32-Z2 in both the large field plots and small plots. The field peas were used to conduct a large-scale swine feeding trial, comparing a standard ration with rations utilizing each field pea variety.

Results and Discussion

2005 was not an ideal year for double cropping because of the hot, dry weather. However, the field pea followed by double-cropped soybean rotation showed some promise in both the small-plot trials and the large field–scale plots. In the large plots, WFP0097 yielded an average of 45 bushels/acre, and Eclipse yielded 35 bushels/acre. There was a considerable difference

in yield between the west and east portions of the field. The yield ranged from 39 to 52 bushels/acre from west to east for WFP0097 and from 31 to 37 bushels/acre from west to east for Eclipse. The soil phosphorus test level varied from very low in the west portion of the field to very high in the east, which may have accounted for some of the yield variation. No fertilizer was spread on the field for the field pea crop, but seed was inoculated with the appropriate Rhizobium bacteria. The soil was also more poorly drained in the west portion of the field, which may have accounted for some of the yield difference, although it was a very dry season. The double-cropped soybeans yielded 26 bushels/acre, with little difference between the west and the east. Part of the reason for the poorer yield with Eclipse was likely due to the lower stand established with this variety. The stand for the WFP0097 variety was 256,000 versus 181,000 plants/acre for Eclipse. The reason for the poor stand was not determined.

In the small plots, plant stands and yields were very similar between the two field pea varieties in rotation 2. Both varieties had stands of over 300,000 plants/acre, which was the goal, and both yielded about 52 bushels/acre. However, the double-cropped soybean yields were lower than in the large plots, with less than 10 bushels/acre harvested. There was a lot of harvest loss due to difficulty getting the soybeans to run through the combine head because of their short height. The yield was likely approximately 20 bushels/acre, if it could have been collected by the combine. Yields for all crops in the three rotations are shown in Table 1.

Poor yields were obtained with all field pea varieties and planting dates when the peas were planted in July following winter wheat (Table 2). Part of the poor yield was a result of the poorer stand established, largely due to the dry soil conditions at planting time (Table 3). Temperatures were also warmer than normal in August when the peas were blooming, which also would have reduced yields. In general, the yields were highest with the latest planting date. This may have been due to the better stand established because of increased soil moisture at the time, and also because the peas bloomed later escaping some of the warm temperatures. There appeared to be more pods/plant with the peas planted on the latest planting date.

There was a later than normal frost in 2005, although field peas were near maturity by early October. However, in a preliminary trial in 2004, peas planted in late July did not reach maturity before an October 1 frost. Part of the poor yield of WFP0097 was due to powdery mildew, which killed the plants prematurely and resulted in a smaller seed size. The other two varieties showed no susceptibility to the disease. The disease did not affect either of the varieties in the spring-planted peas of rotation 2 or in the large field–scale plots. Powdery mildew tends to be more of a problem with warm weather, making summer-planted field peas more prone to the disease.

The research will continue in 2006. The possibility of using winter peas in the rotation will also be explored.

Acknowledgments

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Table 1. Crop yields in the small-plot crop rotation trial in bushels/acre.

Crop	Rotation 1	Rotation 2	Rotation 3
Corn	176	169	162*
Soybean	54	–	62
Winter wheat	–	–	74
Spring field pea	–	52	–
Field pea following wheat (mean)	–	–	13**
Soybean following field pea	–	9	–

*Corn was planted on corn ground to establish the rotation whereas corn in rotations 1 and 2 were planted on soybean ground.
**See Table 2 for details.

Table 2. 2005 Double-cropped field pea yields following wheat in bushels/acre.

	---------- Planting Date ----------			
Variety	July 11	July 18	July 28	Mean
Eclipse	11.0	13.4	17.4	**13.9**
WFP0097	9.7	10.2	11.9	**10.6**
Admiral	13.0	11.8	19.8	**14.9**
Mean	**11.2**	**11.8**	**16.4**	**13.1**
			LSD (0.05) = 6.1	

Table 3. Double- cropped field pea plant stands in thousands of plants/acre on 8/15/05.

	---------- Planting Date ----------			
Variety	July 11	July 18	July 28	Mean
Eclipse	164	223	181	**189**
WFP0097	171	233	267	**224**
Admiral	197	142	219	**186**
Mean	**177**	**199**	**222**	**200**
			LSD (0.05) = 74	