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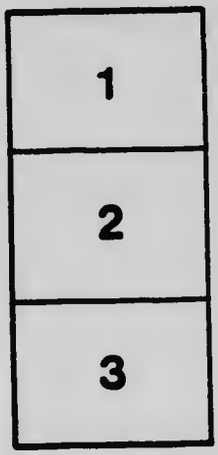

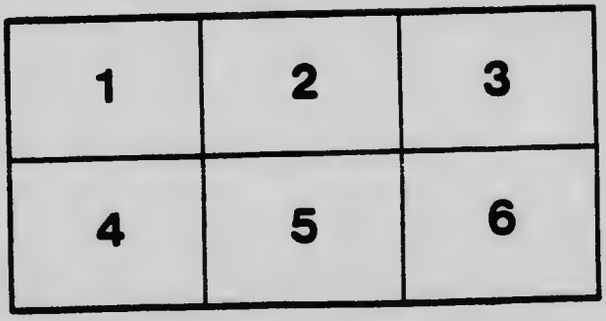

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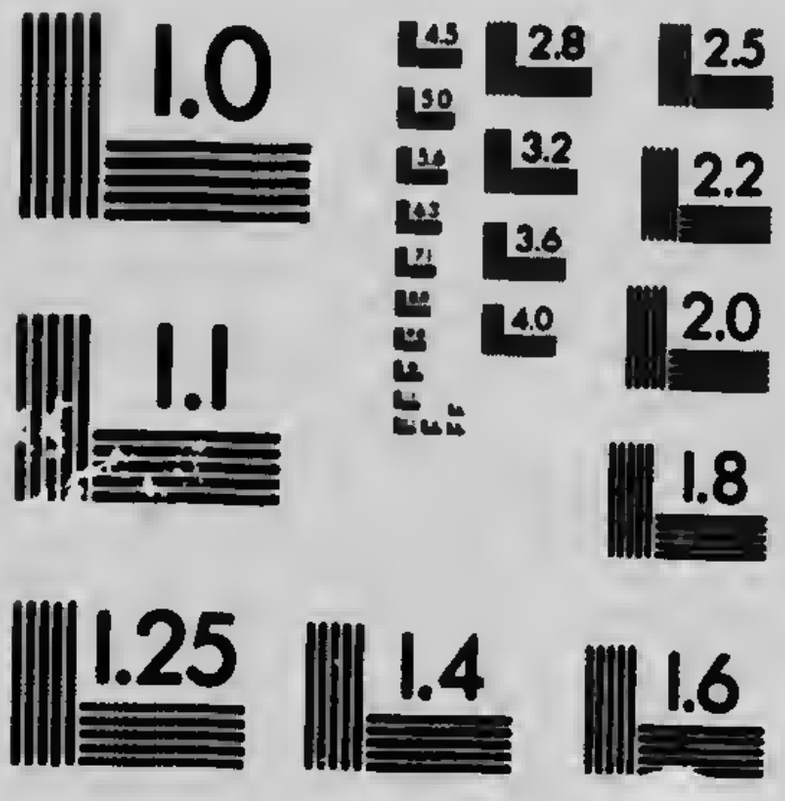

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COMMISSIONER OF AGRICULTURE AND DAIRYING

SEED DIVISION

J. W. ROBERTSON,
Commissioner.

G. H. CLARK,
Chief of Seed Division

WEED SEEDS

COMMONLY FOUND IN

TIMOTHY, ALSIKE AND RED CLOVER SEEDS.

BY

G. H. CLARK, B.S.A.

With Illustrations by J. H. FAULL, B.A.

BULLETIN No. 16—NEW SERIES

PUBLISHED BY DIRECTION OF THE HON. SYDNEY A. FISHER, MINISTER OF AGRICULTURE.

FEBRUARY, 1904.

OTTAWA, February 15, 1904.

The Honourable
The Minister of Agriculture.

SIR,—I beg to transmit herewith a bulletin on weed seeds commonly found in Timothy, Alsike, and Red Clover seeds. The text has been prepared by Mr. G. H. Clark, Chief of the Seed Division. The illustrations of seeds have been taken from drawings made by J. H. Faull, B.A., lecturer in Botany, University of Toronto, while employed by the Department of Agriculture. The information which this bulletin presents has been largely drawn from investigations conducted in our seed laboratory in 1902 and 1903. I recommend that it be printed for distribution.

I have the honour to be, Sir,
Your obedient servant,

JAS. W. ROBERTSON,
Commissioner of Agriculture and Dairying.

WEED SEEDS

COMMONLY FOUND IN

TIMOTHY, ALSIKE AND RED CLOVER SEEDS.

INTRODUCTION.

Large quantities of seeds of many noxious weeds are each year unwittingly sown with grass and clover seeds. The resemblance of many weed seeds to the commercial seeds with which they are found makes their detection difficult to an untrained eye even when they be present to the extent of several hundred per pound. Thus the seeds of White Cockle, Sheep Sorrel and Dock do not materially alter the general appearance of Alsike unless an examination be made with a strong magnifying glass.

During 1902 and 1903, nine hundred and eighty-seven samples of grass and clover seeds were analysed in the seed laboratory. Of these, three samples contained twenty or more, twenty-seven samples contained fifteen or more, and one hundred and twenty-eight samples contained ten or more species of foreign seeds. Forty-eight different species of seeds were found in Timothy, Alsike and Red Clover alone, though fully one half of them were seeds of comparatively harmless plants. Seed that contains a large number of harmless seeds is less undesirable than that containing only a few of noxious weeds. It is therefore of great importance to be able to identify at least the seeds of those weeds which are seriously injurious in agriculture. The illustrations presented in this bulletin are published with a view to assist farmers to identify the more dangerous weed seeds common to grass and clover seeds. Plates I., II., III., and IV., illustrate the appearance of the various species of seeds when examined under a glass that would magnify fourteen diameters.

There are few farmers or local seed merchants who have made a sufficiently careful study of weed seeds to enable them to identify the seeds of even those which are most common and most noxious. Those who are engaged in the commerce of seeds should have access to a reliable and comprehensive collection of specimens of seeds of the more important, useful and noxious plants; they would thus be enabled to identify with which they were not familiar. With a view to meet this need collections of authentic specimens of seeds have been prepared in the seed laboratory for distribution to Canadian seed merchants at a nominal price of $2. The collection consists of the seeds of one hundred species of plants, about sixty-five of which are weeds. The seeds are in two drachm vials and are arranged according to their botanical classification in trays especially designed for this purpose. The trays are made from millboard and covered with binding cloth. The vials are consecutively numbered with the common and scientific names of the seeds to correspond with a printed list on the inside of the cover. (See illustration.)

It is desirable that every rural school and farm home have a comprehensive collection of correctly named specimens of weeds, pressed and mounted, and of weed seeds in bottles conveniently arranged for reference. Pupils in rural districts should each be required to prepare a collection of not fewer than fifty specimens of noxious plants and their seeds before leaving the public school. Collecting and mounting specimens of persistent growing weeds and their seeds by boys and girls who live on farms, combined with instructions as to their habits of growth and how they become disseminated will do much toward stimulating to an application of intelligent and effective methods of combating weeds and preventing their introduction.

HOW DIFFERENT SPECIES OF SEEDS ARE IDENTIFIED.

In distinguishing seeds, size, shape, colour and surface markings are of varying importance. In general, each species of seed possesses characteristics which render its identification comparatively easy, although the size, colour, and shape are not always constant in the same species; variations are brought about by differences of soil, season, age, stage of maturity, and crowding together during growth where several seeds are produced in the same seed vessel.

Surface markings, form, size and colour vary greatly in seeds of different families. Seeds from plants which are closely related, usually have characteristic shapes, and are similarly marked with ridges, wrinkles, tubercles, or winged appendages, by which the *family* to which the seed belongs may be readily ascertained. Many closely related species of plants produce seed so nearly alike that they require strong magnification before their distinctive characteristics may be distinguished. Accurate identification is extremely difficult in only a few species of seeds. The most important of these belong to the genus Brassica. The work that has thus far been done in the seed laboratory with a view to determine some reliable way to differentiate between seed of *B. Sinapistrum* and some of the allied species, has brought out no conclusive evidence to show that they may be distinguished except by a growing test. Similar cases are so rare that although accurate identification of seed of Wild Mustard is of much importance in making a purity test, the value of seed testing on the whole is not materially depreciated because of the delay of twenty days that is required to make a growing test of samples containing seed of certain species of the mustard family.

IMPURITIES OF TIMOTHY, ALSIKE AND RED CLOVER SEEDS.

Impurities of Timothy, Alsike and Red Clover seeds consist of (a) seeds of noxious weeds, (b) seeds of useless though practically harmless plants, (c) inert matter, as chaff, pieces of broken stems, and sand, and (d) seeds of other useful grasses and clovers. Screenings and inferior grades are apt to have quantities of all these impurities and often contain from ten to twenty species of seeds of noxious and useless plants. The accumulation of so many species of weed seeds indicates that the stock consists of a mixture of various lots of seed obtained from different places of production.

Small differences in the size, weight and shape of spurious seeds are taken advantage of by means of screens and air currents in the process of re-cleaning. The better grades of re-cleaned seeds usually contain only such impurities as cannot be separated by mechanical devices.

Buttercup—(*Ranunculus acris* L.). The seeds are irregularly oval in outline and thickly flattened. The fully ripened seeds usually present several shades of colour, ranging from dark brown to black; immature seeds show a distinct tinge of green. They are about one-tenth of an inch in length. The short curved appendage at the apex and the scar are noticeable characteristics. The surface is dull and finely roughened.

The plant is a perennial of wide distribution in moist meadows, pastures and waste places. It grows from one and a half to three feet high, produces conspicuous yellow flowers, and matures seed from June to September.

False Flax—(*Camelina sativa*, Crantz.). The seeds are angularly oval in shape and are grooved along one side. They are about one-twelfth of an inch long, reddish brown in

colour, and the surface is finely granular. The seeds are produced in numerous p[od]-shaped pods, and often form forty or fifty thousand on one plant. (See plate I.)

The plant is an annual and winter annual, and is very troublesome in districts where fall wheat is grown. It is from one to two feet in height, produces pale yellow flowers and matures seed from June to September.

Worm-seed Mustard, Treacle Mustard—(*Erysimum cheiranthoides*, L.). The seeds are very small. The surface is smooth and of a light reddish yellow colour. A well defined groove running lengthwise and sometimes obliquely across the seed is distinctly evident. The seeds are extremely bitter and if even a small quantity of them be mixed with grain or meal, stock will refuse to eat it.

The plant is a branching biennial common to meadows and waste places. It produces small yellow flowers on slender spreading stalks during June and July, and matures seed during July and August.

Charlock, Wild Mustard—(*Brassica Sinapistrum*, Boiss.). The seeds are dull black in colour and almost spherical. Examined under a lens the surface presents a network of fine ridges. Occasional samples of Red Clover and Alsike seeds have been found to contain seeds of this species.

The plant is an annual of wide distribution, from one to three feet in height, common in spring grains, and to a less extent in new meadows. It produces racemes of small yellow flowers from June to September, and matures seed from July to October.

Shepherd's Purse—(*Capsella Bursa-pastoris*, Moench.). The seeds are very small, regularly oblong and flattened in shape, and of a reddish brown colour. They present a slight lustre when examined under a magnifying glass. Each side of the seed is marked with two distinct grooves. (See plate II.)

The plant is an annual and winter annual from one to two feet in height, and is widely distributed. It produces racemes of small white flowers, and matures seed from May to October. The seeds are produced in triangular pods.

Stinkweed, Pennycress—(*Thlaspi arvense*, L.). The seeds are about one-tenth of an inch long, irregularly oval in outline and thickly flattened in shape. Each side is marked with from eight to fourteen concentric grooves which begin and end at the scar. The colour is dark reddish brown, and when examined under a lens the edges of the ridges have a glistening appearances. (See plate III.)

The plant is an annual and winter annual from one to two feet in height. It is one of the worst pests in cultivated lands in Manitoba and the North-west Territories. The plant is characterized by its strong odour, smooth dark green leaves, white flowers, and round, yellow, winged seed pods. It produces flowers from May to October, and matures seed from June to November.

Peppergrass—(*Lepidium Virginicum*, Willd.). The seeds are flat, thin and oval in outline, about one-sixteenth of an inch in length, and of a colour varying from yellowish red to reddish brown. The magnified surface presents a finely roughened appearance, with a single groove down each face. The seeds are produced in flattened circular pods, which are slightly notched at the extremities. (See plate I.)

The plant is an annual and winter annual of wide distribution. It grows from one to two feet high and produces inconspicuous white flowers from May to October, and seeds profusely during the entire summer.

Corn Cockle, Purple Cockle—(*Lychnis Githago*, Lam.). The seeds are irregularly rounded and occasionally somewhat triangular in outline. The two face surfaces are roughened with concentric rows of spines which begin and end near the scar, at which point the seed is much thinner than the outer margin, thus giving it a somewhat

wedgeshaped appearance. They vary from a dark brown to a dull black. The seeds are occasionally found in Red Clover, but are more common in cereal grains.

The plant is an annual and is very common in grain fields. It is easily recognized by its bright purple flowers and profusely branching hairy stems. It matures seed during August and September.

Evening Lychnis, White Cockle—(*Lychnis vespertina,* Sibth.). The seeds are kidney-shaped, about the same size as Alsike seed, and grayish brown in colour. The surface is characteristically marked with regularly arranged rows of small tubercles which give a granular appearance to the surface of the seed. The seeds of this species resemble those of *Silene noctiflora* and *S. inflata.* The rows of tubercles on those of *S. noctiflora* are, however, less distinctly marked, and the seed presents a more finely granular surface than that of *Lychnis vespertina,* while the tubercles on the seeds of the *S. inflata* are more prominent and the concentric rows are more distinct and wider apart. The plants of *S. noctiflora* and *L. vespertina* are equally noxious in character, and are so closely allied that they can be distinguished only by an expert botanist. (See plate II.)

The plant is biennial, from one to two feet in height and is becoming more common in Ontario and the Eastern Provinces. From June to August it produces white or pinkish flowers, which open at dusk and remain open until morning. The seed matures from July to September.

Night-flowering Catchfly, White Cockle—(*Silene noctiflora,* L.). The seeds are similar in character to those of the preceding species, in the description of which the differences between the seeds are noted.

The plant is an annual and winter annual, bearing white or pinkish flowers from July to August and maturing seed during August and September.

Common Chickweed—(*Stellaria media,* Smith). The seeds are very small, broadly oval in outline, and thickly flattened in shape with rounded edges. Like the other members of the Pink family the surface is roughened with broken ridges or tubercles. (In seeds of *S. Graminea* these rows of tubercles blend into short curved ridges, and the seeds are larger and more circular in outline). The seeds vary in colour from a reddish to a dark brown.

The plant is a comparatively harmless annual and winter annual, common to moist lands. It produces small white flowers, and matures seed from April to November.

Cinquefoil, Five-Finger—(*Potentilla Norvegica,* L.). The seeds are very small and somewhat kidney-shaped. They vary in colour from light straw to dark brown, the majority being of the lighter shade. The surface is marked with shallow grooves and ridges which branch irregularly. (See plate I.)

The plant is an annual and winter annual, from eight to twenty inches in height. It produces small yellow flowers and matures seed from July to September. It is a very common pest in meadows and pastures throughout Canada.

Common Evening Primrose—(*Œnothera biennis,* L.) The seeds are light brown in colour, usually irregularly prismatic in shape with the edges slightly winged. Occasionally one or more of the faces is rounded. The surface is dull, finely roughened and is sometimes slightly ridged lengthwise.

The Evening Primrose is common everywhere in damp meadows and along roadsides. It grows from two to four feet high and is easily recognized by its spike of bright yellow flowers, and strong erect growing stems. The seeds are produced in great profusion in September and October.

Ragweed, Hogweed—(*Ambrosia artemisiæfolia,* L.). The seeds vary in length from one-twelfth to one-sixth of an inch and are somewhat pear-shaped. The surface is dull

and varies in colour from light straw to dark brown, the darker coloured specimens frequently having a dark purplish hue. The apex of the seed is long and tapers to a sharp point. The surface is veined and slightly ridged lengthwise. These ridges usually terminate in sharp teeth, which form a circle around and point toward the apex. These teeth vary in number, size and regularity and sometimes are entirely absent. The outer covering of the seed is brittle and may be more or less broken away, thus revealing a smooth, brown inner cover. (See plate III.)

The plant is an annual, from one to four feet in height, and is common in cultivated lands throughout Canada. It produces terminal racemes of minute, yellow, sterile flowers, and green, fertile, axillary flowers at the base of the spikes from July to September, and matures seed from August to November.

Mayweed—(*Anthemis Cotula*, D.C.). The seeds are tapering, about one-sixteenth of an inch in length and present various shades of colour varying from light to dark brown. The surface is roughened with distinct tubercles arranged more or less symmetrically in longitudinal rows. The smaller end is pointed and usually of a lighter colour. (See plate III.)

The plant is an annual, about one foot in height, and is common in meadows, waste places, and along roadsides. It flowers and matures seed from June to September.

Ox-eye Daisy, White Daisy, Bull's-eye—(*Chrysanthemum Leucanthemum*, L.). The seeds are tapering, about one-twelfth of an inch in length, and are marked with ten more or less regular white longitudinal ribs, which appear more conspicuously because of the black interspaces which form the background. A single plant produces from five thousand to eight thousand seeds. (See plate I.)

The plant is a persistent perennial, from one to one and a half feet in height, and is common in Ontario, Quebec and the Maritime provinces. It flowers and produces seed from May to September. The seeds are light in weight, and are common in Timothy seed grown in the eastern provinces.

Canada Thistle—(*Cnicus arvensis*, Hoffm.) The seeds are irregularly cylindrical or club-shaped, with the end bluntly pointed, and the apex presenting a cup-like appearance. They are about one-eighth of an inch in length and of a grayish brown colour. The surface is smooth. The crowding together of the seeds in the head accounts for the irregularity in the form of different seeds. (See plate II.)

The plant is common throughout Canada. It is a perennial, propagated by seeds and underground stems. It grows from two and a half to four feet high, flowers from June to August, and produces seed from July to September.

Chicory, Succory—(*Cichorium Intybus*, L.). The seeds are about one-tenth of an inch in length, irregularly oblong in shape, and frequently taper toward the base from the end to which the pappus is attached. They are irregularly ridged lengthwise, and frequently present an angular appearance. When examined under the lens the surface appears dull with fine transverse striations. The colour varies from a gray to a dark brown.

The plant is a perennial, from two to three feet in height, and is a common pest in grain fields and along roadsides, in some districts in Ontario, Quebec and the eastern provinces. The flowers are bright blue and about one and a half inches in diameter. The stems of the plant are almost leafless. It flowers and matures seed from July to October.

Orange Hawkweed, Paint Brush—(*Hieracium aurantiacum*, L.). The seeds are similar in shape to those of Ox-eye Daisy, but are smaller and more slender. Under a lens the seeds present ten distinct longitudinal ridges which show no variation of colour.

The plant is a persistent perennial, and is a serious pest in the Eastern Townships of Quebec, where it was introduced from the state of Vermont. It is characterized by a terminal cluster of small, conspicuous orange-red flowers which are borne on a hairy stalk from six to twelve inches in height. In addition to the seed which is produced from June to September, it has underground stems which aid greatly in its rapid spread.

Perennial Sow-Thistle—(*Sonchus arvensis,* L.). The seeds are oblong and thickly flattened in shape and are conspicuously marked with five distinct folds running lengthwise on each side, the central one being the largest, and are marked with ridges across their surface. They are fully one-eighth of an inch in length and dark reddish brown in colour. (See plate III.)

The plant is a persistent perennial, propagated by means of seeds and underground stems. It is now quite troublesome in some districts and is spreading rapidly in parts of Ontario, Quebec and the Maritime Provinces. It grows to about three and a-half feet in height, produces conspicuous yellow flowers from June to September, and matures seed from July to October.

Annual Sow-Thistle—(*Sonchus oleraceus,* L.). The seeds are somewhat similar in character to those of the above species, but they are not so thick, the longitudinal ridges and the transverse ridges are less distinctly marked. The seeds of another closely related annual species (*Sonchus asper*) are smooth, and have only three longitudinal ridges, not so strongly marked as in the perennial species. The colour of the two seeds is practically the same.

The plant is an annual, about two feet in height, which flowers from June to August, and produces seed from July to September.

Ribgrass, English Plantain, Buckhorn—(*Plantago lanceolata.* L.). The seeds are about one-tenth of an inch long, oblong-oval and boat-shaped, and of a colour varying from light to dark brown. A well defined groove of about one-third the width of the seed extends along the concave side, in the centre of which is a dark oblong spot flanked with markings of lighter shades. The convex surface is smooth and shining; a light coloured strip extends down the centre which shows the position of the embryo. This is one of the most frequent impurities of Red Clover seed. (See plate III.)

The plant is a deep rooting perennial common to most soils. It has been introduced from Europe where it is sometimes grown for pasture. It is characterized by a stiff, naked flower stalk, from six inches to a foot high headed with a close spike. The long, tapering, pubescent leaves are clustered at the base. It flowers from May to September and matures seed from July to October.

Bracted Plantain—(*Plantago aristata,* Michx.). These seeds are also found in Red Clover seeds. They are somewhat similar in size and shape to those of the *P. lanceolata,* but are slightly wider, and lighter in colour; the margins are less rounded, and a shallow transverse groove crosses the convex side of the seed near its centre.

Common Plantain—(*Plantago major,* L.). The seeds are small, irregularly angular, and vary in colour from a greenish brown to a dull black. Under a magnifying glass they present a roughened appearance and are characterized by small wavy lines which radiate from the scar. (The seeds of *P. Rugelli* are larger, jet black, and present a smooth surface.)

The plant is perennial, widely distributed and common in moist soils. It differs from Ribgrass in having glabrous, obtuse leaves, and a longer spike.

Blue Vervain—(*Verbena hastata,* L.) The seeds are about one-twelfth of an inch long, oblong and somewhat flattened; one face is slightly convex and bears several longitudinal ridges, the other surface has a central longitudinal ridge. The colour is reddish brown, the inner surfaces often having a white powdered appearance.

Blue Vervain is common along streams and in moist locations. It produces dense spikes of purple flowers. The seeds mature in September and October.

Catnip—(*Nepeta Cataria*, L.). The seeds are about one-sixteenth of an inch in length, oblong-oval in outline and somewhat flattened. When examined under a lens the surface appears roughened and dull. Near the base of the seed is a pair of lateral markings which vary in colour from pure white to yellowish white. The seeds are common among Alsike and Red Clover seeds.

The plant is a perennial, from one and a half to three feet in height. It is common near dwellings, on rich soils and in waste places. It is characterized by a square stem, pale green leaves, pale purple flowers, and a pleasant aroma.

Stickseed—(*Echinospermum Lappula*, Lehm.). The seeds are somewhat triangular in outline, with one side flattened and the other convex. The flattened face is surrounded by a double row of short stiff prickles. The convex side has a central midrib extending almost the entire length; the surface is dull and granular, and of a light brown colour. They are about one-tenth of an inch long and are only occasionally found in samples of the smaller commercial seeds.

The plant is an annual, grows from one to two feet high and is common in waste places along roadsides. It is easily recognized by its hard, rough, branching stems and small blue flowers.

Blueweed—(*Echium vulgare*, L.). The seeds are nearly one-twelfth of an inch in length, angularly conical in shape, and the surface presents a very hard, dull gray protective covering, conspicuously marked with irregular tubercles. They are occasionally found in clover seeds.

The plant is a biennial, from one to two feet in height, common along roadsides and in grain fields. It is characterized by its rough and bristly leaves and stems. It produces small blue flowers from July to October, and matures seed from August to November.

Clover Dodder—(*Cuscuta Epithymum*, Murr.). The seeds are very small and somewhat spherical in shape, with one or more sides slightly flattened. The dull surface is very finely roughened and the seeds are frequently mistaken for pieces of sand or dirt. The colour varies and may be yellow, brown, green or purplish. Dodder seeds are occasionally found in imported stocks of clover seed.

The plant is a parasite; it extracts its nourishment direct from the clover plants and spreads rapidly from plant to plant until a comparatively large area of clover is destroyed. Although frequently introduced it has never become a dangerous pest in Canada, but it is extremely noxious in warmer climates that favour its growth.

Lamb's-quarters, Pigweed—(*Chenopodium album*, L.). The seeds are small, nearly circular in outline, and thickly flattened in shape. They appear in various guises on account of the floral envelopes being attached with varying degrees of persistency. The seeds are sometimes enveloped in the outer seed cover which is gray and shows veins that radiate from a central point. They also appear with this seed cover irregularly broken away, thus exposing a smooth, black, shining, inner cover. When the inner cover is removed the light coloured coiled embryo is exposed. Two very common forms in which the seed of Lamb's-quarters appears in grass and clover seeds, are shown in Plates II. and IV.

The plant is an annual, from one to three feet high, of general distribution and common in all crops. It produces minute green flowers from June to November, and matures seed from July to November.

Pigweed, Green Amaranth—(*Amaranthus retroflexus*, L.). The seeds are almost circular in outline, lens-shaped, about one-sixteenth of an inch in diameter, and of a shining jet black.

The plant is a branching annual, from one to three feet in height and is common in waste places and rich lands in all parts of Canada. It produces a panicle of minute green flowers from July to September, and matures seed from August to November.

Curled Dock—(*Rumex crispus*, L.). The seeds are triangular, about one-tenth of an inch in length, and reddish brown in colour. The surface is smooth and faintly shining. The size and weight of these seeds makes it practically impossible to separate them from Red Clover seeds. (See plate III.)

The plant is a persistent perennial of general distribution. It grows from one to three feet in height, produces a panicle of small green flowers during July and August, and matures seed during August and September.

Sheep Sorrel—(*Rumex Acetosella*, L.). The seeds are triangular in shape, about one-sixteenth of an inch in length, and reddish or grayish brown in colour. They usually appear with the floral envelopes attached, and when seen under a magnifying glass they present a rough surface with the veining of the floral envelopes radiating from a central mid-vein. In this condition they are a very common impurity in Alsike seed. When free from the floral coats the seeds are much smaller, but otherwise similar to those of Curled Dock. (See plate IV.)

The plant is a perennial, from six to fourteen inches in height, and is a common pest on dry, sandy soils throughout Canada. It produces a panicle of minute red flowers from May to October, and matures seed from June to November. It is also propagated by means of underground stems.

Lady's Thumb—(*Polygonum Persicaria*, L.). The seeds are about one-tenth of an inch in length, broadly egg-shaped in outline with a sharp extremity, thickly flattened, and jet black. A small rounded projection at the base indicates the point of attachment of the seed. (See plate IV.)

The plant is an annual, from one to one and a half feet in height, and is common in rich, moist lands. It produces spikes of small pink flowers and matures seed from July to September.

Common Smart Weed—(*Polygonum Hydropiper*, L.). The seeds are rather longer than those of the preceding species, bluntly triangular and dull reddish brown in colour. They are sometimes found in Red Clover seeds.

Black Bindweed, Wild Buckwheat—(*Polygonum convolvulus*, L.). The seeds are considerably larger than those of the above species, equally triangular in shape and dull black. They are occasionally found in Red Clover seeds.

The plant is a twining annual, common in grain fields throughout Canada. It produces racemes of minute white flowers and matures seed from July to September.

Green Foxtail, Bottle Grass—(*Setaria viridis*, Beauv.). The seeds are almost one-twelfth of an inch in length, bi-convex in shape, and narrowly oval in outline with blunt extremities. They usually appear free from the glumes as illustrated, and are a common impurity in grass, clover and other small seeds. When free from the glumes they present a light green colour, and are frequently mottled; when the glumes remain attached they present a light gray appearance. They sometimes occur as free grains devoid of both glumes and the outer covering of the seed, in which case they are also of a light green colour. The convex side of the seed is finely striated crosswise and on the opposite side the shining edges of the palea show distinctly beside the inturned edges of the flowering glume. See plate IV.)

The plant is an annual of wide distribution, and is most troublesome in hoed crops. The spike is green and cylindrical in shape. It flowers from July to September and produces seed from August to October.

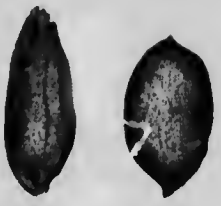
Yellow Foxtail, Pigeon Grass—(*Setaria glauca*, Beauv.) seeds closely resemble those of Green Foxtail, but are considerably larger, being about one-eighth of an inch in length. They are distinctly marked with irregular transverse ridges. (See plate IV.)

The plant is similar in character to the *S. viridis*, and is widely distributed. The matured spike is of a yellowish colour.

Ergot—(*Claviceps* var. Tul.) Sclerotia are black cylindrical bodies, which replace the kernel or seeds in the heads of various grasses. They occur either singly or many in a head, and vary in size, according to the species attacked. Ergot of rye is most widely known; it is much larger in size, though otherwise quite similar to those produced on Timothy and other grasses.

Ergot is extremely dangerous when present in pastures, hay or grain. It is a potent cause of gangrenous ergotism in live stock. European seed control stations condemn seed of any kind in which ergot is found.

Ergot of Timothy is fairly constant in size and shape, and is considerably longer and about one and one-half times the diameter of Timothy seed. When the glumes remain attached to the sclerotia, as shown in the illustration (see Plate I.), they are more difficult to detect in a sample than when free from the glumes. The surface is irregularly ridged longitudinally and is frequently polished. The ends are blunt, rounded and occasionally of a grayish white colour (see plate I.) Spores are produced by the sclerotia in the spring, and these are carried by the insects and winds to the flowers of grasses in bloom, and by this means is the disease spread.



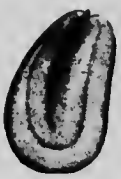
TIMOTHY.
Phleum pratense.

Canada Thistle.
Cnicus arvensis, Hoffm.

False Flax.
Camelina sativa, Crantz.

Perennial S- ..istle.
Sonch s arve sis, L.

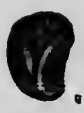
Ox-eye Daisy.
Chrysanthemum Leucanthemum, L.



Peppergrass.
Lepidium Virginicum, L.

Ergot.
Claviceps purpurea, Tul.

Green Foxtail.
Setaria viridis, Beauv.

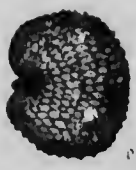


Cinquefoil.
Potentilla, Norvegica, L.

Mayweed.
Anthemis Cotula, D. C.

WEED SEEDS COMMONLY FOUND IN TIMOTHY.

ALSIKE.
Trifolium hybridum.



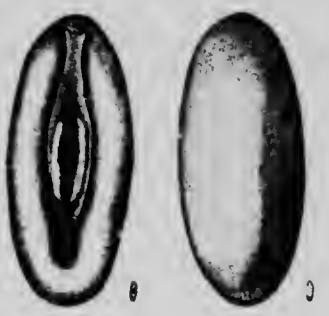
White Cockle.
Lychnis vespertina, Sibth.

False Flax.
Camelina sativa, Crantz.

Curled Dock.
Rumex crispus, L.

Canada Thistle.
Cnicus arvensis, Hoffm.

Shepherd's Purse.
Capsella Bursa-pastoris, Moench.

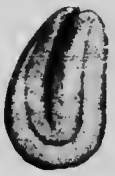


Ribgrass.
Plantago lanceolata, L.

Sheep Sorrel.
Rumex Acetosella, L.

Mayweed.
Anthemis Cotula, D. C.

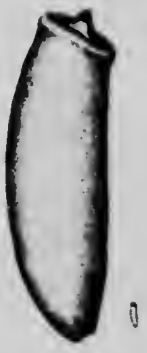
Lamb's-quarters.
Chenopodium album, L.



Peppergrass.
Lepidium Virginicum, L.

RED CLOVER.
Trifolium pratense, L.

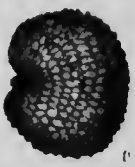
Pennycress.
Thlaspi arvense, L.



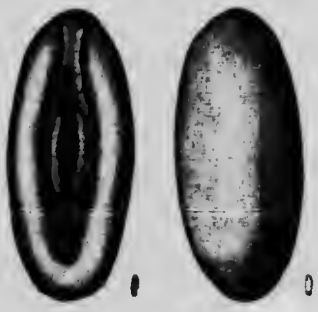
Canada Thistle.
Cirsium arvensis, Hoffm.

Perennial Sow-Thistle
Sonchus arvensis, L.

Curled Dock.
Rumex crispus, L.



White Cockle.
Lychnis vespertina, Sibth

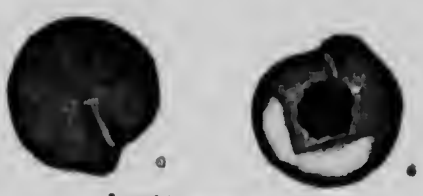


Ribgrass.
Plantago lanceolata, L.

Ragweed.
Ambrosia artemisiaefolia, L.

Lady's Thumb.

Polygonum Persicaria, L.



Lamb's-quarters.

Chenopodium album, L.

Green Foxtail.

Setaria viridis, Beauv.

Ox-eye Daisy.

Chrysanthemum Leucanthemum, L.

Mayweed.

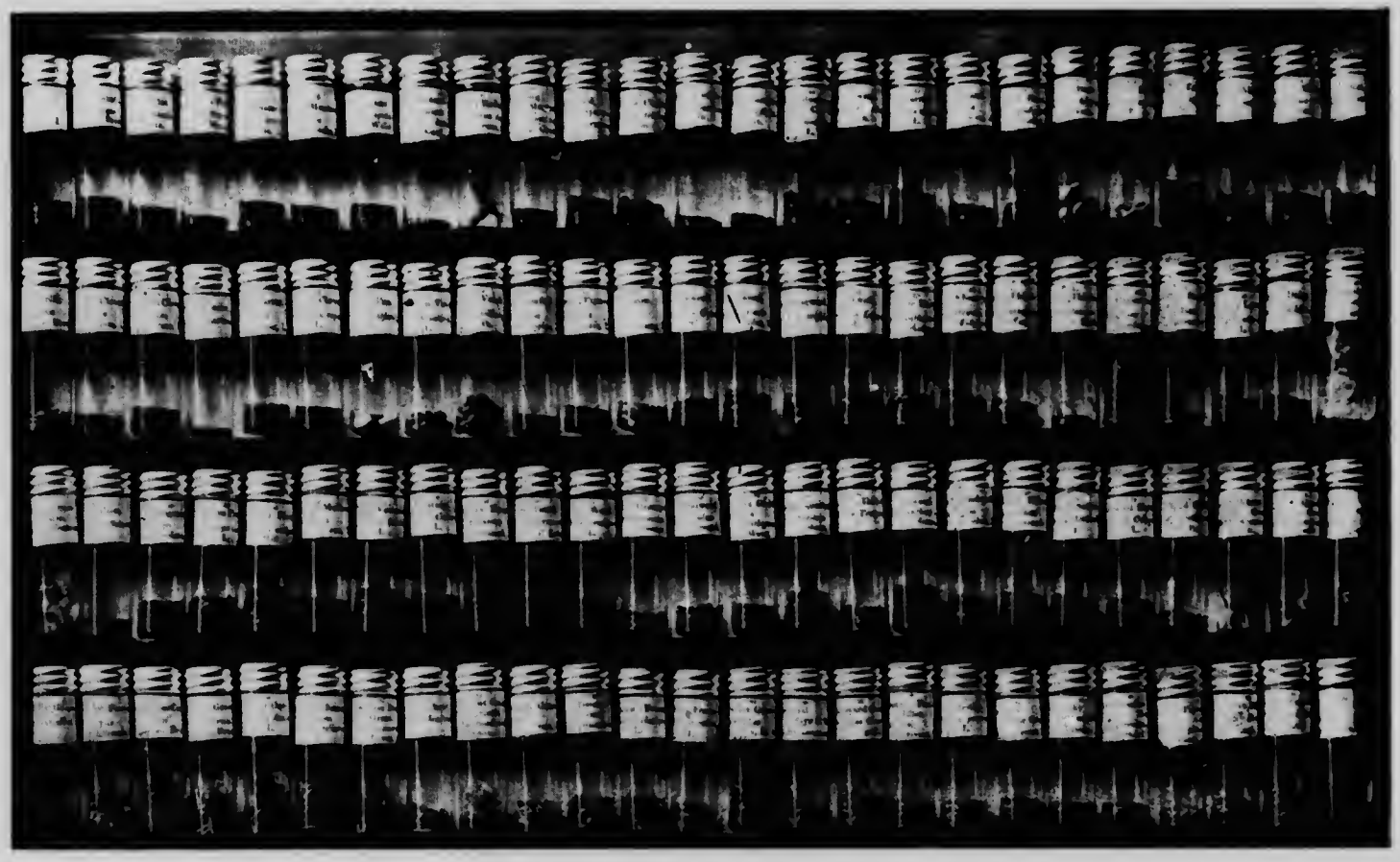
Anthemis Cotula, D. C.

Sheep Sorrel.

Rumex Acetosella, L.

Yellow Foxtail.

Setaria glauca, Beauv.



COLLECTION OF ECONOMIC SEEDS.

Prepared under the direction of the Honourable Sydney A. Fisher, Minister of Agriculture, for the use of Seed Merchants and Agricultural Institutions.