

## Winter Annual Oilseed Grower's Bulletin #2

Pennycress - a new cash cover crop for the Upper Midwest

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Field pennycress (*Thlaspi arvense* L.) is a new winter annual cover crop that produces an oilseed feedstock for industrial uses (Nafziger *et al.* 2016). As a cash cover crop, field pennycress can provide economic return with yields up to 1109 kg ha<sup>-1</sup>, and a seed oil content ranging from 26% to 36%. Field pennycress can be planted in the fall and harvested in the spring prior to summer annual crops grown in a relay or double crop system, thereby intensifying the production system. For the relay system, the summer annual crop is planted in the spring at a near normal time between rows of pennycress and for the double cropping system, the summer annual crops are planted after pennycress harvest. Similar to traditional cover crops, field pennycress has the potential to increase the ecosystem services without negatively influencing crop yields as shown with traditional cover crops in Figure 1 (Schipanski *et al.* 2014). Pennycress prevents soil erosion, nutrients leaching (Phippen and Phippen, 2012), suppresses weeds (Johnson *et al.* 2015), and creates suitable conditions for beneficial insects and pollinators (Eberle *et al.* 2015, Groeneveld and Klein, 2015).

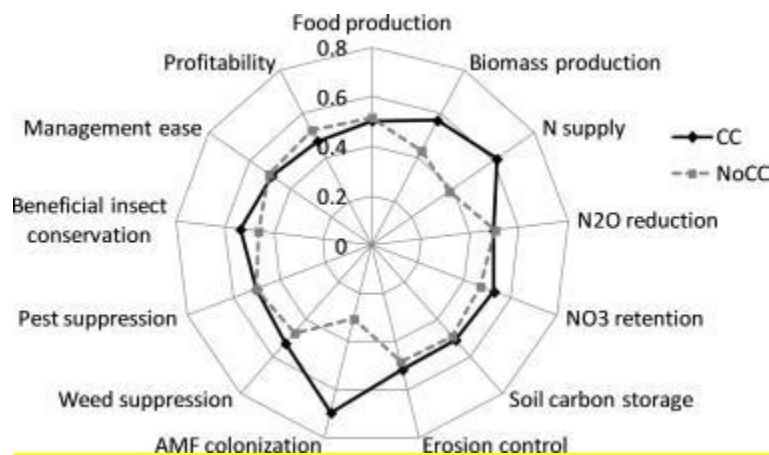


Fig. 1. Normalized values for 11 ecosystem services and two economic metrics averaged across the 3-year rotation of cropping systems with (CC) and without (NoCC) cover crops. Higher numbers indicate better performance. Reproduced from (Schipanski *et al.* 2014).

Despite the multiple benefits offered by this crop, one limitation for its adoption lies in the fact that it is a new crop species. Consequently, growing recommendations for the optimum agronomic performance of the crop are needed. University of Minnesota and USDA-ARS Morris researchers are currently testing and developing these recommendations.

Researchers have tested pennycress in a double and relay cropping systems in the Upper Midwest. Johnson et al., (2015) analyzed the field pennycress production and weed control in a double crop system. The authors found that combined pennycress and soybean seed crop yield was greater, suggesting low risk of using pennycress prior to soybeans. These authors highlighted the potential benefits of including pennycress in double cropping systems to increase total seed yield and reduce early-season weed pressure.

A follow-up study explored the yield trade-offs and nitrogen between pennycress and soybean in double and relay cropping systems (Johnson *et al.* 2017). The results indicated that adding pennycress to the system increased the total oilseed production when integrated with soybean in a double and late-relay cropping systems (Figure 2 a and b). The N soil content was analyzed throughout the pennycress and soybean growing seasons, and the authors concluded that the presence of pennycress reduced the N soil content in the soil profile reducing the risk of nitrogen leaching and water contamination.

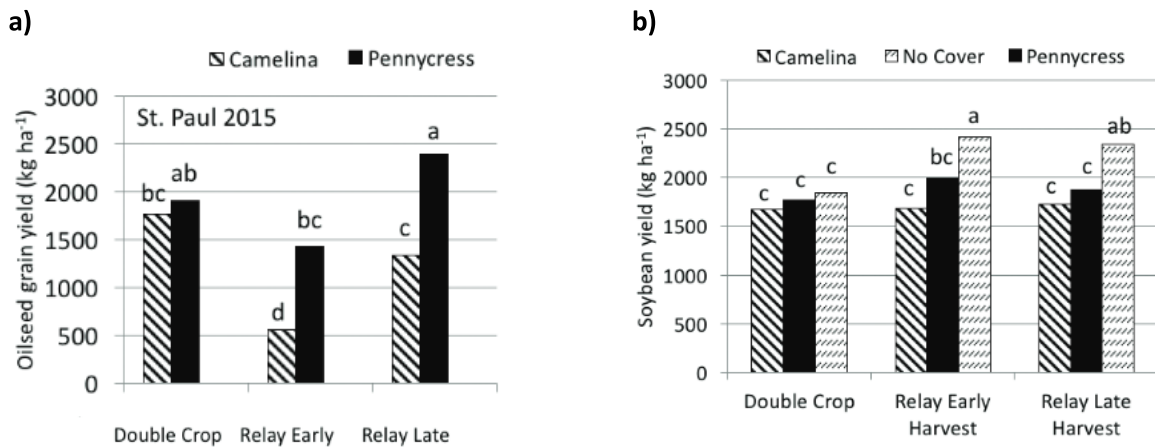


Figure 2. a) Camelina and pennycress yield as influenced by cropping strategy and oilseed cover crop harvest timing at St. Paul in 2015. b) Soybean yield as influenced by cropping strategy and oilseed cover crop harvest timing at St. Paul in 2015. Reproduced from (Johnson *et al.* 2017).

Currently, UMN and USDA-ARS have several ongoing research projects assessing the performance of pennycress in MN cropping systems. These include determining optimal oilseed planting dates, harvest time and management for improved oilseed yield and quality, evaluating pennycress for nitrogen use efficiency and optimal fertilizer rates as well as with exploring alternative summer annual crops for new double cropping system opportunities. New research into market and product development is underway in collaboration with researchers from UMN Extension Regional Sustainable Development Partnerships, UMN Department of Food Science and Nutrition, and the Agricultural Utilization Research Institute.

## **References**

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