

## BEST MANAGEMENT PRACTICES

### Chapter: 39

### Selected Broadleaf Weeds in South Dakota Corn Fields



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Weeds typically are defined as plants out of place. Based on this definition, any plant can be considered a weed when it interferes with a desired plant. However, in natural areas, these same plants may provide food for animals and insects, and ground cover to protect the soil. For a sustainable system, the need to produce food must be balanced with the need to maintain and sustain our ecosystem. The goal of this chapter is to provide information about crop loss (when available), herbicide resistance (if any), management strategies, tips for identifying broadleaf weeds, and images of South Dakota noxious weeds. Up-to-date chemical management for weeds can be found online at [extension.sdstate.edu](http://extension.sdstate.edu).

**Table 39.1 Relative competitiveness of common South Dakota weeds.**

Yield loss due to weeds varies by species, weed density, and time of emergence. Weeds that emerge early tend to cause more yield loss than those that emerge after crop establishment. All weeds have the potential to cause 100% yield loss, however, some are relatively more competitive with corn than others. This table gives a relative rating of different weed species and their ability to cause a 5% yield loss.

Highly competitive weeds (one or fewer plant/foot row results in 5% yield loss)			
Common cocklebur	Common sunflower	Common waterhemp	Giant ragweed
Moderately competitive weeds (5-10 plants needed per foot of row to result in 5% yield loss)			
Canada thistle	Field bindweed	Switch grass	Velvetleaf
Hedge bindweed	Horseweed	Volunteer corn	Giant foxtail
Common lambsquarters	Woolly cupgrass	Redroot pigweed	Russian thistle
Kochia	Wild proso millet		
Low competitive weeds (> 10 needed per foot of row to result in 5% yield loss)			
Wild buckwheat	Green foxtail	Yellow foxtail	Longspine sandbur
Large crabgrass	Witchgrass	Venice mallow	Barnyardgrass

#### Corn Yield Losses (Critical Weed-Free Period)

Weeds present in the field from V2 to V8 can irreversibly reduce corn yields. This period is often called the weed-free period. This loss often occurs before the weeds compete with the corn plant for water, nutrients, and light. The factor(s) responsible for this loss is unknown, although light quality, volatile compounds, and/or other mechanisms have been examined. Different weed species have different emergence and

growth rates. In general, weeds that emerge early in the growing season have greater impact on corn yields than weeds that emerge later.

### **Perennial Weeds**

Perennial plants can germinate from seed, or may produce new shoots from buds on roots, rhizomes (horizontal, below-ground structure that sends up shoots), stolons (prostrate stem above ground that produces new plants from tips or nodes), crowns, etc. (i.e., perenneating structures). The new shoots can emerge very early in the spring and grow quickly because of carbohydrate storage in the perenneating structures. These plants are often found to prosper in no-till or minimum-tillage systems due to the lack of disturbance to the perenneating structures. In most cases, tillage **should not be used** as the major control mechanism because structures with the buds may be moved to new areas to form new infestations.

Examples of perennials include: Canada thistle, field bindweed, hedge bindweed, dandelion, and Jerusalem artichoke. In addition, all seven South Dakota Noxious Weeds are perennials, with descriptions included at the end of this chapter.

Herbicide applications should be timed for summer just before flowering to kill flowers and potential seed, and fall after the first light frost (or in late September even if no frost has occurred) to move herbicide to the plant's roots. Frequent mowing or plant disruption without herbicides is needed to keep the plant from flowering and producing seed. In addition, frequent disturbance can help deplete carbohydrates in the roots, rhizomes, etc., which can weaken the plant. Unfortunately, if new shoots form from buds, the leaves can begin sending carbohydrates to the roots soon after emergence, so nonchemical weed control can be a long-term task.

### **Biennial weeds**

These plants germinate from seed in the spring and form a rosette that, if undisturbed during the first season, overwinters. The second year, the plant produces flowers and seeds. Examples of biennial weeds include: musk thistle, bull thistle, biennial wormwood, and common mallow. Chemical and nonchemical control can be effective against biennial weeds. Nonchemical control approaches for biennial weeds include: tillage, high-quality seed corn, crop rotations, mulches, and cover crops. The chemical control of the rosette form of biennial weeds is often very effective in the fall. Herbicide effectiveness generally increases with temperature. Daytime temperatures of 50°F or higher are desirable.

### **Annual Weeds**

Annual weeds are those that germinate from seed every year and live only for a single season. Annual weeds can germinate at different time periods. *Winter annuals* will germinate and emerge in fall or very early spring and flower early, usually before corn planting. Winter annual weeds include: field pennycress, horseweed or maretail, and evening primrose. Winter annuals can be more of a problem in no-till systems as the undisturbed residues provide overwinter protection for the germinated weeds. In addition, these weeds may set seed even before any spring field operations occur.

Early emerging spring annual weeds (days or weeks prior to corn planting) include: common sunflower, Pennsylvania smartweed and ladysthumb, common lambsquarters, and giant ragweed. Early emerging spring annual weeds may be controlled with preplant burndown applications of herbicides. These plants cause interference and the greatest yield losses if they remain undisturbed because they are already growing before corn emergence.

Weeds that emerge at or soon after corn planting include: common ragweed, velvetleaf, Russian thistle, redroot pigweed, common cocklebur, wild mustard, black nightshade, Venice mallow, wild buckwheat, and kochia. These weeds are targeted with a pre-emergence herbicide application. Weeds that emerge after corn emergence and into midsummer include: common waterhemp, biennial wormwood, Palmer amaranth, and buffalobur. Weeds not controlled by pre-emergence applications are typically the targets of postemergence control operations.

## Perennial Broadleaf Plants

### *Canada thistle (Cirsium arvense)*

Canada thistle (Figure 39.1) is a South Dakota Noxious Weed and it typically emerges before or at corn planting.

**Plant Description:** This perennial has a deep, extensive root systems and spreads by seeds or pieces of root transported from one location to another. The emerging plants are very small and the leaves are opposite. The plants are very dark green, and leaves have a crinkled appearance with sharp spines on the leaf margins and stem. The stems are erect, may have green or red stripes, and can grow to almost 6 ft tall under certain conditions. Flowers are imperfect, with colonies of male and female plants.



Figure 39.1 Canada thistle seedling and mature plant.  
(Ohio State Weed Lab. The Ohio State University,  
Bugwood.org; Rob Routledge, Sault College, Bugwood.org)

**Areas of Infestation and Yield Loss Potential:** This weed is often found in disturbed sites and may thrive in no-till systems. Canada thistle can produce a 30% yield reduction with 4 shoots or more per ft<sup>2</sup>. Tillage, in mature stands, will spread rhizomes and increase areas of infestation. Herbicides can control seedlings, but older plants should be treated with herbicide when plants are in the bud stage or in the fall after the first frost.

**Herbicide Resistance:** Biotypes of Canada thistle have been reported to be resistant to synthetic auxin herbicides (WSSA Group 4).

### *Perennial sowthistle (Sonchus arvensis)*

Perennial sowthistle (Figure 39.2) is a South Dakota Noxious Weed that typically emerges early from rhizomes, whereas young plants can start from creeping roots almost any time during the year. Seeds can germinate throughout the season if moisture is adequate.

**Plant Description:** This perennial reproduces by seeds and regrows from tap and creeping roots. This plant has a dandelionlike rosette and produces a flower stalk that has yellow, dandelionlike flowers. The plant has a smooth stem with milky juice, and it has long, lobed leaves with spiny edges. The leaves have a whitish coating on the leaf surface.

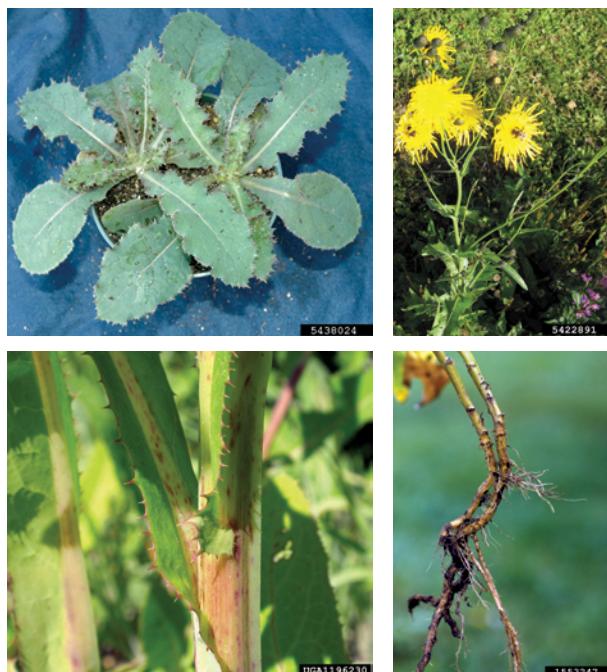


Figure 39.2 Perennial sowthistle rosettes, plant with flowers and seeds, leaf base near the stem, and asexual reproduction by producing satellite plants from rhizome growth. (Courtesy of Bruce Ackley. The Ohio State University, Bugwood.org; Caleb Selemmons, National Ecological Observation Network, Bugwood.org; Mecheal Schepard, USDA, Forest Service Bugwood.org; Ohio State Weed Lab, the Ohio State University, Bugwood.org)

**Areas of Infestation and Yield Loss Potential:** This weed generally escapes from roadside areas, and infestations often start at field margins. Perennial sowthistle is a problem in no-till and minimum-till fields. This plant can form dense colonies, however, little research has been done to examine harvest losses.

**Herbicide Resistance:** To date, herbicide resistance has not been reported in perennial sowthistle, but other species of sowthistle have been reported to be

resistant to ALS-inhibitor herbicides (WSSA Group 2).

#### ***Wild four o'clock (Mirabilis nyctaginea)***

Wild four o'clock (Figure 39.3) typically emerges before or at corn planting, and this perennial plant reproduces primarily from seed and shoots that arise from the taproot.

**Plant Description:** The leaves are opposite, ovate with no or few hairs, and the stems are erect. Inflorescence is an umbel with pink or red-purple sepals. Flowers open late in the afternoon, hence the name four o'clock.

**Areas of Infestation and Yield Loss Potential:** This plant often grows in sandy, dry soils. If growing in more fertile sites, it usually has poor growth because of other plant competition. It has a large taproot and it is not aggressive. It rarely is observed at densities high enough to produce significant yield losses.

**Herbicide Resistance:** As of 2015, herbicide resistance has not been reported, although the plant is tolerant to 2,4-D (synthetic auxin herbicides) (WSSA Group 4).

#### ***Curly dock (Rumex crispus)***

Curly dock (Figure 39.4) typically emerges before or at corn planting. This perennial plant reproduces mainly by seed, but once established, new rosettes form at the top of the taproot in late fall or early spring.

**Plant Description:** Curly dock, a member of the buckwheat (*Polygonum*) family, is erect and grows from 2- to 5-ft tall. It has an ocrea (membranous sheath) at the leaf base. Leaves are hairless, and stems are often unbranched below the flower head. Leaves are alternate along the stem. The fruits and stems turn rusty brown at the end of the season.

**Areas of Infestation and Yield Loss Potential:** This plant is often found in wet areas of the field. This plant is not aggressive and rarely observed in densities high enough to produce large yield losses. However, yield loss may occur due to wet soil conditions.

**Herbicide Resistance:** As of 2015, herbicide resistance has not been reported. However, plants in the *Polygonum* family are tolerant of synthetic auxin herbicides (WSSA Group 4).

#### ***Swamp smartweed (*Polygonum coccineum P. amphibium*)***

Swamp smartweed (Figure 39.5) typically emerges before or at corn planting. This perennial plant reproduces primarily from seed, but once established, shoots arise from rhizomes, stolons, and rooting stems.

**Plant Description:** Swamp smartweed is erect and grows from 1- to 3-ft tall. It is a member of the



Figure 39.3 Wild four o'clock infestation and flowers and taproot (Courtesy of Ohio State Weed Lab, The Ohio State University, [Bugwood.org](#)).



Figure 39.4 Single curly dock plant and infestation. (Courtesy of Steve Dewey, Utah State University, [Bugwood.org](#) and John M. Randall, The Nature Conservancy, [Bugwood.org](#))

buckwheat (*Polygonum*) family. This plant has an ocrea (membranous sheath) at the leaf base. Leaves are oblong and alternate along the stem. The inflorescence is spike with pink- or rose-colored flowers.

**Areas of Infestation and Yield Loss Potential:** This plant is often found in low-lying, wet areas of the field. This plant can be observed in high densities in wet soils and yield losses may be due to poor corn growing conditions.

**Herbicide Resistance:** As of 2015, herbicide resistance has not been reported. However, plants in the *Polygonum* family are tolerant of synthetic auxin herbicides (WSSA Group 4).

#### **Common milkweed (*Asclepias syriaca*)**

Common milkweed (Figure 39.6) typically emerges before or at corn planting, and this perennial plant reproduces from seed, root buds, and crown buds. Several stems can arise from a single crown. This plant is being reintroduced in many areas due to its importance to the larvae of the monarch butterfly.

**Plant Description:** This plant has an erect plant habit that grows from 2- to 6-ft tall. Leaves are opposite, oblong and hairy. Stems are hairy and contain milky sap. The flowers are arranged in umbellate cyme and flowers have pink- to rose-colored petals.

**Areas of Infestation and Yield Loss Potential:**

Common milkweed prefers dry, open sites. This plant can be aggressive with densities high enough to result in significant yield loss. Harvest problems may occur if high densities are present because of the sticky sap from cut stems.

**Herbicide Resistance:** This plant has always been tolerant of glyphosate (WSSA Group 9) due to sticky sap in the plant.

#### **Hemp dogbane (*Apocynum cannabinum*)**

Hemp dogbane (Figure 39.7) typically emerges before or at corn planting but new shoots can emerge throughout the season. This perennial plant reproduces from seeds and a spreading root system.

**Plant Description:** It has an erect plant habit, but unlike milkweed, often is bushy with many stems. Plants can grow up to 3 ft tall. Leaves are opposite, oblong, and the upper leaf surfaces typically are hairless. Stems contain milky sap. The flowers are arranged in a cyme and have white to white-green petals.



Figure 39.5 Swamp smartweed rhizomes, stem showing ocrea, and infestation. (Courtesy of Ohio State Weed Lab, The Ohio State University, [Bugwood.org](#))



Figure 39.6 Image of flowering common milkweed. (Courtesy Steven Katovich, USDA Forest Service, [Bugwood.org](#))



Figure 39.7 Single and multiple plants of hemp dogbane. (Courtesy of Ohio State Weed Lab, The Ohio State University, [Bugwood.org](#) and Mary Ellen (Mel) Harte, [Bugwood.org](#))

Areas of Infestation and Yield Loss Potential: Hemp dogbane prefers dry, open sites and is an aggressive plant that is difficult to control. Crop rotations with a hay crop for several years with several cuttings per year help reduce infestations.

Herbicide Resistance: This plant is tolerant to glyphosate (WSSA Group 9).

#### **Ground cherry (*Physalis sp.*)**

Ground cherry (Figure 39.8) typically emerges before or at corn planting, but new shoots can emerge throughout the season. This perennial plant reproduces from seed and it develops a thick, underground root system.

Plant Description: Ground cherry has an erect habit but often becomes bushy with many stems. Plants can grow up to 3 ft tall. Leaves are alternate, oval with a toothed margin. Leaf surfaces have glandular hairs, and single yellow-green flowers develop papery, conical seedpods (Japanese lanterns).

Areas of Infestation and Yield Loss Potential: This aggressive plant prefers dry, open sites and can be difficult to control. Sticky seeds can adhere to crop seeds during harvest if corn is cut short.

Herbicide Resistance: As of 2015, herbicide resistance has not been reported.

#### **Jerusalem artichoke (*Helianthus tuberosus*)**

Jerusalem artichoke (Figure 39.9) typically emerges early from tubers with many plants appearing in a small area. This perennial plant reproduces from seed, tubers, and rhizomes.

Plant Description: Jerusalem artichoke has a sunflowerlike rosette and the leaves are opposite. The plant has pale yellow, disk flowers, and it can grow up to 10 ft tall.

Areas of Infestation and Yield Loss Potential: High populations can be found in wet sites and in no-till or minimum-till fields. This plant can be extremely aggressive due to its tall stature, and corn yield losses of almost 100% have been reported.

Herbicide Resistance: Herbicide resistance has not been reported.

#### **Field bindweed (*Convolvulus arvensis*)**

Field bindweed (Figure 39.10) emerges in late spring to early summer.

Plant Description: This perennial plant can grow from rhizomes or seed and it has arrow-shaped leaves on a twining stem. The root system can be extensive and deep-rooted. Flowers are white to pink and bell- or trumpet-shaped.



Figure 39.8 Ground cherry infestation, flower, seedpod, and rhizomes (Courtesy of Ohio State Weed Lab, The Ohio State University, [Bugwood.org](#) and author)



Figure 39.9 Jerusalem artichoke seedlings and mature plants. (Courtesy of Theodore Webster, USDA Agricultural Research Service, [Bugwood.org](#) and Ohio State Weed Lab, The Ohio State University, [Bugwood.org](#))

Areas of Infestation and Yield Loss Potential: This plant grows well in dry soils and it can produce a 50% yield reduction in corn. In addition, the vining nature of the plant can cause problems with harvest equipment.

Herbicide Resistance: This plant is tolerant of glyphosate (WSSA Group 9), and biotypes are resistant to cell-membrane disruptor (paraquat) (WSSA Group 22) herbicides.

#### **Hedge bindweed (*Calystegia sepium*)**

Hedge bindweed (Figure 39.11) typically emerges before or at corn planting. This perennial, vining plant reproduces by seed and rhizomes.

Plant Description: Hedge bindweed can be confused with field bindweed (Figure 39.10). However, the leaves have a long petiole and a pointed tip. The flowers are large, funnel-shaped, and white to pink in color.

Areas of Infestation and Yield Loss Potential: Found in disturbed sites. This plant is not as aggressive as field bindweed, although the vines may cause problems during harvest.

Herbicide Resistance: As of 2015, herbicide resistance has not been reported.

#### **Dandelion (*Taraxacum officinale*)**

Dandelion (Figure 39.12) typically emerges early, before corn planting, and the seeds can germinate throughout the season if moisture is adequate. This perennial reproduces by seeds and regrows from the taproots.

Plant Description: Dandelion has a basal rosette with long, lanceolate, lobed leaves. Milky juice can be found throughout the plant and exudes when cut. Bright yellow inflorescence with flowers arranged in heads.

#### Areas of Infestation and Yield Loss Potential:

Dandelions can be a problem in no-till and minimum-till fields. This plant is not as aggressive as other perennials due to the low growing rosettes.

Herbicide Resistance: As of 2015, herbicide resistance has not been reported, although some are tolerant to synthetic auxin herbicides (WSSA Group 4).



Figure 39.10 Image of field bindweed. (Courtesy of Pacific Northwest Weed Handbook and Howard F. Schwartz, Colorado State University, [Bugwood.org](#))



Figure 39.11 Photo of hedge bindweed. (Courtesy of Joseph M. DiTomaso, University of California - Davis, [Bugwood.org](#) and Pacific Northwest Weed Handbook)



Figure 39.12 Dandelion seedling and plant with flower. (Courtesy of Bruce Ackley, the Ohio State University, [Bugwood.org](#) and Ohio State Weed Lab, The Ohio State University, [Bugwood.org](#))

## Biennial Plants

### Common Mallow (or Roundleaf mallow) (*Malva neglecta*)

Common mallow (Figure 39.13) generally is a biennial plant that reproduces from seeds. However, it can behave as an annual, winter annual, biennial, or short-lived perennial if winters are mild or it is located in a protected site. Seedlings emerge in several flushes throughout the season.

**Plant Description:** The leaves are alternate and oval-to kidney-shaped with wavy, lobed edges. The plant is prostrate to the ground, rarely getting taller than 1.5 ft but may have long vines. Leaf surface is hairy. Fruit is disk-shaped and flattened with a cheese-wheel appearance.



Figure 39.13 Common mallow solitary plant. (Courtesy of Joseph M. DiTomaso, University of California - Davis, Bugwood.org)

**Areas of Infestation and Yield Loss Potential:** Dense infestations are rarely observed in cultivated fields, but they may occur. The plant has a deep taproot that can help it survive drought and cold temperatures. Common mallow may not reduce corn yields, however, it can cause problems during harvest.

**Herbicide Resistance:** As of 2015 herbicide resistance has not been reported, although it is tolerant to glyphosate (WSSA Group 9).

### Bull thistle (*Cirsium vulgare*)

Bull thistle (Figure 39.14) is a biennial plant that reproduces from seeds with a rosette (basal whorl of leaves) formed in the first year. In the second year – if the plant is not disturbed – it bolts and sends out many erect stems with flowers starting to form in July. This plant is the symbol of Scotland, as it saved the country from invaders.

**Plant Description:** The rosette leaves are elliptical to ovate in shape covered in cobweb-like hairs. Leaf margins can be unlobed (entire) to finely lobed but all are tipped with spines. Leaf surface is hairy. In the second year, stalks range from 3 to 6 ft in height with alternate, spiny leaves and spines on the stalk. Flower bolls are covered with spines and cobweb-like hairs.



Figure 39.14 Bull thistle rosette, leaf, and infestation. (Courtesy of Michael Shephard, USDA Forest Service, Bugwood.org; Steve Dewey, Utah State University, Bugwood.org; John M. Randall, The Nature Conservancy, Bugwood.org)

**Areas of Infestation and Yield Loss Potential:** This plant prefers moist (not wet) sites but will grow on drier, sandy sites. In South Dakota, corn yield reductions have not been assessed.

**Herbicide Resistance:** As of 2015, herbicide resistant biotypes have not been reported, although it is tolerant of glyphosate (WSSA Group 9).

### Musk thistle (*Carduus nutans*)

Musk thistle (Figures 39.15 and 39.16) reproduces from seeds with a rosette (basal whorl of leaves) formed the first year with emergence in the fall or early spring. In the second year, if not disturbed, the plant bolts and sends out many erect stems with flowers forming as early as May.

**Plant Description:** The rosette leaves are elliptical and smooth (without hair) with leaf margins deeply toothed to pinnately lobed. Leaf veins extend beyond the leaf margin to end as spines. Second-year stalks range from 2 to 4 ft in height, with alternate, spiny leaves and stalks with spiny wings. Flower color ranges from rose-purple to white. The inflorescences are disklike and nodding (Figure 39.15).

**Areas of Infestation and Yield Loss Potential:** This plant prefers moist (not wet) sites but will grow in drier, sandy sites. Musk thistle impact on corn yields is often not assessed, however, areas with heavy infestations may not be suitable for harvest.

**Herbicide Resistance:** This plant may be resistant to synthetic auxin herbicides (WSSA Group 4).

#### **Biennial wormwood (*Artemisia biennis*)**

Biennial wormwood (Figure 39.17) typically emerges in late-June to early July after corn planting and the plant may behave as an annual, flowering later in the first year of growth. Reproduction is from seed.

**Plant Description:** The first true leaves of seedlings are finely divided and often mistaken for common ragweed (compare Figures 39.17 and 39.40). Biennial wormwood has sharp leaf edges and leaves are hairless, whereas common ragweed has rounded leaf edges with hairs. Vegetative plants are rosettes. Flower stalks can grow up to 6 ft tall and a plant can produce over 400,000 seeds/plant.

**Areas of Infestation and Yield Loss Potential:** This plant grows well in disturbed, poorly drained soils and yield reduction can be up to 40% with 1 plant per ft<sup>2</sup>. If the infestation is dense, areas may not be harvested because of the height of biennial wormwood, effectively reducing yield by 100% in these areas.

**Herbicide Resistance:** Herbicide applications must be done before the plant is 3" tall, as tolerance to all herbicides becomes an issue. As of 2015, herbicide resistant biotypes have not been reported.



Figure 39.15 Bull thistle (left) and musk thistle head (right). (Courtesy of Steve Dewey, Utah State University, Bugwood.org)



Figure 39.16 Musk thistle rosette and infestation. (Courtesy of Leslie J. Mehrhoff, University of Connecticut, Bugwood.org; Norman E. Rees, USDA Agricultural Research Service - Retired, Bugwood.org)



Figure 39.17 Biennial wormwood seedling, inflorescence, and mature plant. (Courtesy of Michael Moechnig)

## Annuals Germinating in the Fall or Early Spring

### *Eveningprimrose (Oenothera sp.)*

There are 20 species of eveningprimrose (Figure 39.18) in the Great Plains. These plants will emerge in the fall, overwinter as a rosette, or emerge in the early spring prior to planting. This biennial, winter annual, or early spring emergence plant reproduces only from seed.

**Plant Description:** The plant has numerous hairy leaves that are lanceolate to oblong. Plants can grow up to 6 ft tall, and the flowers are yellow to reddish-yellow. The fruit is a cylindrical capsule tapering at the tip.

**Areas of Infestation and Yield Loss Potential:** High infestations can be found in reduced-tillage systems, and this plant is tolerant of drought conditions and sandy soil types. This plant is being explored as an alternative oil seed crop. Historically, the populations are less than the economic threshold.

**Herbicide Resistance:** As of 2015, herbicide resistance has not been reported, but the plant is difficult to control with herbicides typically used in corn.

### *Prickly lettuce (Lactuca serriola)*

Prickly lettuce (Figure 39.19) is an annual or winter annual erect plant that reproduces from seeds germinating in fall or early spring.

**Plant Description:** The cotyledons (seed leaves) are oval or oblong with spiny margins and spines along the midrib of the leaf. The young plant is a basal rosette (growth habit resembling a dandelion) with stem elongation during flower development. The plant, when cut, exudes milky sap. Leaves on the elongated stem are alternate and leaf bases clasp the stem. Flowers are yellow in color and petals have a toothed margin.

**Areas of Infestation and Yield Loss Potential:** This plant is often found in disturbed sites. Its impact on corn yields is unknown.

**Herbicide Resistance:** Prickly lettuce biotypes in the United States have been reported to be resistant to ALS-inhibitor herbicides (WSSA Group 2) and synthetic auxin herbicides (WSSA Group 4).

### *Flixweed (Descurainia sophia)*

Flixweed (Figure 39.20) is an introduced erect winter annual or biennial that germinates from seeds in the fall or spring.



Figure 39.18 Eveningprimrose rosette, flower, and seed capsule. (Courtesy of Michael Moechnig)



Figure 39.19 Spines along the prickly lettuce leaf and prickly lettuce plant. (Courtesy of Ohio State Weed Lab Archive, The Ohio State University, [Bugwood.org](#))



Figure 39.20 Images of flixweed. (Courtesy of Mary Ellen (Mel) Harte, [Bugwood.org](#)).

**Plant Description:** The leaves are finely divided and pinnately compound, grayish-blue in color. Juvenile plants have ovate-shaped leaves in a rosette arrangement, deeply lobed margins, and the leaves are covered in star-shaped hairs. Flower petals are very small and yellow or greenish-yellow. Flixweed is distinguished from other mustards because of its finely dissected leaves and very long, thin siliques (seed-holding capsules).

**Areas of Infestation and Yield Loss Potential:** This plant is often found in disturbed, dry sites. The impact of this plant on corn yields is unknown.

**Herbicide Resistance:** Flixweed biotypes in Kansas winter wheat fields have been reported to be resistant to ALS-inhibitor herbicides (WSSA Group 2).

### Tansy Mustard (*Descurainia pinnata*)

Tansy mustard (Figure 39.21) is a native winter annual that germinates from seeds in the fall or spring.

**Plant Description:** The leaves are finely divided and pinnately compound, greener in color than flixweed. Juvenile plants have ovate-shaped leaves in a rosette arrangement, deeply lobed margins, and leaf surface has a gray to whitish pubescence. Flower petals are very small and yellow or greenish-yellow. It blooms earlier than flixweed. The fruits (pods) of tansy mustard are siliques. Tansy mustard and flixweed can be distinguished by examining the seed and seedpods. Tansy mustard seeds are  $\frac{1}{2}$ -inch long and arranged in two rows along the pod, whereas flixweed seeds are 1- to  $1\frac{1}{2}$ -inches long and are arranged in a single row.



Figure 39.21 Images of tansy mustard.  
(Courtesy of Joseph M. DiTomaso, University of California - Davis, Bugwood.org and [bing.com](#))

**Areas of Infestation and Yield Loss Potential:** Dry, disturbed sites. Tansy mustard impact on corn yields is not known, and herbicides are most effective if they are applied prior to the plant bolting.

**Herbicide Resistance:** Herbicide resistance has not been reported.

### Shepherds Purse (*Capsella bursa-pastoris*)

Shepherds Purse (Figure 39.22) is a winter annual that germinates from seeds in fall or spring.

**Plant Description:** The basal leaves are in a rosette and deeply lobed, and could be confused with dandelion. The seed stalk, when bolting, has narrow, alternate leaves that wrap around the stem and have irregular margins. The stem can be up to 1.5 ft tall with branches near the top. It has small white flowers and the seedpod is a silicle that is flat and triangular.

**Area of Infestation and Yield Loss Potential:** The impact of sheperdspurse on corn yields is unknown and it can be controlled by a wide variety of herbicides if applied before bolting.



Figure 39.22 Shepherds purse seedling, infestation, and flowers and fruits. (Courtesy of Ohio State Weed Lab, The Ohio State University, Bugwood.org; Karan A. Rawlins, University of Georgia, Bugwood.org; Mary Ellen (Mel) Harte, Bugwood.org)

**Herbicide Resistance:** There are biotypes that are resistant to ALS-inhibitor herbicides (WSSA Group 2) and Photosystem II inhibitors (WSSA Group 5) (e.g., metribuzin) herbicides.

### **Field pennycress (*Thlaspi arvense*)**

Field pennycress (Figure 39.23) is an erect winter annual that may germinate from seeds in the fall or spring.

**Plant Description:** The cotyledons are oval or oblong. The young plant is a basal rosette (growth habit resembling a dandelion), and stem elongation occurs during flower development. Young leaves are generally oval and without hair. Leaves on the elongated stem become more narrow and lancelike toward the top of the plant, but all have a toothed margin. Seeds are in silicles, which have the penny-shaped appearance, giving the plant its common name.

**Areas of Infestation and Yield Loss Potential:** This plant is often found in disturbed sites. This plant may not reduce yield but may cause problems during harvest or result in dockage due to off flavor of grain. This plant is being considered as an alternative oilseed crop, so fields are being planted to this species.

**Herbicide Resistance:** Biotypes have been found to be resistant to ALS-inhibitor herbicides (WSSA Group 2).



Figure 39.23 Images of field pennycress silicle, flowering plant, and infestation. (Courtesy of Mary Ellen (Mel) Harte, [Bugwood.org](http://Bugwood.org))

### **Horseweed (*Conyza canadensis*)**

Horseweed (Figure 39.24) may overwinter as a rosette and bolt in the spring or emerge in the spring at or before corn planting.

**Plant Description:** This winter or summer annual reproduces from seed, and it has numerous linear, hairy (although some plants have few or no hairs) leaves crowded on the stem. The plant has numerous dotlike glands that secrete terpenes, releasing an unpleasant odor when the plant is crushed or cut. Typically the stem below the inflorescence is unbranched unless injured. Plants can grow up to 5 ft tall. The flowers are very small and are generally white. Seed is dispersed by wind with seeds having small white bristles (pappus). The plant can tolerate drought conditions.



Figure 39.24 Image of horseweed. (Courtesy of Pacific Northwest Weed Handbook).

**Areas of Infestation and Yield Loss Potential:** This plant generally has populations that are less than the economic threshold, however, high densities in row crops have been reported to cause > 80% yield loss.

**Herbicide Resistance:** There are biotypes resistant to Photosystem II inhibitors (WSSA Group 5) (atrazine), glyphosate (WSSA Group 9), ALS-inhibitors (WSSA Group 2), and cell-membrane disruptor (paraquat) (WSSA Group 22) herbicides. Rotating herbicides or other control methods is necessary to minimize selection of herbicide resistant biotypes.

### **Black medic (*Medicago lupulina*)**

Black medic (Figure 39.25) is a winter or summer annual that reproduces from seed.

**Plant Description:** This plant has a prostrate growth habit with multiple branches radiating from a central taproot forming a mat. The leaves are compound having 3 leaflets with sharply toothed margins and prominent veins. Small yellow flowers form dense heads at the stem ends. A single large seed develops in each flower. This weed seldom has a high enough density to warrant control and it has been suggested as a possible cover crop.

**Areas of Infestation and Yield Loss Potential:** If uncontrolled early, moderate to high densities can result in significant yield loss. This plant can outcompete corn for nitrogen early in the season. This weed typically has been sparse in fields.

**Herbicide Resistance:** Biotypes have been reported that are resistant to Photosystem II inhibitors (atrazine) (WSSA Group 5), as well as, glyphosate (WSSA Group 9), ALS-inhibitors (WSSA Group 2), and cell-membrane disruptor (paraquat) (WSSA Group 22) herbicides. Rotating herbicides or other control methods is necessary to minimize selection of herbicide resistant biotypes.

### **Low-growing or Vinelike Annual Broadleaf Weeds**

#### **Prostrate knotweed (*Polygonum aviculare*)**

Prostrate knotweed (Figure 39.26) is an annual plant reproducing from seeds that germinate early in the spring at or before corn planting.

**Plant Description:** Plants grow near flat to the ground and form a mat from a central taproot. Leaves are small, alternate and often covered with white mildew. Flowers are in the leaf axil, with 3 to 6 flowers per axil. This plant is a member of the buckwheat (*Polygonum*) family, so there is a papery brown or tan sheath (ocrea) at the nodes. There are other plants similar to prostrate knotweed, including erect knotweed (*P. erectum*), which tends to be more upright, and common knotweed (*P. arenastrum*), which as 1 to 3 flowers per leaf axil.

**Areas of Infestation and Yield Loss Potential:** This plant can grow in compacted, dry, salty soils. Historically, this weed has seldom been dense enough to warrant control. However, mats of the plant can cause problems.

**Herbicide Resistance:** There are European biotypes that are resistant to photosystem II inhibitors (atrazine) (WSSA Group 5). Plants in the *Polygonum* family are difficult to control with synthetic auxin herbicides (2,4-D) (WSSA Group 4).



Figure 39.25 Images of black medic flowers and plants. (Courtesy of Karan A. Rawlins, University of Georgia, [Bugwood.org](#) and Forest and Kim Starr, Starr Environmental, [Bugwood.org](#))



Figure 39.26 Prostrate knotweed closeup of stem showing the ocrea (papery sheath at the base of the leaves) and spreading infestation. (Courtesy of Bruce Ackley, The Ohio State University, [Bugwood.org](#) and Robert Vidéki, Doronicum Kft., [Bugwood.org](#))

### ***Spotted spurge (Euphorbia maculata)***

Spotted spurge (Figure 39.27) is an annual plant that germinates from seeds in the spring at or before corn planting.

**Plant Description:** Similar to knotweed, spotted spurge grows as a mat to cover the ground. Stems are pink and covered with hair and leaves are small and opposite, with some having a distinct purple spot in the leaf center. Flowers are in the leaf axil, and seeds are borne in a three-parted seedpod. This plant contains a sticky, milky white sap that is exuded when the stems are cut.

**Areas of Infestation and Yield Loss Potential:** This weed has seldom been dense enough to warrant control. However, mats of the plant can cause problems.

**Herbicide Resistance:** Herbicide resistance has not been reported, although due to the milky sap, glyphosate (WSSA Group 9) may provide poor control.

### ***Prostrate pigweed (Amaranthus blitoides)***

Prostrate pigweed (Figure 39.28) is annual plant that has seeds that germinate in early spring at or before corn planting.

**Plant Description:** Similar to knotweed and spotted spurge, it grows as a mat to cover the ground. This plant has pink stems that, unlike spotted spurge, do NOT contain milky juice. Stems are pink, sparsely hairy, and leaves are oblong and alternate. Small flower clusters are produced in the leaf axil. Shiny black seeds can be shaken from the plant.

**Areas of Infestation and Yield Loss Potential:** This weed has seldom been dense enough to warrant control. However, the plant mats can cause problems.

**Herbicide Resistance:** Biotypes of prostrate pigweed have been reported to be resistant to ALS-inhibitor (WSSA Group 2) and Photosystem II inhibitors (WSSA Group 5) herbicides.

### ***Common purslane (Portulaca oleracea)***

Common purslane (Figure 39.29) is an annual with seeds that germinate in the spring at or before corn planting.

**Plant Description:** Common purslane has pink stems that are fleshy and leaves are succulent. These plants are drought-resistant and grow best in hot, dry



Figure 39.27 Image of spotted spurge. (Courtesy Utah State University, [Bugwood.org](#))



Figure 39.28 Prostrate pigweed seedling and plant. (Courtesy John D. Byrd, Mississippi State University, [Bugwood.org](#) and Joseph M. DiTomaso, University of California - Davis, [Bugwood.org](#))



Figure 39.29 Common purslane seedling and plant. (Courtesy Phil Westra, Colorado State University, [Bugwood.org](#))

weather. These plants grow as a mat to cover the ground and can re-root from stems following disturbance. Stems are pink, leaves are oblong and alternate, but clustered at the ends of branched stems. Small yellow flowers are produced in the leaf axil. Very tiny, shiny black seeds can be shaken from the plant.

Areas of Infestation and Yield Loss Potential: This weed has seldom been dense enough to warrant control. However, mats of the plant can cause problems.

Herbicide Resistance: Biotypes of common purslane have been reported to be resistant Photosystem II inhibitors (WSSA Group 5).

#### ***Wild buckwheat (*Polygonum convolvulus*)***

Wild buckwheat (Figure 39.30) is an annual vining broadleaf with seeds that germinate at or prior to corn seeding. However, depending on soil temperatures and moisture, seeds can also germinate later.

Plant Description: Wild buckwheat is a member of the buckwheat (*Polygonum*) family. This plant has an ocrea (white to brown sheath) that is located at the base of the leaf on the stem. This plant is often confused with the perennial field bindweed (Figure 39.10) and is known as black bindweed in some areas. Triangular seeds, the ocrea, very small flowers, leaf shape, and root structure all help distinguish wild buckwheat from field bindweed.

Areas of Infestation and Yield Loss Potential: Wet areas of fields are more likely to have infestations. At low densities, wild buckwheat may not reduce corn yields. However, at high densities, yield losses can be as high as 30%. The vines twining up cornstalks may become tangled in harvest equipment. If mixed with corn grain, the high water content of wild buckwheat seeds may cause spoilage in stored grain.

Herbicide Resistance: Biotypes can be resistant to ALS-inhibitor (WSSA Group 2) and Photosystem II inhibitors (WSSA Group 5), and it is difficult to control with either glyphosate (WSSA Group 9) or 2,4-D (synthetic auxin herbicides) (WSSA Group 4).

#### ***Tall morning glory (*Ipomoea purpurea*)***

Tall morning glory (Figure 39.31) is an annual, vining plant that has seeds that germinate at or just after corn planting. This plant can also reproduce from rhizomes.

Plant Description: Tall morning glory has heart-shaped leaves with entire margins. The stems have erect hairs and can climb up a plant. The flowers are large, funnel-shaped, and can be purple, blue, white, or red. This plant has been used as an ornamental but can escape into crop fields.

Areas of Infestation and Yield Loss Potential: Tall morning glory grows best in moist places. Buried seed can stay viable for a long time. It is important to



Figure 39.30 Image of wild buckwheat. (Courtesy of Joseph M. DiTomaso, University of California - Davis, Bugwood.org)



Figure 39.31 Vegetative and flowering plants of tall morning glory. (Courtesy of Howard F. Schwartz, Colorado State University, Bugwood.org)

control as a seedling before the plant twines up the crop. This plant is not as aggressive as field bindweed, although the vines can reach 16 ft in length and may cause problems during harvest.

**Herbicide Resistance:** To date, herbicide resistance has not been reported.

### Broadleaf Annuals with an Erect (upright) Growth Habit

#### *Palmer amaranth (Amaranthus palmeri)*

In South Dakota, Palmer amaranth (Figures 39.32 and 39.33) is an annual plant that is a new invasive weed. It is thought that the seeds will germinate late in the season after corn emergence. **HOWEVER**, this is unsubstantiated.

**Plant Description:** The first true leaves of seedlings are more linear than cotyledons of waterhemp, and the leaf surfaces are not hairy. Palmer amaranth has male and female plants and can grow up to 10 ft tall. The inflorescence of the female plant (Figure 39.34) is more highly branched and has more spines than the male. The female plant has been reported to produce over 1 million shiny black seeds.

**Areas of Infestation and Yield Loss Potential:** This plant is often found in fertilized, disturbed areas. The impact of Palmer amaranth in South Dakota is unknown. However, it is **VERY** aggressive in Southern states with yield losses of 100% reported.

**Herbicide Resistance:** Biotypes of this plant have been reported to be resistant to 5 different herbicide types in Southern regions and may have multiple resistances to two or more herbicides in the same plant. These include ALS-inhibitor (WSSA Group 2) and Photosystem II inhibitors (WSSA Group 5), glyphosate (WSSA Group 9), and PPO type (WSSA Group 14) herbicides.

#### *Redroot pigweed (Amaranthus retroflexus)*

Redroot pigweed (Figure 39.35) is an annual plant with seeds that germinate at or during corn planting.

**Plant Description:** The cotyledons are thin and linear, and the leaves are lanceolate with alternate arrangement. The lower surface is hairy. Stems are stout and the lower portion is reddish (hence the name redroot). The plant is monoecious, with a single plant having both male and female flowers present. Seeds are black, shiny, and numerous with a large plant producing over 800,000 seeds per plant. Plants may hybridize with other *Amaranthus* species.

**Areas of Infestation and Yield Loss Potential:** This plant typically is found in disturbed areas usually with high fertility. Depending on weed density, yield losses as high as 55% have been reported.



Figure 39.32 Seedling of Palmer amaranth vs. common waterhemp. (Courtesy University of Illinois)



Figure 39.33 Palmer amaranth seedling displaying white and purple markings, some plants will have no distinguishing watermarks on the leaves. (Courtesy of author) Note that the leaf petioles of the older leaves are very long. When compared with the length of the leaf blade, the petiole of Palmer amaranth will be longer than the blade.



Figure 39.34 Palmer amaranth seed head (female). (Courtesy of Howard F. Schwartz, Colorado State University, [Bugwood.org](http://Bugwood.org))

**Herbicide Resistance:** Redroot pigweed biotypes have been shown to be resistant to Photosystem II inhibitors (WSSA Group 5) and ALS-inhibitor (WSSA Group 2) herbicides.

#### **Common waterhemp (*Amaranthus rudis*)**

Common waterhemp (Figure 39.36) is an annual plant that has seeds that germinate late in the season after corn emergence.

**Plant Description:** The first true leaves of seedlings are more lancelike (narrow) than the oval (egg-shaped) leaves as seen on redroot pigweed. Leaf surfaces are not hairy. This plant has male and female plants. The inflorescence of the female plant is more highly branched than the inflorescence of the redroot pigweed. The female plant has been reported to produce over 1 million shiny black seeds.

**Areas of Infestation and Yield Loss Potential:** This plant is often found in disturbed areas with high fertility. Depending on density yield losses of up to 55% have been reported.

**Herbicide Resistance:** Biotypes of this plant have been reported to be resistant to ALS-inhibitor (WSSA Group 2) and Photosystem II inhibitors (WSSA Group 5), glyphosate (WSSA Group 9), and PPO (WSSA Group 14) type herbicides.

#### **Toothed Spurge (*Euphorbia dentata*)**

Toothed spurge (Figure 39.37) is an annual plant that has seeds that germinate after corn emergence.

**Plant Description:** The leaves are opposite, blades ovate or lancelike, leaf tip sharply pointed. Short hairs are on upper and lower leaf surfaces. Stems have short bristly hairs, erect, and when cut, exude sticky, milky juice. Flowers are in terminal clusters, green, with seeds borne in capsules.

**Areas of Infestation and Yield Loss Potential:** The yield loss potential is unknown, however, the milky sap can cause problems with harvest.

**Herbicide Resistance:** Herbicide resistance has not been reported at this time. Due to the milky sap in the plant, toothed spurge is not well controlled with glyphosate.

#### **Volunteer Soybean**

Volunteer soybean is an annual plant that has seeds that can germinate after corn emergence. The plants look like the crop soybean but are growing from seed from previous crops. High densities can reduce corn yields 20% to 30%.

**Herbicide Resistance:** The volunteer soybean herbicide resistance will depend on the stacked traits from previous plantings, including glyphosate (WSSA Group 9) and, when available, synthetic auxin herbicides (WSSA Group 4).



Figure 39.35 Image of redroot pigweed. (Courtesy of Phil Westra, Colorado State University, [Bugwood.org](#) and Robert Vidéki, Doronicum Kft., [Bugwood.org](#))



Figure 39.36 Images of common waterhemp. (Courtesy of Iowa State University and Ohio State Weed Lab, The Ohio State University, [Bugwood.org](#))



Figure 39.37 Toothed spurge young plant and infestation in soybean. (Courtesy of Steve Dewey, Utah State University, [Bugwood.org](#) and Howard F. Schwartz, Colorado State University, [Bugwood.org](#))

### ***Smartweed sp. (Pennsylvania smartweed and Ladysthumb) (Polygonum sp.)***

Smartweed sp. (Figure 39.38) is a native, annual plant that has seeds that germinate prior to seeding corn.

**Plant Description:** This plant has a linear- to oar-shaped cotyledon, and the leaves are alternate in arrangement with the leaf surface smooth to slightly hairy. Nodes on the stem are swollen (jointed) with a papery sheath at each node (ocrea). Flowers are pink and the inflorescence type is a raceme.

#### **Areas of Infestation and Yield Loss Potential:**

This plant is adapted to the wetter areas of a field. Smartweeds can reduce yield 15% at high densities.

**Herbicide Resistance:** Smartweed biotypes have been reported to be resistant to Photosystem II inhibitors herbicides (WSSA Group 5).

#### ***Giant Ragweed (Ambrosia trifida)***

Giant ragweed (Figure 39.39) is an annual plant with seeds that first germinate when corn is being planted. Germination can continue if the temperatures remain cool.

**Plant Description:** The cotyledons are spatulate (spoon-shaped) and the leaves are opposite and divided into 3 to 5 lobes. The stems are erect, branched, and can grow to almost 6 ft tall under favorable conditions. The flowers are nonshowy and without petals.

**Areas of Infestation and Yield Loss Potential:** Giant ragweed is often found in disturbed sites with moist soil. If not controlled, early emerging plants at densities of 0.5 plants/ft<sup>2</sup> can reduce corn yield up to 40%.

**Herbicide Resistance:** Biotypes of this plant have been reported to be resistant to ALS-inhibitors (WSSA Group 2) in many states, and glyphosate (WSSA Group 9) has been reported in some populations in Minnesota, Iowa, and Nebraska. Biotypes resistant to both ALS and glyphosate have also been reported.

#### ***Common Ragweed (Ambrosia artemisiifolia)***

Common ragweed (Figure 39.40) is an annual plant with seeds that germinate when corn is seeded.

**Plant Description:** This plant has cotyledons that are spatulate (spoon-shaped), and leaves that are opposite in the lower stem and alternate on the upper stem. The leaves are finely divided. The stems are erect,



Figure 39.38 Smartweed seedling, young ladysthumb plant (note purple coloration about midleaf), ocrea (papery sheath located at the nodes), and raceme inflorescence with pinkish flowers. (Photos courtesy of Michael Moechnig)



Figure 39.39 Giant ragweed seedling, young plant, and mature plant. (Joseph M. DiTomaso, University of California - Davis, [Bugwood.org](#); James H. Miller & Ted Bodner, Southern Weed Science Society, [Bugwood.org](#); and Michael Moechnig)

branched, and grow to 1 to 2 ft. The flowers are nonshowy and without petals.

#### Areas of Infestation and Yield Loss Potential:

This weed is typically found in disturbed sites. At moderate densities, it can reduce corn yields by 10%. At high densities yield losses can be severe (> 50%).

**Herbicide Resistance:** Biotypes of this plant have been reported to be resistant to ALS-inhibitors (WSSA Group 2) in many states. In South Dakota, glyphosate (WSSA Group 9) resistant biotypes have been documented.

#### ***Velvetleaf (Abutilon theophrasti)***

Velvetleaf (Figure 39.41) is an annual plant with seeds that germinate shortly after corn seeding.

**Plant Description:** The seedlings have round cotyledons and alternate, heart-shaped leaves. Leaves are covered with soft hairs giving it a “velvet” feel. The plant can reach 6 ft in height.

**Areas of Infestation and Yield Loss Potential:** This plant is often found in crop production fields and roadsides. In moderate infestations (1-2 plants/ft<sup>2</sup>), 20% corn yield reductions have been reported.

**Herbicide Resistance:** Biotypes in Minnesota and other areas have been reported to be resistant to Photosystem II inhibitors (WSSA Group 5) herbicides.

#### ***Black nightshade (Solanum ptychanthum)***

Black nightshade (Figure 39.42) is an annual plant with seeds that germinate when corn is emerging.

**Plant Description:** The cotyledons of the seedling are ovate, green on upper surface and purple on lower surface. Leaves are alternate and oval in shape with few hairs. Leaves are often holey because of flea beetle feeding. Flowers are white to bluish. Seeds are in berries with 50 to 100 seeds per berry. The juice of the berry stains seeds and reduces crop value.

**Areas of Infestation and Yield Loss Potential:** This plant can often be found in disturbed sites. With high to moderate infestations (> 1 plant/ft<sup>2</sup>) yield losses can be 80%. Juice of berries also mixes with chaff and this combination can plug combines.

**Herbicide Resistance:** Black nightshade biotypes have been reported to be resistant to ALS-inhibitor (WSSA Group 2) and Photosystem II inhibitors (WSSA Group 5), as well as cell-membrane disruptor (paraquat) (WSSA Group 22) herbicides.



Figure 39.40 Common ragweed seedlings at several growth stages and mature plant above a soybean canopy. (Courtesy of Michael Moechnig)



Figure 39.41 Velvetleaf seedling and mature plant. (Courtesy of Michael Moechnig)



Figure 39.42 Blacknightshade cotyledon, underside of young plant, and plant with flowers. (Courtesy of Michael Moechnig)

### **Venice mallow (*Hibiscus trionum*)**

Venice mallow (Figure 39.43) is an annual plant with seeds that typically germinate after corn emergence.

**Plant Description:** The cotyledons of the seedlings are round and the leaves are alternate with 3 to 7 distinct lobes. The leaf surface has hairs and the flowers are white to pale yellow. Fruits are an inflated capsule.

**Areas of Infestation and Yield Loss Potential:** This plant can often be found in disturbed sites and it is drought-tolerant and can grow in gravelly and acid soils. Corn yield losses are generally < 5% with moderate infestations, although season-long competition can increase this loss.

**Herbicide Resistance:** As of 2015, herbicide resistance has not been reported.

### **Buffalobur (*Solanum rostratum*)**

Buffalobur (Figure 39.44) is an annual plant where the seeds typically germinate after corn emergence.

**Plant Description:** The first true leaves of seedlings are lance-shaped and the leaves are many-lobed, and alternate along the stem. Leaf surfaces and stems are spiny with long yellow spines. Spiny capsules hold the fruit.

**Areas of Infestation and Yield Loss Potential:** Buffalobur thrives in well-drained, disturbed soils. Depending on density and emergence date, yield losses are generally low to moderate.

**Herbicide Resistance:** As of 2015, herbicide resistance has not been reported.

### **Common sunflower (*Helianthus annuus*)**

Common sunflower (Figure 39.45) is an annual plant and has seeds that germinate during or shortly after corn planting.

**Plant Description:** The plant cotyledons are oval with toothed-shaped margins on alternating leaves. The stems become multi-branched and covered with stiff hairs as the plant matures, and also has characteristic yellow flowers. This plant may be confused with Jerusalem artichoke, a perennial (Figure 39.9). Common sunflower will not have creeping rhizomes.

**Areas of Infestation and Yield Loss Potential:**

Infestations typically occur in drier soils. At moderate densities, this plant can reduce corn yields 70%.



Figure 39.43 Venice mallow seedling and late-season plant with flowers and seedpods. (Courtesy Phil Westra, Colorado State University, [Bugwood.org](#) and Michael Moechnig)



Figure 39.44 Buffalobur seedling, young plant, and mature plant showing yellow flowers and spiny nature of the plant. (Courtesy of Joseph M. DiTomaso, University of California - Davis, [Bugwood.org](#); Karan A. Rawlins, University of Georgia, [Bugwood.org](#); and [natronacountyweeds.com](#))



Figure 39.45 Common sunflower. (Courtesy of Howard F. Schwartz, Colorado State University, [Bugwood.org](#))

**Herbicide Resistance:** Some biotypes of common sunflower are resistant to ALS-inhibitor (WSSA Group 2) herbicides.

**Common Cocklebur (*Xanthium strumarium*)**

Common cocklebur (Figure 39.46) is an annual plant with seeds that germinate after corn seeding.

**Plant Description:** The cotyledons of the seedlings are linear, thick, and shiny green. Leaves are alternate and large with wavy margins. Seeds are in burs that stick to animal coats.

**Areas of Infestation and Yield Loss Potential:** This plant can often be found in wet, poorly drained soils. At high densities, it can reduce yields 70%.

**Herbicide Resistance:** Biotypes of cocklebur have been reported to be resistant to ALS-inhibitor (WSSA Group 2) herbicides in some Midwestern states.



Figure 39.46 Common cocklebur seedling and mature plant. (Courtesy of Bruce Ackley, The Ohio State University, [Bugwood.org](#) and Joseph M. DiTomaso, University of California - Davis, [Bugwood.org](#))

**Russian thistle (*Salsola tragus*)**

Russian thistle (Figure 39.47) is an annual plant that typically emerges before or at corn planting.

**Plant Description:** The seedlings resemble small pine trees with threadlike leaves. Older plants become spikelike with the leaf surface from smooth to hairy with nonshowy flowers. The entire plant breaks off at the base and disperses seed as it tumbles in the wind.

**Areas of Infestation and Yield Loss Potential:** This very drought- and salt-tolerant plant can be found in many areas. Depending on density and time of emergence, this plant can reduce corn yields 50%. If Russian thistle comes up even 1 week after the crop, yield losses may not be measurable.

**Herbicide Resistance:** Biotypes have been reported to be resistant to ALS-inhibitor (WSSA Group 2) herbicides.



Figure 39.47 Russian thistle seedling and infestation. (Courtesy Phil Westra, Colorado State University, [Bugwood.org](#) and Steve Dewey, Utah State University, [Bugwood.org](#))

**Common lambsquarters (*Chenopodium album*)**

Common lambsquarters (Figure 39.48) is an annual plant and it has seeds that generally germinate at or slightly before corn planting.

**Plant Description:** Emerging plants are very small, and the leaves are opposite and covered with a mealy powder, especially on the underside. The stems are erect, may have green or red stripes, and can grow to almost 6 ft tall under certain conditions. The flowers are nonshowy and without petals.

**Areas of Infestation and Yield Loss Potential:** Found in disturbed sites. Depending on density yield losses can be 30%.



Figure 39.48 Common lambsquarters seedlings. (Courtesy of Pacific Northwest Weed Handbook and Ohio State Weed Lab, The Ohio State University, [Bugwood.org](#))

**Herbicide Resistance:** Biotypes of this plant have been reported to be resistant to ALS-inhibitor (WSSA Group 2) and Photosystem II inhibitors (WSSA Group 5). Reduced sensitivity to glyphosate (WSSA Group 9) has been reported in some populations.

### **Kochia (*Kochia scoparia*)**

Kochia (Figure 39.49) is an annual plant that reproduces from seeds. Kochia emerges at or before corn planting.

**Plant Description:** Seedlings can be very small with over 1000 present in a 1-ft<sup>2</sup> area. Leaf margins are fringed with hair. Leaf surfaces range from being without hairs to very hairy. Wind-blown plants will disburse seed in the fall.

**Areas of Infestation and Yield Loss Potential:** Kochia is often found in disturbed sites. Depending on density, yield losses can be 40%.

**Herbicide Resistance:** Some kochia biotypes in South Dakota have been reported to be resistant to Photosystem II inhibitors (atrazine) (WSSA Group 5), ALS-inhibitors (WSSA Group 2), and synthetic auxin herbicides (WSSA Group 4).

### **Wild Mustard (*Sinapsis arvensis* syn. *Brassica kaber*)**

Wild mustard (Figure 39.50) is an erect annual plant with seeds that germinate before or at corn planting.

**Plant Description:** The cotyledons are kidney-shaped, and the leaves are alternate with hairs on the bottom of the leaf. Lower leaves are deeply lobed, whereas upper leaves are coarsely toothed. Flowers are yellow and seeds are found in a thin pod, known as a silique.

**Areas of Infestation and Yield Loss Potential:** This plant is often found in disturbed sites. Yield losses are dependent on density. For example, 1 and 4 plants/ft<sup>2</sup> can reduce yield 10% and 50%, respectively.

**Herbicide Resistance:** Biotypes have been found to be resistant to ALS-inhibitor (WSSA Group 2) herbicides.



Figure 39.49 Images of kochia plant at different growth stages. (Courtesy of Phil Westra, Colorado State University, [Bugwood.org](#), and Howard F. Schwartz, Colorado State University, [Bugwood.org](#))



Figure 39.50 Wild mustard infestation and seedling. (Courtesy of Joseph M. DiTomaso, University of California - Davis, [Bugwood.org](#))

## Other Weeds

### South Dakota Noxious Weeds

There are seven weeds presently on the South Dakota Noxious Weed list, <http://www.weedcenter.org/store/docs/outreach/sd-weeds.pdf>. All seven weeds are perennial, non-native plants that are considered highly invasive and destructive to human or animal health, or agriculture. The South Dakota Noxious Weeds are listed below.

#### Noxious Weeds of South Dakota (2016)

Plant	South Dakota acres infested
Canada thistle	1.6 million
Leafy spurge	315,000
Perennial sowthistle	120,000
Hoary cress	64,150
Purple loosestrife	5,000
Saltcedar	3,200
Russian knapweed	3,800

There are many weeds in the state that have been listed as Local (County) Noxious Weeds. These plants can be annual, biennial, or perennial. Before the plant can be placed on the local (county) noxious weed list, the county has to petition the South Dakota State Weed and Pest Board. If approved for listing, the plant remains on the list for a maximum of 5 years.

### *Saltcedar (Tamarix sp.)*

Saltcedar (Figure 39.51) was introduced into the United States in the 1820s for ornamental and windbreak purposes. This perennial shrub or small tree reproduces from seeds, root sprouts, and buried stems.

Plant Description: The leaves are alternate and scalelike, blue-green to gray-green. Stems are erect or bushy, and can be up to 20 ft tall. Flowers are pink arranged on a raceme inflorescence. Millions of seeds can be produced per plant. Flowering can start in early April and continue through September.

Areas of Infestation: Often found in wet, disturbed sites, with the first infestations seen along the outside of potholes or along riverbanks. When the plants continue to invade, the infestation can be found in drier sites in very dense stands. Saltcedar is difficult to control. This plant has been found in western and southern South Dakota along rivers and streams and a few eastern South Dakota sites along lakes shores.

### *Leafy Spurge (Euphorbia esula)*

Leafy spurge (Figure 39.52) is a perennial, erect plant reproducing by seed, crown buds, and rhizomes.

Plant Description: The leaves are alternate and narrow. Stems are erect up to 2.5 ft tall, branched



Figure 39.51 Young saltcedar plant and older plant. (Courtesy of author and Steve Dewey, Utah State University, [Bugwood.org](#))



Figure 39.52 Image of leafy spurge. (Courtesy of William M. Ciesla, Forest Health Management International, [Bugwood.org](#) and Leslie J. Mehrhoff, University of Connecticut, [Bugwood.org](#))

above and without hair. When cut, stems exude a milky latex. Creeping rhizomes can extend about 10 ft from the original plant and have many buds on the lateral root. Flowers are greenish-yellow in small clusters. Seeds are in capsules that can split when ripe and shoot seed up to 20 ft. Flowering can start in May and continue through September.

**Areas of Infestation:** Often found in disturbed sites in very dense stands and the plant is difficult to control. Pasture areas of eastern South Dakota both north and south have dense leafy spurge infestations. Scattered plants can be found along roadsides.

#### **Purple Loosestrife (*Lythrum salicaria*)**

Purple loosestrife (Figure 39.53) is a perennial, erect plant, reproducing by seed and rhizomes. This plant is an escaped ornamental.

**Plant Description:** The stems are erect, not highly branched, four-angled, and hairless. Leaves are opposite or in whorls. Leaf blades are lanceolate with sharply pointed tips. Leaves have no petioles (leaves are attached to the stem) and leaves are covered with hairs. Crown buds and short creeping rhizomes. Flowers are purple and arranged on spikes. Flowering can start in July and continue through September.



Figure 39.53 Purple loosestrife. (Courtesy of John D. Byrd, Mississippi State University, Bugwood.org and John M. Randall, The Nature Conservancy, Bugwood.org)

**Areas of Infestation:** Often infestations start in very wet sites, but can then invade drier areas. The stands are too dense for waterfowl nesting and wet areas go dry because of this infestation. It spreads rapidly and is aggressive. This plant can be found along the shores and sandbars in the Missouri River. The eastern South Dakota pothole region may be highly vulnerable to invasion. The plant is difficult to control even with biocontrol agents that have been released in some areas.

#### **Russian knapweed (*Centaurea repens*)**

Russian knapweed (Figure 39.54) is a perennial, erect plant, reproducing by seed and rhizomes. Do not hand-pull as plant contains toxins that cause problems. Horses that eat this plant may get “chewing disease” from toxins in the plant.

**Plant Description:** Russian knapweed stems are erect, sparsely hairy, forming dense colonies. The plant has creeping rhizomes that produce adventitious shoots. Leaves are alternate with lower leaves lobed and upper leaves linear. Inflorescence type is a head with flowers that are pink to purple and numerous. Flowering can start in June and continue through September.



Figure 39.54 Russian knapweed infestation. (Courtesy of Norman E. Rees, USDA Agricultural Research Service - Retired, Bugwood.org)

**Areas of Infestation:** Often found in disturbed sites in very dense stands and the plant is difficult to control. This plant has the greatest acres of infestation in Hutchinson County with scattered reports in other eastern and western South Dakota counties.

### **Hoary cress (*Cardaria draba*)**

Hoary cress (Figure 39.55) is a perennial, erect plant, reproducing by seed and rhizomes.

**Plant Description:** Hoary cress leaves, which clasp the stem, are alternate with lower leaves oblong and upper leaves more lance-shaped. Stems are erect, sparsely hairy. Creeping rhizomes that can extend about 10 ft from the original plant. Flowers are white on corymbs of numerous racemes. Flowering can start in early April and continue through August.

**Areas of Infestation:** Often found in disturbed sites in very dense stands. The plant is difficult to control once established. The plant is found in scattered infestations throughout western South Dakota with the highest infested areas reported in Butte County.



Figure 39.55 Hoary cress plants with rhizomes and infestation. (Courtesy Steve Dewey, Utah State University, Bugwood.org)

### **References and Additional Information**

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**A G R O W I N G   I N V E S T M E N T**

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