IOWA STATE UNIVERSITY
University Extension

WEED IDENTIFICATION

FIELD GUIDE

A reference for identifying weeds in field crops

Weed Management

Weed management is a vital aspect of profitable corn and soybean produc-

Introduction

Corn and soybean producers face multiple pest and plant health challenges that can often be effectively managed with an Integrated Pest Management (IPM) program. Weed management is vital for maximizing crop production and is an important component of IPM.

Accurate weed identification is the first step to successfully managing weeds. Because weed species vary in their response to different management strategies, proper identification is essential to develop effective management plans. These plans include cultural, mechanical or chemical control methods that are specific to the particular cropping system and weeds present. Control methods must be employed at the appropriate time for optimum results.

This field guide helps identify weeds by describing and illustrating diagnostic characteristics of weeds found in crop production fields in Iowa and neighboring states.

Weeds are arranged in two main categories: **Grass and Grass-like Weeds** and **Broadleaf Weeds**. Within the two main categories, weeds are arranged alphabetically by plant family and within each family by scientific name. This guide predominantly uses the most recently accepted common names specified by the Weed Science Society of America and scientific names by Flora of North America.

After identifying a weed problem, consult with state or local extension personnel and agronomic service providers to develop an effective management plan.

Life Cycles of Weeds

Weeds typically fall into one of three life cycle classifications: annuals, biennials or perennials. Some weeds may be classified into more than one life cycle. Weeds are usually best adapted to survive in a crop with a similar life cycle, germination time or growth habit. The most effective control methods often are based on the life cycle of a weed.

Annuals

Annual weeds complete their life cycle in one year and reproduce by seeds. There are summer and winter annual weeds. Summer annual weeds germinate in the spring, then grow, flower and produce seeds during one growing season. They are the most common type of weed in annually tilled fields. Winter annual weeds germinate in late summer or fall, establish a root system and vegetative growth, overwinter and then resume growing the next spring. They usually flower and set seed in spring or early summer and then die. Winter annual weeds can pose problems in fall-seeded crops, early spring grains, pastures and no-till fields. Annual weeds are most easily controlled in the seedling stage and become more difficult to control as they grow and mature.

Winter annual weeds can pose a problem in no-till fields.

Biennials

Biennial weeds require two years to complete their life cycle and, like annual weeds, only reproduce by seeds. Seeds germinate in the spring or summer and produce root systems and rosettes of leaves the first year. The following spring stems bolt (elongate) and plants flower, produce seeds and die. Biennial weeds are typically a problem in no-till fields, pastures and other undisturbed areas. Some biennial weeds can also behave as annuals, completing their life cycle in a single growing season. Chemical control of biennial weeds is most effective when applied to seedlings or during the rosette stage, before stems bolt.

Musk thistle rosette

Musk thistle bolting stem

Perennials

Perennial weeds live multiple years. They reproduce vegetatively and/or by seeds. Perennials typically inhabit no-till fields, pastures, roadsides and, occasionally, tilled fields. Most perennial weeds found in row crops regrow annually from underground overwintering structures.

Perennials can be grouped into two classes, simple and creeping. Simple perennials usually have taproots and reproduce by seed. Creeping perennials can reproduce by seed and vegetatively by rhizomes, tubers, stolons, budding roots and bulbs. Tillage breaks vegetative structures into pieces that can regenerate into new plants, potentially spreading the infestation within or between fields. Perennials may require either repeated efforts or a combination of management tactics to achieve adequate control. A well-timed systemic herbicide application may provide the most effective chemical control. Perennials are easiest to control as seedlings.

Canada thistle is an example of a weed that reproduces

Herbicide Decisions

Herbicide programs typically include soil-applied (e.g., preemergence) and postemergence products. Soil-applied herbicides control weeds as seeds germinate, reducing early-season weed competition and protecting yield potential. They also provide residual activity and greater flexibility in timing of postemergence herbicides. Postemergence applications target weed species not controlled by soil applications. Some postemergence herbicides only control weeds emerged at the time of application. Others control emerged weeds and provide residual activity against later emerging weeds.

A well designed weed management plan involves field scouting and protects crops from weed competition, prevents weed populations from increasing over time, minimizes herbicide injury and delays or prevents herbicide resistant weed development.

Factors to consider when selecting herbicides

- Weed escapes or problems the previous year
- Environmental conditions the previous year, including conditions favorable for herbicide carryover
- Herbicide tolerant crops used the previous year and planned for the current year
- Tillage plans for the current season
- Using herbicides with different sites of action to delay or prevent herbicide resistant weed development
- Using timely herbicide applications that prevent early-season weed competition and provide residual control for late-emerging weed species
- Crop rotation plans for the next year (carryover)
- Postemergence herbicide label restrictions based on crop and weed growth stage and/or height

Soil-applied herbicide application factors

Factors particularly important to consider for soil-applied products include soil type, environmental impacts such as leaching or runoff potential and possible interactions with insecticides or other herbicides. Rates should be based on soil type, target weeds and objectives of the application (full-season weed control versus set up for planned postemergence herbicide).

Postemergence herbicide application timing factors

Field scouting is particularly important when selecting postemergence herbicides. Fields should be scouted frequently following crop emergence to determine the need and appropriate timing of postemergence weed control. Weed species, density and growth rates are critical factors influencing how long weeds can compete with the crop before yields are reduced. Treat fields with heavy infestations as soon as possible after weeds emerge.

The initial growth of weeds is relatively slow, but their growth rate increases rapidly as time progresses. Weeds as small as two inches tall can reduce crop yields if present at high densities. Crop yield loss per day increases due to increasing competition of larger weeds.

Monitor weed emergence prior to postemergence applications.

Herbicide Resistance

Herbicide resistant weeds were first documented in the 1950s. Current weed control programs rely on only a few herbicide products, thus resistant weeds are expected to become more problematic in the future.

Resistance to herbicides results from repeatedly applying a herbicide with the same site (or mode) of action. This selects for individual plants genetically able to survive the herbicide. Resistance is the inherited ability of a weed to survive a herbicide dose that would normally control individual plants of that species. Surviving weeds reproduce, resulting in a population shift where most, if not all, of the plants are resistant. For example, nearly all common waterhemp populations in Iowa are resistant to ALS inhibitor herbicides following widespread use of these herbicides in the 1980s.

Weeds **tolerant** to a herbicide have always had the ability to survive exposure to the chemical. For example, giant foxtail is naturally tolerant to atrazine.

Rotating or tank mixing herbicides with different sites (or modes) of action within the season and across years will reduce the selection pressure on a weed population and decrease the likelihood of developing herbicide resistance. Where possible, include non-chemical weed control strategies.

Mode of action: Mechanism by which a herbicide kills a plant
Site of action: Specific protein to which a herbicide binds, disrupting a physiological process in plants. Herbicides with the same mode of action may or may not have the same site of action (see page 10).

Examples of herbicide resistant weeds found in Iowa (June 2010)

Common name	Site of action*				
	ALS inhibitors	EPSPS inhibitors	Photosystem II inhibitors	PPO inhibitors	ACCase inhibitors
Common cocklebur	X				
Common lambsquarters			X		
Common sunflower	X				
Common waterhemp	X	X	X	X	
Giant foxtail			X		X
Giant ragweed	X	X			
Marestail (horseweed)		X			
Shattercane	X				

* Common products are listed on page 10.

Herbicide mode and site of action

Mode of action	Site of action group*	Site of action	Product examples
Lipid synthesis inhibitors	1	ACCase inhibitors	Assure® II, Fusilade® DX, Poast Plus®, Select®
Amino acid synthesis inhibitors	2	ALS inhibitors	Accent® Q, Autumn™, FirstRate®, Harmony® GT, Option®, Python®, Resolve® Q, Steadfast® Q
	9	EPSPS inhibitors	Roundup®, Touchdown®
Growth regulators	4	Unknown	2, 4-D, Clarity®, Stinger®
	19	Auxin transport inhibitors	component of Distinct®, Status®
Photosynthesis inhibitors	5**	Photosystem II inhibitors	Aatrex®, Atrazine, Sencor®
	6**	Photosystem II inhibitors	Basagran®, Buctril®
	7**	Photosystem II inhibitors	Linex®, Lorox®
Nitrogen metabolism	10	Glutamine synthesis inhibitors	Ignite®
Pigment inhibitors	13	Diterpene synthesis inhibitors	Command®
	28	HPPD inhibitors	Balance® Flexx, Callisto®, Corvus™, Impact®, Laudis®
Cell membrane disrupters	14	PPO inhibitors	Aim®, Cobra®, Flexstar®, Phoenix™, Resource®, Sharpen™, Ultra Blazer®, Valor®
	22	Photosystem I electron diverters	Paraquat
Seedling root growth inhibitors	3	Microtubule inhibitors	Prowl®, Treflan®
Seedling shoot growth inhibitors	15	Long-chain fatty acid inhibitors	Degree®, Dual II Magnum®, Harness®, INTRRO®, Outlook®, TopNotch®

** Site of action group is a classification system developed by the Weed Science Society of America.*

Most premix products containing more than one herbicide are not included in this field guide.
Neither endorsement nor criticism is implied by Iowa State University of products mentioned or not mentioned in this publication.