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Forage and Garden Crops in the James River Valley

J.H. Shepard
South Dakota Agricultural College

E.C. Chilcott
South Dakota Agricultural College

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U. S.
EXPERIMENT STATION,
SOUTH DAKOTA.

IN CONNECTION WITH THE

SOUTH DAKOTA AGRICULTURAL COLLEGE.

Forage and Garden Crops in the James River Valley.

Departments of Chemistry and Agriculture,

BROOKINGS, SOUTH DAKOTA.

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Forage and Garden Crops in the James River Valley.

JAS. H. SHEPARD,
Chemist.

E. C. CHILCOTT,
Agriculturist.

The experiments in the James River Valley during 1897 are a continuation of the work of 1896, the results of which are recited in Bulletin 52. There was no material change in the methods or aims of the researches. All the leading experiments with forage plants were repeated in order to obtain that certainty and weight which comes from repetition. While the results of a single season may have a significant value, nevertheless, the results of a series of seasons raise the issue above the level of accident and place them on the plane of demonstrated fact.

It must be remembered that this whole region has been an exclusively one crop region and that it is comparatively undeveloped in its total resources in forage plants and vegetables.

The main objects of the experiments so far as this Station is concerned is to determine the varieties of forage and garden crops that will make diversified husbandry and home building attractive and profitable.

The number of varieties of forage plants and vegetables tested in 1897 was larger as compared with those of the previous year. Seeds were obtained from all available sources, from seedsmen, from the department of Agriculture, from the experiment stations, and especially from the large seed houses of the John A. Salzer Co., La Crosse, Wis.

In the case of forage plants, upward of one hundred varieties were sown. In addition to these, 36 varieties of grasses and clovers were installed in small plats in order to give a comparative view of the habits of growth, etc., at a single glance. This was an important feature owing to the numerous visitors who came weekly to inspect the experiments in progress. Representatives from all sections of the country took occasion to

avail themselves of the low rates offered by the railroads to visit the experimental grounds which are situated as in former years on the Hunter-Salzer farm at Mellette.

In the case of vegetables and garden truck, upwards of 280 different kinds were planted, This made a most remarkable showing. In testing such a large number, it is unavoidable, that for different reasons, many were not deemed worthy of further trial. It will be the purpose of this bulletin to dwell upon those only which give promise of proving successful.

The weather on the whole was favorable. No violent storms occurred, and, taking it all in all, there was but little need for irrigation. The heavy snows of the preceding winter left the ground provided with an excess of moisture, but the unusually light rainfall in May balanced this excess. Planting was somewhat later than usual and the rapid evaporation caused a slight crust to form on the surface of the ground which called for more care in the preparation of the seed beds. Otherwise the season was all that could be desired.

The rainfall for the growing season, expressed in inches, was as follows: May .38; June 4.5; July 3.41; August 2.55; September .74; October 2.03; making a total of 13.61 inches.

Plats seeded to permanent forage such as the various grasses, alfalfa, clover, etc., were simply continued. Most of the garden plats, and those devoted to annual forage crops, were spring plowed eight inches and subsoiled six inches deeper at one operation by means of a John Deere "Secretary" plow. A liberal dressing of stable manure was applied to the eastern portion on which the vegetables were grown.

Careful note has been kept as to the effect of artesian water on the soil of the plats. Deleterious results have not ensued.

So far as irrigation was concerned, there was little need for it and it was not generally resorted to during the season. A few isolated plats were irrigated the latter part of May while still others received water again in July. Less than two inches would cover the maximum amount applied.

PART I.—FORAGE PLANTS.

CLOVER.

Plat No. 1 was continued in Alsike clover which was seeded in 1896. This clover came through the winter in good condition. It was cut for hay July 5, furnishing 2,200 pounds dry hay per acre. The second growth was allowed to ripen for seed. It was ready for cutting September 15th.

Plat No. 3 was continued to Mammoth Red clover from 1896 seeding. A few small spots were winter killed but it mostly came through in good condition. This plat was irrigated June 17th. It was cut July 8th, furnishing 3,640 pounds of dry hay per acre. It was then allowed to seed, which ripened Sept. 9th, standing 9 to 12 inches high.

Plat 8 was sown to White Dutch clover. This germinated well but was afterwards burnt off. July 14th, it was seeded broadcast to Bromus inermis. Of this latter a fair stand was obtained.

Plat 20 contains Medium Red clover from the 1896 seeding. It wintered perfectly. It was cut July 10th, furnishing 2,360 pounds dry hay per acre. It was again cut Aug. 19th, furnishing 1,960 pounds dry hay per acre. (See Plate I.)

These experiments with clover were made on one-quarter acre plats. Any farmer can duplicate these results, which are certainly very satisfactory.

ALFALFA.

Plat No. 2 was from the 1896 sowing of Alfalfa. It was a fine stand and matured perfectly. It was irrigated June 17th. It was cut July 8th, yielding 2,680 pounds dry hay per acre. The second cutting, Aug. 19th, gave 1,920 pounds dry hay per acre. A third cutting could have been made in September, but it was left with a vigorous growth to go into the winter. This is an encouraging report.

GRASSES.

Plat 4 was sown to Red Top and Kentucky Blue grass. This germinated well, but subsequently burned off. The plat was

PLATE I—MEDIUM RED CLOVER.

sown to Renovator peas which were plowed under.

Plat 5 was sown to Sheep and Meadow fescue, with results as in the preceding.

Plat 16 was sown to St. John's Rye. This gave a good stand but was finally destroyed by rust. (See Plate X, left foreground.)

Plat 6 remained in Canadian Blue Joint from the sowing of 1896. It stood the winter perfectly and on July 8th it was cut, furnishing 2,200 pounds of dry hay per acre. It made a small second growth.

Plats 7 and 15 were in Bromis Inermis from 1896. These were perfect stands and came through the winter in excellent condition. Plat 7 was cut July 8th, furnishing 4,750 pounds of dry hay per acre. Plat 15 was cut June 28th, yielding 3,920 pounds of dry hay per acre. It was again cut Aug. 19th, yielding 2,600 pounds of dry hay per acre. (See Plate X, right foreground.)

Plat 9 was sown to Salzer's Dry Soil Mixture. It germinated well, affording a good stand. Sept. 9th Alfalfa predominated, reaching a height of ten inches. Some seed was formed. Bromus Inermis and other grasses appeared in smaller quantities. (See Plate IX, right upper foreground.)

One half of Plat 10 was sown to Salzer's Bromusal Mixture. It gave about the same results as the preceding with rather more Bromus Inermis. (See Plate IX, right foreground.)

The remainder of Plat 10 was sown to four varieties of barley. 1, Black Hulless; 2, White Hulless; 3, Beardless, and 4, Silver King. These made a good stand at first but were destroyed by rust.

Plat 11 was sown to Salzer's Meadow Mixture, with about the same results as in Plat 9. (See Plate IX, left upper foreground.)

Plat 22 was sown to Hard Fescue. No catch was obtained. Plat 22 in Timothy, Plat 23 in Fowl Meadow grass and English Rye grass, Plat 24 in Italian rye and Orchard grass, Plat 25 in Dog's Tail and Meadow Foxtail, all failed to catch.

Plat 26 was sown in 1896 to Tall Meadow Oat grass. A good stand was obtained. It stood the winter well and was cut on July 5th, yielding 3,320 pounds dry hay per acre. It furnished

PLATE II—RAPE.

an aftermath which was ten inches high on Sept. 9th, and was green and vigorous.

The result of this season's test but confirms the previous good record of Bromus Inermis. It is the hardiest and best all round grass for this state. It is a perennial and needs but one sowing; and it withstands dry weather and our winters perfectly. Moreover the yields of hay reported are about the average that may be expected. As a pasture grass it is doing well and proving hardy. Tall Meadow Oat grass and Canadian Blue Joint have proven perfectly hardy and have given good yields.

PEAS.

Plat 12 was sown to oats and peas May 17th; a mixture of two parts peas to one of oats was used and sown at the rate of four bushels of the mixture per acre. The mixture was cut Aug. 12th, yielding 2,920 pounds of dry hay per acre.

Plat 13 was sown to Canadian Green Field peas May 17th, at the rate of 3 bushels per acre. These were cut Aug. 12th, yielding 3,080 pounds of green fodder per acre, or 1,400 pounds of dry hay.

Plat 14 was sown to White Canadian Field peas May 17th, at the rate of three bushels per acre. These were cut Aug. 12th, yielding 2,640 pounds green, or 1,520 pounds dry hay per acre.

RAPE, SPURRY AND VETCHES.

Plat 17 was sown to Victoria rape in 20-inch drills, using five pounds of seed per acre. It was sown May 31st, and cut Aug. 26th, yielding 53,440 pounds of green fodder per acre. (See Plates II and V, 17.)

Plat 18 was sown to Giant Spurry May 17th. Just at the time of germination the ground baked after a rain. It was resown July 14th, and a rather poor stand was obtained which was in blossom by the middle of September. (See Plate III.)

Plat 19 was sown, the west half to Spring Vetch, and the east half to Sand Vetch. (See Plate IV.) A good stand was obtained. By the middle of September the Spring Vetch was 2 feet high and had formed many seed pods, a few of which were ripened. Nearly all the seeds were full size but still green. (See 19A, Plate V.) The Sand Vetch growing from 3 to 4 feet, formed but few pods and these were poorly filled; a very few had plump seeds but none were ripened. (See 19B,

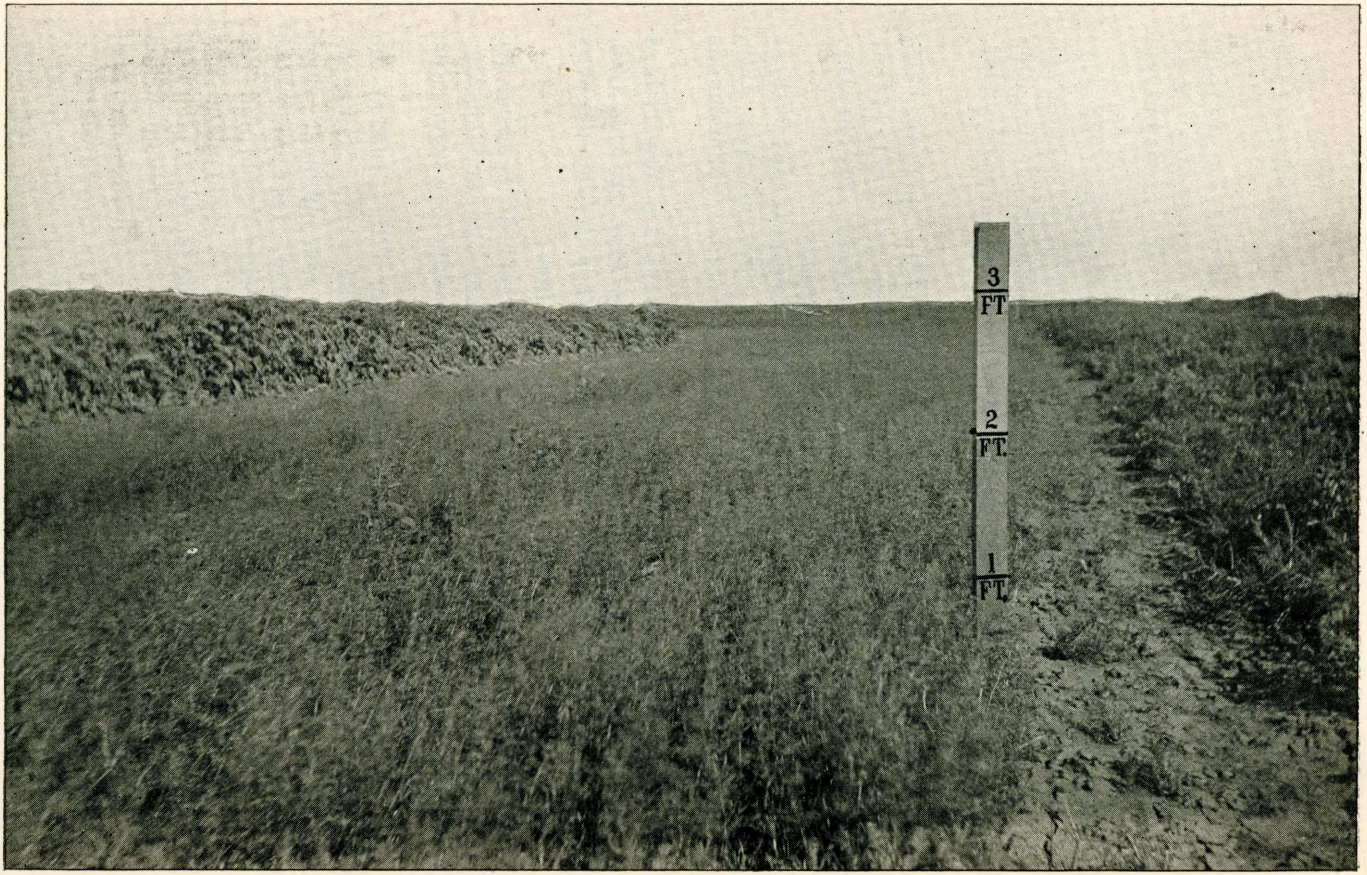


PLATE III.–SPURRY.

Plate V.) The vetches were left without cutting to ascertain if the seeds would ripen. Indifferent results so far have been obtained in this state. This fact will weigh against the general use of the vetches as forage plants owing to the expensiveness of the seed.

GRASSES AND CLOVERS.

(Small Plats.)

As previously stated it was deemed best to install small plats of one square rod each to the various grasses and clovers in order to bring them in a compact body for purposes of comparison. The plats previously described were one-fourth acre each, and consequently were so widely scattered that a comparison was inconvenient. In these small plats there were sown upwards of seventy varieties of grasses, clovers, etc. These were intended for a single season only and also, incidentally, to test their winter resisting properties. This made a most interesting exhibit notwithstanding the fact that a number of them were found unsuited to our conditions.

Plat 75 was sown to Red Top May 18th. This made a poor stand and was resown July 10th. A good stand was obtained. Winter-killed.

Plat 76 was sown to Tall Fescue. This gave a good stand and went into winter green and vigorous and it withstood the winter well.

Plat 77 was sown to Orchard grass. This gave a good stand and went into the winter in good condition and it also withstood the winter well.

Plat 78 was sown to English Rye grass. A splendid stand, which grew beautiful and green till late in the fall, was obtained. It wintered well.

No. 79 was sown to Dog's Tail. A fair stand was obtained and furnished a few scattered clumps late in the fall. It winter-killed.

Plat 80 was sown to Timothy. A fair stand was obtained with a few scattered clumps late in the fall, which winter killed.

Plat 81 was sown to Fox Tail and resown July 10th. A good stand was obtained which winter-killed.

Plat 82 was sown to Bushy Blue Stem and again resown on

PLATE IV.—SPRING AND SAND VETCH.

July 10th. This gave a good stand and came through the winter in poor shape.

Plat 83 was sown to Bromus Mollis. A fine stand was had which reached from 12 to 16 inches high in the fall. This stood the winter well.

Plat 84 was sown to Meadow Soft grass, yielding a thin stand which finally furnished a few scattered clumps which were very green and vigorous, eight to ten inches high. It winter-killed.

Plat 85 was sown to Blue Joint. A good stand was obtained which went into winter twelve to sixteen inches high, green and vigorous. It withstood the winter well.

Plat 86 was sown to Tall Meadow Oat grass. It gave a fine stand ten to twelve inches high, late in the fall. Winter-killed.

Plat 87 was sown to Rough Stalked Meadow grass. It gave a good stand but winter-killed.

Plat 88 was sown to Schrader's Brome grass, and gave a thin stand which went into the winter headed out, from two to three feet high. It withstood the winter well.

Plat 89 was sown to Johnson grass. Obtained a thin stand which grew from three to 5 feet high in the fall and all headed out. Went into winter green and vigorous, but winter-killed.

Plat 90 was sown to Broom Corn Millet. A good stand was obtained which ripened seeds. The heads were destroyed by birds.

Plat 91 was sown to Water Spear grass. This gave but indifferent results.

Plat 92 was sown to Water Meadow grass. This also proved a failure.

Plat 98 was sown to Lathyrus Sylvestris. This gave a very thin stand. The plants which grew withstood the winter well.

Plat 94 was sown to Yellow Tree Foil. This gave indifferent results.

Plat 95 was sown to White Dutch clover. This gave a fair stand and the plants that grew were very fine, yielding some blossoms. This winter-killed.

Plat 96 was sown to Alsike clover. This gave a poor stand and winter-killed.

Plat 97 was sown to Medium clover which yielded about half a stand. It went into winter twelve to sixteen inches high and most blossoms were ripe. This withstood the winter well.

PLATE V—RAPE—SAND VETCH—SPRING VETCH.

Plat 98 was sown to Snail clover and furnished a few scattering plants six to eight inches high in the fall. It produced seed in abundance and nearly all ripened.

Plat 99 was sown to Crimson clover. This gave a poor stand which winter-killed.

Plat 100 was sown to Serradella. This gave a fine stand which grew six to ten inches high and furnished some blossoms. It formed many seed pods but none ripened.

Plat 101 was sown to Mammoth clover. It gave a good stand at first. It became scattering later, with a fine growth eighteen to twenty inches high. Winter-killed.

Plat 102 was sown to Alfalfa clover which gave a good stand going into the winter twelve inches high and with considerable seed. This withstood the winter well.

Plat 103 was sown to Esparsette. This furnished a few scattering plants which late in the fall were lying flat on the ground and from six to twelve inches in diameter.

Plat 104 was sown to Sand clover. This proved a failure.

Plat 105 was sown to Bokhara clover. This gave a fair stand from two to two and one-half feet, with no blossoms. The plants grew, green and vigorous, until winter which it withstood in a satisfactory condition.

Plat 106 was sown to California Millet. This gave a good stand which was cut for hay on August 20th.

Plat 107 was sown to Eragrostic Neo Mexicana. This gave indifferent results.

Plat 108 was sown to Sweet Vernal grass. This also gave poor results.

Plat 109 was sown to Creeping Bent and furnished indifferent results.

Plat 110 was sown to Blue Grama grass. This gave a thin stand which grew twelve to eighteen inches high, going into the winter green and vigorous. It winter-killed.

Plat 111 was sown to Side Oat Grama. This gave a pretty thin stand which headed out in the fall twelve to sixteen inches high. Winter-killed.

Plat 112 was sown to Timothy Grama; 113, to Spruce Top Grama; 114, Fowl Meadow; 115, to Canadian Blue grass; 116, to Kentucky Blue grass; 117, to Wood Meadow grass; 118, to

PLATE VI—SALZER'S SUPERIOR FODDER.

Sheep Fescue; 119, to Red Fescue. All gave indifferent results.

Plat 120 was sown to Meadow Fescue. It gave a fair stand, going into winter green and vigorous twelve to eighteen inches high. This withstood the winter well.

Plat 121 was sown to Hard Fescue which furnished scattering plants twelve to eighteen inches high, going into winter green and vigorous. Winter-killed.

Plat 122 was supposedly sown to California Millet, but the seed sown was not true to name.

Plat 123 was sown to Upland Rice, Rose Valley and Salzer's. The first gave a thin stand which grew about twelve inches high. It formed no heads and the leaves were dead by Sept. 9th. The second variety failed.

Plat 124 was sown to Upland Rice, Salzer's stock. It succeeded similarly to Rose Valley.

Plat 125 was sown to Giant Spurry. A fine stand was obtained and plants ripened many seeds.

Plat 126 was sown to Spring Vetch. It gave a good stand and ripened a few seeds.

Plat 127 was sown to Sand Vetch. Gave a fine stand and formed some pods. The vines grew 3 to 4 feet high.

Plat 128 was sown to Floating Meadow grass. This grew a few scattering stools, three to six inches. Winter-killed.

Plat 129 was sown to Bromusal Mixture. This gave a good stand which lasted through the winter with the same results as in the main plat.

Plat 130 was sown to Meadow Mixture with the same results as in the main plat.

Plat 131 was sown to Dry Soil Mixture with the same results as in the main plat.

Plat 132 was sown to Italian Rye grass. This gave a fine stand, a few heads and a very luxuriant growth of leaves twelve to eighteen inches.

Plat 133 was sown to Shad-scale White Sage. This proved a failure.

Plat 134 was sown to Salt Bush. This proved a failure.

Plat 135 was sown to Winter Fat. This gave no results.

Plat 136 was sown to Water Fescue. It gave a good stand which went into winter green, strong and vigorous, four to eight inches high. Winter-killed.

PLATE VII—COMPARATIVE DEVELOPMENT OF FODDER CORNS AND SORGHUMS.

Plat 137 was sown to Vicia Cracca, 6 rows; Centauria Jacea, 4 rows; Lotus Corniculatus, 2 rows. The first gave only five plants lying flat on the ground, six to twelve inches in diameter, late in the fall. It survived the winter. The second gave a fair stand of creeping vines twelve to sixteen inches long. It survived the winter. The third gave a fair stand of creeping vines fourteen to sixteen inches long. It survived the winter.

Plat 138 was sown to German Millet, which was finally cut for hay.

FODDER CORN.

Plat 27 was sown to Salzer's Superior Fodder corn May 28th. A good stand was obtained and it was cut on Sept. 13th, yielding 22,720 pounds of dry fodder per acre. (See Plate 6.)

Plat 31 was sown to Stowell's Evergreen Sweet corn on May 29th. A good stand was obtained. It was cut on Sept. 11th, yielding 16,480 pounds of dry fodder per acre.

Plat 33 was sown to Salzer's Earliest-Ripe Fodder corn on May 31st. A good stand was obtained. It was cut on Sept. 10th, yielding 10,720 pounds of dry fodder per acre.

SORGHUMS.

Plat 28 was sown to White Kaffir corn on May 28th. A good stand was obtained. It stood the hot winds well and on Sept. 14th, was cut, yielding 19,040 pounds of dry fodder per acre.

Plat 29 was sown to Amber Cane May 20th, yielding 19,920 pounds of dry fodder per acre.

Plat 30 was sown to Jerusalem corn May 27th. A good stand was obtained which stood the hot winds well and yielded 4,640 pounds of dry fodder per acre.

Plat 31 (a) was sown to Red Kaffir corn. A fine stand was obtained which stood the hot winds well and was cut Sept. 18th, yielding 20,800 pounds of dry fodder per acre.

Plat 32 was sown to Milo Maize May 27th. A good stand was obtained which yielded 15,520 pounds of dry fodder per acre.

Plat 34 was sown to Branching Doura corn. A good stand was obtained, yielding 12,000 pounds per acre.

Plat 35 (a) was sown to Teosinthe. A good stand was obtained and although its habit of growth is very low, forming many leaves and no stalks, it yielded, when cut Sept. 21st, 15,360 pounds of excellent dry fodder per acre.

PLATE VIII—COMPARATIVE DEVELOPMENT OF FODDER CORNS AND SORGHUMS.

For comparative development of fodder corns and sorghums see Plates 7, 8, 9 and 10. Plates 7 and 8 represent average samples of each of the several varieties of corn and sorghums cut close to the ground, bound in bundles and photographed, together with a scale of feet which shows the height attained by the several varieties. Plates 9 and 10 are from photographs taken of the corns and sorghums while growing in the field. In Plate 9 Salzer's Superior Fodder corn is seen at the extreme right. Next to that is seen the plat of White Kaffir corn. The plat represented in the center of the photograph is of Early Amber Cane. The one next to it on the left is Jerusalem corn.

In Plate 10 the narrow plat showing a very low growth near the center of the photograph is the Teosinthe. Next to this, to the right is the branching Doura. Next Salzer's Earliest-Ripe Fodder corn, and at the extreme right is seen the plat of Milo Maize.

There are two plats, one of Red Kaffir corn, the other of Stowell's Evergreen, that are not shown in these plates.

East half of Plat 35, Plats 36, 37 and 38 were planted May 26, to twelve varieties of sweet corns and nineteen varieties of field corns. Below we give a list of the varieties planted, together with brief notes upon them. When so small a quantity of each variety is raised it is manifestly impossible to give yields. We have simply attempted to indicate in a general way which of the varieties seem best adapted to this portion of the state.

SWEET CORNS.

Black Mexican:—Fair stand; ears medium size and early.

Hickox Canner:—Fair stand; ears good size; medium late.

Mammoth Sugar:—Fair stand; ears good size; medium late.

Egyptian Sweet:—Good stand; large ears; late.

New Champion:—Fair stand; large ears; early.

Perry Hybrid:—Poor stand; good stalk; large ear; early.

Early Minnesota:—Poor stand; medium ear; early.

Country Gentleman:—Poor stand; medium ear; ripens with Stowell's Evergreen.

First of All.—Good stand; small ear; very early.

Moores Early:—Poor stand; large ear; early.

Twenty-Day-Earliest:—Fair stand; earliest, large eared sweet corn.

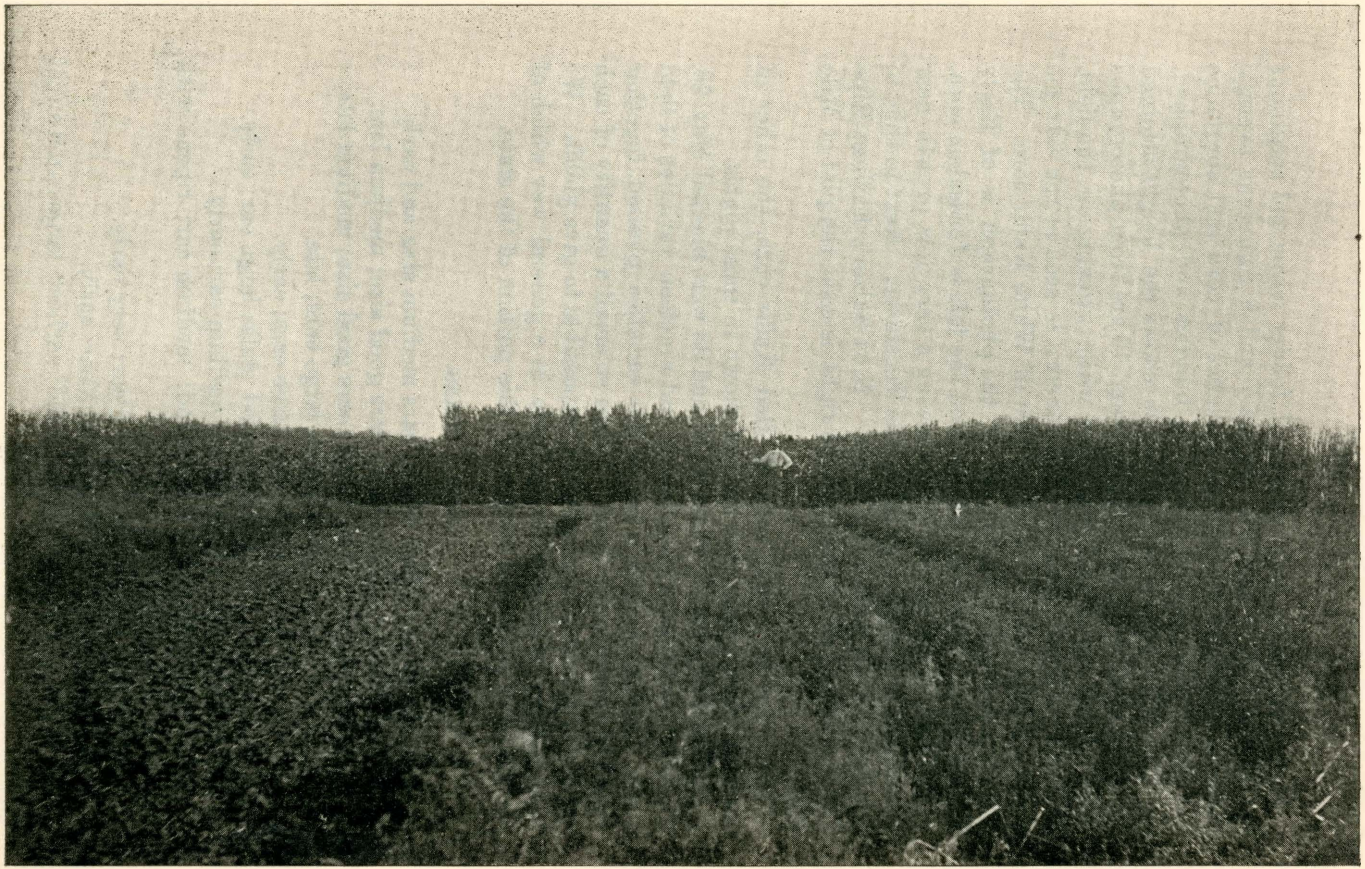


PLATE IX—GENERAL VIEW OF FODDER CORNS AND SORGHUMS.

Salzer's Telephone:— Good stand; small stalk; ear fair size; very early.

FIELD CORNS.

Queen of the North:—Good stand; good tall stalk; medium sized ears; early.

Canadian Yellow Dent:—Thin stand; stalk medium size; small ear; best dent for this locality.

Riley's Favorite:—Good stand; too large and too late for this climate; splendid stalks for fodder.

Squaw Corn:—Good stand; fair size; sound ears; suckered heavily.

Canadian Smut Nose:—Good stand; stalk medium; good ear; very early.

Iowa Yellow Dent:—Good stand; large stalks; large ears; too late for this climate.

Golden Triumph:—Good stand; large; too late for this locality; stalks very tall.

Wisconsin Earliest Dent:—Good stalk; good size ear and early.

Huron Dent:—Good stand; tall stalks; ears small, very early and sound.

Brazilian Flour Corn:—Good stand; well formed ears, good size, well matured.

Colorado Yellow Flint:—Good stand; small ears, early and sound.

Little Giant:—Fair stand; small ears; very early.

North Dakota Flint:—Good stand; fair size ears, very early and very sound.

South Dakota Flint:—Good stand; medium ear, sound and perfect.

Black Prince:—Good stand; good sized ears, well matured.

Russian White:—Good stand; good sized ears, well matured.

Russian Colored:—Good stand; good sized ears and ripe.

King Phillip:—Good stand; ears good sized and ripe.

Bloody Butcher:—Good stand; small ear; loose on cob.

In Bulletins 51 and 52 the opinion was expressed that the corns would be preferable to the canes for forage. The results this year go strongly to prove the correctness of this position. While in some instances the canes have approached the better corns in gross tonnage, nevertheless, pound for pound, the

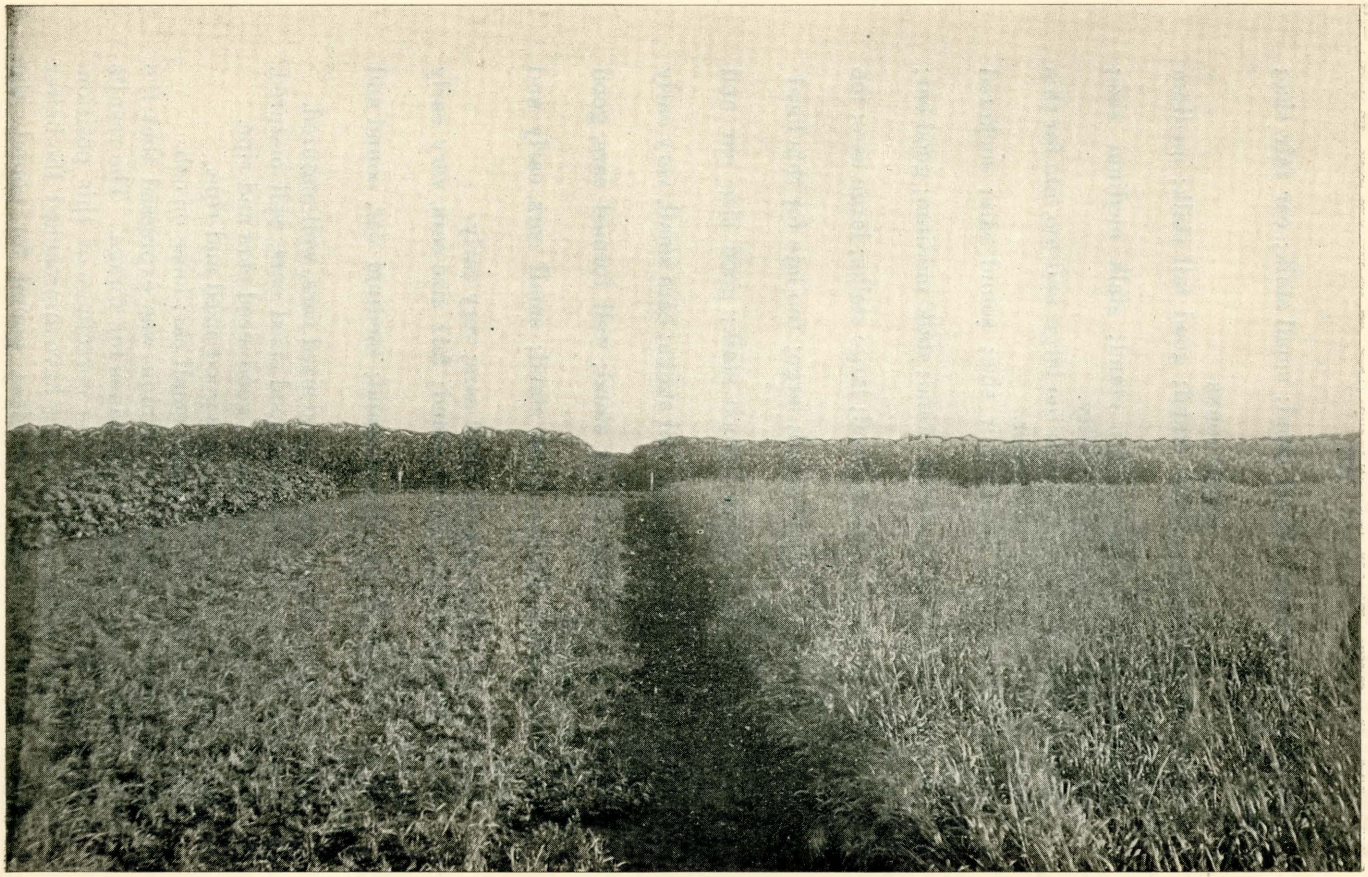


PLATE X—GENERAL VIEW OF FODDER CORNS AND SORGHUMS.

corns are more valuable owing to the fact that the corns carry a larger per cent of digestible nutritive matter. The ears formed by the corns, and especially the smaller varieties, are an important factor in the problem. All the earlier varieties of both Flints and Dents are valuable for fodder purposes, especially is this true of acclimated varieties which are heavy grain producers.

SUNFLOWERS.

Of late a considerable interest has been manifested in the adaptability of cultivated sunflowers for this state. It is a well known fact that a number of varieties of wild sunflowers grow with the greatest luxuriance, so much so that they are in some localities a troublesome pest. This fact would lead to the supposition that cultivated sunflowers would thrive. Three varieties were accordingly planted. (See Plate XI.) From an examination of the figures it will be readily seen that a fine development was secured. The difference in size is due to the habits of growth.

The seeds of sunflowers are now used in many ways: They are fed directly to stock and poultry; they are crushed and the oil extracted for various domestic purposes, such as for illumination, as a substitute for sweet oil, etc., etc.; while the residue is used for stock feeding purposes in place of cotton seed meal. The stalks are used for fuel. In some parts of Russia the peasants carry the whole seeds in their pockets and eat them from time to time just as our people consume peanuts.

When the proper time comes there is little doubt that the sunflower industry can be immediately and successfully inaugurated.

PART II.—GARDEN TRUCK.

The main purpose of the work for this year in garden vegetables was to test as many varieties as possible. It is true of a large portion of the state that the belief is prevalent that the farmer can raise no garden. On account of this belief the farmer has confined his efforts to grain and stock raising, while his family has been obliged to do without a kitchen garden, relying solely upon canned goods purchased at the grocery store or upon vegetables shipped in from some neighboring state. Both this College and Station have been exerting the

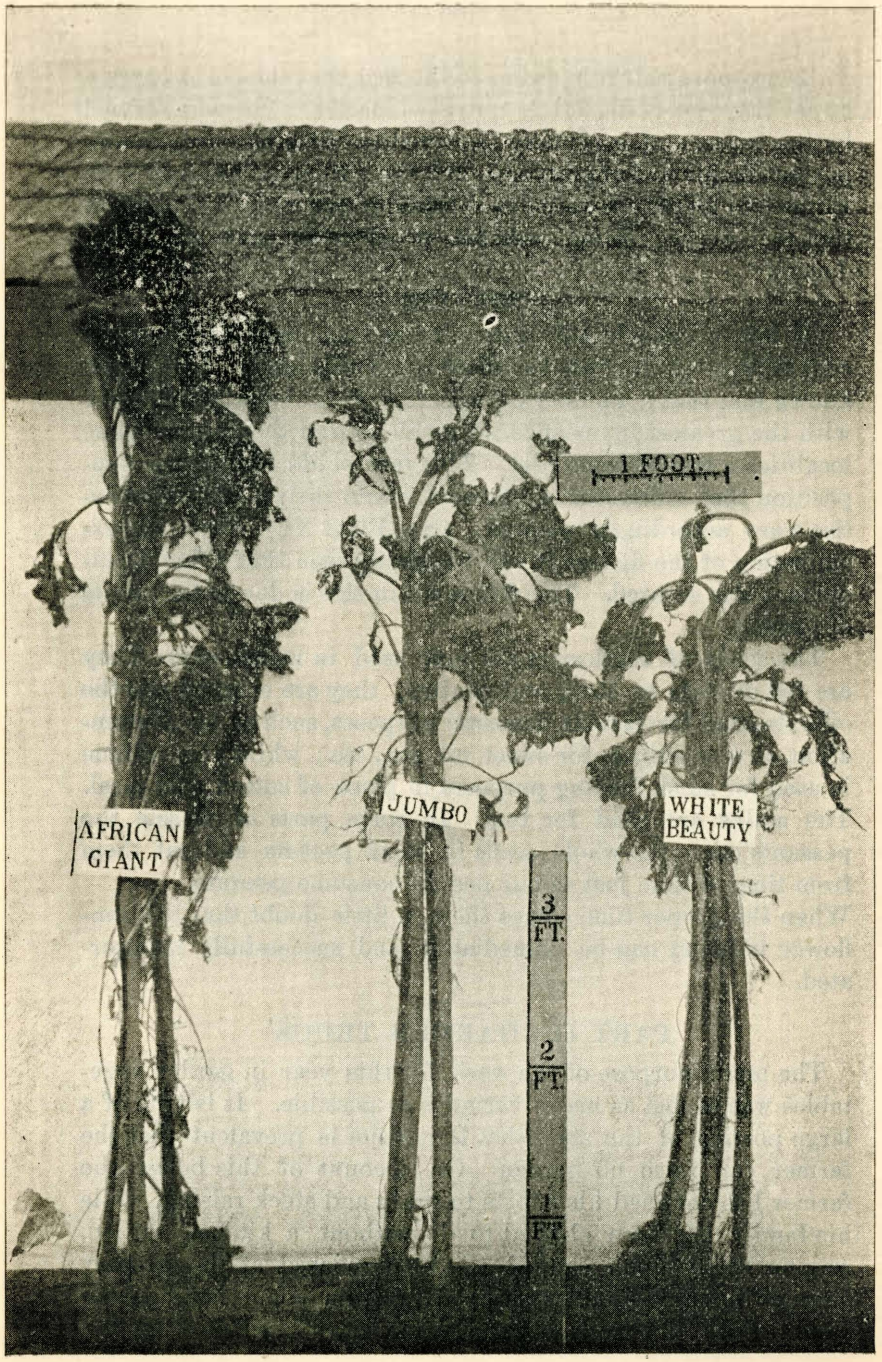


PLATE XI.—SUNFLOWERS.

utmost endeavor to correct this abnormal condition of affairs. Through bulletins and at farmers' institutes the garden has received so much attention that conditions are changing rapidly. In every neighborhood good gardens may now be found, while here and there someone has taken to truck farming as an occupation, often finding this class of work more profitable than raising wheat.

It is axiomatic that no home is complete without a kitchen garden. Visitors at the experimental plats were struck forcibly by the wealth of garden products growing there.

The plats were purposely made small in order to make room for the large number of varieties planted. It would scarcely be permissable to give acreage yields from the small plats installed. Photography and short descriptive notes will give a better general idea of the possibilities of the James River Valley as a truck producing region.

From the results obtained the conclusion is inevitable that every farmer in this whole region may have and enjoy a garden embracing all needed varieties of vegetables. Indeed it would seem that few localities are better suited to gardening.

It will be observed that no experiments with potatoes were installed. The reason for this becomes apparent when it is known that this region is already the producing ground of immense quantities of potatoes which are in demand for seed potatoes in nearly every state. Some of the largest seedsmen in the United States raise their seed potatoes in the fertile loam of this valley. This industry is so well established that experiments along those lines would be simply a work of supererogation.

It will be further noticed that some root crops like turnips and beets have received attention. These are not generally grown. In addition to their culinary value these also possess many desirable qualities as a stock food for the dairymen and stock grower.

ONIONS.

Twenty-four varieties of onions were installed. These are shown collectively and comparatively in Plate XII. The numbers attached to the figures are the plat numbers and will serve to identify the varieties.

Plat 39 was planted to Top Sets. These gave a good stand

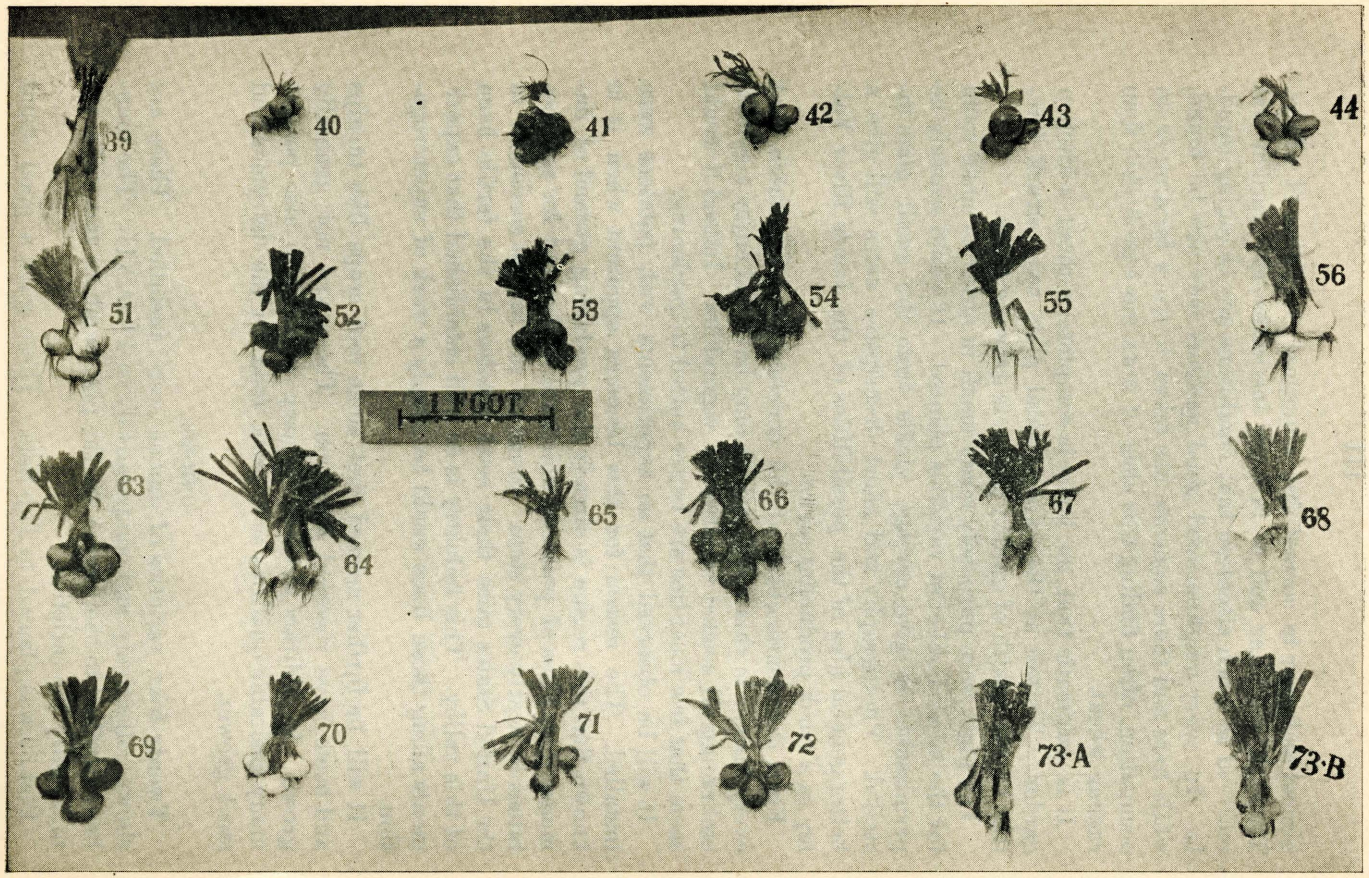


PLATE XII.–ONIONS.

and every kitchen garden ought to have a bed of them. These last through the winter and furnish the first green vegetable of the season.

Plat 40 was set to White Multipliers. These gave a good stand and the onions were ripe by the middle of August, multiplying in the ratio of about one to twelve. The quality of the onion is fairly good.

Plat 41 was set to Yellow Multipliers. These gave a good stand of stalky plants. Ripe about the middle of August and multiplied from eighteen to thirty to one. Good quality.

Plat 42 was set to White Bottoms. These gave a good stand. Slender tops; ripe middle of August; two inches in diameter; quality good.

Plat 43 was set to Red Bottoms and Plat 44 to Yellow Bottoms. These gave about the same results as 42.

Plate 51 was sown to White Globe onions. These gave a good stand of large, well flavored onions.

Plat 52 was sown to extra early Red Globe. A good stand. Not quite so large as 51.

Plat 53 was sown to King of the Earliest. A fair stand. Good quality.

Plat 54 was sown to Yellow Globe Danvers. These gave a fair stand and are a standard sort for this state. They are good keepers and good flavored.

Plat 55 was sown to White Naples. They gave a fair stand. Good quality. This variety makes fine eating when the seedling onions are small. The flavor is sweet and good.

Plat 56 was sown to New Queen. This gave a fair stand. Somewhat larger bulb than 53. Quality about the same.

Plat 63 was sown to Giant Roco. These gave a good stand; large size; well flavored. Plants somewhat tender.

Plat 64 was sown to Silver King. This gave a rather thin stand. These onions also are to be recommended for table use when small. They are not so good keepers as the Yellow Globe Danvers or the Red Weatherfield.

Plat 65 was sown to Giant Red Tripoli. This gave a thin stand and the variety may be considered as a failure.

Plat 66 was sown to Prize Takers. This variety gave a thin stand of very fine onions. The seed did not germinate well.

Plat 67 was sown to Mammoth Pompeii. This gave a very

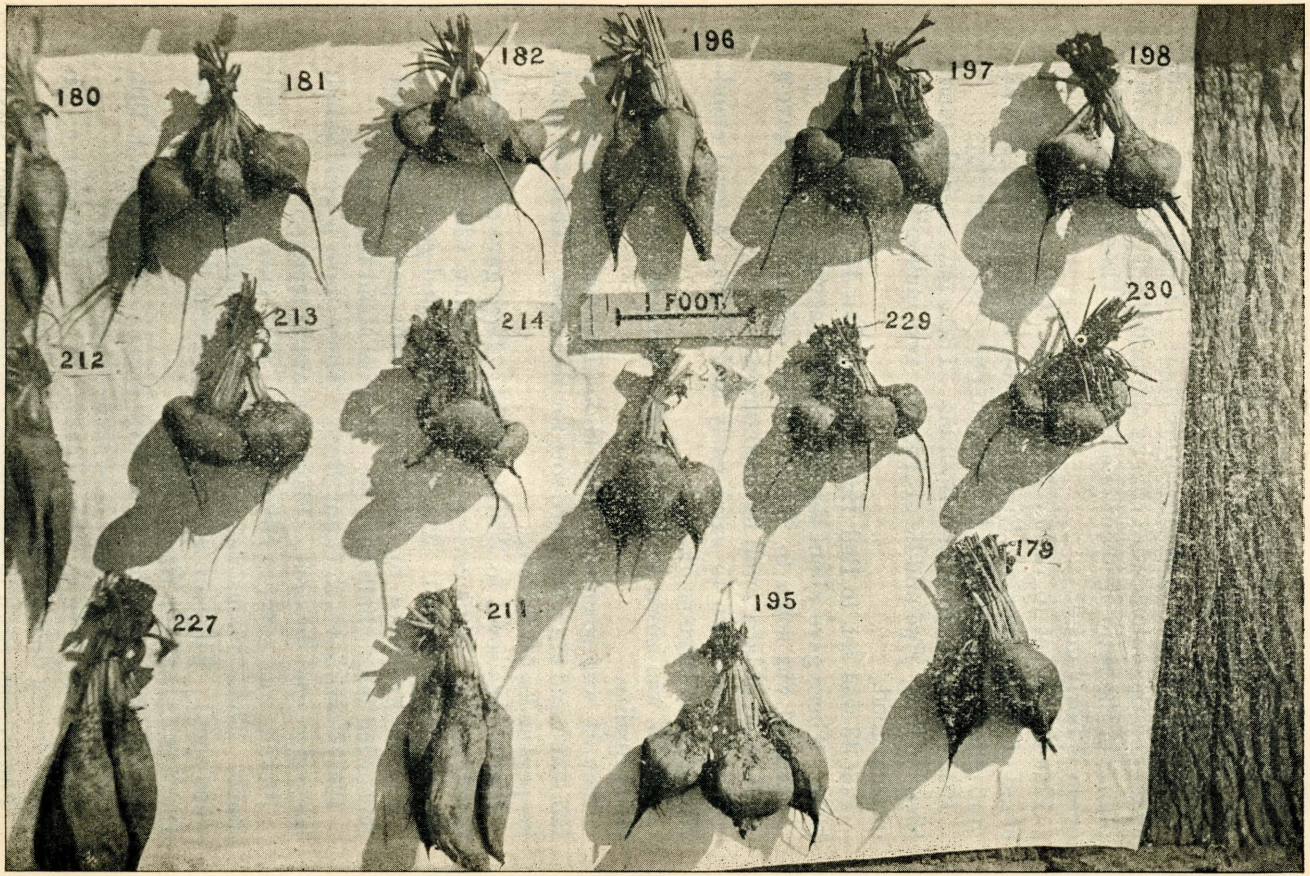


PLATE XIII—BEETS AND MANGELS.

thin stand and was likewise a practical failure.

Plat 68 was sown to Giant White Tripoli. This was likewise a failure.

Plat 69 was sown to Red Weathersfield. Although this seed did not germinate well, the onions are of a sort well adapted to this state.

Plat 70 was sown to the Marzajole. These gave a fair stand and with results about the same as other white onions.

Plat 71 was sown to Autumn King. These germinated slowly and only gave fair results.

Plat 72 was sown to Late Red Globe. This gave a fair stand of very good onions for winter use.

Plat 73 (a) was sown to Zitlaw's Giant, and 73 (b) to White Spanish. These varieties are not recommended for this state.

SPINACH.

Five varieties of spinach were planted. Spinach is easily grown throughout all parts of South Dakota and is valuable as an early green. The five varieties had gone to seed by the middle of July. A rather poor stand was obtained from all five varieties, but the plants were fine and vigorous. The varieties planted were the Round, Savory, the Long Standing, Winter Prickley and Victoria. Any of them would answer the purpose but probably the Long Standing or the Round would be preferable in the ordinary kitchen garden.

SALSIFY.

Plat 49 was sown to Sandwich Island Sslsify. This gave a fair stand with large well formed roots. Salsify is a sure garden crop for this state.

LEEKS.

Two varieties of Leeks were planted. The London Broad Flag gave a good stand and good yield. The Large Rouen gave a fair stand and a good yield. These are as certain as onions.

CHICORY.

Plat 59 was sown to Large Red Chicory. This germinated slowly and a fair stand was finally secured of very large, fine healthy plants. The roots were fine, from one to one and one-half inches in diameter and twelve to sixteen inches long. This plant is valuable not only as a coffee substitute but as a forage crop and a soiling crop. While it will do well on rich land it is especially valuable on barren soils.

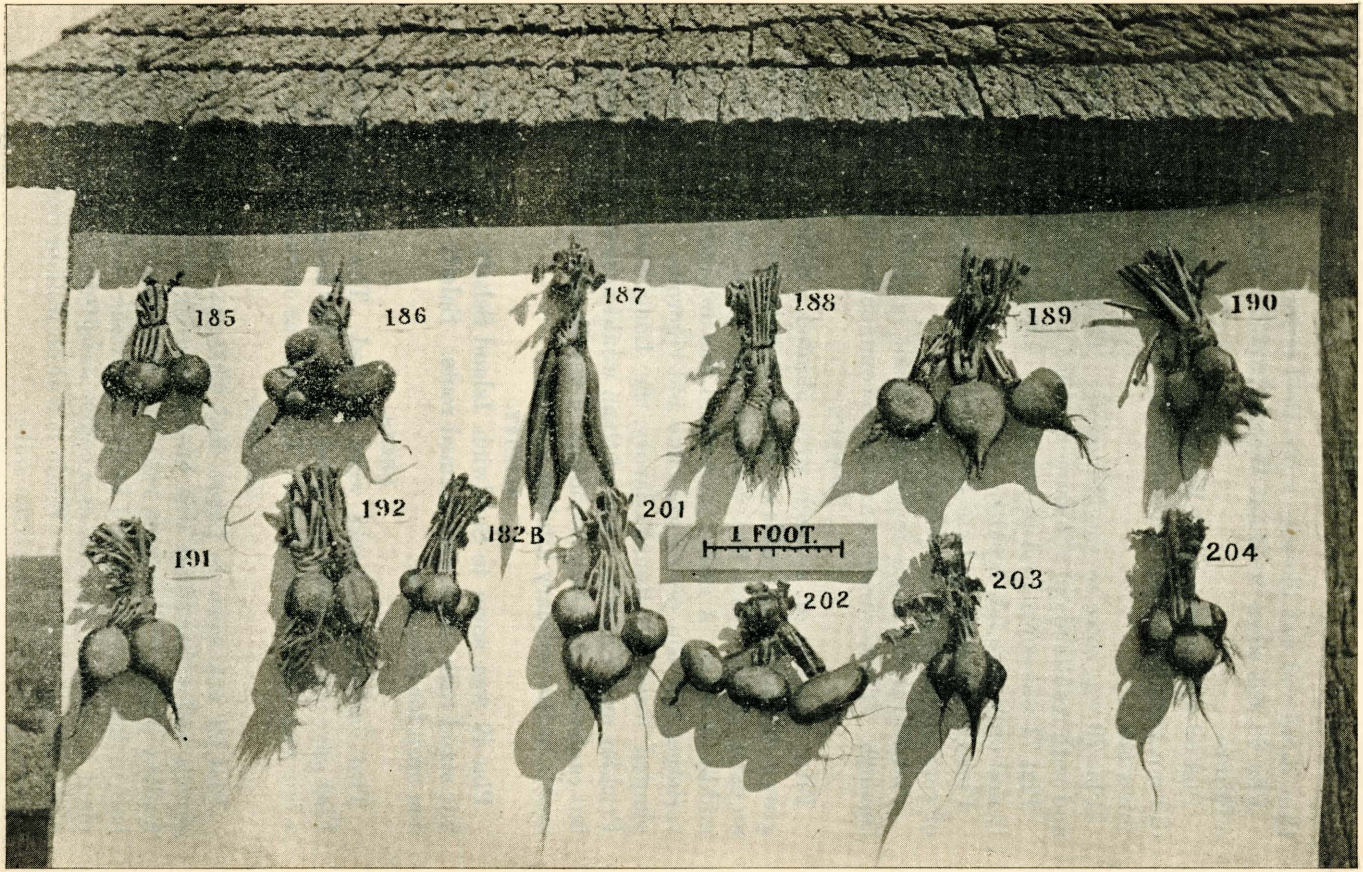


PLATE XIV—TURNIPS AND RUTABAGAS.

KOHL RABI.

Three varieties were sown. They germinated slowly owing to a crust formed on the ground, but finally produced some very fine plants bearing bulbs five to seven inches in diameter. These fine specimens attracted considerable attention at the Aberdeen Corn Palace Exhibition.

PARSNIPS.

Plat 61 was sown to Hollow Crown parsnips. These gave a poor stand with rather inferior roots. This anomaly is hard to explain since not only parsnips but all root crops do exceedingly well in rhis portion of the state.

RADISHES.

Upwards of forty varieties of radishes were sown. Iu common with other root crops these thrive luxuriantly. The White Olive Shape Early gave a fair stand with good size roots, good quality. The Scarlet Turnip White Top gave a stand of fine plants, of good quality. The Olive Shape Rose White Tips gave a fair stand of good sized and well flavored roots. The Olive Shape White Tips gave a fair stand of good sized edible roots. The Chartiers gave a fair stand of smallish roots of a good quality. The Long Scarlet gave a fair stand of good edible roots. The Shepherd gave a fair stand of good quality.

Long Scarlet White Tip gave a good stand of large edible roots of good quality. The Alaska gave a fair stand of good sized roots, of good quality. The Early Bird and the Turnip Scarlet White Tips gave a fair stand of good quality and good size. The Non Plus Ultra and Scarlet Olive gave a fair stand of good size and good quality. The Long White Naples and the Salzer's Brightest Scarlet gave a good crop.

All of the following furnished good results, in fact all kinds of radishes do well beyond question: Ladies' Fingers, Wood's Early Frame, Mammoth California, Long Black Spanish, Erfurt Dark Red, Eighteen Day, Salzer's Acme, Turnip Scarlet Erfurt, White Turnip, Scarlet Turnip, Small Early Gold (yellow oval), Small Turnip, (round black), China White, Half Long Deep Scarlet, Strausburg, Salzer's Earliest, French Breakfast, Rosy Horn, Stuttgart, All The Year Around, Golden Summer Globe, China Rose.

The grower could hardly be amiss in selecting any of these variaties, but the olive shaped varieties are apt to be somewhat better flavored.

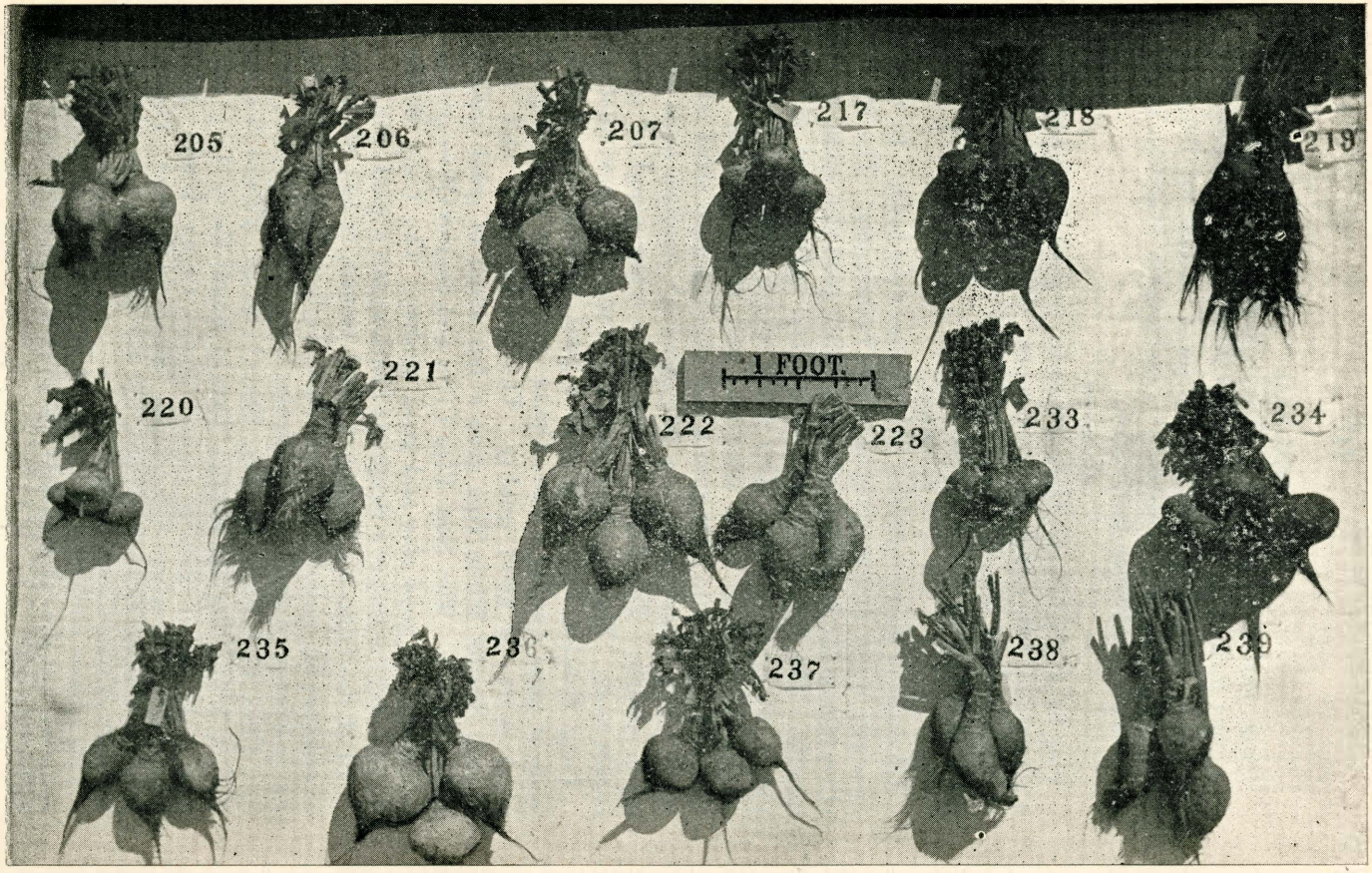


PLATE XV—TURNIPS AND RUTABAGAS.

LETTUCE.

Seventeen varieties of lettuce were sown: Salzer's Sunlight, Oak Leaves, Golden Stone Head, New York Market, Salzer's Improved Hanson, Satisfaction, Golden Ball, Ice Drumhead, Sunset, Stub Horn (headed yellow), Stub Horn (headed brown,) All Cream, Tennis Ball, Laccinated Beauregard, Simpson's Early White Seed, Grand Rapids, Salzer's Earliest, Green Winter, White Company, Heavy Weight, German Butler, Salzer's Prize Head, Peer of All, Boston Market, Deacon, Early Curled Silician.

These lettuces were sown at an inopportune time. A heavy rain fall followed by hot sunshine baked the ground so that it was difficult for the seed to come through. In consequence, the stand was rather thin. But the individual plants were all fine specimens. One could hardly make a mistake in selecting a variety of lettuce.

CARROTS.

Seventeen varieties of carrots were sown. The germination was very poor for the same reason given in the Lettuce; moreover the plants were so checked in their growth that they did not fully recover.

Carrots are a sure crop under all ordinary conditions. If these had been resown, or if the crust had been broken or softened the results would have been different. Long White Belguim and the N. B. & G. Mastodon are standard stock varieties.

Almost any of the stock varieties such as the Half Long Scarlet and Early Short Horn are well adapted to table use.

BEETS AND MANGELS.

Fourteen plats were devoted to different varieties of beets and mangels. These are a neglected crop in this state. It is far from the practice of the dairyman and stock grower to avail himself of this most certain of all root crops to supplement his ration of hay and grain. This is a mistake since no more prolific and profitable feeding stuff can be grown, silage excepted. It must be borne in mind that the expense of storing root crops does not entail the first expense of building a costly silo.

Plate XIII gives a comparative view of the beets and mangels grown. By use of the accompanying scale the absolute size can also be determined. The numbers refer to the plats and will serve to identify the varieties.

Plat 179 was sown to Yellow Globe Mangels. These were a good crop and a good stand.

Plat 180 was sown to Imperial Sugar Beets. These gave a good yield. Beets somewhat smallish. Fine shape.

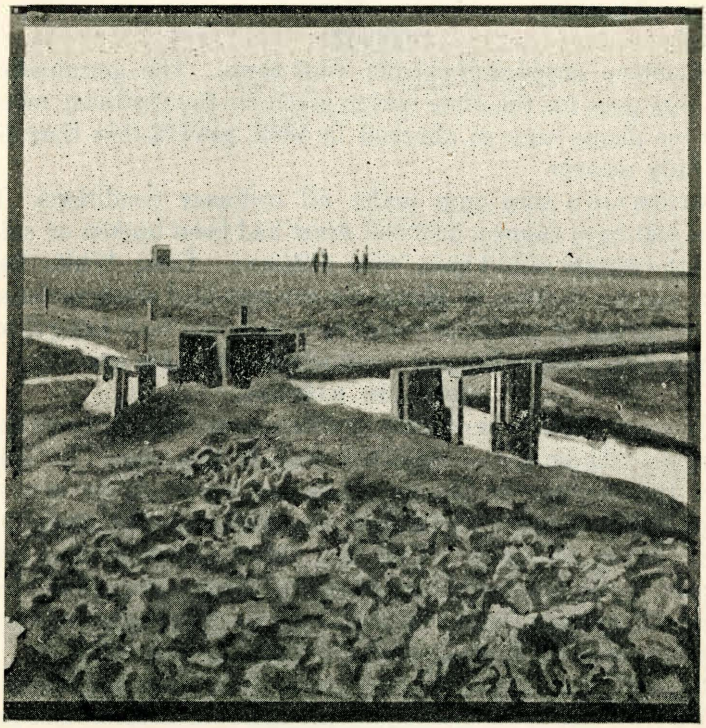
Plat 181 was sown to Red Beauty beets. These gave a large yield of fine roots.

Plat 182 was sown to the Early Blood Turnip beet. These gave a good yield of large flattish roots.

Plat 195 was sown to Red Globe mangels. This gave a heavy crop of large globular roots.

Plat 196 was sown to Sweet White beets. This gave a large yield of long coniform roots.

Plat 197 was sown to Best of All beets. This gave a heavy yield of large flattish roots.



Plat 198 was sown to Early Bassano beets. This gave a heavy yield of roots like the preceding.

Plat 211 was sown to Long Yellow mangels. This gave a heavy yield of long, irregular roots.

Plat 212 was sown to Long Smooth Blood beets. These gave a large yield of coniform irregular roots.

Plat 213 was sown to Eclipse beets. This gave a good yield of flattish globular roots. A good table variety.

Plat 214 was sown to Bastian's Extra Early beets. This gave a good yield of roots somewhat smaller than the preceding. A good table variety.

Plat 227 was sown to Eiffel Tower mangels. These are regular mangels, of enormous size, dark red in color and well adapted to stock feeding.

Plat 228 was sown to Royal Half Long beets. These gave a good yield of somewhat globular form.

Plat 229 was sown to the Edmund's beets. These gave a fair yield, of medium size, globular roots. Fine for table use.

Plat 230 was sown to Dark Red Egyptian beets, giving a good yield. A well known table variety.

A farmer could scarcely go amiss in selecting either beets or mangels for this state.

TURNIPS AND RUTABAGAS.

Thirty varieties of turnips and rutabagas were sown. What has been said concerning mangels and beets applies more or less forcibly in the case of these roots. Turnips and rutabagas grow more quickly and can be raised often as a second crop. In the case of dairy cows, they must be fed with caution, but for sheep and other stock they are most valuable. Plates XIV and XV give a view of the turnips and rutabagas. In each the numbers refers to the plats.

Plat 185, White Stone turnips gave a good yield of medium sized roots.

Plat 186, Early Milan turnips, gave a good yield of large roots.

Plat 187, Cow Horn turnips, gave a good yield of a long beet shaped root.

Plat 188, Imperial Purple Top Swede turnips, gave a fair yield of an inferior quality of roots.

Plat 189, Purple Top White Globe turnips, gave a heavy yield of fine, large roots.

Plat 170, Skirving's Liverpool turnips, gave a small yield of inferior, necky roots.

Plat 191, All Gold turnips, gave a good crop of very fine flavored and fine shaped roots.

Plat 192, Swede Yellow Green Top turnip, gave a medium yield of coarse, inferior roots.

Plat 182 (b), gave a medium yield; early, rather small, sweet and well flavored.

Plat 201, Six Weeks turnips, gave a heavy yield of fine large roots.

Plat 202, Early La Crosse turnip. A fine flat root and a heavy yielder.

Plat 203, Green Top Yellow Scotch turnips. A small yield of half length, smallish roots.

Plat 204, Yellow Aberdeen turnips. Roots small, globular form.

Plat 205, Salzer's Milk Globe turnip. A large yield of well formed roots.

Plat 206, Lang's Purple Top turnips. A large yield of coarse, necky roots. Poor quality.

Plat 207, Mammoth Russian turnips. A heavy yield of large, medium quality roots.

Plat 217, White Lily turnips. A fair yield of smallish, well formed roots.

Plat 218, Early Yellow Stone turnips. A large yield of well formed, well flavored roots.

Plat 219, Sweet German turnips. A heavy yield of coarse, scraggly roots.

Plat 220, Orange Sweet turnips. A small, well formed, fine flavored root with good yield.

Plat 221, White Flesh Swede turnips. A heavy yield of coarse, ill-formed roots.

Plat 222, White Sweet Russian. A heavy yield of large, well formed roots.

Plat 223, American Purple Top turnips. A heavy yield of coarse, ill-formed roots.

Plat 233, Early Flat Dutch turnips. A fair yield of small, well formed roots.

Plat 234, Purple Top Strap Leaf turnips. A heavy yield of large, flattened roots of good quality.

Plat 235, Purple Top Yellow Scotch turnips. A good yield of medium sized roots of medium quality.

Plat 226, Large White Globe turnip. A heavy yield, medium sized roots of fair quality.

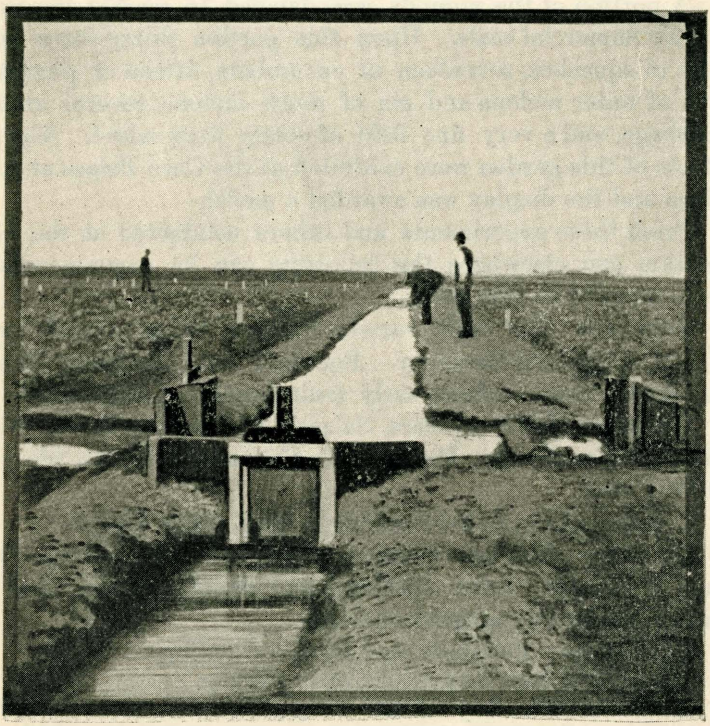
Plat 237, Early Yellow Rutabagas. A good yield, medium sized roots of good quality.

Plat 238, Carter's Imperial Rutabagas. A good yield of coarse, deformed, necky roots.

Plat 239, Drummond's Improved Rutabagas. A large yield of fairly formed roots, of medium quality.

BEANS.

Twenty-two varieties of beans were planted. Golden Wax, fair stand, (a variety well adapted to this climate). Curries' Rust Proof gave a fair stand. Detroit gave a poor stand, not well adapted to this climate. Date Wax gave a fair stand and a fair yield of orange colored beans, dead ripe in first half of September. Farm Bean and Broad Winsor, are horse beans, largely grown in England, not adapted to this climate. Per-



fection Wax, Yosemite Wax, Midsummer and Early Valentine were all failures. Six Weeks beans gave a good stand, all ripe by middle of September, a fair yield and a good quality. Tree and White beans gave a fair stand of good quality. White Navy gave a poor stand; quality poor, nearly a failure. Jackson's Wonder, a long standing variety, remaining green until frost came. D. L. White Lima gave a fair stand, but finally failed, and the same is true of Henderson's Bush Lima and the Round Pod Six Weeks. The White Marrow gave somewhat better results. The reason for the failure of the Bush Lima beans is hard to determine. These beans give excellent results in this state.

Three plats of Soja beans were sown; Cole's Domestic, Salzer's German, and the Idaho Field. These are practically failures. The Soja bean cannot be recommended for this state.

MARKET GARDEN.

A portion of the grounds was devoted to market gardening on a commercial scale. Upon this portion thirty-three varieties of squashes, seventeen of cucumbers, fifteen of pumpkins, ten of water melons and six of musk melons, several kinds of cabbage, and a very fine field of celery were raised. The products of this garden were exhibited at the Corn Palace at Aberdeen and the display was awarded a medal.

From these experiments and others conducted at the home station and elsewhere the following can be recommended as well adapted to this state:

Tomatoes—For early variety, Salzer's "First of All," small fruits, sometimes irregular. For main crop, the Early Ruby is by far the best; medium early fruit, large, red and smooth.

Cabbage—Early varieties, Salzer's Earliest and Jersey Wakefield. Second early, Henderson's Succession. Late, Ideal and Flat Dutch.

Celery—Early, Self-blanching. Late, Giant Pascal.

Squashes—Summer, Summer Cookneck and Stickler's Summer Cookneck. Late, Hubbard and Sibley. Giant Chili is a mammoth variety somewhat coarse.

Cucumbers—Fordhook and Boston Pickling.

Water Melons—Any rather early variety.

Musk Melons—Any of the rough skinned, strongly netted varieties.