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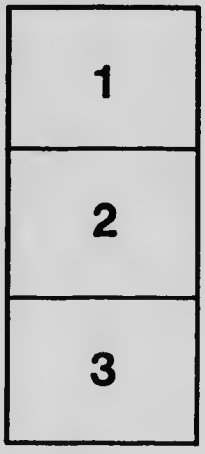

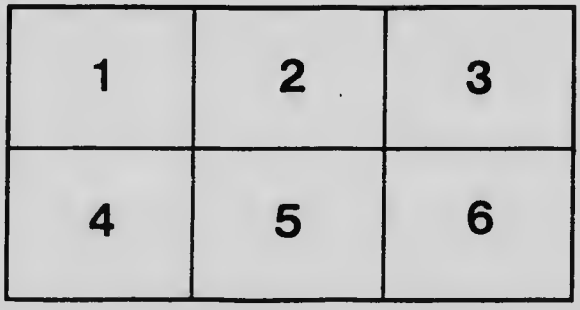

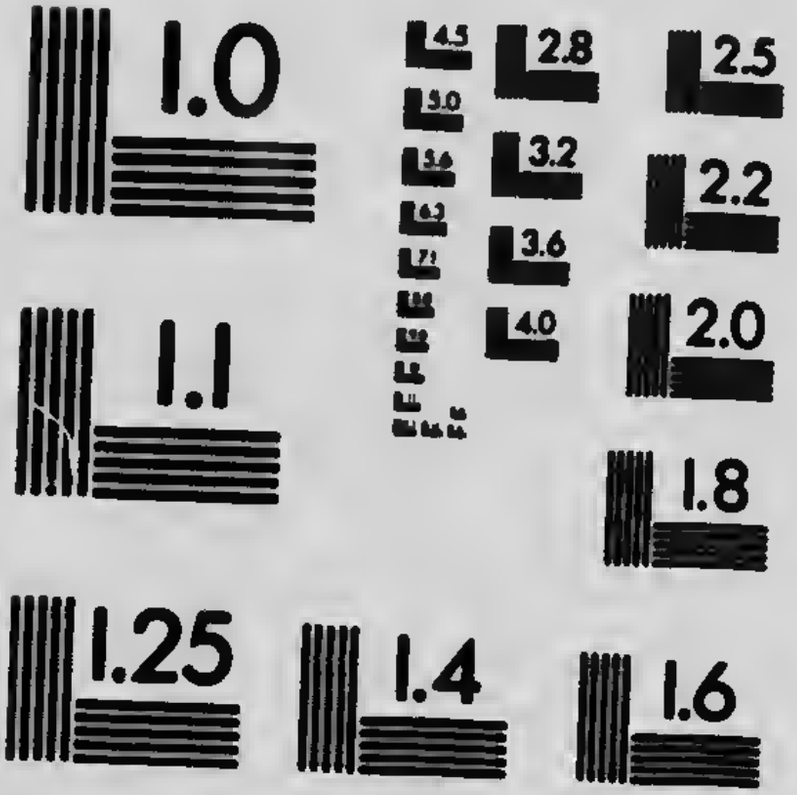

BULLETIN 168.] [OCTOBER, 1908.
1908

Ontario Department of Agriculture.

ONTARIO AGRICULTURAL COLLEGE.

The Perennial Sow Thistle and some other Weed Pests of 1908.

By J. Eaton Howitt, M.S.A., Demonstrator in Botany.

FOREWORD.

The discussion of the Weed Pests of 1908 is a matter of emphatic concern. Through investigation, wide correspondence, and the reports of visitors and Farmers' Institute workers, it becomes more and more apparent to the Department of Botany that the Province of Ontario, at large, is sorely menaced in its agricultural industry by the spreading of noxious weeds. They are usurping our fields and greatly increasing the cost of producing crops. In the majority of cases, they attain a foothold before they are recognized and combatted. Very often they secure entrance into clean land through the use of seed whose impurities are not known. Ignorance of weeds, like all other ignorance, is costly. They are an enemy that is fought better by fore-knowledge than after-skill. Every farmer should be warned and prepared to resist their entrance or their first sign of attack.

Recently in the Province of Nova Scotia when it was found that an influx of the Brown Tail Moth, that has caused much damage in the New England States, was imminent, the pupils in the schools were organized into a first line of defence. To resist the attack of weeds there is need for similar organized precaution throughout the country; not only through the scholars in the schools but by everyone concerned.

Mr. Howitt has been giving special attention to this weed problem. The following pages will be found timely and suggestive. The weed pest of 1908 for one man becomes the weed pest of 1909 and succeeding years for a widening circle of sufferers.

S. B. McCREADY.

Botanical Department, Ontario Agricultural College,
October, 1908.

Fig. 1. Spiny Annual Sow Thistle
(*Sonchus asper.*)

THE SPREAD OF NOXIOUS WEEDS.

In spite of the progress that agriculture is making in Ontario, a number of very bad weeds are steadily, and in some instances rapidly, spreading over the farms of the Province. This is due to various causes, chief among which are the following:—

1. The neglect of the great majority of farmers to make themselves acquainted with the appearance and habit of growth of the worst weeds in the Province, in order that they may attack and exterminate them when they first appear upon their farms. It is a comparatively easy task to root out and destroy a few bad weeds in a field, but it is an extremely difficult, tedious, and costly undertaking to attempt to clean a field which has become over-run with a creeping perennial, such as Couch Grass or Canada Thistle.

2. The failure to cut the weeds on the road sides, along the railways, in neglected fields, and in fence corners before they mature and distribute their millions of seeds far and wide.

3. That far too much impure clover, hay, and grain seed is sown, either through ignorance, carelessness, or false economy. It would not be an exaggeration to say that seventy-five per cent. of the clover and timothy seed sown in the Province contains in various amounts from one to a dozen different kinds of weed seeds.

4. That many new weeds are being brought into the Province as seeds in screenings from the elevators in the West. These screenings are ground in Ontario mills, mixed with corn, barley or oats and sold for feed as mixed chop. Many of the weed seeds are not crushed in grinding and thus find their way on to Ontario farms.

OBJECTS OF THE BULLETIN.

1. To give as much information as possible about the Perennial Sow Thistle with the hope of aiding all who have to contend against this most serious pest.

2. To call attention to and describe six other weeds which are gaining ground in Ontario. Some of these have but recently been introduced; others have been in the Province for some years; but more information is required about all of them, judging by the numerous enquiries received concerning them.

3. To give as much definite information as possible about the best methods of eradicating each of these pests.

4. To call attention to the necessity for united action upon the part of all engaged in farming in order that the Perennial Sow Thistle may be held in check.

Fig. 2. Perennial Sow Thistle (*Sonchus arvensis*).

The Perennial Sow Thistle.

(*Sonchus arvensis*, L.)

This is by all means the worst weed in the Province of Ontario at the present time. It is found in almost every county, and upon almost every farm. So rapidly and so persistently is it spreading that in some parts of the Province it threatens to entirely over-run the fields and drive out the farmer. In spite, however, of its wide dispersal there are many who are not able to recognize this pest and who mistake it for its two comparatively harmless cousins, the Common Annual Sow Thistle and the Spiny Annual Sow Thistle. This should not be the case, as it is a very conspicuous weed, and differs markedly from the other two species. The Perennial Sow Thistle grows freely on a great variety of soils, but is especially troublesome on rich, low, damp land. It appears the first year in a field in scattered patches consisting of young plants, each plant made up of a rosette of leaves lying close to the ground, and thus, when numerous, they completely cover it. These young plants have but short underground root stocks, and are comparatively easy to destroy. The second year a large stem bearing numerous leaves and flowers is produced and the rootstocks grow long and send up quantities of new shoots. Once established in this manner, it is no easy task to destroy this pest.

Description: The Perennial Sow Thistle (*Sonchus arvensis*) is a tall, coarse growing perennial weed with deep roots and numerous thick, underground stems or rootstocks, commonly spoken of as "roots." Upon these at intervals of a few inches are borne buds which develop into new plants. The stem is smooth and hollow and the whole plant is filled with a bitter milky juice. The leaves are pointed, 4 to 12 inches long, deeply cut with the segments pointed backwards (runcinate), slightly prickly. The flowers, or more correctly speaking, the heads of flowers are about 1 to 1½ inches across, and bright orange in color. The involucre, or, as it is commonly called, the flower cup, and the peduncles or flower stems are covered with distinct, yellow glandular bristles. The seeds are dark reddish-brown in color, about ⅛ of an inch long, somewhat spindle shaped with blunt ends, and each surface bears a number of very deeply wrinkled, longitudinal ribs. Each seed bears at the top a tuft of white silky hairs (pappus) which, when dry, acts as a parachute and enables the seed to be borne long distances by the wind.

Points of Distinction Between the Perennial Sow Thistle and the Annual Sow Thistles.

1. The Perennial Sow Thistle is a taller, coarser growing plant than either of the other two Sow Thistles.

2. The Perennial Sow Thistle has numerous underground rootstocks while the annual species have only fibrous roots. (See illustrations.)

Fig. 3. Common Annual Sow Thistle (*Sonchus oleraceus*.)

Fig. 4. Fibrous root of annual Sow Thistle.

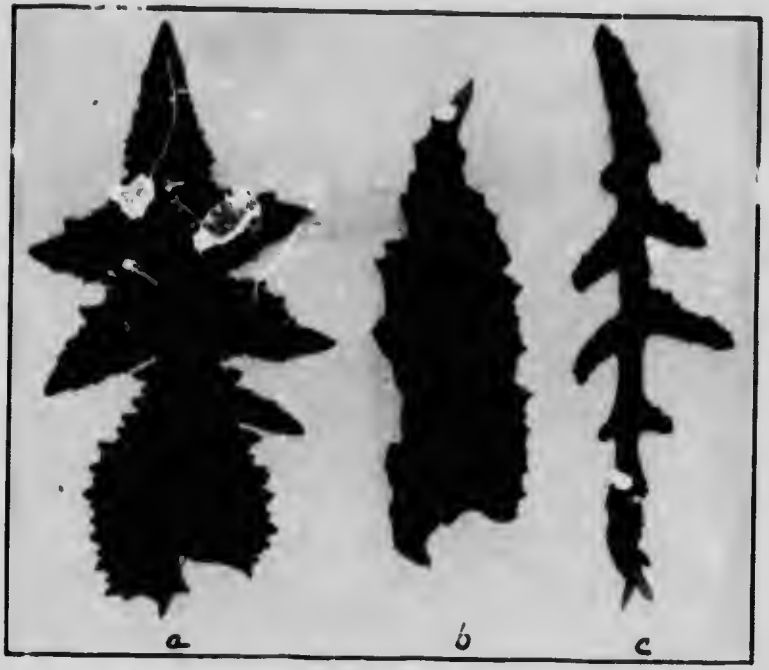

Fig 5. Leaf of (*a*) Common Annual ; (*b*) Spiny Annual ; (*c*) Perennial Sow Thistle.

I g. 6. Creeping "root" of perennial Sow Thistle.

3. The leaves of the Common Annual Sow Thistle are deeply cut and lobed and scarcely spiny. The leaves of the Spiny Annual Sow Thistle are almost entire, very prickly and often decidedly waxy. The leaves of the Perennial Sow Thistle are deeply cut, but not lobed and slightly prickly. (See illustrations.)

4. The "flowers" of the Perennial are bright orange in color and about 1½ inches across, while the flowers of the Annuals are pale yellow and less than ½ inch in diameter.

5. The "flower-cups" (involucres) and "flower stems" (peduncles) of the Perennial Sow Thistle are conspicuously covered with yellow glandular bristles while those of the annual species are nearly smooth.

6. The seeds of the three species also differ as to shape and markings as shown by the accompanying illustrations.

How the Perennial Sow Thistle is Spread.

The Perennial Sow Thistle is being rapidly and widely spread by means of its numerous seeds, which are blown far and wide by the wind, and to some extent by its abundant underground rootstocks which, with remarkable rapidity, spread through a field sending up new shoots which soon entirely cover the ground and choke out all other vegetation. The rootstocks when broken up are often carried from field to field by harrow or cultivator. It has been estimated that an average plant produces 2,000 seeds. There are thousands of these plants going to seed on neglected farms, on road sides and in fence corners. Many more mature plants are harvested with the grain and their millions of seeds scattered at threshing times. Is it to be wondered that the Perennial Sow Thistle is becoming such a serious pest in Ontario?

Methods of Eradication.

These are discussed under the headings of General Suggestions, General Methods and Detailed Methods.

General Suggestions.

1. Bear in mind that a few patches of Perennial Sow Thistle, if allowed to mature, may seed down a whole neighborhood. Therefore, take every precaution to prevent the seeding of patches in meadows, grain fields, fence corners, and on the road side.

2. Watch for the first two or three patches in the field and destroy them before the pest becomes established.

3. Be careful not to harrow or cultivate through patches and drag the underground rootstocks all over the field.

4. The Perennial Sow Thistle thrives most luxuriantly on rather low, damp land. Underdraining therefore will help to control it.

5. Sheep are fond of this weed, and, if turned on a field after harvest, will prevent its seeding and by their close cropping weaken the underground rootstocks.

Fig. 7. "Seed" of perennial Sow Thistle. Enlarged about 12 times.

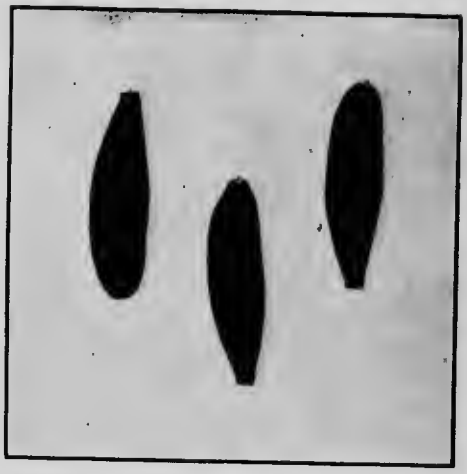

Fig. 8. "Seed" of common annual Sow Thistle. Enlarged about 12 times.

Fig. 9. "Seed" of spiny Annual Sow Thistle. Enlarged about 12 times.

Fig. 10. Seeds of Bladder Campion. Enlarged about 12 times.

General Methods.

Crop Rotation. Crop rotation is of utmost importance in dealing with the Perennial Sow Thistle and other weeds of like nature. Some sharp, short rotation of crops should be adopted, which will allow of the frequent use of the cultivator, the cutting of the flowers before seeding, and the introduction of a smother crop or hoed crop. One cannot recommend a system of cropping which will be suitable in all kinds of farming. Each farmer must select the rotation which is most suitable to his conditions, keeping in mind those features of rotation which will best enable him to fight the Perennial Sow Thistle.

Smothering. The aim of this method is to kill the weed by depriving it of light and air. This is accomplished by getting some quick growing crop, such as rape or buckwheat, established on the land while the thistle is in a weakened condition. The result is that the smother crop soon occupies every available foot of the land and forms a dense shade in which the thistle in its weakened state cannot continue to grow. The same result is obtained by covering the plants with straw, dirt, leaves, etc., to a sufficient depth to prevent them from reaching the light and keeping them covered long enough to exhaust the "roots." This will require a year at least. Such treatment is of course only practicable in dealing with small patches.

Hoed Crops. The growing of such crops as potatoes, corn and roots, which allow of thorough cultivation and hand hoeing, provides a means by which many weeds may be effectively fought. Hoed crops alone do not give entire satisfaction in fighting the Perennial Sow Thistle. This is largely due to the fact that in cultivating and hoeing the rootstocks are cut, but not all destroyed and in a short time some begin to grow again. Hoed crops, therefore, are useful in keeping the pest in check, but should not be depended upon alone. They should be used in connection with other measures as outlined further on.

Summer Fallowing. This method is extremely efficacious with all sorts of weeds, including the Perennial Sow Thistle. By fallowing for this weed a bare fallow is understood or at least one which is given sufficient cultivation to prevent the pest from reproducing itself by means of seeds or roots. A neglected fallow is nothing more or less than a weed bed, and is useless and a source of contamination for every field on the farm. The chief objection to fallowing is the lying idle of the field for a season, but this is probably offset by the effectiveness of the method as compared with other methods which require a great deal more labor, time and attention. At the present time in Ontario many farmers are resorting to this method, considering it on the whole the most economical and most effective.

Digging by Hand. Small patches can be destroyed by digging out the plants with a fork, "roots" and all, and burning them. Great care should be taken to get every bit of the "root." The patch should be

watched, and if new shoots appear they should be taken out at once. In an ordinary season several diggings will be required in order to completely exterminate a patch.

Detailed Methods.

Several methods of exterminating the Perennial Sow Thistle are here outlined in detail. They have all been suggested by practical farmers. It is hoped that those who are looking for information on this subject will find among them a method suited to their own conditions.

Method No. 1. This method is suggested by Professor Zavitz, who found it effective in the eradication of Quack Grass. Cultivate the field until about the middle of June, running over it frequently with the cultivator so as to keep the tops down and thus weaken the "roots." Then apply manure at the rate of about 20 tons per acre (12 good loads). Cultivate the manure in thoroughly and with a double mould board plow slightly ridge up the land, making the ridges about 26 inches apart. On the ridges sow pasture rape at the rate of 1½ lbs per acre. It is important that the right amount of rape should be sown, for if too little is sown the stand will not be thick enough to smother the weeds, and if on the other hand too much is sown the plants will be too crowded and not grow vigorously enough to keep ahead of the thistle. Sow the rape when the land is sufficiently moist to insure quick germination of the seed. If the rape is slow in starting the Sow Thistle may get a start in the rows and thus necessitate hand cultivation there. Cultivate the rape every week or ten days until it occupies all the ground and makes further cultivation impossible. If, when the rape is cut or pastured, any Sow Thistles remain, the field should be ridged up the last thing in the fall and put in with a hoed crop the following year. This should not be necessary if a good stand of rape is secured.

Method No. 2. This is a system of intensive cropping suggested by Professor Zavitz. As soon as a cereal crop is harvested, plow the land and give frequent cultivation to the first or middle of September. Then sow winter rye at the rate of about two bushels per acre. This can be pastured the following spring, or cut for hay or grain. As soon as the crop is off the land, put in rape, turnips or buckwheat. The advantage of this system is that three crops are harvested in two years and the Sow Thistle fought at the same time.

Method No. 3. This method is recommended by Professor Day. Immediately after harvest gang-plow shallow and run over the field several times with the broad shared cultivator. Later in the fall plow a little deeper, and continue cultivating every week or ten days as long as the season permits. Last thing before the ground freezes rib up the land with a double mould board plow. The following spring give frequent cultivation up to the first of July, then sow pasture rape.

Method No. 4. This is a short rotation which has been recommended by several Farmers' Institute workers. Clover is followed by a crop of grain, then clover again. The clover is cut in June, and the land plowed about four inches deep and given frequent and thorough cultivation during the rest of the summer. The following spring a grain crop is sown, seeding down with clover. For best results the grain crop should be one which can be cut early enough to prevent the thistle from seeding.

Method No. 5. Directly after harvest plow the land lightly, and then give frequent cultivation as long as the season permits. The following spring gang-plow, and leave in summer fallow until it is time to sow fall wheat. The summer fallow to be effective must be a *bare fallow.* The field must be cultivated thoroughly and frequently, with the object of keeping the tops down and breaking up and bringing to the surface of the ground as many of the "roots" as possible. The gang-plow should occasionally be run over the field in order to insure the cutting of the roots. Bare summer fallow has given excellent results on the College farm in seasons when other methods were at best only partially effective.

Bladder Campion, Cow Bell or Bladder Weed.

(*Silene inflata,* L.)

This is another bad weed which is becoming a serious pest on many farms in Ontario and about which a great many enquiries have been made during the past two years. It is spread chiefly as an impurity in clover seed. A large number of the samples of clover seed, especially those of red and alsike clover, sent to the Department of Botany this past season for examination as to purity, have been found to contain the seeds of this weed. As it is a free seeder, and very difficult to exterminate once it becomes established, too much care cannot be taken to secure clover seed free from this impurity, and to dig up by the roots and burn any stray specimens that by any means may find their way on to the farm.

Description. The Bladder Campion (*Silene inflata*) is a naturalized, deep rooted, freely branching perennial weed belonging to the Pink Family (*Caryophyllaceae*). It grows from six inches to two feet high. The leaves are ovate lanceolate, smooth, in pairs with their bases meeting around the stem. The flowers are white, nearly an inch in diameter and borne in loose clusters which are often drooping. The petals are two-cleft and the calyx much inflated and bell-shaped, with distinct purplish veins. It is from the inflated calyx that the plant derives its common names, Bladder Campion, Bladder Weed, and Cow Bell. The capsule or "seed pod" is enclosed by the inflated calyx and opens at the top by 5 short recurved teeth. This weed flowers from June to August and matures seed from July to September. Large quantities of seed are produced. They are about 1-16 of an inch in length, irregularly kidney-shaped, light brown to dark grey in color, the surface covered with regularly arranged rows of tubercles. Typical seeds show a marked

depression at the scar. This character, and the more conical shape of the tubercles, make it possible for a careful observer to distinguish them from the seeds of the Night-flowering Catchfly and White Cockle, which they resemble very closely.

Fig. 11. Bladder Campion (*Silene inflata.*)

Eradication. The roots of this pest are very long, thick, and much branched. A good-sized plant will have a root over two feet long with numerous deep rootstocks. A weed with such an underground root system is necessarily hard to combat. Some means must be taken by which the deep roots and rootstocks can be destroyed. Small patches should be carefully dug out early enough in the season to prevent seeding, taking pains to get every piece of the root and rootstocks. Badly infested fields should be plowed deeply immediately after harvest; and then thoroughly cultivated and cross-cultivated with the broad-shared cultivator in order to cut up and weaken the underground root system. The following spring continue this deep cultivation at intervals of about two weeks until it is time to put in a hoed crop, which must be kept thoroughly clean in order to be effective.

Fig. 12. Root of Bladder Campion.

Fig. 13. Stinkweed or Penny Cress. (*Thlaspi arvense.*) About $\frac{2}{3}$ natural size.

Stinkweed, Penny Cress.

(*Thlaspi arvense*, L.)

Though this weed is by no means new to the Province of Ontario, it is worthy of attention here as it is being constantly reported from new sections of the Province. It seems to be spreading through the agency of ground feed made from Western screenings and to some extent as an impurity in farm seeds. It is considered to be one of the worst pests of the grain fields of the West. Careful watch should be kept for it, as it is a very free seeder, and the seeds are said to have great vitality and to be able, like mustard seed, to remain in the ground for some years.

Fig. 14. Seeds of Penny Cress.
(Photo by Prof. M. V. Stingerland, Cornell Univ.)
Enlarged about 12 times.

Description. Stinkweed or Penny Cress is an annual or winter annual belonging to the Mustard Family (*Cruciferae*). It is a foul smelling plant from 1 to 2 feet high, bearing smooth, dark green, sessile leaves, and clusters of small white flowers, which develop into orbicular pods. These are flat, notched at the top, and about half an inch broad. It is from these peculiarly shaped pods that the plant gets its common name, Penny Cress. Each pod contains about a dozen seeds. The seeds are about 1-14 of an inch long, flat, irregularly oval, bronzy brown to metallic black in color, with regularly arranged curved lines on both surfaces.

Eradication. Hand pull and burn when in small quantities. If the field is badly infested the following method of eradication is recommended. *"Run a disk or harrow over the stubble as soon as the crop is removed, so as to start into growth the seeds near the surface. The following spring cultivate or harrow these plants down; and as soon as growth of fresh plants starts, plow the land and harrow at once. This land may be sown late to a green feed crop or it may be kept under a clean fallow for the whole season if the land can be spared. The following spring any growth of weeds should be cultivated down before sowing the crop."

Plants with fully formed pods should never be plowed down, as the seeds will mature below the ground and maintain their vitality for considerable time.

Russian Thistle.

(*Salsola Kali*, var. *tragus*, Moq.)

This is a new weed which has appeared on many farms in Ontario during the past season. It has been introduced as an impurity in Alfalfa seed. A large percentage of the samples of Alfalfa seed examined at the Department of Botany this spring contained the seeds of this weed and already this fall several specimens of the weed, found in Alfalfa

Fig. 15. Russian Thistle. (*Salsola Kali var. Tragus.*)

*Farm Weeds of Canada, by Geo. H. Clark and Dr. James Fletcher.

fields, have been sent in for identification. The Russian Thistle is a very serious pest in several of the Western States, and is found in the Prairie Provinces, but has not yet been reported as being very troublesome there. The plants, when ripe, break off at the surface of the ground and are rolled long distances by the wind, scattering their numerous seeds on their journey. It is this tumbling habit that makes this weed particularly adapted to the prairie lands of the West, and it probably will never be a serious pest in Ontario where fences, trees and other obstructions will prevent its being spread far and wide by the wind.

Description. The Russian Thistle is a native of Europe and Western Asia. It is a nearly smooth, bushy branched annual, from 1 to 3 feet high. Mature plants are more or less spherical in form. The stems and branches are red in color. The leaves are awl-shaped, one to two inches long, soft and fleshy when young, very prickly pointed when mature. The flowers are inconspicuous, being small, without petals, and solitary in the axils of the leaves. The seeds are about 1-12 of an inch long, obconical in general outline, with a cup-shaped depression at the upper end in the centre of which is a pointed projection, color dull grey or green, embryo spirally coiled.

Fig. 16. Seeds of Russian Thistle.
(*a*) Complete seeds.
(*b*) Embryo.
Enlarged about 12 times.

Fig. 17. Seed of Field Pepper Grass or Cow Cress.
Enlarged about 12 times.

Eradication. The Russian Thistle being an annual weed is not hard to exterminate. If once cut off at the surface of the ground it never grows again, and hence in well cultivated fields it is not likely to prove a pest. The chief danger lies in neglect. A single plant produces an enormous number of seeds, and if a few specimens are allowed to mature they will seed down a whole field and cause serious trouble the following year,

especially in a crop which does not allow of the frequent use of the cultivator. Farmers in Ontario should, therefore, be on the lookout for this weed and destroy any specimens they may find in their fields, fence corners, or along the road sides. If a field is neglected until it becomes seeded, repeated plowing will be required in order to clean it. *"When the plant is not more than six inches high careful plowing with a drag chain from the end of the doubletrees to the plow beam, dragging back so as to have every plant dragged under the furrow, with harrowing to fill every crevice between the furrows will destroy every plant that cannot get its leaves to the surface."

Field Pepper Grass or Cow Cress.

(*Lepidium campestre*, Br.)

This is a comparatively new weed in Ontario, about which many enquiries have been received during the past two years. From information gathered from correspondents it seems certain that it has been spread as an impurity in clover seed.

Description. Field Pepper Grass or Cow Cress is an introduced annual or biennial weed belonging to the Mustard Family (*Cruciferae*). It grows from 1 to 2 feet high and branches freely above. The basal leaves are petioled, oblong and entire; stem leaves spear-shaped, entire or slightly toothed and clasping the stem by their arrow-shaped bases. Flowers are small, white or yellowish in color. The seed pods are broadly ovate boat-shaped, being rounded below and hollowed out above. They stand out stiffly from the stem on pedicels of about their own length. The seeds are reddish brown in color, about 1-12 of an inch long, sharply egg-shaped, rounded or somewhat flattened, and the surface is granular and slightly scurfy.

Eradication. Hand pull small patches. Cut clover early enough to prevent seeding. Plow up badly infested fields, and put in a hoed crop for one season.

Dodder, Devil's Gut or Strangle Weed.

(*Cuscuta epithymum*, Murr.)

This weed is spreading very rapidly, as an impurity in Alfalfa and clover seed. It is by no means a new weed in Ontario, but during the past year has been especially abundant. Judging by the numerous samples sent in for identification, and by the host of questions asked concerning it, more information is required as to its appearance, habit of growth and method of control. It is therefore discussed rather fully here.

*Bulletin No. 26, Iowa Agr. College Experiment Station, Ames, Iowa.

Fig. 18. Field Pepper Grass or Cow Cress (*Lepidium campestre*).

Fig. 19. Field Dodder on Red Clover. *a* Flowering Cluster; *b* Cluster of Dry Seed Vessels. From a photograph. Natural size.

(Reproduced by the courtesy of the U. S. Dept. of Agriculture, from Farmers' Bulletin 306 "Dodder in Relation to Farm Seeds," by F. H. Hillman.)

Description. Dodder differs from ordinary weeds in possessing no leaves. The yellow thread-like stems of the plant twine around the clover plants and send into their tissues small short rootlets, which are called suckers or haustoria. By means of these suckers the Dodder draws from the clover the food necessary for its growth and reproduction. It thus kills the clover by robbing the plant of its food and causing it to starve.

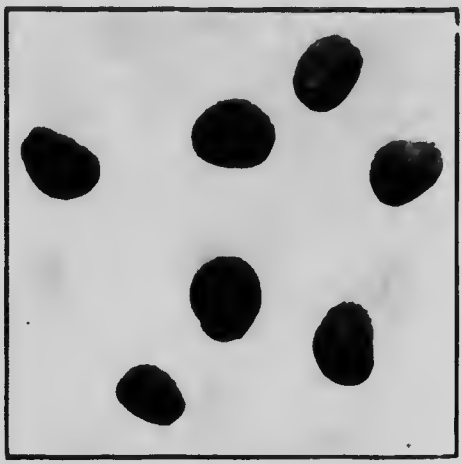

Fig. 20. Seed of Dodder.
Enlarged about 12 times.

The yellow thread-like stems of the Dodder first appear quite early in the season. They soon spread from plant to plant until a tangled mass of yellow threads covers a whole patch of clover. Badly infested fields may become entirely covered with this pest in a short time. On these yellow threads are produced dense clusters of small white flowers, which are succeeded by rounded, brown seed pods. Each plant produces a large number of seeds. The seeds vary in size from 1-24 to 1-15 of an inch; are grey or yellowish brown in color, vary greatly in shape, but are generally somewhat oval in outline, and the surface is dull and roughened.

Eradication. Great care should be taken to secure clover seed free from Dodder seed. Clover seed containing this impurity is dear at any price. Small patches should be mowed, raked and burnt early enough to prevent seeding. If, by any chance, some of the seeds are scattered before the patches are mowed, several thorough hoeings should be given in order to prevent any young plants from getting established. Badly infested fields should be plowed and put under a hoed crop for a season. Clover should not again be sown in the field for two or three years.

Paint Brush, Devil's Paint Brush or Orange Hawk Weed.

(*Hieracium aurantiacum*, L.)

This is another weed which is gaining ground in Ontario. It has been common for some time in the eastern part of the Province, but is now reported as being found as far west as Oxford County. It has been found in the vicinity of Guelph for several years. It is being dispersed as

Fig. 21. Orange Hawkweed or Devil's Paint Brush. (*Hieracium aurantiacum*)

an impurity in clover seed, and by means of its tufted seeds, which are blown about by the wind. It is a serious pest when it gets into meadows and pastures, as it spreads rapidly by runners and soon crowds out the grass. Careful watch should therefore be kept to prevent its establishment upon the farms of Ontario.

Description. It is a perennial weed of European origin, and produces slender runners, which lie near the surface of the soil. The leaves are all basal, and lie close to the ground, forming a rosette. They are broadly lance-shaped, from 2 to 6 inches in length, the "flower" is orange red in color, about 2-3 of an inch in diameter, and borne in clusters on the top of a simple, nearly leafless stem from 12 to 18 inches high. The seeds are provided with tufts of down. When found in clover seed, however, the down is usually absent. They are torpedo-shaped, about 1-12 of an inch long, and ribbed lengthwise. Ripe seeds are dull jet black in color, unripe seeds deep red.

Eradication. Paint Brush is but a shallow rooted perennial, and readily succumbs to cultivation. Infested meadows and pastures should be broken up and put under a short rotation of crops. Salt at the rate of 1½ tons per acre is recommended for the destruction of this weed. It should be scattered over the patches so as to fall on the leaves. It is claimed that it destroys the Paint Brush and improves the grass.

Fig. 22. Seed of Orange Hawkweed.
Enlarged about 12 times.

Know the Weeds.

It is very important that those engaged in farming should get to know the worst weeds, and the weed seeds most frequently found in commercial seeds. This they can do with a little trouble. Strange weeds should be sent to the Botanical Department here for identification and a collection of the most common weed seeds should be secured for reference and comparison. In order to aid farmers and others to test their

own seeds as to purity the Botanical Department will furnish at cost (25 cents) cases containing the weed seeds covered by the Dominion Seed Control Act of 1905, together with numbered lists of the names of the weed seeds they contain. These cases with lists can be had at any time by applying to the Botanical Department, O.A.C., Guelph.

Magnifying Glasses.

Fig. 23. Tripod Magnifier.

Fig. 24. Linen Tester.

Fig. 25. Watchmaker's Lens.

Fig. 26. Hand Lens.

A small magnifying glass is a necessity in identifying seeds. Several kinds of cheap glasses can be purchased at almost any jewellery store. Cuts of some of the best of these are given here. Perhaps the most convenient and cheapest glasses are the tripod magnifier and the linen tester.

Weed Identification and Seed Testing.

The Department of Botany is at the service of farmers, gardeners, seed merchants and others in the identification of weeds, weed seeds, plant diseases, grasses and economic plants. Clover and other farm seeds are tested and reported upon as to purity absolutely free of charge. Plant specimens and samples of seeds should be carefully packed and addressed with postage prepaid to the Botanical Department, Ontario Agricultural College, Guelph, Ontario.