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FAMILY KEY

1A. Seeds with other parts of the flower adhering, which parts appear as remnants and not as enclosing structures
Seeds mostly grain-like, enclosing in chaffy membranous scales (bracts) .................. 1. GRAMINEAE
Seeds not grain-like, enclosed in chaffy membranous scales

Seeds circular in outline
Seeds with a notched wing; seeds not tightly enclosed in a leaf-like calyx
Wing marked with fine radial lines ....... 29. SCROPHULARIACEAE (Linaria)
Wing not marked with fine radial lines .... 6. CHENOPODIACEAE
Seeds not winged; seeds tightly enclosed in a minute leaf-like calyx ........ 6. CHENOPODIACEAE
Seeds not circular in outline

Seeds naiiform in outline
Seeds usually light brown in color ...... 2. CYPERACEAE (Carex)
Seeds shiny black to dull black in color .. 5. POLYGONACEAE
Seeds not naiiform in outline
Seeds triangular in cross-section; russet or red to dull or shiny black in color. 5. POLYGONACEAE
Seeds not triangular in cross-section
Seeds bearing a pappus at the apex
Pappus long, silky or feathery; seeds nearly circular in cross-section
Seeds 8-12 ribbed, smooth ............. 31. CICHORIACEAE
Seeds mostly 10-ribbed, hairy thru- out .................. 33. COMPOSITAE
Pappus of short, blunt scales or teeth; seeds flattened, truncate
Pappus of 1-2 awl-shaped teeth ....... 33. COMPOSITAE
Pappus of numerous (2-3 series) short blunt scales .................. 34. CICHORIACEAE
Seeds not bearing a pappus
Seeds reniform in outline; seeds notched; adhering "scales" ridged .................. 20. MALVACEAE
Seeds not reniform in outline; seeds not notched; adhering scales not ridged

Seeds trowel-shaped
Seeds enclosed in mealy bracts joined or nearly so at the apex .................. 6. CHENOPODIACEAE
Seeds enclosed in hairy bracts not joined at the apex; seed apex terminating in a knob-like projection ........ 4. URTICACEAE (Urtica)
Seeds not trowel-shaped
Seeds irregular in outline (mostly ovate), flattened, roughened, grooved longitudinally .... 6. CHENOPODIACEAE
Seeds regular in outline; flat on one side, deeply rounded on the other; embryo spirally coiled .................. 6. CHENOPODIACEAE
A. Seeds without other parts of the flower adhering (Salsola)

B. Seeds armed with spines or prickles, or projections

Spines or prickles barbed

- Spines numerous covering the rounded side only ........................................... 25. BORAGINACEAE (Lappula)
- Spines few; barbs projecting downward from 2-4 spiny awns at the apex .......... 32. COMPOSITAE (Bidens)

Spines or prickles not barbed

- Spines or prickles numerous, covering the cylindrical seed, which is 12-18 mm. long ........................................... 16. FABACEAE (Franseria)
- Spines or prickles slender, sharp, scattered throughout the seed .................. 32. AMBROSIAEAE (Ambrosia)
- Spines or prickles stout, blunt, arranged in a crown of 5-6 projections at the apex ........................................... 32. AMBROSIAEAE

B. Seeds not armed with spines or prickles (Ambrosia)

C. Seeds spherical in shape or nearly so

Seeds smooth or only slightly roughened

Seeds mostly black

- Hilum a point
- Seeds black, 2-2.5 mm. in diameter ........................................... 10. CARYOPHYLLACEAE (Vaccaria)
- Seeds black to deep red, 1-1.8 mm. in diameter ........................................... 13. BRASSICAEEAE (Brassica, not B. alba)
- Hilum a line or scar, usually white or lighter in color than the remainder of the seed ........................................... 16. FABACEAE (Vicia)
- Seeds not black; seeds yellowish or reddish, irregular or slightly flattened

Seeds grooved ........................................... 13. BRASSICAEEAE (Brassica alba)

Seeds not grooved ........................................... 13. BRASSICAEEAE

Seeds not smooth

- Seeds covered with fine, white, bristly hairs ........................................... 31. RUBIACEAE (Raphanus)
- Seeds not covered with fine, white, bristly hairs ........................................... 31. RUBIACEAE (Gallium)
- Seeds black, covered with a network of shallow pits .................................. 12. PAPAVERACEAE (Argemone)
- Seeds ash-colored, covered with rough, rounded projections; seeds marked with a seam-like ridge (raphe) on one side ........................................... 19. EUPHORBIACEAE (Euphorbia)

C. Seeds not spherical in shape (Euphorbia)

D. Seeds circular in outline

Seeds notched, marked with fine papillose ridges ........................................... 9. ALSINACEAE (Alsine)

Seeds not notched, not marked with fine papillose ridges

Seeds shiny black ........................................... 7. AMARANTHACEAE (Amaranthus)

Seeds not shiny black

- Seeds marked with a large circular scar on the flat side and a network of ridges on the rounded side ........................................... 27. LABIATAE (Teurcium)
COLORADO WEED SEEDS

Seeds not marked with a large circular scar; seeds yellow, dull, granular, rounded on one side, flattened in 2-many planes on the other. 24. CUSCUTACEAE (Cuscuta)

D. Seeds not circular in outline

E. Seeds reniform in shape
Seeds only slightly flattened
Seeds marked with fine branching ridges
Seeds marked with fine branching ridges
Seeds marked with fine concentric papillose ridges
Seeds smooth
Seeds distinctly flattened; seeds marked with fine papillose lines or ridges

10. CARYOPHYLLACEAE (Silene, Lychnis)

15. ROSACEAE (Potentilla monspelliensis)

10. FABACEAE (Medicago, Psoralea)

10. CARYOPHYLLACEAE (Saponaria)

E. Seeds not reniform in shape

F. Seeds cordate in shape
Seeds rough, black, marked with distinct knobs projecting from the concentric ridges
Seeds smooth, or nearly so
Seeds dull-black in color
Seeds not dull-black in color
Seeds grape-green to buff-brown in color, dull, 1.5-2.3 mm. long

10. CARYOPHYLLACEAE (Agrostemma)

20. MALVACEAE (Abutilon)

16. FABACEAE (Trifolium procumbens)

16. FABACEAE (Melilotus)

F. Seeds not cordate in shape

G. Seeds ovate in shape or nearly so
*Seeds flattened on two sides
Seeds with one rounded side and two flat sides meeting in a ridge
Seeds without a rounded side and two flat sides meeting in a ridge
Seeds shiny black
Seeds not shiny black
Seeds dull black
Seeds deeply pitted, wrinkled, margins irregular
Seeds not deeply pitted
Seeds with a minute white scar at the hilum, seeds marked with concentric rows of fine projections

7. AMARANTHACEAE (Amaranthus)

27. LABIATAE (Prunella)

28. SOLANACEAE (Solanum rostratum)

8. PORTULACACEAE (Portulaca)
Seeds without a white scar at the hilum
Seeds marked with
7-10 broken, white-tipped, transverse ridges .......... 18..OXALIDACEAE (Oxalis)

Seeds not marked with white-tipped ridges; seeds marked with several concentric ridges converging at the base (hilum) ........ 12..BRASSICACEAE (Thlaspi)

Seeds not dull black
Seeds gray or drab in color, hairy, mottled with broken lines or spots ........ 32..COMPOSITAE (Helianthus)

Seeds not gray or drab in color
Seeds yellow to yellow-red or brown in color
Seeds thin and parchment-like, with a distinct margin ........ 23..ASCLEPIADACEAE (Asclepias)

Seeds not thin and parchment-like
Seeds with one central, longitudinal groove within a loop-like concentric line, both converging at the hilum ........ 12..BRASSICACEAE (Lepidium, not campestrum)

Seeds not grooved
Seeds hooked on with a beak; seeds smooth ........ 11..RANUNCULACEAE (Ranunculus)

Seeds not hooked or beaked; seeds granular, obscurely pitted, crustaceous (hard) ........ 28..SOLANACEAE (Solanum)

Seeds variable in color, mostly ivory-yellow to drab; seeds with a longitudinal mark or groove
COLORADO W EED S EEDS

Seeds regular in shape, marginless, roughened with blunt projections which are more distinct on the edges ..........14..CAPARIDACEAE (Cleome)

Seeds irregular in shape, broadly margined, smooth, the sides faceted........21..CACTACEAE (Opuntia)

*Seeds not flattened on two sides:
Seeds flattened on one side, rounded on the other: seeds granular, but to olive in color ..........24..CUSCUTACEAE (Cuscuta)

G. Seeds not ovate in shape

H. Seeds flattened
†Seeds flattened on more than two sides
Seeds flattened on three sides: seeds triangular in cross-section .......................... 5..POLYGONACEAE (Polygonum, Rumex)

Seeds flattened on more than three sides; seeds not triangular in cross-section
Seeds truncate
Seeds prismatic ...........23..ONAGRACEAE (Oenothera)

Seeds not prismatic; seeds thimble-shaped, marked with transverse and longitudinal grooves ...........29..SCROPHULARIACEAE (Verbascum)

Seeds not truncate; smooth, irregular, with several flat sides..................25..ROSAEAE (Rosa)

†Seeds not flattened on more than two sides
††Seeds flattened on two sides
Seeds oblong in shape
Seeds not grooved
Seeds rounded on one side, either truncate or rounded at the apex ...................27..LABIATAE (Lycopus, Leonurus, Salvia, Nepeta)

Seeds not rounded on one side
Seeds 1.2-1.5 mm. long with a distinct white margin; seeds smooth ..........33..COMPOSITAE (Achillea)

Seeds 2-2.5 mm. long; not margined; seeds 6-8 ribbed, rough ............34..CICHORIACEAE (Sonchus)
Seeds grooved
Seeds with two longitudinal grooves on each face; seeds oval in cross-section, .6-.8 mm. long, regular in shape .................. 13. BRASSICACEAE (Bursa)

Seeds with one distinct longitudinal groove; seeds nearly circular in cross-section, .6-1.3 mm. long, irregular in shape .................. 13. BRASSICACEAE (Sisymbrium)

Seeds not oblong in shape
Seeds wedge-shaped, rounded on one edge, notched on the other; seeds marked with irregular blister-like protuberances .................. 9. ALSINACEAE (Cerastium)

Seeds not wedge-shaped
Seeds turbinate in shape, black, shiny ........ 1. GRAMINEAE (Panicularia)

Seeds not turbinate in shape
Seeds fusiform in shape
Seeds with a long, slender, hooked tip, hairy at the base .................. 15. ROSACEAE (Geum)

Seeds without a long, slender, hooked tip
Seeds with a distinct point or beak at the apex; seeds 3-8 veined ........ 34. CICORIACEAE (Lactuca)

Seeds not pointed or beaked at the apex; seeds truncate; seeds veined or ribbed .................. 34. CICORIACEAE (Sonchus)

Seeds not fusiform in shape
Seeds pyriform in shape, 2-3 ribbed or veined ........ 32. AMBROSIAEAE (Iva ciliata)

Seeds not pyriform in shape
Seeds cuneate in shape ........ 32. AMBROSIAEAE (Iva)

Seeds narrowly campanulate in shape ........ 33. COMPOSITAE (Ratibida)
COLORADO WEED SEEDS

††Seeds flattened on one side:
   seeds cylindrical to oblong
   in shape
Seeds with a single groove
   on each side; seeds 1.5-2.8
   long, obscurely flattened,
   color brown...............13..BRASSICACEAE
   (Camelina)
Seeds not grooved; seeds dull,
   granular, yellow in color,
   distinctly flattened......24..CUSCUTACEAE
   (Cuscuta)

H. Seeds not flattened

f. Seeds conical in shape
   Seeds shiny, stony, pitted, trim-
   cate .....................25..BORAGINACEAE
   (Lithospermum)
Seeds dull, smooth, rounded at
   the apex; seeds with one
   longitudinal groove on each
   side .....................13..GRASSICACEAE
   (Lepidium campestre)

I. Seeds not conical in shape

J. Seeds oblong to cylindrical
   in shape
   Seeds not circular in cross-
   section; seeds obscurely
   4-5 angled
   Seeds honey-yellow in
   color ......................33..COMPOSITAE
   (Grindelia)
Seeds usually brown in
   color ......................33..COMPOSITAE
   (Carduus)
Seeds circular in cross-ssec-
   tion throughout
   Seeds constricted by two
   grooves, which form a
   longitudinal rounded
   ridge .....................13..BRASSICACEAE
   (Conringia)
   Seeds not constricted by
   two grooves
   Seeds reticulated or pit-
   ted .......................17..GERANIACEAE
   (Geranium)
   Seeds not reticulated or
   pitted
   Seeds distinctly ribbed
   or ridged longitudi-
   nally
   Ribs white, usually
   10 in number, smooth
   ............33..COMPOSITAE
   (Leucanthemum)
   Ribs of the same
   color as the seed, roughened with
   rounded projections
   ............33..COMPOSITAE
   (Anthemis)
   Seeds only faintly
   wrinkled or ribbed
   Seeds dull, summit
   bearing a light-
   colored disk...........33..COMPOSITAE
   (Artemisia)
Seeds shiny, truncate; apex cup-like with a point in the center...33. COMPOSITAE
(Carduus)

J. Seeds not oblong in shape

K. Seeds fusiform in shape, not circular in cross-section throughout
Seeds smooth or nearly so, 4-8 angled or ribbed at the apex; circular in cross-section at base, somewhat resembling a ten-pin.............22. OKAGRACEAE (Gauna)
Seeds roughened with hard, sharp points near the apex; seeds circular in cross-section at the apex, 4-angled or ribbed at the base........34. CICHORIACEAE (Taraxacum)

K. Seeds not fusiform in shape

L. Seeds pointed at both ends; seeds cylindrical
Seeds tailed at the ends and often throughout one side; seeds adhering to each other in groups of 4-6....3. JUNCACEAE (Juncus)
Seeds not tailed at the ends or on one side
Seeds 4-6 mm. long, reticulated........1. GRAMINEAE
Seeds 5-15 mm. long, not reticulated; seeds often with black mark at the base........1. GRAMINEAE (Eragrostis)

L. Seeds not pointed at both ends

M. Seeds boat-shaped...30. PLANTAGINACEAE (Plantago)
M. Seeds not boat-shaped; seeds trapeziums in outline, frustums or spherical pyramids in shape....30. PLANTAGINACEAE (Plantago)

In the KEY TO FAMILIES, "SEEDS" are referred to as such because they are so called in commercial samples. Thus all fruits whether utricles, achenes, Caryopses or true seeds are called seeds.

Seeds triangular in cross-section occasionally occur in Polygonum persicaria.
Colorado Weed Seeds

By G. E. Egginton

The appearance of weed seeds in lots of field and garden seeds is the rule rather than the exception. It is seldom that commercial seed is free from the seeds of weeds or other crops. However, vegetable and flower seeds, and the seeds of cereals or other crops in breeding plots, when selected, harvested and threshed by hand, are usually free from weed seeds. Occasionally, machine threshed and machine hulled seeds (sorghums and alfalfa more frequently than other crop seeds) are free from weed seeds.

A sample of wheat seed may contain one to many species of weed seeds. For example, in the samples of Colorado wheat examined, there were found 35 species. Wild oats, bindweed, poverty weed, wild buckwheat, cow cockle, kinghead, butterfly weed, wild sunflower, and wild rose appeared more frequently than others. In the samples of Colorado alfalfa, 72 species of weed seeds were found, those of most common occurrence being black mustard, small-seeded alfalfa dodder, pigweed, lamb's quarters, barnyard grass, gum weed, marsh elder, burning bush, white sweet clover, witchgrass, breadroot, curled dock, Russian thistle, and green foxtail. From the preceding examples cited it would appear that the possibilities of finding absolutely pure seed are extremely limited. Such limited possibilities are further shown by the fact that wheat and alfalfa are among the cleanest of the machine-threshed or machine-hulled crops, with a smaller percentage of impurities and a far less extensive range of weed seed species than any of the common grass crops such as timothy, red top, and blue-grass, or many of the leguminous crops such as red clover, alsike clover, and white clover.

Weed seeds are for the most part disseminated by natural means, yet the introduction of new or foreign species is due to the presence of weed seeds in shipments from other states or countries. Thus foreign weeds may result from the direct planting of crop seeds containing these seeds or by the scattering of weed seeds from grain in transit. In addition to the latter method of dissemination, there are many others which would require exten-
sive space for enumeration.

It is not to be expected, neither is it essential, that a dealer in, or a buyer of, seeds know the number of different sorts of weed seed species that have been found in crop seeds, but it is of value to be able to recognize those weed seeds which occur most frequently or are particularly harmful. For example, the seeds of wild oats, bindweed, wild buckwheat, and cow cockle occur more commonly in wheat and are more harmful and undesirable than the seeds of slender wheat grass or bee plant. A knowledge of the nature of the impurities, then, is of more importance to the purchaser than a statement of the amount (percentum) of the impurities present. For example, one lot of alfalfa seed, 99.2 per cent. pure, contains dodder and wild mustard, another lot, 95 per cent. pure, contains no harmful or undesirable weed seeds, and though inferior in purity to the preceeding lot is of superior quality because of the nature rather than amount of the impurities present. Seed of high purity and free from harmful weeds is the most desirable, being an improvement over either of the above possibilities. It is necessary, then, that care be exercised in the selection of all seed though the foregoing cannot be accomplished without a knowledge of what makes for better seed, together with a desire to improve seed quality.

The keys, descriptions, and drawings, included in this bulletin were made that they might be of some assistance in supplying the need for information which is helpful in both buying and selling seeds, particularly field seeds; also that they might be of use for reference or classwork in schools.

The noxious weed seeds designated in the Colorado Seed Act appear on page 21. Any of these seeds are considered particularly harmful.

It is unnecessary to devote more than a few words to the often quoted and usually misunderstood term “adulteration”. In the past seed merchants “adulterated” the seeds they were selling by mixing with them seeds of other species. Thus wild mustard seeds, the germs killed by drying in an oven, were mixed with cabbage, turnip or cauliflower seeds and sold as such. Today “adulteration” has a different meaning, is practiced in a far different way, and is not readily detected. Old seeds that have been
in storage for years, or seeds that have been carried over for one or two years, seeds of low vitality, and mechanically injured seeds, all may be mixed proportionately with seeds of the same species having a high germinating power. For example, 50 pounds of Danish ball head cabbage having a vitality of 40 per cent. when mixed thoroughly with 200 pounds of the same variety with a vitality of 95 per cent. would give 250 pounds of cabbage with an average vitality of 84 per cent.

A better understanding of the common impurities and adulterants has created greater interest in better seed, and with it the realization that the best seed is the cheapest after one considers not the initial cost of inferior seed but its damaging effect upon clean fields. Seed may be pure and of good germination but low in quality because of its color. Though color alone should not regulate quality and seed values it is a valuable indicator in that it shows careful harvesting, good hulling, and allows ready detection of foreign seeds.

In buying seed one should keep in mind the following points: Purity, amount and nature of impurities, germination, source of seed, and color. If buying from your neighbor, keep in mind the above points and in addition ask yourself whether or not the seed can be further cleaned by sieves or milling machinery for, though seed companies' stocks are usually cleaned by special machinery your neighbor has no such equipment, neither does he realize the amount and nature of the impurities that may be removed from average lots of seed by even a hand sieve or a small hand mill.

A purity analysis is easily made when there are drawings or samples of weed seeds at hand for comparison. This entire bulletin may be looked thru for a drawing of the seed to be determined, or more easily by first referring to the family key on page 3. After finding the family to which the seed belongs, do the same for the genus and species by referring to the respective keys.

Figures 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 164 were drawn by the author, and the remainder are the work of Miss Caroline M. Preston.
**THE SEED**

In Fig. 1 there is shown a diagrammatic section of the pistil of a typical flower after pollination and prior to fertilization. The sepals, petals, and stamens have been removed. The structure we are interested in within this pistil is the **ovule**, which develops into the **seed**. In the ovaries of some plants, as in the squash for example, there are many ovules and consequently many seeds, whereas, in the ovary of such plants as sunflower, lettuce, buck-
wheat, (Fig. 2), wheat, corn, and other cereals, there is but one ovule. Thus we see that the true seed, botanically speaking, is always associated with the flower structure, and is formed within the ovary of the pistil; the seed develops from a structure in the ovary known as the ovule. In fact, the true seed may be defined as the fertilized and ripened ovule. It is primarily a young plant in a resting stage capable of development by germination.

Seed development begins immediately after the union of a male element of the pollen tube with the egg or female element of the ovule. The pollen tube enters the ovule by way of the micropyle. The body resulting from this union of two sexual elements develops into the young plant or embryo. The embryo may be partly or wholly imbedded in the endosperm which is a food supply, as in wheat and other cereals, or may occupy the entire space within the seed coats when the endosperm is lacking. The latter condition is characteristic of bean and pumpkin seeds, and is due to the absorption of the endosperm by the embryo during the development of the seed. The cells of the nucellus are in part absorbed by the developing embryo and the nucellus is usually present as a thin, compressed layer known as perisperm. During the process of development of the embryo and nucellus, changes have taken place in the coats of the ovules. The integuments, or outside layers, have gradually hardened and formed seed-coats.

In describing the kinds of ovules the terms atropous (orthotropous), campylotropous, amphiropous, and anatropous are used (Fig. 3). The same terms may be used in describing seeds, particularly in referring to the relative positions of hilum and micropyle. The seed upon ripening usually detaches itself from the stalk (funicle) and the resulting scar is called the hilum. The
opening in the coat of the ovule remains as a tiny, pit-like opening in the seed-coat known as the *micropyle*.

Seed-coats may vary greatly in their external appearance; they may be ridged, veined, pitted, reticulated, grooved, faceted, scaly and warty, or provided with certain structures such as a *raphe* (Fig. 4). A mature or ripened seed consists of: Embryo.
endosperm, nucellus and seed-coats. The embryo (Fig. 5), or young plant, and consequently the most important structure of seed, upon reaching a certain stage in its development becomes dormant for a time, continuing its development only when condi-

tions are again favorable for growth. In a well developed embryo three distinct parts can be found: Cotyledons, which supply food and in many cases become the first temporary leaves; a hypocotyl, which terminates in the young root or radicle, and often pulls the cotyledons and plumule from the seed-coats; and the first bud or plumule.

Fruit and Seed Distinguished.—The term seed is frequently and incorrectly applied to many of the small, dry, one-seeded, indehiscent fruits. The caryopsis or grain of wheat is known commercially as a seed as are the achenes of sunflower and rhubarb. A fruit is the matured ovary together with the seed or seeds. In the case of the one-seeded, indehiscent fruits, the seed is enclosed in the ovary wall, which has become hardened, whereas a many-seeded dehiscent fruit such as the pea, has the ovary wall or pericarp represented as the pod and the seeds are the enclosed “peas”.

A caryopsis, (Fig. 6) such as the grain of wheat or of any other grass, is in reality a dry fruit containing one seed, and the fruit wall does not split open at maturity to allow the seed to escape. Further-
Fig. 7. Longitudinal section of an achene (Sundlower) showing the seed free from the enclosing pericarp.

Fig. 8. Cross-section of a nutlet (Motherwort) showing two flat sides (areas of cleavage where fruit split into nutlets) and relation of closely united pericarp and testa.

Fig. 9. Cross-section of an utricle (Bee) showing the loose, bladder-like calyx enclosing the pericarp which is not adherent to the testa.

Fig. 10. Cross-section of an involucrre enclosing an achene (Kinghead) showing the relation of involucrre to pericarp and testa.
more, the wall of the ovary is firmly grown to the seed-coats. An achene (Fig. 7) is a dry, non-splitting, one-seeded fruit resembling the caryopsis, but the ovary wall is not firmly grown to the seed-coats. A nutlet (Fig. 8) is a small, hard, usually one-seeded indehiscent fruit. An utricle (Fig. 9)) is a small, thin-walled, bladdery, one-seeded fruit. A true seed is shown in Fig. 11.

![Diagram](image)

Fig. 11. Longitudinal section of a true seed (Pumpkin) showing outer and inner seed coats (integuments).
SEEDS GROUPED BOTANICALLY

The groupings as given below are based upon the “seeds” as they appear in commercial samples. The term “seed” used commercially may refer to either a true seed, botanically, or to a true seed plus other flower parts, such as ovary wall, involucre, calyx, etc. Thus a fruit, sometimes commercially known as a “seed”, may occur as a caryopsis, achene, nutlet, utricle, and rarely as a druplet, berry, or follicle. Some genera may occur in more than one grouping, as for example, *Cenchrus* and *Chenopodium*.

<table>
<thead>
<tr>
<th><strong>Achene</strong></th>
<th><strong>Caryopsis</strong></th>
<th><strong>Seed Surround-\ed by an Involute</strong></th>
<th><strong>Nutlet</strong></th>
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**Utricle**

| Amaranthus    | Atriplex            | Chenopodium                        | Kochia     | Salsola       |
| Cycloloma     |                    |                                  |            |               |
| Taraxacum     |                    |                                  |            |               |
| Urtica        |                    |                                  |            |               |
Following are the noxious weed seeds of Colorado as enumerated in the Colorado Seed Act:

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<tr>
<th>Common Name</th>
<th>Botanical Name</th>
<th>Description Page</th>
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<tr>
<td>Spiny Sow Thistle</td>
<td>Sonchus asper</td>
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I. GRASS FAMILY

Graincace

The grass inflorescence or flowering group is made up of spikelets. A spikelet (Fig. 12), as the unit of inflorescence, consists of a stalk or axis (rachilla) bearing a number of two-ranked (distichous) bracts (glumes) the lowest two of which are empty. Above the two empty glumes, which subtend each spikelet, and attached to the rachilla, are one or more flowers. Each flower is borne in the axil of a bract called the lemma and subtended or enveloped by a two-keeled bract opposite the lemma, commonly referred to as the palet or palea.

The back of the palet is toward the rachilla. The palet usually envelops the other parts of the flower with its infolded edges.

![Fig. 12. Spikelet of Sandbur (Cenacurus triboloides) showing rachilla, empty glumes palet, lemma, stamens and pistils. (After Vasey.)](null)
The palis is never awned (bearded), the glumes and lemma are inserted on the rachilla, and the palis on a very short flower stalk (pedicel). The ovary of the grass flower contains a single ovule, which when fully developed or mature is a one-seeded grain-like fruit (caropsis). The seed proper is enclosed by the pericarp (ovary wall) which is firmly attached to the seed coat (Fig. 6). There is usually an abundance of endosperm present. The germ (embryo) is located at the base of the grain on the side opposite the hilum (scar at the point of attachment of the grain to the stalk).

Considering the grains (fruits) of grasses collectively, there are two classes in which all grass grains may be placed: (1) Grains free at maturity, and (2) grains adherent to the palis and lemma at maturity.

**KEY TO GENERA**

**Seeds adherent (adnate) at maturity**
- Seeds enclosed by a persistent involucre armed with barb-like spines
- Seeds not enclosed in a persistent involucre armed with barb-like spines
- Seeds awnless
  - Margins of lemma involuted along entire length
  - Margins of lemma not involuted along entire length
  - Margins of lemma involuted except at the tip
  - Lemma shiny, smooth
  - Lemma distinctly roughened transversely
  - Margins of lemma not involuted
- Seeds awned
  - Rachilla absent; lemma bearing three awns, two lateral ones united at the base—seeds scarcely wider than the awn
  - Rachilla present
    - Rachilla prolonged behind palis as an awn
    - Rachilla not prolonged behind palis as an awn
- Awn dorsal
  - Awn arising from a hyaline (transparent) lemma
  - Awn arising from an indurated (hardened) lemma
- Awn not dorsal
  - Palis completely enclosed by the lemma; lemma indurated; a hard sharp point at base of seed
  - Palis not completely enclosed by the lemma
  - Lemma with a dorsal ridge (midrib)
  - Dorsally ridged throughout
  - Dorsally ridged at the tip only
  - Lemma without a dorsal ridge (midrib)
  - Veins of lemma 3-7, distinct converging at apex
  - Veins of lemma obscure throughout

**Seeds free at maturity**
- Seeds 0.4-0.6 mm long
- Seeds 0.5-1.5 mm long, often with a characteristic black mark at the base
- Seeds not cylindrical; seeds shiny, turbinate in shape

**Colorado Agricultural College**
COLORADO WEED SEEDS

1. Sandbur, Bur-grass
   (Cenchrus L.)

Spikelet with an involucre of rigid, connate (united) spines or barb-like prickles; lemma and palet less hardened than in Panicum; lemma not inrolled at the margins, falcate (scythe-shaped); curved and flat, tapering gradually.

Sandbur (Cenchrus tribuloides L., Cenchrus carolinianus Walt.) (Fig. 13).—Spikelets flattened, oval in shape, 4 to 5 mm. long, armed with stiff, stout prickles 2 to 5 mm. long.

2. Panic Grass, Witch Grass
   (Panicum L.)

Lemma parchment-like, awnless, hardened, veins indistinct; margins of lemma inrolled; palet similar to lemma in texture, the margins firmly clasped by the inrolled lemma; seeds 1 mm.-3 mm. long rarely 4-5 mm., .5-1 mm. wide.

Key to Species

Seeds 1.1.5 mm. long, .3-1 mm. wide. oval in shape............... 1. P. capitale
Seeds 2.5-2.8 mm. long, .8-1 mm. wide, tapering abruptly from the middle of the seed to the tip.................. 2. P. virgatum

1. Witch Grass, Old Witch Grass (Panicum capitale L.) (Fig. 14).—Seeds light green-yellow to yellowish oil green, shiny, obscurely five-veined.

Fig. 13. Sandbur (Cenchrus tribuloides). Spiny involucre (left) x 5, caryopsis (right). x 9.

Fig. 14. Witchgrass (Panicum capitale). Fruits (left) enclosed in glumes, fruits (right) without glumes. x 9.

¹Seed colors were determined by comparing a number of seeds of each species, with the colors in Ridgway's "Color Standards and Color Nomenclature".
2. **Switch Grass, Tall Smooth Panicum** (*Panicum virgatum* L.) (Fig. 15).—Seeds coarsely mottled, sulphur yellow to smoke gray in color, shiny, obscurely five-veined at each end, the veins indistinct in the light colored band which crosses the center of the seed.

3. **Barnyard Grass, Jungle Rice**

(*Echinochloa Beauv.*)

Lemma parchment-like, acuminate (tapering at the end), awnless, margins enclosing the palet except at the apex; palet parchment-like, the tip or summit free from the inrolled lemma; seeds 3-3.5 mm. long, 1.5-2 mm. wide, tapering at the ends, shiny, smooth; rachilla absent.

**Barnyard Grass** (*Echinochloa crus-galli* (L.) Beauv.) (Fig. 16).—Seeds light orange yellow to buckhorn brown in color, shiny, obscurely three-veined.

Fig. 15. Switch-grass (*Panicum virgatum*). A. Top view. B. Bottom view. x 12.

Fig. 16. Barnyard grass (*Echinochloa crus-galli*). Fruit (center) enclosed in glumes, x 13. Fruit (right and left) without glumes, x 10.
4. Foxtail Grass

(Setaria Beauv., Chaetochloa Scribn.)

Lemma awnless, wrinkled, roughened transversely by fine branching ridges, dull, oval in shape, rarely smooth and shiny; palet rugose, both transversely and longitudinally, tip free from the inrolled lemma; rachilla absent; seeds 1.5-3 mm. long, 1.2 mm. wide, flat on one side, deeply rounded on the other, half circular (hemispheric) in cross section.

Key to Species

Seeds 2.5-3 mm. long, 1.5-2 mm. wide, 1-1.5 mm. thick, deeply wrinkled transversely .......................................................... 1. S. glauca

Seeds 1.5-2 mm. long, 1 mm. wide, .5-.8 mm. thick, wrinkles shallow; seeds dark brown and mottled, or spotted ............ 2. S. viridis

1. Yellow Foxtail (Setaria glauca (L.) Beauv., Chaetochloa glauca (L.) Scribn.) (Fig. 17).—Seeds yellow ocher to mummy brown in color, deeply wrinkled, rounded side strongly arched.

2. Green Foxtail (Setaria viridis (L.) Beauv., Chaetochloa viridis (L.) Scribn.) (Fig. 18).—Seeds bone-brown to black in color, faintly wrinkled, mottled, faintly arched on the rounded side.

Fig. 17. Yellow Foxtail Setaria glauca. A. Bottom view. B. Top view. C. Caryopsis. x 9.

Fig. 18. Green Foxtail Setaria viridis. x 12. Fruits (top and bottom) enclosed in glumes, fruit (left) top view, fruit (right) bottom view.

5. Crab-Grass

(Synthecrisma Walt.)

Lemma awnless, leathery, hardened, marked with fine longitudinal lines, margins not inrolled, transparent or nearly so; palet also leathery; seeds 1-8 mm. long, .5-1 mm. wide; rachilla absent.

Key to Species

Seeds 2.5-3 mm. long, 5-8 mm. wide, slender, 4 to 5 times longer than wide .......................................................... 1. S. sanguinale

Seeds 1-1.5 mm. long, .5-8 mm. wide, stout ........................................ 2. S. humifusum
1. **Large Crab-Grass** (*Syn-therisma sanguinale* (L.) Dalw.) (Fig. 19).—Seeds dark ivy green to Andover green in color; twice as long as *S. humifusum*.

2. **Small Crab-Grass** (*Syn-therisma humifusum* (Pers.) *Rudb.*) (Fig. 20).—Seeds black in color; almost as wide as long.

6. **Triple-awned Grass**

   (*Aristida L.*)

   The lemma tapers off into a terminal awn and two lateral awns as long or longer than the seed; palet thin, scale-like; rachilla not distinguishable; seed downy or smooth at the base, 7-15 mm. long, .5-1 mm. wide, scarcely wider than the awns.

   **Wire Grass** (*Aristida longiseta Stend.*) (Fig. 21.—Awns neither twisted nor bent; spikelets purplish; awns 10-15 mm. long; lemma 5-12 mm. long.

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![Fig. 19. Large Crab-Grass (Syn-therisma sanguinale), A. Top view, B. Bottom view. x 8.](image1.png)

![Fig. 20. Small Crab-Grass (Syn-therisma humifusum), A. Bottom view, B. Top view. x 14.](image2.png)

![Fig. 21. Wire grass (Aristida longiseta), x 6.](image3.png)
7. Barley, Squirrel-tail Grass

(Hordeum L.)

The lemma, obscurely 5-veined, tapers off into a terminal awn from one
to ten times the length of the seed; seeds usually in groups of three in the
spikelet, the numerous awns, several long and some short, giving a brush-like
appearance; palet slightly shorter than the lemma, with two distinct veins
near the margin; rachilla prolonged behind the palet as an awn one-half to
three-fourths as long as the seed; seeds 5-8 mm. long, 1-2 mm. wide.

Key to Species

Awns 8 to 10 times longer than seeds—central spikelet prominent 1. .H. jubatum
Awns 1 to 2½ times longer than seeds—all spikelets of nearly
the same size .................................................. 2. .H. pusillum

Fig. 22. Wild Barley (Hordeum jubatum). Caryopses (left). x 5. Spikelet (right). x 3.

1. WILD BARLEY, SQUIRREL-TAIL GRASS (Hordeum jubatum L.) (Fig.
22).—Seeds buff to straw yellow in color; spikelets in clusters of three; only
the central one fertile; central seed 5-7 mm. long, 1-1.5 mm. wide.

2. LITTLE BARLEY (Hordeum pusillum Nutt.) (Fig. 23).—Seeds pale,
dull green yellow to straw yellow in color; spikelets in clusters of three; all
fertile; seeds all the same size, 5-7 mm. long; 5-1 mm. wide.

8. Beard Grass, Bluestem

(Andropogon (Royen) L.)

Spikelets distinctly awned, the rachilla breaking off (articulating) below
the glumes. The awn is dorsal (arising a noticeable distance below the apex
of the hyaline (transparent) lemma but above its base). Awns 15-30 mm.
long, as long or several times longer than the seed; palet and lemma are
scale-like; rachilla prominent, half as long as the seed, distinctly hairy along
its entire length or tipped with hairs; base of seed hairy at the point of articulation; seeds 2.5-8 mm. long, with a silky or downy appearance throughout.

**Key to Species**

Rachilla hairy near the tip, flattened ...................... 1 *A. scoparius*
Rachilla hairy along its entire length, cylindrical ............ 2 *A. furcatus*

1. **Little Bluestem, Broom Beard Grass** (*Andropogon scoparius* Michx.) (Fig. 24).—Seeds chocolate to walnut brown in color, 5-7 mm. long, 1-1.5 mm. wide, slender; awn twisted and bent; seeds hairy at the base and near the tip of the rachilla.

2. **Big Bluestem, Forked Beard Grass** (*Andropogon furcatus* L.) (Fig. 25).—Seeds pyrite-yellow to chocolate color, 6-8 mm. long, 1.5-2 mm. wide, stout; awn straight, hair-like; seed and rachilla hairy throughout.

9. **Oat Grass** (*Avena* (Tourn) L.)

Lemma 5-9 veined, hardened except toward the apex which is bidentate (having two teeth); lemma bearing a long dorsal awn (either straight or wanting in cultivated forms); palea papery, two-cleft at the apex, hairy at the base; rachilla cylindrical, slender, hairy, about one-fourth the length of the seed; seed 8-15 mm. long, 1-3 mm. wide, hairy at the base which usually appears as a perfect ring or sucker-like mouth with a tuft of hairs surrounding it; grain 2-7 mm. long, 1.25 mm. wide, hairy at the top and distinctly grooved.

1. **Wild Oat Grass** (*Avena fatua* L.) (Fig. 26).—Seeds walnut-brown to straw-yellow in color, 10-15 mm. long 1.5-2.5 mm. wide; rachilla hairy; lemma with a sucker-like mouth at the base; dorsal awn, when present, stout, twisted, and bent.
10. Porcupine Grass, Spear Grass

(Stipa L.)

Lemma terminating in a single, stiff awn twisted one-half to three-quarters its length, straight near the tip, the straight portion bent at an angle of 80° to 90°; palet inclosed within the hardened lemma; rachilla reduced to a hard and sharp point at the base and armed with a tufted ring of short, stiff hairs directed upwards; seeds 8-20 mm. long, 1-1.5 mm. wide.

Key to Species

Seeds 18-20 mm. long, 1-1.5 mm. wide; awn prominently twisted ......................................................... 1... S. spartea

Seeds 10-12 mm. long, 1 mm. wide; awn twisted indistinctly... 2... S. comata

1. Porcupine Grass (Stipa spartea Trin.) (Fig. 27).—Seeds clay color, hairy at base; lemma somewhat shiny; awn bent one-half its length, 12-15 cm. long.

2. Western Stipa (Stipa comata Trin. & Rup.) (Fig. 28).—Seeds straw-yellow in color, hairy at base; lemma dull; awn nearly straight, 10-12 cm. long.

11. Brome Grass

(Bromus L.)

Lemma convex or keeled, 5-9 veined or nerved, usually two-toothed at the apex, bearing a sub-terminal awn ranging from a mere blunt point to a slender, hair-like projection as long or longer than the seed; palet a little shorter than the lemma, two-keeled; rachilla cylindrical, very short, one-tenth to one-fifth the length of the seed, smooth or hairy; seed 6-12 mm. long, 1.5-4 mm. wide, many species widely flaring at the apex; grain flat, furrowed, dark reddish-brown in color, 5-8 mm. long.

Key to Species

Seeds plump, distinctly rounded on the back; lemma smooth or nearly so...................................................... 1... Bromus secalinus

Seeds thin, flat to slightly round on the back; lemma very hairy throughout ........................................... 2... Bromus tectorum
1. **Cheat or Cheat (Bromus secalinus L.)** (Fig. 20).—Seeds cinnamon buff to clay color; lemma rounded on the back, obscurely 7-nerved, 6-8 mm long, 1.5-2 mm wide; awn from 4-6 mm long, straight and stout; palea edge bear a single row of stiff hairs.

2. **Downy Brome Grass (Bromus tectorum L.)** (Fig. 30).—Seed wood-brown to buffy-brown in color, 8-10 mm long, .5-1 mm wide; awn 10-11 mm long; lemma hairy with longer hairs at the margins.

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**Fig. 29. Cheat (Bromus secalinus) x 6. a. Bottom view, b. Side view.**

**Fig. 30. Downy Brome Grass (Bromus tectorum). Floret (left), spikelet (right). x 5.**

### 12. Wheat Grass, Quitch Grass

(Lepidium perenne L.)

*Lemma* convex or slightly keeled above, 5-7 veined, acute at the apex or bearing a sub-terminal awn either short and inconspicuous or rarely from one to three times the length of the seed; palea shorter than the lemma, bristly on the keel; rachilla smooth or hairy, cylindrical but narrower at the base; seed 8-12 mm long, 1.5-2.5 mm wide, slender, gradually tapering to a slender point or awn; grain oval to oval-round, hairy at the summit or...
COLORADO WEED SEEDS

Key to Species

1. Quack Grass (Agropyron repens (L.) Beauv.) (Fig. 31).—Seeds straw-yellow in color, 8-10 mm. long, 1.5-2 mm. wide; lemma smooth, strongly veined, bearing a sub-terminal awn from 2-4 mm. long; rachilla smooth; base smooth.

2. Slender Wheat Grass (Agropyron tenerum Vasey) (Fig. 32).—Seeds of same color, length, and width as Agropyron repens; lemma hairy at the base, elsewhere smooth, strongly veined bearing a sub-terminal awn 2-4 mm. long; rachilla hairy.

13. Darnel, Rye Grass
( Lolium L.)

Lemma 5-7 veined, veins converging at the two cleft apex; lemma bearing a sub-terminal awn one to one-half times as long as the seed; awn rough; palet shorter than the lemma; rachilla flattened, stout, cylindrical, usually smooth; seeds 5-7 mm. long, 1-2.5 mm. wide.

Darnel (Lolium temulentum L.) (Fig. 33).—Seeds cinnamon in color, 4-5 mm. long, 2-2.5 mm. wide; lemma 7-veined, bifid at the apex and bearing a sub-terminal, rough awn one to one-half times the length of the seed; seeds stout, as thick as wide; rachilla stout, smooth.
14. **Wild Rye, Lyme Grass**  
*(Elymus L.)*

Lemma convex, faintly 5-veined, acute at the apex or bearing a sub-terminal, blunt, acute, or long awn; palet a trifle shorter than the lemma, velvety; rachilla one-fourth to one-sixth the length of the seed, cylindrical, distinctly narrower at the base, hairy or smooth, prominent; seed 7-15 mm. long, 1-2.5 mm. wide; grain flat or rounded on one side, grooved, hairy at the tip.

**NODDING WILD RYE** *(Elymus canadensis L.)* (Fig. 34).—Seeds pale green-yellow to straw-yellow in color, 10-12 mm. long, 1.5-2 mm. wide; lemma and rachilla hairy; awn 15-20 mm. long.

15. **Stink Grass, Skunk Grass**  
*(Eragrostis Beauv.)*

Grains free at maturity, spherical to broad oval, or cylindrical in shape, pointed at the ends, smooth with a network of fine lines; translucent.

**STINK GRASS** *(Eragrostis megastachya (Koel.) Link.)* (Fig. 35).—Seeds maroon to claret-brown in color, spherical or cylindrical in shape, marked with a network of fine lines, translucent, pointed at the ends, 4.5-6 mm. in diameter.

16. **Drop-seed, Rush Grass**  
*(Sporobolus R. Br.)*

Grains free at maturity, pericarp, loosely enclosing the seed, often thin, and passing away early (evanescent); grains usually have a characteristic crescent-shaped black mark at the base; many grains lose the pericarp early and the black mark is not in evidence; grains vary in color from Morocco-red to light buff, are usually translucent, flattened oval to disk-shaped, 5-15 mm. long, 3-1 mm. wide.

**SAND DROP-SEED** *(Sporobolus cryptandrus (Torr. A. Gray))* (Fig. 36).—Seeds Morocco-red in color, 7 mm. long, 3-4 mm. wide, black mark at the base minute and almost indistinct; seeds faintly translucent, oval in shape.
17. **Manna Grass, Meadow Grass**  
* (Panicularia Fabr., Glyceria R. Br.)*

Grains free at maturity, flattened, napiform to obtusely wedge-shaped, distinctly pointed at one end, usually smooth, shiny, or dull shiny, sometimes marked with fine longitudinal lines; grains black to blackish-brown in color.

**Key to Species**

<table>
<thead>
<tr>
<th>Seeds</th>
<th>Description</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>.5-6 mm. long, .5 mm. wide, shiny black</td>
<td>1. <em>P. nervata</em></td>
<td></td>
</tr>
<tr>
<td>1.5-2.5 mm. long, .6-1 mm. wide, dull-shiny to oily</td>
<td>2. <em>P. grandis</em></td>
<td></td>
</tr>
</tbody>
</table>

1. **Fowl Meadow Grass** (*Panicularia nervata* (Wild.) Kuntze., *Glyceria nervata* (Wild.) Trin.)  (Fig. 37).—Seeds flattened, napiform, pointed at one end, shiny black, uniform in size and shape.

2. **Reed Meadow Grass** (*Panicularia grandis* (S. Wats.) Nash., *Glyceria grandis* Wats.)  (Fig. 38).—Seeds napiform to obtusely wedge-shaped, blackish-brown in color, variable in size and shape, more flattened than *P. nervata*.

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**II. SEDGE FAMILY**  
*(Cyperaceae)*

In all sedges the 1-celled ovary bears a single, erect ovule. The matured ovary forms an achene (a small, dry, hard fruit which does not split open at maturity). The fruit (seed) is flattened and either 3-angled or the shape of a double-convex lens (lenticular). The achene is completely surrounded by the perigynium (the inflated sac-like, beaked organ surrounding the ovary) rarely rupturing it in ripening.

Owing to the scarcity of herbarium material for comparison and the large number of species in this family, generic and specific characters have been omitted.

The accompanying illustration shows several species of sedge
(Carex) found in red top, blue grass, white clover, barley, and Sudan grass. (Fig. 39).

![Diagram of Sedges (Carex spp.)](image)

3. **RUSH FAMILY**

(*Juncaceae*)

Ovary a 1-3-celled capsule 3-valved; the minute embryo of the seed is enclosed by and at the base of the fleshy albumen; seeds three to many, often apiculate (with a minute point) or winged.

1. **Slender Rush** (*Juncus tenuis* Willd.) (Fig. 40).—Seeds brick-red in color, apiculate, transversely netted with fine lines, translucent, winged at the tips or throughout the length of one side; seeds .2-3 mm. long, often adhering to each other in groups of four or six.

4. **NETTLE FAMILY**

(*Urticaceae*)

Ovary 1-(rarely 2-)celled forming a 1-seeded fruit; fruit an achene; endosperm scant, oily or wanting; embryo straight.
COLORADO WEED SEEDS

SLENDER NETTLE (Urtica gracilis Alt.) (Fig. 41).—Seeds light wood-brown in color, dull, often roughened, ovate, compressed, summit terminating in a small knob-like projection; calyx somewhat persistent and armed at the base with several stinging hairs; seeds .8-1 mm. long, .5-6 mm. wide.

5. BUCKWHEAT FAMILY

(Polygonaceae)

Ovary 1-celled, bearing a single, erect seed; fruit usually an achene; either double convex, compressed, 3-angled or rarely 4-angled, usually wholly or partly enclosed by the persistent calyx; seed shaped like the pericarp; endosperm mealy.

Key to Genera

Seeds margined or winged, usually enclosed by the calyx...... 1. Rumex
Seeds not margined or winged, and seldom enclosed by the calyx 2...Polygonum

1. Dock, Sorrel

(Rumex L.)

Achenes 3-angled rarely 4-angled, with equal sides, distinctly winged or margined or with a persistent calyx; embryo curved or nearly straight, borne in one of the faces of the achene.

Key to Species

Seeds with distinct, flaring, calyx wings................. 1. R. crispus
Seeds without flaring calyx wings
Seed edges obtuse or rounded................................ 2. R. acetosella
Seeds edges acute or sharp.................................. 3. R. persicarioideae

1. Curled Dock, Yellow Dock

(Rumex crispus L.) (Fig. 42).—Seeds bay color, shiny, 2-2.5 mm. long, 1.5-2 mm. wide, 3-angled, sides equal, edges sharp or acute; sides slightly concave near the apex, which is abruptly acute.

2. Sheep Sorrel, Field Sorrel

(Rumex acetosella L.) (Fig. 43).—Seeds mahogany-red to bay color, shiny, persistent, roughened calyx usually present; achenes 1 mm. long, .8-1 mm. wide, 3-angled; sides equal, edges blunt or obtuse; sides slightly convex.
3. Golden Dock (*Rumex persicarioiides* L.) (Fig. 44).—Seeds russet in color, shiny, 1 mm. long, 0.8-1 mm. wide, 3-angled, sides equant, ridges sharp or acute; achenes acutely pointed as in *R. crispus*.

![Golden Dock](image)

**Fig. 44. Golden Dock (*Rumex persicarioiides*). A. Calyx enclosing achene. B. Achene. x 10.**

2. Knotweed (*Polygonum* (Tourn.) L.)

Achenes either lenticular, compressed or 3-angled; sides usually unequal; achenes longer and usually larger than in *Rumex*; embryo near the end of the achene in one of its angles; achene usually exceeding the calyx in length when calyx is persistent.

**Key to Species**

- Seeds 3-angled
  - Seeds with equal sides
  - Seeds with unequal sides
  - Seeds flat, napiform in shape
- Seeds nearly circular in outline, 3 mm. long, 3 mm. wide
- Seeds oval in outline, 1.5-2 mm. long, 1.1-0.5 mm. wide

1. Wild Buckwheat (*Polygonum convolvulus* L.) (Fig. 45).—Seeds dull black, the three sides equal and slightly concave, 2.5-3.5 mm. long, 2.2-5 mm. wide, 2.2-5 mm. thick; part of the calyx is often persistent; ridges rounded or obtuse.
2. Knotweed (Polygonum aviculare L.) (Fig. 46).—Seeds maroon to black in color, the three sides unequal, gradually tapering to the acute apex; seeds 2.2-5.5 mm. long, 1.2-1.8 mm. wide, 1.2-1.8 mm. thick; part of the calyx is often persistent; ridges rounded or obtuse.

3. Pennsylvania Smartweed (Polygonum pennsylvanicum L.) (Fig. 47).—Seeds shiny black, lenticular, 2.5-3 mm. long, 2.5-3 mm. wide, nearly circular in outline, apex a short, sharp point; part of the calyx often persistent.

4. Lady’s Thumb (Polygonum persicaria L.) (Fig. 48).—Seeds shiny black, lenticular, 1.5-2 mm. long, 1.1-1.5 mm. wide, naphiform, tapering to a point longer and not so abrupt as in P. pennsylvanicum; part of the calyx often persistent; 3-angled seeds resembling R. crispus but shiny black in color, often appear in this species.

6. GOOSEFOOT FAMILY
   (Chenopodiaceae)

Ovary 1-celled, becoming a 1-seeded thin utricle (a small bladder fruit) or rarely an achene; pericarp thin or coriaceous (leathery in texture); embryo coiled into a ring, entirely or partly around the mealy albumen (endosperm) when albumen is present,
conduplicate (folded together lengthwise) or spirally coiled; calyx usually persistent, enclosing the fruit.

**Key to Genera**

Calyx in fruit surrounded by a wing (parallel to the flat surface)
- Wing continuous, broad ................................................. 1. *Cycloloma*
- Wing 5-lobed, narrow .................................................. 2. *Kochia*

Calyx not surrounded by a wing parallel to the flat surface
- Calyx present
  - Embryo spirally coiled ................................................... 3. *Salsola*
  - Embryo a ring ................................................................ 4. *Chenopodium*
- Calyx absent; utricle enclosed in foliaceous (leaf-like) bracts 5. *Atriplex*

1. **Winged Pigweed**
   
   *Cycloloma Moq.*

   Utricle depressed, enclosed in the calyx; ovary 1-celled; seed flat, horizontal; calyx strongly keeled and appressed with a broad, continuous, horizontal wing; endosperm mealy.

   **Winged Pigweed** (*Cycloloma atriplicifolium* (Spreng.) Coudt.) (Fig. 49).—Calyx 5-lobed, surrounded by a broad, horizontal, membranaceous wing: fruit flat, thin; with wing and calyx persistent seeds are 2.5-3 mm. across; with wing removed the seeds are 1.5 mm. across; wings white to neutral gray in color; calyx brown to black; seeds with calyx and wing removed, dull black in color.

2. **Burning Bush, Kochia**
   
   *Kochia Roth.*

   Utricle ovate to pyriform in shape when calyx is removed; pericarp membranous, not adherent to the seed; endosperm little or wanting.

   **Burning Bush** (*Kochia scoparia* (L.) Schrad.) (Fig. 50).—Seeds with calyx persistent, pale smoke-gray in color, with calyx removed dull black; seed surface rough, wrinkled, irregularly and deeply concave on both sides; seed ovate to pyriform in shape, with little or no endosperm, 1-1.5 mm. long; 0.6-1 mm. wide.
3. Saltwort, Russian Thistle
(Salsola L.)

Calyx horizontally winged at the base of the fruit, the wings forming a broad scarious border; embryo coiled in a conical spiral; endosperm wanting.

RUSSIAN THISTLE (Salsola pestifer A. Nels.) (Fig. 51).—Seeds with calyx persistent, pale smoke-gray in color; with calyx and papyry pericarp removed, the conical, spiral embryo is apricot-yellow in color; seeds including wing, 2.5-3 mm. wide, 1.15 mm. from base to summit; seeds with calyx removed 1-1.5 mm. wide, .5-1 mm. from base to summit.

![Figure 51](image)

A. Calyx enclosing fruit. (Top view). C. Calyx enclosing fruit. (Side view). F. Embryo. x 12.

4. Goosefoot
(Chenopodium (Tourn.) L.)

Calyx 5- (rarely 4-) parted usually persistent; fruit lenticular, nearly circular in outline, the edge bluntly rounded; embryo annular (in the form of a ring), coiled partly or fully around the mealy endosperm.

LAMB'S QUARTER'S (Chenopodium album L.) (Fig. 52).—Seeds, with calyx persistent, pale smoke-gray to smoke-gray in color; with calyx and pericarp removed, seeds black and shiny; fruits 1-1.2 mm. wide, .5 mm. thick, edges rounded with a distinct groove leading from a marginal protuberance to the middle of each face; embryo annular, usually completely surrounding the endosperm.

![Figure 52](image)


5. Orache, Salt Bush, Shad-scale
(Atriplex (Tourn.) L.)

Ovary 1-celled; utricle wholly or seldom partly enclosed in the foliaceous bracts which are often united at the top; calyx wanting; embryo coiled in a ring around the endosperm.
Key to Species
Bracts, enclosing the fruit, 2.5-3.5 mm. long
1. A. hastata
Bracts, enclosing the fruit, 5-7 mm. long
2. A. semibaccata

1. Halberd-leaved Orache (Atriplex hastata L.) (Fig. 53).—Seeds, with enclosing bracts persistent, mahogany to black in color, rough, mealy; seeds with bracts removed, 1.4-1.5 mm. across, flat, thin, slate-black in color, with one protuberance, and a shallow groove which marks off the protuberance from the remainder of the seed.

2. Australian Salt Bush (Atriplex semibaccata) (Fig. 54).—Seeds, with enclosing bracts persistent, pinkish-buff to cinnamon-buff in color, rough; seeds, with bracts removed, clay color; parts of the pericarp persist when the bracts are removed giving the seed a mealy, scurfy appearance; groove less distinct than in A. hastata; seeds, with bracts, 5-7 mm. long, 4-5 mm. wide in the widest part; seeds, without bracts or pericarp, 1.5 mm. across, flattened, thin.

7. Amaranth Family (Amaranthaceae)
Fruit a membranous 1-seeded utricle, ovoid or subglobose, circumscissile (dehiscing by a regular, transverse, circular line of division), bursting irregularly, or indehiscent; seeds mostly smooth and shiny; embryo annular; endosperm mealy. Abundant.

Amaranth
(Amaranthus (Tourn.) L.)
Fruit an ovoid 1-seeded utricle, 2-3 beaked (ending in a prolonged tip) at the apex; calyx sometimes persistent; fruits opening transversely or sometimes bursting irregularly usually indehiscent; seeds smooth shiny, oval to circular in outline, lenticular; embryo coiled into a ring around the endosperm.

Key to Species
Seeds circular in outline or nearly so
Seeds 1.2-1.5 mm. across each face
1. A. bitoides
Seeds 6-7 mm. across each face
2. A. gracicotus
Seeds broadly ovate to oval in outline
3. A. retroflexus
COLORADO WEED SEEDS

1. TRAILING OR PROSTRATE PIGWEED (Amaranthus bitoides S. Wats.) (Fig. 55).—Seeds shiny black, smooth, faintly marked with fine lines, flattened at the edge, distinctly margined, 1.2-1.5 mm. across each face.

2. TUMBLEWEED (Amaranthus graccizans L.) (Fig. 56).—Seeds shiny black, more shiny than A. bitoides, margin less distinct than preceding, 0.7 mm. across each face.

3. ROUGH OR COMMON PIGWEED (Amaranthus retroflexus L.) (Fig. 57).—Seeds shiny black, as in A. graccizans; margins less pronounced than in A. bitoides or A. graccizans. 1-1.2 mm. long, .9-1 mm. wide.

8. PURSLANE FAMILY (Portulacaceae)

Ovary 1-celled; capsule thin and translucent or hard and brittle, splitting open across, as a lid, or by 3-valves; seeds 2 to many, ovate to obscurely reniform in shape, globose or compressed; embryo curved around the mealy endosperm.

Purslane, Pussley (Portulaca (Tourn.) L.)

Capsule 1-celled, thin and translucent, splitting or opening by a lid. Many seeded; seeds flattened, ovate to reniform in shape.

Common Purslane (Portulaca oleracea (Tourn.) L.) (Fig. 58).—Seeds black, dull to dull-shiny, flattened, obscurely kidney shaped with a distinct white mark at the hilum; 3-4 concentric rows of minute projections give the seed a finely roughened appearance; the edges are faintly grooved by 2-3 annular lines; seeds .5-.8 mm. long.
9. CHICKWEED FAMILY  
(*Alsinaceae*)

Ovary 2-5 celled; fruit a capsule opening with from 2-10 valves; seeds several to many; embryo curved around the outside of the mealy endosperm.

**Key to Genera**

Seeds circular in outline—regular in shape. ......................... 1. *Stellaria*
Seeds wedge-shaped—irregular in shape. ......................... 2. *Cerastium*

1. Chickweed, Starwort  
(*Alsinie L.*, *Stellaria L.*)

Ovary 1-celled; capsule short, opening by 5-6 valves; seeds flattened or globose.

![Fig. 59. Common Chickweed (*Stellaria media*). X 28.]

1. Common Chickweed (*Stellaria media* (*L.* Cyrill., *Alsinie media* L.) (Fig. 59).—Seeds deep-neutral-gray to dusky-purplish-gray in color; embryo so curved as to bring the apex and base nearly together; seeds circular in outline or nearly so, flattened, the sides marked with several rows of regular protuberances, arranged in concentric lines, which appear to end at the distinct notch in the edge; seeds are .6-8 mm. across each face and .4-5 mm. thick.

2. Mouse-ear Chickweed  
(*Cerastium L.*)

Ovary 1-celled; capsule cylindrical, often curved, opening by 8-10 valves; seeds rough, irregular, marked with distinct protuberances or mere lines; markings may be very irregular or somewhat regular; seeds more or less flattened on sides and edges.

**Large Mouse-ear Chickweed** (*Cerastium vulgatum* L.) (Fig. 60).—Seeds brick-red in color; embryo so curved as to bring the apex and base nearly together; seeds usually wedge-shaped, flattened, notched at the narrow end, the sides marked with irregular, blister-like protuberances; seeds .4-6 mm. long, .3-4 mm. wide.

Fig. 60. Large Mouse-ear Chickweed (*Cerastium vulgatum*). a. & b. Top views, c. Edge view. X 20.

10. PINK FAMILY  
(*Caryophyllaceae*)

Ovary 1-celled to incompletely 5-celled; capsule 1-5 celled, opening by 2-5 valves at the apex; seeds numerous, either with rounded or prickly projections, or rarely smooth; embryo usually coiled or curved around the mealy endosperm.
COLORADO WEED SEEDS

Key to Genera

Seeds spherical ........................................... 1. Vaccaria
Seeds not spherical
   Seeds reniform in outline
      Seeds very flat, thin ...................................... 2. Saponaria
      Seeds slightly flattened, thick
   Hilum with a distinct knob on two sides ................ 3. Silene
      Hilum nearly surrounded by a prominent protuberance.. 4. Lychmis
   Seeds heart-shaped in outline; seeds rough, dull black in color... 5. Agrostemma

1. Cow Herb, Cow Cockle
   (Vaccaria Medic.)

   Ovary 1-celled; capsule opening by four toothlike valves at the top; embryo curved.
   Cow Cockle (Vaccaria vaccaria (L.) Britton) (Fig. 61).—Seeds dull black, smooth to slightly rough with microscopic, rounded points; seeds 2-2.5 mm. in diameter.

Fig. 61. Cow Cockle (Vaccaria vaccaria). X 10.

2. Soapwort, Bouncing Bet
   (Saponaria L.)

   Ovary 1-celled; capsule oval to oblong in outline, opening by four tooth-like valves at the top; embryo curved into a ring around the endosperm.
   Bouncing Bet (Saponaria officinalis L.) (Fig. 62).—Seeds dull black, each face with 6-8 concentric rows of blister-like projections which appear to originate at the deep notch in the edge; each face is marked by a deep cup-like pit near the notch; seeds flat, reniform in outline, 1.2-2 mm. across each face.

Fig. 62. Bouncing Bet (Saponaria officinalis). X 10.

3. Catchfly, Campion
   (Silene L.)

   Ovary 1-celled; capsule opening by 6 or more valves at the top; seeds with rounded, prickly or spiny projections; seeds slightly flattened on each side, usually thick.

Key to Species

   Seeds .5 mm. or less across each face.......................... 1. S. antirrhina
   Seeds .8-1 mm. across each face
   Projections on surface in regular concentric ridges ............. 2. S. vulgaris
   Projections on surface not in regular ridges.................... 3. S. noctiflora

Fig. 63. Sleepy Catchfly (Silene antirrhina). A. Top view. B. Edge view. X 22

1. Sleepy Catchfly (Silene antirrhina L.) (Fig. 63).—Seeds slate black to black in color, with 4-5 irregularly concentric rows of blister-like projections on each face; seeds reniform to nearly circular in outline, slightly flattened, 4-5 mm. across each face.
3. Night-flowering Catchfly (Silene noctiflora L.) (Fig. 65).—Seeds slightly lighter gray in color than S. vulgaris, each face with 7-10 irregular, concentric rows of black tipped projections, almost flat (not prominent); seeds reniform to nearly circular in outline, flattened, slightly larger than S. vulgaris, 1-1.2 mm. across each face.

4. Campion, White Cockle

(Campsis (Torn.) L.)

Capsule opening by 8-10 valves at the top; other characters nearly identical with Silene.

White Cockle (Lychnis alba Mill.) (Fig. 66).—Seeds neutral-gray in color, projections and markings similar to Silene noctiflora, also similar in shape, but a trifle larger; as distinguished from Silene noctiflora, Lychnis alba has a prominent projection nearly surrounding the hilum, whereas the hilum of Silene noctiflora appears between two distinct knob-like projections; seeds 1.1-1.2 mm. across each face.

5. Corn Cockle

(Agrostemma L.)

Capsule 1-celled; seeds numerous, black, deeply grooved, curved so that the base and apex are brought nearly together.

Corn Cockle (Agrostemma githago L.) (Fig. 67).—Seeds seal-brown to black in color, wedge-shaped to triangular, the top and bottom faces with 7-10 rings of sharp projections, which become very small and indistinct near the hilum; the third face or edge opposite the hilum is very thick and ridged with 7-10 rings of sharp projections; seeds 2.4 mm. long, 2.2-5 mm. thick.
11. CROWFOOT FAMILY
(Ranunculaceae)

Fruits either dry pods (follicles), achenes (seed-like), or berries; seeds with a very small embryo, and hardened endosperm.

Crowfoot, Buttercup
(Ranunculus (Tourn.) L.)

Fruit an achene, usually flattened, and either smooth, or bearing minute, round tipped projections or prickles; fruit usually tipped with a short, curved, or straight point or beak.

Key to Species

Seeds swollen or inflated ........................................ 1. R. sceletatus
Seeds compressed or flattened
Beak of seed straight or nearly so .......................... 2. R. acris
Beak of seed strongly hooked or curved ............. 3. R. bulbosus

1. CURSED CROWFOOT, CELERY-LEAVED OR DITCH CROWFOOT (Ranunculus sceletatus L.) (Fig. 68).—Seeds honey-yellow in color, swollen or inflated, 5-7 mm. long, marginless (without a distinct annular band around the edge of the seed), beak very short and straight.

Fig. 68. Cursed Crowfoot (Ranunculus sceletatus). A. Top view. B. Edge view. x 24.

2. TALL OR MEADOW BUTTERCUP (Ranunculus acris L.) (Fig. 69).—Seeds mahogany-red to Suckle-brown in color, about 3 mm. long, and 2 mm. wide, margins distinct, often lighter in color than the remainder of the seed; beak short, straight, or nearly so.

Fig. 69. Tall Buttercup (Ranunculus acris). x 12.

3. BULBOUS BUTTERCUP (Ranunculus bulbosus L.) (Fig. 70).—Seeds seal-brown in color, 2.3-5 mm. long, 1.5-2.5 mm. wide, margins very distinct, usually much lighter in color than the remainder of the seed; beak short (shorter than R acris) usually curved or strongly hooked.

Fig. 70. Bulbous Buttercup (Ranunculus bulbosus). A. Top View. B. Edge view. x 10.
12. POPPY FAMILY
    (Papaveraceae)

Ovary 1-celled; fruit a capsule usually splitting open by a
pore or by valves; seeds numerous, often crested (tufted); embryo
very small and located at the base of the endosperm.

Prickly Poppy, Thistle Poppy
    1. (Argemone L.)

Capsule oblong, prickly, opening at the top by 4-6 valves; seeds
numerosus, pitted and usually
crested; endosperm oily.

White Prickly Poppy (Argemone intermedia Sweet) (Fig. 71).--
Seeds blackish-brown in color, oily,
shiny, roughened owing to numerous
shallow pits connected by a network
of fine ridges; the wing-like ridge
on one side is more prominent at
the extremities; seeds nearly spherical, 1.5-2.5 mm. in diameter.

13. MUSTARD FAMILY
    (Brassicaceae Lind., Cruciferae B. Juss.)

Ovary 2-celled, rarely 1-celled; fruit a capsule, usually split-
ing open at maturity; seeds generally so curved that the apex and
base are brought nearly together; endosperm absent; embryo is
usually large, filling the seed.

Key to Genera

Seeds spherical except Brassica alba......................... 1. Brassica
Seeds not spherical
    Seeds flat (except Lepidium campestre)
    Seeds with a single groove running nearly the length of the seed 2. Lepidium
    Seeds with a number of circular grooves or concentric
    circles converging at the hilum................................ 3. Thlaspi
    Seeds not flat
    Seeds conical to cylindrical in shape, circular in cross-section
        Seeds 1.5-2.5 mm. long
            Seeds tawny color ............................................ 4. Camelina
            Seeds auburn color .................................. 5. Corrynia
        Seeds 6-1.3 mm. long................................. 6. Sisymbrium
    Seeds oblong
    Seeds broadly oval to irregularly circular in cross-section... 7. Raphanus
    Seeds slightly oval in cross-section... 8. Bursa

1. Mustard
    (Brassica (Tourn.) L.)

Pods either long, slender, or thick, nearly circular in outline or 4-sided;
seeds mostly spherical, roughened or smooth; cotyledons of the seed folded
together lengthwise.
COLORADO WEED SEEDS

Key to Species

1. White Mustard (Brassica alba (L.) Boiss.) (Fig. 72).—Seeds dull, antimony-yellow in color, smooth, irregular in shape, mostly oblong to slightly flattened or nearly spherical, 2-2.5 mm. long.

2. Wild Mustard, Charlock (Brassica arvensis (L.) B. N. P.) (Fig. 73).—Seeds dull, slate-black to black in color, smooth, spherical in shape, 1-1.8 mm. in diameter.

3. Black Mustard (Brassica nigra (L.) Koch.) (Fig. 74).—Seeds brick-red in color, rough, spherical in shape, 1-1.5 mm. in diameter (usually noticeably smaller than either B. arvensis or B. juncea), surface marked with pits distinctly deeper than the network of fine lines bordering them.

Seeds smooth
Seeds yellow .......................................................... 1. B. alba
Seeds black .......................................................... 2. B. arvensis

Seeds not smooth
Seeds marked with pits deeper than the network of fine lines surrounding them ........................................ 3. B. nigra
Seeds marked with pits no deeper than the network of fine lines surrounding them ................................ 4. B. juncea

Seeds of B. nigra can also be distinguished from B. juncea by their smaller size and redder color. Seeds of B. juncea are usually covered with a grayish bloom which can be easily rubbed off.
4. Indian Mustard (*Brassica juncea* (L.) Cossom.) (Fig. 75).—Seeds brick-red to wood-brown in color, usually covered with grayish bloom; seeds spherical in shape, 1.2-1.8 mm. in diameter, surface marked with a network of lines bordering pits, more shallow than in *B. nigra*, but each pit covering a greater area, giving the network a distinct and coarser appearance.

2. Peppergrass, Bird-seed
(*Lepidium* L.)

Pods either round or oblong, short; seeds mostly flat, grooved nearly their entire length.

**Key to Species**

<table>
<thead>
<tr>
<th>Seeds flat</th>
<th>Seeds conical or cylindrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>L. apetalum</em></td>
<td>2. <em>L. campestre</em></td>
</tr>
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</table>

1. *Peppergrass, Apetalous Peppergrass* (*Lepidium apetalum* Wild.) (Fig. 76).—Seeds dull cinnamon-rufous in color, each side marked with a distinct groove nearly the length of the seed; seeds often possess narrow, translucent, scale-like margins; seeds oval in shape, one extremity pointed, the other rounded, 1.1-1.7 mm. long, 0.5-0.8 mm. across each face.

![Fig. 76. Peppergrass (*Lepidium apetalum*). A. Top view. B. Edge view. x 15.](image)

2. *Field Cress, Cow Cress* (*Lepidium campestre* (L.) R.Br.) (Fig. 77).—Seeds dull, bone-brown in color, conical to cylindrical in shape, circular in cross-section, surface roughened with two shallow grooves, meeting at the hilum and forming an angle of 60°; seeds rounded at one extremity, the other pointed, 1.7-2.5 mm. long, 1.1-1.5 mm. wide, in the widest part.


Pods either circular in outline, oblong or wedge-shaped; seeds 4-12 in each pod.

**Pennycress, Frenchweed** (*Thlaspi arvense* L.) (Fig. 78).—Seeds dull black to oily black in color, each surface marked with 5-7 distinct concentric ridges converging at the hilum; seeds flat, ovate in shape, one extremity rounded, the other pointed, 1.6-2 mm. long, 1.1-1.5 mm. across each face at the widest part.

![Fig. 78. Pennycress (*Thlaspi arvense*). x 12.](image)
4. False Flax
(Camelina Crantz.)

Pods circular in cross-section, ranging from almost spherical to cylindrical in shape; seeds numerous, oblong, swollen or inflated.

False Flax (Camelina sativa (L.) Crantz.) (Fig. 79).—Seeds tawny to Sanford’s-brown in color, irregularly oblong to cylindrical in shape, circular in cross-section; two distinct deep grooves (one on each side) constrict the seed nearly its length resulting in a rounded ridge, which often projects, lip-like, beyond the hilum; seeds 1.5-2.8 mm. long, 0.8-1.5 mm. wide, in the widest part.

5. Hare’s-ear Mustard
(Conringia (Heist.) Link.)

Pod long and narrow, usually 4-angled; seeds oblong.

Hare’s-ear Mustard (Conringia orientalis (L.) Dum.) (Fig. 80).—Seeds auburn color, usually oblong to cylindrical in shape, circular in cross-section, constricted by less distinct grooves but otherwise ridged as in Camelina sativa, the distinct lip-like projection usually extending beyond the hilum; surface of seed marked with shallow, minute pits; seeds 2.2-5 mm. long, 1.2-1.5 mm. wide in the widest part.

6. Hedge Mustard, Tumbling Mustard
(Sisymbrium (Torn.) L., Erysimum L., Norta Adams.)

Pods either awl-shaped or cylindrical, circular in cross-section, or 4-sided; seeds numerous, cylindrical, conical or irregular in shape.

Key to Species

Color raw-sienna to antique-brown.......................... 1. S. altissimum
Color bone-brown to hazel................................. 2. S. officinale

1. Tumble or Tumbling Mustard (Sisymbrium altissimum L., Norta altissima (L.) Britton.) (Fig. 81).—Seeds raw-sienna to antique-brown in color, nearly circular in cross-section usually with one groove nearly as long as the seed; seeds 0.7-1 mm. long, 0.4-0.6 mm. wide.
2. **Hedge Mustard** (*Sisymbrium officinale* (L.) Scop., *Erysimum officinale* L.) (Fig. 82).—Seeds bone-brown to hazel in color, nearly circular in cross-section, grooved as in *S. altissimum* and more irregular in shape, 0.6-1.3 mm. long, 0.4-0.6 mm. wide.

7. **Radish**
(*Raphanus* L.)

Pods oblong, circular in cross-section, tapering into a beak; pods rarely splitting open at maturity; seeds oblong to nearly spherical.

**Wild Radish, White Charlock** (*Raphanus raphanistrum* L.) (Fig. 83).—Seeds vineaceous-brown to dark vineaceous-brown in color, surface marked with a network of fine lines and shallow pits; seeds 2.3 mm. long, 1.5-2 mm. wide, irregular in size and shape.

8. **Shepherd's Purse**
(*Bursa* Weber., *Capsella* Medic.)

Pods distinctly flattened, wedge-shaped or heart-shaped, notched at the top; seeds numerous.

**Shepherd's Purse** (*Bursa bursa-pastoris* (L.) Britton., *Capsella bursa-pastoris* (L.) Medic.) (Fig. 84).—Seeds brunet-brown in color, oblong, slightly oval in cross-section, each face marked with one distinct ridge separating the two distinct grooves, which are nearly as long as the seed and join at the end of the ridge, forming a loop around it; seeds 0.6-0.8 mm. long, 0.3-0.5 mm. wide.

14. **CAPER FAMILY**
(*Capparidaceae*)

Fruit a capsule or berry, elongated or flattened; seeds numerous, usually kidney-shaped, without endosperm; embryo coiled.

**Bee Flower, Stink Flower**
(*Cleome* L., *Peritoma* DC.)

Capsule elongated, oblong; seeds numerous, appearing as though folded together lengthwise.
ROCKY MOUNTAIN BEE PLANT (*Cleome serrulata* Pursh., *Peritoma serrulatum* (Pursh.) DC.) (Fig. 85).—Seeds dull, variable in color, mostly yellow-drag, bone-brown or black, flattened, grooved as though folded together lengthwise, roughened with blunt projections more distinct on the edges; seeds 3-4 mm. long, 2-2.5 mm. wide, usually ovate or oval-shaped, pointed at the hilum, rounded at the other extremity.

15. ROSE FAMILY
(*Rosaceae*)

Fruits variable, usually an achene or follicle, or a druplet: achenes may be hairy or smooth, and may split open or remain intact at maturity; seeds mostly without endosperm.

Key to Genera

Seeds many-sided—irregular in shape ........................................ 1. *Rosa*
Seeds two-sided—regular in shape
Seeds hairy ................................................................. 2. *Geum*
Seeds not hairy ........................................................... 3. *Potentilla*

1. *Rosa* (*Tourn.* L.)

Achenes numerous, enclosed in a berry-like, fleshy covering; achenes become hard and bony at maturity.

ARKANSAS ROSE (*Rosa arkansana*, Porter) (Fig. 86).—Seeds hazel to backthorn-brown in color, prismatic though irregular in shape, with 3-6 faces, smooth, 3.5-4 mm. long, 2-3 mm. wide.

Fig. 86. Arkansas Rose (*Rosa arkansana*): A. Two achenes united. B. Single achene, top view. x 10.
2. Avens
(Geum L.)

Achene numerons, small, dry, usually hairy, with a characteristic tail or hooked beak.

Large-leaved Avens (Geum macrophyllum Willd.) (Fig. 87).—Seeds Hay's russet to hazel in color, flattened, hairy, tipped with a long, slender, hooked beak (persistent style), usually as long as the achene: seeds 3-4 mm. long, .7-1 mm. wide.

3. Cinquefoil, Five-finger
(Potentilla L.)

The fruits are dry achenes: achenes usually swollen or inflated, kidney to oval-shaped, smooth or ridged.

Rough Cinquefoil (Potentilla monspeliensis L.) (Fig. 88).—Seeds buckthorn-brown in color, flat-oval in cross-section, kidney-shaped, marked with forked, rounded ridges, the longest ridge usually parallel to the rounded edge opposite the hilum, or point of attachment: seeds .5-.7 mm. long, .3-.5 mm. wide.

16. PEA FAMILY OR PULSE FAMILY
(Fabaceae Reichenb., Papilionaceae L. or Leguminosae Juss.)

Fruit a more or less elongated pod splitting along its length by 2 valves or retaining its seeds at maturity; seeds without endosperm; the cotyledons (leaves of the embryo) are mostly thick and fleshy; seeds oval, spherical, cordate, cylindrical, reniform, and irregular; scar (hilum) and notch at the top, or side of the seed; hilum a line or point.

Key to Genera

Seeds spherical, or nearly so ........................................ 1. Vicia
Seeds not spherical
  Seeds enclosed in a prickly, often persistent pod ............. 2. Glycyrrhiza
  Seeds not enclosed in a prickly pod
    Seeds with the hilum near the middle of one side
      Seeds regular in shape
        Seeds 4-6 mm. long ....................................... 3. Psoralca
        Seeds 1.5-2.5 mm. long .................................. 4. Trifolium
          (not T. procumbens)
    Seeds usually irregular in shape, 1.5-3 mm. long, somewhat flattened ...................................................... 5. Medicago
    Seeds with the hilum near one end
      Seeds .7-1 mm. long, shiny ................................ 6. Trifolium
        (T. procumbens)
      Seeds 1.5-2.5 mm. long, dull ................................ 7. Melilotus
1. Vetch, Tare, Wild Pea  
(Vicia L.)

Fig. 89. Vetch (Vicia sp.) x 11.

Pods flat, 2-valved, splitting open at maturity; seeds few or many, irregular, spherical or globular in shape, usually smooth; hilum a line lighter in color than the rest of the seed; the seeds of most species are dull black.  
Vetch (Vicia sp.) (Fig. 89).

2. Liquorice  
(Glycyrrhiza (Tourn.) L.)

Pods oblong, compressed, covered with prickles or glands, seldom splitting open at maturity.

Wild Liquorice (Glycyrrhiza lepidota (Tourn.) L.) (Fig. 90).—Seeds mostly enclosed in a prickly pod; seeds black, irregular in shape, 2-3 mm. long, 1.8-2.2 mm. wide.

Fig. 90. Wild Liquorice (Glycyrrhiza lepidota). A. Spiny pod x 2. B. Seed. x 6.

3. Pomme de Prairie, Bread-root, Wild Alfalfa, Indian Turnip  
(Psoralea L.)

Pods seldom splitting open at maturity, covered with glandular dots, rough, each bearing a single seed; pods pointed, oval in outline.

Few-flowered Psoralea, Wild Alfalfa, or Bread-root (Psoralea tenuiflora L.) (Fig. 91).—Seeds buffy-brown to deep olive in color, rarely mottled, regular in shape; hilum in the middle of one edge, distinct, much lighter in color than the remainder of the seed; seeds 4-6 mm. long, 2.5-3 mm. wide.

Fig. 91. Few-flowered Psoralea (Psoralea tenuiflora). A. Pod. B. Seed. x 5.
5. **Medick, Lucerne**  
*(Medicago (Tourn.) L.)*

Pods 1- to several seeded, coiled or curved, spiny, net-veined, or smooth, seldom splitting open at maturity; seeds regular or irregular in shape and size, generally kidney-shaped or broadly oval in outline, with a characteristic projection near the hilum.

**Black Medick, Nonesuch** *(Medicago lupulina L.)* (Fig. 92).—Pods black, marked with a distinct network of veins; seeds lime-green to clay color, somewhat flattened, broadly oval to kidney-shaped, with a distinct projection near the hilum, regular in shape, 1.5-2 mm. long, 1.3 mm. wide.

6. **Clover, Trefoil**  
*(Trifolium (Tourn.) L.)*

Pods oblong, circular in cross-section, splitting open by 1 suture, 1-6 seeded; seeds oval, broadly oval to nearly spherical, notched; hilum usually in the middle of one edge.

**Low Hop Clover** *(Trifolium procumbens L.)* (Fig. 93).—Seeds shiny, cinnamon-buff to honey-yellow in color, notch and hilum near the top; seeds nearly cylindrical, 5.1 mm. long, 5.7 mm. in diameter.

7. **Sweet Clover, Honey Clover**  
*(Melilotus (Tourn.) Hill)*

Pods short and thick, straight, oval in outline, often nearly spherical, marked with a network of veins, seldom splitting open at maturity; seeds few, regular in shape, flattened, notched near the ends.

**Key to Species**

<table>
<thead>
<tr>
<th>Surface of seeds rough</th>
<th>1. <em>M. indica</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface of seeds smooth</td>
<td>2. <em>M. officinalis</em></td>
</tr>
<tr>
<td></td>
<td>3. <em>M. alba</em></td>
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</table>

**Annual Sweet Clover** *(Melilotus indica (L.) All.)* (Fig. 94).—Seeds dull, buffy-brown to deep olive in color, rough as though covered by minute grains, often with part of the pod persisting and giving the seed a scurfy appearance; seeds 1.2-1.7 mm. long, 8-1.5 mm. wide, broadly oval in outline, slightly flattened on two sides, notched at one end, regular in shape.

**Fig. 92. Black Medick (Medicago lupulina). Seeds (top), pod (bottom) x 12.**

**Fig. 93. Low Hop Clover (Trifolium procumbens). A. Top view. B. Edge view. x 22.**

**Fig. 94. Annual Sweet Clover (Melilotus indica). A. Seed. B. Pod. x 12.**
YELLOW SWEET CLOVER (*Melilotus officinalis* (L.) Lam.) (Fig. 95).—Seeds dull or occasionally shiny, grape-green in color, smooth, 1.5-2.3 mm. long, 1-1.5 mm. wide, oblong to long oval in outline, notched at one end, regular in shape.

Fig. 95. Yellow Sweet Clover (*Melilotus officinalis*). a. & b. Seeds. c. Pod. x 11.

WHITE SWEET CLOVER (*Melilotus alba* Desv.) (Fig. 96).—Seeds mostly dull, old-gold in color, smooth; other characters as in *M. officinalis*.

Fig. 96. White Sweet Clover (*Melilotus alba*). a. Seed. b. Pod. x 11.

17. GERANIUM FAMILY

(*Geraniaceae*)

A few species of *Geranium* seed are occasionally found in crimson clover and red clover. Seeds of these crops are imported from other states and the greater part of the crimson clover sold in the United States comes from Europe.

Of the many species of *Geranium* found in Colorado none of the seeds have appeared in our commercial samples of seed thus far. The scarcity of these seeds in crop seeds may be due largely to the method of seed dispersal. The sudden contraction of the coiled awn, resulting from contact with moisture, to which the awn is highly sensitive, ruptures the fruit and the seeds are shot out, sometimes traveling several feet.

Some of the Colorado species have been introduced from Europe, possibly in such importations as named above, others are thought to be native.
18. **WOOD SORREL FAMILY**

*(Oxalidaceae)*

Fruit a capsule, nearly spherical or oblong, seldom berry-like; endosperm fleshy; embryo flat, straight.

**Wood Sorrel, Yellow Wood Sorrel**

*(Oxalis L., Xanthoxalis, Small)*

Capsule oblong or angular with flat sides, or cylindrical; seeds with the hilum and micropyle nearly together; seeds usually rough, ridged or grooved; endosperm abundant; embryo large and straight.

**Yellow Wood Sorrel** *(Oxalis stricta L., Xanthoxalis stricta L.)* (Fig. 98).—Seeds bay to almost black in color, flat, egg-shaped to ovate in outline, rounded at one extremity, pointed at the other, roughened by 7-10 broken, white-tipped, transverse ridges and occasionally a groove running the length of the seed; the edges are usually marked by one white-tipped ridge extending almost entirely around the seed; seeds 1-1.2 mm. long, .8-.8 mm. wide.

19. **SPURGE FAMILY**

*(Euphorbiaceae)*

Fruit mostly a 3-lobed capsule, splitting into three parts (carpels) at maturity; seeds with the micropyle next the hilum, usually roughened by ridges or projections; endosperm oily and fleshy; embryo straight or slightly curved; cotyledons large.

**Spurge, Carpet Weed**

*(Euphorbia L., Lepadina Raf.)*

Capsule smooth, three-lobed, with rounded or sharp angles; seeds occasionally with an appendage near the hilum; seeds angled, pitted, ridged or transversely wrinkled.
SNOW-ON-THE-MOUNTAIN, WHITE-MARGINED SPURGE (Euphorbia marginata Pursh., Lepadenia marginata (Pursh.) Nieuw.) (Fig. 99).—Seeds dull, castor-gray or white in color, 3.9-4.2 mm. long, 2.8-3 mm. wide, broadly oval in outline, circular in cross-section; surface netted, marked with rounded projections; a seam-like, dark ridge nearly as long as the seed is often distinct on one side.

20. MALLOW FAMILY
(Malvaceae)

Fruit usually a capsule, seldom a berry; seeds either kidney-shaped, circular in outline, nearly globular, or egg-shaped; endosperm little or abundant; embryo curved; cotyledons large.

Key to Genera

Seeds slightly flattened; cordate in shape ........................................... 1. Abutilon
Seeds distinctly flattened
Seeds reniform in shape, 1.3-2 mm. long .............................................. 2. Malvastrum
Seeds nearly circular in outline, 1.2-1.5 mm. long ................................ 3. Malva

1. Indian Mallow
(However, (Town.) Mill.)

Seeds numerous, more or less short, kidney-shaped; embryo curved; cotyledons large.

Velvet Leaf, Indian Mallow (Abutilon theophrasti Medic., Abutilon abutilon (L.) Rusby.) (Fig. 100).—Seeds, dull, scurfy, mouse-gray in color, 3.3-3.5 mm. long, sides somewhat flattened, notched at one end, the ridge, from the longer projection formed by the notch, terminating in a lip-like shelf, which covers the base of the notch.

2. Scarlet Mallow, False Mallow
(Malvastrum Gray., Sphaeralcea St. Hil.)

Fruit circular in outline, flattened, splitting up into a number of nutlets at maturity; nutlets seldom splitting open; seeds short, kidney-shaped, flattened.

False Mallow, Red False Mallow (Malvastrum coccineum (Pursh.) Gray., Sphaeralcea coccinea (Nutt.) Rydb.) (Fig. 101).—Nutlets cinnamon-buff in color; seeds olive-gray in color, flattened, often with a deep pit on each side, notched at the end, short kidney-shaped, 1.3-1.7 mm. long, 1-1.3 mm. wide, smooth; nutlets nearly circular in outline, the edge sharp on one side, sides wrinkled, flat.
3. Mallow
(Malva (Tourn.) L.)

Fruit as in Malvastrum; nutlets often splitting open at maturity; nutlets and seeds circular in outline, flattened.

Common or Low Mallow, Chelsea
(Malva rotundifolia L.) (Fig. 102).—Nutlets and seeds of the same color; Malvastrum cocineum; seeds flattened notched on one side, circular in outline 1.2-1.5 mm. wide, smooth; nutlets smooth or very slightly wrinkled, thin and seldom covering the entire seed.

21. CACTUS FAMILY
(Cactaceae)

Fruit a fleshy or sometimes dry berry; seeds usually hard an brittle in texture, smooth, with faceted surfaces; endosperm little or abundant.

Prickly Pear, Indian Fig, Cholla
(Opuntia, Mill.)

Berry often pear-shaped or nearly so, often spiny, fleshy or sometimes dry; seeds flattened, oval to nearly circular in outline; embryo curved around the endosperm.

Prickly Pear, Many-spined
Opuntia (Opuntia polyacantha Haw., Opuntia missouriensis DC.) (Fig. 103).—Seeds white with a grayish area on each side, flattened, faceted, irregular with angles and depressions throughout and a distinct notch or slit at one side, as though the extremities had been pressed tightly together; a distinct band-like margin, 6.1 mm. wide, completely encircles the seed; seeds 4-6 mm. across each face.

22. EVENING PRIMROSE FAMILY
(Onagraceae)

Fruit a capsule or nut-like; seeds with the micropyle next the hilum; seeds small, mostly without endosperm.

Key to Genera

Seeds enclosed in a nutlet........................................ 1. Calystegia
Seeds not enclosed in a nutlet; seeds prismatic, angled........ 2. Oenothera
1. **Gaura, Butterfly Weed**  
*Gaura L.*  
Fruit hard and nut-like, angled or 3-4 ribbed, pointed or blunt, not splitting open at maturity; seeds 1-4 in a fruit.

**Key to Species**

<table>
<thead>
<tr>
<th>Description</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeds pointed at tip, distinctly angled</td>
<td><em>G. coccinea</em></td>
</tr>
<tr>
<td>Seeds blunt, faintly angled</td>
<td><em>G. parviflora</em></td>
</tr>
</tbody>
</table>

1. **SCARLET BUTTERFLY WEED OR GAURA**  
*Gaura coccinea Pursh.* (Fig. 104).—Seeds dark honey-yellow, spindle or ten-pin shaped, 8-veined, faintly angled at the large end, 6.8 mm. long, 1.7-2.5 mm. wide in the widest part.

![Fig. 104. Scarlet Butterfly-weed (Gaura coccinea). x 10.](image)

2. **SMALL-FLOWERED BUTTERFLY WEED OR GAURA**  
*Gaura parviflora Dougl.* (Fig. 105).—Seeds dull, russet in color, rough. angled, irregular, prism-shaped, 1.5-2.5 mm. long, .6-1.2 mm. wide in the widest part.

![Fig. 105. Small-flowered Butterfly-weed (Gaura parviflora). x 5.](image)

2. **Evening Primrose**  
*Oenothera L.*  
Fruit a capsule, 4-veined; seeds numerous, prismatic, angled.

**Evening Primrose**  
*Oenothera strigosa Rydb.* Seeds dull, russet in color, rough, angled, irregular, prism-shaped, 1.5-2.5 mm. long, .6-1.2 mm. wide in the widest part.

![Fig. 106. Evening Primrose (Oenothera strigosa). x 11.](image)
23. **MILKWEED FAMILY**  
(*Asclepiadoceae*)

Fruit a follicle (a single carpel splitting along one suture) containing several or numerous seeds; seeds compressed, flattened, thin, with the hilum next the micropyle; endosperm thin, firm, and tough; cotyledons flat; embryo nearly as long as the seed.

**Milkwed, Silkweed**  
(*Asclepias* (Tourn.) *L.*)

Follicles mostly thick, spindle-shaped, tapering at the end, either smooth or warty; seeds flat, margined, usually bearing a tuft of long silky hairs at the hilum; embryo large; endosperm thin.

**Key to Species**

Seeds 8-10 mm. long, margins without white spots ............. 1. *A. speciosa*
Seeds 6-7 mm. long, margins with white spots .................. 2. *A. galioides*

1. **Showy Milkwed** (*Asclepias speciosa* *Torr.*) (Fig. 107).—Seeds hazel in color, dull, 8-10 mm. long, 4-6 mm. wide, flat, thin, distinctly margined, ridged on one side nearly the length of the seed.

2. **Whorled Milkwed** (*Asclepias galioides* *L.*) (Fig. 108).—Seeds similar to *A. speciosa* in color, 6-7 mm. long, 3.5-4 mm. wide, otherwise as in *A. speciosa* except the margin which is marked with numerous white streaks and spots; the edge also is often white.

24. **DODDER FAMILY**  
(*Cuscutaceae*)

Capsule nearly globular or oval in outline, either bursting irregularly or not splitting open at maturity, 1-4 seeded; seed smooth, or slightly rough, nearly globular or angular, with one or more flat surfaces; embryo curved or spiral, circular in cross-section; endosperm fleshy.

**Dodder, Love-vine, Coral-vine**  
(*Cuscuta* (Tourn.) *L.*)

Capsule mostly 4-seeded; embryo spirally coiled in the fleshy endosperm; other characters as given in the family description.
COLORADO WEED SEEDS

Key to Species

Seeds with 2-3 flat faces
Seeds .4-1.6 mm. in diameter ........................................... 1. C. planiflora
Seeds .3-1.2 mm. in diameter ......................................... 2. C. arvensis

Seeds usually without flat faces; seeds with a cup-like depression. 3. C. indecora

1. SMALL-SEEDED ALFALFA DODDER,
LESSEER CLOVER DODDER (Cuscuta planiflora Tenore., Cuscuta epithymum Murr.)
(Fig. 109).—Seeds light yellowish-olive to dark olive-buff in color, .5-7 mm. long,
.4-6 mm. in diameter, rough, scurfy, usually with three flat faces, and one
rounded face; of the three flat faces two are long, meeting through their length and
forming a ridge, the other face is short and at the end of the seed, cutting the
other two faces transversely; seeds either oblong, cylindrical or nearly spherical in
shape.

2. FIELD DODDER (Cuscuta arvensis
Beyrich) (Fig. 110).—Seeds cinnamon-
buff to light brownish-olive in color,
.9-1.2 mm. in diameter, rough, usually
with two to three flat faces and one
rounded face as in C. planiflora though
mostly unequal and not always meeting
to form a ridge, often with only one
flat face; seeds mostly spherical in
shape.

3. LARGE-SEEDED ALFALFA DODDER,
PRETTY DODDER (Cuscuta indecora
Choisy) (Fig. 111).—Seeds of same
color as C. arvensis, 1.1-1.7 mm. across
each face, rough, usually with a deep
or shallow cup-like depression on one
side, seldom with even one flat face;
seeds circular in outline, compressed.

25. BORAGINE FAMILY
(Boraginaceae)

Fruit mostly of four 1-seeded nutlets, separating into two
2-seeded or four 1-seeded nutlets; endosperm often absent, but
sometimes fleshy and abundant; embryo straight or curved; cotyle-
dons flat or flat on one side and convex on the other.
Seed armed with barbed prickles
Seed smooth or wrinkled, unarmed

1. **Stickseed, Burseed**
   *(Lappula (Riv.) Moench)*

Fruit composed of 4 nutlets; nutlets armed with barbed prickles along the edge and sometimes with smaller ones on the rounded side (dorsal surface), the flat sides roughened with short hard processes.

2. **Stickseed, Sticktight** *(Lappula occidentalis (S. Wats.) Greene)* (Fig. 113).—Seeds buckthorn-brown in color, margins with 8-10 spines at regular intervals around the deep, cup-like depression; the rounded or dorsal side of the seed tapers to a point and is marked by short, rough projections, and a distinct ridge extending from the apex or center to a cleft in the spined margin; seeds nearly circular in outline, 1.5-2.2 mm. across the flat face, including the spines.

2. **Gromwell, Puccoon, Indian Paint**
   *(Lithospermum (Town.) L.)*

Nutlets smooth, wrinkled or rough, hard or stony, often shiny and white, or nearly so.

**Narrow-leaved Puccoon** *(Lithospermum linearifolium) Goldie.*

*Lithospermum a v e s t i f o l i a m Michx.* (Fig. 114).—Seeds shiny, pale-olive-gray to white in color, ridged on one side, obscurely pitted, pointed at one end, truncate (as though cut off transversely) at the other; circular in cross-section; 2.5-4 mm. long, 2.2-5 mm. wide, in the widest part.
26. **VERVAIN FAMILY**  
(Verbenaceae)

Fruit separating into 2 or 4 dry nutlets at maturity, or berry-like; endosperm little or absent, seldom fleshy; embryo straight.

**Vervain, Verbena**  
(Verbena (Town.) L.)

Fruit separating into 4 dry nutlets at maturity; nutlets 1-seeded, either oblong, or long and narrow, hard, either smooth or rough.

**Key to Species**

<table>
<thead>
<tr>
<th>Description</th>
<th>Species</th>
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<tr>
<td>Seeds faintly ridged on the rounded side</td>
<td><strong>1. V. hastata</strong></td>
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<tr>
<td>Seeds strongly ridged on the rounded side</td>
<td><strong>2. V. stricta</strong></td>
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<tr>
<td>Seeds 2.2-7 mm. long</td>
<td><strong>3. V. bracteosa</strong></td>
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<td>Seeds 1.5-2 mm. long</td>
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</table>

1. **BLUE VERVAIN** (Verbena hastata L.) (Fig. 115).—Seeds Sanford’s-brown in color, with two or three faint ridges on the back nearly as long as the seed, white-tipped at the base, the two flat sides meeting throughout their length and forming a distinct ridge; flat faces covered with numerous white, scurfy scales; seeds 1.2-1.7 mm. long, about .5 mm. wide.

2. **HOARY VERVAIN** (Verbena stricta Vent.) (Fig. 116).—Seeds bay color, with four or five distinct ridges on the back parallel to each other, extending over one-half the length of seed and then breaking up into a network of ridges which extend to the tip; the two flat faces meet as in Verbena hastata but are marked with a few, faint, white streaks; seeds 2-2.7 mm. long, .6-7 mm. wide.

3. **LARGE-BRACTED VERVAIN** (Verbena bracteosa Michx.) (Fig. 117).—Seeds cinnamon-drab to drab in color, ridged as in Verbena stricta, white-tipped at the base; the two flat faces meet as in other species and are marked throughout with a mass of minute, roundish, drab-colored projections; seeds 1.5-2 mm. long, .4-5 mm. wide.
27. MINT FAMILY

(Labiatae B. Juss., Lamiaceae Lindl.)

Fruit of 4 seed-like nutlets or achenes; nutlets 1-seeded, smooth or rough; endosperm usually absent or, if present, fleshy; embryo straight.

**Key to Genera**

Seeds 3-angled, truncate
- Seeds with a distinct band or margin around the edge ........................................ 1. *Lycopus*
- Seeds without a band or margin around the edge ........................................ 2. *Leonurus*

Seeds not 3-angled, not truncate
- Seeds oval in outline
  - Seeds with 2 flat faces meeting in a ridge throughout their length
    - Seeds pointed at one end ................................................................. 3. *Prunella*
    - Seeds rounded at each end ............................................................... 4. *Salvia*
  - Seeds compressed, one end marked with two white dots ............................. 5. *Nepeta*
  - Seeds circular in outline, marked with a network of ridges ....................... 6. *Teucrium*

1. Water Horehound, Bugle Weed

(*Lycopus* (Tourn.) *L.*)

Nutlets with thickened margins, usually 3-angled, smooth, mostly truncate (ending abruptly as though cut off transversely) at the top, narrower at the base.

**Cut-leaved Water Horehound (*Lycopus americanus* Muhl.)** (Fig. 118).—Seeds buckthorn-brown to mummy-brown in color, obscurely 3-angled, truncate, margins thick, wide, and usually distinct; seeds 1-1.5 mm. long, .6-1.3 mm. wide.

2. Motherwort

(*Leonurus* *L.*)

Nutlets 3-angled, smooth, truncate at the top, narrower at the base.

**Common Motherwort (*Leonurus cardiaca* *L.*)** (Fig. 119).—Seeds buffy-brown to clove-brown in color, distinctly 3-angled and 3-sided, truncate, hairy at the top (truncate end), 1.3-1.8 mm. long, 1 mm. wide, in widest part.

3. Self-heal, Heal-all

(*Prunella* *L.*)

Nutlets oval in outline, smooth, rounded at the broad extremity, pointed at the other.
COLORADO WEED SEEDS

HEAL-ALL, CARPENTER-WEED (Prunella vulgaris L.) (Fig. 120).—Seeds chestnut-brown to hazel in color, oily, with one rounded face and two flat faces, nearly as long as the seed; a distinct band appearing as two parallel lines encircles the edge of the seed; a similar band runs the length of the seed on each side, dividing the seed into four equal areas; seeds 1.5-2 mm. long, 1 mm. wide, in the widest part, tapering to a white-tipped point.

4. Sage
(Salvia (Tourn.) L.)

Nutlets smooth, either oval or nearly spherical in outline, rarely cylindrical; mostly rounded at both ends, rarely pointed.

LANCE-LEAVED SAGE (Salvia lanceolata Wild.) (Fig. 121).—Seeds mottled, mostly pale orange-yellow in color, rounded at both ends, oval-shaped, with one rounded face and two flat faces meeting throughout their length and forming a ridge; seeds 1.7-2 mm. long, 1.2-1.5 mm. wide.

5. Catnip, Cat Mint
(Nepeta L.)

Nutlets smooth, flattened or compressed, oval in outline.

CATNIP, CAT MINT (Nepeta cataria L.) (Fig. 122).—Seeds chestnut-brown to bone-brown in color, oval-shaped, rounded at both ends, one side rounded, the other compressed or flattened; marked with two small but distinct white spots at the base; seeds 1.2-1.5 mm. long, .7-1 mm. wide.

6. Germander, Wood Sage
(Teucrium (Tourn.) L.)

Nutlets circular in outline or broadly oval, usually wrinkled in the form of a network of ridges.
Hairy Germander (*Tecurium occidentale A. Gray*) (Fig. 123).—Seeds chestnut-brown to honey-yellow in color, circular in outline or nearly so, one side rounded, the other flat or concave and almost entirely occupied by a rounded scar; with the exception of the scar-like area, the seed is marked with a network of ridges.

28. **POTATO FAMILY, NIGHTSHADE FAMILY**

(*Solanaceae*)

Fruit a many-seeded berry or capsule; seeds numerous, flattened, with rounded projections, pitted or roughened, often hard and brittle, so curved as to bring the apex and base nearly together; endosperm abundant and fleshy; embryo curved or spirally coiled, circular in cross-section.

1. **Nightshade, Bittersweet, Horse Nettie**

(*Solanum (Tourn.) L.*)

Fruit a berry, mostly spherical in shape; seeds numerous, flattened.

**Key to Species**

Seeds smooth or nearly so
- Seeds 1.5-2.5 mm. long........................................... 1. *S. triflorum*
- Seeds 1-1.5 mm. long........................................... 2. *S. nigrum*
- Seeds pitted and rough........................................... 3. *S. rostratum*

1. **THREE-FLOWERED OR CUT-LEAVED NIGHTSHADE** (*Solanum triflorum Nutt.*)

(Fig. 124).—Seeds buff-yellow to buckthorn-brown in color, flattened, oval in outline, 1.5-2.5 mm. long, 1.3-1.7 mm. wide; seeds appear faintly pitted when examined with a hand lens.

2. **BLACK OR COMMON NIGHTSHADE**

(*Solanum nigrum L.*) (Fig. 125).—Seeds black to clay color, flattened, oval or nearly circular in outline, 1-1.5 mm. long, .8-1 mm. wide; seeds appear pitted as in *Solanum triflorum*. 

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**Fig. 123. Hairy Germander (Tecurium occidentale A. Gray). A. Bottom view. B. Top view. x 11.**

**Fig. 124. Three-flowered Nightshade (Solanum triflorum). Top view (left), edge view (right). x 14.**

**Fig. 125. Black Nightshade (Solanum nigrum). Top view (left), edge view (right). x 12.**
3. **Buffalo Bur, Beaked Nightshade** (*Solanum rostratum* Dunal.) (Fig. 126).—Seeds dull black, flattened, irregular, mostly ovate in outline, surfaces deeply wrinkled and distinctly pitted; seeds 1.5-2.5 mm. across each face, .6-5 mm. thick.

29. **FIGWEED FAMILY**

(*Scrophulariaceae*)

Fruit a capsule, rarely berry-like; seeds numerous, marked with a network of lines; ribbed transversely or with fine lines throughout the length of the seed or sometimes smooth; endosperm fleshy; embryo small, curved or straight.

**Key to Genera**

Seeds mostly circular in outline....................................................... 1. *Linaria*
Seeds not circular in outline—angled........................................... 2. *Verbascum*

1. **Toadflax**

(*Linaria (Tourn.) L.*)

Capsule thin, short, opening by 3 pores below and near the top; seeds numerous, wingless or winged, wrinkled or rough, mostly flattened but sometimes angled.

**Butter-and-Eggs, Wild Snapdragon**

(*Linaria linaria* (L.) Karst., *Linaria vulgaris Mill.*) (Fig. 127).—Seeds black, the wide notched wing buckthorn-brown to mummy-brown in color; seeds flattened, each face marked with numerous, minute rounded projections; wings marked with minute radiating lines nearly touching each other and almost parallel; seeds, including wing, 1.5-2 mm. across each face.

2. **Mullein**

(*Verbascum (Tourn.) L.*)

Capsule spherical or oblong in shape: seeds roughened, wingless.

**Great Mullein, Common Mullein**

(*Verbascum thapsus* L.) (Fig. 128).—Seeds olive-brown in color, truncate and broader at one end and partially truncate or rounded at the other, marked with grooves as long as the seed and brokenly grooved, pitted or ridged transversely; seeds circular in cross-section, narrower at the tip, .5-8 mm. long, .3-5 mm. wide, in the widest part.
30. PLANTAIN FAMILY

(Plantaginaceae)

Fruit a capsule splitting by a circular, horizontal line, the upper part coming off like a lid, or a nutlet not splitting open at maturity; seeds with flattened or concave faces; endosperm fleshy; embryo mostly straight.

Plantain, Rib-grass

(Plantago (Town.) L.)

Capsule thin and somewhat translucent; seeds numerous, with flattened faces, or hollowed out on one side giving a boat-like appearance.

Key to Species

Seeds with flattened faces
Seeds black ................................................................. 1. P. rugelii
Seeds brown in color .................................................... 2. P. major

Seeds with a hollow or concave side
Seeds with a transverse groove on the rounded side ........... 3. P. purshii
Seeds not grooved on the rounded side ............................ 4. P. lanceolata

1. RUGEL'S PLANTAIN, RED-STEM PLANTAIN (Plantago rugelii, Dec.) (Fig. 129).—Seeds dull, mostly black, irregular, mostly oval in shape but often oblong or sometimes nearly square, rounded on one side, flattened into several faces on the other, the faces sloping away from a distinct scar near the center; seeds 1.2-2.5 mm. long, roughened but not marked with a network of ridges.

2. COMMON PLANTAIN, BROAD-LEAVED PLANTAIN (Plantago major L.) (Fig. 130).—Seeds dull, dark russet in color, irregular, varying in shape as in P. rugelii, marked, on the rounded side, with fine parallel lines running the length of the seed; the lines on the several faces appear to radiate from the central scar to the margin of the seed; seeds 1.2-2.5 mm. long.

Fig. 129. Rugel's Plantain (Plantago rugelii). A. Capsule. B. Top view of seeds. C. Bottom view. x 10.

Fig. 130. Common Plantain (Plantago major). a. & b. Top view. c. Bottom view. x 15.
3. Pursh’s Plantain (*Plantago purshii* R. & S.) (Fig. 131).—Seeds dull, mostly russet in color, long oval in outline, rounded on one side and deeply concave on the other, the rounded side with a single transverse groove in the middle of the seed, the concave side with a lighter colored oval area, appearing as an oval within an oval, lighter in the middle and marked with two minute dark depressions (rarely one): seeds 1.5-2.5 mm. long, .7-1 mm. wide.

4. Rib-grass, Buckthorn or Snake Plantain (*Plantago lanceolata* L.) (Fig. 132).—Seeds shiny, mostly sudan-brown in color, rounded side smooth, the concave side with the margins inrolled and often nearly meeting so that the concave side may appear as a slit only: the depressions at the bottom of the trough-like depression may be darker than the seed or of the same color; seeds 1.7-2.7 mm. long, .7-1 mm. wide.

31. Madder Family

(***Rubiaceae**)

Fruit variable: A capsule, berry or stone fruit (drupe); seeds variable; seed-coats thin and more or less translucent or hard and brittle in texture.

**Bedstraw, Cleavers**

(*Galium* L.)

Fruit dry or fleshy, either bristly-hairy or with rounded projections or smooth; seeds spherical or nearly so, often rounded on one side and concave on the other; endosperm hard; embryo curved.

**Key to Species**

Seeds 2.5-3 mm. in diameter

1. *G. aparine*

Seeds 1-1.5 mm. in diameter

2. *G. boreale*

1. Cleavers, Goose Grass (*Galium aparine* L.) (Fig. 133) — Seeds neutral-gray to mouse-gray in color, spherical in shape, with a small pit-like depression or scar on the surface; seeds rough, covered with short, hooked bristles; fruits 2.5-3 mm. in diameter.
2. Northern Bedstraw (*Galium boreale* L.) (Fig. 134).—Seeds cinnamon-brown to mummy-brown in color, broadly to nearly spherical in shape, deeply concave on one side, rounded on the other, rough, covered with bristly hairs; seeds 1-1.5 mm. long, or across each face when circular in outline.

32. **RAGWEED FAMILY**

(*Ambrosiaceae*)

Fruits (achenes) at maturity enclosed in either a beaked, bur-like or spiny involucre, or achenes winged or not winged; with pappus (growth or crown formation at the summit of the achene), occurring as hairs, scales or bristles.

**Key to Genera**

Seeds enclosed in an involucre at maturity

- Seeds armed with short, slender spines throughout.............. 1. *Franseria*
- Seeds armed with stout projections at the summit.............. 2. *Ambrosia*
- Seeds not enclosed in an involucre at maturity; seeds compressed, without hairs or pappus................................. 3. *Iva*

1. Poverty Weed, Bur Ragweed

(*Franseria*, Cav.)

Fruit (achene) enclosed in a spiny, beaked involucre which becomes bur-like at maturity; involucres oval or nearly spherical, rarely splitting open at maturity.

Poverty Weed (*Franseria tomentosa* A. Gray) (Fig. 135).—Seeds light wood-brown to russet in color, armed with short, slender spines throughout; including spines, the seeds are 4-6 mm. long, 3.5-6 mm. wide, circular in cross-section.

Fig. 135. Poverty Weed (*Franseria tomentosa*). x 12.
2. *Ragweed, Bitter-weed, Roman Wormwood*  
(*Ambrosia* (Tourn.) *L.*)

Fruit enclosed in a nut-like involucre bearing 6, or rarely 7, stout projections or spines, usually 5 short spines and 1 long, central spine at the top, and the others just below the top or summit.

**Key to Species**

Seeds 2-2.5 mm. long. ........................................... 1. *A. artemisiaefolia*  
Seeds 5-10 mm. long. ........................................... 2. *A. trifida*

1. **Great Ragweed, Kinghead**  
(*Ambrosia trifida* *L.*) (Fig. 136).—Seeds white, cream-buff or honey-yellow in color, distinctly 5-6 ridged, the ridges ending in stout projections or spines near the summit; the apex of the seed terminates in a single stout projection which appears distinctly above the other spines; seeds variable in size usually 5-8 mm. long but occasionally 1 cm. long, broad at the top, narrow at the base.

![Fig. 136. Great Ragweed (*Ambrosia trifida*). x 12](image)

2. **Ragweed, Roman Wormwood, Hog-weed** (*Ambrosia artemisiaefolia* *A. Gray, Ambrosia clatior* *L.*) (Fig. 137).—Seeds neutral-gray to dark olive-gray in color, 5-7 ridged, either distinct or obscure, the ridges terminating in spines near the summit of the seed which itself tapers off into a spine or projection; seeds 2-3.5 mm. long, broad at the apex, narrower at the base.

![Fig. 137. Ragweed (*Ambrosia artemisiaefolia*  
a. Involucre enclosing achene. b. Achene. x 11.](image)

3. **Marsh Elder, Salt Sage, Bozzleweed**  
(*Iva* *L.*)

Achene compressed, mostly roughened, dull, marginless, pear-shaped, sides slightly concave; pappus absent.
Key to Species

Seeds ribbed

Seeds not ribbed

1. Rough Marsh Elder (*Iva ciliata* Willd.) (Fig. 138).—Seeds smoke-gray to deep grayish-olive in color, flattened, thin, each face marked with 2 or 3 ribs as long as the achene; seeds either broadly oval or pear-shaped, 2.5-3.5 mm. long, 2.3 mm. wide, in the widest part.

Fig. 138. Rough Marsh Elder (*Iva ciliata*). X 12.

2. Common Marsh Elder (*Iva xanthifolia* Nutt.) (Fig. 139).—Seeds neutral-gray to dark neutral-gray in color, somewhat rounded on each side, usually obscurely angled on one side; seeds uniformly cuneate in shape, 1.5-2 mm. long, 1.1-1.5 mm. wide, in the widest part, marked with numerous fine parallel lines as long as the seed.

Fig. 139. Common Marsh Elder (*Iva xanthifolia*). X 12.

3. Poverty Weed, Small-flowered Marsh Elder (*Iva axillaris* Pursh.) (Fig. 140).—Seeds deep mouse-gray to iron-gray in color, rounded on each face, not angled, uniformly cuneate in shape, 2.3 mm. long, 1.2-1.5 mm. wide, in the widest part.

Fig. 140. Poverty Weed (*Iva axillaris*). X 11.

33. THISTLE FAMILY

(*Compositae, Carduaceae*)

Fruit an achene; pappus consisting of bristles, awns, scales, teeth, or cup-like crown, or absent; seeds erect; endosperm absent; embryo straight.
COLORADO WEED SEEDS

Key to Genera

Seeds with a persistent pappus

1. Lacinaria

Pappus feathery (plumose)

2. Bidens

Pappus not plumose

3. Ratibida

Pappus of 2-4 barbed teeth

Seeds without a persistent pappus

4. Achillea

Pappus of 1-2 awl-shaped (subulate) teeth

Seeds distinctly flattened, compressed, angled

5. Carduus

Seeds with a light colored margin

6. Helianthus

Seeds marginless

7. Grindelia

Seeds flattened but obscurely 4-angled

8. Artemisia

Seeds smooth, usually uniform in color

9. Chrysanthemum

Seeds rough or hairy, usually mottled or striped

Ribs white

10. Anthemis

Ribs of the same color as the achene

---

1. Blazing Star, Button Snakeroot
(Lacinaria Hill, Liatris, Schreb.)

A chenes 10-ribbed, slender, tapering from the top to the base; pappus of 1 or 2 circles or series of firm, equal, plumose hairs, or finely barbed bristles.

DOTTED BUTTON SNAKEROOT,
BLAZING STAR (Lacinaria punctata (Hook.) Kuntze) (Fig. 141).—Seeds neutral-gray in color, 10-ribbed, hairy throughout, 6-8 mm. long; pappus plumose 8-10 mm. long.

Fig. 141. Dotted Button Snake- root (Lacinaria punctata). x 6.

2. Beggar-ticks, Bur-marigold
(Bidens L.)

A chenes either flat, obscurely 4-angled or almost circular in outline, wedge-shaped or oblong; pappus of 2-4 awns or teeth usually barbed downwardly or covered with bristly, stiff hairs.
**Beggars-ticks, Sticktight (Bidens frondosa L.) (Fig. 142).—**
Brown in color, flattened, slightly concave on one side, rough, each side a central ridge as long as the seed; margins of the seeds barbed downward; pappus mostly of 2 downwardly barbed awns, 3-4 mm. long; seeds 5-7 long.

![Diagram of Beggars-ticks](image)

Fig. 142. Beggar’s-ticks (Bidens frondosa). X 12.

3. **Cone-flower**

(Ratibida Raf., Lopachys Raf.)

Achene short, flattened, with a broad margin, or wing which drops off at maturity; pappus of 1-2 awl-shaped teeth.
LONG-HEADED OR PRAIRIE CONE-FLOWER
(Ratibida columnaris (Sims.) D. Don.,
Ratibida columnifera (Nutt.) Woot. &
Standl.) (Fig. 143).—Seeds light neutral-
gray to dark neutral-gray in color, flat-
tended, a prominent ridge as long as the
seed on one side, and both sides marked
with 12-16 fine rounded ridges parallel to
each other and as long as the seed; seeds
2.2-5 mm. long, 1.1-5 mm. wide.

4. Yarrow, Milfoil
(Achillea (Vaillant) L.)

Achenes oblong, flattened, distinctly
margined; pappus wanting.

COMMON YARROW, MILFOIL (Achil-
lea millefolium L.) (Fig. 144).—Seeds
pallid neutral-gray to light olive-gray,
flattened, oblong, margins light, nearly
white in color; seeds 1.2-1.5 mm. long,
.4-.7 mm. wide.

5. Thistle, Common or Plumed Thistle
(Carduus L., Cirsium (Tourn.) Hill.)

Achenes oblong, flattened, seldom ribbed, occasionally obscurely 4-angled:
pappus of plumose bristles united at the base into a ring, which drops away
as a cap at maturity.

Key to Species

Seeds streaked with fine black lines......................... 1. C. lanceolatus
Seeds not streaked
Seeds with a circular, yellow band at the top............. 2. C. discolor
Seeds uniformly brown in color
Seeds 5-7 mm. long........................................... 3. C. filipendulus
Seeds 2.5-3 mm. long......................................... 4. C. arvensis
1. **Bur Thistle, Spear Thistle, Bull Thistle** (*Cirsium lanceolatum L., Cirsium lanceolatum (L.) Hill*) (Fig. 145).—Seeds streaked with fine, broken, black lines, otherwise pale smoke-gray in color, 3.5-4 mm. long, 1.2-1.5 mm. wide in the widest part, oblong, obscurely flattened, straight or slightly curved (bent), apex with a distinct knob-like projection.

2. **Field Thistle** (*Cirsium discolor (Muhl.) Nutt., Cirsium discolor (Muhl.) Spreng.*) (Fig. 146).—Seeds shiny, light Dresden-brown in color, with a circular band of light yellow at the apex; seeds 3.5-4.5 mm. long, 1.5-2 mm. wide in the widest part, oblong, obscurely flattened, straight or slightly curved as in *C. lanceolatum*; apex with a knob-like projection.

3. **Drooping Thistle, Floydman’s Thistle** (*Cirsium filipendulus (Engelm.) Nels., Cirsium filipendulus (Engelm.) Arthur*) (Fig. 147).—Seeds shiny, brown in color, 5-7 mm. long, 1.5-2 mm. wide in the widest part, oblong, obscurely flattened, mostly slightly curved, seldom straight; apex with a proportionately smaller knob-like projection than *C. lanceolatum* or *C. discolor*.

4. **Creeping Thistle, Canada Thistle** (*Cirsium arvense (L.) Roßb., Cirsium arvense (L.) Scop.*) (Fig. 148).—Seeds shiny, buckthorn-brown to Dresden-brown in color, 2.5-3 mm. long, 0.7-1 mm. wide, slightly flattened, oblong, mostly straight, seldom curved; apex with a minute knob-like projection.
6. Sunflower, Ground Artichoke

(*Helianthus* L.)

Achenes obscurely 4-angled, flattened or compressed, thick, oblong, or short wedge-shaped; pappus of 2 scales or awns, seldom persisting at maturity.

**Key to Species**

1. H. annuus

Seeds usually smooth, striped

2. H. petiolaris

Seeds usually hairy, mottled

1. **Common Sunflower** (*Helianthus annuus* L., *Helianthus petiolaris* Dougl.) (Fig. 149).—Seeds pale smoke-gray to drab-gray in color, mottled with broken, black lines or spots, smooth or hairy, the hairs more pronounced near the top; seeds 4-6 mm. long, 2.5-3 mm. wide, straight, mostly ovate to wedge-shaped.

![Fig. 149. Common Sunflower (Helianthus annuus). x 6.]

2. **Prairie Sunflower** (*Helianthus petiolaris* Nutt.). (Fig. 150).—Seeds wood-brown to buffy-brown in color, mottled though not as in *H. annuus*, but usually more hairy; achenes 4-6 mm. long, 2-2.5 mm. wide, straight, mostly ovate to wedge-shaped.

![Fig. 150. Prairie Sunflower (Helianthus petiolaris). x 11.]

7. **Gum Plant, Resin-weed, Tar-weed**

(*Grindelia* Willd.)

Achenes short, thick, (ending abruptly as though cut off transversely) 4-5 ribbed, flattened, smooth; pappus of 2-8 awns or bristles which fall off at maturity; achenes honey-yellow to chamois in color.

**Gum Plant** (*Grindelia sp.*) (Fig. 151).—In Colorado alone there are eleven known species of Gum Plant.

The seeds of the several species have many characters in common. Up to the present time the seeds of these species have not been differentiated systematically.

- Flora of Colorado—Rydberg.
8. **Wormwood, Sage-brush**  
(*Artemisia L.*)

Achenes narrowly cylindrical to oblone in outline, circular in cross-section, 2-ribbed or marked with slender grooves as long as the achenes; apex or summit rounded, usually bearing a disk.

**WORMWOOD SAGE, PASTURE SAGE-BUSH** (*Artemisia frigida Willd.*) (Fig. 152).—Seeds Brussels-brown in color, circular in cross-section, oblong to cylindrical in shape, 5-7 mm. long, slightly shiny, obscurely wrinkled lengthwise, and usually bearing a light colored disk at the summit.

9. **Ox-eye Daisy**  
(*Chrysanthemum (Torr.) L., Leucanthemum (Torr.) Mill.*)

Achenes cylindrical, circular in cross-section, 10-ribbed; pappus wanting or reduced to a scaly cup.

**OX-EYE DAISY** (*Chrysanthemum leucanthemum L., Leucanthemum leucanthemum (L.) Rydb.*) (Fig. 153).—Seeds light wood-brown in color, cylindrical in shape, circular in cross-section, distinctly 10-ribbed; ribs white, parallel to each other and as long as the seed; seeds 1-5 mm. long, 4-6 mm. wide at the apex.

10. **May-weed, Dog Fennel, Chamomile**  
(*Anthemis L., Maruta Cass.*)

Achenes nearly cylindrical or oblong in shape, 10-ribbed, marked with glandular, rounded projections which usually occur at the summit of the ridges; pappus wanting.

**MAY-WEEP, DOG FENNEL** (*Anthemis cotula L., Maruta cotula (L.) D. C.*) (Fig. 154).—Seeds cinnamon-brown to clay color, 10-ribbed, summit of ridges covered thickly or sparingly with glandular, rounded projections; achenes 1-1.5 mm. long, .5 mm. wide.
34. **CHICORY FAMILY**  
(*Cichoriaceae*)

Fruit an achene; pappus consisting of either scales, simple bristles (without subdivision or branches), plumose bristles, both simple and plumose bristles, or wanting; seeds erect; endosperm absent; radicle narrower than the cotyledons.

**Key to Genera**

Pappus consisting of scales reduced to a crown. 1. *Cichorium*
Pappus of hair-like bristles not plumose, often persistent  
Seeds flattened; seeds smooth or with minute blunt (not spiny) projections near the apex  
Seeds narrowed at the top, or beaked. 2. *Lactuca*
Seeds square or even at the top as though cut off transversely. 3. *Sonchus*
Seeds not flattened  
Pappus usually persistent; seeds with the tip merely an indistinct point. 4. *Lygodesmia*
Pappus seldom persistent; seeds with the tip long, slender and distinct, 8-12 ribbed. 5. *Taraxacum*

1. **Chicory**  
(*Cichorium (Tourn.) L.*)

Achenes 5-angled or 5-ribbed, square or even at the top as though cut off transversely; the pappus consists of 2 series of short, blunt scales.

**CHICORY, WILD SUCCOR (Cichorium intybus L.)** (Fig. 155).—Seeds chamois to bone-brown in color; 2-2.5 mm. long, 1.2-1.5 mm. wide in the widest part, with a light colored, ring-like pappus at the apex; pappus more distinct on the darker seeds; other characters as given in the generic description.

2. **Lettuce**  
(*Lactuca (Tourn.) L.*)

Achenes flattened, 1-5 veined or ribbed on each face, narrowed at the apex into a small disk bearing the hair-like pappus bristles, which fall separately.

**Key to Species**

Seeds 5-8 veined on each face. 1. *L. scariola*
Seeds mostly 3-veined on each face. 2. *L. pulchella*

1. **PRICKLY LETTUCE (Lactuca scariola L.)** (Fig. 156).—Seeds buffy-brown in color, mostly 5-6 veined, mottled, flattened, slightly marzined, hairy at the apex, 2.5-3 mm. long, .6-1 mm. wide.

![Fig. 155. Chicory (Cichorium intybus). X 12.](image)

![Fig. 156. Prickly Lettuce (Lactuca scariola). X 15.](image)
3. **Sow Thistle**

*(Sonchus (Town.) L.)*

Achenes flattened, 10-20 ribbed, marked with blunt projections throughout, even or square at the apex as though cut off transversely; pappus of fine bristles mostly falling off together.

**Key to Species**

Seeds distinctly flattened
- Seeds roughened transversely
- Seeds not roughened, mostly 3-ribbed on each side
- Seeds only slightly flattened, 6-8 ribbed on each side; roughened transversely

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1. **Annual Sow Thistle, Common Sow Thistle** *(Sonchus oleraceus L.)* (Fig. 158).—Seeds russet in color, flattened, slightly roughened transversely. 5-ribbed (one central rib and two on each side of the central rib parallel to it but close together giving a groove-like appearance on each side, thus 5-ribbed and 2-grooved). Slightly margined, 2.5-3 mm. long, .7-1 mm. wide, in the widest part, narrowed at the base.

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2. **Spiny-leaved, Spiny, or Sharp-fringed Sow Thistle** *(Sonchus asper (L.) All.)* (Fig. 159).—Seeds russet in color, flattened, smooth, mostly 3-ribbed on each side, distinctly margined, blunt, thin, 2.5-3 mm. long, 1.2-1.4 mm. wide in the widest part, distinctly wider than *S. oleraceus* or *S. arvensis*. 
3. **Corn Sow Thistle, Field Sow Thistle, Milk Thistle (Sonchus arvensis L.)** (Fig. 160).—Seeds liver-brown in color, slightly flattened, roughened transversely, 6-8 ribbed on each side, ribs thick and rough; seeds 2-2.2 mm. long, 1.1-1.2 mm. wide, stout, blunt, margin indistinct.

4. **Prairie Pink, Sand Pink, Skeleton Weed** *(Lygodesmia D. Don.)*

Achenes slender, either smooth, 6-8 ribbed or grooved, tapering slightly at the pappus end; pappus of numerous soft bristles as long or longer than the achene and usually persistent; beak or tip an indistinct point.

**Sand Pink (Lygodesmia juncea (Pursh.) D. Don.)** (Fig. 161).—Seeds ivory-yellow in color, slender, cylindrical in shape, nearly circular in cross-section, 8-12 ribbed, 5-7 mm. long, .5-8 mm. wide.

5. **Dandelion** *(Taraxacum (Haller) L.)* *(Leontodon L.)*

Achenes mostly spindle shaped or fusiform (swollen in the middle and narrowing toward each end), with a long, slender, distinct tip; achenes 8-12 ribbed, roughened with hard, sharp, small spines near the apex.

**Key to Species**

| Seeds honey-yellow in color | 1. *T. officinale* |
| Seeds claret-brown in color | 2. *T. erythrospermum* |

1. **Dandelion, Common Dandelion.**

**Blow-ball (Taraxacum officinale Weber., Leontodon taraxacum L.)** (Fig. 162).—Seeds honey-yellow in color, mostly 10-12 ribbed, the ribs roughened with hard, sharp, small spines near the apex of the seed; in the middle area of the seed the ribs are roughened with short, hard (not spined) processes; the base of the seed is nearly smooth; seeds 3-3.5 mm. long, .5-1 mm. wide, nearly circular in cross-section.
2. **Red-seeded Dandelion** (*Taraxacum erythrospermum* Andr., *Leontodon erythrospermum* (Andr.) Eichh.) (Fig. 163).—Seeds chestnut-brown in color, 8-12 ribbed, the ribs roughened with longer, more distinct spines at the apex than seeds of *T. officinale*; the remainder of the seed is usually roughened with short, hard processes gradually becoming smaller and extending to the base; seeds 2.5-3 mm. long, 5.8 mm. wide, nearly circular in cross-section at apex, irregularly 4-sided at the base.

**GLOSSARY**

-Achene, a small, dry, and 1-celled, 1-seeded, indehiscent fruit.-
-Acuminate, taper-pointed.-
-Acute, sharp-pointed but less so than acuminate.-
-Adnate, united; grown to.-
-Albumen, the substance, usually nutritive, surrounding the embryo of the seed.-
-Angled, having an angle or angles.-
-Annular, in the form of a ring.-
-Apex, the tip, point or summit of anything.-
-Aplicate, with a minute point, or ending in a short pointed tip.-
-Articulated, joined; having a node or joint.-
-Axil, the angle formed by a leaf or branch with the stem.-
-Awn, a bristle-like, or beard-like, appendage.-
-Barbed, with rigid points or short bristles, usually reflexed like the back of a fish-hook.-
-Beaked, ending in a beak or prolonged tip.-
-Bidicate, having two teeth.-
-Bifid, two-cleft.-
-Bloom, a surface coating.-
-Bract, a leaf, usually small, subtending a flower or flower cluster.-
-Calyx, the outer of two series of floral leaves.-
-Campanulate, bell-shaped.-
-Capsule, a dry, dehiscent fruit, composed of more than one carpel.-
-Carpel, a simple pistil, or one member of a compound pistil.-
-Caryopsis, the grain of grasses. A seed-like fruit with a thin pericarp adnate to the contained seed.-
-Circumscissile, transversely dehiscent, the top falling away as a lid.-
-Compressed, flattened, especially laterally.-
-Conuplicate, folded together lengthwise.-
-Connate, united; used especially of like structures joined from the start.-
-Cordate, heart-shaped.-
-Coriaceous, leathery in texture.-
-Crescent, shaped like the moon in its first quarter.-
-Crested, bearing an elevated appendage like a crest.-
-Cross-section, a section at right angles to the longer axis.-
-Crustaceous, hard and brittle in texture; crust-like.-
-Cuneate, wedge-shaped.
Dehisce, to open or split.
Distributus, in two vertical ranks, as the leaves of grasses.
Dorsal, on the back; surface of member turned away from the main axis.
Dowry, covered with down, pubescence, or soft hairs.
Druplet, a small, fleshy fruit, with the inner portion hard and bony.
Enrolled, enveloped; inwrapped.
Evanescent, disappearing early.
Faceted, with small faces; as the facets of a diamond.
Falcate, scythe-shaped.
Fleshy, pulpy; succulent; plump.
Foliose, leaf-like in texture or appearance.
Follicle, a dry fruit consisting of a single carpel, dehiscing by a ventral suture.
Furrowed, grooved; wrinkled.
Fusiform, spindle-shaped; swollen in the middle and narrowing toward each end.
Glomular, with glands, or gland-like.
Globose, spherical or nearly so; globe-shaped.
Glume, the scaly bracts of the spikelets of grasses and sedges.
Granular, appearing as though covered by minute grains.
Hilum, the scar or area of attachment of the seed or ovule.
Hyaline, thin and translucent; nearly transparent.
Indurated, hardened.
Inflorescence, the flowering part of plants; the mode of arrangement.
Involute, folded over; invrapped; inclosed.
Involute, a whorl of bracts subtending a flower-cluster or fruit, as in Compositae.
Irregular, not uniform.
Keel, with a projecting ridge on a surface, like the keel of a boat.
Lateral, belonging to or borne on the side.
Lemma, the lower of the two bracts inclosing the flower in the grasses sometimes called the flowering glume.
Lenticular, shaped like a double-convex lens.
Lobed, with rounded and projecting parts.
Membranous, thin and rather soft, and more or less translucent.
Microphyte, orifice of the ovule and corresponding point on the seed; the opening between the ovule or seed-coats.
Millimeter, the 1000th part of a meter—0.03937 inches.
 Napiform, turnip-shaped.
Nerved, with veins or slender ribs.
Notched, a V-shaped indentation or hollow.
Nutlet, diminutive of nut; a small nut.
Oblance, blunt, or rounded.
Oval, broadly elliptical.
Ovary, the part of the pistil that contains the ovules.
Ovate, in outline like a longitudinal section of a hen's egg.
Ovoid, shaped like a hen's egg.
Ovule, the body which becomes the seed after fertilization.
Pell (Pulea), the upper bract which, with the lemma, incloses the stamens and pistils of grass flowers.
Papillose, bearing minute, nipple-shaped projections.
Pappus, the modified calyx-limb in Compositae forming a crown of various character at the summit of the achene.
Pedicel, the stalk of a single flower in a flower cluster.
Pericarp, the wall of the fruit, or seed vessel; the ovary wall, consisting of three layers: exocarp, mesocarp, and endocarp.
Perigynium, the more or less infolded sac-like organ surrounding the pistil in Carex.
Pitted, marked with small depressions or pits.
Plumose, having fine hairs on each side, like the plume of a feather.
Protruberance, a swelling; a prominence.
Pyriform, pear-shaped.
Rachilla, the axis of the spikelet in grasses. The secondary axis.
Radial, spread from a common center.
Raphe, a seam or suture. That part of the funicle united to the integument.
forming a ridge along the ovule.
Reniform, kidney-shaped.
Reticulated, in the form of network.
Ribbed, with ribs, as the primary or prominent vein of a leaf.
Ridge, a raised line or strip.
Rugose, wrinkled.
Scales, minute, thin, membranous, chaffy or woody bracts.
Saccharous, thin, dry and translucent.
Scurfy, with thin, dry scales adhering to the surface.
Spikellet, diminutive of spike; especially applied to flower-clusters of grasses.
Subglobose, nearly, or imperfectly, globular.
Subulate, awl-shaped.
Sub-terminal, arising below the summit or apex.
Suture, a line of splitting or opening.
Tailed, having an appendage or tail.
Teeth, projecting marginal points.
Terminal, end, or extremity.
Tip, the point, extremity, or upper or top part.
Translucent, partially transparent.
Transverse, across; in a right and left line.
Truncate, ending abruptly, as if cut off transversely.
Turbinate, top-shaped.
Utricle, a 1-seeded fruit with a bladder-like covering.
Valve, one of the pieces into which a dehiscent pod, or any similar body, splits.
Vein, one of the vascular bundles forming the framework of a leaf.
Ventral, on the lower surface.
Winged, with any membranous expansion.
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<td>Wire Grass 26</td>
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<td>Witch Grass 23</td>
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<tr>
<td>Wood 56, 65</td>
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<tr>
<td>Sage 65</td>
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<tr>
<td>Sorrel 56</td>
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<td>Wood Sorrel 56</td>
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<td>Family 56</td>
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<td>Wormwood 71</td>
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<td>Xanthoxalis stricta</td>
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<td>Common 75</td>
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<td>YELLOW 55</td>
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<td>Sorrel 56</td>
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<tr>
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<tr>
<td>WOOD SORREL 53</td>
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