

## **Historic, archived document**

Do not assume content reflects current scientific knowledge, policies, or practices.

U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN No. 28.

Has been rev.  
--see rev.ed.  
binders at  
end of file.

# WEEDS; AND HOW TO KILL THEM.

LYSTER H. DEWEY,  
ASSISTANT BOTANIST.



WASHINGTON:  
GOVERNMENT PRINTING OFFICE.

1895.



## LETTER OF TRANSMITTAL.

---

UNITED STATES DEPARTMENT OF AGRICULTURE,  
DIVISION OF BOTANY,  
*Washington, D. C., April 12, 1895.*

SIR: I have the honor to transmit herewith, for publication as a Farmers' Bulletin, an illustrated report entitled "Weeds; and How to Kill Them," by Mr. Lyster H. Dewey, Assistant Botanist. The value of the principal field crops of the United States for the year 1894, including corn, wheat, oats, rye, barley, buckwheat, tobacco, potatoes, and hay, according to official statistical returns, is \$1,630,873,795. This estimate does not cover cotton, pasturage, fruit, garden truck, or other agricultural products, all of which are of immense commercial importance. The direct loss in crops, the damage to machinery and stock, and the decrease in value of land due to weeds, amount, without question, to tens of millions of dollars each year—a loss sustained almost wholly by the farmers of the nation. This brief bulletin contains simple and valuable directions for weed eradication, and in view of the enormous interests concerned, it is hoped that these methods may early be incorporated in our systems of practical farming.

Respectfully,

FREDERICK V. COVILLE,  
*Botanist.*

Hon. J. STERLING MORTON,  
*Secretary of Agriculture.*

LETTER OF INTRODUCTION

Having been invited to attend the meeting of the

Association of Authors and Publishers, I have the honor to

introduce you to the members of the Association.

## CONTENTS.

---

	Page
Introduction .....	7
General methods of eradicating weeds .....	8
Weeds attracting especial attention during 1894. ....	11
Spud (fig. 1) .....	9
Prickly lettuce (fig. 2) .....	11
Bracted plantain (fig. 3) .....	13
Horse nettle (fig. 4) .....	14
Buffalo bur (fig. 5) .....	16
Spiny amaranth (fig. 6) .....	17
Spiny cocklebur (fig. 7) .....	18
Chondrilla (fig. 8) .....	19
Wild carrot (fig. 9) .....	20
Wild oat (fig. 10) .....	21
False flax (fig. 11) .....	22
Table of one hundred weeds .....	24



# WEEDS; AND HOW TO KILL THEM.

## INTRODUCTION.

During the season of 1894, which was remarkable for its extreme drought, the ordinary farm crops were checked in their growth and the weeds became 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 amply recognized by the United States Department of Agriculture, and the time and pains devoted to the study and investigation of weeds in its Division of Botany 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 rootstock must be killed. The processes by which seed production may be prevented or rootstocks 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 the 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 cockleburrs 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.

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, rape, 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.

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 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



FIG. 1.—Spud.

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, 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.

Perennial weeds reproduce themselves by seeds and also propagate by some form of perennial underground stem, as the rootstocks of Canada thistle and couch grass, the corm or solid bulb, of the nut grass and chufa, and the bulb of the wild onion. 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 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 rootstocks 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.
3. Rootstocks 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 clover or millet that will exclude the light.
5. Most rootstocks 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 DURING 1894.

The influence of the Russian thistle agitation is plainly manifest in the attention given to certain weeds during the past season. Nearly one-half of those received at the United States Department of Agriculture with requests for naming and information belong 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 during 1894, according to the reports received at the United States Department of Agriculture:

Pricky 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*).

The prickly lettuce is also known by the common names milk thistle, English thistle, and compass plant. During the past season it has been mistaken for Russian thistle in many localities. 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 it 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.

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. The seed, or strictly speaking the akene—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

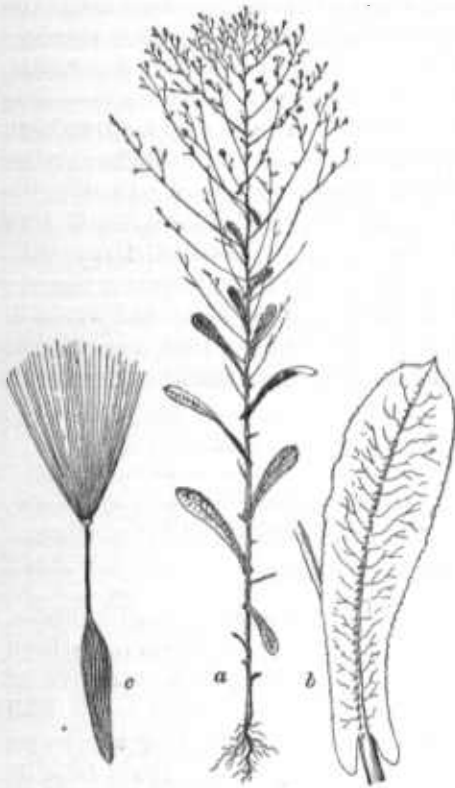


FIG. 2.—Prickly lettuce.

long as the body of the akene, 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.

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.

BRACED 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 a very few instances its seeds have been mentioned as a minor impurity in clover seed, but it is not named in any of the numerous lists of weeds of the United States. During the past season it has appeared in abundance in meadows, pastures, and lawns in many localities from Maryland to Illinois. 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 the past season in lawn grass seed.

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



FIG. 3.—Bracted plantain.

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.

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 during the past season 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*).

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.

It 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 rootstocks.

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 worst in sandy or loose, friable soils, which are easily penetrated by the long rootstocks.

The production of seed may be prevented by keeping the plants mown. The rootstocks must be killed, however, and this task is about as difficult as killing the rootstock 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. Clean cultivation

and grubbing or spudding sufficient to prevent any development above ground will starve out the rootstocks. Oats, barley, or millet sown thickly on well-tilled land will weaken the rootstocks, 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 rootstocks 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

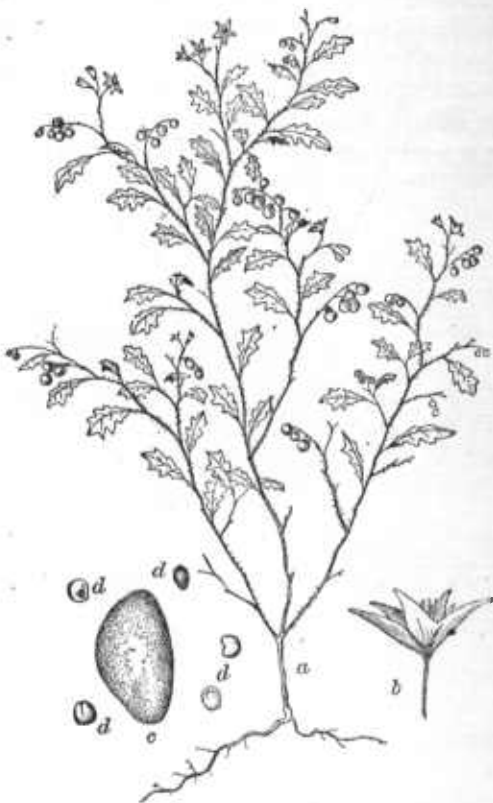


FIG. 4.—Horse nettle.



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 rootstocks are likely to be dragged and scattered about the field.

BUFFALO BUR (*Solanum rostratum*).

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 ocean, threatening to become a troublesome weed in Germany. It 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,

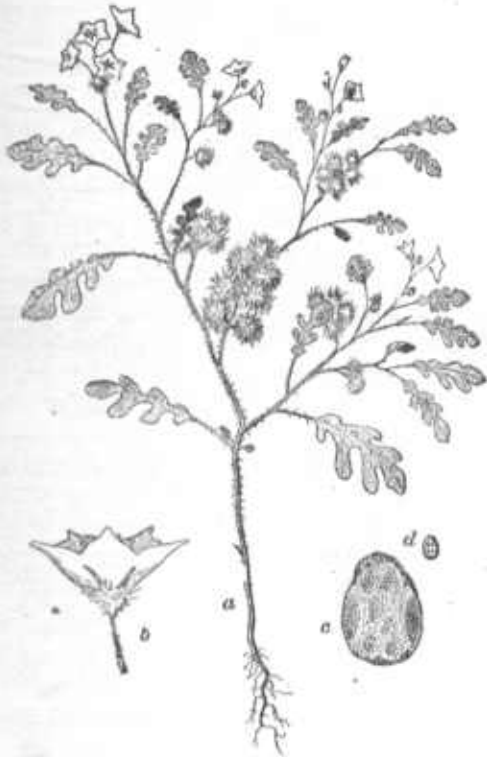


FIG. 5.—Buffalo bur.

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.

It 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 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 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.

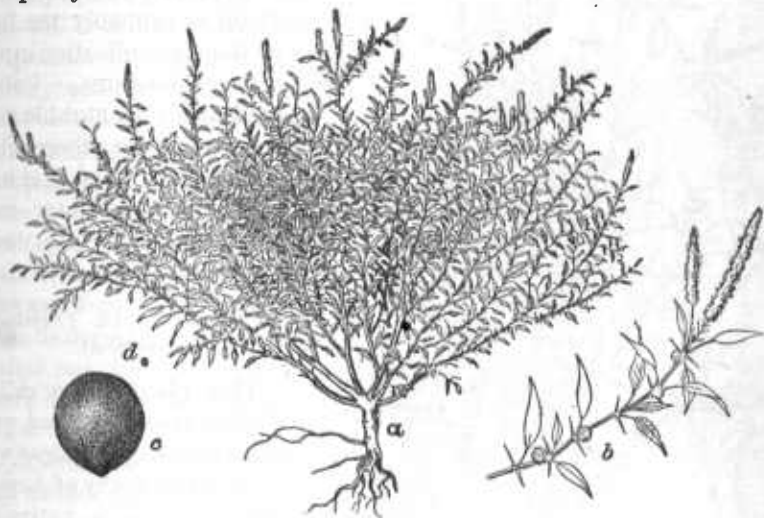


FIG. 6.—Spiny amaranth.

SPINY AMARANTH (*Amaranthus spinosus*).

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 albus*) and other amaranths or careless weeds of the neglected cornfield and garden. It 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 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.

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*).

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



FIG. 7.—Spiny cocklebur.

even cultivated, at first, for the striking effect produced by its shiny, dark-green foliage and its slender, bright-yellow spines. 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.

Its growth 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.

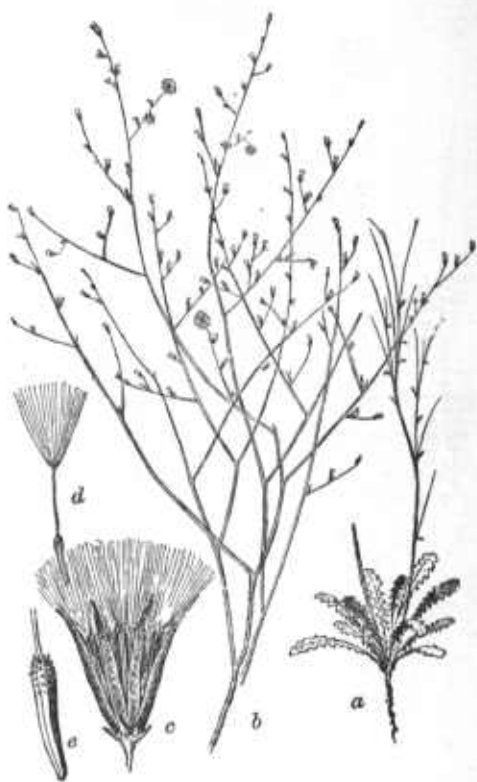


FIG. 8.—*Chondrilla*.

CHONDRILLA (*Chondrilla juncea*).

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. It 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 akenes (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 akenes to be carried a considerable distance by the wind.

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*).

The wild carrot is by no means a new weed, but it is spreading to new localities, and has consequently been the object of considerable attention during the past season. 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.

Its flat cymes of white flowers, usually with a small purple flower in the center of each cyme, appear from June until



FIG. 9.—Wild carrot.

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.

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.

#### WILD OAT (*Avena fatua*).

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.

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.

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



FIG. 10.—Wild oat.

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.

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. If summer-fallowing is practiced, the land should be rolled after cultivation, when not too wet, to conserve moisture and pack it closely about the seeds near the surface. 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*).

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, peppergrass, 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 grew 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.

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.

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.

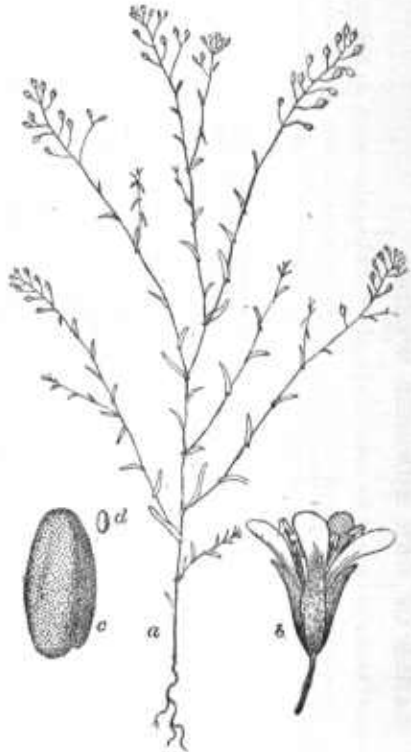


FIG. 11.—False flax.



## 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 in neat 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 injur- ous.	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 eradica- tion.
Barn grass, barnyard grass, cockfoot.	<i>Panicum crus-galli</i>	Minnesota to Washington to California.	Annual...	June to Au- gust.	July to Sep- tember.	Green; $\frac{1}{2}$ inch; panicle.	Seeds; in grain seed.	Fields; spring wheat.	Prevention of seed- ing.
Black mustard	<i>Brassica nigra</i>	Washington to California.	.....do.....	June to Sep- tember.	July to Oc- tober.	Yellow; $\frac{1}{2}$ inch; panicle.	Seeds; in grass and grain seed.	Fields; grain crops.	Prevention of seed- ing; hood crops.
Bracted plantain, rib grass, buckhorn.	<i>Plantago aristata</i>	Ohio to Iowa.....	.....do (f).....	May to Oc- tober.	June to De- cember.	Green; $\frac{1}{2}$ inch; spike.	Seeds; in grass and clover seed.	Meadows; pas- tures.	Do.
Brake, eagle fern.....	<i>Pteris aquilina</i> .....	Washington to California.	Perennial.	.....do.....	.....do.....	Flowerless.....	Roots; in stocks; spores.	.....do.....	Heavy seeding; cul- tivation.
Broom rape.....	<i>Orobancha ramosa</i>	Kentucky to North Caro- lina.	Annual...	June to Au- gust.	July to Sep- tember.	White; $\frac{1}{2}$ inch; spike.	Seeds.....	Hemp; tobacco	Clean seed.
Buffalo bur, beaked horse nettle.	<i>Solanum rostratum</i>	Iowa to Colo- rado.	.....do.....	June to Sep- tember.	July to No- vember.	Yellow; $\frac{1}{2}$ inch	Seeds; tumble- weed.	Grain; hood crops.	Heavy seeding; close cultivation.
Ball thistle, common thistle.	<i>Carduus lanceola- tus</i>	Everywhere.....	Biennial.....	June to Au- gust.	.....do.....	Purple; 1 inch; head.	Seeds; wind.....	Meadows; winter wheat.	Prevention of seed- ing; cutting in fall.
Burdock, great dock.....	<i>Arcotium lappa</i> .....	New England to Wisconsin.	.....do.....	July to Sep- tember.	August to October.	Purple; $\frac{1}{2}$ inch; head.	Seeds; animals.	Waste places; pastures; wool.	Prevention of seed- ing; grabbing in summer.
Bar grass, hedgehog grass, Rocky Mountain sand bur, sand bur, Battleground.....	<i>Cenchrus tribu- loides</i>	Everywhere.....	Annual.....	June to Oc- tober.	July to No- vember.	Green; bur.....	.....do.....	Sandy pas- tures; wool.	Cultivation; burn- ing.
Canada thistle.....	<i>Carduus arvensis</i> .....	Maryland to Alabama.	.....do.....	.....do.....	.....do.....	Green; 1 line; axillary.	Seeds.....	Waste places; hood crops; grainfields.	Prevention of seed- ing; close cultiva- tion.
Charlock, wild mustard...	<i>Brassica arvensis</i> .....	New England to Michigan.	Perennial.	June to Sep- tember.	July to Oc- tober.	Purple; $\frac{1}{2}$ inch; head.	Roots; in stocks; seeds.	Fields; grain; meadows.	Alternate cultivation and heavy crop- ping.
Cheese, cheat, wheat thief, Willard's bromo grass.	<i>Bromus cecallinus</i> .....	New England to Washing- ton.	Annual.....	May to Sep- tember.	June to Oc- tober.	Yellow; $\frac{1}{2}$ inch; panicle.	Seeds; in grain seed.	Fields; grain.....	Prevention of seed- ing; cultivation; hood crops.
			.....do.....	July to Sep- tember.	August to October.	Green; panicle	.....do.....	.....do.....	Clean seed.

Chondrilla, gum succory, skeleton weed, stick clover dodder, devil's gut, dodder.	Chondrilla juncea.	West Virginia to Maryland.	Biennial	June to November.	July to December.	Yellow; 1/2 inch; solitary.	Seeds; wind.	Waste places; pastures.	Cultivation; hood crops.
Cockle, corn cockle, rose campion.	Cnacula trifoli.	New York to North Carolina and westward.	Annual	June to August.	June to November.	Yellow; 1/2 inch; clusters.	Seeds; in clover seed.	Clover; alfalfa.	Clean seed.
Cocklebur, clot bur, ditch bur, small burdock.	Agrostemma githago.	New England to Washing.	do	June to August.	July to September.	Purple; 1 inch; solitary.	Seeds; in grain seed.	Grain fields; wheat.	Do.
Comech grass, quack grass, quick grass, witch grass, devil's grass, duffee grass.	Xanthium can. dense, Xanthium strumarium.	Everywhere	do	July to October.	August to November.	Green; 1/2 inch; heads.	Seeds; animals.	Waste places; pastures; wood.	Prevention of seeding; cultivation.
Cow herb, cockle, cow basil, cow fat, gland.	Agropyron repens.	New England to Minnesota.	Perennial	July to August.	August to September.	Green; spikes.	Rootstocks.	Fields; all crops except hay.	Alternate cultivation and heavy cropping.
Crab grass, finger grass, Polish millet.	Saponaria vacaria.	Colorado to Utah.	Annual	June to July.	July to August.	Pink; 1/2 inch; cymes.	Seeds; in grain seed.	Fields; grain.	Prevention of seeding; clean seed.
Curled dock, yellow dock.	Panicum sanguinale.	New Jersey to south.	Perennial	June to September.	July to October.	Green; spikes.	Seeds	Hood crops.	Prevention of seeding; closer cultivation.
Dandelion	Rnrex crispus.	New England to Washing.	do	do	do	Green; 1/2 inch; panicle.	do	Meadows; grain crops.	Alternate cultivation and heavy cropping.
Devil's weed, devil's paint brush, king devil weed, golden hawkweed	Taraxacum taraxacum.	Nearly everywhere.	Biennial	May to October.	May to November.	Yellow; 1 inch; head.	Seeds; wind.	Meadows; lawns.	Cultivation.
Dog fennel, Mayweed.	Hieracium praelatum.	New York.	Perennial	July to September.	August to October.	do	Seeds; wind; rootstocks.	Meadows; pastures.	Sheep pasturing; cultivation and heavy cropping.
English bindweed, morning-glory.	Anthemlis cotula.	Everywhere	Annual	June to August.	July to September.	White; 1 inch; solitary.	Seeds	Roadsides.	Prevention of seeding.
False flax, gold of pleasure, wild flax.	Convolvulus arvensis.	New England and California.	Perennial	June to September.	August to October.	White; 1 inch; solitary.	Seeds; rootstocks.	Grain fields; hood crops.	Prevention of seeding; late cultivation.
Feabane, daisy feabane, sweet scabious, white-top.	Camelina sativa.	Michigan to Minnesota.	Annual	May to July.	June to August.	Yellow; 1/2 inch; raceme.	Seeds; in flax and grain seed.	Flax and winter grain.	Prevention of seeding.
Frauseria	Erigeron annuus.	Maine to Minnesota and south.	do	June to August.	July to September.	White; 1/2 inch; heads.	Seeds	Waste places; meadows.	Do.
Great ragweed, bogweed.	Gaertneria discolor.	Wyoming to New Mexico.	Perennial	do	do	Yellow; 1/2 inch; heads.	Rootstocks.	do	Thorough cultivation.
Gum plant, rosinweed, sunflower.	Ambrosia trifida.	Iowa to Louisiana and east.	Annual	July to September.	August to October.	do	Seeds	Bottom lands.	Cultivation; heavy cropping.
Hedge bindweed, morning-glory.	Grindelia squarrosa.	North Dakota to Utah.	do	do	do	Yellow; 1 inch; heads.	Seeds; animals.	Meadows; pastures.	Prevention of seeding; cultivation.
	Convolvulus sepium.	New Jersey to Illinois.	Perennial	do	do	White; 2 inches; solitary.	Seeds	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.
Hogweed .....	<i>Boerhaavia erecta.</i>	Louisiana to Texas.	Annual ...	June to November.	July to December.	White; 1/2 inch; cyme.	Seeds .....	Meadows; cultivated land.	Prevention of seeding; thorough cultivation.
Horse nettle, bull nettle, sand lark.	<i>Solanum carolinense.</i>	Iowa to New Jersey and south.	Perennial.	June to October.	August to November.	Purple; 1/2 inch; solitary.	Seeds; root-stocks.	Waste land; meadows; pastures.	Alternate cultivation and heavy cropping.
Horseweed, butterweed, colt's tail, fleabane.	<i>Erigeron canadensis.</i>	Everywhere ...	Annual ...	June to September.	July to October.	White; 1/2 inch; head.	Seeds; wind ...	Waste land; meadows; grainfields.	Prevention of seeding; late cultivation.
Indian mallow, butter print, stamylweed, velvet leaf.	<i>Abrutilon avicennae.</i>	Illinois to Iowa and Missouri.	.....do .....	July to August.	August to September.	Yellow; 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, Cuban grass, Australian millet, Egyptian millet, evergreen millet, Means's Grass.	<i>Andropogon halopensis.</i>	North Carolina to Texas and California.	Perennial.	June to August.	July to September.	Green; 1/2 inch; panicled.	Root-stocks; seeds.	Cultivated fields; hoveed crops.	Alternate cultivation and heavy cropping.
Lamb's quarters, pigweed.	<i>Chenopodium album.</i>	Everywhere ...	Annual ...	July to September.	August to November.	Green; 1/2 inch; panicled.	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; 1/2 inch; cyme.	Root-stocks; seeds.	Fields.	Infection with fungous disease; close cultivation.
Malva .....	<i>Malva parviflora.</i>	California.	.....do .....	June to August.	July to September.	Purple; 1/2 inch; solitary.	Seeds; root-stocks.	.....do .....	Prevention of seeding; thorough cultivation.
Mammoth, 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.	<i>Iva xanthifolia.</i>	Minnesota to Utah.	Annual ...	August to September.	September to October.	Green; 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; 1/2 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; 1/2 inch; umbel.	Seeds; wind; root-stocks.	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; 3 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; 3 inch raceme.	Seeds; in grass seed.	Meadows	Sowing clean seed; cultivation; grubbing in fall.
Musky alligatoria, ground needle, musky horsetail	<i>Erodium moschatum</i>	California to Arizona	Annual	April to July	May to August	Rose; 1/2 inch umbel.	Seeds	Pastures	Sowing clean seed; burning.
Narrow-leaved stickseed, beggar tick	<i>Lappula leppala</i>	Everywhere	do	July to September	July to October	Blue; 1/2 inch raceme.	Seeds; animals	Everywhere; all 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; 1/2 inch; spikelets.	Tubers; in nursery packing; seeds.	In bood 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; 1/2 inch; solitary.	Seeds; wind; rootstocks.	Meadows; pastures.	Prevention of seeding; cultivation.
Ox-eye daisy, bull's-eye, white-daisy, whitered, Paraguay bar, sheep bur.	<i>Chrysanthemum leucanthemum</i> , <i>Acanthospermum xanthioides</i>	Maine to Virginia and Ohio, North Carolina to Florida	do	June to September	July to October	White; 1 inch; solitary.	Seeds; animals; rootstocks.	Waste places; wood.	Do.
Paroquet bnr	<i>Sida stipulata</i>	Alabama to Florida	do	June to November	July to December	Yellow; 1 inch; solitary.	Seeds; animals.	Waste places; cultivated land; wood.	Cultivation.
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; 1/2 inch; raceme.	Seeds; wind	Grain fields; pastures; dairy products.	Burning; thorough cultivation.
Pigeon grass, foxtail, yellow foxtail	<i>Setaria glauca</i>	Everywhere	Annual	June to September	July to November	Green; 1/2 inch; spikes.	Seeds; in clover seed.	Cultivated land; grain crops.	Do.
Pigweed, careless weed, rough amaranth	<i>Amaranthus retroflexus</i>	do	do	July to October	August to November	Green; 1/2 inch; spikes.	Seeds	Cultivated land; all crops.	Prevention of seeding; thorough cultivation.
Poison ivy, poison oak, poison vine	<i>Rhus radicans</i>	do	do	June to July	July to August	Yellow; 1/2 inch; raceme.	Rootstocks; seeds.	Waste land; man.	Cultivation; repeated grubbing.
Poverty weed	<i>Iva axillaris</i>	Montana to New Mexico	do	June to August	July to September	Yellow; 1/2 inch; beads.	Rootstocks; seeds.	Cultivated land; all crops.	Closer cultivation; smothering crops.
Prickly lettuce, compass plant, milkweed, wild lettuce	<i>Lactuca scariola</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.
Purslane, garden purslane, pursley, pnsley	<i>Portulaca oleracea</i>	Everywhere	do	May to November	June to December	Yellow; 1/2 inch; solitary.	Seeds	Cultivated land; garden crops.	Closer cultivation.
Ragweed, bitterweed, hogweed, richweed, Roman wormwood	<i>Ambrosia artemisiifolia</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, size, 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; $\frac{1}{2}$ inch; spike.	Seeds; root-stocks.	Everywhere; all crops.	Clean seed; cultivation.
Running hrier, dewberry, low blackberry.	<i>Rubus canadensis</i> .	Maryland to North Carolina.	.....do.....	May to July.	June to August.	White; $\frac{1}{2}$ inch; solitary.	Seeds; birds; rootstocks.	Fields; all crops.	Cultivation; smothering crops.
Russian thistle, Russian cactus, Russian salt-wort, Russian tumbleweed.	<i>Salsola kali</i> tragus.	Minnesota to Colorado.	Annual.	July to September.	August to November.	Purple; $\frac{1}{2}$ inch; solitary.	Seeds; wind.	Everywhere; small grains.	Cultivation; burning.
Shepherd's purse, moth-eaten heart, pickpurse, toothwort.	<i>Bursa bursa-pastoris</i> .	Everywhere.	.....do.....	March to December.	May to December.	White; $\frac{1}{2}$ 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, knotweed.	<i>Polygonum pennsylvanicum</i> .	Ohio to Nebraska.	.....do.....	July to August.	August to September.	Pink; $\frac{1}{2}$ inch; spike.	Seeds.	.....do.....	Do.
Stuesweed.	<i>Helenium autumnale</i> .	North Carolina to Texas.	Perennial.	July to September.	August to October.	Yellow; $\frac{1}{2}$ inch; head.	Seeds; root-stocks.	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 stalks; root-stocks.	.....do.....	Cultivation; smothering crops.
Sorrel, sourweed.	<i>Rumex acetosa</i> .	South Carolina to Georgia.	.....do.....	.....do.....	.....do.....	Reddish; $\frac{1}{2}$ inch; panicle.	Seeds; root-stocks.	.....do.....	Thorough cultivation.
Sowthistle, field sowthistle, perennial sowthistle.	<i>Sonchus olerensis</i> .	New England to Wisconsin.	.....do.....	July to October.	August to November.	Yellow; $\frac{1}{2}$ inch; heads.	Seeds; wind; rootstocks.	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; $\frac{1}{2}$ inch; spikes.	Seeds.	.....do.....	Do.
Spiny nightshade.	<i>Solanum aculeatissimum</i> .	North Carolina to Mississippi.	.....do.....	June to September.	July to October.	White; $\frac{1}{2}$ 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.



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.	<i>Rudbeckia hirta</i> ...	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.	<i>Rumex obtusifolius</i> .	New England to Wisconsin.	Perennial	July to September.	August to October.	Green; $\frac{1}{2}$ inch; raceme.	.....do	Meadows; pastures.	Do
Yellow dog fennel.....	<i>Helianthemum tenuifolium</i> .	Nebraska to Mississippi.	Annual	July to October.	August to November.	Yellow; $\frac{1}{2}$ inch; head.	.....do	Waste land; pastures.	Do.
Yerba mansa.....	<i>Anemopsis californica</i> .	California to Arizona.	Perennial	May to September.	June to October.	White; $\frac{1}{2}$ inch; spike.	Rootstocks; seeds.	Moist land; cultivated crops.	Alternate cultivation and heavy crops.





## FARMERS' BULLETINS.

These bulletins are sent free of charge to any address upon application to the Secretary of Agriculture, Washington, D. C. Only the following are available for distribution:

- No. 15. Some Destructive Potato Diseases: What They Are and How to Prevent Them. Pp. 8.  
 No. 16. Leguminous Plants for Green Manuring and for Feeding. Pp. 24.  
 No. 18. Forage Plants for the South. Pp. 30.  
 No. 19. Important Insecticides: Directions for Their Preparation and Use. Pp. 20.  
 No. 21. Barnyard Manure. Pp. 32.  
 No. 22. Feeding Farm Animals. Pp. 32.  
 No. 23. Foods: Nutritive Value and Cost. Pp. 32.  
 No. 24. Hog Cholera and Swine Plague. Pp. 16.  
 No. 25. Peanuts: Culture and Uses. Pp. 24.  
 No. 26. Sweet Potatoes: Culture and Uses. Pp. 30.  
 No. 27. Flax for Seed and Fiber. Pp. 10.  
 No. 28. Woods; and How to Kill Them. Pp. 30.  
 No. 29. Souring of Milk, and Other Changes in Milk Products. Pp. 23.  
 No. 30. Grape Diseases on the Pacific Coast. Pp. 16.  
 No. 31. Alfalfa, or Lucern. Pp. 23.  
 No. 32. Silos and Silage. Pp. 31.  
 No. 33. Peach Growing for Market. Pp. 24.  
 No. 34. Meats: Composition and Cooking. Pp. 29.  
 No. 35. Potato Culture. Pp. 28.  
 No. 36. Cotton Seed and Its Products. Pp. 10.  
 No. 37. Kaffir Corn: Characteristics, Culture, and Uses. Pp. 12.  
 No. 38. Spraying for Fruit Diseases. Pp. 12.  
 No. 39. Onion Culture. Pp. 31.  
 No. 40. Farm Drainage. Pp. 24.  
 No. 41. Fowls: Care and Feeding. Pp. 24.  
 No. 42. Facts About Milk. Pp. 29.  
 No. 43. Sewage Disposal on the Farm. Pp. 22.  
 No. 44. Commercial Fertilizers. Pp. 24.  
 No. 45. Some Insects Injurious to Stored Grain. Pp. 32.  
 No. 46. Irrigation in Humid Climates. Pp. 27.  
 No. 47. Insects Affecting the Cotton Plant. Pp. 32.  
 No. 48. The Manuring of Cotton. Pp. 16.  
 No. 49. Sheep Feeding. Pp. 24.  
 No. 50. Sorghum as a Forage Crop. Pp. 24.  
 No. 51. Standard Varieties of Chickens. Pp. 48.  
 No. 52. The Sugar Beet. Pp. 48.  
 No. 53. How to Grow Mushrooms. Pp. 20.  
 No. 54. Some Common Birds in Their Relation to Agriculture. Pp. 40.  
 No. 55. The Dairy Herd: Its Formation and Management. Pp. 24.  
 No. 56. Experiment Station Work—I. Pp. 30.  
 No. 57. Butter Making on the Farm. Pp. 15.  
 No. 58. The Soy Bean as a Forage Crop. Pp. 24.  
 No. 59. Bee Keeping. Pp. 32.  
 No. 60. Methods of Curing Tobacco. Pp. 16.  
 No. 61. Asparagus Culture. Pp. 40.  
 No. 62. Marketing Farm Produce. Pp. 28.  
 No. 63. Care of Milk on the Farm. Pp. 40.  
 No. 64. Ducks and Geese. Pp. 48.  
 No. 65. Experiment Station Work—II. Pp. 32.  
 No. 66. Meadows and Pastures. Pp. 24.  
 No. 67. Forestry for Farmers. Pp. 48.  
 No. 68. The Black Rot of the Cabbage. Pp. 22.  
 No. 69. Experiment Station Work—III. Pp. 32.  
 No. 70. The Principal Insect Enemies of the Grape. Pp. 24.  
 No. 71. Some Essentials of Beef Production. Pp. 24.  
 No. 72. Cattle Ranges of the Southwest. Pp. 32.  
 No. 73. Experiment Station Work—IV. Pp. 32.  
 No. 74. Milk as Food. Pp. 39.  
 No. 75. The Grain Smuts. Pp. 20.  
 No. 76. Tomato Growing. Pp. 30.  
 No. 77. The Liming of Soils. Pp. 19.  
 No. 78. Experiment Station Work—V. Pp. 32.  
 No. 79. Experiment Station Work—VI. Pp. 28.  
 No. 80. The Peach Twig-borer—an Important Enemy of Stone Fruits. Pp. 10.  
 No. 81. Corn Culture in the South. Pp. 24.  
 No. 82. The Culture of Tobacco. Pp. 23.  
 No. 83. Tobacco Soils. Pp. 23.  
 No. 84. Experiment Station Work—VII. Pp. 32.  
 No. 85. Fish as Food. Pp. 30.  
 No. 86. Thirty Poisonous Plants. Pp. 32.  
 No. 87. Experiment Station Work—VIII. (In press.)  
 No. 88. Alkali Lands. (In press.)  
 No. 89. Cowpeas. (In press.)