Chapter 6: Weed Prevention

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Summary

Preventing weeds from entering or spreading within a field is critical to successful integrated weed management. Some of the tactics for weed prevention include cleaning equipment, planting weed-free seed, and controlling weeds prior to seed production.

Introduction

"An ounce of prevention is worth a pound of cure."

Preventing weeds from entering or spreading within a field is critical to successful integrated weed management. However, prevention can be difficult because weeds are well adapted for spread. Faithful prevention practices will reduce the weed population over time, making all management tactics easier and cheaper. If prevention is neglected, farmers are forced to battle weeds after infestations, treating symptoms rather than underlying problems.

Managing weeds both in-crop and between crops is key to successful prevention. Weeds can spread by seed and vegetative propagules (plant parts capable of becoming a new plant such as rhizomes or stolons). Because the spread of weeds by processes such as wind and movement by birds or animals is difficult to manage, this chapter will focus on seed dispersal by human activities and how to manage such spread.

Weed Prevention Practices

At planting

Plant certified, weed-free crop seed. Planting "bin-run" or saved crop seed contaminated with weed seeds places weed seeds directly in the crop row, spreads weeds within and between fields, and may increase establishment by increased seed-to-soil contact. All of these increase competition with the crop.

During the season

Do not let weeds go to seed, especially weeds with high seed production that are capable of rapid infestation, such as Palmer amaranth. Eliminating seed production of Palmer amaranth for one season reduced the number of weeds by over 300% in the following season (Flessner et al. 2018).

Up to 80% of this year's weeds are a result of the previous year's weed seed production.

Also, ensure weed-free irrigation and drainage waters. When surface irrigating, water can easily spread and introduce weed seeds and other plant parts capable of infestation (Walker 1995).

Harvest time

Clean harvest and grain transporting equipment. Remove weed seed and other weedy plant parts from all equipment before moving to the next field (Photo 6.1). In particular, harvesters can move weed seeds more than 450 feet from the mother plant resulting in weed spread within and between fields (Shirtliffe and Entz 2005). Models have calculated crop yield losses of more than one third in the area directly behind the harvester, the area with the highest density of weed disbursement (Maxwell and Ghersa 1992).

Photo 6.1: Cleaned brush mower (left) versus a brush mower covered in dandelion seed (right) (Photo credit: M. Flessner).

Post-harvest

Weeds that emerge while a crop is drying down or after harvest may produce viable seed ahead of a killing frost in certain parts of the Mid-Atlantic region. Preventing seed production reduces weed pressure faced in the following season (see Chapter 14: *Harvest Weed Seed Control*).

Weed prevention practices throughout the year

There are a number of ways weed seeds can enter a particular field. The following are practices and considerations to keep in mind.

- Do not spread weed-infested hay, straw, manure, or soil into fields.
    - Composting will reduce the number of viable weed seeds. However, weed seeds on the edges of compost piles may survive as they are not subjected to the heat required to kill them. When purchasing compost ensure the source of material does not contain weed seeds.
- Livestock can spread weed seed.
    - Many weed seeds remain viable after passing through the gut of cattle and poultry. If these animals are fed anything that contains viable weed seed or are allowed to graze a weedy field, quarantine the animals for three to seven days (until the seeds completely pass through their digestive systems) before moving them to clean fields.
    - Ensiling will greatly reduce viability of most weed seeds, although viability may not be completely eliminated.
- Control weeds around the farm in areas such as ditches, roadsides, the exterior of structures, and fence lines. Weeds growing in these areas will be a continuous source of field infestation.

Other weed prevention considerations

Beyond the practices mentioned above, other practices are critical to successfully preventing weeds.

- Crop rotation prevents build-up and domination of weeds common to a particular crop (Walker 1995). A diverse crop rotation increases the number of environmental and management obstacles for weeds (See Chapter 10: *Cultural Control*).
- Fallow periods in a crop rotation allow weeds to grow without competition and produce weed seed, which can replenish weed seedbanks and cause increased problems for years to come. For example, common lambsquarters has been reported to increase its weed seedbank size 14 times in a single fallow period (Leguizamon and Roberts 1982).
- Tillage can increase infestations of perennial weeds, by cutting and spreading propagules, such as johnsongrass rhizomes.
- Cover crops or smother crops may be used to prevent weed population build-up between cash crops. Care must be taken so that the cover crop does not become a weed itself (Walker 1995) (See Chapter 12: *Cover Crops for Weed Suppression*).
- Weeds that produce wind-borne seeds, such as thistles or horseweed, should be managed prior to seed production wherever they occur.

Key Points

- Plant certified, weed-free crop seed.
- Do not let weeds set seed.
- Avoid introducing sources of new weed infestation, such as hay, manure, and compost.
- Clean equipment to prevent weed seed and propagule spread, particularly harvest and tillage equipment.
- Rotate crops and avoid fallow periods.
- Control weeds around the farm in areas such as ditches, roadsides, and fence lines.

References

Flessner ML, Haring SC, Beam SC, Bamber K (2018) Assessing zero Palmer amaranth seed return in a grain sorghum-soybean rotation versus continuous soybean. Page 59 *in* Proceedings of the Northeastern Plant, Pest, and Soils Conference. Philadelphia, PA: Northeastern Weed Science Society

Leguizamon ES, Roberts HA (1982) Seed production by an arable weed community. Weed Res 22:35–39

Maxwell BD, Ghersa C (1992) The influence of weed seed dispersion versus the effect of competition on crop yield. Weed Technol 6:196–204

Shirtliffe SJ, Entz MH (2005) Chaff collection reduces seed dispersal of wild oat (*Avena fatua*) by a combine harvester. Weed Sci 53:465–470

Walker RH (1995) Preventative Weed Management. Pages 35-50 *in* Smith AE ed. Handbook of Weed Management Systems New York, NY: Marcel Dekker, Inc.