More and Better Clover

by E. A. HOLLOWELL

HIGH COSTS of feed for livestock, lower yields of a later cash crop, and inadequate conservation of the soil are all closely associated with failures or poor stands of clover. Too frequently those conditions are blamed on unfavorable weather. Too infrequently do farmers look for the real causes of the failures.

When they do, it is often found that the seed used was of a variety not adapted to the local climatic conditions and lacking in resistance to the diseases and insect pests prevalent in the region. The purpose of this article is to report the progress that has been made in improving clover in recent years.

The problems involved are complex. First, there are more than 14 species of true clovers (*Trifolium* spp.) and sweetclovers (*Melilotus* spp.) that are important in United States agriculture. To determine proper objectives of an improvement program, thorough studies must be made of the method of reproduction of each species and of the plant diseases and insect pests that attack it. Special breeding techniques must be developed in many cases to obtain the characteristics that go to make a superior variety. After a new variety has been developed by breeding methods, it must be tested adequately to determine its range of adaptation and its cultural requirements. Finally, seed stocks of the improved and tested variety must be increased and maintained in a pure condition before it can be released for farm use.

Besides the usual factors of adaptation, resistance to low and fluctuating winter temperatures, potato leafhopper, and several leaf-spot diseases, northern anthracnose has recently been recognized as a serious disease in the northern and central regions of the main red clover belt. Breeders are searching for strains resistant to the disease. Another prob-

lem is one of adaptation to day-length during the growing season. Within certain limits, strains or varieties adapted to northern latitudes are lower yielding when planted farther south. On the other hand, varieties adapted to the lower latitudes give increased yields as they are moved northward until environmental factors, such as winterhardiness and diseases, limit their productivity. A step toward control of these problems has been made by the development of two new red-clover varieties—Midland and Cumberland.

Improved Red Clover

Midland red clover originated as a composite of equal proportions of four old strains, one each from Ohio, Indiana, Illinois, and Iowa. Thirteen years of testing it and increasing seed stocks were involved in developing Midland. Midland is winter hardy, has good growth characteristics, and has some resistance to northern anthracnose. As the name implies, it is adapted to the middle or central part of the Corn Belt States, and to areas with similar climatic conditions in the Eastern States. In the West, its use is recommended particularly for the production of certified seed for the eastern market. Depending on the environmental conditions, yields of one-quarter to three-quarters a ton more to the acre can be expected of Midland over common red clover.

Cumberland is a superior variety adapted to the southern part of the red clover belt. This southern red clover adaptation zone includes most of New Jersey, the southeastern corner of Pennsylvania, and the area generally south of 40° latitude. It originated as a composite of equal proportions of three identified strains, one each from Kentucky, Tennessee, and Virginia. It also is the result of 13 years of testing and increasing seed stocks and was developed cooperatively in State and Federal research and crop improvement programs. Cumberland has good growth characteristics. It is moderately resistant to southern anthracnose (caused by the fungus *Colletotrichum trifolii*), and has some resistance to crown rot as well. When severe, southern anthracnose may kill the seedling or mature plants of common varieties of red clover, besides lowering the quality of the hay. Cumberland frequently yields a ton per acre more than unadapted red clover in the southern red clover belt.

But varieties even more resistant to diseases than Midland and Cumberland are in the making. A new kind highly resistant to the powdery mildew disease and more resistant to northern anthracnose than Midland is being increased and tested to determine its range of adaptation. Likewise, another new variety highly resistant to southern anthracnose is in the final testing stages. In preliminary tests at a few locations it has lived over into the third year, or second harvest year. If subsequent tests confirm the early results, this fact is of considerable significance. This

evidence that by breeding to eliminate the hazards of the environment, there are possibilities of developing superior varieties of red clover that are perennial in length of life. If more extensive tests substantiate the earlier ones, these new varieties will be named and increased as rapidly as facilities permit.

Improved Sweetclover

There are several new varieties of sweetclover, some of which warrant more extensive farm use.

Evergreen, a superior variety of biennial white sweetclover, was developed by the Ohio Agricultural Experiment Station. It is tall, rank growing, and late maturing. It is recommended for use in the Corn Belt, and the eastern edge of the Great Plains States for pasture and for plowing under for green manure. Evergreen yields from ½ ton to 1 ton an acre more than many other common white sweetclovers. It has particular value for pasture purposes because it gives an extra 3 or 4 weeks of grazing during the summer of the second year. Frequently, under humid conditions, Evergreen does not produce an abundance of seed. It has a long flowering period, but considerable seed shatters before and with harvesting operations.

Madrid is a new variety of biennial yellow sweetclover. It is superior to common varieties in that it matures slightly later and yields more. Besides, it has early seedling vigor and resists fall frost in the seedling year. Seed production is heavy and early enough to escape the hazard of drought common during the summer in the Great Plains. It is recommended for the Great Plains and Corn Belt States.

Spanish, a new variety of biennial white sweetclover, is recommended for the Corn Belt, Great Plains, and sections of the Intermountain region. It is midseason in maturity, higher yielding than most kinds of common biennial white sweetclover, and a heavy producer of seed.

Willamette, another biennial white sweetclover, was developed at the Oregon Agricultural Experiment Station. It is midseason in maturity and a higher yielder. Of particular importance is its resistance to stem rot, a disease that frequently kills stands during the winter and early spring months in the Pacific Northwest.

Sangamon is a late-maturing variety of common biennial white sweetclover developed by the Illinois Agricultural Experiment Station. It produces high yields and has the same advantages as Evergreen, except that it matures earlier.

Besides those, there are other less important varieties of sweetclovers. New superior ones that are resistant to Phytophthora root rot and black stem disease complex, common in the Corn Belt, are being increased and tested. A more leafy, fine-stemmed variety, more desirable for hay in

the Great Plains than present varieties, is being increased for testing purposes. These varieties will be named and released when their value has been proved.

Improved Crimson and Sub Clovers

Dixie Crimson clover, a new hard-seeded variety, gives promise of eliminating a serious hazard in growing common crimson clover. The seed of common crimson has the undesirable characteristic of immediate germination. This may occur throughout the summer after seed is mature or after seeding in the fall. Light rains frequently provide sufficient moisture for germination, but fail to provide enough moisture to establish the seedling plants. For this reason, stands of common crimson clover are frequently lost. Dixie Crimson was developed by men in the Department in cooperation with the Georgia Coastal Plain Experiment Station and the Georgia and North Carolina Agricultural Experiment Stations. It is a composite of three identified strains of similar growth habits and has the characteristic of hard seeds which delays germination. Dixie Crimson volunteers in the fall from shattered seed, either when used in rotations or in pastures in association with such grasses as Bermuda.

Sub clover, formerly called subterranean clover, presents an outstanding example of the value of a superior variety in the successful introduction of a new species. For the past 30 years, common sub clover seed has been widely tested in the Southeast and Pacific Northwest. The results from these tests were not encouraging, and it appeared that the species had little value in this country. In 1934 seed of a series of sub clover varieties were obtained from Australia and were extensively tested. Among them were the varieties Tallarook, which is late maturing, and Mount Barker, which matures in midseason. Tallarook and Mount Barker have grown so well in the Pacific Northwest that the acreage of sub clover is being increased rapidly. In the Southern States they are also the most promising varieties of sub clover.

Improved White Clover

Ladino white clover, a mammoth or giant variety, is now widely known. It seems appropriate, however, in a survey of improved varieties to mention its rapid spread in farm use. The results of early, extensive tests on Ladino between 1912 and 1930 indicated that it was well adapted in many irrigated sections of the Western States, but not in the humid Eastern States.

After growers recognized that Ladino needed larger quantities of mineral plant nutrients than were formerly used and that continued close grazing had to be avoided for best returns, Ladino proved its value

in the Northeast. It is now the symbol of large yields of high-quality feed. More recently, experimental and farm trials in several Lake and Corn Belt States, as well as in the upper sections of the Southeast, have indicated that Ladino has much to offer farmers interested in the production of quality feed.

The leaves, flower heads, and stems of Ladino are from three to five times larger than common white clover, but the seed is the same size and indistinguishable. Well-established seedling plants spread rapidly by large fleshy creeping stems.

Mixtures of Ladino with orchard grass, bromegrass, or timothy have given good results. Frequently Ladino is seeded with other legumes, such as red clover and alfalfa. Since Ladino seed is small in size, 2 pounds an acre with a grass is adequate for a good stand. When seeded with other legumes, and a grass, a half pound to the acre has been sufficient. For seed production most farmers plant Ladino alone, using from 3 to 5 pounds of seed per acre. Remember, however, that a compact seedbed with plenty of phosphate and potash fertilizer where needed is essential for good stands and high yields.

Value of Improved Clovers

The value of superior varieties of clovers has been difficult for some farmers to appreciate. The farm scale of measuring yields of clover in terms of loads of hay is too indefinite. Yields of hybrid corn and improved varieties of small grains are more accurately measured in bushels per acre from known acreages. The difference in yields between superior clover varieties and common kinds, however, is just as great, or even greater, than differences in yields between superior varieties of corn and small grains over common kinds. Too frequently farmers are price buyers. They purchase the lower-priced common seed instead of paying a few more cents a pound for certified seed of adapted superior varieties. The increase in yield more than pays for the extra seed cost. For example, look at red clover. The usual rate of seeding of red clover is 10 pounds an acre. Certified red clover seed of superior varieties costs 6 cents a pound more than common red clover seed. That means that it would cost 60 cents an acre more to use seed of superior varieties instead of common seed. Superior varieties, however, will produce a half a ton or more hay per acre than common red clover. Is not the investment of 60 cents per acre for an additional half a ton of hay profitable?

Unfortunately, the grower cannot distinguish the seed of these superior varieties from common kinds. Since the seed cannot be differentiated by appearance and since many varieties are grown in one region to produce planting stock for other regions, it is imperative that the seed

be certified to insure the distributor and consumer that it is true to name. Producers of certified seed are required by regulation to plant seed of approved parentage, in fields free from volunteer seed and isolated to prevent contamination by cross pollination with common clover. Roguing of weeds and off-type plants may be necessary as the crop develops. Careful harvesting of the seed must be done to prevent contamination. The harvested seed must be cleaned and free from noxious weed seed. It must be of high germination, and marketed in sealed bags. These procedures require inspections by agents of the State Crop Improvement Associations. These regulations and procedures protect the varietal purity at a cost of a few additional cents a pound.

THE AUTHOR

E. A. Hollowell, an agronomist in the Bureau of Plant Industry, Soils, and Agricultural Engineering, is in charge of the Bureau's clover investigations; since 1924 he has carried on research pertaining to the cultural phases of clover production and the development of improved varieties. New superior varieties have been developed and their farm use expanded as a result of Dr. Hollowell's work.

FOR FURTHER READING

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