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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF PLANT INDUSTRY, SOILS
AND AGRICULTURAL ENGINEERING
WASHINGTON, D. C.

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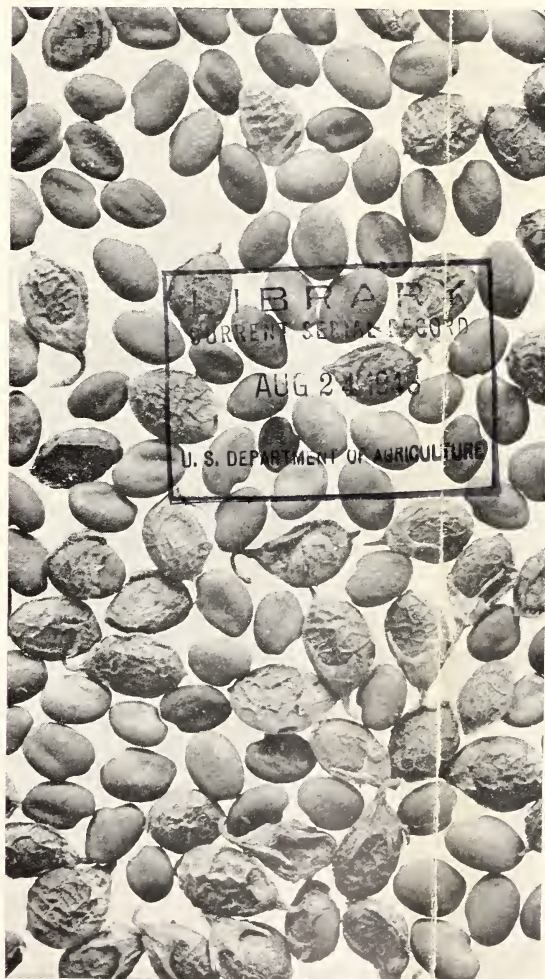
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LEGUME SEED PRODUCTION

In the North



AWI-49

Issued July 1943

U. S. DEPARTMENT of AGRICULTURE

can be obtained free from the United States Department of Agriculture. More specific information, however, will be needed to meet local conditions, and it is therefore recommended that growers consult their State agricultural experiment stations.

Of the pertinent suggestions that apply to all legume seed production, the following two should be specially emphasized:

1. **Bees are needed for adequate pollination.**—Wild bees in gathering nectar and pollen are natural pollination agents. Over these the farmer has no control, but he can see that honeybees are available. To insure success in cross-pollination and tripping the flowers he should see that a minimum of one hive of bees per acre is placed adjacent to his blooming legume field. State apiarists can help legume growers locate colonies of honeybees for moving to the fields for pollination purposes, which are essential to large seed yields.

2. **Seed waste must be avoided.**—This requires care in harvesting and attention to every possible loss. Considerable shattered seed can, for example, be saved by covering the bottom of the wagon with a canvas when the seed is being hauled to a stationary thresher.

ALFALFA

Fertilizing.

Early spring applications of phosphate and potash fertilizer as top dressings on established alfalfa growing on sandy or porous soils have aided in the maintenance of stands in some localities. Such stands could be used advantageously for seed production. Where the minor element boron is deficient in the soil, its application has increased seed production in certain regions. The kind and quantity of fertilizer to apply differ for each region and soil.

Crop to save for seed.

The crop that develops during the hottest and driest part of the summer usually produces the most seed. Over most of the country this is the second crop; south of Kansas it may be the third; and in the extreme North it is the first crop. Under a wide range of conditions slow uniform growth and comparatively thin stands usually produce more seed than thick stands or rank growth, which may lodge.

Production under irrigation.

Apply irrigation water with care. Too much water stimulates rank growth and causes the flowers to drop; too little causes the blossoms to "burn." Kind of soil, height of water table, and rate of water loss are factors to be considered in irrigation practices. Heavy irrigations stimulate new growth and reduce seed yields. Irrigation practices that bring about a continuous slow growth favor seed setting.

Where injury by *Lygus* bugs is serious, seed fields should be given a general fall and spring clean-up and cultivation to destroy the hibernating places of this and other insect pests that cause serious losses of seed. All weeds and plant trash should be removed or burned along fences and ditch banks. A thorough cultivation with a spring-tooth harrow is recommended late in fall, early in spring, and immediately after each crop is harvested.

Time to cut first crop.

Except in regions where early cutting induces leafhopper injury, the blooming period of the second or third crop may be determined somewhat by the time the first or second hay crop is removed. The cutting treatment that causes the flowering period to occur during the hottest, driest part of the season is desirable, provided there is sufficient soil moisture to

insure moderate growth. Pasturing the first crop and allowing the second to produce seed is frequently more successful than mowing the first crop for hay. This practice is particularly advantageous in mixtures of bromegrass and alfalfa.

Pollination.

Most alfalfa flowers require tripping for seed setting. Under high temperatures and dry conditions some self-tripping occurs. Various species of wild bees are efficient cross-pollinators. Nectar-collecting honeybees do not trip many flowers, but in certain localities they are known to collect large quantities of pollen and thus must be effective cross-pollinating agents. Cross-pollination is essential for large seed yields. Increasing the number of honeybees to supplement the number of wild bees may be of considerable value in seed production. The presence of other flowering plants more attractive to bees results in fewer visits to alfalfa and consequently less seed production.

Harvesting.

Alfalfa should be harvested when two-thirds to three-fourths of the pods have turned brown. To avoid shattering, cutting should be done in the morning, when the pods are damp. Immediately after or at the time of cutting, the growth should be windrowed and allowed to remain in place until cured. Handling the plants increases shattering and subsequent seed loss. Seed may be threshed from the windrow by the combine or by hullers, threshers, or combines used as stationary machines. In many localities the latter method has the advantage of saving more seed, since the straw can be rethreshed if necessary to get all of it. When hauling the seed crop to a stationary thresher cover the bottom of the wagon with a canvas.



Cleaning.

Clean seed demands a better price than thresher-run seed. Fanning mills and gravity seed cleaners carefully adjusted and operated are generally all that are required to make a clean marketable product. Many commercial seed companies operate small cleaning plants in their districts to do custom work and return the cleaned seed and screenings.

SEE ALSO Farmers' Bulletin 1722, Growing Alfalfa.

MEDIUM RED CLOVER

Fertilizing.

Fertilizing is not necessary if adequate mineral fertilizers have been applied at the time of seeding. On certain soils where the quantity of phosphate and potash are not sufficient for good growth, light top dressings early in the spring of the second year may help to increase seed production. The kind and quality to use differ for each soil and region.

Crop to save for seed.

Throughout the Corn Belt and Western States the second crop is usually harvested for seed. This practice is recommended for large seed yields for the following reasons: (1) The first crop is needed for hay. (2) Essential cross-pollination by bees is generally more thorough in the second crop than in the first, and other flowering plants that are more attractive to honeybees are not so numerous in midsummer. (3) Dry weather, favorable to cross-pollination and seed threshing, occurs more frequently during the blooming period of the second crop than the first, hence a uniformly larger yield of seed. (4) Time of harvesting does not interfere with as many other farm operations.

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Time to cut first crop

The first crop should be cut when the plants are one-half to three-fourths in bloom. This is 10 days to 2 weeks earlier than the normal cutting time. Early removal of the first growth results in (1) rapid vigorous second growth and more profuse bloom, (2) blooming at a more favorable time for pollination, (3) reduction in the number of seed-destructive insects of the second crop, and (4) improvement in the quality of the first-crop hay.

Pollination.

Lack of adequate cross-pollination is one of the principal reasons for low seed yields. Bumblebees and other wild bees are effective pollinators, but they are not generally present in adequate numbers and are more abundant in midsummer than earlier. Honeybees are effective pollinators when in sufficient numbers, and the availability of hives will usually result in increased seed production. The cutting of competing blooming plants will divert the flight of honeybees to red clover and thus bring about more cross-pollination and seed setting.

Harvesting.

The seed crop should be cut before shattering occurs from the heads that represent the largest bulk of the crop. The hulls enclosing the seed are brown and dry when ready for cutting. Cut in the early morning, when the heads are damp with dew, and stop cutting during the hot part of the day. Windrow the crop either when cutting or when the heads are damp and tough. Combines equipped with pick-up attachments may be used to thresh the seed in the field. The use of combines as stationary machines, however, is recom-

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mended, since rethreshing the straw frequently results in the saving of a considerable quantity of seed. The crop should be handled as little as possible, and when hauled to a stationary combine or threshing machine it should be protected against seed loss by placing a canvas in the bottom of the wagon.

Cleaning.

The measures suggested for cleaning alfalfa seed apply.

SEE ALSO Farmers' Bulletin 1339, Red-Clover Culture; and Leaflet 93, Red-Clover Seed Production in the Intermountain States.

SWEETCLOVER

Crop to save for seed.

Since biennial sweetclover produces only one set of crown buds the second year, grazing or cutting the early growth reduces the top growth and maximum seed production. Clipping is not recommended in humid regions, but if clipping is done, the plants should be cut at a height of not less than 9 inches before the first flower buds appear, or grazing animals should be removed by the middle of May.

Pollination.

Cross-pollination is essential for seed production of biennial yellow sweetclover and for large seed yields of biennial white sweetclover. Bees are the principal insect visitors and pollinators of the flowers. Since sweetclover is an excellent source of readily available nectar, honeybees are attracted to it and are the most effective pollinators. The availability of hives adjacent to blooming fields will aid in increasing seed production.

Harvesting.

As sweetclover seed matures unevenly and shatters readily, earlier cutting than is normally done may prove profitable. Combines have

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been used to harvest the seed directly in the field, but seed losses are liable to be high unless conditions are ideal. If harvested with a grain or corn binder, cut in the early morning or late evening, when the plants are damp and tough. The Ohio Agricultural Experiment Station has developed an inexpensive attachment for a corn binder that facilitates its use for harvesting broadcast plantings. After the bundles have become thoroughly dry, the seed may be threshed with a grain thresher or a combine used as a stationary machine. When the bundles are being hauled from the field to the thresher a canvas should be spread over the bottom of the wagon.

Cleaning.

The recommendations given for cleaning alfalfa seed apply.

SEE ALSO Leaflet 23, Sweetclover.

ALSIKE CLOVER

Crop to save for seed.

The first crop is used for seed, as the second crop produces only an aftermath unless the season is abnormally wet. For maximum yields the first crop should not be grazed or harvested for hay. Grazing animals should be removed from the fields about the middle of May, except in the most northerly States.

Pollination.

Cross-pollination of the flowers is essential before seed will set. Bees are the principal pollinating insects. Of most importance are honeybees that visit the flowers for both nectar and pollen. Placing hives near blooming fields is recommended for large seed yields.

Harvesting and cleaning.

The stage of maturity and methods of harvesting and cleaning alsike clover seed are sim-

ilar to those for red clover, and the red clover recommendations should be followed.

SEE ALSO Farmers' Bulletin 1151, Alsike Clover.

WHITE CLOVER

Fertilizing.

Under most conditions the use of phosphate fertilizers is recommended. Applications should be made early in spring. The quantity needed depends on the soil and region and on past cropping practices. On acid soils the use of lime is recommended—at rates ranging from 500 pounds per acre for moderately acid soils to 1 ton on those that are strongly acid.

Conditions favoring seed production.

Bright warm weather following early cool moist weather favors blossoming and cross-pollination by bees. In the central Eastern States, heads that develop during the latter part of June and early in July, and farther north during July, usually produce the most seed. Where proper irrigation practices are followed two seed crops can be grown and harvested at one time.

Management.

Grazing or clipping the early spring growth is favorable to free blooming and aids in seed harvesting. Grazing animals should be removed 4 to 6 weeks before the maximum number of flower heads is expected. Clipping the fields immediately after all the animals are removed aids in the control of weeds and levels off the growth. Pigweed, charlock, catchfly, cinquefoil, and other weeds and alsike clover should be rogued from the fields before harvesting, as their seeds are difficult to separate from those of white clover in cleaning operations.

Pollination.

Cross-pollination is necessary for seed setting. Honeybees, the chief pollinating insects, can be utilized by proper placement of hives when blooming begins.

Harvesting.

Examine flower heads as blooming progresses to determine the period of greatest seed set. The seed is ready for harvesting 3 to 4 weeks after blooming. Cut with an ordinary mower. Windrow the clover as it is being cut, if it is tall enough to handle. Otherwise use a buncher to permit curing in the bunch or windrow. To facilitate curing before threshing, handle the material as few times as necessary. In threshing, use a clover huller or a combine as a stationary machine. The regular grain thresher is not recommended, since considerable seed is often lost by its use. When the seed crop is being hauled to the thresher cover the bottom of the wagon with a canvas.

Cleaning.

The measures suggested for cleaning alfalfa seed should be followed.

SEE ALSO Leaflet 119, White Clover.

LADINO CLOVER

Ladino clover is a variety of white clover, and the same management applies.

SEE ALSO Farmers' Bulletin 1910, Ladino White Clover for the Northeastern States; and Oregon Station Circular 129, Ladino Clover for Western Oregon.

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FORAGE LEGUMES are war crops of importance in the Food for Freedom Program. All are high in protein and mineral nutrients, and adequate supplies are essential for needed increases in milk, meat, and wool production. Less total labor is involved in harvesting forage crops than other feed crops, and this increases the advantages of growing them on the farm. Furthermore, legumes used as green manure add nitrogen to the soil, and when grown in mixtures they furnish this needed element to the associated grasses. The use of a green-manure legume in the crop rotation is of greater than normal importance for maintaining and increasing the production of feed, food, fiber, and vegetable-oil crops.

In addition to providing for home needs for legumes, the United States is now supplying legume seed to its allies, and large quantities will also be needed for post-war restoration of devastated lands in the far-flung battle areas of the world.

Despite these urgent needs, seed production in 1942 actually decreased for alfalfa, red clover, sweetclover, and alsike clover, and except for red clover the seed carry-over from preceding years was small.

It is apparent that the acreage and yield of legume seeds must be increased in 1943 and subsequent years. Moreover, it is important for farmers to realize that adequate legume-forage plantings on their farms in 1944 will depend to a great extent on the seed grown at home in 1943.

Suggestions for increasing legume seed production are presented in this pamphlet and in the other publications referred to in it. These

This pamphlet was written by E. A. Hollowell, senior agronomist, Division of Forage Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration.

AUG 23 1943