Trap Cropping as an Alternative Management Option for Red Sunflower Seed Weevils in the Dakotas

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Introduction

With the confirmation of pyrethroid resistant red sunflower seed weevils in South Dakota, one of the greatest challenges is identifying a suitable management alternative (Hargens et al. 2026). A strategy that was investigated 33 years ago in North Dakota was trap cropping (Brewer and Schmidt 1995). Trap cropping is a cultural management strategy that implements another crop in the field that is more attractive to the target pest (i.e., red sunflower seed weevil) than the agronomic crop (i.e., sunflower) (Vandermeer 1989). Since commercial sunflower is the most attractive crop to the red sunflower seed weevil, the challenge faced was figuring out how to make a subset of sunflowers within a field more attractive to the weevils. Trap cropping with sunflowers can work because the red sunflower seed weevils, like other phytophagous insects, has preference or requirement for a certain sunflower growth stage (Hokkanen 1991). Specifically, red sunflower seed weevils are attracted to sunflowers during bloom, and the adult females require a pollen meal to initiate egg development (Korman and Oseto 1989, Brewer 1991).

Trap Crop Design

Brewer and Schmidt (1995) investigated a sunflower trap crop by altering hybrid maturity and planting dates. Sixteen rows of trap crop sunflower were planted around the field edges using an early maturing hybrid and a planting date that ensured the bloom period was in late July or early August. The cash crop sunflower was planted in the interior of the field using a late maturing hybrid and a planting date that ensured the bloom period would be 7-10 days after the trap crop. On average, the trap crop sunflower required 7% of the fields. Foliar insecticides were applied to the trap crop sunflower just before the start of blooming in the cash crop sunflower to prevent the red sunflower seed weevils from leaving the trap crop. Foliar insecticides were only applied to the cash crop sunflower if red sunflower seed weevil thresholds were exceeded. For the study, there were also check/control fields where normal agronomic practices were implemented (i.e., no trap crop) (Brewer and Schmidt 1995).

Efficacy of a Sunflower Trap Crop

The average yield of trap crop sunflower fields was slightly lower than control fields, but the yields were not significantly different from one another (Brewer and Schmidt 1995). Some of the variation in yields was attributed to differences in field conditions and sunflower hybrids (Brewer and Schmidt 1995). In addition, economic loss due to red sunflower seed weevil infestations between the check and trap crop fields was also found (Brewer and Schmidt 1995). The biggest difference was that the insecticide input costs (insecticide product plus application) for fields with trap crop sunflower were significantly lower than the check fields (Brewer and Schmidt 1995). When the input cost differences and slight economic drag of the trap crop sunflower fields were considered, the sunflower fields with trap crop sunflower cost approximately $39 per acre less to produce than the check fields (Brewer and Schmidt 1995). It's important to note that this value is likely higher when accounting for the inflation of modern input costs.

Trap Crop Conclusions

Utilizing a trap crop in sunflower can be advantageous for reducing insecticide input costs. In addition, only treating a portion of the field (<20%) may also reduce the selection pressure on the active insecticide ingredient being used to reduce red sunflower seed weevil populations. One of the greatest challenges that would be faced with implementing a trap crop in South Dakota is selecting an active insecticide ingredient that successfully reduces the red sunflower seed weevils in the trap crop sunflower. Research has shown that planting sunflower early (i.e., first to second week of May) can greatly reduce red sunflower seed weevil damage (Oseto et al. 1987, Prasifka et al. 2026) (Figure 1).

Figure 1. Early vs late planted sunflowers. Photo courtesy of Patrick Wagner.

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