

U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN No. 28.

WEEDS; AND HOW TO KILL THEM.

BY

LYSTER H. DEWEY,

ASSISTANT BOTANIST, BUREAU OF PLANT INDUSTRY.

[Second revision, March, 1905.]



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1905.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE CHIEF,
Washington, D. C., March 7, 1905.

SIR: I have the honor to transmit herewith copy for a second revision of Farmers' Bulletin No. 28, entitled "Weeds; and How to Kill Them," prepared under the direction of the Botanist, Mr. Frederick V. Coville, by Mr. Lyster H. Dewey, Assistant Botanist. The lessening of crops, the damage to machinery and stock, and the decrease in value of land due to weeds involve a large loss, which is sustained almost entirely by the farmers. This bulletin contains descriptions of many of the worst of these weeds, with simple directions for their extirpation, and, while no method for destroying weeds is proposed which obviates the necessity of patient effort, it is believed that the suggestions made will prove helpful to thoughtful farmers.

Respectfully,

BEVERLY T. GALLOWAY,
Chief.

Hon. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
Introduction.....	7
General methods of eradicating weeds.....	8
Weeds attracting especial attention.....	11
Prickly lettuce.....	11
Bracted plantain.....	13
Horse nettle.....	14
Buffalo bur.....	16
Spiny amaranth.....	17
Spiny cocklebur.....	18
Chondrilla.....	20
Wild carrot.....	20
Wild oat.....	21
False flax.....	22
Table of one hundred weeds.....	24

ILLUSTRATIONS.

	Page.
FIG. 1.—Spud	9
2.—Prickly lettuce	12
3.—Bracted plantain	13
4.—Horse nettle	15
5.—Buffalo bur	16
6.—Spiny amaranth	17
7.—Spiny cocklebur	18
8.—Chondrilla	19
9.—Wild carrot	20
10.—Wild oat	21
11.—False flax	23

WEEDS; AND HOW TO KILL THEM.

INTRODUCTION.

During seasons remarkable for their extreme drought, the ordinary farm crops are checked in their growth and the weeds become more conspicuous than usual. This fact, together with the attention attracted by certain species recently introduced, has awakened particular interest in the subject of weed eradication, and there has been an enlarged demand for accurate knowledge in regard to injurious weeds. This fact has been recognized by the United States Department of Agriculture, and the time and pains devoted to the study and investigation of weeds have been greatly increased in late years, while its efforts have been directed to meet the growing demand for accurate information on the subject by the frequent publication of bulletins and circulars. Similar publications have also been issued from the experiment stations, and many agricultural papers have given the subject of weeds considerable space in their columns.

For the complete eradication of a noxious plant, the production of seeds must be prevented, and if the plant is a biennial or a perennial the root, bulb, or rootstock must be killed. The processes by which seed production may be prevented or roots killed are comparatively simple in most cases, and in no case are they impracticable. It would seem, therefore, at first thought that, the best processes of weed eradication being known and practiced with reasonable fidelity, the complete eradication of some of the farmer's worst enemies might be accomplished. But in the case of weeds which have already become abundant and widely distributed, the conditions under which many of them occur are such that the farming community regards their extermination as impossible, and we can only hope for their reduction to a state of comparative harmlessness. A species newly introduced, however, might doubtless be completely eradicated if taken in time. If the farmer on whose land the first Russian thistles grew in 1873 had known the evil character of the plant and had spent a few hours destroying them in his flax field, the species might have been completely annihilated in this country and millions of dollars and years of labor saved.

The same might doubtless be said, were their histories better known, of the king devil weed of northern New York, the Paraguay bur of Florida, Georgia, and the Carolinas, the prickly lettuce of the Northern States, and many others. This emphasizes the necessity that each

landowner should be on the watch for new plants and learn their character, if possible, before they become established and assert themselves as aggressive weeds on his farm. This eradication of a species on its first appearance in a limited area forms practically the only possible method of complete and final extermination, unless public sentiment shall be aroused to a point of a more vigorous and universal destruction of weeds than has heretofore been practiced. Unless strongly supported and enforced by the people directly interested, laws for the complete extermination of weeds are of little avail, and in most cases thus far they have been found ineffectual, as is proved by the abundant crops, growing year after year, of Canada thistles in Pennsylvania, Ohio, and Michigan, of wild carrots in Connecticut, and of cockleburs and sunflowers in Kansas.

If weeds can not be completely exterminated, they may be brought under subjection, and in restricted localities this subjection may approach so near to extermination as to prevent any material damage without requiring appreciable extra labor. This is almost the ideal condition for a farm so far as weeds are concerned. There are all gradations from this condition to that of the farm so weedy that a profitable crop can not be raised and that no one will buy the land at any good price unless he has some assurance that wild onion, penny cress, horse nettle, Canada thistle, or quack grass can be killed or controlled. Any species of weeds can be subdued and controlled within the limits of an ordinary farm, and unless the value of the land is low from other causes this may be profitably undertaken.

GENERAL METHODS OF ERADICATING WEEDS.

Annuals.—If the weed, like many of our most abundant kinds, is an annual, reproducing itself from the seeds only and dying root and branch each year, it may be subjected by preventing seed production. The seeds of many annuals retain their vitality for several years, so that if they once become abundant in the soil they are likely to germinate at irregular intervals, and thus cause trouble for a long time, even though no fresh seed is introduced. In this case merely preventing the production of seed will gradually reduce the quantity of weeds and will prevent any further spreading.

For permanent pastures, lawns, and roadsides this is often the most practical method, and it is quite sufficient if persistently followed. In cultivated fields the land thus seeded should first be burned over to destroy as many as possible of the seeds on the surface. It may then be plowed shallow, so as not to bury the remaining seeds too deeply in the soil. The succeeding cultivation, not deeper than the plowing, will induce the germination of seeds in this layer of soil and kill the seedlings as they appear. The land may then be plowed deeper and the cultivation repeated until the weed seeds are pretty thoroughly

cleared out to as great a depth as the plow ever reaches. Below that depth—8 to 10 inches—very few weed seeds can germinate and push a shoot to the surface. A thousand young seedlings may be destroyed in this manner by the cultivator with less effort than a single mature plant can be destroyed, and every seedling killed means one less weed seed in the soil. Barren summer fallowing is often practiced to clear out weedy land by the method just described; but usually corn, potatoes, cotton, cabbages, or beets may better be grown, giving a profitable return for the extra cultivation. The best results can be obtained, of course, with crops that allow cultivation during the greater part of the season, and that do not shade the soil too much, as the direct rays of the sun heating the surface of the soil aid materially in the germination of many seeds. Good results have been obtained by spraying with 2 to 4 per cent solutions of copper sulphate to destroy charlock or wild mustard in growing grain, but the application of chemicals can not be recommended for killing annual plants where cultivation is possible.

As annual weeds usually thrive best in soil that has been broken but is not occupied, it is evident that broken land should not be permitted to remain idle. Abundant crops of annual weed seeds are matured every fall on potato and corn land and in stubble fields, where a profitable crop of crimson clover or winter oats or rye might have



FIG. 1.—Spud.

been grown. A little grass seed raked in on bare hillsides will often keep down annual weeds and will at the same time prevent washing. Mowing the roadside two or three times during the summer will subdue the dog fennel and ragweed. Mowing the stubble about two weeks after harvest in grainfields that have been seeded to grass or clover will check the annual weeds and at the same time produce a mulch that is very beneficial to the seeding during the August drought.

Biennials.—Biennials, such as burdock, wild carrot, and bull thistle, store up nourishment in thickened roots during the first year of growth and during the second year they produce seed and die. Many species which are ordinarily true biennials will live three years, or possibly longer if seed production is prevented by mowing or cutting the stem above the crown of the root. In fact, mowing or cutting off the main stem often induces it to branch out at the base and send up several stalks in place of the one. Cutting the roots below the crown usually kills them. If this work is to be done by hand with a hoe, grub hoe, or spud, as is often the case with bull thistles on new ground, it can be done most effectively and with least labor in the fall, during the first year of growth. The stools or rosettes of leaves, close to the ground, often give little suggestion of the prominent seed stalk to be grown the following year; but they are sufficient to indicate to the observing eye

the presence of weeds. The root at this time is more tender, and hence more easily cut than in the mature plant, and one does not have to strike so deep to be sure of killing it. In sod ground a spud—a tool like a chisel on the end of a fork handle (fig. 1)—may be used to much better advantage than a hoe for cutting thickened roots below the surface.

Biennial weeds are readily killed by cultivation such as is given to hoed crops, and the seeds may be cleaned out of the land by this method. The weeds of this class are usually most abundant in old pastures, along roadsides, and in waste places where the soil is seldom disturbed. The weeds must be destroyed in these places if the work of clearing the seed out of cultivated fields is to be made effective.

Perennials.—Perennial weeds reproduce themselves by seeds and also propagate by some form of perennial underground root or stem, as the crown-forming root of dandelion and ribgrass, the creeping root of Canada thistle and bindweed, the rootstock of couch grass and smartweed, the corm or solid bulb of nut grass and chufa, and the bulb of wild garlic. A few plants sometimes classed as noxious weeds have runners above ground, as Bermuda grass and cinquefoil. To destroy perennial weeds seed production must be prevented and the underground portion must be killed. Seed production may be prevented by mowing when the first flower buds appear, the same as in the case of annuals or biennials. The best methods for killing the roots or rootstocks vary considerably according to the soil, climate, character of the different weeds, and the size of the patch or the quantity to be killed. In general, however, the following principles apply:

1. The roots, rootstocks, bulbs, etc., may be dug up and removed, a remedy that can be practically applied only in small areas.

2. Salt, coal oil, or strong acid applied so as to come in contact with the freshly cut roots or rootstocks destroys them for some distance from the point of contact. Crude sulphuric acid is probably the most effective of comparatively inexpensive materials that can be used for this purpose, but its strong corrosive properties render it dangerous to handle. Carbolic acid is less corrosive and nearly as effective. Arsenite of soda, a dangerous poison, is sometimes effective, applied as a spray on the growing weeds.

3. Roots may be starved to death by preventing any development of green leaves or other parts above ground. This may be effected by building straw stacks over small patches, by persistent, thorough cultivation in fields, by the use of the hoe or spud in waste places, and by salting the plants and turning on sheep in permanent pastures.

4. The plants may usually be smothered by dense sod-forming grasses or by a crop like hemp, buckwheat, clover, cowpeas, or millet that will exclude the light.

5. Most roots are readily destroyed by exposing them to the direct action of the sun during the summer drought, or to the direct action of the frost in winter. In this way plowing, for example, becomes effective.

6. Any cultivation which merely breaks up the rootstocks and leaves

them in the ground, especially during wet weather, aids in their distribution and multiplication, and is worse than useless, unless the cultivation is continued so as to prevent any growth above ground. Plowing and fitting corn ground in April and May, and cultivating at intervals until the last of June, then leaving the land uncultivated during the remainder of the season, is one of the best methods that could be pursued to encourage the growth of couch grass, Johnson grass, and many other perennial weeds.

WEEDS ATTRACTING ESPECIAL ATTENTION.

The influence of the Russian thistle agitation is plainly manifest in the attention given to certain weeds during recent seasons. Nearly one-half of those received at the United States Department of Agriculture with requests for naming and information belongs to species which are more or less prickly, and many of them have been mistaken for the Russian thistle. While but few complaints have been received in regard to the older well-known weeds, such as ragweed, dog fennel, and shepherd's purse, it is not to be supposed that these are becoming less abundant or less troublesome. People are generally familiar with these common weeds—too often so familiar that the weeds have come to be accepted as a matter of course and a necessary evil. Complaints about Canada thistle, couch grass, and Johnson grass indicate that these weeds, even when well known, can not be disregarded; but in general it is the new weed coming as an added evil that attracts attention.

Aside from the Russian thistle, the following ten species of weeds in the order given have received the most notice, according to the reports received at the United States Department of Agriculture:

Prickly lettuce (<i>Lactuca scariola</i>).	Dagger cocklebur (<i>Xanthium spinosum</i>).
Bracted Plantain (<i>Plantago aristata</i>).	Chondrilla (<i>Chondrilla juncea</i>).
Horse nettle (<i>Solanum carolinense</i>).	Wild carrot (<i>Daucus carota</i>).
Buffalo bur (<i>Solanum rostratum</i>).	Wild oat (<i>Avena fatua</i>).
Spiny amaranth (<i>Amaranthus spinosus</i>).	False flax (<i>Camelina sativa</i>).

PRICKLY LETTUCE (*Lactuca scariola*).¹

Distribution.—The prickly lettuce is also known by the common names milk thistle, English thistle, and compass plant. It is a native of Europe. The first record we have of it in this country is in the fifth edition of Gray's Manual (1868), where the locality is given as "waste grounds and roadsides, Cambridge, Mass." About ten years later it was observed in the region of the Great Lakes, and now has become widely distributed throughout nearly all the States from Massachusetts to Virginia and westward to the Missouri River, and has crossed the mountains to Idaho, Oregon, and Washington. It is most abundant and troublesome in the States bordering on the Ohio River and the Great Lakes.

¹ Later study has proved this to be a variety, *Lactuca scariola integrata* Gren. et Godr. The true *L. scariola* L. is rare in this country.

Description.—The prickly lettuce is closely related to the common garden lettuce, which it resembles in the seed-bearing stage (fig. 2, *a*). It is an annual, sometimes doubtless a winter annual, partaking of the character of a biennial. The stem, smooth or with small, scattered prickles, rises to a height of 2 to 6 feet, bearing a few lateral branches and a large open panicle of flowers. The flowers are small, one-fourth to one-half inch in diameter, yellow, and inconspicuous, as only a few are open at a time. The plant begins to bloom in July and produces a few blossoms each morning thereafter until killed by the frost.

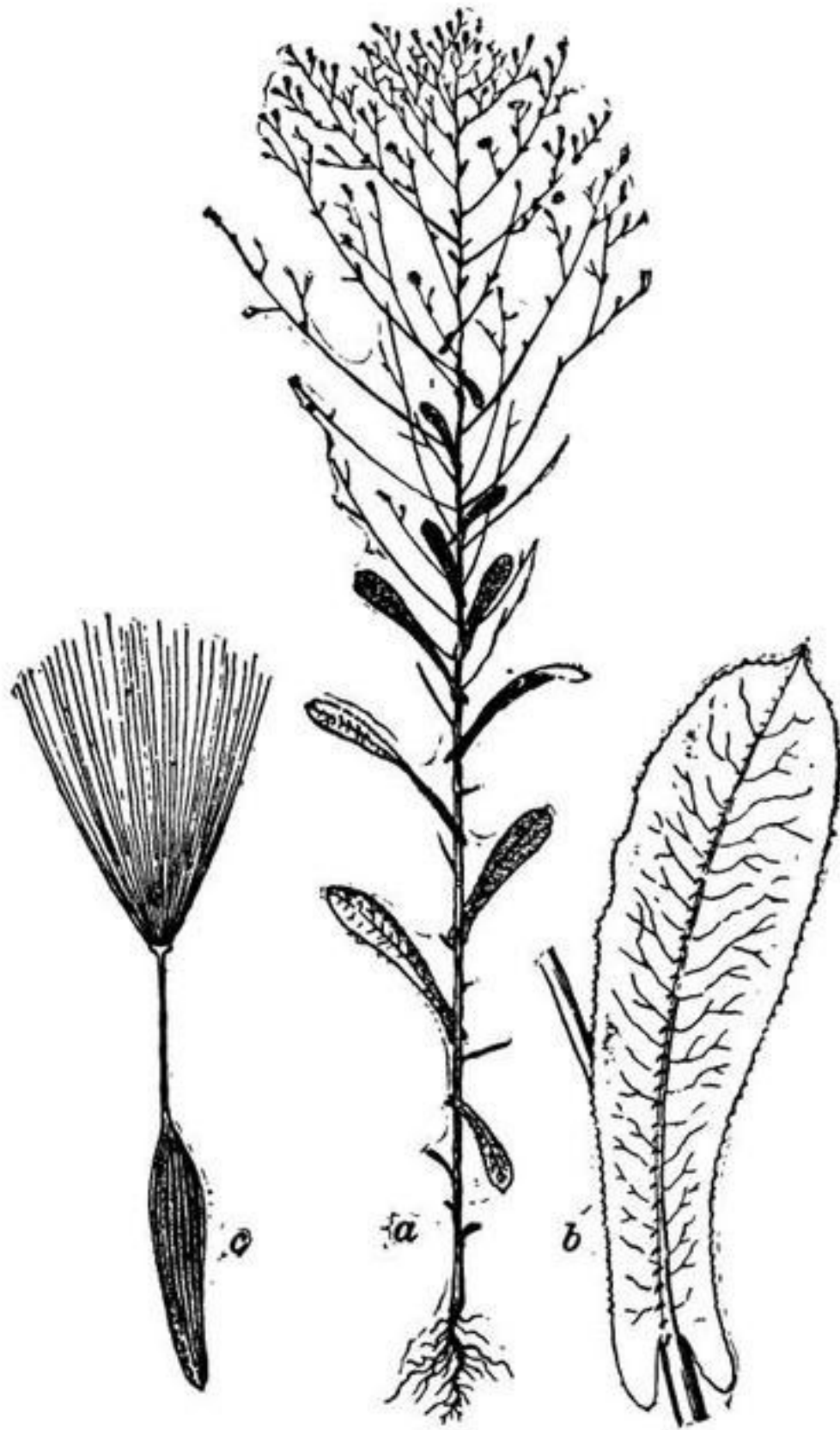


FIG. 2.—Prickly lettuce.

The seed, or strictly speaking the achene—the seed with the close-fitting case which contains it—is dark brown in color, flattened, between oblong and lance-shaped in outline, about one-sixth of an inch long and one-fourth as broad. On each of the flat faces there are 5 or 6 ridges lengthwise, which are finely roughened. At the apex is a slender, thread-like beak, nearly as long as the body of the achene, bearing a tuft of fine white hairs about as long as itself (fig. 2, *c*). In the fruiting stage the tufts of the 10 to 15 seeds which grow in one head spread out so as to form a white, gauzy ball of down, like that of the dandelion, but smaller and less dense. A single average plant has been estimated to bear more than 8,000 seeds. The leaves are oblong and without stalk, the blade clasping the main

stem by a base with two ears. They are prickly along the wavy margins and along the midrib on the back (fig. 2, *b*). The principal leaves on the stem have the unusual habit of twisting so that the upper part of the blade becomes vertical. They also point north and south, hence the name compass plant. The white, milky juice has suggested the name milk thistle. Both of these names are incorrectly used in this connection, as they are properly applied to very different plants.

Unlike most annual weeds, the prickly lettuce is very troublesome in meadows and permanent pastures. Clover intended for a seed crop is

often entirely ruined. Oats and other spring grain crops suffer more or less damage. When it is mixed with grain its milky juice is very troublesome in thrashing.

Remedies.—Sheep and sometimes cattle will eat the young prickly lettuce, and in some localities their services have been found very effective in keeping it down, especially in recently cleared land where thorough cultivation is impossible. Repeatedly mowing the plants as they first begin to blossom will prevent seeding and eventually subdue them. Thorough cultivation with a hoed crop, by means of which the seed in the soil may be induced to germinate, will be found most effective. The first plowing should be shallow, so as not to bury the seeds too deep. Under no circumstances should the mature seed-bearing plants be plowed under, as that would only fill the soil with seeds buried at different depths to be brought under conditions favorable for germination at intervals for several years. Mature plants should be mowed and burned before plowing. The seed appears as an impurity in clover, millet, and the heavier grass seeds, and the plant is doubtless most frequently introduced by this means. As the seed may be carried a long distance by the wind the plants must be cleared out of fence rows, waste land, and roadsides.

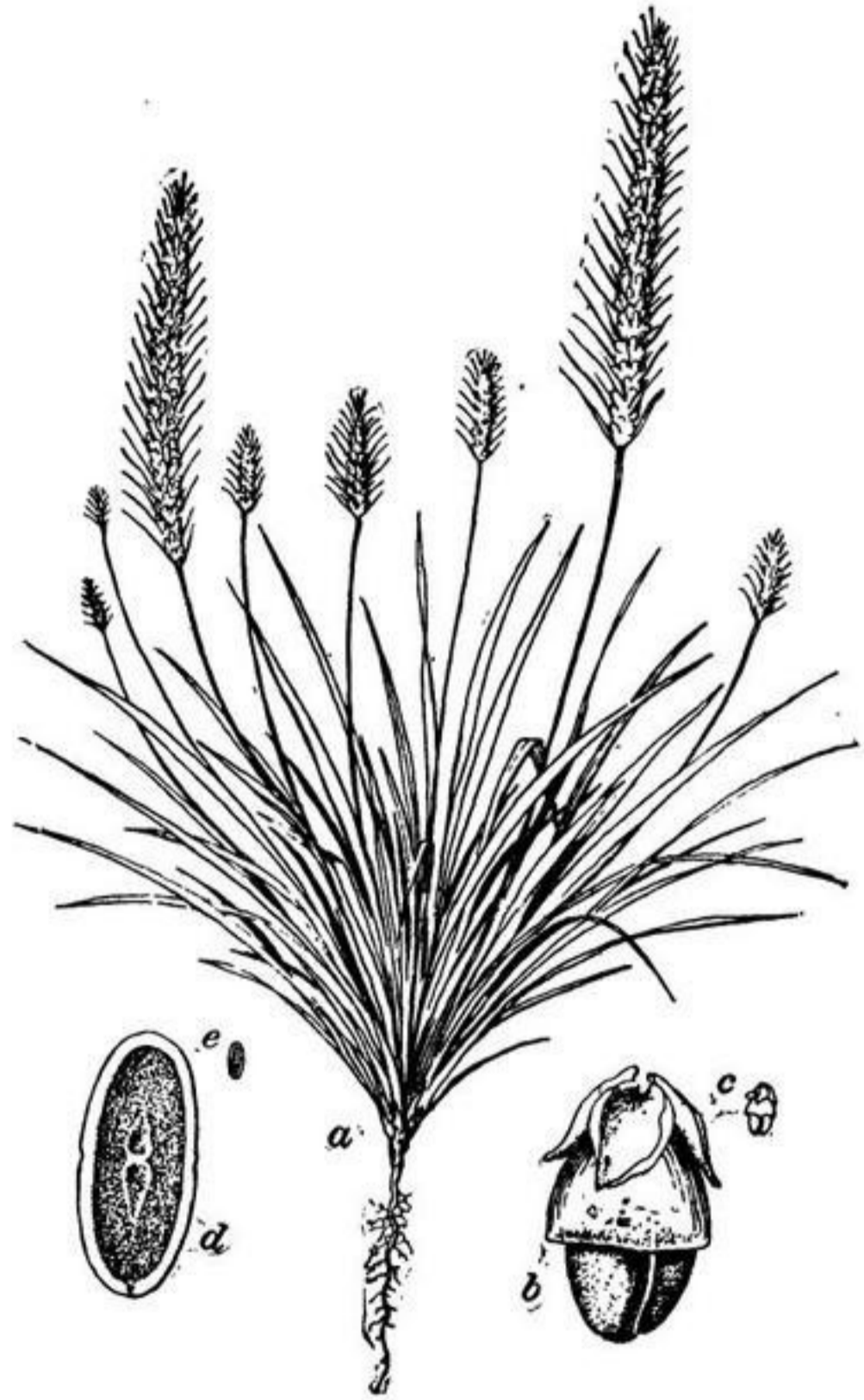


FIG. 3.—Bracted plantain.

BRACTED PLANTAIN (*Plantago aristata*).

This plant, although a native of the Mississippi Valley and well known to botanists since the beginning of the present century, is practically new as a weed. In recent years its seeds have been found in increasing frequency as an impurity in clover seed, but it is not named in any of the older lists of weeds of the United States. It has appeared in abundance in meadows, pastures, and lawns in many localities from Illinois to Maryland. Although generally reported as new, it had doubtless existed before in small quantity and with less robust habit in many

of these places. In some instances, however, it is known to have been introduced during recent years in lawn grass seed. Its seeds are known to seedsmen as western buckhorn or western ripple.

Description.—The bracted plantain is an annual, sometimes a winter annual, and in some cases the roots are apparently perennial. The leaves are not killed even by severe frosts. It is closely related to the lance-leaved plantain, or rib grass, and to the woolly plantain. The leaves, appearing almost like a tuft of rather thick, dark-green grass leaves, spring from the apex of a somewhat thickened root (fig. 3, *a*). The seed-bearing stems, 5 to 12 inches in height and numbering 5 to 25 on each plant, as in other plantains, are leafless and naked near the base. At first the flower spike is contracted and short, but at maturity it is 2 to 5 inches long and crowded with small flowers (fig. 3, *a*). Below each flower is a narrow green bract one-half to one inch long, giving the flower spike a plume-like appearance. Each flower produces two seeds in an egg-shaped capsule which opens transversely, the dome-shaped lid with the persistent, papery corolla lobes falling away with the two seeds hanging in it (fig. 3, *b, c*). This kind of parachute enables the seeds to be carried a short distance by the wind. They usually fall near the parent plant, hence after the first introduction the bracted plantain grows in dense colonies, covering the ground so thickly as to choke out all other vegetation. An average plant produces about 15 flower spikes, and an average spike bears about 100 flowers or 200 seeds, making a total of about 3,000 seeds to the plant. The seeds are dark brown or nearly black, oblong, concavo convex, rounded at the ends, and about one-twelfth of an inch long (fig. 3, *d, e*). They are most likely to be found as an impurity in clover seed and the heavier grass seeds.

Remedies.—The bracted plantain is so low and inconspicuous and its leaves are so much like those of grass that it is not easily discernible until the flower spikes appear. Hand pulling and burning is perhaps one of the best remedies where the plants are not too abundant. If the land has become thoroughly seeded a series of hoed crops will probably be necessary to clear it out. In permanent pasture, mowing the plants as the seed stalks first appear will keep them in subjection. The mowing will have to be repeated several times, however, as the bracted plantain sends up seed stalks from May until November.

The reports concerning this plant indicate that, if unchecked, it is likely to prove as troublesome as the rib grass which has become so widely distributed, chiefly in clover seed. The seeds of the bracted plantain are of nearly the same size and shape as those of the rib grass, and as they ripen throughout the same season—June to November—they are just as likely to be harvested and thrashed with the clover seed.

HORSE NETTLE (*Solanum carolinense*).

Distribution.—The horse nettle is native in the southeastern part of the United States, as its specific name indicates. It is now found in

nearly all of the States east of the Missouri River, and is slowly increasing its territory. As the seeds are seldom found as impurities in commercial seeds, and as they have no special adaptation to aid in distribution except that the berries are sometimes eaten by birds, the horse nettle spreads rather slowly. When it has once obtained a foothold, however, it ranks among the worst weeds of this country as regards difficulty of eradication.

Description.—Horse nettle is closely related to the common potato, which it much resembles in its white or purple flowers and yellow berries. The plants are 6 to 20 inches in height, loosely branching, rough, with short stiff hairs, and armed with yellow prickles (fig. 4, *a*). The leaves are oblong and irregularly lobed like those of the white oak. The midrib and larger veins bear prickles like those of the stem, but smaller. The plant is reproduced by the seeds (fig. 4, *c*, *d*), which are borne in the berries, and it is abundantly propagated, also, by slender, perennial running roots.

The horse nettle is not eaten by any kind of farm stock, even when dried and made into hay, being avoided on account of its sharp prickles and rough, pubescent foliage. Ordinary cultivation has comparatively little effect on it, often tending to multiply and improve its growth rather than to subdue it. It is more or less troublesome in nearly all crops and in all soils, but is worse in sandy or loose, friable soils, which are easily penetrated by the long roots.

Remedies.—The production of seed may be prevented by keeping the plants mown. The roots must be killed, however, and this task is about as difficult as killing the root of the Canada thistle; in fact the methods which are most successful in destroying the Canada thistle may be used with advantage in destroying the horse nettle.

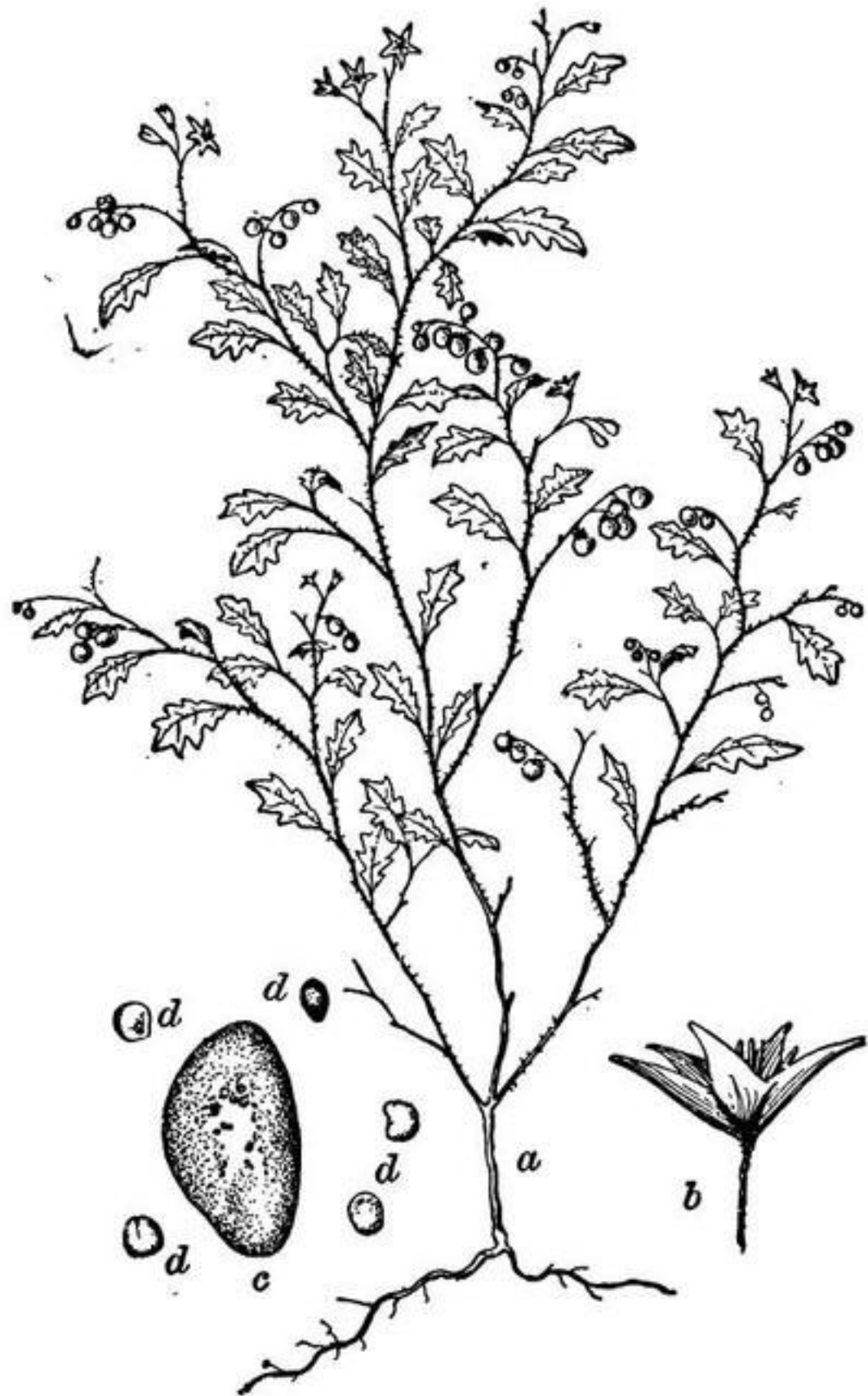


FIG. 4.—Horse nettle.

Clean cultivation and grubbing or spudding sufficient to prevent any development above ground will starve out the roots. Oats, barley, or millet sown thickly on well-tilled land will weaken the roots, preventing much growth above ground. Immediately after these crops are harvested the land may be plowed and then harrowed frequently until time for sowing crimson clover or winter rye. This will induce the germination of weed seeds, and at the same time expose some of the roots to be killed by the sun. Crimson clover, hairy vetch, rye, or winter oats may

be sown to choke down the growth of horse nettle and other weeds during the fall and early spring, to furnish winter pasturage, and then to be plowed under as a green fertilizer. A hoed crop following, if kept well cultivated, will clear out most of the remaining weeds. The plowshare used in these operations should be kept sharp, so as to cut a clean furrow, otherwise the roots are likely to be dragged and scattered about the field.

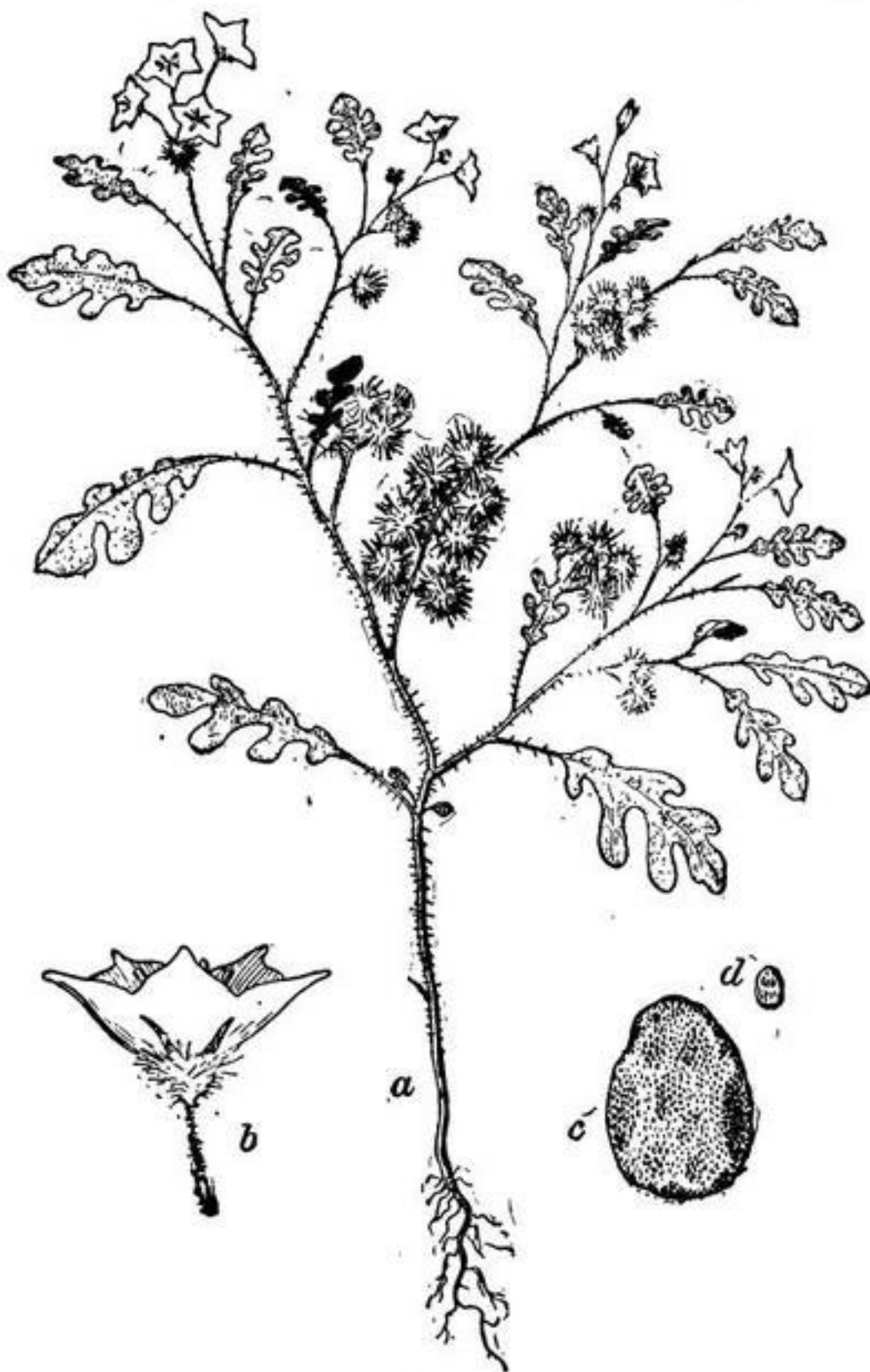


FIG. 5.—Buffalo bur.

BUFFALO BUR (*Solanum rostratum*).

Distribution.—This plant is also native in this country, originally growing on the western plains, close to the mountains, from Mexico northward. It was doubtless spread to some extent by the buffaloes, as it has been

found along the buffalo wallows. While the horse nettle has been slowly traveling westward the buffalo bur has been working eastward, until it is now found in many States east of the Mississippi River, and has even crossed the oceans, threatening to become a troublesome weed in Germany, England, and Australia.

Description.—Buffalo bur is related to the potato and closely resembles the horse nettle, but its spines are stouter and more abundant and its flowers are yellow. Instead of the smooth, yellow berries of the horse nettle and potato, moreover, it has spiny burs, somewhat resembling those of the burdock at first, but developing at maturity into nearly spherical, spiny balls, filled with black, irregular seeds (fig. 5, *c*, *d*). These burs, becoming attached to passing animals, are readily scattered.

The plant has a lighter, more bushy habit than the horse nettle, and is often blown about as a tumbleweed in the prairie region.

Remedies.—Buffalo bur is an annual, easily subdued by preventing the production of seeds. This may be done by mowing as often as the yellow blossoms appear. The seeds are less abundant than those of most of the bad annual weeds, and they are not often ripe, at least in the northern part of its range, until after the hurrying work of harvest is over. The buffalo bur is seldom troublesome in fields where thorough cultivation is practiced. The seeds may be expected as impurities in alfalfa and clover seed grown in the West. So far as known, however, in the East this weed has appeared first in waste places in cities and towns and has spread thence to the surrounding farms.

In this respect the buffalo bur is typical of a large number of introduced weeds, which are neglected on the waste land in villages and

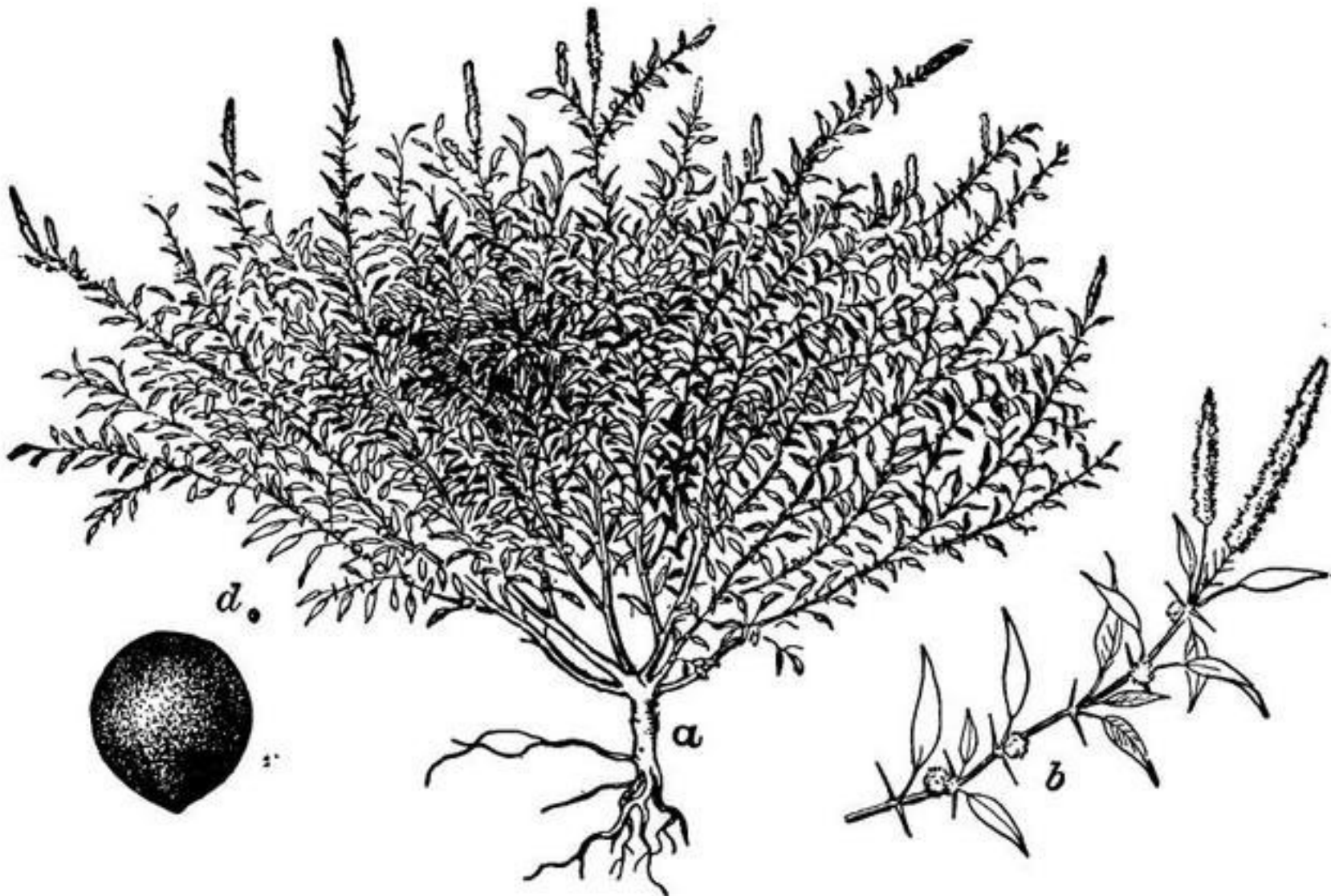


FIG. 6.—Spiny amaranth.

cities where they do no direct and manifest injury. The Canada thistle and spiny amaranth are growing on many vacant lots in Washington. The prickly lettuce first became abundant in Michigan and Ohio in the cities of Detroit and Toledo. The Russian thistle is now growing unchecked, save by the occasional botanical collector, in many localities in and about Chicago. Similar instances might be multiplied; in fact, probably the majority of the cities and towns of this country are harboring noxious weeds which should be destroyed in simple justice to the farming communities which aid most directly in supporting the prosperity of these towns.

SPINY AMARANTH (*Amaranthus spinosus*).

Distribution.—The spiny amaranth, or prickly careless weed as it is often called, is native in tropical America, and seems to have been first

introduced into this country along the southeastern coast. It is now more or less abundant in most of the States south of the Potomac and Ohio rivers, and is spreading with considerable rapidity. It resembles the common tumbleweed (*Amaranthus graecizans*) and other amaranths or careless weeds of the neglected cornfield and garden.

Description.—Spiny amaranth is an annual with a succulent stem, branching profusely throughout and attaining a height of 15 to 30 inches (fig. 6, *a*). The leaves are dark-green, lance-ovate, smooth, about $1\frac{1}{2}$ inches long. At the base of the leaf stalk in most cases are two slender sharp spines, one-fourth to one-half inch long (fig. 6, *b*). The small, green flowers are crowded in slender spikes at the ends of the



FIG. 7.—Spiny cocklebur.

branches and in dense clusters in the axils of the leaves (fig. 6, *b*). The seeds, borne singly in the flowers, but aggregating several thousand on an average plant, are black and shining, round or slightly flattened, and about one-twenty-fourth of an inch in diameter (fig. 6, *c*, *d*). They might be found in clover seed, millet, or grass seeds. The plant grows in broken ground like other amaranths, but, unlike most of them, it also grows and even spreads aggressively in strong blue-grass sod. No farm stock will eat it, at least after the spines begin to develop.

Remedies.—Like other annuals it may be subdued by preventing the production of seed. It would readily succumb to thorough cultivation, as it grows rather slowly at first and does not

produce seed until midsummer or later. Mowing or grubbing up the plant before the flower spikes develop is probably the best method of eradication in permanent pastures. Potato land and corn stubble may be plowed or thoroughly disked after the crop is harvested and a winter crop sown which will keep down the weeds.

SPINY COCKLEBUR (*Xanthium spinosum*).

Distribution.—This plant, often called dagger cocklebur and well deserving that name as one of the most spiny of American weeds, is a

native of tropical America. It has been introduced into many parts of this country, in some places doubtless having been spared, or possibly even cultivated, at first, for the striking effect produced by its shiny, dark-green foliage and its slender, bright-yellow spines.

Description.—The stem branches from the base and grows to the height of 1 to 3 feet, bearing many narrowly ovate leaves about $1\frac{1}{2}$ inches long, sometimes slightly toothed near the base, rather thick in texture, the upper surface dark-green with a whitish midrib, and the lower white with woolly pubescence (fig. 7, *a, b*). At the base of the leaf stem on one side is a three-pronged spine about an inch long. On the other side is an inconspicuous flower, followed by an oblong, spiny bur like those of the common native cockleburs, but smaller, about one-half inch long (fig. 7, *b, c*). Each bur contains two seeds. The seeds are therefore less abundant than those of most troublesome annuals, but this apparent defect is counterbalanced by the fact that they retain their vitality many years and that the hooked spines on the burs provide for their wide distribution by passing animals. As they remain inclosed in the hard, spiny bur, they are seldom found in commercial seeds. Although this weed is an annual it is most troublesome in pastures and meadows, spreading even in strong sod.

Remedies.—The growth of spiny cocklebur at first is slow and, as it needs light and room to develop into a robust plant, it may be choked down by any quick-growing crop that will crowd and shade it. In permanent pastures and waste places, where it flourishes best, it could doubtless be eradicated in time by mowing the plants about twice each year, in August and September, or by cutting them up with a hoe or spud in May and June. As the seeds often lie dormant in the thick-walled bur (fig. 7, *d*) several years before germinating, it might require a like period to exterminate a patch by this method; but the plants would continually be growing less in number, and the labor correspondingly lighter.

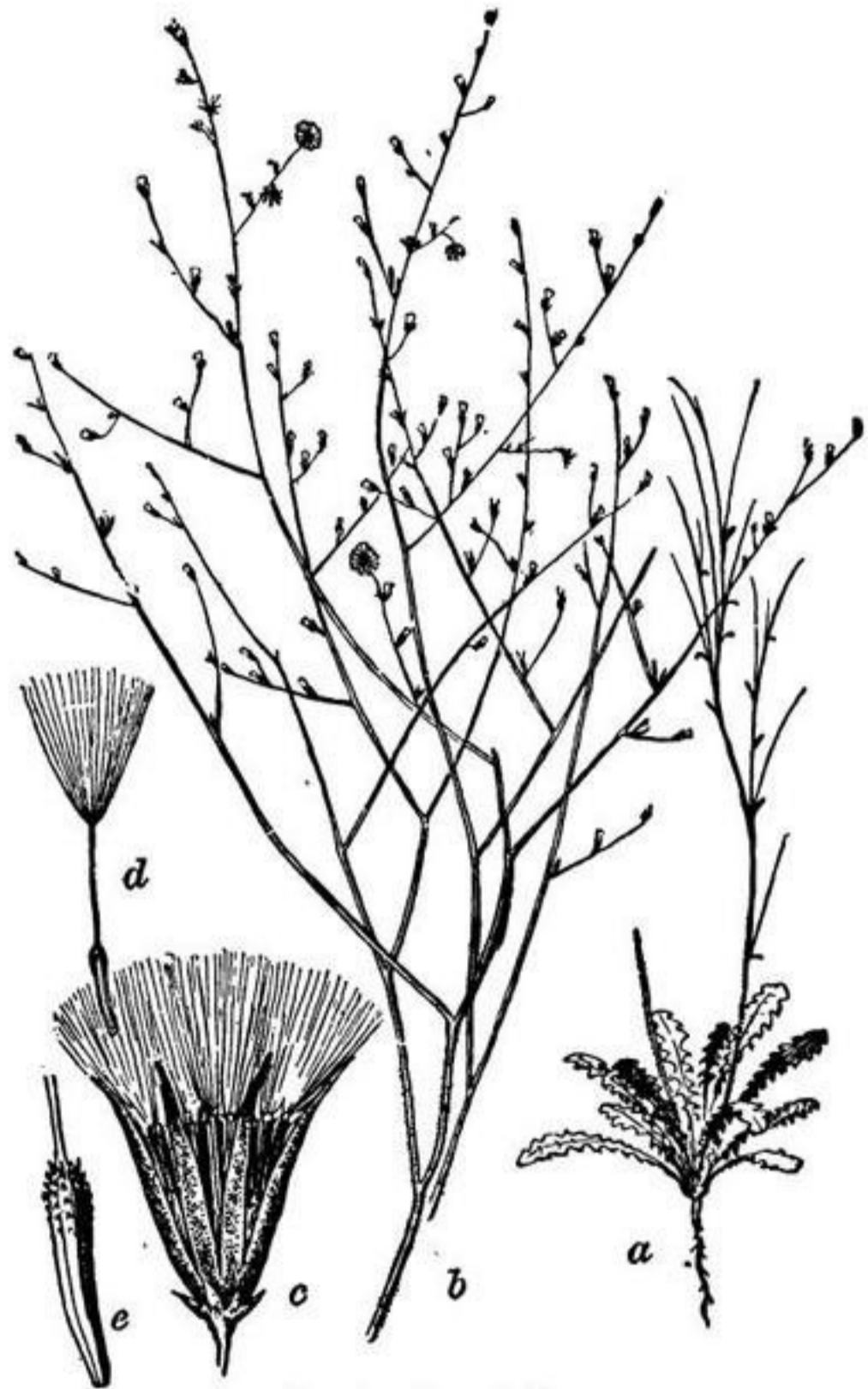


FIG. 8.—Chondrilla.

CHONDRILLA (*Chondrilla juncea*).

Distribution.—This is an almost leafless, branching biennial weed, introduced from Europe and now abundant on clay knolls in the middle Atlantic coast region and in northern West Virginia.

Description.—Chondrilla has a rosette of root leaves similar to those of the dandelion, but the rigid, branching stems are bare, except for the inconspicuous linear bracts and the small yellow flowers (fig. 8, *a, b*). The lower part of the main stem is clothed with small prickles. The plant begins to bloom in June or July and continues to flower and produce seeds until killed by frost. The achenes (cases containing the

seeds) are nearly black, oblong and prismatic in form, roughened at the summit with small projections (fig. 8, *e*), from among which springs a slender beak bearing a tuft of fine white hairs, or pappus, at its apex (fig. 8, *d, e*). This pappus enables the achenes to be carried a considerable distance by the wind.

Remedies.—As the plant is usually most abundant in neglected pasture land where the soil is somewhat impoverished, it seems probable that cultivation and a supply of fertilizer would soon subdue it. Left unchecked it not only occupies all the space where the grass has become thin, but encroaches aggressively on strong grass sod.

WILD CARROT (*Daucus carota*).

Distribution.—The wild carrot is by no means a new weed, but it is spreading to new local-

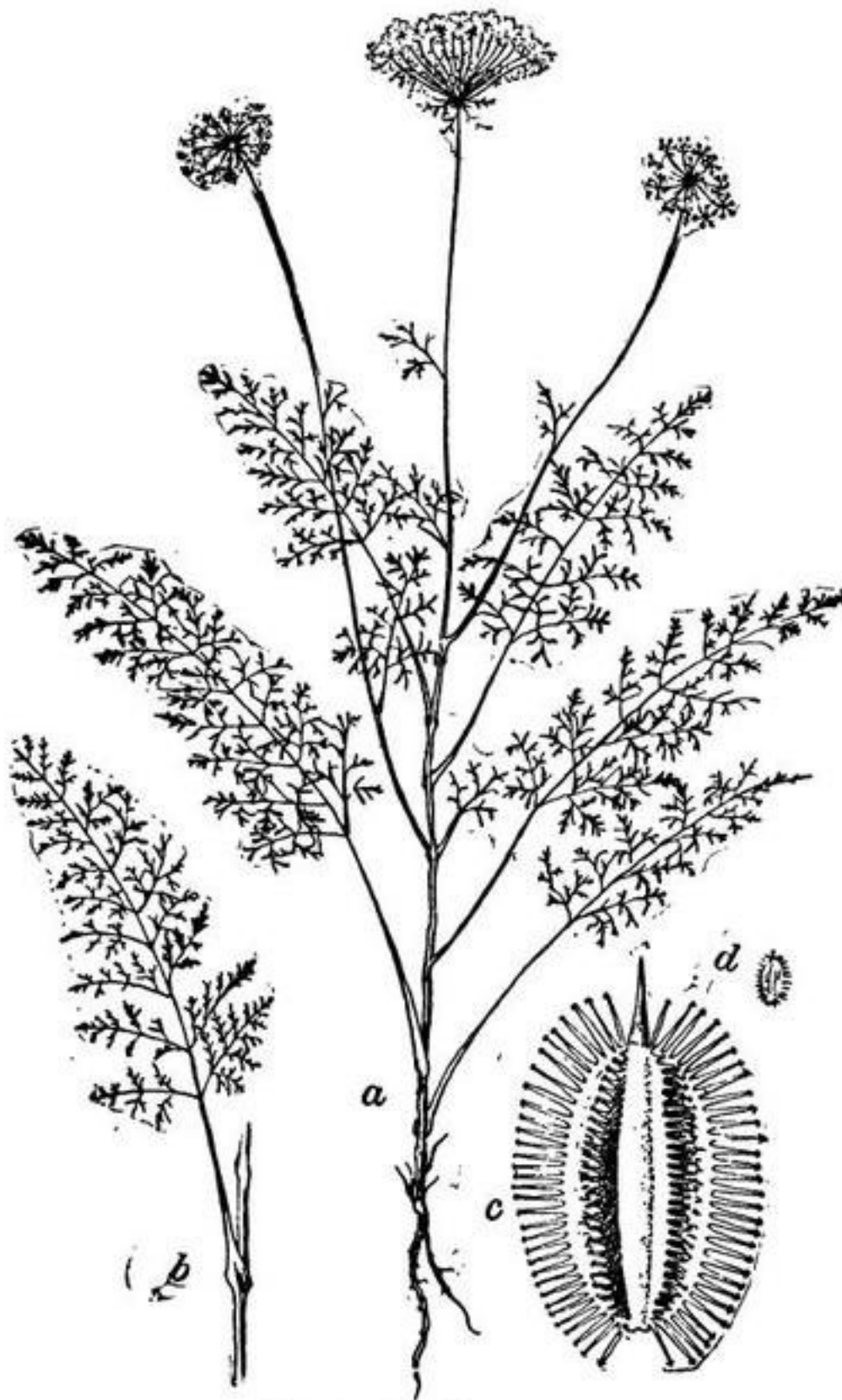


FIG. 9.—Wild carrot.

ities, and has consequently been the object of considerable attention during recent years. It is one of the most aggressive weeds of the Eastern States, and is rapidly spreading westward, having been found at several points west of the Mississippi River. It seems to thrive well in nearly all kinds of soils, and in all climates from Maine to Georgia. As capable of becoming troublesome over a wide area, therefore, the wild carrot is probably one of the worst weeds that we have.

Description.—The flat cymes of white flowers, usually with a small purple flower in the center of each cyme, appear from June until September,

and they are followed by contracted, cup-shaped clusters of small bur-like, one-seeded fruits, usually called seeds (fig. 9, *c*, *d*). These seed fruits are readily attached to passing animals and are distributed in that way, or they often remain undisturbed on the plant until winter and are then blown across the snow. Too often they are found in poorly cleaned clover and grass seed. The seeds, inclosed in their hard, spiny coat, retain their vitality for several years, and when once abundant in the soil they are likely to cause trouble during several seasons, even though fresh seeding is prevented.

Remedies.—In permanent pasture the persistent mowing of the plants as often as the flower appears will eventually destroy them. They will continue to branch out from the base after each cutting until finally exhausted, so that the first mowing will often appear to increase rather than diminish their numbers. The root may be cut off with a spud some distance below the surface of the ground, a process that usually kills them at once. Pulling the plants by hand when the ground is wet, although somewhat laborious, is one of the surest methods of eradication. Sheep eating the young plants will aid considerably in keeping them down. The wild carrot is seldom troublesome in cultivated fields, which indicates that even moderate cultivation will partly subdue it, and that thorough cultivation of the fields, accompanied by the destruction of the weeds in waste places, would reduce it to comparative harmlessness.



FIG. 10.—Wild oat.

WILD OAT (*Avena fatua*).

Origin.—Whether the wild oat and the wild carrot are retrograde developments from the cultivated oat and carrot are questions still unsettled, but doubtless both were introduced into this country as weeds, and they have certainly been propagated here as such. If the wild oat or the wild carrot has appeared in the cultivated field, it is because the seed of the wild oat or the wild carrot has been sown. The seeds of both are nearly like those of the cultivated plants, and in case of the oat the seed of the wild plant may easily be sown mixed with good oats.

Distribution.—The wild oat has become most abundant and troublesome in the regions from Minnesota to Oregon and California where spring wheat is grown. In the East, where winter wheat is grown and some regular rotation of crops generally practiced, it is almost unknown. It is, of course, most troublesome in oat crops, not only crowding out the true oats, but also reducing the grade of the thrashed grain by the admixture of its inferior lighter grains. Their stiff, twisting awns sometimes cause trouble by irritating the nostrils and mouths of animals.

Description.—Three species of wild oats have been introduced into this country, all quite similar in appearance and all annual weeds. The most common species, *Avena fatua*, is readily distinguished from the cultivated oat by its usually larger size and earlier and irregular ripening, by the separate florets falling as soon as ripe, and by the long, stout, twisted and bent awns borne by the first and second florets (fig. 10, *c*, *d*). The floral glume, inclosing the grain, is hairy below the middle, usually nearly black at maturity (fig. 10, *d*), and is harder and tougher than that of the cultivated oat, while the grain is very light in weight, much lighter than in any of the cultivated varieties of white oats.

Remedies.—The grain retains its vitality much longer than does the common oat, and may remain buried in the soil several years without germinating. It germinates best when there is an abundance of moisture and the soil is warm. To clear the seed out of the soil, therefore, the land should be stirred when it is warm and as moist as will permit good cultivation. It is understood, of course, that cultivating the land when wet, especially in clay soils, is bad policy, and it is advocated in this case only for a special purpose. The clearing of the soil can be accomplished in conjunction with the cultivation of corn or root crops. Where winter wheat and rye may be grown profitably the land should be plowed as soon as possible after the spring crop is harvested, and harrowed about once a week until time for sowing the wheat or rye. Oats should be left out of the rotation so far as may be until the wild oats are subdued, as the latter growing among the cultivated oats are difficult to detect for removal, and after harvesting and thrashing it is practically impossible to separate completely the two kinds of grain. In other grain crops the wild oat may be pulled or cut and removed by hand before maturity in the same manner as wild mustard or rye. Where it is very abundant, however, this plan would be too laborious to pursue with profit, and the crop would better be mown for hay or plowed under. No oats should be sown coming from farms where the wild oat is known to grow.

FALSE FLAX (*Camelina sativa*).

Origin.—This plant, a member of the mustard family, has been introduced from Europe, where it has long been known as a troublesome weed in flax fields. It resembles flax somewhat, but has much smaller flowers and seeds, and its seed capsules are pear-shaped instead of spherical (fig. 11, *a*). It is an annual, like shepherd's purse, pepper-

grass, and most of the other troublesome weeds of the mustard family. In the northern part of its range, at least, the seeds are seldom matured except on plants which grow as winter annuals. The seeds germinating in the fall produce a rosette of leaves in the same manner as the dandelion. In the spring a seed stalk is developed from the midst, and after the seeds are matured the plant dies. The seeds germinating in the spring produce plants that usually blossom during the same season, but seldom mature seeds, being killed too early by the frost.

Distribution.—The false flax has become abundant and troublesome as a weed in some parts of Michigan and Minnesota. It is also present in several other States, but not yet abundantly enough to cause any appreciable damage. It is most troublesome in flax and in winter wheat and rye. Pastures and meadows are also injured to a considerable extent. The seed (fig. 11, *c*, *d*) occurs as an impurity in flaxseed and clover seed, and in some of the grass seeds, especially timothy.

Remedies.—Where the false flax has become abundant it may be necessary to omit winter wheat and rye from the rotation for a few years and raise crops that will permit cultivation in autumn. Spring grain crops may be grown, or hoed crops may occupy the ground during the summer. Hoed crops may be employed to best advantage, as the cultivation given to these crops will induce the false-flax seed to germinate and thus clear the land sooner. In pastures and meadows the weeds may be pulled if they have not become too abundant; but if this work has been long neglected it will probably be necessary to plow and cultivate the land.

The false flax, like most of the other weeds here treated, is not yet one of our "worst weeds." In fact, where it is most abundant there are probably other weeds that outrank it in bad qualities. This and most of the others are either of comparatively recent introduction, or are as yet troublesome only in rather restricted localities. They are spreading and becoming more abundant nearly every year, however, and a knowledge of their habits of growth and noxious characters may aid in their detection and suppression in new localities, and possibly lead to their subjection in the areas already infested.

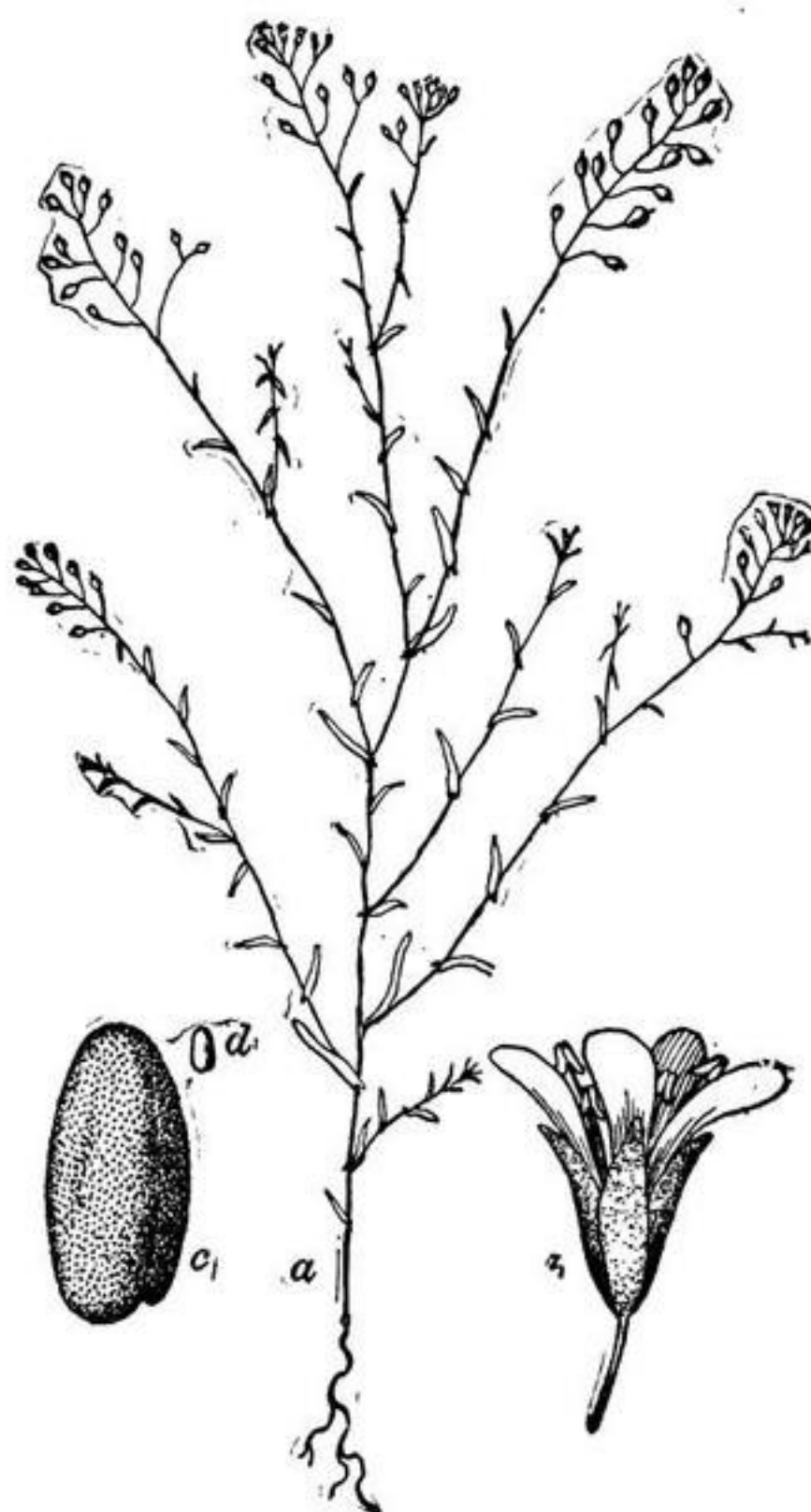


FIG. 11.—False flax.

TABLE OF ONE HUNDRED WEEDS.

NOTE 1.—This table presents the common and technical name, with some of the characteristics, of one hundred weeds which are regarded as the most troublesome in the United States.

NOTE 2.—By alternate cultivation and smothering crops is meant clean cultivation during the dry season and a heavy seeding of some annual crop, as crimson clover, cowpeas, millet, or oats, that will cover the ground thickly and choke down the weeds during the growing season.

NOTE 3.—Under color and size of flowers the most prominent color and the approximate diameter of a single flower, or of a head in the case of composites, are given.

Common names.	Technical name.	Where injurious.	Duration.	Time of flowering.	Time of seeding.	Color, size, and arrangement of flowers.	Methods of propagation and distribution of seed.	Place of growth and products injured.	Methods of eradication.
Barnyard grass, barn grass, cocksfoot.	<i>Panicum crus-galli</i>	Minnesota to Montana.	Annual...	June to August.	July to September.	Green; $\frac{1}{2}$ inch; panicle.	Seeds; in grain seed.	Fields; spring wheat.	Prevention of seeding.
Black mustard	<i>Brassica nigra</i>	Washington to California.	.....do	June to September.	July to October.	Yellow; $\frac{1}{2}$ inch; panicle.	Seeds; in grass and grain seed.	Fields; grain crops.	Prevention of seeding; hoed crops.
Bracted plantain, rib grass, buckhorn, western buckhorn.	<i>Plantago aristata</i> ..	Ohio to Iowa ..	.....do (?)..	May to October.	June to December.	Green; $\frac{1}{4}$ inch; spike.	Seeds; in grass and clover seed.	Meadows; pastures.	Do.
Brake, eagle fern.....	<i>Pteridium aquilinum</i> .	Washington to California.	Perennial.	.....	.....	Flowerless	Rootstocks; spores.	.....do	Heavy seeding; cultivation.
Broom rape	<i>Orobanche ramosa</i>	Kentucky to North Carolina.	Annual...	June to August.	July to September.	White; $\frac{1}{2}$ inch; spike.	Seeds	Hemp; tobacco; tomatoes.	Clean seed; cultivation of crops other than hemp, etc.
Buffalo bur, beaked horse nettle.	<i>Solanum rostratum</i>	Iowa to Colorado.	.....do	June to September.	July to November.	Yellow; $\frac{1}{2}$ inch	Seeds; tumbleweed.	Grain; hoed crops.	Heavy seeding; close cultivation.
Bull thistle, common thistle.	<i>Carduus lanceolatus</i> .	Everywhere ...	Biennial..	June to August.	.....do	Purple; 1 inch; head.	Seeds; wind ...	Meadows; winter wheat.	Prevention of seeding; cutting in fall.
Burdock, great dock	<i>Arctium lappa</i>	New England to Wisconsin.	.....do	July to September.	August to October.	Purple; $\frac{1}{2}$ inch; head.	Seeds; animals.	Waste places; pastures; wool.	Prevention of seeding; grubbing in summer.
Bur grass, hedgehog grass, Rocky Mountain sand bur, sand bur, sand spur.	<i>Cenchrus tribuloides</i> .	Everywhere ...	Annual...	June to October.	July to November.	Green; bur ...	.....do	Sandy pastures; wool.	Cultivation; burning.
Buttonweed, alligator head.	<i>Diodia teres</i>	Maryland to Louisiana.	.....do .....	.....do .....	.....do	Green; 1 line; axillary.	Seeds	Waste places, hoed crops; grainfields.	Prevention of seeding; close cultivation.
Canada thistle.....	<i>Carduus arvensis</i> ..	New England to Iowa.	Perennial.	June to September.	July to October.	Purple; $\frac{3}{4}$ inch; head.	Creeping roots; seeds.	Fields; grain; meadows.	Alternate cultivation and heavy cropping.
Charlock, wild mustard, yellow mustard.	<i>Brassica arvensis</i> ..	New England to North Dakota.	Annual...	May to September.	June to October.	Yellow; $\frac{1}{2}$ inch; panicle.	Seeds; in grain seed.	Fields; grain.	Prevention of seeding; cultivation; hoed crops.
Chess, cheat, wheat thief, Willard's brome grass.	<i>Bromus secalinus</i> ..	New England to Washington.	.....do	July to September.	August to October.	Green; panicle	.....do .....	.....do	Clean seed; cultivation.
Chickweed	<i>Alsine media</i>	New York to North Carolina.	.....do	February to June.	March to July.	White; $\frac{1}{4}$ inch; clusters.	Seeds; in grass seed.	Lawns, gardens; spring crops.	Cultivation in late fall and early spring.

Chondrilla, gum succory, skeleton weed, stickweed.	<i>Chondrilla juncea.</i>	West Virginia to Maryland.	Biennial..	June to November.	July to December.	Yellow; $\frac{1}{4}$ inch; solitary.	Seeds; wind...	Waste places; pastures.	Cultivation; hoed crops.
☞ Clover dodder, alfalfa dodder, love vine.	<i>Cuscuta epithymum.</i>	Utah to Nebraska; New England.	Annual...	.....do.....	June to November.	Yellow; $\frac{1}{2}$ inch; clusters.	Seeds; in clover and alfalfa seed.	Clover; alfalfa.	Clean seed; cultivation.
Cockle, corn cockle, rose campion.	<i>Agrostemma githago.</i>	New England to Washington.	.....do.....	June to August.	July to September.	Purple; 1 inch; solitary.	Seeds; in grain seed.	Grainfields; wheat.	Do.
Cocklebur, clot bur, ditch bur, small burdock.	<i>Xanthium canadense, Xanthium strumarium.</i>	Everywhere...	.....do.....	July to October.	August to November.	Green; $\frac{1}{2}$ inch; heads.	Seeds; animals.	Waste places; pastures; wool.	Prevention of seeding; cultivation.
Couch grass, quack grass, quick grass, witch grass, devil's grass, durfee grass.	<i>Agropyron repens.</i>	New England to Minnesota.	Perennial.	July to August.	August to September.	Green; spikes.	Rootstocks....	Fields; all crops except hay.	Alternate cultivation and heavy cropping; close grazing.
Cow herb, cockle, cow basil, cow fat, glond.	<i>Vaccaria vaccaria.</i>	Colorado to Utah.	Annual...	June to July.	July to August.	Pink; $\frac{1}{4}$ inch; cymes.	Seeds; in grain seed.	Fields; grain.	Prevention of seeding; clean seed.
Crab grass, finger grass, Polish millet.	<i>Panicum sanguinale.</i>	New Jersey to Missouri and south.	.....do.....	June to September.	July to October.	Green; spikes.	Seeds; runners.	Hoed crops...	Prevention of seeding; closer cultivation.
Curled dock, yellow dock.	<i>Rumex crispus</i>	New England to Washington.	Perennial.	.....do.....	.....do.....	Green; $\frac{1}{4}$ inch; panicle.	Seeds; crown-forming root.	Meadows; grain crops.	Alternate cultivation and heavy cropping.
Dandelion.....	<i>Taraxacum taraxacum.</i>	Nearly everywhere.	.....do.....	May to October.	May to November.	Yellow; 1 inch; head.	Seeds; wind; crown-forming root.	Meadows; lawns.	Cultivation; digging roots in lawns.
Devil's weed, devil's paint brush, king devil weed, golden hawkweed.	<i>Hieracium praealtum.</i>	New York.....	.....do.....	July to September.	August to October.	.....do.....	Seeds; wind; rootstocks; runners.	Meadows; pastures.	Sheep pasturing; cultivation and heavy cropping.
Dog fennel, Mayweed.....	<i>Anthemis cotula</i> ..	Everywhere...	Annual...	June to August.	July to September.	White; $\frac{1}{2}$ inch; head.	Seeds.....	Roadsides....	Prevention of seeding.
English bindweed, morning-glory.	<i>Convolvulus arvensis.</i>	New England and California.	Perennial.	June to September.	August to October.	White; 1 inch; solitary.	Seeds; creeping roots.	Grainfields; hoed crops.	Prevention of seeding; late cultivation.
False flax, gold of pleasure, wild flax.	<i>Camelina sativa</i> ...	Michigan to Minnesota.	Annual...	May to July	June to August.	Yellow; $\frac{1}{2}$ inch; raceme.	Seeds; in flax and grain seed.	Flax and winter grain.	Prevention of seeding.
Field dodder, love vine, clover dodder.	<i>Cuscuta arvensis</i> ..	New England to Ohio and southward.	.....do.....	June to November.	July to November.	Yellow; $\frac{1}{2}$ inch; clusters.	Seeds; in clover and alfalfa seed.	Clover; alfalfa	Clean seed; cultivation of crops other than clover.
Fleabane, daisy fleabane, sweet scabious, white-top.	<i>Erigeron annuus</i> ..	Maine to Minnesota and south.	.....do.....	June to August.	July to September.	White; $\frac{3}{4}$ inch; heads.	Seeds.....	Waste places; meadows.	Prevention of seeding.
Franseria.....	<i>Gaertneria discolor.</i>	Wyoming to New Mexico.	Perennial.	.....do.....	.....do.....	Yellow; $\frac{1}{2}$ inch; heads.	Rootstocks....	.....do.....	Thorough cultivation.
Great ragweed, hogweed..	<i>Ambrosia trifida</i> ...	Iowa to Louisiana and east.	Annual...	July to September.	August to October.	.....do.....	Seeds.....	Bottom lands.	Cultivation; heavy cropping.
Gum plant, rosinweed, sunflower.	<i>Grindelia squarrosa.</i>	North Dakota to Utah.	Perennial.	.....do.....	August to November.	Yellow; $\frac{1}{2}$ inch; heads.	Seeds; animals; crown-forming root.	Meadows; pastures.	Prevention of seeding; cultivation.
Hedge bindweed, morning-glory.	<i>Convolvulus sepium.</i>	New Jersey to Illinois.	.....do.....	.....do.....	August to October.	White; 2 inches; solitary.	Seeds; rootstocks.	Corn and grain-fields.	Late cultivation.

Table of one hundred weeds—Continued.

Common names.	Technical name.	Where injurious.	Duration.	Time of flowering.	Time of seeding.	Color, size, and arrangement of flowers.	Methods of propagation and distribution of seed.	Place of growth and products injured.	Methods of eradication.
Horse nettle, bull nettle, sand briar.	<i>Solanum carolinense.</i>	Iowa to New Jersey and south.	Perennial.	June to October.	August to November.	Purple; 1 inch; solitary.	Seeds; running roots.	Waste land; meadows; pastures.	Alternate cultivation and heavy cropping.
Horseweed, butterweed, colt's tail, fleabane.	<i>Leptilon canadense.</i>	Everywhere...	Annual...	June to September.	July to October.	White; $\frac{1}{2}$ inch; head.	Seeds; wind...	Waste land; meadows; grainfields.	Prevention of seeding; late cultivation.
Indian mallow, butter print, stampweed, velvet leaf.	<i>Abutilon abutilon.</i>	Illinois to Iowa and Missouri.	.....do.....	July to August.	August to September.	Yellow; $\frac{1}{2}$ inch; solitary.	Seeds.....	Cultivated lands.	Prevention of seeding.
Jimson weed, Jamestown weed, thorn apple.	<i>Datura tatula</i>	Virginia to Texas.	.....do.....	July to September.	August to October.	Purple; 3 inches; solitary.	.....do.....	Waste places..	Do.
Johnson grass, Cuba grass, Australian millet, Egyptian millet, evergreen millet, Means's grass.	<i>Andropogon halepensis.</i>	North Carolina to Texas and California.	Perennial.	June to August.	July to September.	Green; $\frac{1}{2}$ inch; panicle.	Rootstocks; seeds.	Cultivated fields; hoed crops.	Alternate cultivation and heavy cropping.
Lamb's quarters, pigweed.	<i>Chenopodium album.</i>	Everywhere...	Annual...	July to September.	August to November.	Green; $\frac{1}{8}$ inch; panicle.	Seeds.....	Waste places..	Prevention of seeding.
Live forever, garden orpine.	<i>Sedum telephium.</i>	New York to Pennsylvania.	Perennial.	July to August.	August to September.	Purple; $\frac{1}{2}$ inch; cyme.	Rootstocks; seeds.	Fields.....	Infection with fungous disease; close cultivation.
Malva.....	<i>Malva parviflora</i> ..	California, Arizona.	.....do.....	June to August.	July to September.	Purple; $\frac{1}{2}$ inch; solitary.	Seeds; rootstocks.	.....do.....	Prevention of seeding; thorough cultivation.
Manroot, man-of-the-earth, morning-glory.	<i>Ipomoea pandurata.</i>	Delaware to Missouri.	.....do.....	July to September.	August to October.	White; 3 inches; solitary.	.....do.....	.....do.....	Prevention of seeding; killing roots with coal oil.
Marsh elder, high-water shrub, false sunflower.	<i>Iva xanthifolia</i>	Minnesota to Utah.	Annual...	August to September.	September to October.	Green; $\frac{1}{2}$ inch; heads.	Seeds.....	Fields; pastures; grain crops.	Prevention of seeding.
Mexican tea, pigweed.....	<i>Chenopodium ambrosioides.</i>	Virginia to Louisiana.	.....do.....	.....do.....	August to October.	Green; $\frac{1}{6}$ inch; spikes.	.....do.....	Waste places..	Do.
Milkweed, cottonweed, silkweed.	<i>Asclepias syriaca</i> ..	New York to Nebraska.	Perennial.	July to August.	August to September.	Purple; $\frac{1}{2}$ inch; umbel.	Seeds; wind; creeping roots.	Fields.....	Prevention of seeding; cultivation; heavy cropping.
Morning-glory.....	<i>Ipomoea nil, Ipomoea purpurea.</i>	Delaware and California.	Annual...	July to November.	August to December.	Purple; 2 inches; solitary.	Seeds.....	Cultivated fields.	Prevention of seeding; thorough cultivation.
Moth mullein.....	<i>Verbascum blattaria.</i>	Maryland to Ohio and Oregon.	Biennial...	June to October.	July to November.	Yellow; $\frac{1}{2}$ inch; raceme.	Seeds; in grass seed.	Meadows.....	Sowing clean seed; cultivation; grubbing in fall.

Musky alfilerilla, ground needle, musky heronbill.	<i>Erodium moschatum</i> .	California to Arizona.	Annual...	April to July.	May to August.	Rose; $\frac{1}{4}$ inch; umbel.	Seeds	Pastures	Sowing clean seed; burning.
Narrow-leaved stickseed, beggar tick.	<i>Lappula lappula</i> ..	Everywhere...	.....do	July to September.	July to October.	Blue; $\frac{1}{8}$ inch; raceme.	Seeds; animals.	Everywhere; wool; crops.	Sowing clean seed; cultivation.
Nut sedge, nut grass, coco, coco sedge.	<i>Cyperus rotundus</i> ..	Maryland to Arkansas and Texas.	Perennial.	July to October.	August to November.	Brown; $\frac{1}{8}$ inch; spikelets.	Tubers; in nursery packing; seeds.	In hoed crops.	Alternate cultivation and smothering crops.
Orange hawkweed, ladies' paint brush, red daisy.	<i>Hieracium aurantiacum</i> .	New York .....	.....do	July to September.	August to October.	Orange; $\frac{1}{4}$ inch; solitary.	Seeds; wind; runners; rootstocks.	Meadows; pastures.	Prevention of seeding; cultivation; salt.
Ox-eye daisy, bull's-eye, white daisy, whiteweed.	<i>Chrysanthemum leucanthemum</i> .	Maine to Virginia and Ohio	.....do	June to September.	July to October.	White; 1 inch; solitary.	Seeds; rootstocks.	.....do	Do.
Paraguay bur, sheep bur.	<i>Acanthospermum xanthioides</i> .	North Carolina to Florida.	Annual...	May to November.	June to December.	Yellow; $\frac{1}{4}$ inch; heads.	Seeds; animals; runners.	Waste places; pastures; wool.	Cultivation.
Paroquet bur.....	<i>Triumfetta semitriloba</i> .	Hawaii; Porto Rico; Florida.	.....do	June to November.	July to December.	Yellow; $\frac{1}{4}$ inch; panicles.	Seeds; animals.	Waste places; cultivated land; wool.	Do.
Passion flower, maypop ...	<i>Passiflora incarnata</i> .	North Carolina to Florida.	Perennial.	July to September.	August to October.	White; 2 inches; solitary.	Seeds	Hoed crops ...	More thorough cultivation; prevention of seeding.
Pennycress, Frenchweed .	<i>Thlaspi arvense</i> ...	North Dakota to Minnesota.	Annual...	May to November.	June to December.	White; $\frac{1}{4}$ inch; raceme.	Seeds; wind ...	Grainfields; pastures; dairy products.	Burning; thorough cultivation.
Pigeon grass, foxtail, yellow foxtail.	<i>Setaria glauca</i>	Everywhere ...	.....do	June to September.	July to November.	Green; $\frac{1}{8}$ inch; spikes.	Seeds; in clover seed.	Cultivated land; grain crops.	Do.
Pigweed, careless weed, rough amaranth.	<i>Amarantus retroflexus</i>.	.....do .....	.....do	July to October.	August to November.	Green; $\frac{1}{8}$ inch; spikes.	Seeds	Cultivated land; all crops.	Prevention of seeding; thorough cultivation.
Poison ivy, poison oak, poison vine.	<i>Rhus radicans</i>.....	.....do	Perennial.	June to July.	July to August.	Yellow; $\frac{1}{4}$ inch; raceme.	Rootstocks; seeds.	Waste land; poisonous to man.	Cultivation; repeated grubbing.
Poverty weed.....	<i>Iva axillaris</i>	Montana to New Mexico.	.....do	June to August.	July to September.	Yellow; $\frac{1}{4}$ inch; heads.	.....do	Cultivated land; all crops.	Closer cultivation; smothering crops.
Prickly lettuce, compass plant, milkweed, wild lettuce.	<i>Lactuca scariola integrata</i> .	Ohio to Iowa, and Utah to Oregon.	Annual...	June to October.	July to November.	.....do	Seeds; wind...	Everywhere; all crops.	Prevention of seeding; burning.
Prickly pear, cactus, Western Prickly pear.	<i>Opuntia humifusa</i> .	Oklahoma, Texas, New Mexico.	Perennial.	.....do	July to December.	Yellow; 2 to 3 inches; solitary.	Seeds; animals.	Pastures.....	Permitting grass to grow and burning.
Purslane, garden purslane, pursely, pusley.	<i>Portulacaoleracea</i> .	Everywhere ...	Annual...	May to November.	June to December.	Yellow; $\frac{1}{4}$ inch; solitary.	Seeds	Cultivated land; garden crops.	Closer cultivation.
Ragweed, bitterweed, hogweed, richweed, Roman wormwood.	<i>Ambrosia artemisiaefolia</i>.	.....do .....	.....do	July to October.	August to November.	.....do	Seeds; wind...	Everywhere; all crops.	Prevention of seeding; burning.
Rattlebox.....	<i>Crotalaria sagittalis</i> .	Iowa to South Dakota.	.....do	July to September.	.....do .....	.....do	Seeds	Pastures; poisonous to stock.	Cultivation.

Table of one hundred weeds—Continued.

Common names.	Technical name.	Where injurious.	Duration.	Time of flowering.	Time of seeding.	Color, sizes, and arrangement of flowers.	Methods of propagation and distribution of seed.	Place of growth and products injured.	Methods of eradication.
Rib grass, black plantain, buckhorn, deer tongue, English plantain, lance-leaved plantain, ripple grass.	<i>Plantago lanceolata.</i>	Nearly everywhere.	Perennial.	June to October.	July to November.	White; $\frac{1}{8}$ inch; spike.	Seeds; crown-forming roots.	Everywhere; all crops.	Clean seed; cultivation.
Running brier, dewberry, low blackberry.	<i>Rubus villosus</i>	Maryland to North Carolina.	.....do.....	May to July.	June to August.	White; 1 inch; solitary.	Seeds; birds; rootstocks.	Fields; all crops.	Cultivation; smothering crops.
Russian thistle, Russian cactus, Russian saltwort, Russian tumbleweed.	<i>Salsola kali</i> <i>tragus.</i>	Minnesota to Colorado.	Annual...	July to September.	August to November.	Purplish; $\frac{1}{2}$ inch; solitary.	Seeds; wind....	Everywhere; small grain.	Cultivation; grazing; mowing for hay; burning.
Shepherd's purse, mother's heart, pickpurse, toothwort.	<i>Bursa bursa-pastoris.</i>	Everywhere...	.....do.....	March to December.	May to December.	White; $\frac{1}{8}$ inch; raceme.	Seeds	Everywhere; all crops.	Cultivation.
Small carrot, bristly carrot, Southern wild carrot.	<i>Daucus pusillus</i> ...	Georgia to Arizona.	.....do.....	June to July.	July to August.	White; $\frac{1}{2}$ inch; umbel.	Seeds; animals; wind.	.....do.....	Prevention of seeding; cultivation.
Smartweed, swamp persicaria, shoestrings.	<i>Polygonum amphibium</i> <i>emersum.</i>	Ohio to Nebraska.	Perennial.	July to August.	August to September.	Pink; $\frac{1}{8}$ inch; spike.	Seeds; rootstocks.	Lowland; corn, grain.	Do.
Sneezeweed	<i>Helenium autumnale.</i>	North Carolina to Texas.	.....do.....	July to September.	August to October.	Yellow; $\frac{1}{2}$ inch; head.	.....do.....	Meadows; pastures.	Cultivation.
Sorrel, field sorrel, horse sorrel, red sorrel, sheep sorrel, sourweed.	<i>Rumex acetosella</i> ..	Nearly everywhere.	.....do.....	May to October.	June to November.	Red; $\frac{1}{2}$ inch; panicle.	Seed, in clover seed; rootstocks.	.....do.....	Cultivation; smothering crops.
Sow thistle, field sow thistle, perennial sow thistle.	<i>Sonchus arvensis</i> ..	New England to Wisconsin.	.....do.....	July to October.	August to November.	Yellow; $\frac{1}{2}$ inch; heads.	Seeds; wind; creeping roots.	Meadows; pastures; grain-fields.	Thorough cultivation and smothering crops.
Spanish needles, bur marigold, beggar ticks.	<i>Bidens bipinnata</i> ..	Everywhere...	Annual...	June to September.	July to November.	.....do.....	Seeds; animals.	Waste land; pastures.	Prevention of seeding.
Spiny amaranth, spiny careless, weed, red careless weed.	<i>Amaranthus spinosus.</i>	Virginia to Texas.	.....do.....	July to November.	August to December.	Green; $\frac{1}{8}$ inch; spikes.	Seeds .....	.....do.....	Do.
Spiny nightshade.....	<i>Solanum aculeatissimum.</i>	North Carolina to Mississippi.	.....do.....	June to September.	July to October.	White; 1 inch; raceme.	.....do.....	Waste places; pastures.	Prevention of seeding; cultivation.
Spiny cocklebur, Bathurst bur, Chinese thistle, dagger cocklebur.	<i>Xanthium spinosum.</i>	Maryland to Texas and California.	.....do.....	July to October.	August to November.	Green; $\frac{1}{2}$ inch; head.	Seeds; animals.	Waste land; pastures; wool.	Do.
Squirrel tail, foxtail, wild barley.	<i>Hordeum jubatum.</i>	Texas to Utah..	.....do.....	June to September.	July to October.	Green; spike..	Seeds; wind; animals.	Pastures	Do.

Star thistle, Texas thistle.	<i>Centaurea americana.</i>	Texas to Oklahoma.	.....do.....	June to August.	July to September.	Purple; 2 inches; heads.	Seeds; wind...	Cultivated land.	Do.
Stubble spurge, spotted spurge.	<i>Euphorbia nutans.</i>	Maryland to Missouri.	.....do.....	July to October.	August to November.	White; $\frac{1}{4}$ inch; cyme.	Seeds.....	.....do.....	Prevention of seeding; burning stubble.
Sunflower, common sunflower.	<i>Helianthus annuus.</i>	Nebraska to Louisiana.	.....do.....	July to September.	August to October.	Yellow; 4 inches; heads.	.....do.....	.....do.....	Prevention of seeding.
Tarweed	<i>Madia sativa</i>	Washington to California.	.....do..	May to October.	June to November.	Yellow; $\frac{1}{4}$ inch; heads.	Seeds; animals.	Roadsides; cultivated land.	Prevention of seeding; burning.
Toadflax, butter-and-eggs, devil's flax, impudent lawyer, ramstead, snapdragon.	<i>Linaria linaria</i>	New England to Wisconsin.	Perennial.	July to October.	August to November.	Yellow; $\frac{1}{4}$ inch; raceme.	Rootstocks; seeds.	Meadows; pastures.	Cultivation; heavy cropping.
Teasel, English thistle, fuller's card, Huttonweed, Indian thistle.	<i>Dipsacus sylvestris.</i>	Ohio to Tennessee.	Biennial..	July to September.	August to October.	White; 1 inch; head.	Seeds.....	.....do.....	Prevention of seeding; cultivation.
Trefoil, black medic, none-such.	<i>Medicago lupulina.</i>	New York to Virginia.	Annual...	March to December.	April to December.	Yellow; $\frac{1}{4}$ inch; head.	Seeds; in clover seed.	Meadows; lawns.	Clean seed; cultivation.
Tumbleweed, pigweed	<i>Amaranthus graecizans.</i>	Minnesota to Kansas.	.....do.....	August to September.	August to October.	Green; $\frac{1}{8}$ inch; spike.	Seeds; wind...	Cultivated land.	Prevention of seeding; burning.
Vipers bugloss, blue thistle, blueweed.	<i>Echium vulgare</i> ...	New York to North Carolina.	Biennial..	June to October.	July to November.	Blue; $\frac{1}{4}$ inch; thyrus.	Seeds.....	Meadows; pastures.	Alternate cultivation and heavy cropping.
Wheat thief, corn gromwell, field gromwell, pigeonweed, redroot, stone seed.	<i>Lithospermum arvense.</i>	Michigan to Ohio.	Annual...	June to September.	July to October.	White; $\frac{1}{4}$ inch; solitary.	Seeds, in grain seed.	Grainfields ...	Sowing clean seed; cultivation with hoed crops.
White heath aster, frostweed aster, steelweed, tanglefoot, fall aster.	<i>Aster ericoides</i>	Maryland to Indiana.	Perennial.	September to November.	September to December.	White; $\frac{1}{4}$ inch; head.	Seeds; wind.	Meadows and pastures.	Mowing; grazing with sheep; rotation of crops.
Wild buckwheat, black bindweed.	<i>Polygonum convolvulus.</i>	Michigan to North Dakota.	Annual...	June to September.	July to October.	White; $\frac{1}{4}$ inch; raceme.	Seeds; wind; animals.	Grain and corn fields.	Sowing clean seed; cultivation.
Wild carrot, bird's nest, devil's plague, Queen Anne's lace.	<i>Daucus carota</i>	New England to Virginia.	Biennial..	June to October.	July to November.	White; $\frac{1}{4}$ inch; umbel.	Seeds; animals; wind.	Meadows; pastures.	Grubbing in fall; cultivation.
Wild gourd, calabazita	<i>Cucurbita perennis.</i>	California to New Mexico.	Perennial.	April to July.	June to September.	Yellow; 3 inches; solitary.	Seeds.....	Cultivated land.	Killing the roots with coal oil.
Wild oats.....	<i>Avena fatua</i>	Minnesota to Oregon.	Annual...	July to August.	July to September.	Green; $\frac{1}{4}$ inch; panicle.	Seeds, in seed oats.	Oat fields.....	Sowing clean seed; burning; pasturing.
Wild garlic, field garlic, crow garlic, wild onion.	<i>Allium vineale</i>	Pennsylvania to South Carolina.	Perennial.	.....do.....	August to September.	White; $\frac{1}{4}$ inch; umbel.	Bulblets; seeds.	Everywhere; dairy products; grain.	Alternate cultivation and heavy cropping.
Wild parsnip, queenweed .	<i>Pastinaca sativa</i> ...	New England to Wisconsin.	Biennial..	June to September.	July to October.	Yellow; $\frac{1}{4}$ inch; umbel.	Seeds.....	Meadows; pastures.	Prevention of seeding; cultivation.

Table of one hundred weeds—Continued.

Common names.	Technical name.	Where injurious.	Duration.	Time of flowering.	Time of seeding.	Color, size, and arrangement of flowers.	Methods of propagation and distribution of seed.	Place of growth and products injured.	Methods of eradication.
Yellow daisy, brown-eyed Susan, cone flower, niggerhead, ox-eye daisy.	Rudbeckia hirta...	New England to Ohio.	Biennial..	June to August.	July to September.	Yellow; 1 inch; head.	Seeds	Meadows; pastures.	Prevention of seeding; cultivation.
Yellow dock, bitter dock, broad-leaved dock.	Rumex obtusifolius.	New England to Wisconsin.	Perennial.	July to September.	August to October.	Green; $\frac{1}{2}$ inch; raceme.	.....do .....	.....do	Do.
Yellow dog fennel, bitter weed.	Helenium tenuifolium.	Texas to North Carolina.	Annual...	July to October.	August to November.	Yellow; $\frac{1}{4}$ inch; head.	.....do	Waste land; pastures; dairy products.	Do.
Yellow melilot, yellow sweet clover.	Melilotus officinalis.	Maryland to Michigan.	Biennial..	June to September.	July to October.	Yellow; $\frac{1}{2}$ inch; spike.	Seeds; in hay and clover seed.	Dry meadows and pastures.	Cultivation; increased fertilization.

FARMERS' BULLETINS.

Bulletins in this list will be sent free, so long as the supply lasts, to any resident of the United States, on application to his **Senator, Representative, or Delegate in Congress**, or to the Secretary of Agriculture, Washington, D. C. Because of the limited supply, applicants are urged to select only a few numbers, choosing those which are of special interest to them. Residents of foreign countries should apply to the Superintendent of Documents, Government Printing Office, Washington, D. C., who has these bulletins for sale. Price 5 cents each to Canada, Cuba, and Mexico; 6 cents to other foreign countries. The bulletins entitled "Experiment Station Work" give briefly the results of experiments performed by the State experiment stations.

- | | |
|--|---|
| <ul style="list-style-type: none"> 22. The Feeding of Farm Animals. 27. Flax for Seed and Fiber. 28. Weeds: And How to Kill Them. 30. Grape Diseases on the Pacific Coast. 32. Silos and Silage. 34. Meats: Composition and Cooking. 35. Potato Culture. 36. Cotton Seed and Its Products. 44. Commercial Fertilizers. 48. The Manuring of Cotton. 49. Sheep Feeding. 51. Standard Varieties of Chickens. 52. The Sugar Beet. 54. Some Common Birds. 55. The Dairy Herd. 56. Experiment Station Work—I. 60. Methods of Curing Tobacco. 61. Asparagus Culture. 62. Marketing Farm Produce. 63. Care of Milk on the Farm. 64. Ducks and Geese. 65. Experiment Station Work—II. 69. Experiment Station Work—III. 73. Experiment Station Work—IV. 77. The Liming of Soils. 78. Experiment Station Work—V. 79. Experiment Station Work—VI. 81. Corn Culture in the South. 82. The Culture of Tobacco. 83. Tobacco Soils. 84. Experiment Station Work—VII. 85. Fish as Food. 86. Thirty Poisonous Plants. 87. Experiment Station Work—VIII. 88. Alkali Lands. 91. Potato Diseases and Treatment. 92. Experiment Station Work—IX. 93. Sugar as Food. 96. Raising Sheep for Mutton. 97. Experiment Station Work—X. 99. Insect Enemies of Shade Trees. 101. Millets. 103. Experiment Station Work—XI. 104. Notes on Frost. 105. Experiment Station Work—XII. 106. Breeds of Dairy Cattle. 110. Rice Culture in the United States. 113. The Apple and How to Grow It. 114. Experiment Station Work—XIV. 118. Grape Growing in the South. 119. Experiment Station Work—XV. 120. Insects Affecting Tobacco. 121. Beans, Peas, and Other Legumes as Food. 122. Experiment Station Work—XVI. 126. Practical Suggestions for Farm Buildings. 127. Important Insecticides. 128. Eggs and Their Uses as Food. 131. Household Tests for Detection of Oleomargarine and Renovated Butter. 133. Experiment Station Work—XVIII. 134. Tree Planting on Rural School Grounds. 135. Sorghum Sirup Manufacture. 137. The Angora Goat. 138. Irrigation in Field and Garden. 139. Emmer: A Grain for the Semiarid Regions. 140. Pineapple Growing. 142. Nutrition and Nutritive Value of Food. 144. Experiment Station Work—XIX. 145. Carbon Bisulphid as an Insecticide. 149. Experiment Station Work—XX. 150. Clearing New Land. 152. Scabies of Cattle. 154. Home Fruit Garden: Preparation and Care. 155. How Insects Affect Health in Rural Districts. 156. The Home Vineyard. | <ul style="list-style-type: none"> 157. The Propagation of Plants. 158. How to Build Small Irrigation Ditches. 162. Experiment Station Work—XXI. 164. Rape as a Forage Crop. 166. Cheese Making on the Farm. 167. Cassava. 169. Experiment Station Work—XXII. 170. Principles of Horse Feeding. 172. Scale Insects and Mites on Citrus Trees. 173. Primer of Forestry. Part I: The Forest. 174. Broom Corn. 175. Home Manufacture and Use of Unfermented Grape Juice. 176. Cranberry Culture. 177. Squab Raising. 178. Insects Injurious in Cranberry Culture. 179. Horseshoeing. 181. Pruning. 182. Poultry as Food. 183. Meat on the Farm: Butchering, Curing, etc. 185. Beautifying the Home Grounds. 186. Experiment Station Work—XXIII. 187. Drainage of Farm Lands. 188. Weeds Used in Medicine. 190. Experiment Station Work—XXIV. 192. Barnyard Manure. 193. Experiment Station Work—XXV. 194. Alfalfa Seed. 195. Annual Flowering Plants. 196. Usefulness of the American Toad. 197. Importation of Game Birds and Eggs for Propagation. 198. Strawberries. 200. Turkeys. 201. Cream Separator on Western Farms. 202. Experiment Station Work—XXVI. 203. Canned Fruits, Preserves, and Jellies. 204. The Cultivation of Mushrooms. 205. Pig Management. 206. Milk Fever and Its Treatment. 209. Controlling the Boll Weevil in Cotton Seed and at Ginneries. 210. Experiment Station Work—XXVII. 213. Raspberries. 218. The School Garden. 219. Lessons from Grain Rust Epidemic of 1904. 220. Tomatoes. 221. Fungous Diseases of the Cranberry. 222. Experiment Station Work—XXVIII. 223. Miscellaneous Cotton Insects in Texas. 224. Canadian Field Peas. 225. Experiment Station Work—XXIX. 227. Experiment Station Work—XXX. 228. Forest Planting and Farm Management. 229. The Production of Good Seed Corn. 231. Spraying for Cucumber and Melon Diseases. 232. Okra: Its Culture and Uses. 233. Experiment Station Work—XXXI. 234. The Guinea Fowl. 235. Preparation of Cement Concrete. 236. Incubation and Incubators. 237. Experiment Station Work—XXXII. 238. Citrus Fruit Growing in the Gulf States. 239. The Corrosion of Fence Wire. 241. Butter Making on the Farm. 242. An Example of Model Farming. 243. Fungicides and Their Use in Preventing Diseases of Fruits. 244. Experiment Station Work—XXXIII. 245. Renovation of Worn-out Soils. 246. Saccharine Sorghums for Forage. 248. The Lawn. 249. Cereal Breakfast Foods. 250. The Prevention of Stinking Smut of Wheat and Loose Smut of Oats. |
|--|---|

251. Experiment Station Work—XXXIV
 252. Maple Sugar and Sirup.
 253. The Germination of Seed Corn.
 254. Cucumbers.
 255. The Home Vegetable Garden.
 256. Preparation of Vegetables for the Table.
 257. Soil Fertility.
 258. Texas or Tick Fever and Its Prevention.
 259. Experiment Station Work—XXXV.
 260. Seed of Red Clover and Its Impurities.
 262. Experiment Station Work—XXXVI.
 263. Information for Beginners in Irrigation.
 264. The Brown-tail Moth and How to Control It.
 266. Management of Soils to Conserve Moisture.
 267. Experiment Station Work—XXXVII.
 269. Industrial Alcohol: Uses and Statistics.
 270. Modern Conveniences for the Farm Home.
 271. Forage Crop Practices in Western Oregon and Western Washington.
 272. A Successful Hog and Seed-corn Farm.
 273. Experiment Station Work—XXXVIII.
 274. Flax Culture.
 275. The Gipsy Moth and How to Control It.
 276. Experiment Station Work—XXXIX.
 277. Alcohol and Gasoline in Farm Engines.
 278. Leguminous Crops for Green Manuring.
 279. A Method of Eradicating Johnson Grass.
 280. A Profitable Tenant Dairy Farm.
 281. Experiment Station Work—XL.
 282. Celery.
 283. Spraying for Apple Diseases and the Codling Moth in the Ozarks.
 284. Insect and Fungous Enemies of the Grape East of the Rocky Mountains.
 286. Comparative Value of Whole Cotton Seed and Cotton-seed Meal in Fertilizing Cotton.
 287. Poultry Management.
 288. Nonsaccharine Sorghums.
 289. Beans.
 290. The Cotton Bollworm.
 291. Evaporation of Apples.
 292. Cost of Filling Silos.
 293. Use of Fruit as Food.
 294. Farm Practice in Columbia Basin Uplands.
 295. Potatoes and Other Root Crops as Food.
 296. Experiment Station Work—XLI.
 298. Food Value of Corn and Corn Products.
 299. Diversified Farming Under the Plantation System.
 301. Home-grown Tea.
 302. Sea Island Cotton: Its Culture, Improvement, and Diseases.
 303. Corn Harvesting Machinery.
 304. Growing and Curing Hops.
 305. Experiment Station Work—XLII.
 306. Dodder in Relation to Farm Seeds.
 307. Roselle: Its Culture and Uses.
 309. Experiment Station Work—XLIII.
 310. A Successful Alabama Diversification Farm.
 311. Sand-clay and Burnt-clay Roads.
 312. A Successful Southern Hay Farm.
 313. Harvesting and Storing Corn.
 314. A Method of Breeding Early Cotton to Escape Boll-weevil Damage.
 316. Experiment Station Work—XLIV.
 317. Experiment Station Work—XLV.
 318. Cowpeas.
 319. Demonstration Work in Cooperation with Southern Farmers.
 320. Experiment Station Work—XLVI.
 321. The Use of the Split-log Drag on Earth Roads.
 322. Milo as a Dry-land Grain Crop.
 323. Clover Farming on the Sandy Jack-pine Lands of the North.
 324. Sweet Potatoes.
 325. Small Farms in the Corn Belt.
 326. Building Up a Run-down Cotton Plantation.
 328. Silver Fox Farming.
 329. Experiment Station Work—XLVII.
 330. Deer Farming in the United States.
 331. Forage Crops for Hogs in Kansas and Oklahoma.
 332. Nuts and Their Uses as Food.
 333. Cotton Wilt.
 334. Experiment Station Work—XLVIII.
 335. Harmful and Beneficial Mammals of the Arid Interior.
 337. Cropping Systems for New England Dairy Farms.
 338. Macadam Roads.
 339. Alfalfa.
 341. The Basket Willow.
 342. Experiment Station Work—XLIX.
 343. The Cultivation of Tobacco in Kentucky and Tennessee.
 344. The Boll Weevil Problem, with Special Reference to Means of Reducing Damage.
 345. Some Common Disinfectants.
 346. The Computation of Rations for Farm Animals by the Use of Energy Values.
 347. The Repair of Farm Equipment.
 348. Bacteria in Milk.
 349. The Dairy Industry in the South.
 350. The Dehorning of Cattle.
 351. The Tuberculin Test of Cattle for Tuberculosis.
 352. The Nevada Mouse Plague of 1907-8.
 353. Experiment Station Work—L.
 354. Onion Culture.
 355. A Successful Poultry and Dairy Farm.
 356. Peanuts.
 357. Methods of Poultry Management at the Maine Agricultural Experiment Station.
 358. A Primer of Forestry. Part II: Practical Forestry.
 359. Canning Vegetables in the Home.
 360. Experiment Station Work—LI.
 361. Meadow Fescue: Its Culture and Uses.
 362. Conditions Affecting the Value of Market Hay.
 363. The Use of Milk as Food.
 364. A Profitable Cotton Farm.
 365. Farm Management in Northern Potato-growing Sections.
 366. Experiment Station Work—LII.
 367. Lightning and Lightning Conductors.
 368. The Eradication of Bindweed, or Wild Morning-glory.
 369. How to Destroy Rats.
 370. Replanning a Farm for Profit.
 371. Drainage of Irrigated Lands.
 372. Soy Beans.
 373. Irrigation of Alfalfa.
 374. Experiment Station Work—LIII.
 375. Care of Food in the Home.
 376. Game Laws for 1909.
 377. Harmfulness of Headache Mixtures.
 378. Methods of Exterminating Texas-fever Tick.
 379. Hog Cholera.
 380. The Loco-weed Disease.
 381. Experiment Station Work—LIV.
 382. The Adulteration of Forage-plant Seeds.
 383. How to Destroy English Sparrows.
 384. Experiment Station Work—LV.
 385. Boys' and Girls' Agricultural Clubs.
 386. Potato Culture on Irrigated Farms of the West.
 387. The Preservative Treatment of Farm Timbers.
 388. Experiment Station Work—LVI.
 389. Bread and Bread Making.
 390. Pheasant Raising in the United States.
 391. Economical Use of Meat in the Home.
 392. Irrigation of Sugar Beets.
 393. Habit-forming Agents.
 394. Windmills in Irrigation in Semiarid West.
 395. Sixty-day and Kherson Oats.
 396. The Muskrat.
 397. Bees.
 398. Farm Practice in the Use of Commercial Fertilizers in the South Atlantic States.
 399. Irrigation of Grain.
 400. A More Profitable Corn-planting Method.
 401. Protection of Orchards in Northwest from Spring Frosts by Fires and Smudges.
 402. Canada Bluegrass: Its Culture and Uses.
 403. The Construction of Concrete Fence Posts.
 404. Irrigation of Orchards.
 405. Experiment Station Work—LVII.
 406. Soil Conservation.
 407. The Potato as a Truck Crop.
 408. School Exercises in Plant Production.
 409. School Lessons on Corn.
 410. Potato Culls for Industrial Alcohol.
 411. Feeding Hogs in the South.
 412. Experiment Station Work—LVIII.
 413. Care of Milk and its Use in the Home.
 414. Corn Cultivation.
 415. Seed Corn.
 416. Cigar-leaf Tobacco in Pennsylvania.