

In looking over a large number of agricultural reports of the Northern States we find in some of them much space is given to discussions of the grasses by the farmers at their winter meetings. There is much said about the care of meadows and pastures, with many repetitions. We cannot help being strongly impressed with the idea that we need many more careful observers—farmers who are trained students of science.

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## CHAPTER VIII.

### TESTING SEEDS. SOME COMMON WEEDS.

**Seed Stations and Their Work.**—Whether a seed is liable to grow or not depends much on how it was cured and the nature of the place where it has been stored. In the following account of some experiments this subject will receive some attention.

The first station for testing seeds was established by Dr. Knobbe, of Saxony, in 1869. In Germany, in 1878, upwards of forty of the experimental stations had attached to them a seed control department, and 14 of these did nothing else.

*Adulterations.*—These stations discovered adulterations of seeds which were “most ingenious in character, harmful in effect, and remarkable in amount.” One practice is to kill seeds by boiling or baking and mix them with some desirable seeds which they resemble. The dead seeds in that case tell no tales.

Old seeds, or seeds of another variety, are often dyed or bleached with sulphur, and used to adulterate good seeds of red clover or some other species. Old seeds are dressed with oil and sometimes rubbed by machinery to improve their appearance. Seeds of rye-grass and Italian rye-grass are often adulterated

with those of chess, which they much resemble. *Holcus lanatus*, a poor grass, is also found in rye-grass. Meadow fescue is largely adulterated with that of perennial rye-grass, a cheaper seed of less value.

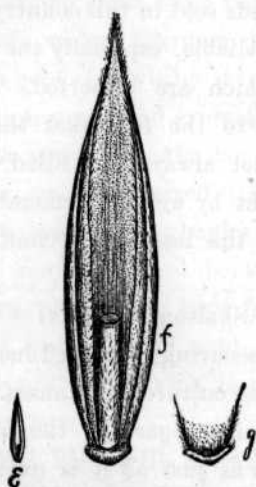


FIG. 88.—*c*, A floret of meadow fescue; *f*, the same enlarged; *g*, the other side of the base of same.

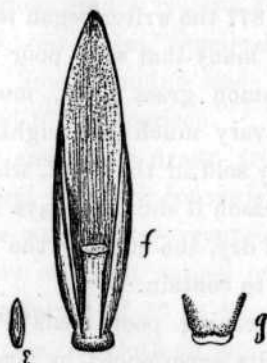


FIG. 89.—*c*, A floret of perennial rye grass; *f*, the same enlarged; *g*, the other side of the base. Observe the difference in the apexes, difference in the piece of the rachis held by each, though this is not uniformly as here shown. Observe the base of Fig. 88 is convex, while that of Fig. 89 is flat or concave.

Crested dog's-tail is largely adulterated with *Molinia cœrulea*, which is of no value.

Seeds formerly sold, even by the very best seedsmen, were more or less tampered with, and they were careful to adulterate their seeds about so much each year to prevent troublesome questions.

In Germany, the mills ground quartz, it was sifted, colored, and mixed with seeds of clover. Pure seeds are quoted as "net seed," while dead ones are quoted as *trio* or "000."

James Hunter, of England, in his seed catalogue and treatise on grasses, writes: "If it be asked how such a state of things can be possible, the only reply that can be given is, that so complete is the want of knowledge of this subject on the part of the seedsmen and agriculturists, that almost any species of adulter-

ation of grass seeds may be practiced without fear of detection. It is probable that not one seedsman in twenty knows all the species of grasses commonly used for permanent pastures, or the seeds of the various species of grass seeds he sells."

In 1877 the writer began testing seeds sold in this country, and found many that were poor and unreliable, especially the more uncommon grass seeds, most of which are imported. Grass seeds vary much in weight, owing to the fact that they are usually sold in the chaff, which is not always well filled. For this reason it should always be bought by weight, remembering that if dry, the heavier the sample, the less empty chaff it is likely to contain.

Concerning poor seeds Professor Shelton remarks: "The difficulty experienced by farmers in securing good seed has been a serious obstacle in the way of grass culture in Kansas. We have reason to know that the complaint regarding the quality of grass seeds retailed in the State is as just as it is universal. The special cause of this trouble in Kansas seems to grow out of the fact, that, as a rule, the trade in grass seeds is not a large one as yet, anywhere; and seeds which are not sold any one season, are carried to the next. In this way, seeds which were originally good are badly damaged, or their vitality is totally destroyed by being kept year after year in damp cellars and mouldy warehouses. But more than this, seeds are often worthless in the start, from having never been properly matured, or from injury received in the field or mow before threshing."

Doctoring and adulterating and selling such seeds is worse than selling 100 yards of cotton thread for 200 yards, or deceiving in the weight or cost of tea, coffee or sugar. The sale of poor seeds affects the future crops as well as the present one.

In German seed-stations the following kind of work is done: determination of the species, the amount of impurities and their nature, the germinating power of seeds, the total weight of the

seeds, their specific gravity, their weight per bushel, detection of dyeing, bleaching, oiling, etc.

The apparatus needed is very simple, consisting of a small magnifying glass, some sieves of various grades, bellows, forceps, delicate scales, thermometers, jars, test-plates, chemical tests, and a good knowledge of botany. Some genuine seeds of the common weeds and grasses are useful for comparison.

The sample should be carefully and fairly drawn from the whole, and well mixed. As a general thing for convenience, 50 or 100 seeds or multiples of these numbers are counted out. They may be placed between layers of moist flannel or thick woolen paper, and kept in a temperature of 50 to 60 degrees F. A dish of damp sand, with a paper or cloth on top to hold the seeds, over which is another cloth, is a very satisfactory arrangement.

**What kind will usually Germinate and what will not.—**

Seeds of the commonest grasses, such as Timothy, orchard grass, June grass, red top, and the common clovers, are generally very good, containing from two to twenty per cent. of impurities, which consist mostly of dirt, straw and chaff.

The seeds of the less common grasses, such as perennial rye grass, the fescues, meadow foxtail, oat grass, crested dog's tail, sweet vernal possess a very low vitality, almost without exception. These are mostly imported from Europe.

In 1877, the writer tested grass seeds purchased of one of the best known seedsmen of New York. Four lots of 50 seeds each were tested, with the following results given in per cent. In each case what appeared to be a seed was tested. Most of these were in the chaff:

Hard fescue, 13 per cent.	Red-top, 14 per cent.
Rhode Island bent, 7 per cent.	June grass, 3 per cent.
English rye-grass, 5 per cent.	Reed canary grass, 3 per cent.
Rough-stalked meadow, 2 per cent.	Meadow foxtail, 4 per cent.
Schroeder's Bromus, 60 per cent.	Sheep's fescue, 1 per cent.

Wood-meadow grass, 1 per cent.	Creeping bent, 2 per cent.
Meadow fescue, 7 per cent.	Crested dog's-tail, 8 per cent.
Sweet vernal, 15 per cent.	
Tall fescue, 11 per cent.	Large red clover, 88 per cent.
Darnel spiked fescue, 5 per cent.	Medium red clover, 88 per cent.
Orchard grass, 27 per cent.	Bokhara clover, 48 per cent.
Hungarian grass, 51 per cent.	Italian clover, 82 per cent.
Yellow oat grass, 11 per cent.	Lucerne, 74 per cent.
Timothy, 68 per cent.	White clover, 84 per cent.
Italian rye-grass, 21 per cent.	Alsike clover, 64 per cent.

The writer had kept some home grown seeds at the Agricultural College for two or three years in several different rooms, one of which was a damp basement. These seeds were shelled out, as were the seeds taken from the samples purchased from the New York seedsman:

## NEW YORK SEEDS.

Shroeder's Bromus, 64 per cent.
Sheep's fescue, 0 per cent.
June grass, 6 per cent.
Rye-grass, 18 per cent.
Meadow fescue, 6 per cent.
Orchard grass, 66 per cent.
Red clover, 94 per cent.

## COLLEGE SEEDS

Shroeder's Bromus, 96 per cent.
Sheep's fescue, 72 per cent.
June grass, 28 per cent.
Rye-grass, 74 per cent.
Meadow fescue, 92 per cent.
Orchard grass, 82 per cent.
Red clover, 52 per cent.

Seeds taken from packages with low vitality will vary much in different tests, but good fresh seeds run high and quite uniform. Good seeds will stand the most abuse.

**Will Seeds Sprout More Than Once?**—It is the opinion of many that seeds once sprouted and well dried will never sprout again. "To sprout" means "to germinate," "to vegetate," "to begin to grow," "to shoot, as the seed or the root of a plant." In each of the cases considered the roots died at the end of each test, and new ones pushed out when moistened. The same *plumule* lived over, or endured all the changes. Wheat and rye and oats will start to grow after drying for several times, often for six or more times.

**How to Procure Seeds that are Good and True to Name.**

—It has been shown that there are many difficulties in the way of making improvements in the seeding of land to grass. Our farmers usually buy two or three common sorts offered in the market. In England the seedsmen have largely prescribed the kinds to be used for meadows and pastures, and they are naturally inclined to recommend what is to them most profitable and easily obtained. Where land is to remain in grass for some years it is very important to make the right selection of seeds. The leading seedsmen keep experts, as they call themselves, for the purpose of giving information on this subject.

They take contracts at special rates for laying down a certain number of acres to grass.

The Royal Agricultural Society employs a consulting botanist to examine samples of seeds offered in the market. He has fees for performing certain work. To report on the purity, amount and nature of foreign materials, perfectness, and germinating power of a sample of seeds the fee is five shillings. The council have established a standard for the examination of seeds.

1. That the bulk be true to the species ordered.
2. That it contain not more than five per cent. of seeds other than the species ordered.
3. That the germinating power shall be, for cereals, green crops, clovers and Timothy not less than 90 per cent.; for fox-tail not less than 20 per cent.; and for other grasses not less than 70 per cent.

Seedsmen in England and Germany will now guarantee seeds in accordance with this standard.

In England, in 1869, after enacting a law against "doctoring" seeds, they nearly or quite disappeared from the market. The consulting botanist had only seen two samples in five years. Killed and dyed seeds are gone, but dead seeds may still be found.

Notwithstanding the laws enacted, and care taken, it is by no means easy to secure good seeds true to name.

Mr. De Laune, in *Jour. Royal Ag. Soc.*, in 1882, says: "However careful I was in my orders, and from whatever seed-market I ordered my seeds; the percentage of rye grass, soft woolly grass, and other bad grasses and weeds, was beyond all belief. I learned that good seed was most difficult to get. I consulted the botanist, and to my great amazement was told that my seed bought for meadow fescue was all rye grass, and the rough meadow grass was all smooth meadow grass. I have, since these experiments, never sown any seed except after the sample had been examined by the consulting botanist; and have, in consequence, obtained results most satisfactory to myself. I have found it necessary to examine seeds from different parts of every sack. I regret to say that there is no seed-merchant I would trust without the seed was examined by the consulting botanist." And yet a leading seedsman in England says: "The seedsman should be treated with much the same sort of confidence as the family doctor."

Doubtless my readers will be glad to see the following quotation from the Annual Report of the consulting botanist,—W. Caruthers, of the Royal Agricultural Society for 1884:

"During the past year I have examined 701 samples of seeds for the members of the society, besides replying to inquiries regarding the nature, habits, and names of weeds, and the best way of dealing with them; the diseases of cultivated plants; and to various matters affecting the crops of the farm. I have examined 69 samples of meadow fescue, and 46 of tall fescue, in all 115 samples, as compared with 85 in the previous year. Sixty-five per cent of the samples of meadow fescue were free from weeds and seeds of other grasses, as against 26 per cent of last year. The principal adulterant employed is rye grass; but the

use of this seed is very greatly lessened. [This is on account of the work of the consulting botanist.]

“Seventy-six samples of cocksfoot [orchard grass] were on the whole pure. Six per cent had some small rye grass seeds in them, and in one case 20 per cent of Yorkshire fog (*Holcus lanatus*,) were included in the sample.

“A fair proportion of 65 samples of meadow foxtail was found good. No less than 64 per cent of the samples of *Agrostis alba* var. *stolonifera*, florin or creeping bent, were infested with ergot, a most dangerous fungus.

“Out of 126 samples of clover, 19 per cent of the red clover contained seeds of dodder, and 25 per cent of the alsike contained seeds of this parasite.

“Fewer samples of grass mixture have been submitted to me during the past year, but the samples examined have more firmly convinced me that it is most undesirable for growers to purchase their seed in this form. One mixture consisted entirely of rye grasses, with some trefoil and a little clover, and in addition the rye grass was infested with ergot. Another consisted of rye grass with one per cent of other grasses and clovers.”

If railroad companies find it necessary to employ engineers, if trustees think it best to employ a landscape gardener to lay out a park or cemetery, if builders employ architects, why should not the farmers, at a trifling expense to each, employ a consulting botanist at an experiment station, to examine seeds before purchase?

We look forward with hope to the time when every State shall have one or more such stations.

To some extent, the following plan adopted by Professor Shelton, of Kansas, will work well:

“Our practice, which has been entirely satisfactory, has been to send to those dealers who make a specialty of grass seeds in the sections where the seeds are raised. We have always sent



to the large eastern dealers for our grass seeds, and to Denver and San Francisco for our alfalfa seeds. This may not be the best plan, but it has been satisfactory as to the quality of the seed procured and as to the price, which, including the freight, we have found to be considerably less than that asked by local dealers."

**Weeds in the Meadow.**—A weed is now generally described as a plant out of place, or growing where it is not wanted. All the pasture grasses are weeds, if they grow in our garden or corn field. In some countries potatoes become weeds. A plant may be a troublesome weed in one country and not in another.

R. W. Emerson entertained a very hopeful view of weeds, and defined one as "a plant whose virtues have not yet been discovered. \* \* \* \* Every plant probably is yet to be of utility in the arts."

A large majority of our worst weeds are foreigners, and have come from Europe, Asia and South America. It is just so with the fields of Australia and New Zealand. Most of the weeds are introduced on to a farm by being sown with seeds of the grasses and clovers; occasionally they come from fresh manure or from waste places, or slovenly farms in the neighborhood. Most of them are following the tide of emigration and are "going west," but a few are taking the opposite course, such as *Rudbeckia hirta*, *L. Dysodia* and *Matricaria discoidea*, *D. C.*

In the words of Dr. Thurber: "Weeds seem to be naturally well provided for distribution, but the careless farmer sows them broadcast by the handful, and does what nature cannot do—he puts them in well prepared soil, where they will be sure to grow. In the month of March hundreds of farmers will sow their clover. Next summer, or later, we shall have from some of them letters and specimens. 'A new weed has appeared in my field, or meadow, and threatens to kill out everything else. What is it, and how shall I get rid of it? Where *did* it come

from?' The answer will be: 'You carefully sowed it that cool March day with your clover.'"

Plants are assisted to become weeds by producing many seeds, by ripening with the crop so the seeds are harvested with it, by ripening before the crop and scattering seeds on the ground, by producing seeds which are not easily separated by sieves, by producing very small seeds which escape notice, by having a supply of hairs that they may be carried by the wind, or some awns or hooks to hold fast to animals, by remaining a long time in the soil without losing their vitality, by producing long or thick roots not easily eradicated, by producing bulbs, or long root stocks, by being offensive to all kinds of stock so they are allowed to grow and multiply.

Clay soil is less likely to be troubled than loam or sand.

Some of the weeds which interfere with the growth of grasses and clovers in the Northern States are here enumerated, with figures of a few and remarks in reference to all.

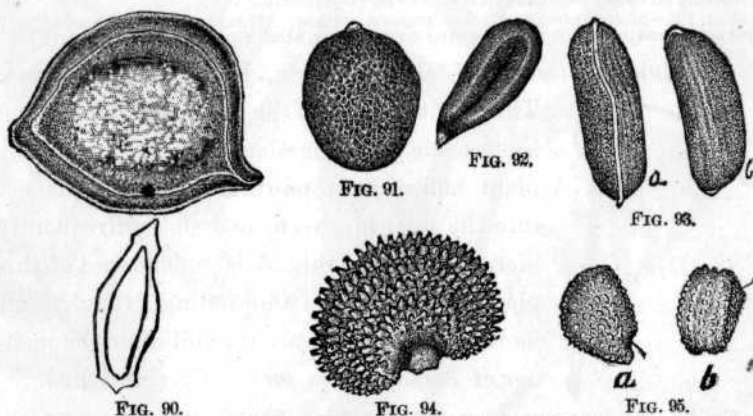


FIG. 90. An achene or fruit of *Ranunculus bulbosus*, L. (Bulbous Crowfoot.) A troublesome perennial with yellow flowers, found in the northeast. Side view and cross section,  $1 \times 10$ .—(Sudworth.)

FIG. 91. *Ranunculus acris*, L. (Tall Crowfoot.) Much resembling the last though destitute of the bulb.

FIG. 92. *Brassica nigra*, L. (Black Mustard.)  $1 \times 15$ .—(Sudworth.)

FIG. 93. *Capsella Bursa-pastoris*, Mœnch. (Shepherd's Purse.)  $1 \times 20$ .—(Sudworth.)

FIG. 94. *Hypericum prolificum*, L. (Shrubby St. John's Wort), two views.  $1 \times 20$ .—(Sudworth.)

FIG. 95. *Silene inflata*, Smith. (Bladder Champion.)  $1 \times 16$ .—(Sudworth.)

FIG. 96. *Cerastium vulgatum*, L. (Mouse-ear Chickweed), two views of a seed.  $1 \times 25$ .—(Sudworth.)



FIG. 96.

FIG. 96.—*Stellaria media*, Smith. (Star chickweed.) A seed lying on one of its two flat sides.  $1 \times 20$ .—(Sudworth.)



FIG. 97.

FIG. 97.—*Mollugo verticillata*, L. (Carpet-weed.) Two views, *a*, looking towards one edge; *b*, lying on one side. These are much like chickweeds.  $1 \times 4$ .—(Sudworth.)



FIG. 98.

FIG. 98.—*Papaver Rhoeas*, L. A seed of poppy. Two or three species are quite troublesome in some places.  $1 \times 30$ .—(Sudworth.)

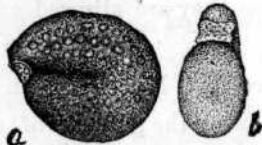


FIG. 99.

FIG. 99.—*Portulaca oleracea*, L. (Purslane, "Pusley"); *a*, seed lying on one side, *b*, standing on edge showing seed scar.  $1 \times 12$ .—(Sudworth.)

FIG. 100.—*Malva rotundifolia*, L. (Common mallow.) This low perennial seeds freely for some months in the year, sending down a long, stout root.  $1 \times 18$ .—(Sudworth.)

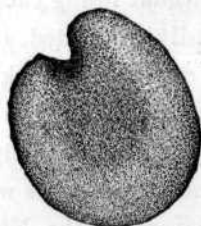


FIG. 100.

*Erodium cicutarium*, L'Her. Alfilaria, Pin-clover, Pin-grass.

FIG. 101.—*Erodium cicutarium*, L'Her. (Alfilaria.)  $1 \times 3$ .—(Scribner.)

This plant belongs to the geranium family, and has become quite abundant in California. The plant makes good pasture, but the seeds get into the wool of sheep, and not unfrequently pierce the skin of the animal. The seed of this plant, by the aid of alternating drought and moisture, can penetrate the soil after the manner of *Stipa spartea* previously mentioned.

*Medicago lupulina*, L. (Black Medick.) This is a biennial or perennial, and in habit much resembles white clover. The flowers are yellow; the plant makes good feed, though there is less

FIG. 103.—*Oxytropis Lambertii*. (Loco Weed.)—(U. S. Agricultural Report.)

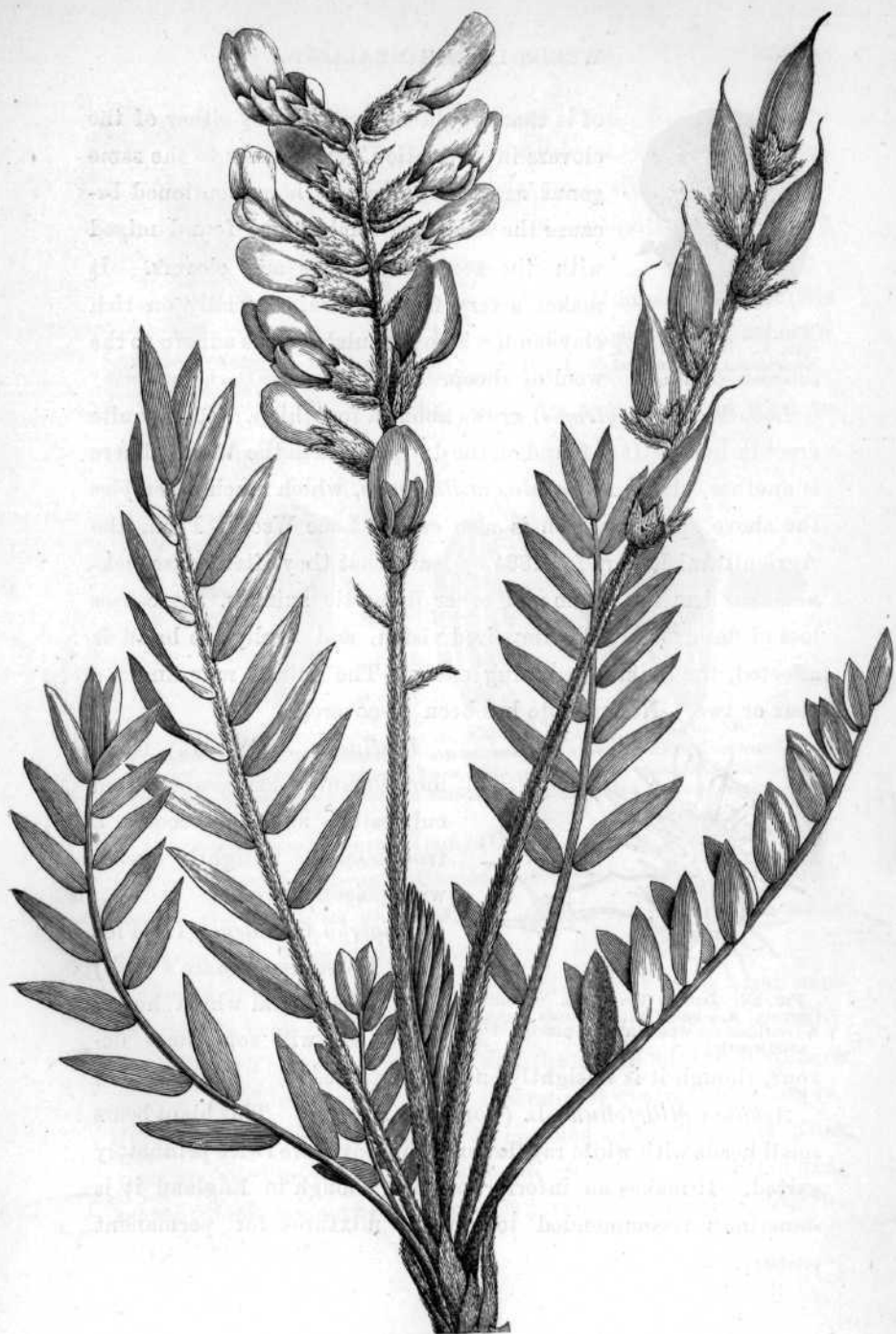




FIG. 102.—*Medicago lupulina*, L. (Black Medick Nonesuch.) Fruit or pod enlarged.—(Scribner.)

of it than would be furnished by either of the clovers in cultivation. It belongs to the same genus as Lucerne, and is here mentioned because the seeds are likely to be found mixed with the seeds of grasses and clovers. It makes a very fair pasture, especially on rich clay land. The reticulated pods adhere to the wool of sheep.

Loco Weed (*Oxytropis*) grows about a foot high, and is quite erect in habit. It is found on the dry prairies in the West. There is another plant, *Astragalus mollissimus*, which much resembles the above species, which is also called Loco Weed. From the Agricultural Report for 1884 we learn that they often cause sickness and death of cattle and other domestic animals. It causes loss of flesh, lassitude, impaired vision, and finally the brain is affected, the animal becoming crazy. The animal may linger a year or two. No antidote has been discovered.

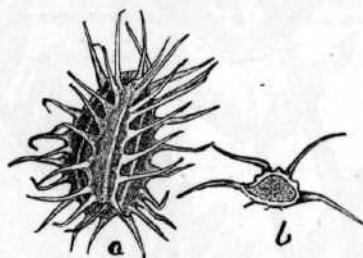


FIG. 104. *Daucus Carota*, L. (Common Carrot). a, whole fruit; b, cross section. A troublesome weed in some places. 1×8. —(Sudworth.)

*Pastinaca sativa*, L. Common Parsnip—has escaped from cultivation and has become a troublesome, unsightly weed, with poisonous roots.

*Erigeron Canadense*, L. (Flea bane, Horse-weed, Mare's tail.)

This is an annual which horses and sheep will sometimes devour, though it is unsightly and of no value.

*Achillea Millefolium*, L. (Common Yarrow.) This plant bears small heads with white ray flowers; the leaves are twice prinnately parted. It makes an inferior pasture, though in England it is sometimes recommended to sow in mixtures for permanent pasture.



FIG. 105.—*Erigeron Canadense*, L. (Fleabane.)  $1 \times 20$ .—(Sudworth.)

*Erigeron annuum*, Pers., *E. bellidifolium*, Muhl., *E. Philadelphicum*, L., *E. strigosum*, Muhl., are other species of similar habit to figure 105, and are quite unsightly and common in thin meadows.

*Rudbeckia hirta*, L. (Cone-flower.) This hairy weed has a purple cone surrounded with yellow ray-flowers. It is becoming more common, and has made its way from the West to the New England States.



FIG. 106.

FIG. 106.—*Achillea Millefolium*, L. An achene, two views.  $1 \times 10$ .—(Sudworth.)



FIG. 107.

FIG. 107.—*Leucanthemum vulgare*, Lam. (Ox-eye.) Achene enlarged.—(Scribner.)



FIG. 108.

FIG. 108.—*Cnicus arvensis*, (Canada thistle); an achene, also a cross section of the same.  $1 \times 10$ .—(Sudworth.)

*Leucanthemum vulgare*, Lam. (Ox-eye, White Daisy.) This is one of the worst perennial weeds or weeds of any kind which infests the meadows and pastures of this country. The seeds are sown with grass seed.

*Cnicus arvensis*, Hoffm. (Canada Thistle). This is often considered the arch fiend of weeds, and is too well known in many localities. The heads are small and the scales of the involucre scarcely prickly pointed. It is a perennial rooting very deeply. Its course westward is likely to be checked by the fact that it has usually failed to produce seeds on the prairies. It is often dioecious. Some account of this pest is given in connection with the chapter on clover.

Ragweed, Hogweed, Roman Wormwood, *Ambrosia*, is very common, especially in old fields. It is a coarse, homely annual, which one, not a botanist, would scarcely suspect was a member of the aster family.

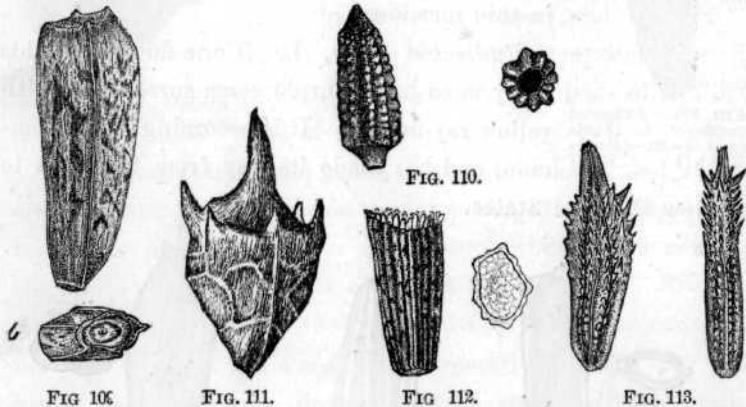


FIG. 109.

FIG. 111.

FIG. 112.

FIG. 113.

FIG. 109.—*Lappa officinalis*, var. *major*, Gr (Burdock). One of our worst wayside weeds, carried on the fleeces of animals. 1×6.—(Sudworth.)

FIG. 110.—Two views of an achene of *Anthemis Cotula*, (Mayweed). 1×15.—(Sudworth.)

FIG. 111.—*Ambrosia artemisiifolia*, L. (Rag weed), an achene. 1×8.—(Sudworth.)

FIG. 112.—*Cichorium Intybus*, L. (Chicory, Succory), two views. 1×7.—(Sudworth.)

FIG. 113.—*Taraxacum Dens-leonis*, Desf. (Dandelion), two views of an achene, destitute of the long beak and pappus, which break off easily. 1×10.—(Sudworth.)

Chicory, Siccory, (*Cichorium Intybus*, L.) has been introduced as a substitute for coffee, and has spread in many waste places in the older portions of the Northern States.

*Plantago lanceolata*, L. (Ribgrass, Narrow-leaved Plantain.) This perennial herb has become extensively introduced with grass seed from the East. The flower stalk runs up quickly after cutting, and thus becomes unsightly on lawns. It has been found quite as nutritious as some of our best grasses, but it affords only a small amount of feed. Most kinds of stock eat it when young. Seeds ought to become familiar to every one who makes a lawn or a meadow.



FIG. 114.—*Plantago lanceolata*, L. (Rib grass, Narrow-leaved Plantain), 2 views. 1×12.—(Sudworth.)

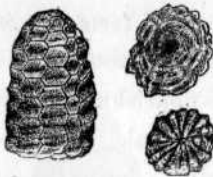


FIG. 115. *Verbascum Thapsus*, L. (Common Mullein). Three views of a seed.  $1 \times 20$ .—(Sudworth.)

*Plantago major*, L., (Common Plantain), is not very troublesome when compared with the former species. Found about door yards.

*Verbascum Thapsus*, L. (Common Mullein, Velvet-leaf.) The seeds of this biennial are very small and very numerous. *V. Blattaria* (Moth Mullein), is becoming com-

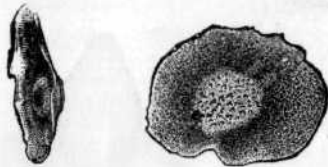


FIG. 116.—*Linaria vulgaris*, Mill. (Toad-flax.) Two views of a winged seed.  $1 \times 15$ .—(Sudworth.)

*Linaria vulgaris*, Mill. (Toad-flax, Butter and Eggs.) This is a vile nuisance in meadow or pasture. It seeds freely, and also spreads very rapidly by its rootstocks.



FIG. 117.—*Brunella vulgaris*, L. (Self-heal, Heal-all.)  $1 \times 12$ .—(Scribner.)

*Brunella vulgaris*, L. (Self-heal or Heal-all.) This is a small perennial herb, bearing violet flowers. In dry, thin meadows it is quite common and on the increase.

*Cynoglossum officinale*, L. (Hounds-tongue.) This is another plant bearing a nutlet containing hooded prickles.

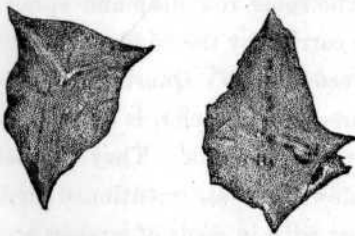


FIG. 118.—*Echium vulgare*, L. (Viper's Bugloss.) This is somewhat ornamental, but in some places has become very prolific and hard to eradicate. An angular wrinkled nut; two views, much enlarged. (Scribner.)

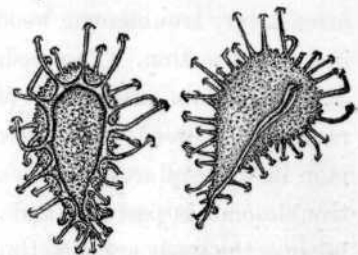


FIG. 119.—*Echinosperrum Lappula*, Lehm. (Stick-seed.) The small nutlets are covered with a double row of hooked prickles. It must be carefully kept out of sheep pastures; two views.  $1 \times 10$ .—(Sudworth.)

*Oscuta Epithymum*, Murr. (Lucerne Dodder.) This is a parasitic vine which has occasionally been introduced with seed of



Lucerne. It is likely to be destroyed by the careful farmer. As soon as the slender vine from the seed gets fast to the stem of a plant, the root of the dodder perishes. It takes nourishment from the Lucerne. The seeds are very small and spherical. Sulphate of iron (green vitriol), one pound to the gallon, sprinkled on plants of dodder is said to destroy it, and will not injure the Lucerne. A sieve of the proper size will remove the seeds. The seeds will remain alive in the soil for some years. A similar *Cuscuta* is parasitic on red clover.

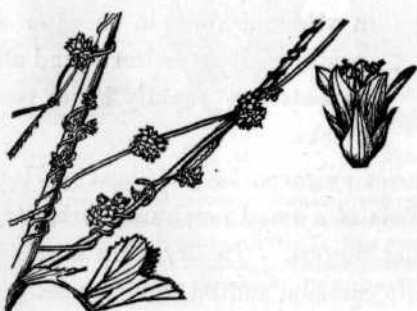


FIG. 120.—*Cuscuta Epithymum*, (Dodder.) Plant and an enlarged flower reduced. (Flore de Paris.)

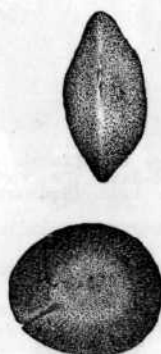


FIG. 121.—*Amaranthus retroflexus*, (Amaranth. Pigweed.) Two views of a seed. 1×20.—(Sudworth.)

*Asclepias Cornuti*, Des. (Milkweed.) In light soils this is often a very troublesome weed. The roots run deep and spread in every direction. The seeds are carried by the wind.

*Chenopodium album*, L. (Pigweed, Lamb's Quarters.) This rank annual weed, with two or three other species, is quite common in waste places and in cultivated grounds. They are not troublesome in pastures and meadows, but are mentioned here because the seeds are sometimes met with in seeds of grasses and clovers.

The seeds are lenticular, black, and glossy, and are much like those of *Amaranthus*.

Another plant, or rather several plants of the genus *Amaranthus*, are often spoken of as pigweeds. They are not very likely

to be annoying in meadows or pastures, but the seeds are not unfrequently found mixed with those of grasses and clovers.



FIG. 122. *Polygonum aviculare*, L., (Knot-grass. Doorweed.) 1 + 8.—(Sudworth.)

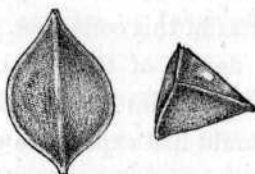


FIG. 123. *Rumex crispus*, L. (Narrow Dock.) Two views. 1 x 11.—(Sudworth.)

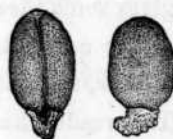


FIG. 124. *Euphorbia Cyparissias*, L. Two views. 1 x 10.—(Sudworth.)

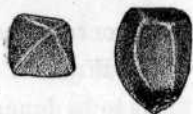


FIG. 125. *Euphorbia maculata*, L. (Spotted Spurge.) A creeping weed. Two views. 1 x 15.—(Sudworth.)



FIG. 126. *Urtica dioica*, L. (Great stinging nettle.) This has spread over low land meadows in some places. 1 x 15.—(Sudworth.)



FIG. 127. *Bromus secalinus*, L. (Chess deprived of glume and palea.) 1 x 3.—(Sudworth.)

*Polygonum Persicaria*, L. (Lady's Thumb), and some other species of *Polygonum* have smooth, black flat seeds.

*Polygonum aviculare*, L. (Knot-grass) and some others have triangular seeds, shaped much like small grains of buckwheat. The seeds of these two species, and of others, are often found among grass seeds.

*Rumex crispus*, L. (Curled or Narrow Dock) and *R. obtusifolius*, L. (Bitter Dock) are both common and troublesome weeds in meadows. They are perennial and have long tap roots. The seeds are three angled and like those of *Polygonum*.

*Rumex Acetosella*, L. (Sheep sorrel) is very common on poor, light land. The seed has the shape of the species last named.

*Euphorbia Cyparissias*, L. (Euphorbia) has escaped from cultivation. It roots deeply, and has in some places become a great pest.

Occasionally seeds of common chess, or cheat, are met with in

grass seeds. In a few instances the writer has met with seeds of chess which had been rubbed so as to deprive them of the floral glume and palea which usually adhere quite firmly; Figure 118 gives some idea of chess in this condition.

For accounts and figures of the weeds, which are themselves grasses, see the several species of grasses elsewhere described. The reader has no doubt had experience with some of them, or has heard of June grass, quack grass, *Eragrostis*, chess, barn-yard grass, crab or finger grass, the bristly fox-tails, burr-grass and others. The grasses are remarkably free from poisonous properties, there being only two or three upon which rests any serious suspicions.

For further accounts of the weeds the reader will consult the paragraphs on "*Seed Distribution*" and "*Battle in the Meadow.*"

**How to Get Rid of Weeds.**—There are two things to be done: 1st, prevent further seeding and the further introduction of seeds; 2d, destroy the seeds and the plants now in the soil.

Farmers cannot be too careful about the source of grass seed. Weeds, and some of the worst type, are thus freely distributed. Where possible it is better and safer to grow one's own seed, or procure it of some careful, thorough farmer near home. The older the country, as a rule, the more likely it is to furnish ox-eye daisy, yarrow, rib-grass, and other tenacious and troublesome weeds. Foul seed is dear as a gift. It is cheaper to pay triple price for clean seed than to be perplexed with the trouble of getting rid of the weeds introduced. Some of the seeds should be spread out on a table in a very thin layer to aid in the discovery of the seeds of weeds which are liable to otherwise escape notice. Sieves and fans may remove some kinds entirely. Many sorts of seeds, especially the small ones, will pass undigested and unharmed through the digestive organs of horses and cattle. An ordinary compost heap does not kill all unless every portion is carefully turned in and heated.

In certain cases, one or more hoed crops may be raised on the land thoroughly summer fallowed. Pastures and meadows should always be looked over carefully and the weeds dug or pulled before the seeds are ripe, or taken off the ground if the seeds are ripe.

Sheep must be kept from pastures until stick seed, hound's tongue, burdock and the like have been removed.

The large weeds, like narrow and bitter dock, parsnip, carrot, may be left till the growing stalk has acquired some strength. Then on some day when the soil is soft and before the seeds have dropped, go over the field with a spade or a stout spud, thrusting it down perpendicularly within a couple of inches of the plant, take the stalk with one hand near the root and with the other pry it loose. In this way no roots are left below the surface to sprout and send up a new crop. Never cut off the tops of such weeds, leaving the roots in the ground.

By the following process the writer has found no trouble in killing quack grass, whether the season be wet or dry, the soil sand or clay, drained or undrained:

Plow it late in autumn, and as soon as a team can be put on the ground in the spring run over it with a cultivator every three or four days. Never allow a leaf to show itself, for then it begins to recuperate. By the middle of June every vestige has disappeared. Farther south than Central Michigan no doubt it would disappear earlier. To harrow and rake up the roots is a waste of labor. If during its growing season, the green tops are kept out of sight the plants will die. Thorough work, eternal vigilance is the only way to keep the upper hand of weeds.

For further remarks concerning the destruction of weeds, the reader will consult the paragraphs on irrigation, drainage, use of fertilizers, quack grass, care of meadows and pastures, the battle in the meadow.