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A. A. Crozier

Iowa Agricultural College

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Grasses and Other Forage Plants.

A. A. Crozier, Botanist.

About seventy-five kinds of grasses and other forage plants were sown last spring. A considerable number of these were in one-eighth-acre plots, with a thin seeding of rye for protection. The rye proved to be the winter, instead of the spring variety, as was intended, and it grew so rank as to cover the ground and greatly injure the grasses. It was cut and removed July 7, but the weather following was so hot and dry that some of the kinds failed to recover. In addition to this, a severe attack of chinch bugs occurred in the latter part of July and nearly destroyed many of the other kinds. Only the true grasses were attacked. The coarser kinds of these, such as Johnson grass, sorghum, teosinte, and the pearl and German millets, suffered least.

Specimens of each kind, together with many of the native grasses of the State, were planted in hills four feet each way for convenient comparison, and to determine their growth under favorable conditions. The land where all the forage plants were grown, was a deep rich prairie soil containing some clay, with the exception of the field containing the Alfalfa, which was rather sandy, and some of it gravelly. The following kinds are all that it is desirable to report upon at this time:

Alfalfa. (Medicago Sativa). Six acres were sown April 11th on manured well-prepared rolling land at the rate of eighteen pounds per acre. One-half was sown alone, the other with a thin seeding of rye for protection. All started well, except a small clayey spot where the seed rotted. The part which was seeded alone grew finely, until by July 4th it was a foot high and in blossom. Weeds, however, were abundant, especially the mammoth smartweed (Polygonum incarnatum). These were mown on July 11th above the alfalfa.

The alfalfa on the part which was seeded to rye grew very slowly. The rye, as above stated, proved to be the winter instead of the spring variety, and it grew so rank as to entirely cover the ground with its leaves, hiding the alfalfa in most places entirely, and in some spots killing it out. At this date, August 16th, the rye is nearly all dead, none of it having been cut, and but scattering plants having produced seed. The alfalfa on this part, although not over four inches high, is now nearly free from weeds, and is of good color. On the part which was sown without rye the weeds have again over-topped it, this time the prevailing weed being pigeon or fall grass (Setaria glauca). The alfalfa here is now paler in color than where the rye was sown. On none
of the field has there been much growth since the first of July, and no seed has formed. Taken as a whole, the alfalfa is much the best where the rye was not sown. It is yet too soon to determine the result of the experiment, but it is expected that next season the alfalfa will keep the start of the weeds and make a better growth. A small plot grown on the college farm for several years did well.

Alsike Clover. (Trifolium hybridum). This endured shading by the rye much better than any of the grasses, and is now looking well.

Bermuda Grass. (Cynodon Dactylon). Roots of this southern grass were planted April 20th. By May 30th it had started well, and by July 15th the runners were from one to two feet long. At this date, August 15th, the seed spikes are abundant, but the attack of chinch bugs will probably prevent its being determined whether or not seed would be produced. It is hardly expected that it will endure the winters here without protection, and it is not regarded as of any practical value for Iowa.

Cow Pea. (Dolichos Chinensis). Seed from North Carolina was planted April 24th, in rows three and one-half feet apart. It came up poorly and slowly, and by July 1st the plants were but little over six inches high. By the middle of August, however, they had in most places covered the ground and produced runners four to six feet long, with blossoms and nearly full grown pods. It is not so valuable here as in the south, where the seasons are longer and permit a larger growth, and where clover is more uncertain; but even here it would make a valuable crop for plowing under to enrich the soil or even to feed. Stock eat it as well as clover after becoming accustomed to it.

Hungarian Grass. German Millet, Italian Millet, Golden Millet. (Setaria Italica). This grass is quite variable, and some strains of seed are better than others; soil, season, and thickness of planting, however, have a great effect upon it. One field sown as Hungarian grass proved to be about the same as another called German or Golden millet. The latter was sown April 21st, and is now, August 15th. just out of blossom: the former sown about June 20th, is just heading out. Each is fully four feet high and very fine. The early planted piece grew slowly at first and contains many weeds, mostly horse weed, or great rag weed (Ambrosia trifida). Hungarian grass is considered the earliest of these two varieties, and to have stiffer awns and longer and more compact heads. It makes good hay if sown thickly and cut as soon as headed out, but it is rather hard to cure. It is excellent to sow where spring crops have failed, or whenever a shortage of the hay crop is threatened, for it stands drought well and may sown as late as July.
**Italian Rye Grass.** (Lolium perenne, var. Italicum). This grass made the largest growth of any of the plots, and withstood the rye and weeds better than any other grass. Killed by the chinch bugs August 1st.

**Johnson Grass.** (Sorghum halepense). Roots were planted early in June. They were taken from a plot on the grounds of the Department of Agriculture at Washington, where it was then fully headed out. It has grown rapidly, and is now, August 15th, some of it over six feet high, again headed out and in blossom. It is a coarse fodder plant, largely grown in the south, and will probably not endure our winters.

**Kentucky Blue Grass, June Grass.** (Poa pratensis). This grows but little the first year, but stands shading well. It is best pasture grass we have, but fails during a summer drouth.

**Prickly Comfrey.** (Symphytum asperrimum). A small quantity of this is on trial, but from the report of the Wisconsin Experiment Station it is not expected that it will prove worthy of introduction. It is a plant of the Borago family, having leaves somewhat like tobacco. It gives a large yield, but cattle do not eat it when they can get the ordinary grasses. It is grown mainly from root cuttings. As it is now being extensively advertised, it will be given further trial next season. From all that can be learned, however, its cultivation in Iowa is not to be recommended.

**Red Clover.** (Trifolium pratense). Four acres were sown with spring wheat April 13th. Four quarts per acre were sown, with six quarts of timothy. The latter mostly failed, and the clover now covers the ground and looks well. Red clover is proving more successful in the State than many expected, and its extensive cultivation cannot be too strongly urged. It does best where the land has been in cultivation for a few years. When sown with spring wheat it is less liable to injury by drought after the grain is cut than when sown with oats. It should not be closely pastured in the fall or it may winter kill.

**Soja Bean, Japanese Fodder Bean.** (Glycine hispida). This has made a good growth, and is now, August 15th, very stocky, over two feet high and full of the minute flowers, with many nearly full sized pods. (September 20, nearly ripe.)

**Spurry.** (Spergula arvensis). Thick and thrifty, one foot high, with few weeds, finally becoming matted on the ground. Abundant seeds ripe July 10th. Of little value here.

**Teosinte.** (Euchlaena luxurians). Planted May 18th, and came up well, but grew slowly at first, and by July 14th was but six inches high. On
August 15th it is full of suckers, thick, and about four feet high, or six feet to the end of the tallest blades. Livingston's Evergreen Sweet corn adjoining is seven feet high. The Teosinte is affected in a few places with corn smut. It has done better than was expected, but it will not ripen seed here and at the present price of the seed is not profitable to grow. (Cut September 17; averaged nearly six feet high.)

Grasses of Northwestern Iowa.

Between July 16th and August 8th I made a trip with horse and wagon into Northwestern Iowa and adjoining parts of Dakota and Minnesota to study the native grasses, and collect seeds of such as promised to be of value for cultivation. Mr. Craig, the Director's Assistant, is now in Northern Idaho collecting seeds of the noted grasses of that region. My route passed through Story, Hamilton, Wright, Humboldt, Kossuth, Palo Alto and Emmet Counties, to Jackson, Minnesota; then westward to Valley Springs, Dakota, and returning through Lyon, Sioux, Cherokee, Ida, Sac, Calhoun, Carroll, Greene and Boone Counties. Haying had begun on the bottom lands at the time of starting. The uplands are generally cut later, often not until late in autumn. The hay crop is a good one this year, and most of the uplands in Iowa will be suitable to cut. Northward in Minnesota the yield, as usual, is not so large, and much of the higher land will serve only for pasture. Large quantities of hay are shipped to eastern markets, especially from Kossuth, Palo Alto and Pocahontas Counties. The area available for cutting, however, is being rapidly diminished, owing to the demand for land for cultivation and for pasture, so that the privilege of cutting on the open prairies is no longer free. The price of hay in the field at the time of the visit was two to two and one-half dollars per ton, which was considered good. Tame hay usually brings about a dollar per ton more. The hay is usually stacked in the field, generally with self-stackers, the cost of cutting and putting in the stack being about one dollar per ton. In some localities it is the practice to burn the prairies in the fall or early spring, the hay from a "meadow burn" being thus rendered free from old grass.

For pasture it is often desirable to burn a portion of the prairies during a dry time in June, which gives the grass a new start and furnishes better feed in August and September when vegetation usually fails. Such a "late burn" is highly valued. The effect of pasturing is invariably to deteriorate the value of the land for that purpose, unless tame grasses are sown. Shoe-string (Amorpha canescens), which occurs everywhere on the uplands, increases in amount, and certain herbaceous weeds, especially a kind of golden rod (Solidago rigida) increase to such an extent that little grass remains. None of the wild upland grasses seem to endure pasturing as well as the
ordinary grasses of cultivation, nor do they start as early in the spring, or last as long in the fall, their value being mostly destroyed by the first hard frosts. Tame grasses, however, are being rapidly introduced, especially timothy and Kentucky blue grass. The latter is spreading spontaneously, and wherever sown forms the best of pasture, but fails in the latter part of summer. Timothy holds out better and if rains are plenty, furnishes good pasture throughout the season. Both these grasses take readily upon the raw prairies by simply sowing the seed and pasturing rather closely. Timothy is sometimes seeded by scattering the hay over the surface in winter feeding. The cultivation of timothy for hay is on the increase, and in some of the older counties thousands of acres are raised for seed. Clover is but little grown, although it generally does well where tried. It is mainly grown with timothy for hay. It more often fails from drought in summer than cold in winter. The mammoth variety is regarded highly by those who have tried it, and is thought to be more hardy.

Red top is frequently seen along the railroads and highways, and is occasionally sown, but it has been given up by most who have tried it. It grows well, but cattle do not like it either as hay or pasture. A few who have used it as hay, however, think highly of it, both for cattle and horses, saying that although they do not relish it at first, they will if confined to it keep in good condition and eat less than of any other kind.

Fowl meadow grass grows in similar situations and is much more abundant than red top, and is generally mistaken for it. It may be distinguished where they are growing together by its finer leaves and stems, and by its softer head, the branches of which do not stand out in rigid whorls. About sixty species of the native grasses were collected, and seeds of twenty of them. Only a few are of much value. The following are most worthy of mention:

**Blue Joint.** (*Andropogon provincialis*). This is the best known and most generally prized of all the native grasses. The names "blue stem" and "blue grass" are also applied to it, but these names should be reserved for other kinds, for the one above given is that by which it is commonly known here. It is more generally distributed than either slough grass or wild red top, but seldom occupies the ground as they do to the exclusion of other kinds. It grows everywhere except in marshy land and on occasional gravelly ridges, but it thrives best and is most prevalent on rich "second bottoms" where the soil is somewhat sandy. On light rolling land it seeds better than on heavier soils, but the leaves are not so abundant. It grows in tufts or bunches, much like orchard grass. The leaves, when grown on good soil, are very long and numerous. The base of each leaf is generally hairy. The leaves are of a bluish green color, and sometimes purplish on the upper portion where
exposed to the sun. The erect, slender stems are solid like sorghum or corn, and terminated by a cluster of three to five purplish finger-like spikes, resembling a turkey's foot. There are usually several erect side branches bearing similar clusters. The stems are usually more distinctly marked with blue at the nodes or joints than elsewhere, hence the name Blue Joint. There is another species (Andropogon scoparius) often found growing with this which is considered much inferior. It may be distinguished by the dwarfish habit, fewer and smaller leaves, more slender stem, and the single hairy heads or spikes along the stem.

Blue Joint grows from four to six feet or more high, but the stems are usually scattering, and frequently no seed stems are produced. It is found most abundant, and seeds most freely, on land which has been broken, as along roads and ditches. On land which has been plowed and allowed to "go back" it sometimes springs up and produces large crops of hay. It starts later in spring than some of the other grasses, and is benefited by the burning of the land in May to check the growth of the other kinds. As a pasture grass it is excellent while it lasts; but like most other wild grasses, close pasturing for a few years kills out. For hay it is generally cut in September, about the time of ripening or a little before. If cut very early the hay is said to blacken before spring. The seed is occasionally gathered and sown upon the raw prairies in the spring, where it starts readily, but makes only a small growth the first year.

Arrangements have been made for giving this grass an extensive trial at the station next season.

Blue Stem. (Agropyrum glaucum). Also known as Blue Grass, Blue Joint, Wheat Grass, Wild Timothy, Wild Quack Grass and Gumbo Grass. In Iowa this grass has attracted but little attention, but on the plains it is well known to stock men by the name of "blue stem," and is highly valued both for hay and pasture. The name "gumbo grass" is given from its being supposed to be peculiar to black waxy "gumbo" land, which is not the case. The name "wheat grass" is more appropriate, from the appearance of the heads which are generally abundant and not unlike the head of wheat. The name "wild quack grass" is better still, as it is closely related to the troublesome quack grass of the East, which is beginning to appear in Iowa, and of which it has been regarded by some as a variety. The leaves are of a bluish green, almost steel blue color in dry soil, and quite narrow, sharp and rigid, and produced in abundance from the lower half of the stem as well as from the ground. It starts very early in the spring, and at that time cattle eat it very readily, but here after other grasses have started it is seldom eaten. It has increased considerably during the past two dry seasons, but is seldom seen in cultivated grounds, though not uncommon in many places along roadside.
fences. It spreads by means of underground stems like quack grass, and becomes very thick, so that patches of long standing give but a small growth. The heads are shorter and thicker than those quack grass, though quite variable in this respect.

In nearly all places where it was seen it was more or less affected with ergot, which in some cases had caused a copious secretion of honey dew, which had caught the dust and attracted small insects, giving the heads a peculiar smutty appearance. In no place was it seen that the heads had been eaten by stock, and no cases of ergotism were reported. Unless the ergot should continue too prevalent it may possibly be worthy of cultivation for hay, and it will receive a trial.

Buffalo Grass. (Bouteloua oligostachya). Buffalo grass is the name by which this grass is best known in Iowa, though farther west and southwest where the true buffalo grass (Buchloe dactyloides) is abundant it is known as 'mesquit' or 'gramma' grass. This grass was seen in a few places on gravelly hills in Northern Iowa and Southern Minnesota, and a small patch has been found growing native upon the college grounds. It has been regarded as the most valuable species of its genus, but where seen it had not been eaten by stock of any kind. In Emmet county, it grew undisturbed upon a sheep range where most of the other grasses were eaten to the ground. It is doubtless much inferior to the true buffalo grass. Though not abundant, it is well known by the conspicuous, dark, banner-like spikes, two of which are usually borne upon the slender stems about a foot in height.

Indian Rice. (Zizania aquatica). Abundant along Lake Creek, in Sac county and seen in a few other localities. Beginning to bloom August 4th. Grows only in mud or shallow water. The long black seeds make excellent food, and were much used by the Indians. They drop as soon as ripe, and were gathered by the Indians by being beaten into their canoes. The plant is relished by stock, but as it grows only in wet land it is of little practical value.

Koeleria cristata. Common on the uplands, growing in scattered bunches about a foot and a half high. It ripens early in July and has too few leaves to be of much value.

Muskit or tall Gramma Grass. (Bouteloua racemosa). This is the most abundant species of Bouteloua found in the State. It seldom occupies the land to the exclusion of other grasses, but it is widely distributed over the uplands, thriving best where the soils are somewhat sandy. It produces a considerable amount of fine, rather stiff herbage, but stock do not appear to be very fond of it. It may be easily recognized by the slender stems about three feet high, which appear in the latter part of July, and which stand well above the leaves and bear numerous small spikes along the side. A fine field of it may be seen upon a hillside south of the college farm.
Panicum virgatum. This is the most prevalent of the wet land grasses, but it is not so well known as some of the other native kinds, and seems not to have received any common name here. In some places it has been called "switch grass," and in others "wild red top." It yields two to four tons per acre, and should be cut early to be of good quality. It blooms about the first of August. A small amount was sown at the station last spring, and the grass is now, August 15th, some of it two feet high and beginning to head. There is a glaucous variety of about the same value occasionally found growing with it.

Porcupine Grass. (Stipa spartea). Also known as Spear Grass, Arrow Grass and Devil's Knitting-needles. This is a conspicuous grass in most localities, growing in the higher lands, but never to the exclusion of other grasses. It seems to increase during dry seasons. There is a field of clover and timothy near the college, in a portion of which this has become the prevailing plant. The awns are sometimes injurious to stock, but as the grass ripens by the first of July these have generally fallen by the time the hay is cut, though the stalks bearing the empty heads will, if not disturbed, remain through the summer. It is not considered of much value.

Slough Grass. (Spartina Cynosuroides). Also known as Thatch Grass, Cord Grass and Bull Grass. The name slough grass (ordinarily pronounced "slew" grass) is often applied to all grasses and sedges of wet land, but as this grass is the most characteristic and conspicuous one on wet land in the region visited, it has received in most localities the above name. As hay for horses it is regarded next to timothy as the most valuable kind that is obtained, and by some it is even preferred to that grass. It is considered by many who have fed it carefully, to be richer than upland hay, and it is certainly heavier in proportion to its bulk. It is bright and free from dust, and keeps horses healthy and the coat sleek. They probably do not like it quite as well as upland hay, and they eat less of it, which for driving horses is desirable. For distant markets, however, the hay has not the reputation of that grown upon uplands, not being distinguished from the hay of sedges, which grow in similar situations. To make the best hay it should be cut during the last half of July, soon after the heads appear, and not later than the time of flowering. If cut earlier it is too soft, and cannot be cured without liability of becoming musty. If allowed to stand much longer it becomes so woody that it is not readily eaten. For cattle it is not as desirable as horse hay is, and should be cut rather earlier. They usually reject a considerable portion of the stems, but these in most cases form but a small part of the hay. Although naturally growing in wet land, it does well on land which has been drained, and spreads to some extent, especially where the land has been broken. Wherever it grows it occupies the land to the exclusion of all other plants. Its value for
pasture remains to be determined, as cattle do not eat it readily in the growing state when other grasses can be obtained. When pastures are short, however, it is eaten, and it grows again quickly. It will receive a careful trial.

_Squirrell Tail._ (Hordeum jubatum). Common about buildings, and conspicuous for the glossy, bushy heads which ripen about the middle of July. At Algona the closely mowed lawn of the court yard was largely composed of this grass, and had a fine appearance. If mowed in July it will produce a second crop of seed.

It occurs from Lake Michigan to the Rocky Mountains, and is usually found in damp soil in the neighborhood of water, or in waste places around cultivated land. It is always regarded as a weed, but is not particularly troublesome. When fed as hay the beards sometimes break off and accumulate in the manger, to the injury of stock. On this account it is better to feed it out of doors, if possible.

_Wild Red Top._ (Deyuxia Canadensis). This is considered by some to produce the best hay for cattle of all the native grasses. It is very leafy and stands remarkably thick upon the ground. The seed ripens early in July, but the leaves remain green until winter. It is probably hardly equal to some of the upland grasses in quality, but it gives a larger yield, and is undoubtedly worthy of cultivation. It is usually found upon the margins of ponds, where it sometimes forms a broad belt just outside the rushes. It will thrive, however, on land that is only slightly moist, and it often occurs along the banks of roadside ditches. On rather low land, which has been broken and allowed to go back, it frequently comes in, and after a few years overcomes the weeds and occupies the land to the exclusion of all other vegetation. In some localities this grass is considerably affected by ergot.

_Wild Rye._ (Elymus Canadensis). Several species of Elymus are common, but this is the most abundant, being found everywhere along roadsides, where in good soil it grows five feet high, and sometimes forms a continuous growth like a field of grain. It is rarely found in fields, except in damp places or on gopher knolls. It blooms about the first of August, and is cut with the other grasses for hay, but is not considered of much importance.

_Wild Wheat._ (Elymus Virginicus). Grows shorter and thicker than wild rye, and makes very good hay and pasture. It ripens about the middle of September, a little later than the other.

_Bunch Grass._ (Sporobolus airoides). This is the ordinary bunch grass of Iowa, often called "wire grass" from the numerous long wiry leaves. It grows in dense firmly rooted tufts on the uplands and dryer bottoms, and is of little value either as pasture or hay. The small round seeds ripen about the middle of September, but in dry seasons little or no seed is produced.