

The Coming of the Legumes

There is no indication that legumes occupied an important place in the early agriculture of Iowa. An abundance of pasture and forage crops greeted the early pioneer; his problem was the production of concentrated food such as wheat and corn. And by the time he had developed an interest in legume crops certain of those introduced from Europe were so well adapted to the American environment that he escaped many of the discouragements encountered by his predecessors.

There are many legumes possessing varied characteristics, one serving best one set of requirements and another others. Of these, the first introduced and generally grown in the colonial States, from which many early Iowa families migrated, was red clover — which probably accounts for the fact that possibly ninety-nine times out of one hundred when an Iowan thinks of legumes he has red clover in mind. But between its introduction into America and its arrival in Iowa is some interesting history, intimately associated with our present-day use of the crop.

It is now a matter of common knowledge that many years, sometimes decades, are required to acclimate a crop to a new environment. Evidence recently available indicates that the lapse of a century

was required for red clover, through natural selection, to become sufficiently hardy to survive Russian winters. Strains from central Europe are unsuited to conditions a little to the north; likewise, seed from Italy and southern France is poorly suited for use in central Europe.

So, looking backward, the difficulties and discouragements encountered by the pioneer farmers of the eastern States may be imagined. Each farmer was of necessity his own seedsman as well as his own "experiment station". When first brought into New England, clover seed was clover seed, and little attention was given either to its origin or its potential adaptation to local requirements — a condition which has continued almost to the present day. For indeed it was less than a dozen years ago that the first serious attempts were made to determine the relative value of clover seed from different sources.

Not enough red clover seed for planting has been produced in this country. Consequently a considerable amount of seed was imported, most of it from Europe, particularly southern Europe — an average of nearly 12,000,000 pounds annually. During the past ten years, through the coöperation of the Federal Department of Agriculture, hundreds of samples of seed from different parts of Europe have been tested at the Iowa Experiment Station, while other hundreds, taken from cargo import shipments, were also grown for comparison with Iowa and other domestic seed. While perfect stands were

secured with the European seed, the imported clover lacked winter hardiness and if the conditions were at all severe the plants were likely to be almost entirely dead the following spring. In those cases where it did not winter-kill, the growth was likely to be so inferior in the second year to that secured from domestic seed that farmers could ill afford to plant it even if supplied at no cost.

It was evident much of this imported seed was being sold in Iowa and there was no way in which either the seed dealer or the farmer buyer could identify it. As a result, through the influence of the Iowa station and others, Federal legislation was enacted requiring the United States Department of Agriculture to stain all imported seed, in order that its identity might be positively known both by the dealer and the farmer.

While testing the imported lots of seed, comparing them with the domestic lots, differences other than winter hardiness became apparent. The imported clover was very susceptible to certain disease organisms which often proved fatal, and to which American strains grown under the same conditions were almost immune. But in many seasons the imported clover became almost wholly non-productive in the second cutting — the seed crop — and the trouble could not be traced to disease injury. What was the difficulty?

The American clover differs from the European not only in winter hardiness and disease resistance

but also in certain other ways. One of the most noticeable of these is that the American strains of clover are all hairy, with the hairs extending at right angles to the surface of the stems, while the European strains are smooth, or if not entirely smooth, with the few hairs compressed. The cause or causes which brought this about has been a matter of speculation. The answer was found only some three years ago when E. A. Hollowell, a former Iowa State College student, discovered that the imported clovers often were almost destroyed before the end of the second season of growth from injuries inflicted by a minute leaf-hopper, the same insect which it was discovered some fifteen years ago was responsible for tipburn in potatoes.

Working with the different types of clover and alfalfa available he found that the degree of injury was almost in direct proportion to the hairiness of the plant. By midsummer the smooth European clover was so weakened that it could not produce a seed crop, while the American type, with its hairy surface, was largely immune from injury. Thus it became evident that the leaf-hopper was one of the enemies this clover encountered in its fight for existence under the new environment, and the warfare waged generation after generation, unseen by the eye of man, ultimately evolved a truly American type of red clover.

Still another evolution has been suggested as a result of the general disappearance of the bumble

bee, brought about by plowing the wild grass land where these insects are wont to nest. It is now generally accepted that self-fertilization in red clover is practically impossible, and that for every seed produced it is necessary for an insect to crowd its proboscis deep into the heart of a clover flower. The bumble bee was the only insect generally prevalent with a proboscis sufficiently long to reach the nectar. Of late years a relationship between clover seed crops and the proximity of honey bees has been observed; and the theory has been advanced that the present-day clover has a corolla tube somewhat shorter than in previous years, that this has come about as a result of variation in the length of the corolla tube on different flowers, only those with the shorter tubes being visited by honey bees and producing seed. And so the process of change goes on, producing plants best suited to survival and of the greatest value under existing conditions.

Through a considerable period of years red clover may be said to have been the only legume grown as a field crop in Iowa. Mention made of red clover in the reports of the various county agricultural societies in the early fifties would indicate that scattering plantings were being made at that time, but with much more attention given to tame grasses and especially timothy. By 1880 the acreage of red clover was considerable. In fact "clover" was listed separately from other hay crops in the statistical reports of the State for that date. While red clover

had become an established crop, the acreage in proportion to other crops remained small. "Uncle Henry" Wallace was probably more largely responsible than any other one individual for the high appreciation which Iowa farmers have come to have for red clover. Ever and anon, through a long period of years, "Uncle Henry" stressed the value of this clover as a feed and as a soil improver.

Considering our combined need for hay, pasture, and soil maintenance, red clover is probably better suited to our soils and cropping systems than any other legume of which any one knows. But the high prices demanded for red clover seed — as much as \$25.00 per bushel — led many farmers to substitute other legumes. At the time red clover seed was most costly, the price of sweet clover seed was very low due to a rapid increase in seed production.

Perhaps no development in the legume history of Iowa is more romantic than the successful emerging of sweet clover as a desirable field crop after a long battle in which this particular plant was regarded as a persistent and troublesome weed. It was finally recognized as a soil improving crop before its value was conceded for any other purpose except as bee pasture. To-day it is everywhere regarded as a valuable legume crop, and in due time its increasingly extensive use as one of the most nutritious and valuable of our forages, as well as a green manure capable of improving our soil as few crops can, will entirely obliterate the prejudices of the past. Its

present position in our agricultural program is accurately indicated by the experience of one Iowa seed firm which in 1926 sold 18 carloads of the seed, as compared with exactly 18 bags just ten years previously.

Frank Coverdale of Maquoketa was more largely responsible than any other man in creating interest in sweet clover as a field crop. First growing sweet clover about 1900 for bee pasture, he also farmed extensively and was soon convinced that the clover had great value for pasture and soil improvement as well as some value for hay. Mr. Coverdale wrote constantly for the agricultural journals regarding the results which he was securing. Judge William B. Quarton of Algona also did much in popularizing this legume through his articles in the press. While there were other men in the State who used sweet clover extensively as a field crop before Mr. Coverdale took it up, they had little influence in popularizing it except in their immediate communities.

From the time that sweet clover was first handled commercially as a field crop great dissatisfaction had been experienced because of the difficulty in securing stands. Many seedsmen were about to abandon the handling of sweet clover entirely when the Farm Crops Section of the Iowa Experiment Station announced the perfecting of the Ames hulling and scarifying machine, providing a practical means for scratching the "hard" seed coats of sweet clover seed, making it possible for these seeds to absorb

moisture and germinate promptly. The scarifier came into almost immediate use throughout the country, so that within a very short time little or no sweet clover seed was offered which had not been scarified. It is altogether probable that sweet clover would never have become an important field crop except for the scarifying of the seed.

Previous to 1916 the only known types of sweet clover which were of any value under Iowa conditions were biennial. These clovers had large succulent roots and, when seeded in small grain and fall plowed, volunteered profusely in the following spring—in many cases producing almost as good a stand as existed before plowing. While this difficulty could be avoided by delaying the plowing until late in April of the second year, many farmers reported that their soils were heavy and in many seasons the land was in no condition to plow from early spring until the corn should be planted.

In 1916 a large number of lots of biennial white sweet clover were planted at the Iowa Experiment Station, in one of which a few plants were discovered which came into bloom and set seed that year, proving them to be annual. It was found that when planted alone in the spring on soil of fair fertility this new clover often made a growth of four to seven feet while seedlings made with small grain would produce a crop following small grain harvest. The value of this clover for seeding in small grain as a green manure crop which could be plowed down in the fall

of the first year without any danger of the crop volunteering in corn the following season was readily apparent; but not until the past two years has the cost of seed of this annual type, known as Hubam, become sufficiently low to permit its general seeding in this way. Where plowing can be delayed until the following spring the biennial types give a considerably greater return in nitrogen and organic matter.

There remain two other legumes which have come into general use in Iowa within the last twenty-five years. For many years alfalfa had been successfully grown on the Missouri loess soils in the western part of the State. And following splendid results secured at Ames from 1900 to 1910, without either liming or inoculation, it was concluded that alfalfa could be successfully grown throughout Iowa without any soil treatment. However, in 1910 the Experiment Station asked the coöperation of individual farmers scattered throughout the State in making experimental plantings on their own farms.

The results secured, which were published in Iowa Experiment Station Bulletin 135, in 1913, did much to stimulate interest in alfalfa growing and to make possible the satisfactory results which have been secured in all parts of the State. For these studies showed that on approximately ninety per cent of the soils inoculation was essential, and that for the successful production of alfalfa it was necessary to apply lime before seeding on fully two-thirds of the soils of the State.

In 1910 alfalfa was being grown on less than twenty-five thousand acres in Iowa, with practically all of this in the southwestern part of the State. Following the report of the Iowa Station studies, the acreage increased rapidly with over two hundred thousand acres in 1920 and approximately four hundred thousand at the present time. During the past twenty years alfalfa has received several serious setbacks owing to excessive winter-kill. However, an increasing per cent of the more recent seedings have been made with varieties and regional strains known to be winter hardy, especially the Dakota common and the Grimm.

But both alfalfa and sweet clover require soils either naturally sweet, or those to which lime has been applied, and we have many soils, particularly in the southern half of Iowa, which are distinctly acid. It is on such soils that the soy bean is of particular value. This legume will grow well on almost any soil, heavy or light, rich or poor, wet or dry, acid or alkaline. It is a very sure crop, one which can be seeded at any time through a period of several weeks, with the practical assurance of a return before frost of from one and a half to two and a half tons of hay per acre — hay which approximates alfalfa in feeding value. If hay is not desired, a yield of from fifteen to twenty-five bushels of beans may be had. The demand has been such that in the past most of the good quality beans have been marketed as seed. With the recent establishment of two soy

bean oil mills in the State, with the prospect of others soon to follow, a home market for the beans is provided which will stimulate production.

Of the varieties of beans first introduced many shattered very badly when mature while others gave low yields. Hundreds of unnamed strains introduced from the Orient, as well as all promising varieties, have been compared to determine their adaptation to Iowa conditions. It was not until the Manchu and Black-Eye-Brow varieties were distributed from the Iowa Experiment Station that a rapid increase in acreage began. The Manchu has been grown almost to the exclusion of other varieties for a number of years and only now is giving way to superior types. By far the largest acreage of beans is found in the southern part of the State, particularly in southeastern Iowa, where from two to five thousand acres per county is common.

Of the five to eight thousand queries on crop problems annually received by the Farm Crops Section of the Experiment Station at Ames, more have to do with legumes than with other crops. This fact indicates the trend of thought of Iowa farmers. The acreage of legumes in proportion to other crops is still lamentably low — in a number of counties less than five per cent. Legume planting must become much more general if our cereal crops are to be fed most profitably and the productivity of our soils maintained.

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