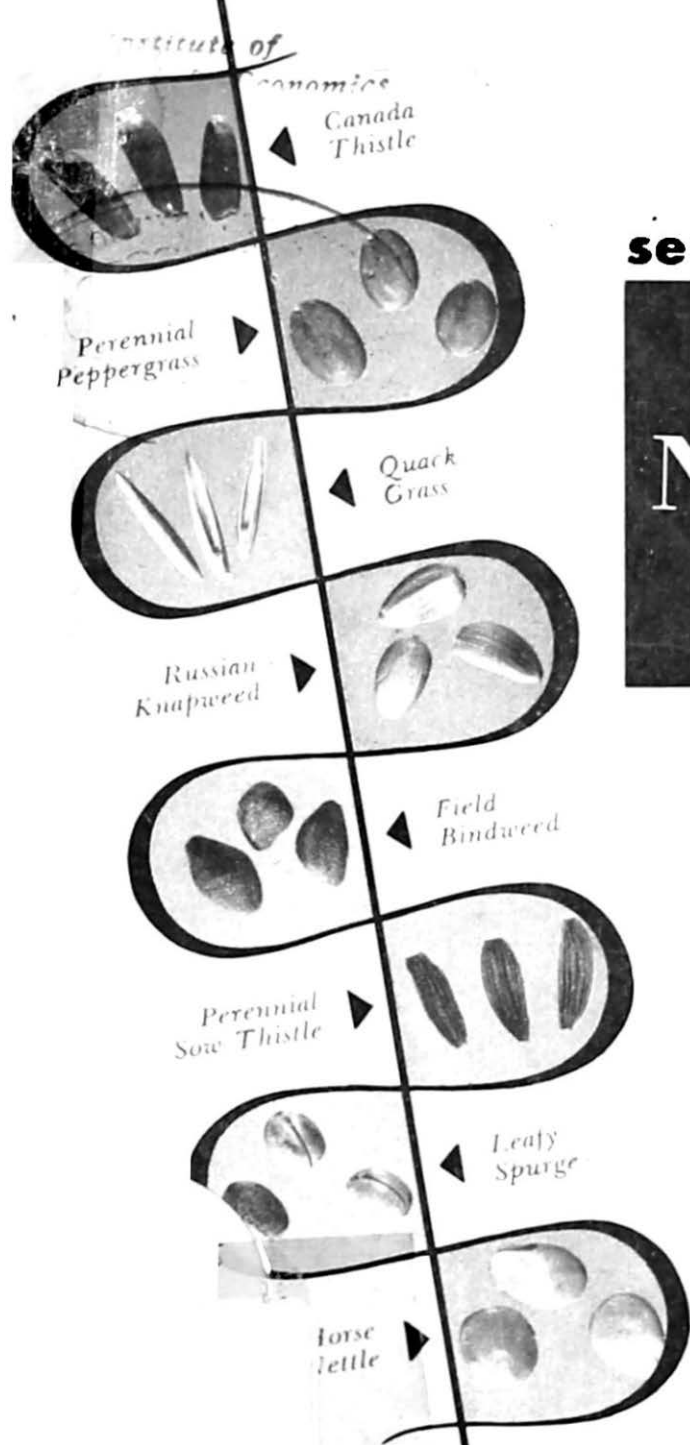


seeds of

IOWA NOXIOUS WEEDS



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Agricultural Experiment Station, Iowa State College of Agriculture and Mechanic Arts, Floyd Andre, director. Ames, Iowa.

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Seeds of Iowa Noxious Weeds

BY DUANE ISELY

Weeds are one of the most serious problems faced by the American farmer. Losses due to weeds are estimated at 3 billion dollars annually. The inroads on farm income brought about by reduction in yields resulting from weed infestations, and expenses involved in control measures constitute a major factor in the economical production of crops.

The best way to control weeds is to stop them before they reach our farms; this is particularly true of noxious weeds which still have a rather limited distribution. It is much easier and cheaper to prevent these pests from establishing themselves than to eradicate them. The seeds of a few kinds of weeds can be carried long distances by natural means; for instance, dandelion seeds are wind-transported, cockleburrs and stickseeds are carried by the hair of animals. However, the seeds of most weeds are spread by human agencies, most commonly in mixtures with agricultural seed.

Many individuals can recognize our worst weeds by appearance. If these weeds show up in agricultural fields their presence is soon noted, and the necessary control measures are taken. It would seem even more desirable that the seeds of these weeds be recognized when found in agricultural seed and control be effected before they get into the soil. The identification of weed seeds is admittedly, in many cases, a more difficult job than knowing the plants themselves and is primarily the responsibility of seed analysts. Nonetheless, many farmers would be benefited by knowing some of these weed seeds, or at least having a general impression of them so that suspicious material might be sent to specialists for examination.

Seeds of weeds noxious under the Iowa weed and seed laws are discussed and illustrated in this bulletin. The seeds of certain common weeds and crop plants which are similar and likely to be confused with some of the noxious weed seeds are also included. While it is hoped that the pamphlet will be useful to farmers, teachers of vocational agriculture, 4-H leaders, county extension directors and others, it is not to be considered as an infallible guide for noxious weed seed identification. As stated above, the identification of weed seeds is sometimes difficult, and considerable experience is

necessary to identify them accurately. Doubtful material should be sent to the Iowa State College Seed Laboratory for more accurate checking. Farmers' seed samples tested at the laboratory (with the exception of corn) are always given a noxious weed examination.¹

All agricultural seed should be tested and examined for noxious weeds before it goes into the soil. If a farmer is planting seed which he has grown himself, he should know if he is running the danger of putting weed seeds back into the soil. If, on the other hand, he is selling seed, he needs a test (1) because the law requires it, (2) for the seller's protection in case the purchaser obtains a poor stand due to cultural conditions, or finds new weeds in his fields which might be attributed to the seed planted.

IOWA WEED AND SEED LAWS

The Iowa Agricultural Seed Law, administered by the Iowa Department of Agriculture in Des Moines, aids in weed control by restricting the sale and distribution of agricultural seed containing the seeds of undesirable weeds. The law designates the seeds of certain weeds as "noxious weed seeds" and classifies them as "primary noxious weed seeds" and "secondary noxious weed seeds." The primary noxious weeds are our worst pests. They include Canada thistle, quack grass, perennial sow thistle, perennial peppergrass, Russian knapweed, horse nettle, field bindweed, and leafy spurge. These are perennial weeds which cannot be controlled by ordinary cultural practices. *It is illegal to sell agricultural seed containing seeds of any of these weeds.*

Secondary noxious weeds are very serious pests. They are the cause of serious losses in yield and are difficult to control in non-cultivated crops. However, it is frequently possible to control them by clean cultivation. The secondary noxious weeds include buckhorn, dodder, wild carrot, mustard, docks, sheep sorrel, butterprint and cocklebur. Agricultural seed containing seeds of these weeds can be sold providing (1) the name and number (above certain specified minimums) per ounce or per pound of agricultural seed of each of these weeds present is clearly indicated on a tag or label, and (2) the total weed seed content (both noxious and common weeds) does not exceed 3 percent of the whole by weight.

¹Pamphlet 95, entitled *Services of Your Iowa State College Seed Laboratory*, gives further details as to types of tests made and discusses procedure for submitting seed to the laboratory.

The Iowa Weed Law (a regulation entirely distinct from the seed law) empowers the state to enforce the control of noxious weeds. The list of weeds declared noxious under this law is similar to that included under the seed law. The differences are: Bull thistle and puncture vine are noxious under the weed law, but are not listed under the seed law; dodder, secondary noxious under the seed law, is not designated in the weed law.²

TERMS USED IN DESCRIBING SEEDS

So far as practical, the noxious weed seeds described in this bulletin are discussed in everyday language. However, it is not possible to avoid the use of some semitechnical words. A short glossary at the end of the bulletin defines a few words that may cause the reader difficulty.

DESCRIPTIONS OF WEED SEEDS

QUACK GRASS (*Agropyron repens*)

(Figures 1, 2 and 3)

Status Under Iowa Law. Seed law: primary noxious. Weed law: primary noxious.

Other Common Names. None.

How Produced. Quack produces numerous seeds in terminal spikes in a fashion similar to wheat. The individual seeds are in clusters (spikelets) and may remain together after separation from the parent plant or may be completely free from one another.

Size. Unhulled seeds 5 to 7 mm. long, 1 to 1.5 mm. wide. Hulled seeds 2.5 to 4 mm. long, 1 to 1.2 mm. wide.³

Shape and Appearance. Unhulled quack seeds are similar to those of rye grass, meadow fescue or wheat grass. They are narrowly oblong in shape, somewhat flattened or boat shaped. At the top end the seed commonly bears a long stiff bristle; this structure, however, is usually broken off during threshing. At the other end of the seed is a short stalk (known as the rachilla) attached at the base and extending upwards pressed against the face of the seed. This rachilla is of importance in distinguishing seeds of quack and similar grasses.

²Copies of the Iowa Agricultural Seed Law and the Iowa Weed Law may be obtained from the Iowa Department of Agriculture, Des Moines.

³One inch equals 25 mm. or 2.5 cm.; 3 mm. equals $\frac{3}{8}$ inch. A scale comparing English and metric measurements is included on the inside of the back cover.

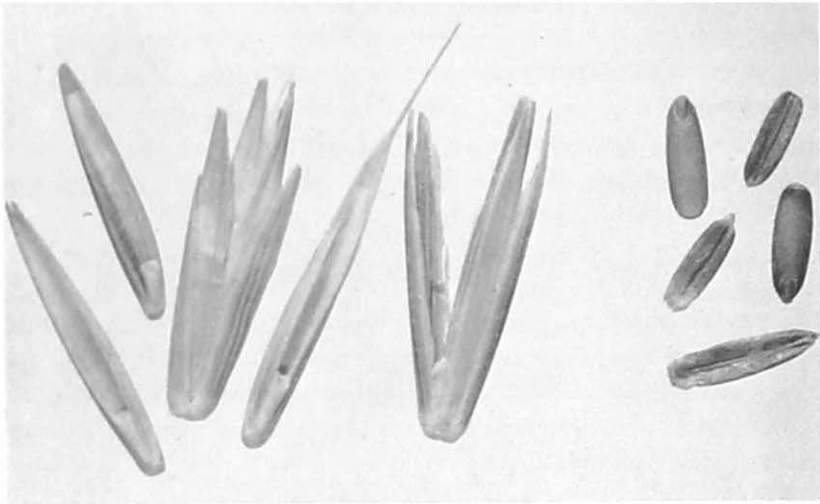


Fig. 1. Quack grass. Left and center, single seeds and seeds clustered together. Right, dehusked grains. (Magnified five times actual size.)

Hulled seeds of quack grass sometimes occur in clover or alfalfa. These, illustrated in fig. 1, look very much like miniature grains of wheat. However, most of these seeds are injured and not capable

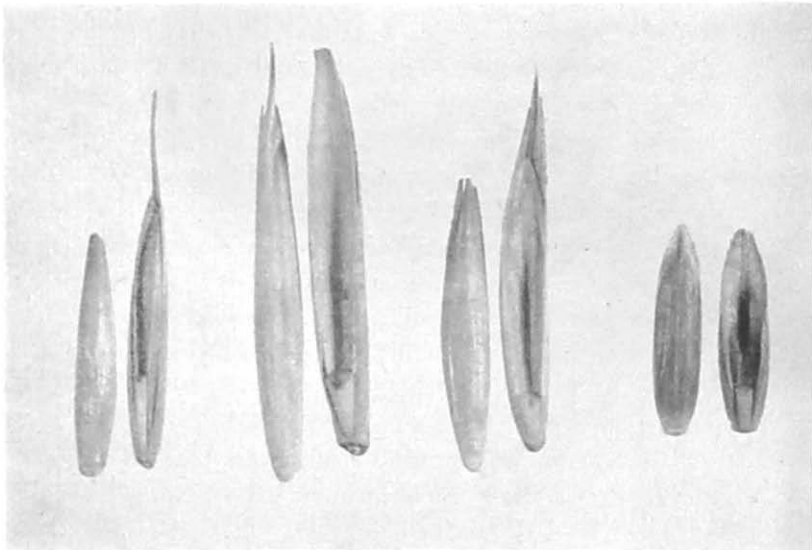


Fig. 2. Quack grass and other similar seeds. From left to right, quack grass, western wheat grass, slender wheat grass, perennial rye grass. (Magnified five times actual size.)

of growth. The embryo, which must be intact to produce a new plant, is frequently broken or completely chipped out during the cleaning process. An analyst, finding hulled quack seeds in clovers and alfalfa, should examine them carefully under magnification to see if they are viable before condemning the crop seed. In oats one may find quack in clusters or spikelets of 2 to 5 seeds attached together. (See fig. 1.) Usually the lowermost seeds in these spikelets are viable while the upper are partially developed or abortive.

Seeds With Which Quack Grass May Be Confused. (See figs. 2 and 3.) Quack grass seeds are extremely similar to several small-seeded grasses, and their diagnosis should in most cases be undertaken only by a specialist. Meadow fescue (*Festuca elatior*) and rye grass (*Lolium* spp.) seeds resemble quack but are broader and shorter. Positive identification can be obtained by examining questionable seeds closely at the end where the rachilla is borne. By turning the seed so that the rachilla or front side is downward, a distinct, narrow, crosswise furrow just above the base of the seed can be observed on rye grass and meadow fescue (some magnification is usually necessary). This furrow is absent or poorly de-

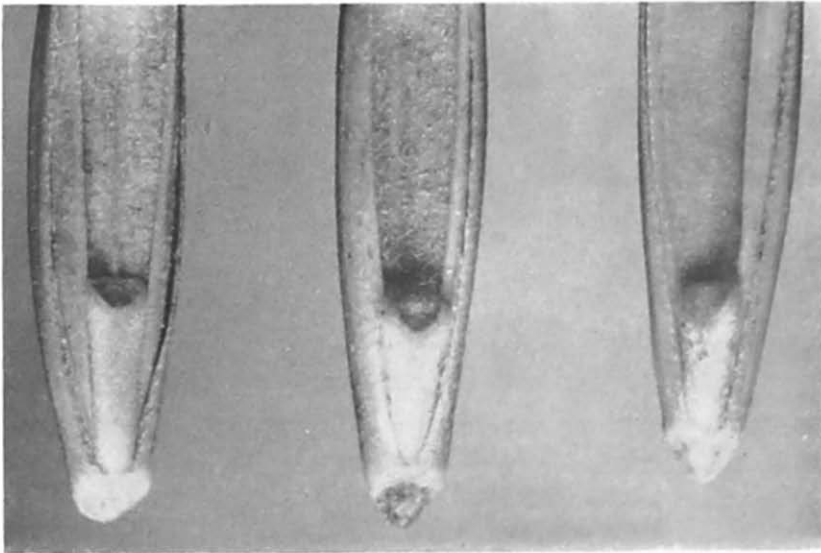


Fig. 3. Quack grass and similar seeds, enlargement of rachilla region. Left, quack grass. Center, western wheat grass. Right, slender wheat grass. (Magnified 12 times actual size.)

veloped in quack; instead a raised area or bulge is frequently present.

Seeds of western wheat grass (*Agropyron smithii*) and slender wheat grass (*A. pauciflorum*) are so similar to those of quack that good distinctions can scarcely be made on the basis of general appearance. Detailed examination of the rachilla perhaps offers the best way of telling these seeds apart. (See fig. 3.) In quack grass this structure is of nearly the same width at the top and at the bottom; it is covered with very short hairs that can scarcely be seen except under strong magnification. In western wheat grass the rachilla appears narrowed at the base and enlarged upwards. Slender wheat grass has an apically enlarged rachilla covered by long silky hairs which can be seen even under rather weak magnification. Other differences between these seeds exist, but they are of a technical nature and difficult to recognize by those not intimately familiar with these seeds. Doubtful material should be referred to the Iowa State College Seed Laboratory for verification.

Occurrence. Quack grass occurs primarily in the northern half of Iowa. Its seeds may be found in seed oats, various grasses and clovers. They are most common in oats.

PERENNIAL PEPPERGRASS (*Cardaria draba*, formerly *Lepidium draba*)

(Figure 4)

Status Under Iowa Law. Seed law: primary noxious. Weed law: primary noxious.

Other Common Names. White top, hoary cress.

How Produced. The seeds are produced in small, papery, somewhat heart-shaped pods. They mature from midsummer until fall.

Size. About 2 mm. long and 1 to 1.6 mm. wide.

Shape and Appearance. Perennial peppergrass seeds are more or less ellipsoidal in side view but are somewhat flattened. They are more pointed at one end than at the other. A distinct furrow running down each of the flattened sides to the pointed end can usually be observed. Commonly there is a small mass of whitish scurfy material attached to the narrow end of the seed. The seeds are reddish-brown in color and possess a nearly smooth surface. Under a hand lens they appear finely granular.

Seeds With Which Perennial Peppergrass May Be Confused. Perennial peppergrass seeds are not likely to be confused with

Fig. 4. Left, perennial peppergrass. Right, field peppergrass. (Magnified seven times actual size.)



those of any of our common weeds with the exception of field peppergrass (*Lepidium campestre*), a related, common, winter annual weed. Field peppergrass seeds are approximately the same width and shape as those of perennial peppergrass but are considerably less flattened. They are usually a dark chocolate-brown or black-brown in color and have a more coarsely granular seed coat than perennial peppergrass. In most cases, field peppergrass can be distinguished from perennial peppergrass by color alone, but the shape and surface of the seeds should be examined, as slightly immature seeds of perennial peppergrass may turn dark on drying, and one occasionally sees light seeds of field peppergrass. Field peppergrass sets seed in late spring and early summer.

Occurrence. Perennial peppergrass is local in Iowa, occurring in scattered areas, primarily in the western half of the state. It is not frequently seen in agricultural seed grown in Iowa.

LEAFY SPURGE (*Euphorbia esula*)

(Figure 5)

Status Under Iowa Law. Seed law: primary noxious. Weed law: primary noxious.

Other Common Names. None.

How Produced. The seeds are borne in a three-chambered and three-lobed capsulelike fruit. Each fruit bears three seeds, one to each chamber. The seeds are usually ripe in the early or middle part of the summer. When ripe they are discharged from the capsule by means of an explosive mechanism which scatters them several feet from the parent plant.

Size. About 2 mm long, 1.5 mm. wide.

Shape and Appearance. The seeds of leafy spurge are spheroidal or somewhat football-shaped. They possess a distinct longitudinal

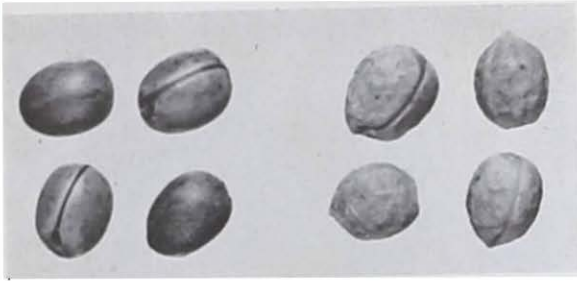


Fig. 5. Left, leafy spurge. Right, flowering spurge. (Magnified six times actual size.)

seam or line which runs from one end of the seed to the other. The surface is smooth or finely granular and presents a grayish-white marbled appearance. Slightly immature seeds may be brownish blotched.

Seeds With Which Leafy Spurge May Be Confused. The seeds of the leafy spurge are quite similar to those of a related plant known as flowering spurge (*Euphorbia corollata*). The latter is a relatively common weed, particularly in southern Iowa, and care should be taken that the seeds of these two plants are not confused. Seeds of the flowering spurge are nearly the same size and shape as those of the leafy spurge but usually appear dull-white, sometimes giving the impression that they have been rolled in flour. In addition, flowering spurge seeds frequently exhibit scattered irregular ridges or lines on the surface.

Occurrence. This plant is most strongly established in the northwestern portion of Iowa but occurs in scattered areas over the entire state.

FIELD BINDWEED (*Convolvulus arvensis*)

(Figure 6)

Status Under Iowa Law. Seed law: primary noxious. Weed law: primary noxious.

Other Common Names. Creeping Jenny, European bindweed, bindweed.

How Produced. Several seeds are borne clustered together in a capsulelike structure. They become mature from midsummer until late fall.

Size. Seeds 3 to 4 mm. long and approximately 2 mm. wide.

Shape and Appearance. The seeds of field bindweed roughly approximate the shape of a section from an orange, that is, they

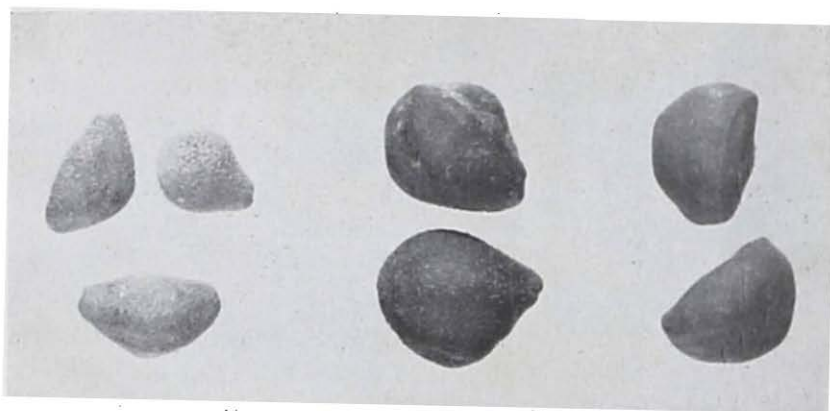


Fig. 6. Field bindweed and similar seeds. Left, field bindweed. Center, hedge bindweed. Right, wild morning glory. (Magnified four times actual size.)

have a curved back and two more or less flat sides that come together in a straight line. The seeds are smoky-gray in color and appear rough on the surface. With a little magnification they show fine prominences or warts.

Seeds With Which Field Bindweed May Be Confused. Plants known as wild morning-glory (*Ipomoea* spp.) and hedge bindweed (*Convolvulus sepium*) have seeds similar to those of field bindweed. The seeds of these non-noxious weeds, however, average considerably larger than those of the field bindweed and are black in color. The surface of the seed is also much smoother than that of field bindweed, appearing only finely roughened—not warty. The attachment scar of the seed is frequently outlined by a reddish margin.

Occurrence. Field bindweed may be found over nearly the entire state of Iowa. Its seeds are found occasionally in those of small grains and soybeans.

HORSE NETTLE (*Solanum carolinense*)

(Figure 7)

Status Under Iowa Law. Seed law: primary noxious. Weed law: primary noxious.

Other Common Names. Bull nettle.

How Produced. Horse nettle seeds are borne in greenish-yellow to yellowish berries which are about the size of a small cherry. The

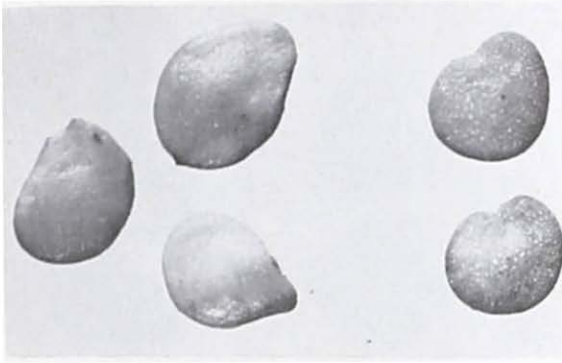


Fig. 7. Left, horse nettle. Right, ground cherry. (Magnified seven times actual size.)

berries are produced in the middle or latter part of the summer, and the seeds are mature by late summer.

Size. Seeds 2 to 3 mm. across, about 0.3 to 0.5 mm. thick.

Shape and Appearance. The seeds of this plant are more or less flattened or disk-shaped; in outline they are rounded or irregularly angled. The surface is yellowish or yellow-brown, shiny or dull, and finely marked by little pits or inconspicuous curving lines. Sometimes the outside of the seed is partially obscured by dried, blackened fragments of the pulp of the berries in which the seed was originally produced.

Seeds With Which Horse Nettle May Be Confused. Horse nettle seeds are very similar to those of the ground cherries (*Physalis* spp.). There are several species of *Physalis* in Iowa, none of which are noxious weeds. Ground cherry seeds are usually somewhat smaller than those of horse nettle, are more evenly rounded or symmetrical and have a rougher and definitely pitted surface. These characteristics, however, are variable and cannot always be relied upon unless one has had considerable experience in distinguishing these seeds. Inasmuch as the correct identification of horse nettle seeds is rather important from the standpoint of the grower or potential purchaser of agricultural seed, doubtful material should be submitted to the Iowa State College Seed Laboratory for verification.

Occurrence. Horse nettle may be found in nearly all Iowa counties. The seeds are occasionally found in red clover and grass seed samples; sometimes entire berries may be found in soybeans or oats. Southern grown Korean lespedeza is particularly apt to carry horse nettle.

RUSSIAN KNAPWEED (*Centaurea repens*)

(Figure 8)

Status Under Iowa Law. Seed law: primary noxious. Weed law: primary noxious.

Other Common Names. None.

How Produced. The seeds of this plant are borne in a cluster in a manner similar to that of Canada thistle. Seeds are matured from the middle to the end of summer.

Size. Russian knapweed seeds are approximately 3 mm. in length and 1.5 to 2 mm. wide.

Shape and Appearance. The seeds are oblong or ellipsoidal, straight or slightly curved, conspicuously plump or somewhat flattened, usually broader at one end than the other, commonly with inconspicuous longitudinal lines, angles or ridges. The surface is nearly smooth and is generally light gray or cream-colored; immature (and usually nonviable) seeds are sometimes a dull reddish-brown.

Seeds With Which Russian Knapweed May Be Confused. Russian knapweed seeds should not be confused with those of any common Iowa weeds.

Occurrence. Russian knapweed is fortunately quite rare in Iowa except for a few local areas in western Iowa. We have seen very few samples of agricultural seeds infested with seeds of this pest.

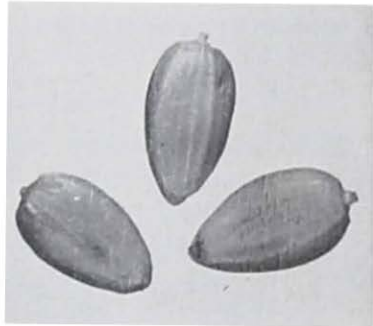


Fig. 8. Russian knapweed. (Magnified six times actual size.)

CANADA THISTLE (*Cirsium arvense*)

(Figure 9)

Status Under Iowa Law. Seed law: primary noxious. Weed law: primary noxious.

Other Common Names. None.

How Produced. The seeds of Canada thistle are borne together in spiny clusters, each cluster being produced by a single flower head. They usually mature about the middle of the summer. Frequently Canada thistle does not produce a good seed set. There are two reasons for this. First, there are two kinds of Canada thistle

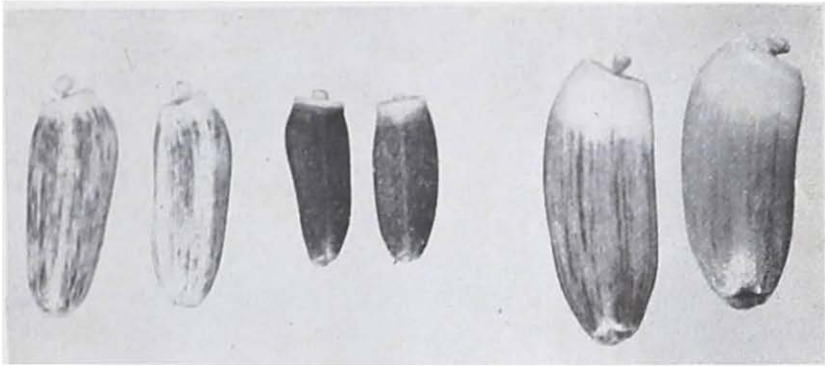


Fig. 9. Thistles. Left, bull thistle. Center, Canada thistle. Right, field thistle. (Magnified seven times actual size.)

plants. One kind produces pollen only; the other cannot produce pollen but will set seeds if pollen-producing plants grow in the vicinity. In many cases only one type of plant grows in an infested area and hence no seeds are produced. Also, Canada thistle has several insect enemies which in some years are capable of destroying most of the seeds.

Size. Seeds 2 to 3 mm. long and about 1 mm. wide.

Shape and Appearance. Seeds of Canada thistle are more or less oblong, straight or slightly curved longitudinally. In cross section they may be round or somewhat flattened. They are slightly narrowed at one end. At the other end there is an apical depression which is surrounded by a narrow flange or collar. From this depression arises a cluster of fine feathery bristles similar to those commonly seen on the dandelion. When Canada thistle seeds are found with crop seeds, however, these bristles are usually destroyed by the threshing or combining processes. Canada thistle seeds are dull- or yellowish-brown in color except for a very narrow yellowish band on the flange around the apical depression.

Seeds With Which Canada Thistle May Be Confused. Canada thistle seeds have the same general shape and appearance as those of several of our less harmful weedy thistles but may usually be distinguished by their smaller size. The seeds of the common field thistle or tall thistle have a wide and distinct yellow band at the apex (the broad end) and most commonly possess a reddish-brown streaked surface rather than the solid brown typical of Canada

thistle. Bull thistle seeds are ordinarily finely black streaked or blotched over a light background. The seeds of these thistles usually mature considerably later in the season than Canada thistle.

Occurrence. Canada thistle may be found in scattered areas all over Iowa. The seeds fortunately are not common in agricultural seeds, probably due to the frequent failure of good seed production. They are most commonly found in seeds of red clover and oats.

BULL THISTLE (*Cirsium vulgare*, formerly *Cirsium lanceolatum*)

(Figure 9)

Status Under Iowa Law. Weed law: primary noxious. Not included in seed law.

Other Common Names. Thistle.

How Produced. The seeds are produced within large spiny heads in a manner similar to that of Canada thistle. They mature in late summer or fall.

Size. About 4 mm. long and 1.5 mm. wide.

Shape and Appearance. Seeds oblong, straight or slightly curved longitudinally, usually tapered somewhat toward one end and blunt at the other. In cross section the seeds are rounded or distinctly flattened. At the blunt end of the seed is a cuplike depression from which arises a cluster of fine hairs; these hairs do not, however, persist on bull thistle seeds which have been processed along with crop seeds. The seeds present a somewhat streaked or mottled appearance, having a gray- or ivory-colored background covered by irregular longitudinally directed black lines. The amount of this black streaking varies from seed to seed, some of which appear almost entirely ivory-gray and others nearly black. The surface is smooth. There is a narrow yellow band or collar encircling the above-described depressed area at the end of the seed.

Seeds With Which Bull Thistle May Be Confused. Bull thistle seeds may be confused with those of Canada thistle and field thistle if careful observation is not made. The differences between these seeds are discussed under Canada thistle.

Occurrence. Bull thistle seeds are occasionally found in clover seeds and sometimes occur in small grains or grasses.

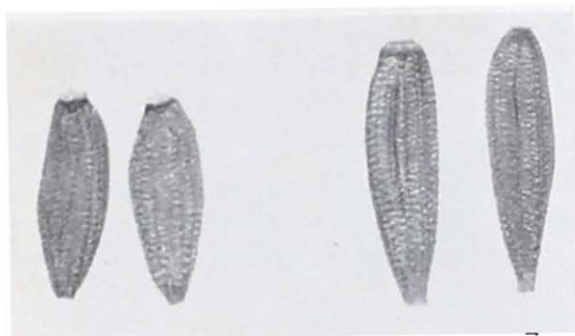


Fig. 10. Left, perennial sow thistle. Right, annual sow thistle. (Magnified 10 times actual size.)

PERENNIAL SOW THISTLE (*Sonchus arvensis*)

(Figure 10)

Status Under Iowa Law. Seed law: primary noxious. Weed law: primary noxious.

Other Common Names. None.

How Produced. Each of the large, yellow perennial sow thistle flower heads produces a cluster of seeds in a manner similar to that of dandelion or Canada thistle. The seeds may mature throughout the summer.

Size. Length. 2.5 to 3.0 mm.; width, 1.2 to 1.3 mm.

Shape and Appearance. The seeds of this weed are oblong in general appearance, although slightly narrowed at each end. In cross section they are elliptical or somewhat flattened. At the top end there is a cuplike depression from which arises a feathery cluster of hairs similar to that borne by dandelion seeds. These hairs are usually destroyed on sow thistle seeds mixed with agricultural seeds and subjected to various cleaning processes. The seeds are brownish to red-brown in color and are conspicuously roughened by a series of distinct longitudinal ridges and irregular cross wrinkles.

Seeds With Which Perennial Sow Thistle May Be Confused. A closely related plant, the so-called annual sow thistle (*Sonchus oleraceus*), possesses seeds similar to those of the perennial sow thistle. Contrasting characters by which they may be distinguished are as follows (see fig. 10):

Perennial sow thistle.

1. Seeds broadest near middle, tapering evenly toward both ends or slightly more strongly tapered toward base.

2. Longitudinal ridges distinct, easy to count.
3. Cross wrinkles distinct on ridges but scarcely discernible in furrows between.

Annual sow thistle.

1. Seeds broadest toward the top, strongly tapering to base, somewhat spindle-shaped.
2. Longitudinal ridges often indistinct, merging into one another and difficult to count.
3. Cross wrinkles discernible in furrows as well as on ridges.

Occurrence. Perennial sow thistle is found primarily in the north central and eastern parts of Iowa. Its occurrence in agricultural seed is quite rare.

DOCK (*Rumex* spp.)

(Figures 11, 12 and 13)

Status Under Iowa Law. Seed law: secondary noxious. Weed law: secondary noxious.

Other Common Names. Two types of dock are noxious in Iowa: sour dock (*Rumex crispus*), also known as curly dock; and smooth dock (*Rumex altissimus*), also called broad-leaf dock.

How Produced. The seeds are borne in long, dense clusters at the top of the plant. Each seed is surrounded by three brownish, papery bracts which completely hide it from view.

Size. Length, 2 to 2.5 mm.; width, 1 to 1.4 mm.

Shape and Appearance. The appearance of dock seed is de-

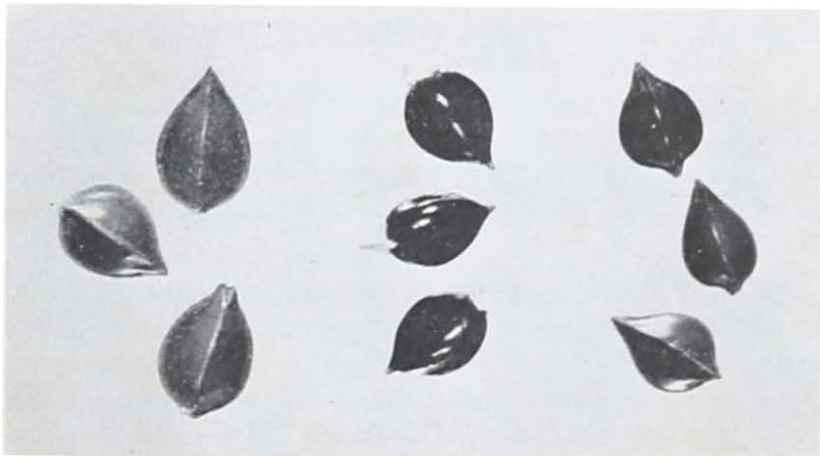


Fig. 11. Docks and smartweed. Left, smooth dock. Center, smartweed. Right, sour dock. (Magnified six times actual size.)

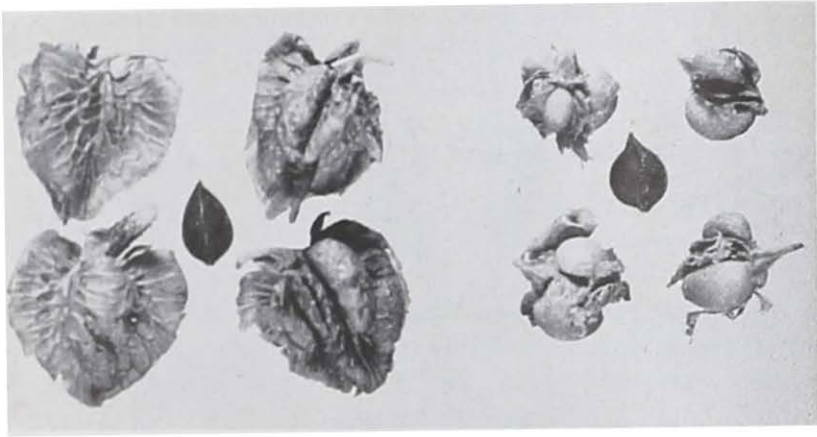


Fig. 12. Dock with outer hull. Left, smooth dock. Right, sour dock. (Magnified four times actual size.)

pendent upon whether the hulls surrounding them have been destroyed or are still present. (See figs. 11 and 12.) Dock occurring in clover seed usually does not possess these appendages—they are torn off during the threshing process. The seeds are distinctly three-sided and sharply three-angled. They taper to a point at each end. The seed coat is smooth, brownish and shiny in appearance. Dock seeds occurring in oats and soybeans, on the other hand, are usually concealed by the above-mentioned scales. These hulls are brownish, rough and crinkly; many of them may have a swollen tuberclelike structure attached to the back. A curved stalk is often visible at the base of the seed.

Hulled seeds of these two kinds of dock are indistinguishable except that smooth dock is slightly the larger. Unhulled seeds, on the other hand, are easily distinguished—the hulls surrounding smooth dock seeds are much larger than those of sour dock. (See fig. 12.)

Seeds With Which Dock May Be Confused. Dock seeds will probably not be confused with any other kinds of seed except possibly certain immature smartweeds. (See fig. 11.) These smartweeds are frequently brown before they are ripe (thus similar to dock), but assume a blackish color upon full maturity. The edges of the smartweed seeds come together in rounded corners rather than sharp angles, as is the case in dock. Small seeds of dock may be con-

fused with sheep sorrel. (See fig. 13.) The distinctions are discussed under the latter.

Occurrence. Docks are common over the entire state and are perhaps the most abundant noxious weed seeds to be found in agricultural seed. They occur in small grains, legumes and grasses. Sour dock is the most common and widely distributed of the two.

SHEEP SORREL (*Rumex acetosella*)

(Figure 13)

Status Under Iowa Law. Seed law: secondary noxious. Weed law: secondary noxious.

Other Common Names. Red sorrel.

How Produced. Seeds of sheep sorrel are borne in dense clusters on an elongated stalk at the top of the plant in a manner similar to those of dock. They mature from the early to middle part of the summer.

Size. About 1 mm. long and approximately the same width.

Shape and Appearance. Sheep sorrel seeds possess three sides which taper to a point at each end. These sides come together in three distinct angles. Usually the seeds are almost completely covered by dried brownish remnants of the flowers which produced them and have a dull-brown, scaly appearance. Sometimes, however, this papery covering is scraped off during seed cleaning processes. In this case the sheep sorrel seeds appear somewhat smaller and exhibit a shiny, polished, brown surface.

Seeds With Which Sheep Sorrel May Be Confused. Sheep sorrel

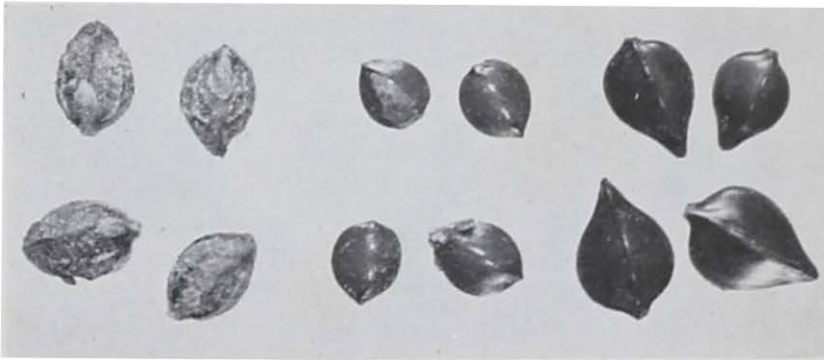


Fig. 13. Sheep sorrel and dock. Left, sheep sorrel with outer hull. Center, sheep sorrel without hull. Right, sour dock. (Magnified eight times actual size.)

seeds from which the outer covering has been removed may be confused with small seeds of dock. However, the angles of the sides of the sheep sorrel seeds are usually blunt and well rounded whereas those of the dock seeds are sharp and present an almost knife edge appearance. Usually dock seeds are larger than sheep sorrel.

Occurrence. Sheep sorrel is abundant over the entire state of Iowa. Its seeds may be found with those of nearly any small-seeded field crop. It is, perhaps, most common in timothy, alfalfa, red clover and miscellaneous grasses.

MUSTARDS (*Brassica* spp.)

(Figure 14)

Status Under Iowa Law. Seed law: secondary noxious. Weed law: secondary noxious (wild mustard only).

Other Common Names. Several kinds of weedy mustards are to be considered noxious under the seed law. The most common of these include wild mustard (*Brassica kaber*),³ black mustard (*Brassica nigra*), and Indian mustard, (*Brassica juncea*).

How Produced. Two to four seeds are borne in small fruits which are similar to bean pods but much smaller.

Size. Wild mustard—1.2 to 1.5 mm. in diameter; black mustard—1.0 to 1.5 mm. long. 0.9 to 1.0 mm. wide; Indian mustard, about 1.0 to 1.4 mm. in diameter.

Shape and Appearance. Mustard seeds vary from spheroidal to

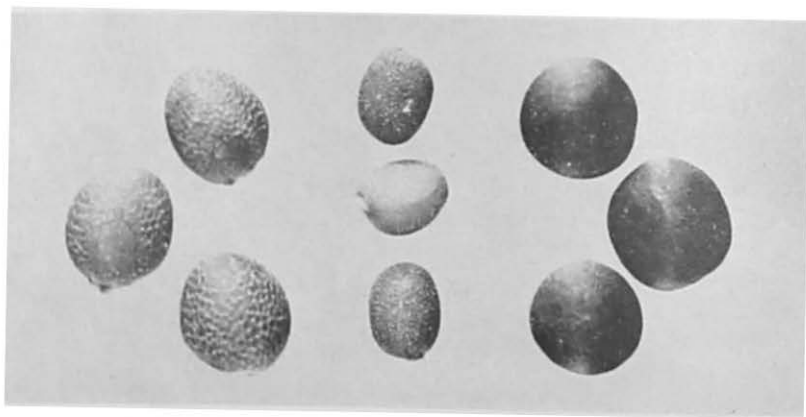


Fig. 14. Mustards. Left, Indian mustard. Center, black mustard. Right, wild mustard. (Magnified eight times actual size.)

³Designated *B. arvensis* in weed law.

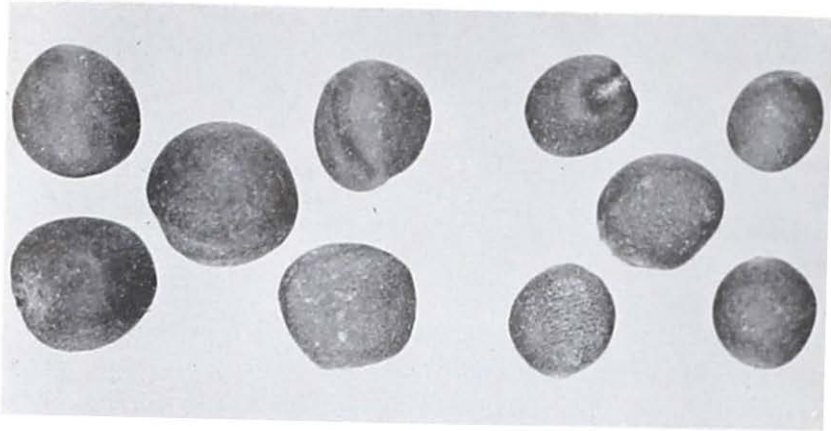


Fig. 15. Left, cabbage. Right, turnip. (Magnified seven times actual size.)

ellipsoidal or football-shaped. In color they are black, blackish-brown or a dull red-brown. The surface is smooth or finely roughened (hand lens examination) by an extensive series of lines which form a dense network over the surface of the seed. While it is usually sufficient to identify these seeds merely as mustards, it is sometimes desirable to know which kind one has at hand. The distinguishing characters are as follows:

Wild mustard—seeds nearly spheroidal; black, smooth.

Indian mustard—seeds brownish, spheroidal to football-shaped, covered with a network of fine lines (hand lens).

Black mustard—seeds brownish to red-brown; football-shaped or ellipsoidal, usually smaller than either of the other two types; covered with a very distinct network of fine lines (hand lens).

Seeds With Which Mustards May Be Confused. Indian mustard is a wild form of the cultivated plant which furnishes mustard greens. Their seeds are indistinguishable. If such seeds are found in agricultural seed, they should be considered as those of the weed; seeds of leaf mustards are not likely to be mixed in with those of field crops. Seeds of cabbage, turnips or rutabagas may be confused with those of the wild mustards. (See fig. 15.) The seeds of these cultivated forms are, however, usually somewhat larger (2 to 3 mm. in diameter) than those of their weedy relatives. They are spheroidal or somewhat flattened, black to reddish-brown and usually possess, on the surface, a faint network of lines. These detailed surface markings can be seen only under magnification.

Occurrence. Mustards are common over the entire state of Iowa. Their seeds are found primarily with those of small grains, particularly oats, in which they are sometimes extremely abundant.

PUNCTURE VINE (*Tribulus terrestris*)

(Figure 16)

Status Under Iowa Law. Weed law: secondary noxious. Not included under seed law.

Other Common Names. None.

How Produced. Puncture vine plants produce spiny burs which at maturity separate into five seedlike segments.

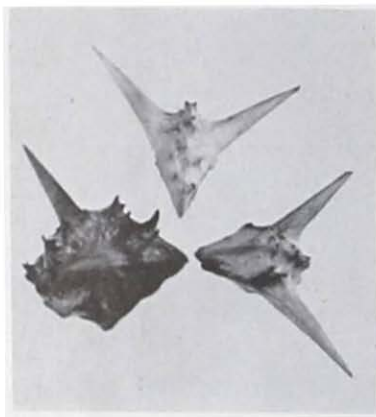


Fig. 16. Puncture vine. (Magnified three times actual size.)

Size. Seeds 5 to 7 mm. long, spines 4 to 6 mm. long.

Shape and Appearance. Puncture vine "seeds" are, in reality, several-seeded bur segments. However, since the true seeds almost never break out of the hard covering of the bur, we can, for practical purposes, refer to the whole structure as the seed. These seeds are somewhat flattened and are roughly semicircular in outline. On the upper side or near the thick margin arises a pair of spines. These structures, by far

the most conspicuous character of the seeds, are said to be capable of puncturing automobile tires. The surface of the seed is straw-brown in color and is irregularly marked by a network of curving ridges or lines.

Seeds With Which Puncture Vine May Be Confused. None.

Occurrence. Puncture vine is most commonly found in southern Iowa. It occurs infrequently in agricultural seeds.

WILD CARROT (*Daucus carota*)

(Figure 17)

Status Under Iowa Law. Seed law: secondary noxious. Weed law: secondary noxious.

Other Common Names. Queen Anne's lace.

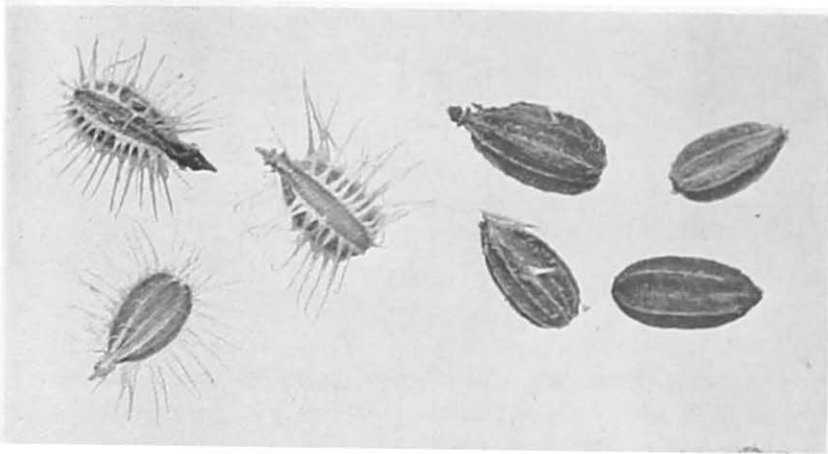


Fig. 17. Wild carrot. Left, seeds with bristles present. Right, seeds with bristles destroyed. (Magnified six times actual size.)

How Produced. The wild carrot fruit is a bristly subspherical or ellipsoidal structure which at maturity splits lengthwise into two seeds.

Size. Seeds are 2.2 to 2.5 mm. long, about 1.2 mm. wide.

Shape and Appearance. Wild carrot seeds are somewhat turtle-shaped; they have one flat side and an opposing curved back. The back is conspicuously marked by a series of lengthwise directed ribs each bearing a line of hooked barbs. However, these barbs are usually entirely broken off on wild carrot seeds which occur with processed agricultural seeds; the ribs are also frequently scraped down so that they appear like low ridges. The seeds are dull-gray in color and somewhat granular in appearance.

Seeds With Which Wild Carrot May Be Confused. If the above-described barbs or bristles are present on wild carrot seeds, they are not likely to be confused with any other type of weed seeds. However, when these are destroyed, the seeds may be confused with those of certain other members of the carrot family. In some cases, it is necessary to note the position of the ribs on the back of the seeds. Wild carrot possesses a very weak rib in the middle of the back of the seed and much larger ones on either side. In the case of similar weed seeds with which wild carrot may be confused, there is always a strong rib placed symmetrically in the middle of the back.

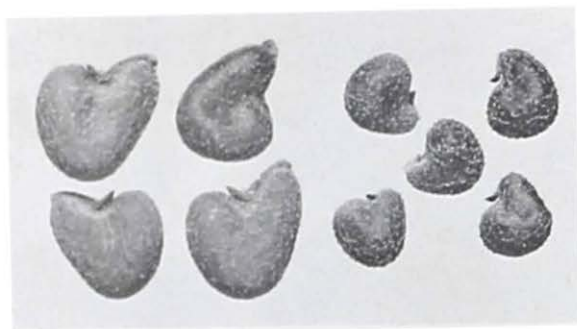


Fig. 18. Left, butterprint. Right, shoofly. (Magnified five times actual size.)

Occurrence. The plant occurs to some extent in all portions of Iowa but is most common in the southern part of the state. Its seeds are sometimes found with those of clovers.

BUTTERPRINT (*Abutilon theophrasti*)

(Figure 18)

Status Under Iowa Law. Seed law: secondary noxious. Weed law: secondary noxious.

Other Common Names. Buttonweed, velvet weed, velvet leaf, Indian mallow.

How Produced. Several seeds are produced together in a rounded cuplike seed pod. At maturity, late summer or fall, the pod opens from the top into numerous sharp-pointed sections.

Size. About 3 mm. long, 2.2 to 2.5 mm. wide, 1 to 1.3 mm. thick. Butterprint seeds, except for cocklebur, are the largest of our noxious weed seeds.

Shape and Appearance. Butterprint seeds are flattened so that they usually appear to have two faces and a thick edge. In face view the seed is strongly hooked, having one side drawn out into a lobe that is longer than the remainder of the seed. The surface is smooth or slightly roughened, and is gray to whitish-gray in color. Under a hand lens the seed appears finely granular, like a fine grade of sand paper.

Seeds With Which Butterprint May Be Confused. The seeds of the plant known as flower-of-an-hour or shoofly (*Hibiscus trionum*) are similar to those of butterprint but considerably smaller and plumper. They are finely warty over the surface.

Occurrence. Butterprint is extremely common over the state. Its seeds are most commonly found in soybeans.

DODDER (*Cuscuta* spp.)

(Figure 19)

Status Under Iowa Law. Seed law: secondary noxious. Not included in weed law.

Other Common Names. Love vine.

How Produced. One to several seeds are formed within small globose pods. They mature from midsummer until frost.

Size. Seeds are 1 to 1.5 mm. long, of similar width or somewhat narrower.

Shape and Appearance. Dodder seeds are various in shape. They may be spherical, ellipsoidal, football-shaped, or are sometimes irregularly lumpy with several somewhat flattened sides. The surface of well developed seeds is brownish to brownish-gray, sometimes with a faint tinge of green. It is finely roughened, having the aspect of a fine grade of sandpaper under a lens. Frequently a large proportion of the dodder seeds found in agricultural seed are immature or dead. Such seeds are usually dull-gray or even whitish in color. If pinched with a pair of analytical tweezers, they will, in most cases, be found to consist of a shell only, and will collapse leaving only chalky remnants. Since it is obvious that such "seeds" are incapable of producing plants, they should not be reckoned against a given lot of agricultural seed when a noxious weed determination is being made.

Several kinds of dodder occur in the state of Iowa. No attempt will be made to distinguish these in the present bulletin.

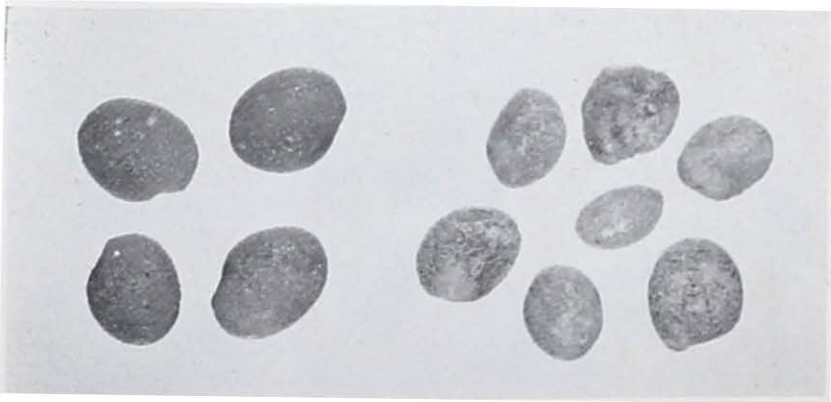


Fig. 19. Left, sour clover. Right, dodder. (Magnified eight times actual size.)

Seeds With Which Dodder May Be Confused. Seeds of the crop plant, sour clover (*Melilotus indica*), may be confused with dodder. Sour clover seeds are not commonly seen in Iowa but occasionally are found in Hubam clover or in South American-grown alfalfa seed. They usually possess an indistinct furrow running down the side of the seed, are an olive-brown in color and are covered (magnification required) by fine warts or protuberances.

Occurrence. Dodder, a parasite, attacks various legumes and flax. Its seed is quite common in commercial lots of alfalfa and lespedeza seed.

BUCKHORN (*Plantago lanceolata*)

(Figure 20)

Status Under Iowa Law. Seed law: secondary noxious. Weed law: secondary noxious.

Other Common Names. Buckhorn plantain. English plantain. rib grass. narrow-leaf plantain.

How Produced. The seeds are formed at the top of a long spike which extends above the leaves. They are produced in pairs inside of small rounded fruits.

Size. About 2 to 2.2 mm. long and 1 mm. wide.

Shape and Appearance. Buckhorn seeds are shaped like a dug-out canoe, oblong with a hollowed-out middle. The sides of the "canoe" are rather thick. The surface of mature seeds is a rich, shiny brown except for a broad band of slightly lighter color which extends longitudinally across the back. The seeds become sticky and gelatinous when slightly moistened. Frequently immature or shriv-



Fig. 20. Plantains. Left, buckhorn, good seed. Center, buckhorn, nonviable seed. Right, bracted plantain. (Magnified six times actual size.)

eled buckhorn seeds are found mixed with agricultural seed. Such buckhorn seeds are usually dull-brown or blackish in color and variously withered or contorted. (See fig. 20.) Experiments have shown that they are not capable of growing and hence should not be counted when one is determining the noxious weed content of a lot of agricultural seeds.

Seeds With Which Buckhorn May Be Confused. Buckhorn seeds are similar to those of bracted plantain (*Plantago aristata*). This latter plant, occurring in southern Iowa, is a very common weed in the southern part of the United States, where it is usually considered noxious. Its seeds are somewhat broader than those of buckhorn and have thinner sides. There is a conspicuous white line which encircles the inside of the hollowed-out portion. A narrow furrow is also present directed sideways across the middle of the back of the seed.

Occurrence. Buckhorn plantain is found to some extent throughout Iowa. It is a common noxious weed in clovers.

COCKLEBUR (*Xanthium commune*)

(Figure 21)

Status Under Iowa Law. Seed law: secondard noxious. Weed law: secondary noxious.

Other Common Names. None.

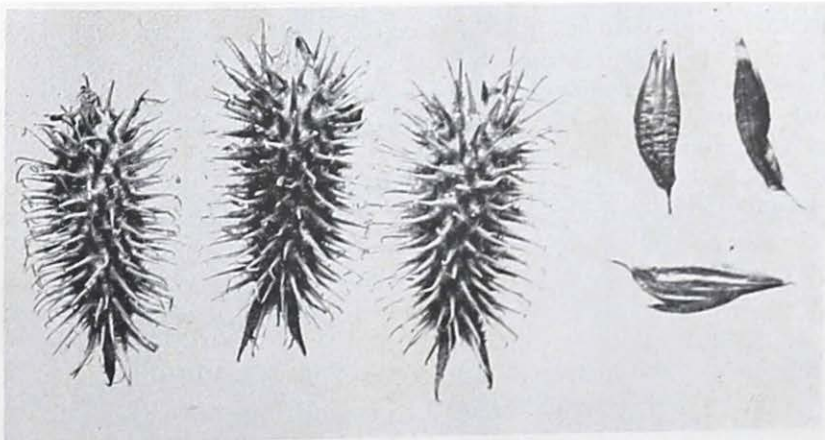


Fig. 21. Cocklebur. Left, burs. Right, dehulled seeds. (Magnified 13 times actual size.)

How Produced. The seeds are formed in pairs within the characteristic spiny burs. They ordinarily are not mature until fall.

Size. Burs about 20 mm. in length; seeds 10 to 15 mm. long, 4 to 5 mm. wide.

Shape and Appearance. The burs of this plant (see fig. 21) are so familiar to everyone that detailed description seems unnecessary. The seeds inside are not often seen. They are long and narrow, more or less oblong and flattened. The surface is blackish or brown in color and marked by several distinct longitudinal lines or ridges.

Seeds With Which Cocklebur May Be Confused. None.

Occurrence. Cocklebur is very common over the entire state of Iowa, particularly in low and poorly drained soils. Occasionally the hulled seeds or the entire burs may be found in oats or soybeans.

GLOSSARY

Attachment scar (seed)—Place where seed was originally attached to the pod.

Barb—A sharply pointed, thornlike bristle.

Berry—A fleshy or succulent fruit with several seeds.

Bract—A scale or hull.

Bur—A spiny structure containing one or several seeds.

Ellipsoidal—Football shaped.

Flange—A raised rim or border.

Granular—Finely roughened, like fine sandpaper.

Hull—The outside coat or covering.

Hulled (seed)—The outer covering, or hull, removed.

Lobe—A rounded projection.

Longitudinal—Extending parallel to the long axis.

Mottled—Irregularly shaded or spotted with two or more colors.

Oblong—Narrow, with parallel sides.

Prominence—A tiny raised area or bump.

Rachilla—A little stalk attached at the bottom of certain grass seeds and closely pressed against the face of the seed (fig. 3).

Spheroidal—Shaped like a globe or sphere.

Spike—A dense, usually elongate cluster of flowers or seeds, e.g. a head of wheat.

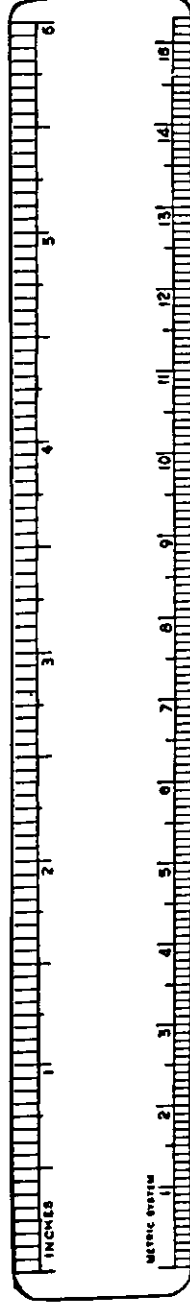
Spikelet—A small portion of a spike containing 2 to 10 seeds.

Taper—To gradually become narrow.

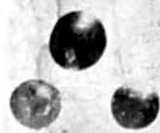
Truncate—Ending in a blunt tip.

Tubercle—A small knoblike structure.

Unhulled (seed)—Surrounded by the hull.



Weed seeds illustrated on the front cover are those declared **Primary Noxious** under the Iowa Agricultural Seed Law. Those shown on the back cover are **Secondary Noxious** under this law.



Wild Mustard



Wild Carrot



Smooth Dock



Butterprint



Black Mustard



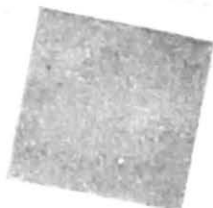
Cocklebur



Indian Mustard



Dodder



Sour Clover



Buckhorn



Sheep Sorrel