Field pennycress (*Thlaspi arvense* L.) is being investigated as a new off-season oilseed crop for the Midwest region. Ecotypes of pennycress have been shown to respond differently to applied nitrogen rates. How pennycress flowering and seed characteristics are effected by nitrogen will help breeders better understand how to select varieties to maximize seed yield.

This study was initiated to closely evaluate the effect of nitrogen rates on specific flowering and seed production characteristics that directly relate to seed yield. A growth chamber experiment was conducted on a non-dormant spring pennycress line ‘Spring 32’, with six nitrogen rates of 0, 25, 50, 75, 100, and 125 lbs. nitrogen per acre. Each experimental pot contained a single plant and was replicated 5 times. All pots were watered by capillary mat irrigation to minimize fertilizer run-off. Plant height, filled and aborted pod number, pod diameter, number of seeds per pod, floral branching, plant tillering, and seed and biomass yield were all measured for each treatment.

The highest rate of 125 lbs. nitrogen per acre resulted in significant changes in branches, tillers, pods per plant and seeds in comparison with the other treatments. The 125 lbs. of nitrogen per acre had an estimated total seed yield of 1,865 lbs per acre while 0 lbs. of nitrogen per acre had a total seed yield of 688 lbs. per acre.

Understanding the ideal nitrogen rates for pennycress to obtain optimal seed yields will further improve a producer’s ability to successfully grow this new crop.