SUCCULENT FORAGE FOR THE FARM AND DAIRY.

By Thomas A. Williams,
Assistant Agrostologist.

EARLY FORAGE CONDITIONS.

In the early years of the settlement of this country the farmers found no difficulty in securing plenty of forage from the native grasses for the few live stock they possessed. The supply was abundant for their every need (in fact, seemed unlimited), and little thought was given to the cultivation of crops designed especially for forage purposes. If anything was needed in addition to the native grasses, the lack was more than supplied by the waste or roughage from the various garden and field crops, such as beans, peas, turnips, and cabbage.

As the country became more thickly populated, and a greater proportion of the land was brought under cultivation, the native forage supply was reduced. Furthermore, with the advance of agricultural industries came better methods of caring for stock, and gradually it became necessary to devote some of the cultivated land to the production of forage crops. At first these crops were grown for pasturage or for hay, but with the development of the dairying industry came the demand for succulent feed to keep up the flow of milk in cows during the season of drought in summer and autumn, when pasturage became reduced, and during the winter, when the fresh pasturage was cut off entirely. The supplying of succulent feed for these two seasons presented very different problems.

On the one hand, it was necessary to provide crops on the approach of the droughty season and to arrange for a succession of these while it lasted, the feeding being done from the field or by pasturing off directly; on the other hand, it was not only necessary to grow and harvest the supply of forage for winter, but it must be preserved in such a manner as to be ready for use at the proper time. In the South the problem was less difficult than in the North, since, owing to the climatic conditions, it was possible to secure fresh feed for at least a large portion of the late fall and winter by the use of winter rye, oats, and other so-called winter annuals. Naturally, root crops were among the earliest grown for the purpose of supplying succulent feed for the fall and winter, since they were already extensively grown for this purpose in the Old World. Although these crops have received considerable attention from farmers in different parts of the country,
and their cultivation for forage has been at times quite general in cer-
tain sections, they have never assumed the place in American agri-
culture that they occupy in England and other parts of Europe, and
it is doubtful if they ever will do so. The reason for this may be
found in part in the different conditions under which agriculture has
developed in this country, but principally in the fact that corn, one
of our standard crops, so readily takes the place of root crops in the
farm rotations and is adaptable to use in so many ways as a food for
stock. Then, too, the advent of the silo gave the American farmer
a means of preserving this crop for an indefinite period in a most sat-
isfactory condition for feeding to all kinds of live stock.

PRESENT METHODS OF PRODUCING SUCCULENT FORAGE.

In the United States succulent food is in the main at the present
time provided by means of soiling crops, temporary or annual pas-
tures, and silage.

The crops that are most valuable for the production of succulent
forage comprise coarse, quick-growing plants that draw their nour-
ishment largely from the atmosphere and produce relatively large
amounts of foliage. They are much less exhausting to the soil than
grain and other so-called money crops, and include most of the best
soil renovators.

THE PLACE OF SUCCULENT FORAGE CROPS ON THE FARM.

Just as it must be generally admitted that a system of diversified
farming is preferable for the country at large, so it must be agreed
that succulent forage crops may be made to form a very important
part in the rotations to be followed in practicing such a system.
These crops can usually be grown in such a manner as not only not
to interfere in any way with the regular yields of grain or other pri-
mary crops, but even to the great advantage of the latter on account
of the direct beneficial effect which they may exert on the fertility of
the soil. This is especially true of such leguminous crops as vetches,
cowpeas, and crimson clover.

A strong point in the favor of growing crops for succulent forage
lies in the fact that an increased number of stock may be maintained
on a given amount of land and that the dairy products may be very
materially augmented, both on account of the possibility of handling
relatively larger numbers of milch cows and also of the greater returns
that may be secured from each animal. This is of special significance
in the older, more thickly settled portions of the country, as is also
the fact that the keeping of this increased number of stock insures
more manure for the land. This last is in itself an item of great
importance in the maintenance of the fertility of the farm, and, taken
in connection with the direct beneficial effects upon the soil of many
of the crops grown for soiling and ensiling, is a most substantial argument in favor of giving these crops a regular place in plans of crop rotations.

Another point in favor of the growing of these supplementary forage crops is the fact that the general health of farm stock may be kept in better condition, especially in winter, by the judicious use of succulent forage, which serves as an appetizer and promotes the digestion generally.

GROWTH OF THE PRACTICE OF SOILING IN THE UNITED STATES.

In 1821 Thomas Massey, of Delaware, advocated soiling for the dairy, and urged the great value of corn as a forage crop.\(^1\) In the same year a system of soiling was recommended by a prominent agriculturist, with the following crops in the order mentioned: (1) Grass, including clover; (2) oats; (3) Indian corn; (4) cabbage, with the addition of turnip tops and trimmings from other root crops.\(^2\) Other writers of this period speak of the value of corn for this purpose, and from the time that the Government first began to issue reports on the various crops grown in this country it has been regarded as the most important fodder crop. The reports for the early forties contain many references to its use for soiling as well as for cured fodder. Soiling seems to have been quite general about this time in the Eastern and Southern States, but in the then Western States of Ohio, Indiana, and Michigan it was said that "the pastures were too extensive for much to be done in soiling," although "corn was regarded as the best crop for this purpose." In Massachusetts and New York, where the dairying industry was largely followed, soiling was quite favorably regarded and its practice urged by the more advanced dairymen. In addition to corn, other crops, such as peas and oats, were grown, especially in Maine, where, according to the reports for the late forties and early fifties, the production of live stock and forage crops were matters of great commercial importance.

There has been but very little complete soiling practiced in the United States. Occasionally, where the acreage of land is limited, as may be the case in the immediate vicinity of the larger cities and towns, it has been found expedient to keep the animals confined in summer as well as winter and to supply green feed in the form of soiling crops. The general practice has been, however, to combine soiling with pasturing, using the former in a supplementary way only, the animals being allowed to run on the pasture a part of the time and receiving in addition a sufficient amount of freshly cut forage to keep them in proper condition.

One objection early urged against soiling was that the animals were not allowed sufficient exercise when complete soiling was practiced.

\(^1\) American Farmer, May 25, 1821.

\(^2\) Ibid., July 20, 1821.
and that their health was injuriously affected to a greater or less extent. On this account the system followed most generally in the United States is to be preferred. Complete soiling has been urged by some on the ground that under partial soiling stock is likely to become restless in the pasture in attempts to get at the soiling crops. This difficulty may be avoided, as a rule, by growing the crops at a distance from the pasture and feeding only in the barn or yard.

TEMPORARY PASTURES.

Too little place is given to temporary pastures on the average American farm, but one effect of the recent periods of drought has been to turn attention more strongly to this method of producing forage. Often it is much more profitable to furnish stock with succulent food in this way than by soiling, the extra labor and expense of cutting the crop and hauling or carrying it to the feeding place being saved. It is not always possible to keep sufficient help on the farm to attend to the work of soiling properly, but by the use of the temporary or annual pasture the stock may be supplied with the desired feed and the permanent pastures brought safely through a droughty season, because of the lessened drain on their resources. True, this may not be the most economical manner of feeding succulent forage, owing to the waste from the trampling of the animals, but it is much better than keeping the stock on overgrazed pastures, both as regards the condition of the animals and the future productiveness of the pastures.

In certain parts of the country, notably in the Middle West and some sections of the South, this practice of sowing supplementary pastures has become much more common than formerly, partly because of the effect of drought on the yields of forage from the permanent meadows and pastures and partly through the increased demand for succulent feed arising from the growing interest in dairying and the increase of stock on farms heretofore largely devoted to the raising of cotton and grain.

In the main, the crops that are grown for soiling can be also used in these supplementary pastures, but there are certain varieties which are best adapted for this purpose. Among such may be mentioned rye, turf oats, sorghum, rape, vetches, field peas, millet, beggar weed, and bur clover.

HISTORY OF THE PRACTICE OF ENSILAGE.

PIONEER ATTEMPTS AT PRESERVING FORAGE IN SILOS.

The first recorded American silo for the storage of fodder was built in 1875 by Dr. Manly Miles, who says he was led to make the experiment through the favorable reports made by farmers practicing this method of preserving corn and other forage crops in France. He used four small silos, two of which were filled with corn and two with
the heads of broom corn. The results were most satisfactory, and Dr. Miles published an account of his experiments the following year.1

In 1876 attempts at preserving forage in silos were made by Messrs. Francis Morris, of Maryland, and C. W. Mills, of New Jersey. The results of Mr. Morris's trial were published the following year, and those of Mr. Mills in the Journal of the American Agricultural Association for 1881. Others followed in the footsteps of these pioneers, some with success and others with failure, and the subject was much discussed in the various farm journals. Occasional notices regarding this method of preserving forage had appeared in American journals as early as 1873, but all related to European practices. A great deal was added to the interest exhibited by American farmers through the translation of a French book on the subject, in which M. August Goffart described the method of ensilage followed by himself and others in France. It is interesting to note that while the work of M. Goffart undoubtedly had much to do with the spread of this practice in the United States, it was a German, Herr Adolph Reihlen, who first demonstrated the great value of corn as an ensilage crop. His experiments were carried on in the early sixties, and as a result the ensilage of corn was soon practiced in both Germany and France.

One of the most effective agents in advancing the claims of the silo was the ensilage congress first held in New York City in 1882, in which two days were devoted to the discussion of this method of preserving forage. The consensus of opinion at that time was expressed in the resolution, unanimously adopted by the congress, "that it has become a well-established fact by six years' successful use in this country, and by the concurrent testimony of many intelligent farmers, that the ensilage system is of great advantage to the farming interest and to all mankind."

The progress of this system of preserving forage was no doubt much hindered by the extravagant statements made by some of its early advocates. Practical farmers hesitated to adopt it because of the visionary character of these claims. However, the advocacy of Dr. Miles, Governors Price and Smith, and Messrs. Morris, Mills, Sprague, Brown, and other men prominent as scientific and practical farmers was proof conclusive that there were advantages to be gained by the ensilage of certain forage crops. Here and there enterprising farmers and dairymen began to build silos, and gradually the practice was accorded a permanent place in American agriculture. Seven years after Dr. Miles made his first experiments a report was published by the Commissioner of Agriculture giving the results of the experience of ninety-one farmers and stockmen in different sections of the country, and while these included by no means all the silos that were built at that

1 Country Gentleman, October 6, 1876.
time, the report is undoubtedly fairly representative of the practice of ensilage throughout the country as a whole. More than half the reports came from Massachusetts and New York, and only a dozen from the States west of New York and south of New Jersey. Some idea of the rapid development of the use of the silo may be gained from the fact that in the report of 1882 but three were recorded from Wisconsin, while in 1896, according to Mr. C. P. Goodrich,\(^1\) "in the town of Lake Mills, Jefferson County, Wis., which contains but thirty-four sections of land, there are not far from seventy silos, and the use of not one of them has been discontinued, but more are going up." It is noticeable that from the first the silo has been most generally used in sections where the dairying industry is paramount.

CONSTRUCTION OF SILOS AND TREATMENT OF CONTENTS.

It is interesting to note that in the United States the development, both as to the construction of the silo and the treatment of the contents, has been along lines of greater simplicity. The expensive structures of masonry, built by most of the earlier advocates of this method and patterned after the silos of M. Goffart and other European farmers, have given place to those of wood, which are at once cheaper and more easily built, while wooden walls are less conductive of heat and cold.

The early practice of placing heavy weights on the material in the silo in order to press it down and exclude the air, and which was thought to be very necessary to the preservation of the forage, was pretty generally abandoned some years ago, as it was found that the forage kept quite as well without such pressure. It was also thought to be of the greatest importance that the filling of the silo should be rapidly done. Dr. Miles was the first to combat this idea, arguing that "with slow filling, without treading down the fodder, the temperature of the mass would rise to a point that is fatal to the bacteria that cause acid fermentation and that sweet ensilage" would result. This view was soon found to be upheld by experiment, and for ten years or more it has been generally accepted that rapid filling is unnecessary, many farmers maintaining that the best quality of sweet ensilage is made by slow filling. Another early idea was that the fodder should be firmly packed as it was put into the silo, but it has been found by experience that all that is really necessary is to keep the surface leveled off and perhaps to tramp the fodder down a little along the edges near the walls of the silo.

In order that the temperature of the whole mass may be kept as uniform as possible, it is a common practice to delay the leveling off of the fodder put in one day until the temperature has risen to the proper degree when the hot material is leveled off, being well packed.

\(^1\)Report Kansas State Board of Agriculture, third quarter, 1896, p. 116.
FIG. 1.—A ROUND SILO ATTACHED TO DAIRY BARN ON FARM OF SOUTH DAKOTA AGRICULTURAL COLLEGE, SHOWING METHOD OF FILLING.

FIG. 2.—AMERICA'S BEST FODDER CROP (FIELD OF CORN GROWN NEAR WASHINGTON, D. C.).
at the edges, and fresh fodder is added at once. This maintains a higher temperature in the outer portions of the mass and results in silage of a more uniform quality. The former practice was to cover the fodder with planks or boards, which were deemed necessary to keep the silage from spoiling at the top. This covering of boards was discarded, however, soon after it was learned that heavy weighting was unnecessary, and a covering of straw, chaff, grass, or uncut corn-stalks was substituted. Nowadays the covering is often omitted entirely, but it is generally considered the best practice to cover with straw, chaff, or grass, since a few inches on top will mold and spoil anyway, forming a practically air-tight covering, and the addition of the straw or other material saves this loss in silage.

At first silos were either square or rectangular, but more or less difficulty was experienced from the spoiling of the silage at the corners, and it was also difficult to make the high wooden silo strong enough to resist the lateral pressure of the mass of silage. This led to the building of the circular silo (Pl. LIX, fig. 1), which form is generally preferred at the present time. There are no corners in such a silo, and a much stronger structure can be made with less building material than in the square or rectangular type. Moreover, the capacity of the round silo is greater in proportion to the wall space. It is the present practice when building a square or rectangular silo to board up or otherwise cut off the corners, thus lessening the danger of loss of silage. Metal linings for the inside of wooden silos have been tried, but with poor success, usually proving less durable than wood. Recently steel siding has been used in place of wood for the outer part of the wall of the silo, and it is said to compare favorably with lumber as to cost.

The first silos built in the United States were "pit silos," and these are still sometimes made, but aside from their cheapness they have no advantage of consequence over those built on top of the ground. A serious objection to them lies in the difficulty in feeding the silage from them. On side-hill situations they can sometimes be used advantageously. It is often possible to build the silo partly below and partly above ground, materially lessening the cost, but retaining the advantages of the above-ground silo.

The desirability of silage as a food for farm animals during the winter and also in times of drought has led to many attempts to construct cheap silos, especially in sections where building materials are high. One of the most satisfactory of these cheap structures is known as the "stave silo." It is built much as a round tank, but is without top or bottom other than the soil, and is composed of 2-inch lumber of varying width held together by hoops of one-half inch iron, with suitable blocks for tightening. When filled a temporary roof may be placed on the silo, or straw or grass may be spread over the silage.

A still simpler and more inexpensive method of preserving fodder
fresh from the field is practiced in some sections, notably in Texas and elsewhere in the Southwest. This is by means of the "stack silo." The freshly cut forage (sorghum is usually used) is drawn into compactly built stacks, generally topped with grass, and carefully raked down and heavily weighted. The forage undergoes fermentation and is said to be of good quality, while the loss from molding is seldom very great, being confined to the surface.

**VALUE OF ENSILAGE AS A FOOD FOR STOCK.**

The value of silage as a food for all kinds of farm stock is now pretty generally recognized. It is seldom fed entirely alone, but usually in connection with a small amount of hay and grain. In the case of horses, it is generally conceded that silage should form but a part of the ration, especially when the animals are doing hard work. On dairy farms silage holds a particularly important place, but even here it has had to win its way against strong opposition. Although it was early admitted that this forage when properly fed materially increased the flow of milk and exerted a beneficial influence on the health of dairy cattle, many dairymen refrained from using it because it was said to taint the milk and butter. This has been shown to be largely erroneous, at least so far as silage of good quality is concerned, and in any event may be avoided by feeding the cows only after milking. It has been shown by experience that the cost of milk and butter can be materially reduced by the judicious use of good silage.

In summing up the advantages of silage under the system of agriculture prevailing throughout the greater part of the United States at the present time, it may be confidently maintained that with no other method can so much forage that is so palatable and of such feeding value be secured, be so safely harvested, stored so economically, and fed with so little waste. The silo is certainly a most valuable adjunct of intensive farming, may almost be regarded as a necessity on any well-ordered stock or dairy farm, is a safeguard in times of drought as well as in excessively wet seasons; its use is by no means necessarily confined to the wealthier farmers, but is spreading rapidly in all sections of the country where the acreage of land is limited or where succulent forage is needed during the winter months.

**THE BEST CROPS FOR SUCCULENT FORAGE.**

CORN.

Corn (Pl. LIX, fig. 2), the most valuable crop of our forefathers, early assumed an important place as a forage crop, not without some opposition, however, for it is said that the idea of sowing it for fodder was at first ridiculed. As early as the second decade of the century

---

this crop is mentioned as a most valuable one for soiling, and from
the first introduction of the practice it has been regarded as the best
to grow for this purpose.

It was early observed that certain varieties of corn were more
adapted to use for soiling and fodder than others. These have been
improved and increased by selection and crossing until at the present
time there is a long list of varieties, some of which are suitable for
soiling and ensiling in any part of the United States.

Two points have been kept in mind by those endeavoring to develop
the varieties of fodder corn, namely, the desirability of varieties with
a long season of utility and producing heavy yields of foliage rather
than of grain. Thus, we have the various "evergreen" varieties, which
remain in condition suitable for feeding for a relatively long period,
and other varieties, which give exceptionally large amounts of forage.
These last are especially valuable for ensilage. By the use of a judi-
cious selection of early and late varieties, and planting at proper sea-
sons, it is now possible to have plenty of green corn for soiling for a
large part of the summer and autumn in most parts of the United
States.

CLOVER AND OTHER LEGUMES.

As the need of succulent forage became more generally recognized,
it was found desirable to grow several crops for use each season in
order that a succession of fresh forage would be assured. It was also
found that a better quality of forage might be secured by selecting a
suitable variety of crops to be grown in this way. Among the more
important crops used for this purpose, in addition to corn in the early
part of the century, were field peas, usually grown with oats or other
small grain, clover, cowpeas, rye; and, a little later, millet, sorghum
and other crops came into use.

CLOVER.—Red clover was grown in Rhode Island as early as 1750.
John Bartram is said to have grown it on his place near Philadelphia,
Pa., prior to Revolutionary times, and, according to Darlington, it
was introduced into general cultivation in Chester County, Pa.,
during the last decade of the eighteenth century. Suffolk County,
N. Y., was an early center for the cultivation of this crop, and con-
siderable seed is said to have been exported from there. Red clover
was included in nearly all lists of crops desirable for meadows, and
its use for soiling seems to have been quite general in the North
during the early part of the present century. It did not win its way
unchallenged, however. A writer from Indiana, in the United States
Patent Office Report for 1849, speaks of the strong prejudice against
clover prevailing in his section on account of frequent deaths among
cattle when first turned on it, and because worms destroyed corn
following the clover. Its value as a soiling crop was early recognized,
however, and it is still to be regarded as one of the best perennial
crops available for this purpose, as well as for use in the silo.
Mammoth, or sapling, clover is frequently grown and used in the same way as red clover, and in some sections, especially where the soil is wet and heavy, alsike replaces both of these.

Cowpea.—In the South the cowpea early assumed the place occupied by clover in the North. A writer in 1821 recommended the cultivation of this crop for forage and soil renovation, and there are references to its use for these purposes at least as early as 1815. Many writers for the United States Patent Office reports and farm journals during the second quarter of the century speak of the great value of the cowpea (several varieties of which were grown chiefly under the name of black-eyed peas) in the South. A writer from Louisiana says, in the United States Patent Office Report for 1849, that the cowpea ranks next to corn in importance to the sugar planter, both for its value for forage and as a soil renovator, while another from Tennessee calls it “perhaps the most valuable crop in the South.” Although it was more often made into hay or the crop fed off on the ground, it was also often used for soiling, and in recent years is frequently made into silage, being generally regarded as next in value to corn and sorghum for this purpose in the South. It is used to best advantage in connection with corn as a mixed silage. During recent years many new varieties of cowpeas have been developed, some of them, because of their season of maturity and upright habit of growth, admirably adapted for soiling and ensilage.

Field Pea.—One of the first leguminous crops to be grown in the United States for succulent forage was the field pea. For many years the cultivation of this crop was confined largely to the New England States, but of recent years it has received more attention and is now quite generally grown in the Northern United States, where it is deservedly popular not only as a succulent forage but also as a hay crop. There are a great many varieties now on the market, varying widely as to hardiness, date of maturity, and yield. The seed is usually sown with some of the small grains, chiefly oats, the mixture containing about equal quantities of peas and grain. The crop is, perhaps, most commonly used for soiling, but is equally valuable for pasturage and silage. The combination makes a forage of high feeding value and palatability, and the yield is usually good.

Alfalfa.—Another legume of great importance as a soiling crop is alfalfa, or lucerne. A writer in 1821 regards it as a most valuable crop for South Carolina, and claims to have grown it for seven years, with the best of results, securing from six to eight cuttings per year. A New Jersey farmer, writing a few years later (1823), says: “Of all grasses, it is the most profitable for soiling;” and Judge L. Buel, of Albany, N. Y., an authority on such matters, also speaks highly of it

1 American Farmer, 1821.
for this purpose. In fact, in the earlier years of its cultivation in the United States it seems to have been grown almost exclusively for soiling. The seed was brought from France, and the French name "lucerne" was generally used. It was much less widely grown than red clover, however, until after the introduction, in the early fifties, of the Chilian variety, on the Pacific coast, from whence its cultivation has spread over the whole United States. Although largely grown as a hay crop at the present time, it is also much used for soiling. The early season at which it is ready for use in the spring, the fact that several cuttings may be made each year, and the high feeding value of the forage make it a very desirable crop to grow for this purpose. The recent introduction of the hardy Turkestan alfalfa by the Department of Agriculture promises to make this desirable forage crop available to sections where it could not be grown heretofore on account of unfavorable climatic conditions.

SOY BEAN.—The soy bean was introduced from Japan in the early part of the century, but was grown in a desultory way for a long time, only coming into prominence as a forage crop within comparatively recent years. It was apparently first grown in the botanic garden at Cambridge, Mass. In 1829 Thomas Nuttall¹ wrote regarding its possible value for cultivation in the United States, and another writer tells of its having been grown at Cambridge in 1829 and at Milton, Mass., two years later.² It is now regarded as one of the most valuable crops for soiling and ensilage. Careful selection on the part of those engaged in growing seed for the market has resulted in the development of early, medium, and late varieties, so that it is now possible to get a good supply of fresh soy-bean forage for a large part of the summer and autumn. Although probably less valuable in the South than the cowpea, it has a more extended northern range, and hence serves as an intermediate between that crop and clover.

VETCHES.—Of the vetches, common and sand (or hairy vetch) are the only sorts that have been grown to any extent in this country, and these, while grown and used in essentially the same way, have been by no means as commonly cultivated as field peas. Common vetch seems to have been first introduced, and both spring and winter varieties were grown as early as 1820, principally under the name of tares. Several writers in the farm journals published in the early twenties speak of their value for soiling and supplementary pasturage, and in some sections large fields were devoted to the cultivation of these legumes. One farmer speaks of growing 30 acres of tares annually. Sand, or hairy vetch, is of much more recent introduction, and is, if anything, better adapted to general culture throughout the United States than the common vetch.

¹ New England Farmer, October 22, 1829.
² Farmers' Cabinet, October 15, 1847.
Crimson clover.—Crimson clover is one of the most valuable legumes grown in the Middle Atlantic States. It was introduced from Italy in 1818 by Bedingfield Hands, of Chestertown, Md., and first grown by him and others to whom he gave seeds. In the first notes regarding it that appeared in the agricultural journals it is called Italian clover, but this name was soon supplanted by the one now in most common use. In 1820 Mr. Hands gave an account of the introduction of this clover and his experiments with it, and still earlier a Dr. Anderson, to whom Mr. Hands had given seeds, recorded the results of his trials, speaking enthusiastically regarding the value of the crop, particularly for green forage. Aside from being one of the most valuable cover crops and soil fertilizers grown in the Eastern United States to-day, crimson clover ranks high as a forage crop, especially where the climatic conditions are such that it can be sown in the autumn for an early crop the next season. Affording an excellent hay when cut in the right season and properly cured, it is also extensively used in soiling and for filling the silo, as well as in annual pastures.

Japan clover.—Japan clover was an accidental introduction from Japan, as it name indicates, first coming into notice in this country about 1830. It now occurs quite abundantly in the naturalized state throughout the greater part of the region south of the Ohio River. It is, perhaps, most valuable as an annual pasture crop, but is also used in other ways. Its ability to endure heat and drought and to thrive on a great variety of soils renders it of much importance as a forage as well as a soil renovator. It is available as a pasture plant from May until heavy frost.

Florida beggar weed.—Florida beggar weed has only recently become of importance as a cultivated crop. It is a native of the West Indies and quite likely, also, of southern Florida, where it was first cultivated. The plant is an annual and is well adapted to the light, sandy soils of portions of the South. Its cultivation is spreading rapidly, and although it has thus far been most commonly grown for hay, it is also valuable for soiling; pasturage, and ensilage.

Velvet bean.—Another succulent forage crop which has recently attracted much attention is velvet bean. Its first introduction into the United States seems to have been through the Department of Agriculture some thirty years ago. Until within a few years it was grown solely as an ornamental plant, but proving adapted to the light, sandy soils of the South, it was taken up as a soil renovator and forage crop, and is now being grown and used in essentially the same ways as the cowpea.

1 American Farmer, May 19, 1820.
FIG. 1.—JAPANESE BARNYARD MILLET, GROWN AT THE UNITED STATES GRASS EXPERIMENT STATION, WALLA WALLA, WASH.

FIG. 2.—KAHIR CORN, GROWN IN SOUTH DAKOTA.
MILLET.

Millet was recommended for soiling by various writers in the early twenties, and its use for this purpose was urged in the United States Patent Office Report for 1847. Varieties of both foxtail and broom-corn millets seem to have been included in these early discussions, although it is difficult, often impossible, to tell just what kind of millet the writer had in mind. At one time Hungarian millet attracted some attention, but it soon gave way to common millet and German millet. During recent years several varieties of broom-corn millet have come into prominence, notably certain sorts introduced from Japan and Russia. Another millet which has been highly recommended by prominent agriculturists is Japanese barnyard millet (Pl. LX, fig. 1), a recent introduction from Japan. Pearl millet can also be used to advantage as a soiling crop, and is perhaps more valuable for this purpose than for any other.

SORGHUMS.

In some parts of the United States, especially in the South, sorghum has, since its first introduction, been regarded as a valuable soiling crop. Under the name of Guinea corn its cultivation for this purpose was urged by John Lorain in the Memoirs of the Philadelphia Agricultural Society as early as 1810, and frequent references to it occur in farm journals during the succeeding decades. A writer in 1822 speaks of the great value of "Guinea corn"¹ in South Carolina, and its use as a forage seems to have early become quite general in the South. Fresh impetus was given to the growing of sorghum by the importation of new and valuable varieties (especially of the saccharine sorghums) from South Africa, China, and other countries, during the early fifties. The value of the saccharine varieties for soiling was soon recognized, particularly in the South, and this use of them has spread until it is now quite general wherever soiling is practiced to any extent. The more recently introduced Kafir corn (Pl. LX, fig. 2) and Jerusalem corn, nonsaccharine varieties, are also much used in Kansas and neighboring States, and the growing of these crops is spreading rapidly, particularly in sections where the dry weather is liable to interfere with the raising of Indian corn. The sorghums are valuable to grow for ensilage, but are not generally regarded as equal to corn for this purpose. They may also be used to advantage in temporary pastures.

OTHER CROPS FOR SOILING, PASTURAGE, OR SILAGE.

Many other crops are available either for soiling, pasturage, or silage, but their use has not become general, and in many cases their value is only local on account of their cultivation being limited by

¹American Farmer.
soil or climatic conditions. Among such crops may be mentioned rescue grass, more or less extensively grown in the South for winter pasturage; rape, quite widely grown in the Northwest in recent years for soiling and pasturage; bur clover, a valuable annual pasture crop for the South and Southwest; Guinea grass, grown in the extreme South and regarded as valuable for soiling; sweet clover, grown to some extent in the South and West, for soiling and silage; Australian saltbush, valuable for soiling and pasturage, particularly on alkali soils in the Southwest.