

OSU
Collection

OKLAHOMA
AGRICULTURAL EXPERIMENT
STATION

BULLETIN No. 83

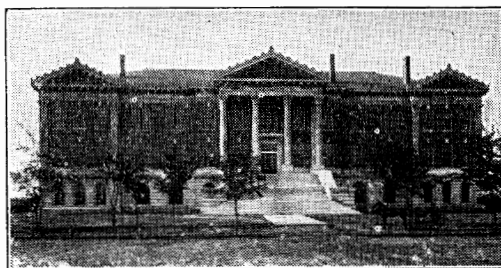
FEBRUARY, 1909

ALFALFA SEED IN OKLAHOMA

PART I.—TESTING ALFALFA SEED

PART II.—WEED SEEDS FOUND IN ALFALFA SEED

AGRONOMY



AGRICULTURAL BUILDING
(MORRILL HALL)

STILLWATER, OKLAHOMA

A. & M. COLLEGE PRINTING DEP'T

STATE BOARD OF AGRICULTURE

(Ex-Officio Board of Regents)

HON. J. P. CONNORS, <i>President</i>	Canadian
HON. J. C. ELLIOTT, <i>Vice President</i>	Paul's Valley
HON. EWERS WHITE, <i>Treasurer</i>	McLoud
HON. FRANK IKARD	Chickasha
HON. G. T. BRYAN	Perry
HON. J. W. L. CORLEY	Howe
HON. DAN DEIHL	Gotebo
HON. W. R. LINDSAY	Choteau
HON. R. F. WILSON	Valliant
HON. THAD RICE	Hitchcock
HON. A. C. COBB	Wagoner

STATION STAFF

B. C. PITTUCK, B. S.	<i>Acting Director</i>
L. L. LEWIS, M. S., D. V. M.	<i>Veterinarian and Bacteriologist</i>
O. M. MORRIS, B. S.	<i>Horticulturist and Botanist</i>
L. A. MOORHOUSE, M. S.	<i>Agronomist</i>
W. A. LINKLATER, B. S. A.	<i>Animal Husbandman</i>
CORNELIUS BEATTY, A. B.	<i>Chemist</i>
ROY C. POTTS, B. S.	<i>Dairyman</i>
W. L. BURLISON, M. S.	<i>Assistant Agronomist</i>
W. R. WRIGHT, B. S.	<i>Assistant in Bacteriology</i>
R. O. BAIRD, B. S.	<i>Assistant Chemist</i>
L. M. MONTGOMERY, B. S.	<i>Assistant in Horticulture and Botany</i>
J. A. RATCLIFF, B. S.	<i>Assistant in Agronomy</i>
A. L. LOVETT, B. S.	<i>Acting Entomologist</i>
W. W. EVANS	<i>Farm Superintendent</i>
M. J. OTEY, B. S.	<i>Financial Secretary</i>
LETHE MORROW	<i>Stenographer and Clerk</i>

Visitors are cordially welcomed at all times.

The publications of this Station are sent free to residents of Oklahoma on request. All communications should be addressed, not to individuals or departments, but to the

EXPERIMENT STATION, Stillwater, Oklahoma.

ALFALFA SEED IN OKLAHOMA

L. A. MOORHOUSE, AGRONOMIST
W. L. BURLISON, ASSISTANT AGRONOMIST

Introduction

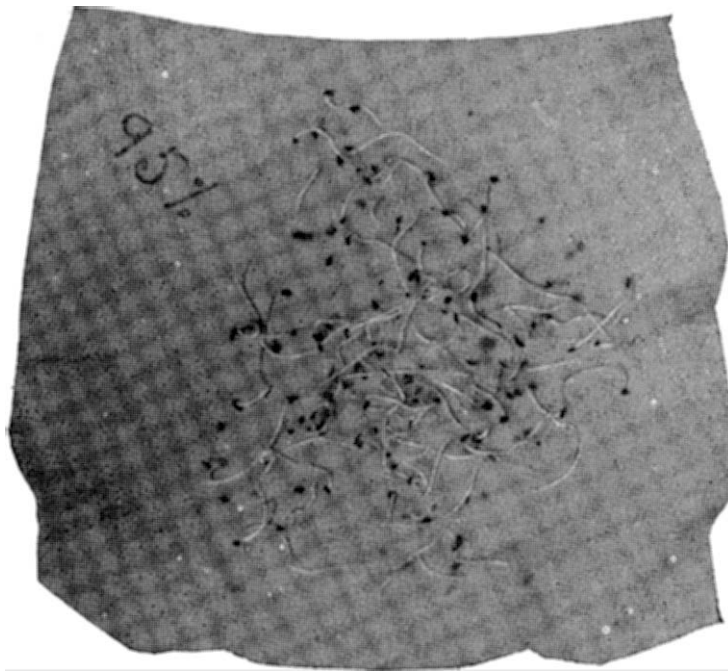
Since June 1906, the department of Agronomy of the Oklahoma Experiment Station has tested more than 400 samples of alfalfa seed for the farmers of this State. During the progress of this work much interesting information has been gathered the results of which will not only be instructive to alfalfa growers, but they will also be of considerable value in helping to raise the standard grades of alfalfa seed which are sold in Oklahoma.

At this season of the year much advice is sought with reference to methods of preparing the soil and sowing alfalfa seed and the grower exercises good judgment when he investigates the best known plans before the seed is sown. But even after these factors have been guarded from every possible view point, the entire problem has not been solved. *The seed itself represents unknown powers and energies.* We can measure the germinative ability of a given lot of alfalfa seed by subjecting representative seeds to a test, the results of which will determine with some accuracy whether the seed will respond under normal conditions in the field. However, many samples of alfalfa seed are not entirely free from weed seeds, and many of these seeds are noxious in character and should not be sown in our cultivated fields. The Experiment Station has provided a laboratory in which alfalfa seeds may be tested and weed seeds identified, and as this examination is made without cost to the grower only selected alfalfa seed should be planted in Oklahoma.

PART I—TESTING ALFALFA SEED

A Simple Test

It will remain for the seed expert to make decisions concerning the noxious nature of many types of weed seeds, but to determine the viability of the alfalfa seed does not demand expensive apparatus. The grower can make such a test with a few simple pieces. After counting out one hundred typical seeds from the sample, place these seeds on a moistened piece of blotting paper, which can, in turn, be laid on a large dinner plate. The alfalfa seeds should then be covered with a moist sheet of blotting paper; fold the corners of these pads so that they will not extend beyond the edge of the plate, then turn a second dinner plate over the sheet to prevent undue evaporation of moisture. A temperature of 70 degrees Fahrenheit is necessary for rapid germination. Within five or six days the seeds will be sprouted enough to permit counting and the actual



strength of the seeds can be ascertained. The seeds in the accompanying illustration show a germination test of 95 per cent.

Such seed should be classified as fancy when judged from a vitality record only.

The Station Method

The methods followed by the Station in testing alfalfa seed are very simple. Ten grams of the original sample are taken for inspection. This portion is separated into two parts:—pure seed and impurities.

Germination tests are made by counting out two lots of one hundred seeds each. These lots are then placed between moistened sheets of blotting paper, and are allowed to remain in a warm room for six or eight days when the final results are recorded.

The impurities found in alfalfa seed naturally fall into two groups:—weed seeds and inert material. Weed seeds are classified by means of a microscope together with samples of weed seeds which are kept in the laboratory for comparative identification. Weed seeds cause a much greater loss than the inert material, because the labor expended in fighting the plants which come from such seeds is enormous. Inert material is composed of broken sticks, broken seeds, and sand. The loss incurred through the presence of inert material varies from an insignificant amount to twenty pounds in every one hundred pounds of average alfalfa seed.

Seed Selection

Good seed is an important factor in securing a perfect set. It sometimes happens that the alfalfa seed which is sold to the trade is almost worthless. Some samples have come to the laboratory containing as much as 50 per cent of impurities. One sample carried thirteen different kinds of weed seeds. It is obvious that no purchaser would be satisfied with a sample which contained fifty per cent of impurities. *After careful consideration we have reached the conclusion that it is not a wise plan to keep or use alfalfa seeds which contain any noxious weed seeds.* It is even doubtful whether one ought to sow alfalfa seed which contains a large per cent of seeds coming from weeds more or less common where the alfalfa is to be grown. The excuse has been suggested that these noxious weeds are

already growing in the district, and it is therefore needless to take any precautions with regard to a further distribution of such seeds. In some samples enough crab grass seeds were found to furnish one acre with one plant for each square foot; foxtail seeds were present in one sample in quantities sufficient to start one plant on every eighteen inch block; two other samples contained enough plantain seeds to start one plant on every square yard. Our basis for this calculation includes the use of eighteen pounds of alfalfa seed per acre. It is evident that higher standards of purity should be demanded if greater returns are to be secured for the labor and management required to operate a large alfalfa farm.

Grades of Seed

The grades of alfalfa seed offered for sale might be greatly improved through the judicious use of the fanning mill. At least 50 per cent of the samples tested at the Station could be graded up several degrees with proper sieves. It is an ordinary occurrence to find that a large portion of the impurities present in alfalfa seed are composed of broken sticks and sand as well as broken alfalfa seeds. These broken pieces may be removed quite readily with an efficient mill or seed grader, and this extra work will assist in reducing the bulk of the sample. The intelligent buyer prefers to set a reasonably strong bid on a first class grade of seed rather than make even a low offer for a sample composed largely of an abundant supply of refuse. It is true that there are certain weed seeds which grade in size and weight about the same as alfalfa seed, and it is a difficult matter to sift or blow out such material. Under these conditions the grader will not be of material value. In such cases a different grade of seed should be selected especially if the weed seeds present are known to be a pest. It will be interesting to note that thirteen per cent of the impurities of a certain sample were taken from the alfalfa seed, and when this material was removed, the seed was given a much higher rating.

The purity question is not the only perplexing problem connected with the selection of good seed. Several samples have

been analyzed which were almost free from inert material and weed seeds, but they gave a very low vitality test. Some of these tests are shown in subsequent tables.

HIGH PURITY TEST; MEDIUM GERMINATION TEST

SAMPLE	PURITY	GERMI-NATION	KINDS OF WEED SEEDS
1	100	80	No weeds
2	100	70	" "
3	100	75	" "
4	100	85	" "
5	100	89	" "
6	100	87	" "
7	100	89	" "
8	100	77	" "
9	100	90	" "
10	100	92	" "

It will be observed that three samples germinated less than 78 per cent; and six out of ten germinated 85 per cent or above. No weed seeds were found. Sample No. 2 contained alfalfa seeds which were comparatively weak. The maximum test did not run much above 90 per cent.

HIGH PER CENT OF IMPURITIES; SATISFACTORY GERMINATION TEST

SAMPLE	PURITY	GERMI-NATION	KINDS OF WEED SEEDS
11	90.8	96	No weeds
12	70.0	97	Plantain, green foxtail, white clover
13	91.0	82	Green foxtail, lambs quarter
14	75.0	86	Plantain, pigweed, green foxtail
15	80.0	90	Pigweed
16	90.0	84	Old witch grass
17	50.0	92	Pigweed, lambs quarter Green foxtail, old witch grass, crab grass,
18	75.0	81	lambs quarter
19	89.0	83	Careless weed, smartweed
20	80.0	84	Lambs quarter, pigweed, Russian thistle,

Sample No 11 contained approximately 10 per cent of impurities; however the alfalfa seeds gave a high germination test and the sample was free from weed seeds. Samples 12 and 14 contained seeds of plantain or rib grass, a weed which is giving trouble in some districts. Where the alfalfa sample shows a high percentage of impurities, it is important to determine whether these impurities are made up of noxious weed

seeds or whether they contain merely inert material. One sample in the above list, No. 17, was made up of one-half foreign material, but it contained only three kinds of weed seeds.

LOW PER CENT OF IMPURITIES; GOOD VITALITY; SOME SAMPLES
CONTAIN NOXIOUS WEED SEEDS

SAMPLE	PURITY	GERMI- NATION	KINDS OF WEED SEEDS
21	99.75	96	Centaurea repens, roquette
22	100.00	95	No weed seeds
23	99.50	93	Green foxtail, yellow foxtail, plantain
24	100.00	92	No weed seeds
25	100.00	93	No weed seeds
26	99.75	93	Centaurea repens
37	100.00	96	No weed seeds
28	99.75	96	Plantain
29	99.75	95	No weed seeds
30	100.00	94	Plantain

Practically all of these samples, Nos. 21 to 30 inclusive, were taken from imported seed. They are rather unusual in that the purity tests are exceptionally good and the seeds show excellent germinative power. Not a single sample fell below 90 per cent. Nos. 22, 24, 25, 27, and 29 were free from weed seeds. Some of the weed seeds which were found in the remaining samples are classified as coming from noxious weeds. This is a very objectionable item. While imported samples have given good results in the laboratory, it may be stated that noxious weed seeds frequently make their appearance in such samples.

HIGH PER CENT OF IMPURITIES; LOW GERMINATION TEST

SAMPLE	PURITY	GERMI- NATION	KINDS OF WEED SEEDS
31	58	17	No weed seeds
32	70	40	No weed seeds
33	70	30	No weed seeds
34	60	20	No weed seeds
35	65	30	Plantain, careless weed, crab grass
36	60	73	Green and yellow foxtail, pigweed
37	75	60	Plantain, pigweed
38	70	50	Plantain, pigweed
39	60	70	Plantain, green foxtail, crab grass, self-heal
40	88	55	Old witch grass, green foxtail, pigweed
41	88	65	Yellow foxtail, lambs quarter
42	80	35	No weed seeds

These are all low grade samples. They not only contain a high percentage of impurities, but they also made a very low record from the standpoint of viability. Several of the lots were free from weed seeds, but even this characteristic would not warrant the grower in selecting such types, because a full set would be almost out of question with such seed. Other samples in this lot gave a low purity test, an exceedingly low germination test, and carried foul weed seeds. As long as such grades continue to have a place on the market, the grower ought to examine the seed thoroughly before deciding to make a purchase.

Out of four hundred samples which have been examined not more than twenty combined a high purity test with a vigorous germination record.



PLANTAIN OR RIB GRASS

PART II — WEED SEEDS FOUND IN ALFALFA SEED

Weeds destroy the beauty and attractiveness of the farm and possibly no other condition is a better index of the lack of progressiveness or the prosperity of the community than their presence or absence. Weedy roadsides and weedy cornfields are indicative of shiftless methods of farm practice. Noxious pests which are sometimes found in our alfalfa fields show that due care was not exercised in the selection of pure seed. The injury which results through the growth of weeds may be outlined as follows:

First, weeds require a large amount of moisture. In many instances fields are covered with a dense mat of weeds which have a considerable leaf surface. Under such conditions the moisture which passes from these leaves is equivalent to several inches of rainfall. Where a portion of the soil moisture is taken up by a noxious plant, the supply for crop use is lessened and the yield of grain or forage is curtailed thereby.

Second, it frequently happens that weeds smother and choke out entire fields of alfalfa as well as other farm crops. Aside from this feature, weeds prevent the sunlight from falling upon the soil, and this hinders the best physical and chemical actions so essential to the liberation of plant food.

Third, all plant life requires food. Where there is a heavy growth of weeds, several tons of material are produced.

In such cases a large amount of plant food is removed from the soil by the plants which are out of place and the useful crop is compelled to make its growth on a lower percentage of the essential elements.

Fourth, insects, such as chinch bugs, live through the winter under cover of weeds which are left standing in the fields and along the roadsides. Greater losses may accrue the coming season through the protection which is afforded by such rubbish.

Fifth, some weeds are poisonous, though such plants occur very infrequently in alfalfa.

Sixth, a high percentage of weed seeds renders the crop almost valueless for commercial purposes. This is an especially important point in sections where alfalfa seed production is contemplated as a part of the farm business.

Eradication

All weeds fall into one of three classes: annuals, biennials, or perennials. Annuals are those plants which live one year, produce seed and die. Biennials grow from seed, but do not produce seeds until the second year at which time growth ceases. Perennials grow from the seed or root stalks and may live year after year without producing seeds. Without some knowledge as to what class our most troublesome weeds belong, eradication is made more difficult. Those weeds which belong to the first and second group may be held in check or even exterminated by not allowing the seeds of such plants to mature. If biennials are to be eliminated the first year, it will be found necessary to destroy the plant, and in some cases, remove the roots from the soil. Perennial plants are very troublesome as they spread from the seeds and from the roots—the seeds may not be allowed to mature and at the same time, this plant may spread rapidly by means of its underground roots. In such instances the farmer must destroy the entire plant instead of simply preventing it from maturing its fruit. A large number of plans have been outlined for the destruction of weeds by means of sprays or other chemicals, but as yet, the most effective means of exterminating undesirable plants is judicious and persistent cultivation.

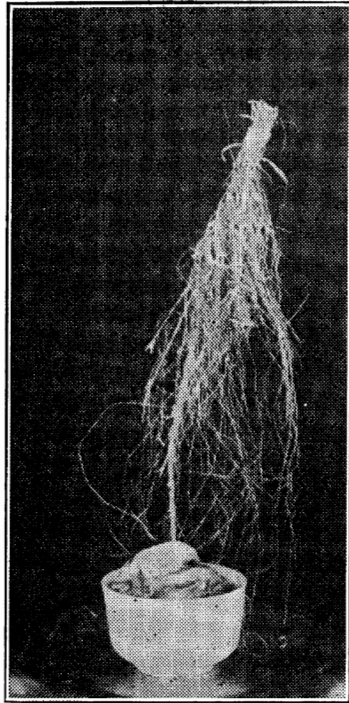
The following table indicates the species of weed seeds found in samples tested at this Station, their habit of growth and the percentage of samples in which they occurred:

SPECIES	HABIT OF GROWTH	PER CENT OF SAMPLES IN WHICH EACH OCCURRED
<i>Setaria viridis</i> (Green Foxtail).....	Annual	27.0
<i>Setaria glauca</i> (Yellow Foxtail).....	Annual	29.0
<i>Plantago lanceolata</i> (Plantain).....	Perennial or biennial	24.0
<i>Panicum sanguinale</i> (Crab grass).....	Annual	18.0
<i>Chenopodium album</i> (Lambs Quarter).....	Annual	16.0
<i>Amaranthus hybridus</i> (Pigweed).....	Annual	19.5
<i>Panicum capillare</i> (Old Witch grass).....	Annual	11.0
<i>Centaurea piciris</i> (common name not given)	Annual	11.0
<i>Salsola Tragus</i> (Russian Thistle).....	Annual	7.0
<i>Eruca sativa</i> (Roquette).....	Annual	5.0
<i>Rumex crispus</i> (Dock).....	Perennial	5.3
<i>Panicum Crus-galli</i> (Barnyard grass).....	Annual	4.3
<i>Daucus Carota</i> (Wild Carrot).....	Biennial	3.6
<i>Malva rotundifolia</i> (Low Mallow).....	Annual or biennial	3.9
<i>Trifolium repens</i> (White Clover).....	Perennial	2.4
<i>Polygonum punctatum</i> (Dotted Smartweed).....	Annual or Perennial	2.4
<i>Polygonum Persicaria</i> (Lady's Finger).....	Perennial	4.0
<i>Paspalum setaceum</i> (Paspalum).....	Annual	1.9
<i>Carduus arvensis</i> (Canada Thistle).....	Perennial	1.6
<i>Carduus lanceolatus</i> (Spur Thistle).....	Biennial	1.4
<i>Trifolium pratense</i> (Red Clover).....	Perennial	.9
<i>Medicago lupulina</i> (Trefoil).....	Annual	.9
<i>Centaurea Jacea</i> (Rayed Knapweed).....	Perennial	.9
<i>Cuscuta arvensis</i> (Dodder).....	Annual	.4
<i>Linaria Linaria</i> (Yellow Toad Flax).....	Perennial	.4
<i>Lepidium Virginicum</i> (Pepper grass).....	Annual	.4
<i>Rumex Acetosella</i> (Sheep Sorrel).....	Annual or Perennial	.4
<i>Prunella vulgare</i> (Self-heal).....	Perennial	.4
<i>Plantago 'Rugelii</i> (Rugel's Plantain).....	Perennial	.4
<i>Lolium perenne</i> (Italian Rye).....	Annual or Perennial	.4
<i>Agrostis alba</i> (Red Top).....	Perennial	.4
<i>Chrysanthemum Leucanthemum</i> (Ox Eye Daisy).....	Perennial	.4

Green and yellow foxtail, plantain, lambs quarter, crab grass, pig weed, thistle (*Centaurea piciris*), and old witch grass occurred in the largest number of samples. The four grasses mentioned are very common in Oklahoma, and are

widely distributed over many sections. Plantain (buckhorn or rib grass) is the only noxious weed seed which was found in a large number of samples. It is not common in this state, although during the last two years it has been distributed over a large area of Oklahoma in alfalfa seed which was shipped from northern sections.

Russian thistle appeared in 7 per cent of the samples examined. This weed is not found in all of the counties of Oklaho-



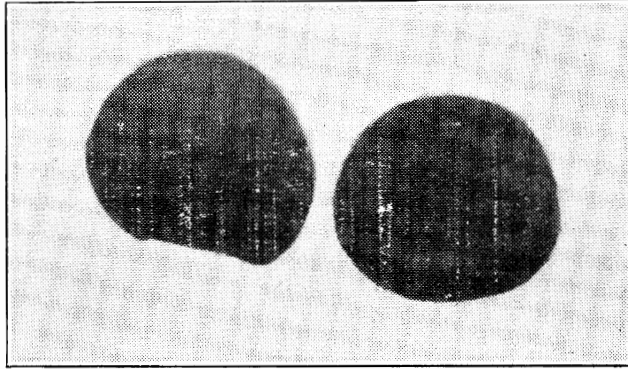
DODDER

ma. Some of the northern and western areas have reported that this weed is giving trouble. Canada thistle is less prevalent in alfalfa seed, and it is hoped that this figure will remain low as the plant is considered to be more or less of a noxious character. *Centaurea piciris* and roquette are two new weeds which are attracting some attention at the present time. The samples of alfalfa analyzed during the last season are the only ones which have contained seeds of either of these weeds. It remains to be seen whether or not they are very injurious weeds. Dodder is the worst pest known to infest our alfalfa fields, but seeds of this pest have been found in only one sample of alfalfa during the past two and one-half years.

NOTE—In working out a description of the weed seeds found in alfalfa samples which have been examined in the Station laboratory, the authors received considerable help from Britton & Brown's "Illustrated Flora of the United States and Canada," a work published by Chas. Scribner's Sons, New York City, N. Y. We also wish to acknowledge assistance received from Bulletin No. 175, entitled "Second Ohio Weed Manual," a publication issued by the Ohio Experiment Station, Wooster, Ohio.

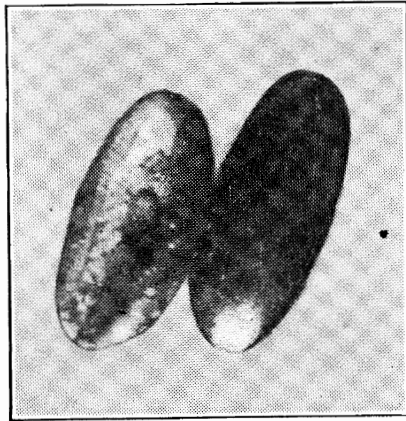
Description of Weed Seeds and Weeds

Cuscuta arvensis (Dodder) seeds are generally about the size of alfalfa seeds; color, rusty brown; under high power glass the seeds present a rough downy appearance. The plant is often called love vine and is one of the worst enemies of alfalfa. Its eradication can be accomplished by digging up and burning all of the alfalfa plants which have been attacked by this weed. **Annual.**



DODDER—(15 x diameter)

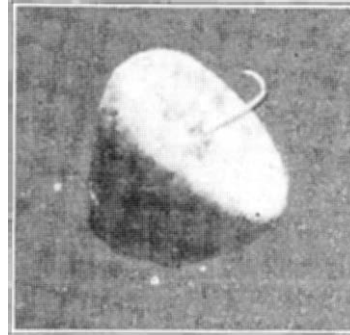
Plantago lanceolata (Plantain) seeds are dark brown, shining, one-tenth to one-eighth of an inch long by about half as wide, oval, one side grooved more or less. Bracted plantain and plantain are readily distinguished from each other by the fact that the former has a transverse groove on the rounded side. Plantain ranks among the worst pests, especially upon light soils, though it frequently grows upon good bottom land. It must be fought vigorously. Where only a few plants occur they may be removed from the alfalfa field with a narrow-bladed hoe, but when they are widely distributed in the field the surest method of eradication would be to plow the entire area. **Biennial or perennial.**



PLANTAIN—(10 x diameter)

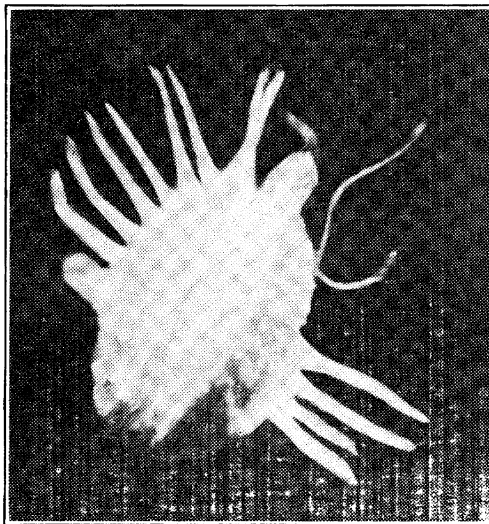
Salsola Tragus (Russian Thistle) seeds have many characteristic features. They are more or less conical, one-sixteenth of an inch at the base and about one-thirty-second at the top,

gray; around the base there seems to be a crown or urn-shaped cup, from the center of which a small spine projects; the embryo lies in a coiled position within the seed. The Russian thistle plant varies greatly in size. While young the leaves are about two inches long, very slender; when older they drop off and give place to three spines. The plant may grow to be three or four feet in height and several feet in diameter. In order to eradicate this weed it will be found necessary to dig up the entire plant early in the season. If the seeds are allowed to mature, burning the entire plant so as to destroy the seed is the only safe plan to follow. Russian thistle seeds were found in 7 per cent of the samples inspected. **Annual.**

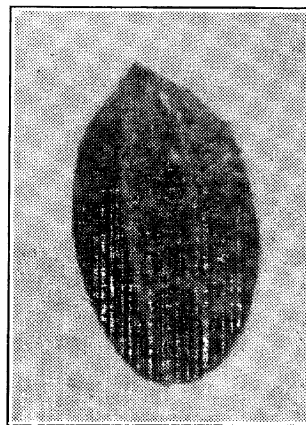


RUSSIAN THISTLE
(14 x diameter)

Daucus Carota (Wild Carrot) seeds are about one-eighth of an inch long, about two-thirds as wide as long, light brown, oval, flattened on one side, lines extend lengthwise of



WILD CARROT—(11 x diameter)

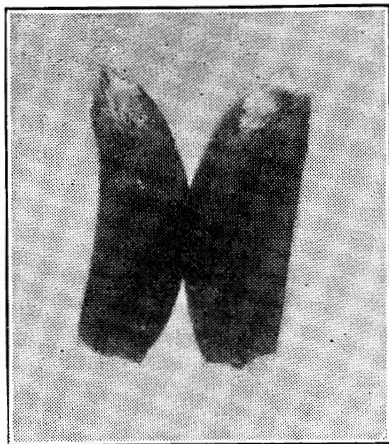


SPINES REMOVED BY
THRESHER

seed, a number of spines between the lines if they have not been removed during the threshing process. Wild carrot is a serious pest in fields and along roadsides. It grows two or three feet high and resembles our cultivated parsley to some

extent. Thorough and persistent cultivation is the surest means of eradication. Wild carrot occurred in 3.6 per cent of the samples analyzed. **Biennial.**

Carduus arvensis (Canada Thistle) seeds are one-tenth of an inch long, oblong, banana shaped, thicker in the center

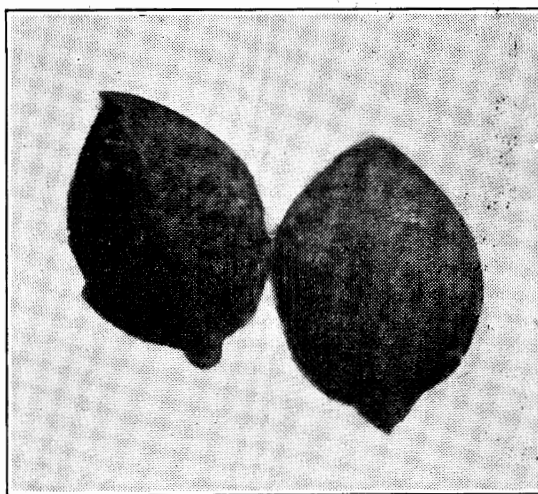


CANADA THISTLE
(9 x diameter)

than at ends; color, brown. On the large end is a small cup or urn, from the center of which projects a small blunt spine. Under a high power glass transverse lines are seen. The Canada thistle plant does not differ essentially from other thistles except that it has a well developed underground root system. This plant is a pest in northern sections. We hope that every precaution will be taken to prevent the introduction of this weed into Oklahoma. One and six-tenths per cent of the samples examined

contained seeds of the Canada thistle. **Perennial.**

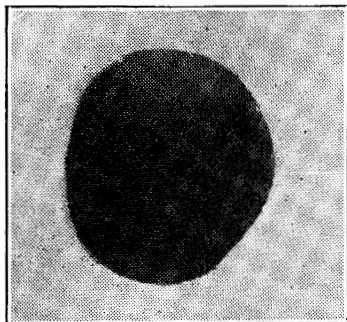
Rumex Acetosella (Sheep Sorrel) seeds are practically as wide as long, less than one-sixteenth of an inch each way; light to dark brown, triangular in form. When free from the hull they are very smooth and shining. The sheep sorrel plant is too well known to need a very elaborate description. It is both annual and perennial in its habit of growth. This plant is a serious pest on sandy soils in many sections of the United States. Generally speaking, sorrel is an indication of an acid soil. Careful



SHEEP SORREL—(20 x diameter)

and persistent cultivation will hold the plant in check and may in time accomplish eradication. Sorrel seeds were found in .4 per cent of the samples sent in for inspection. **Annual or perennial.**

Eruca sativa (Roquette) seeds are one-twelfth of an inch

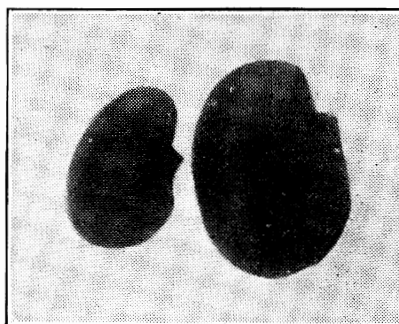


ROQUETTE—(14 x diameter)

long by one-sixteenth of an inch wide; light brown to a dull black or blue; regular in form. The seeds are generally smooth; however, occasionally the surface is rough. This plant has been discovered in Oklahoma in a large number of alfalfa fields which were seeded last fall. Samples of

alfalfa seed which have been inspected since June, 1908, are the only ones which have been found to contain roquette. The reports from Kansas indicate that the new weed is giving trouble in alfalfa fields of that state. The weed is an annual, and if it is winter killed the farmers of this section of the country need not worry over its occurrence. Roquette is a member of the mustard family, and may be identified comparatively easy after its characteristics are once known. **Annual.**

Medicago lupulina (Yellow Trefoil) seeds are very much like those of the alfalfa plant. They resemble alfalfa seeds to such an extent that it is difficult to separate them. Trefoil seeds are smooth and present a glossy yellow color which is typical of alfalfa seed. This plant is not a weed in any other sense than it frequently appears in seeds of other farm crops. It is used as an adulterant. **Annual.**



YELLOW TREFOIL
(15 x diameter)

Amaranthus blitoides (Low Amaranth) seeds are easily distinguished from other seeds of this class, as they are much larger. They are generally about one-twelfth of an inch in

diameter, with winged margins distinctly visible; color, black, shiny, sometimes brown; lenticular in outline; occasion-

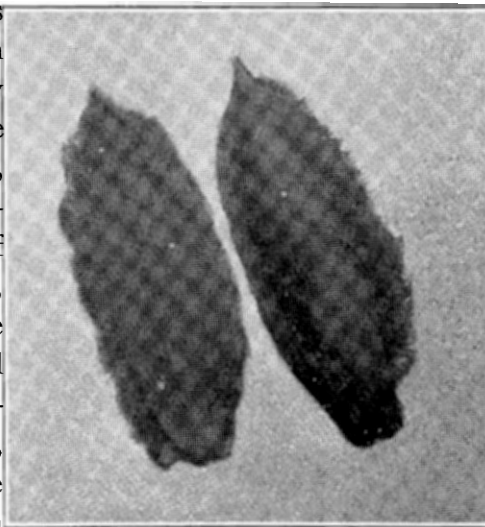


LOW AMARANTH—(12 x diameter)

ally the hull (palea) remains attached, giving the seed a light straw color. Low amaranth resembles the tumble weed except that its branches are more spreading. The weed may be destroyed like other annuals. Nine-tenths of one per cent of the samples analyzed

contained seeds of this weed. **Annual.**

Panicum sanguinale (Crab Grass) seeds are about one-eighth of an inch in length by one-twenty-fourth in width; with dark brown hull, kernel green. The outer covering on the flattened side exhibits five lines or nerves, which are seen in the photograph. In nearly all cases the rounded side is not covered by the hull, which is one of the distinguishing characteristics of the seed. It is lance-shaped, gradually tapering toward the apex. Crab grass is too well known to need a full description. Eradication is difficult, as the stems take root at the joints where they come in contact with the soil. Very careful cultivation is practically the only means of eradication. **Annual.**

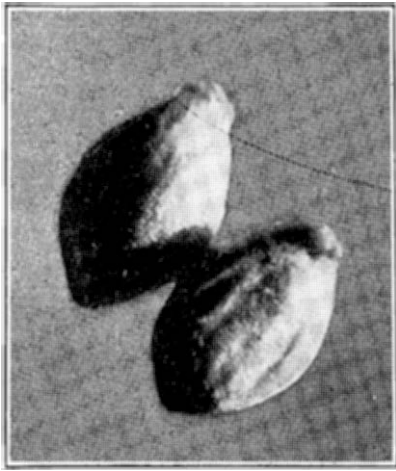


CRAB GRASS—(14 x diameter)

Chenopodium album (Lambs Quarter) seeds are small and lenticular; diameter one-sixteenth of an inch and a little more than one-half as thick as broad; color, dark brown, reddish or

black. The hull may remain attached, thus giving the seed a pure light yellow color; surface rough, small ribs or wrinkles radiate from a common central point. Lambs quarter is one of our most common weeds. It grows two or three feet high; the color of the leaves is a light milky green. Certain animals relish the soft, tender stems. **Annual.**

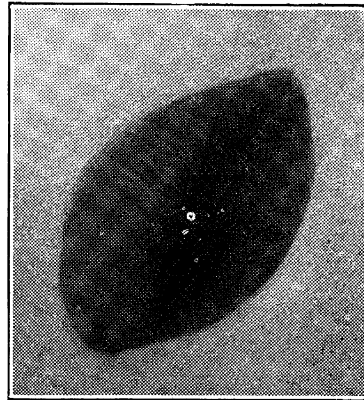
Setaria viridis (Green Foxtail) seeds are much like yellow foxtail except that they are somewhat smaller; one six-



GREEN FOXTAIL—(17 x diameter)

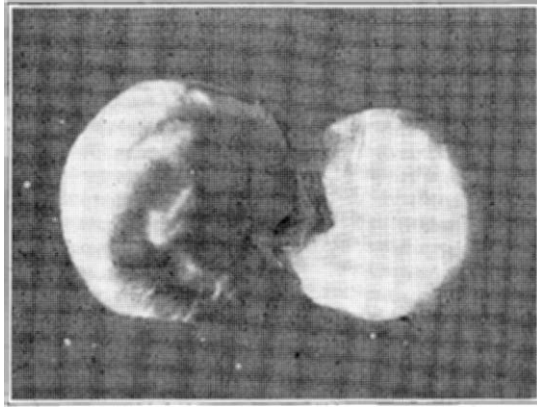
teenth of an inch in length and about one 24th of an inch in width; oblong, lines extend with the long axis of the seed. The hull adheres more closely than the hull of yellow foxtail. The only difference in the two kinds of foxtail mentioned is found in color. The green foxtail is indicated by the light green pigment. It is also smaller in size. The seeds of this plant occurred in 27 per cent of the alfalfa samples examined. **Annual.**

Setaria glauca (Yellow Foxtail) seeds are one-eighth of an inch in length and about one-twelfth in width, light yellow or green to dirty brown; surface covered with small transverse wrinkles or ridges; seeds flattened on one side. The seeds of yellow foxtail are much larger than those of green foxtail and are quite frequently found in the common late grasses. This plant resembles millet and is known in almost all sections of the U. S. It is found growing in cultivated fields, meadows, and pastures. Eradication may be accomplished by thorough cultivation. 29 per cent of the samples tested contained seeds of the yellow foxtail. **Annual.**



YELLOW FOXTAIL
(12 x diameter)

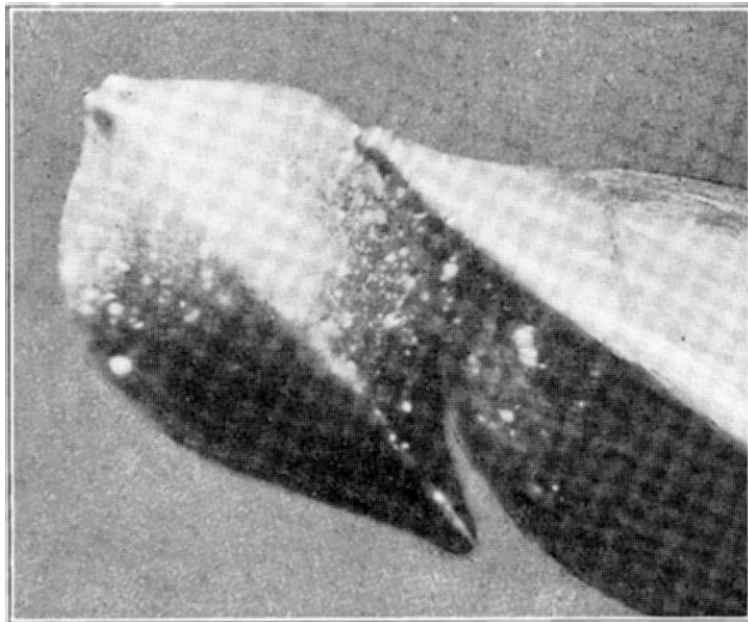
Malva rotundifolia (Low Mallow) seeds are disc shaped;



thicker at one side; about one sixteenth of an inch in diameter and about one-third of this distance in width; color light brown to straw. The seeds are often attached together in rings. Low mallow is a common road side weed and not of a noxious character. It occurred in about .9 per cent of the samples

LOW MALLOW—(16 x diameter)
examined at this Station. **Annual or Biennial.**

Rumex crispis (Curled Dock) seeds are comparatively large; one-sixteenth of an inch wide by one-twelfth long; color, dark brown; surface smooth and glossy; triangular in shape; seeds taper towards both ends; very uniform in size. Some



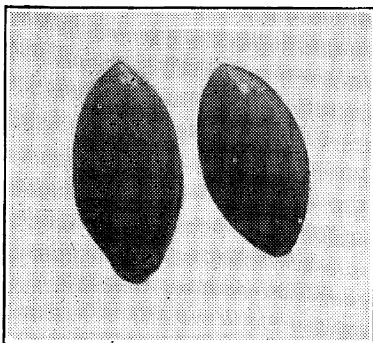
CURLED DOCK—(24 x diameter)

difficulty is encountered in distinguishing the seeds of different species of this group. Curled dock is a common weed around

the barn and garden. The plant is easily recognized by its curled leaves and large roots. Because of its large roots and its habit of rooting deeply it is necessary to remove the plant from the field in order to assist in eradication. About .4 per cent of the samples tested contained seeds of this weed.

Perennial.

Panicum capillare (Old Witch Grass) seeds are green to straw color; one-twelfth of an inch long by 1-24 in width; smooth and shining; sometimes dim lines or nerves are present extending lengthwise of the seeds: shape more or less flattened on one side. Old witch grass is very common in Oklahoma and seems to thrive best on upland soils. In order to prevent distribution of the seed the field will have to be thoroughly cultivated until the reserve supply of seeds has become exhausted. 11 per cent of the samples which have been analyzed at this Station contained seeds of this class.



OLD WITCH GRASS
(15 x diameter)

Annual.

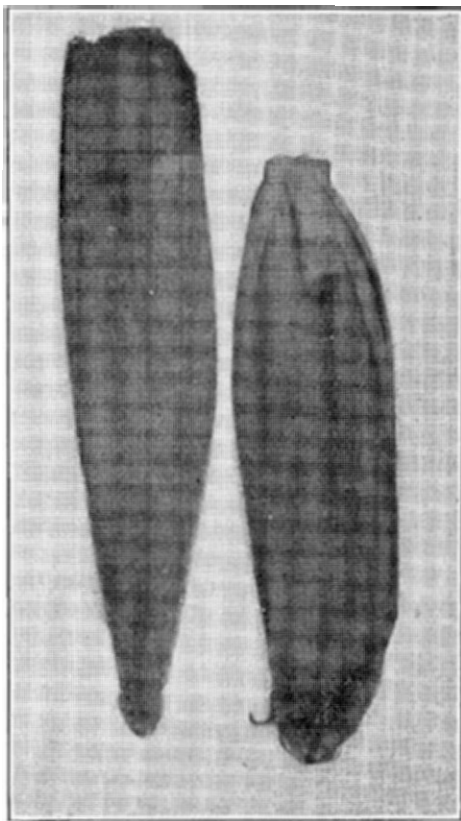
Lepidium Virginicum (Pepper Grass) seeds are generally about one-sixteenth of an inch long by one-twenty-fourth of an inch in width; color, light brown to almost red; oval or egg shaped, with a very distinct margin or wing. The pods that contain the seeds resemble those of the shepherd's purse to a slight degree. Pepper grass is known almost everywhere in alfalfa fields. It may be eradicated by seeding the land to crops which require intercultural tillage. Seeds of this weed occurred in about .4 per cent of the samples inspected.



PEPPER GRASS—(14 x diameter)

Panicum Crus-galli (Barnyard Grass) seeds are about one-fourth of an inch long by one-eighth in width; light straw color,

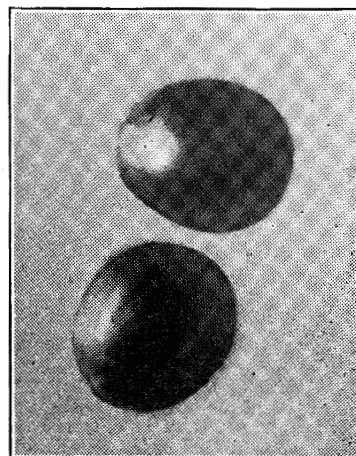
almost green; flattened on one side and rounded on the opposite surface, tapering gently toward the apex with a large awn at tip; smooth with dim marking. Barnyard grass is a coarse leafy plant which grows sometimes to a height of two or three feet and generally makes its appearance in rich bottom land also around lots and barnyards. In some sections the plant is grown for forage purposes because of its heavy late summer growth. Seeds were found in 4.3 per cent of the samples analyzed. **Annual.**



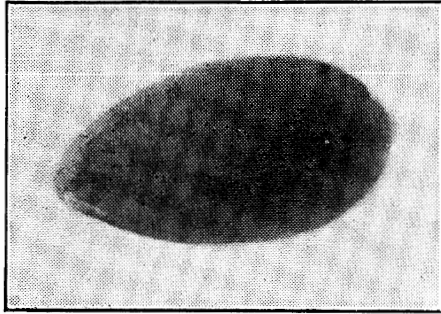
ITALIAN RYE—(22 x diameter)

Amaranthus albus (Tumble Weed) seeds are the smallest of the amaranths. Seeds are about one-thirty-second of an inch in diameter; black to a reddish brown.

Lolium perenne (Italian Rye) seeds are less than one-eighth of an inch long and about one-third as wide as long; dirty brown to a light straw color; hull one-third longer than kernel; the seed is marked by a line on the flattened side, which is very distinct near the blunt end; the pedicle about one-third as long as grain; very uncommon in alfalfa. **Annual or perennial.**



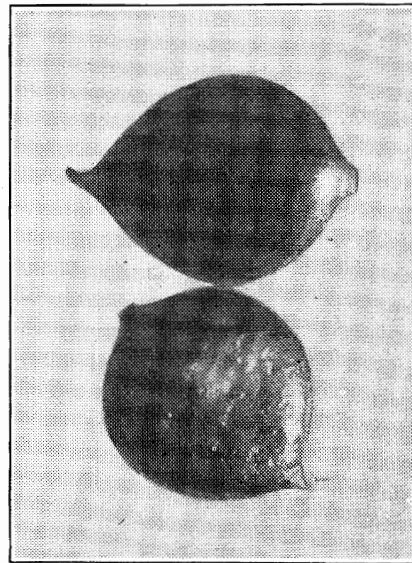
TUMBLE WEED—(24 x diameter)



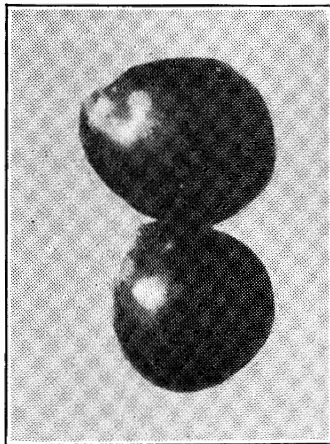
CENTAUREA PYCNANTHEMUM—(12 x diameter)

Centaurea pycnanthemum is one of the thistles; seeds are one-eighth of an inch long by one-sixteenth wide; light straw color; the seeds taper from the larger end to a blunt point. On the large end a scar may be found, if the seed is carefully examined. **Annual.**

Polygonum Persicaria (Lady's Finger) seeds are about one-sixteenth of an inch wide by about one-twelfth of an inch in length. In some cases the hulls remain attached, giving the seed a slight difference in appearance; lenticular or lens shaped; surface smooth when seed has been freed from its covering. **Annual.**



LADY'S FINGER—(9 x diameter)



SLENDER PIG WEED
(14 x diameter)

Amaranthus hybridus (Slender Pig Weed) seeds are very common in alfalfa. They are more or less egg shaped; about one-twentieth of an inch in diameter, and sometimes less; generally a small scar is noted near the pointed end of seed; color, black to reddish brown. In some cases a

very slender margin may be seen with a high power glass. Rough and slender pigweed seeds are almost alike, and in many cases it is very difficult to distinguish between these two species. **Annual.**

