

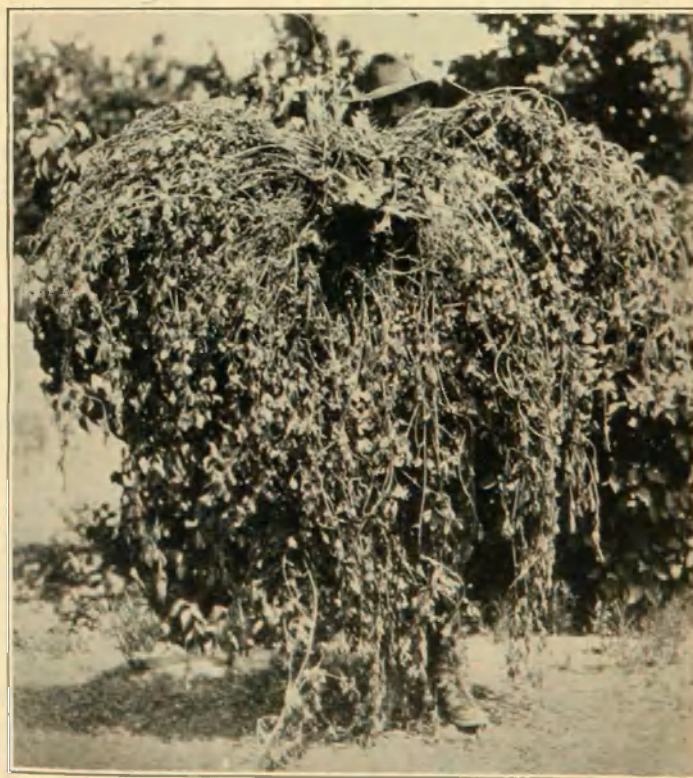
STATE AGRICULTURAL COLLEGE  
FORT COLLINS, COLO.

EXAMINED AND CHECKLISTED

Bulletin 314-A

March, 1932

## ALFALFA SEED PRODUCTION



The sleep feeder's ideal of how an alfalfa plant should produce.  
This plant is 11 years old.

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COLORADO AGRICULTURAL COLLEGE  
EXTENSION SERVICE F. A. ANDERSON, DIRECTOR  
FORT COLLINS

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# ALFALFA SEED PRODUCTION

By JOHN N. SPENCER, In Charge of Seed Registration  
and

T. G. STEWART, Extension Agronomist

Farmers and stock growers all over the West are finding alfalfa more and more important in their farming operations. Alfalfa fills an important place in western systems of crop rotation; it is without a superior as a protein supplying roughage for livestock; and it helps in solving the problem of equal distribution of farm labor.

Unlike many other crops, there is at present no over-production of alfalfa seed. Among the hardy variegated varieties there is an actual shortage of seed stocks. The United States Department of Agriculture reports importations of alfalfa seed amounting to 337,000 pounds for 1930. An average of one-half million pounds has been imported from Asia, Argentina, France, Russia and other countries during the past 10 years. Approximately 2 million pounds of alfalfa seed are used each year in Colorado with less than 300,000 pounds being produced.

If alfalfa plants fail to set seed, the farmer still has a hay or pasture crop left and some returns will be secured from the field. It is possible to determine the extent of seed set in ample time to cut a normal crop should the set of seed appear insufficient. Areas adapted to seed production have not been well defined. However, there are many places in the state where seed can be produced with reasonable regularity and with good average profits over a period of years.

This circular has been prepared to answer a few of the questions which are frequently asked by those engaged in alfalfa-seed production and by those who contemplate the production of this crop. Answers to other questions dealing with alfalfa problems may be secured by writing to the Extension Agronomist, Colorado Agricultural College, Fort Collins, Colorado.

## Adaptation

The bulk of Colorado alfalfa seed is produced in the irrigated Arkansas and Grand Valleys and the non-irrigated sections of Northwestern and Southwestern Colorado. Within recent years alfalfa seed has been successfully produced on small favorably located areas in the non-irrigated regions of Eastern Colorado. There is good reason to believe the acreage grown for seed production can profitably be increased in Northwestern, Southwestern and Eastern Colorado non-irrigated districts. Past experience seems to indicate that this crop cannot be produced profitably under irrigation except in the two irrigated districts named above. Some sloping areas which are well

drained on farms under irrigation may be found suited to alfalfa-seed production thruout the state below 7500 feet altitude.

Soils best suited to the normal growth of the alfalfa plant are deep, well-drained soils which contain a fair reserve of moisture in the subsoils. Under no circumstances should alfalfa be planted on lands which possess a hard-pan close to the surface. This is an important factor to be considered before planting alfalfa on many of the non-irrigated lands. Alfalfa for seed has been found to do well on non-irrigated areas where the water-table is within 6 to 8 feet of the surface, providing this level of subsoil water does not vary materially at any season of the year. Examples of successful seed production under such conditions are to be found in the vicinity of Grover, Weld County, and Chivington, Kiowa County. In some of these areas the land has been broken out of salt grass and other alkali vegetation before seeding to alfalfa.

Alfalfa will seed best in climates where the weather is dry and hot, particularly during the blossoming period of the plant. A period of damp, cool weather during the blossoming stage will almost invariably result in light seed set.

The soil should contain sufficient plant food and moisture to carry a slightly stunted plant growth. It need not and usually should not be highly fertile. Alfalfa plants on fertile soils tend to produce vegetative growth (hay) at the expense of seed. The Utah Experiment Station has found that heavy applications of manure tend to decrease seed yields markedly. Extreme difficulty is usually encountered in securing satisfactory seed yields on fertile irrigated farms due to the tendency of the plant to produce abundant forage instead of seed. On non-irrigated lands this tendency is not so apparent. Limited soil moisture acts as a control to extreme vegetative growth.

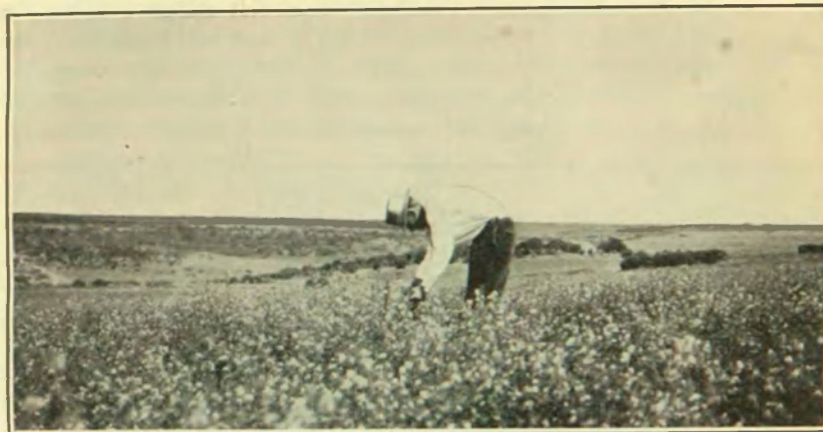
Nature has been generous in furnishing Colorado soils with essential minerals, especially lime, and with few exceptions our soils are abundantly supplied. In fact, the lime content in many areas is already so great that any addition would be decidedly harmful. Lime fertilizer is essential for successful alfalfa production in most of the Eastern States where heavy rainfall has carried on a relentless process of leaching for past ages.

If there is doubt about the need for lime, soil samples should be taken under the direction of the county agent and these samples sent to the agricultural college for testing.

#### Varieties To Plant

Experimental evidence indicates that there is very little difference in comparative seed yields between alfalfa varieties. The important question to the prospective seed grower is not "how much

seed will this variety yield," but, "is this variety in greatest demand." Needless to say, present seed demands in Colorado and surrounding states are for high-quality seed of the winter hardy strains. Grimm and Cossack are standard varieties in this class.



White blossoms, yellow, purple, all colors of the rainbow, are found in a good field of Grimm.—Field being inspected for registration.

There is apparently little difference in degree of hardiness among so-called hardy varieties of alfalfa if the parent fields have been grown for an equal period of years under the same climatic conditions. Knowing the past history of Grimm, Cossack or Baltic alfalfa seed is more important than knowing the variety. Alfalfa plants grown in a severe climate are continually under-going natural selection. Weaklings die out leaving only those plants which can survive under the climatic conditions. In buying alfalfa seed, apply the following rules:

1. Find out where the seed was produced.
  2. Find out how long it has been growing there.
- Such information is always available on registered alfalfa seed.

#### Preparation of Seedbed

Seedbed preparation is the most important step toward securing a stand of alfalfa. The following points should be carefully considered:

1. Always plant alfalfa on a smooth, firm seedbed. On irrigated land, or non-irrigated land which will resist blowing, alfalfa should follow a cultivated crop. As a rule, the only spring preparation necessary will be a light harrowing.
2. On non-irrigated lands where there is danger of soil blowing, alfalfa should follow corn, grain or some other stubble crop.



Planting should be made with a drill as early in the spring as possible. Seedbed preparation which will destroy the stubble and loosen up the surface layer of the soil is exceedingly undesirable on such lands.

3. Any soil preparation which tends to loosen the surface below a depth of 1 to 2 inches should be made in the fall.
4. Save the seed rather than plant it on a loose or poorly prepared seedbed. In case of a special seedbed problem, confer with the county agricultural agent before planting time.



Discovered! One little alfalfa plant a month after seeding on a loose, rough seedbed.

### Seeding

Drilling with alfalfa or grain drill, or planting in cultivated rows, are both recommended in preference to hand or machine broadcasting. The old broadcasting method requires the use of double or more the amount of seed per acre and does not insure an even stand.

Experiments conducted at the Alfalfa Experiment Station, Fort Duchesne, Utah, indicate that alfalfa planted in rows 28 inches apart yields 44 percent more seed per acre than alfalfa drilled or broadcast. Alfalfa planted in 28-inch rows and the plants spaced from 14 to 49 inches apart in the row produced 76 percent more seed than that drilled or broadcast. Spacing of plants is exceedingly important in successful seed production.

Planting in rows enables cultivation and more complete control of weeds which in turn insures better-quality seed. However, row-planted alfalfa is sometimes difficult to harvest due to the tendency of the stems to lodge, particularly if heavily loaded with seed. This fault may be largely overcome by planting in rows not in excess of 25 to 28 inches apart.

For seed production the usual rate of seeding is from 2 to 5 pounds of seed per acre depending on the seeding method used. If planted in rows, 2 or 3 pounds of seed per acre is sufficient. If broadcast or drilled, the seeding rate should be increased to 4 or 5 pounds per acre.

One pound of alfalfa seed contains about 200,000 seeds. On the basis of 43,560 square feet per acre, 1 pound of seed evenly scattered would place over 4 seeds on each square foot. One alfalfa plant on each square foot is too thick for maximum seed production. The fact that sufficient stand is not secured from seeding 1 pound of seed per acre is easily accounted for by seedbed preparation. A good seedbed is of primary importance in securing the uniform stand desirable in either hay or seed production.

The most desirable machine for use in planting alfalfa is the ordinary grain drill with grass seeder attachment. This implement may be regulated for planting in rows by stopping up enough holes to give the desired row width. A common beet drill may also be used for row planting, tho it may be difficult to adjust to seed the proper amount.

Montana Experiment Station workers and farmers have developed alfalfa seeding attachments for corn planters which are described by Waldo Kidder, former extension agronomist for that state, as follows:

"Alfalfa seed is largely grown in rows on dry land in Montana, where the rainfall ranges between 10 and 16 inches. Alfalfa rows are three to three and one-half feet apart. The most successful planter tried was made by fitting a section of a grass seeder box including the feed cup in front or behind the seed box on a corn planter. One such alfalfa seeder section can be fitted in front of each corn box on the two or four-row planter. The feed cups are driven from the corn planter sprocket with a chain. The alfalfa seed is dropped thru a hose which places the seed just behind the shoe opener.

"This seeder is not expensive to make and will seed evenly and cover the seed properly with little waste of seed. As little as one-half pound of seed per acre can be evenly distributed. If difficulty is experienced in seeding small amounts of seed per acre, ground coal screened to the same size as alfalfa seed is good to dilute small seeds for a thin seeding."

Inoculation is the artificial application to the soil of bacteria essential for the growth of the alfalfa plant. These little organisms

attach themselves to the alfalfa roots and depend upon the plant for certain nutrients. In return they remove nitrogen from the air and place it in the soil for the use of the alfalfa plant. Alfalfa is a heavy nitrogen feeder. Without this additional supply the plant appears dwarfed and sickly.

Inoculation is generally not necessary in old irrigated sections or upon fields which have previously been cropped to alfalfa. However, it is a good safety precaution on newly broken land or upon any land which has never been planted to alfalfa.

Material for inoculating and directions for use may be secured thru the office of the agricultural extension agents.

#### Cultivation and Thinning

Cultivation of alfalfa grown for seed is necessary as a weed control measure. When the crop is grown in rows the young plants may



Alfalfa planted in rows and hills 28 by 21 inches produced 76 percent more seed per acre than when broadcast.

be cultivated when large enough to be easily seen. A beet cultivator with knife weeders makes a desirable tool for this purpose. A drilled or broadcast field cannot be cultivated the first year. Under such conditions, weeds must be controlled by mowing. As the stand becomes better established, 2 years old, harrowing with a spring-tooth harrow or disc is advisable.

After the third year it is usually necessary to thin the stand in order to maintain the yield of seed. This procedure is of particular importance on the non-irrigated lands. Thinning may be done in the early spring before the plants start growth. It is best accomplished by removing the moldboard from a sulky or two-way plow and plow-

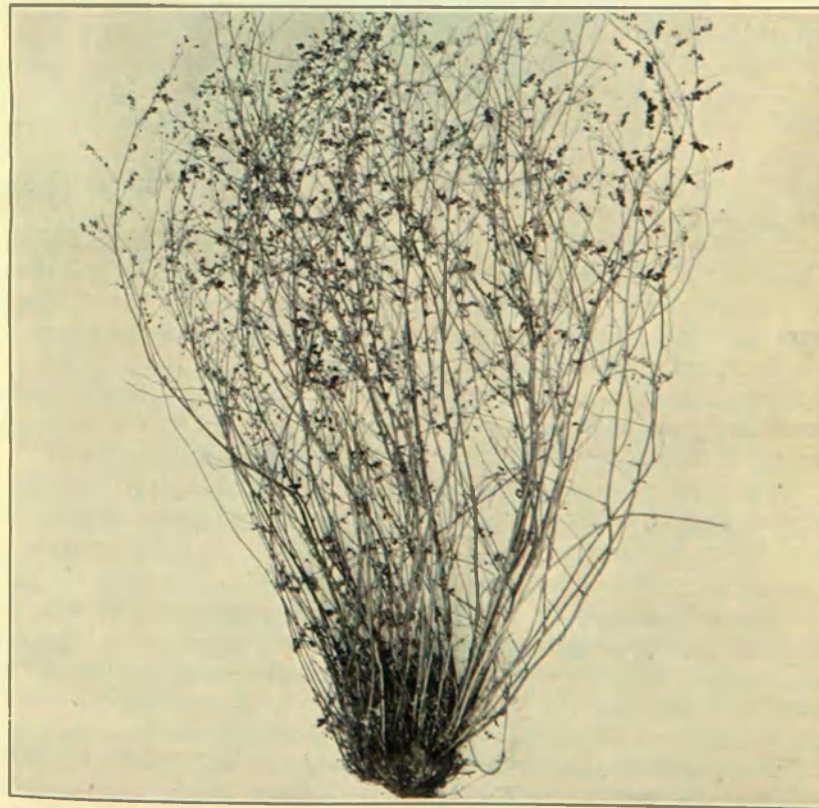


ing across the drill rows. The plow should be adjusted to leave an unplowed strip 6 or 8 inches wide between each furrow. A heavy disc-type tractor plow has been used with good results in thinning alfalfa stands in some districts.

Immediately after thinning the field should be disced or harrowed and levelled.

#### Factors Affecting Seed Set

Alfalfa, when grown for seed, is very exacting of soil mixture, weather and climate. The moisture supply, thru the early period of growth, must be sufficient to produce normal plant development. As the summer advances, moisture should be restricted to induce seed to set instead of growth to stems and leaves. Still later, there must be sufficient moisture to permit proper filling of the seed pods. Seed growers who irrigate are finding it advisable to give the seed field



Poor seed set. The crop should have been cut for hay immediately after the blossom stage.

one heavy application of water in the early spring, then no further irrigation until after the seed has formed. Others in particularly dry regions find it advisable to apply one heavy irrigation followed by one or two light applications of water as the plants indicate a need for moisture. This is a problem which must be solved by individual experience. Alfalfa seed production has often failed under irrigation due to the inability of the grower to properly regulate soil moisture.

Weather and climate also have much to do with success in seed production. The following conditions during blossom time are known to go hand in hand with heavy seed yields:

1. Hot days.
2. Cool nights.
3. Dry air, both day and night.

Nothing will so quickly spoil a good seed prospect as an extended period of cold, drizzly weather during blossom time. Growers frequently practice clipping back in localities where wet weather is encountered at this period of the plant's normal growth.

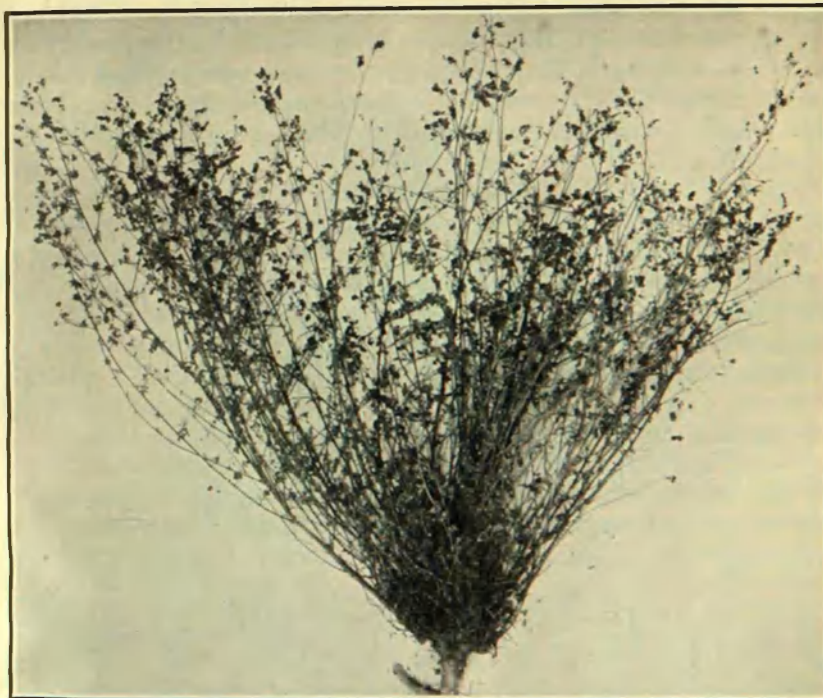
Common causes for failure in seed production are: Too thick a stand, over-irrigation, drouth, wet, cold weather at blossom time, late spring frost and insect pests such as grasshoppers or weevils.

The plant which produces a number of coarse stems invariably carries the heaviest set of seed. Observe the alfalfa plants growing along a ditch bank. Those with massive crowns and a number of coarse spreading stems are loaded with seed. Spacing, as discussed in another part of this circular, has much to do with the development of good seed-type plants. A thick stand, desirable for hay production, is never desirable for seed production.

Seasonal requirements for a seed crop vary in all of the seed-producing areas of the state. In the Arkansas Valley a seed crop will mature in from 50 to 60 days if grown in midsummer following the cutting of a hay crop. Seed production as a first crop will usually require 65 or 70 days. At high altitudes seasonal requirements are from 80 to 90 days.

#### **Harvesting Methods**

There is no specific way of telling the grower when to cut his seed crop. Here again experience is the best teacher. A general rule set down by successful growers is to cut when two-thirds to three-fourths of the pods are brown or black. Alfalfa seed cut too green will not ripen in the shocks or stack. If cutting is withheld too long the grower must suffer severe loss due to shattering. The usual tendency among new growers is to cut too soon in order to save seed. Such cutting results in a very poor quality product and a low market value.



A profitable seed set. The alfalfa seed crop should be harvested when two-thirds to three-fourths of the pods are brown or black.

No machine for harvesting can excel the self rake reaper made especially for cutting alfalfa and clover. If this machine is not available a mowing machine with buncher attachment will serve the purpose.

Harvesting alfalfa with an ordinary mower followed by a rake is at best a wasteful method. Should this method be necessary, mow in the afternoon and rake early the following morning while the crop is moist with dew.

Alfalfa may be threshed in the field or in the stack. Most growers find that threshing is easier and more seed is saved if the alfalfa is stacked and permitted to go thru the sweat stage before it is threshed. This practice will also eliminate much of the chance of loss due to wet weather.

The clover huller is so constructed as to do a complete job of threshing with very little loss of seed. However, an ordinary threshing machine can be operated successfully providing proper adjustments are made. The adjustments usually require removal of part of the concaves, use of special alfalfa sieves, and adjustment of running

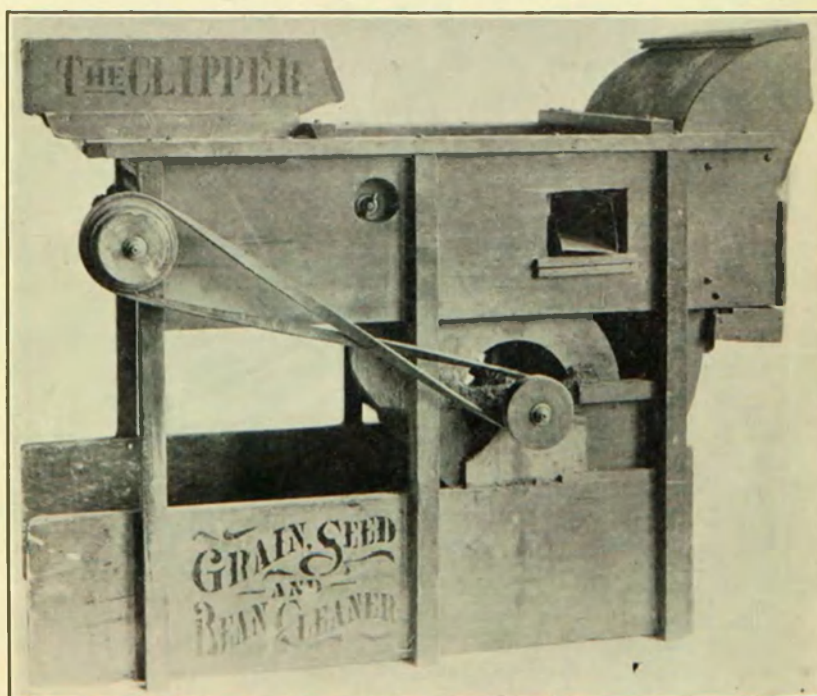


speed. As a safety precaution, be sure to carefully clean out the machine before starting. Many a pure lot of alfalfa seed has been contaminated with sweet clover seed thru the use of an uncleaned threshing machine. Some growers have found it profitable to thresh the straw stack, particularly in cases where the ordinary grain thresher is used.

#### Cleaning Methods

To clean alfalfa seed properly usually requires a combination of cleaners. The seed as it comes from the thresher should first be run over the common fanning-mill-type cleaner. This machine will remove the bulk of inert matter, immature seed and weeds. For the final recleaning, which is usually necessary in order to market profitably, the seed should be run over a gravity table or other machine equipped to remove weed seed and inert material not taken out by the ordinary farm-type cleaner.

It is seldom, if ever, that an individual farmer can afford to buy all of the equipment needed in cleaning his alfalfa. Centralized plants have been established and operated in many communities where seed production is an important farm industry. Unless enough seed



A practical farm cleaner when equipped with proper sieves.

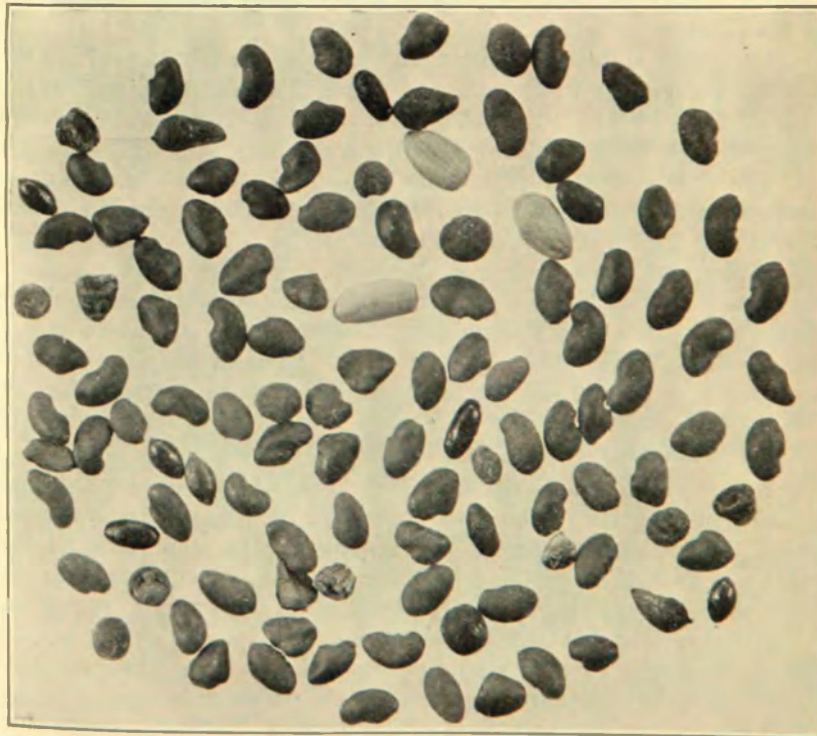
can be produced to warrant the expense of a cleaning plant there is some doubt as to the advisability of alfalfa seed production.

The percentage of purity of alfalfa seed means the percentage of the seed which is actually alfalfa. This is determined by what is known as a purity test in the seed laboratory. In order to determine this percentage all weed seeds, other crop seeds, dirt and small pieces of seeds are removed. After this separation has been made the alfalfa seed, crop seed, weed seed and inert matter are weighed and the percentage of each is calculated.

The two crop seeds which cannot be separated from alfalfa seed are red clover and sweet clover. Red clover occurs only occasionally but sweet clover is present in nearly three-fourths of the samples examined by the State Seed Laboratory.

#### Weeds and Weed Control

Noxious weeds of importance to Colorado alfalfa-seed growers might be listed as follows: Dodder, Russian Knapweed, Buckhorn, Poverty Weed, Wild Morning Glory and Wild Mustard. Others which are equally noxious but less often found in our alfalfa fields



Alfalfa seed mixed with sweet clover and six different noxious weed seeds.



are: "White Weed," Squirrel Tail and Curled Dock.

The first rule for control of any noxious weed is prevention. Never plant alfalfa seed which is known to contain a serious weed pest. The Colorado seed laws require that the names of noxious weeds and number per pound in alfalfa seed be plainly marked on the tag borne by each bag of seed if there are more than 90 per pound. Registered seed does not contain noxious weeds.

Dodder is best controlled by plowing up the alfalfa and planting the land to non-host plants such as small grain or corn. The infested field should not be planted to alfalfa or clover for at least 3 years.

Knapweed, Poverty Weed and Wild Morning Glory are perennials which can be controlled by clean culture or treatment with chemicals. If clean culture is practiced, the infested areas must be cultivated frequently enough to prevent any growth of weeds above the ground.

Chemical treatment is recommended where the weeds are found in small plots. Information regarding materials and methods of application may be secured from the local county agent or from the Botany Department of the Colorado Agricultural Experiment Station at Fort Collins.

Non-noxious weeds usually found in Colorado alfalfa seed are the well-known annual weeds such as Green Foxtail, Russian Thistle, Lamb's Quarter and Pigweed. These weed seeds are quite readily removed with modern cleaning equipment.

The most common pest from a seed-production standpoint is **sweet clover**. Sweet clover seed is so similar to alfalfa seed in size and weight that it cannot be removed by recleaning. The best-known control of this pest is field roguing during the growing season. A sharp shovel or grubbing hoe is a good implement for removing sweet-clover plants easily seen at blooming time. Sweet clover is a biennial and must come up from seed every other year. In cases when the mixture is so great as to prohibit roguing, control may be accomplished by cutting the alfalfa for hay. Cuttings must be frequent enough to prevent blossoming and seeding by the clover plants.

**Never plant alfalfa on weed-foul land.** If weeds are thick in the new seeding they should be controlled by mowing two or three times. When mowing weeds in a young alfalfa stand, elevate the sickle bar as high as possible in order to do the most damage to the weeds with the least injury to the young alfalfa plants.

A nurse crop planted at one-half to three-fourths of the normal seeding rate may be used on irrigated land providing there is sufficient irrigation water to keep the alfalfa plants growing. Experiments conducted at the Colorado Experiment Station indicate that barley is a better nurse crop than either wheat or oats. However, field



Weed seed found in Colorado alfalfa seed.

1.—Buckhorn. 2.—Poverty Weed. 3.—Dodder. 4.—Wild Mustard. 5.—Russian Thistle. 6.—Witch Grass and Green Foxtail. 7.—Sweet Clover. 8.—Knapweed.

peas were found to excell all other crops as a nurse crop.

Except in rare instances, the use of a nurse crop on dryland is not advisable. Even if the alfalfa stand lives thru, it is often so badly stunted when started with a nurse crop as to require an extra year's growth before a profitable seed crop is produced.

#### Registered Seed

Registered alfalfa seed is the pure offspring or pedigreed seed of an officially tested and recommended variety of alfalfa. It must be pure seed of that variety and its parentage traced back to the original stock. Two varieties, Grimm and Cossack, are at present registered in Colorado. Both are hardy variegated-blossom types developed from crossing purple and yellow-blossom varieties.

To produce registered alfalfa, it is necessary to start with blue tag registered seed. This seed must have been produced in a climate as severe or more severe than the one where the new crop is to be grown. Seeding must be made on fields which have not been in alfalfa for at least 2 years. Official blue tags and all other evidence of pedigree should be carefully preserved to be presented to the inspector who examines the field for registration. Application for field inspection must be sent to the Seed Registration Service, Fort Collins, on or before June 15 of the year the field is to be left for seed. Before making application, confer with the county agricultural agent.

#### The State Seed Law

The State Seed Law requires a farmer who sells seed to label it

just as carefully as the dealer. Farmers buying any lot of seed should request the State Seed Laboratory report for protection against weed pests. The laboratory report will also give an accurate basis for determining the value of seed by indicating purity and germination or percentage of live seed.

So-called "hard seed" is live seed which possesses a seed coat more or less impermeable to water. In the seed laboratory hard seed germinates very slowly. However, experimental evidence indicates that under field conditions most of these seeds do germinate and produce normal plants. The amount of hard seed varies according to the locality where the seed is produced. If the total percentage of hard seed and viable seed is well above 90 percent the seed may be considered satisfactory from a live-seed standpoint.

The sample sent to the seed laboratory for test should be at least one-fourth of a pound. A sample should be carefully taken so that it really represents the bulk of the seed lot to be sold. A small amount of seed should be taken from each bag. These small lots of seed should be thoroly mixed. A one-fourth pound sample taken from the mixture will be fairly representative of the entire seed lot. Address the seed samples to the Seed Laboratory, Colorado Agricultural College, Fort Collins, Colorado.

The following label form is suitable for farmers or dealers who sell seed in Colorado.

SEEDS	
Kind _____	Variety _____
Pure Seed % _____	Date of Test _____
Germination % _____	Hard Seed % _____
Grown In _____	Locality _____
NOXIOUS WEEDS: Name and Number per pound, in excess of 90 seeds per pound.	
_____ _____ _____	
SALESMAN _____	
ADDRESS _____	

Hard seed must **not** be added to the actual germination percentage.

Appreciation is expressed for valuable suggestions and information in the preparation of this bulletin which were kindly supplied by Miss Anna M. Lute, State Seed Analyst, and Professor Bruce J. Thornton, Associate Botanist, Colorado Agricultural College.