

Seed Pelleting Did Not Improve Fall Establishment of Oilseed Pennycress (*Thlaspi arvense* L.)

Alexander Lindsey, Nasib Koirala, and David Barker (The Ohio State University, Columbus OH)

Russ Gesch and Yesuf Mohammed (USDA-ARS, Morris, MN)

Nicholas Heller (Illinois State University, Normal, IL)

Alex Hard and Samantha Wells (University of Minnesota, St. Paul, MN)

Winthrop Phippen (Western Illinois University, Macomb, IL)

Pamela Tas (University of Wisconsin-Platteville, Platteville, WI)

Background/Objectives. Oilseed pennycress is an emerging biofuel crop for use in the aviation industry, and has great potential to fit as a rotational crop in corn-soybean cropping systems. Fall emergence of pennycress can accelerate spring harvest by two weeks compared to spring emergence. An accelerated spring harvest (early June) is attractive to farmers because it allows more time double-crop a full-season summer annual crop. Therefore, ensuring fall emergence with early planting may help increase grower adoption. One possible mechanism to accelerate fall planting of pennycress is to broadcast seed the crop. However, surface broadcasting seeds may result in uneven spatial distribution due to small seed size and variable germination because of soil moisture conditions. The objective of this research was to evaluate if applying seed treatments or enhancements would improve fall establishment in oilseed pennycress after broadcast seeding compared with no treatment.

Approach/Activities. Two pennycress varieties (MN106NS - black-seeded variety, tt8-t/ARV1 - golden-seeded variety) were treated with one of six seed treatments: untreated control; gibberellic acid soak at 0.01% w/w for 12 hours; fludioxonil fungicide; pelleting with diatomaceous earth and a commercial binder, and two additional pelleting treatments with the addition of either fungicide alone or with gibberellic acid added to the pelleting binder solution along with the fungicide. Seeds were planted at nine sites in four U.S. states to assess fall establishment. All seeds were broadcast in fields after the previous crop was harvested, with planting dates ranging from 13 September to 12 October 2021. Fall emergence was counted after the first frost in November, and fractional green percent cover was quantified using the Canopeo app. Spring survival using Canopeo and grain yield from each treatment were also quantified in April and June, 2022, respectively.

Results/Lessons Learned. Broadcast seeding varied in efficacy of establishment, with germination being quantified in eight of the nine environments. Overall, pelleting treatments without GA were not beneficial for stand establishment of either variety. The black-seeded variety performed better with GA treatments (both soak and GA in pelleting) by exhibiting more plants m⁻² and greater percent green cover. The golden-seeded variety however was not responsive to GA treatments, and had reduced establishment and survival when pelleted compared to the untreated. Yield of pelleted black-seeded was 20% greater than the untreated when pelleted or treated with GA, but yield of the golden-seeded line did not improve with any treatment and was 20-40% lower than the untreated when pelleted.

The number of plants established and yield across sites were negatively correlated with total precipitation up to 14 days after planting, suggesting excessive rainfall post-planting may impede establishment when broadcast seeded. Alternatively, rain may have stimulated germination but dry conditions after emergence may have impacted survival and led to lower

plant stands. Future work with oilseed pennycress should expand on efforts to improve establishment, either through drill seeding or by varying fall planting date.