Field pennycress (Thlaspi arvense L.) is a new potential oilseed crop that is currently being evaluated as a domestic source of biodiesel fuel. Knowledge of pennycress nitrogen requirements will help producers apply optimal nitrogen and sulfur rates while minimizing production costs.

This study was initiated to evaluate the effect of nitrogen and sulfur fertilization rates on pennycress plant height, pod number, seed and biomass yield, and oil content and quality. Two growth chamber experiments were conducted on spring and winter annual pennycress lines, ‘Spring 32’ and ‘W12’, with six nitrogen rates (0, 25, 50, 75, 100, and 125 lbs. nitrogen per acre) and two sulfur rates at 10 and 25 lbs. per acre. Each study was replicated twice over 1 year.

Nitrogen fertilizer rate was a significant factor influencing plant height, pod and seed number per plant, seed and biomass yield for both the spring and winter lines of pennycress. A rate of 100 lbs. of nitrogen resulted in the greatest number of pods and seeds per plant, 83 and 650 respectively. Nitrogen fertilization had no effect on the number of seeds per pod, 1000 seed weight, harvest index, total oil content, and fatty acid constituents. Seed yields increased significantly for 100 and 125 lbs. of nitrogen per acre in combination with 25 lbs. of sulfur. Winter and spring pennycress lines were not significantly different from each other in response to increasing nitrogen rates. Overall nitrogen use efficiency decreased with increasing nitrogen rates.

Understanding the ideal nitrogen and sulfur levels for pennycress to obtain optimal yields will further improve a producer’s ability to successfully integrate this new crop into the already well-established corn and soybean rotation in the Midwest.