Evaluation of Planting Method and Seeding Rates with Field Pennycress (Thlaspi arvense L.)

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ABSTRACT

Thlaspi arvense, L. is a common winter annual weed throughout the United States that produces nearly 36% oil content per seed in early spring. Current estimates of wild population seed yields are over 2,240 kg/ha.1 Variety selection has begun on this crop to identify high yielding lines, however, to commercialize pennycress, the correct planting method and seeding rate needs to be established to maximize yield and minimize impact on producers.

The objective of this study was to determine the optimum planting method and seeding rate to produce high seed yield, uniform yield and minimize impact on producers.

ABSTRACT

Pennycress has been investigated for oil potential (Clopton and Gesch, R.W., Forcella, F., Barbour, N., Phillips, B., Voorhees, W.B. 2003. Feedstocks and products from high erucic acid oil: crambe and industrial rapeseed. Univ. Missouri-Columbia, Columbia, MO.). More recent studies have shown that Pennycress line 'Spring 32' showed an increase in establishment rates from 21.7, 28.1, and 30.0% for the non-dormant spring line, 'Spring 32', was utilized in this study to accommodate a spring planting study. The spring lines are characterized by a short height and less seed yield. Pennycress line 'Spring 32' showed an increase in establishment rates from 21.7, 28.1, and 30.0% for the non-dormant spring line, 'Spring 32', was utilized in this study to accommodate a spring planting study. The spring lines are characterized by a short height and less seed yield. Pennycress line 'Spring 32' showed an increase in establishment rates from 21.7, 28.1, and 42.7% as seed rates decreased from 4.9, 2.2, and 1.1 kg/ha, respectively for the drilled plots (Figure 4). A much higher stand establishment occurred for the broadcast plots with rates increasing only slightly from 21.1, 1.75, and 2.5% for the decreasing seeding rates, respectively. As established population size increased, there was a significant decrease in plant height for the drilled plots but not in the broadcast plots (Figure 5). This may be the result of less resource competition due to smaller population size.

INTRODUCTION

The identification and development of new and alternative crops for fuel and industrial applications is becoming increasingly important in today's economy. Seed oil from the new crop, field pennycress (Thlaspi arvense L.) has the potential to be an economically viable, sustainable replacement for many petroleum based products. Pennycress offers a tremendous advantage by supplying this oil in the offseason in the Midwest. Pennycress is a short fuel and industrial applications is becoming increasingly important in today's economy. Seed oil from the new crop, field pennycress (Thlaspi arvense L.) has the potential to be an economically viable, sustainable replacement for many petroleum based products. Pennycress offers a tremendous advantage by supplying this oil in the offseason in the Midwest. Pennycress is a short

RESULTS AND DISCUSSION

Although pennycress is being considered as a winter annual and is normally planted in the fall, a non-dormant spring line, 'Spring 32', was utilized in this study to accommodate a spring planting study. The spring lines are characterized by a short height and less seed yield. Pennycress line 'Spring 32' showed an increase in establishment rates from 21.7, 28.1, and 42.7% as seed rates decreased from 4.9, 2.2, and 1.1 kg/ha, respectively for the drilled plots (Figure 4). A much higher stand establishment occurred for the broadcast plots with rates increasing only slightly from 21.1, 1.75, and 2.5% for the decreasing seeding rates, respectively. As established population size increased, there was a significant decrease in plant height for the drilled plots but not in the broadcast plots (Figure 5). This may be the result of less resource competition due to smaller population size.

LITERATURE CITED


RESEARCH FUNDING

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Figure 1. Evaluation plots of planting method and seeding rates with field pennycress in Macomb, IL on April 1. Evaluation plots of planting method and seeding rates with field pennycress in Macomb, IL on April 1.

Figure 2. Planting rate used to established research plots on April 1.

Figure 3. Plant heights for broadcast and drilled plots at three seeding rates. Different letters in bar graphs indicate significant differences at the P<0.05 level.

Figure 4. Established plant populations for broadcast and drilled plots at three seeding rates. Different letters in bar graphs indicate significant differences at the P<0.05 level.

Figure 5. Plant heights for broadcast and drilled plots at three seeding rates. Different letters in bar graphs indicate significant differences at the P<0.05 level.

Figure 6. Total biomass yield for broadcast and drilled plots at three seeding rates.

Figure 7. Average seed yield per hectare for broadcast and drilled plots at three seeding rates.

Figure 8. High density drilled planting of pennycress demonstrating no branching of plants.

Figure 9. Low density broadcast planting of pennycress demonstrating an increase in branching of plants.

Figure 10. Average total seed oil yield per hectare for pennycress line 'Spring 32' across broadcast and drilled plots at three seeding rates. Different letters in bar graphs indicate significant differences at the P<0.05 level.