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Proso and Kaoliang as Table Foods

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AGRICULTURAL EXPERIMENT STATION

SOUTH DAKOTA
STATE COLLEGE OF AGRICULTURE
AND MECHANIC ARTS

Department of Horticulture

PROSO AND KAOLIANG AS TABLE FOODS

1. History and Milling
 2. Cooking Recipes by the Department of Home Economics
-

BROOKINGS, SOUTH DAKOTA

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HISTORY OF PROSO

By N. E. HANSEN.

Millet has been cultivated from prehistoric times both for forage and grain. The three principal groups as cultivated in the United States are: 1. Foxtail millets; 2. Barnyard millets; 3. Proso millets. The Proso millets are mainly valuable for the grain. Proso is the Russian word for the true or common millet. The Latin or botanical name, *Panicum miliaceum*, was applied to the plant by Linnæus. *Milium*, the old Latin word for this plant is from *mille*, meaning one thousand. This refers to its productiveness which sometimes is one thousandfold. The Swiss stone-dwellers in the Stone Age used this millet extensively. Ledebour says it is nearly wild in the Altai Mountain region of Siberia and southern Russia, and wild south of the Caucasus. In Crimea it furnishes food for the Tartars. De Candolle notes its ancient cultivation as a grain in India and China. Its original habitat appears to be unsettled, but indications point to its cultivation in prehistoric times in Egypt and Arabia. In India, according to Baron von Mueller, it is cultivated in the Himalayas up to 11,000 feet. Hippocrates of ancient Greece considered it a good food. In the driest interior parts of Asia the proso millet constitutes a crop of vast importance since it makes a crop when Durum wheat or other grain is a failure. This dry area includes Thibet, Turkestan, Mongolia, Manchuria and Siberia. It is raised extensively in eastern Russia and has been found to be one of the best grains for poultry. Ch. Flint states that in mild counties as many as 70 bushels have been harvested from an acre of land, and that the yield may be one thousandfold.

Proso is the ancient Slav name and is now generally accepted in the United States. The objection to using the word millet in connection with Proso is that most people at once think of hay instead of grain. When these large seeded Proso millets first came into the United States

someone had success feeding hogs on the grain and so called it hog millet. This name is certainly objectionable since it is a staple food for human beings in the Old World. The name Broom Corn millet is also objectionable owing to its length. However, in Manchuria the threshed heads are sometimes used for small brooms, but for this purpose it cannot compete with our common broom corn. In Russia Proso is a distinct name by itself the same as wheat, rye, oats or barley. Proso is a name that we must now accept as a welcome addition to our vocabulary.

In describing the millets raised in the United States in 1907, M. A. Carleton, Cerealist, United States Department of Agriculture, stated that there had been a great revival in the cultivation of millet as a seed grain the previous six years largely through the introduction of newer and better varieties by the United States Department of Agriculture, and summarizes the subject as follows: *

“The principal definitely named varieties at present known to us are the Early Fortune, Manitoba, Black Voronezh, Red Voronezh, Red Russian, Tambov, Red Lump and Red Orenburg. Even some of these are very similar to each other, and may be identical. All but the first two have been imported from Russia since 1897. Several so-called varieties making up our stock known previous to this period, and imported largely from Germany, Austria-Hungary, China and Japan, may be distinct, but have not yet been thoroughly studied.”

WANTED: DROUTH-RESISTANT GRAINS

Over a vast area of our western states the crop failures during the four year period 1910-1913 show with great force that we need to increase the list of drouth-resistant cereals. Wheat, oats, barley, rye;—can we increase this list? As settlers go into the new driest upland regions of our western states from the Mexican boundary north to Canada, they find that the staple small grains

*Cyclopedia of American Agriculture, L. H. Bailey, 1907, Vol. 2, p. 471

are less certain than in the moister regions further east. In the driest interior region of Asia the grain that succeeds where all other grains fail, owing to drouth, is Proso. In the dry interior desert region north of the Sea of Aral in Turkestan and north into Siberia, Proso is a great food staple of the Kirghiz nomads, tent dwellers in the desert. It is a great advantage to have a grain like Proso that can be sown in spring after it gets too late for other grains, a grain that will serve as a catch crop and yet ripen early enough to afford a satisfactory yield.

PROSO AS A GRAIN FOR LIVE STOCK

The value of Proso as a feed for cattle, sheep and swine has been investigated at various times by James W. Wilson, Director of this Station, and these experiments demonstrate that stock may be fattened ready for the Chicago market without any other grain than Proso. That Proso may be raised successfully as a field crop in South Dakota has been shown through a number of years by the Agronomy Division of this Station. For information on these topics the reader is referred to the earlier bulletins of this Station. We now know that a number of varieties of Proso may be profitably raised anywhere in the state and are specially suited for the western half. One point in its favor is that the grain may be sown after it is too late to sow wheat, although for the best results it should not be sown too late. It is of great importance to know that there are very many varieties of proso, and that they differ widely in their productiveness and other important points.

FASHION IN FOODS

In foods, as well as in clothes and hats, fashion rules the world. People in general are slow to change their list of staple foods. In the southern states corn is a great staple food, and yet Europe has taken to corn meal as a table food very slowly. Dr. Johnson, an Englishman, in his first dictionary is said to have defined oats as a grain used for food for horses in England, and for people in

Scotland. A Scotchman than asked the famous doctor if he had noticed what fine horses they had in England and what fine people there were in Scotland. This old story may or may not be true, but it illustrates the truth that prejudices rather than food values largely govern our choice of foods. Sometimes conditions compel the choice. Wheat may be considered the favorite food cereal of the world and yet millions of peasants in Europe and Asia look upon wheat bread as we do upon cake, as a delicacy. Rye endures great vicissitudes, and is a staple grain for bread in Europe and Asia.

CHEMICAL ANALYSIS OF PROSO

The food value of Proso has been investigated at various times in Europe, the general results showing that the protein content compares favorably with that of wheat, while the percentage of fat is about the same. However it was necessary to determine the exact chemical composition of this particular variety of Proso. The following analysis was made December, 1914, in the Department of Chemistry of the South Dakota Experiment Station.

HANSEN'S WHITE SIBERIAN PROSO

Percentage of Constituents

Moisture	9.90
Ash	3.51
Crude Protein	13.12
Ether extract	2.10
Fiber	8.30
Nitrogen free extract	63.07
	100.00

Guy E. Youngburg,
First Assistant Chemist.

This analysis was of the unhulled seed. Removing the hulls will tend to reduce the per cent of fiber.

ANALYSIS OF HULLED SEED OF HANSEN'S WHITE SIBERIAN PROSO.

This hulled proso seed was analyzed by G. A. Youngburg, Assistant Chemist of this Station. The per cent of protein was found to be 16.96. Washing the seed was found to make no difference in the amount of protein. The per cent of fat was found to be 3.86 and of crude fiber .95. This analysis indicates the high nutritive value of hulled proso, since it is 4.97 per cent more than wheat flour. In the Minnesota Experiment Station Bulletin 74, page 157, the protein of a straight grade patent flour made from a hard Scotch tife wheat is given as 11.99 per cent, and the fat 1.61 per cent.

WASHING THE HULLED PROSO

The following observations were made during the process of preparing Kaoliang in various ways for the table. The hulled proso was poured into a pail of water. The unhulled seeds floated which were skimmed off and then the water was poured off. Fresh water was added twice and this process of removing the unhulled seeds continued. Finally the hulled proso left in the bottom of the pail was poured out on a sieve to dry slowly, then water poured over it to finish the process of cleaning after which they were left to dry slowly. The few kernels of black and red seeded proso did not seem to float as well as white seeds, they were a little heavier and settled to the bottom with the hulled seeds. A sieve was used to skim off the seeds that floated, but only a very small per cent of the seeds with hulls on could not be removed by this method of using water. The white proso seems to have softer hulls which were more easily removed than the black or red proso, and the fact that it sunk to the bottom faster would indicate that it is of softer texture.

PROSO AS A TABLE FOOD

The one phase of the subject that remained for investigation was the value of Proso as human food. The available English references to this subject were brief and

indefinite. In the course of five tours to Russia 1894, 1897, 1898, 1906, 1908 and 1913 I have eaten many times the proso mush known as Kasha and found it was good food. On three of these tours 1897, 1906, 1908 as Agricultural Explorer for the United States Department of Agriculture an effort was made to obtain samples of proso seed from the driest regions of the Old World. In the expedition of 1913 special attention was given to the matter. As a result, many varieties were obtained differing widely in productiveness of plant and in size and color of seed. In my tours among the Kirghiz Tartars I had seen the food cooked in the simplest possible manner as mush, but took no notes as to the exact method. Nor did I examine the method the Russians used except that mush was cooked with salted water. I distinctly remember having one excellent dish of Kasha cooked with summer squash; that Kasha was improved by adding various kinds of fruit juices and preserved fruits to it, and that it was used to thicken soups, and in general that I had eaten plenty of Kasha and that it was good.

MILLING PROSO

It appeared necessary to take up the whole matter from the standpoint of American domestic economy. First came the question of milling. The Kirghiz Tartars solved the problem by pounding a sack of grain with a stick and winnowing it in the wind. The Russian peasants had small hand hullers but I did not bring any along, hence early in January, 1915, a common small coffee mill was taken costing perhaps 50 cents. It was found that it could easily be adjusted so as to grind the Proso to various degrees of fineness and that the hulls were readily removed by sieves of a small fanning mill using for this purpose the Clipper Seed Cleaner, office size. The hulling was greatly facilitated by having the seed thoroughly dry. The bran was very readily removed by the first screen; screen No. 20 removed the shorts; No. 40 screen yielded flour corresponding to middlings; No. 60 screen flour corresponding to Red Dog; No. 80 screen gave us baker's flour;

No. 100 M gave us flour corresponding to white patent flour. For the mush it is not necessary for the size to go further than the No. 40 screen. In other words, it has been shown that Proso may be milled with a coffee mill and a cheap sieve. The hulls come off very easily and there are no hairs to interfere.

Milling this Proso was as far as the writer could go. The subject was now evidently one for investigation by some one skilled in the principles as well as in the practice of preparing food for the table. During January and February, 1915, Miss Nola K. Fromme, Professor of Home Economics in the South Dakota State College of Agriculture and Mechanic Arts, made extensive experimental tests to determine the culinary possibilities of Proso. The following pages contain the results of this work. These new recipes will be a great help to all interested in the problem of cheap and good food, especially in the driest upland region of all our western states.

WHY A WHITE PROSO IS BEST FOR TABLE USE

It may be asked why white seeded proso is better than any other. The reason is that in case some of the kernels were not hulled, which would occur even with the best of hulling machinery, the white color would be the same color as the grain whereas a black seeded proso would seem an impurity in a dish of cooked proso.



Hansen's White Siberian Proso

In 1913 while gathering 3,250 pounds of the strongest and most vigorous form of the yellow flowered alfalfa, *Medicago falcata*, in the Semipalatinsk region of Siberia, the writer obtained 36 pounds of the large white seeded Proso among the Kirghiz Nomads. It is hoped this will prove to be the best adapted for human food owing to the large size kernel, and clear white color. The Semipalatinsk region is a very dry region with great extremes of climate, the temperature ranging from 50 degrees below zero in winter to 106 degrees (Fahrenheit) above in summer and with 8 inches of rainfall. Samples were sent to many places in the spring of 1914. This variety which was named Hansen's White Siberian Proso, proved very productive on the grounds at this Station the past year, the yield being 254 pounds of grain from each pound of seed. Five pounds on one acre yielded 1,270 pounds of seed. A field of three acres yielded at this rate, 1,270 pounds at 56 pounds per bushel means 22 bushels and 38 pounds. The legal weight of millet in South Dakota is 50 pounds per bushel, but the actual weight of this variety was 56 pounds per bushel stroke measure. A heavy yield was also secured near Pierre, South Dakota from seed sown June 17, ripening in fifty-one days. This date of sowing was of course too late for the maximum yield. One-half ounce of this seed was sown at Maymont, Saskatchewan, Canada, yielding over one peck of seed or about 450 fold. The seed was sown thinly with the aim of obtaining a large yield of grain, but it is best sown thinly to allow for heavy stooling; probably 10 pounds or more per acre would be better.



Field of Hansen's White Siberian Proso, Brookings, S. D. 1914

In the original seed brought from Semipalatinsk there were a few grains of other colors including red, brown, smoke color, black and yellow. This would not be of any special importance as a feed grain, but for the best results as a table food these should be eliminated which is now being done by hand picking. By hand picking a small sample enough seed can be secured to sow a larger acreage the following season. At Brookings the Proso was sown with a press drill and harvested with a self binder; afterwards it was shocked, stacked and threshed the same as any other grain. In the drier regions the single or double row method is practiced to permit cultivation and kill the weeds.

FIRST OFFICIAL EATING TEST, JAN. 6, 1915.

During the Farm and Home Course, Jan. 1-10, 1915, at the South Dakota State College of Agriculture and Mechanic Arts, it was determined to make the first public test of Proso as a table cereal. More than one hundred South Dakota farmers sampled this new food grain which was prepared in seven different ways by Miss Nola K. Fromme, head of the department of Home Economics. The bill of fare was as follows: Proso soup, Proso mush, or "Kasha," Proso nut loaf, Proso molasses bread, Proso cooked in fireless cooker with dates, Proso with cheese, and Proso muffins.

The general verdict was very favorable as to the good flavor of all these new foods. An interesting account of this occasion was published in The Observer column by Prof. W. M. Mair, in the Argus Leader, Sioux Falls, January 9th, and by Prof. G. A. Starring in many papers. Two days afterward, Jan. 8th, the first samples of Kaoliang pancakes and Kaoliang bread were served. These dates mark the official introduction of two valuable table food grains to our western states. Proso and Kaoliang have already shown that they will make a sure crop in the driest season on the highest uplands.

PROSO RECIPES

By Miss Nola K. Fromme, Professor of Home Economics,
South Dakota State College of Agriculture and Mech-
anic Arts.

The seed of Proso millet, although almost unused in America as food for man, is in Russia and India a staple article of diet, and has been cultivated in southern Europe since the days of the Greeks. During the Russian famine of 1890, proso millet bread was for a long time the only food remaining between the peasantry and starvation.*

The grain may be used whole and made into many palatable dishes or it may be ground into a meal as corn meal, or it may be finely ground into flour. The flour is light and nutritious and produces a nutty flavor, but does not make a good bread unless combined with wheat flour, preferably one rich in gluten as durum wheat flour.

The following recipes have all been tried. The proso millet seed seems to lend itself very readily to many ways of cooking. In fact, it can be prepared in almost every way that corn meal can be used, and in some ways as rice, although it requires a longer cooking than rice. It does not absorb quite as much liquid as rice, but the meal absorbs about the same as corn meal. In all the recipes the results were much better when milk instead of water was used for the liquid, the appearance as well as the flavor being more attractive, and of course the food value was made higher.

RECIPES

"KASHA" OR PROSO MUSH

- 1 cupful proso meal
- 1 teaspoon salt
- 3½ cupfuls milk

Cook all together in double boiler four hours or in a fireless cooker for 6 hours or more. One-half cup more of milk should be added if cooked in fireless cooker.

*Food Products of the World, 1895, Mary E. Green, M. D.

VARIATIONS OF KASHA

1. Steamed chopped dates, stewed prunes or fruits of that nature may be added to the mush a few minutes before taking from the fire.

2. Grated cheese may be added just before serving, using one-half cup of grated cheese to the above recipe.

3. Sauces, such as meat gravy or tomato sauce, may be served with the mush.

4. A proso mush with pork may be prepared by cooking pork in water and using this water for cooking the meal in proper proportion.

The finely chopped meat is added and the mush packed in tins and later cut in slices and fried.

5. A scrapple may be prepared the same as corn meal scrapple, or as above, using the pig's head as the meat.

PROSO SCRAPPLE

1 pig's head split in halves

2 cups proso meal

2 teaspoons salt

1/2 teaspoon powdered sage

Water

Cook pig's head in water till tender. Remove the meat. Reduce the broth or add water to make two quarts and cook the proso meal in this. Add the meat finely chopped and seasonings. Pack in bread tins. Cut in slices and fry.

PROSO SOUP

A soup stock may be made using either beef, veal or mutton and one-third cup of the whole proso, added to one quart of stock. Season to taste.

STEAMED PROSO

1 cup proso

1 cup boiling water

1 teaspoon salt

Wash proso and add to boiling salted water in a double boiler. Boil briskly for 5 minutes directly over the fire and

then place over hot water. Add 1 pint hot milk and steam for 1 hour.

CREAMED PROSO PUDDING

$\frac{1}{2}$ cup proso
 1-3 cup sugar
 1 quart milk
 $\frac{1}{2}$ teaspoon salt
 1 tablespoon of butter added at the last
 Flavor with 1 inch of stick cinnamon

Wash proso, mix all together and pour in a buttered baking dish and bake in a slow oven 3 hours. Keep covered the first hour.

PROSO CUSTARD PUDDING

$\frac{1}{4}$ cup proso
 1 inch stick cinnamon
 3 cups milk
 Yolks of 4 eggs, or 2 whole eggs
 $\frac{1}{2}$ teaspoon salt 2 tablespoons corn starch
 $\frac{1}{4}$ teaspoon essence $\frac{1}{2}$ cup sugar

Wash proso and cook in boiling water with cinnamon until tender. Moisten corn starch with a little cold water or milk and cook with the heated milk 15 or 20 minutes. Add the slightly beaten eggs and cook at low temperature 3 or 4 minutes, then add the well cooked proso. Pour the mixture into a baking dish and finish with a meringue over the top with 2 egg whites, using 2 tablespoons of powdered sugar to each white beating until dry and glossy. Place in the oven until slightly brown.

PROSO MUFFINS

$\frac{1}{2}$ cup proso meal 2 tablespoons sugar
 1 cup flour 1 teaspoon salt
 3 teaspoons baking powder 1 egg
 2 tablespoons melted butter $\frac{3}{4}$ cup milk

Sift and mix dry ingredients; add milk gradually, then the well beaten egg and melted butter and bake in a hot oven in well buttered gem tins 25 to 30 minutes.

SOUR MILK PROSO BREAD

½ cup wheat flour	1½ teaspoons salt
2 cups proso meal	2 eggs
2 cups sour milk	1 teaspoon soda
3 tablespoons butter	2 tablespoons sugar

Mix all dry ingredients, then add sour milk, eggs and melted butter. Bake in a shallow pan 30 minutes.

QUICK PROSO ROLLS

1½ cups wheat flour	3 tablespoons butter
¾ cup proso meal	1 egg
3 teaspoons baking powder	½ cup milk
1½ teaspoon salt	

Sift the dry ingredients. Rub in the butter. Add the slightly beaten egg with milk and add more milk if necessary to make a soft dough to be rolled. Roll, cut with a biscuit cutter and fold as Parker House rolls. Bake in a quick oven.

BOSTON BROWN BREAD

1 cup proso meal	
2 cups whole wheat flour or 1 cup rye and 1 cup whole wheat	
1 teaspoon salt	3 teaspoons baking powder
¾ cup molasses	¼ teaspoon soda

Add soda to the molasses, add sweet milk to make a drop batter, (from 1¾ to 2 cups). Pour into buttered cans, filling them not more than 2-3 full, cover and steam 3½ hours. Sour milk may be used instead of sweet, using 2 cups and 2½ teaspoons soda in place of the ¼ teaspoon soda and baking powder.

PROSO PANCAKES

2 cups flour	1-3 cup sugar
½ cup proso meal	1½ cups boiling water
1½ teaspoons salt	1¼ cups milk
1½teaspoons baking powder	1 egg
2 tablespoons melted butter	

Add meal to boiling water and boil 5 minutes, add milk

and dry ingredients, sifted, and egg well beaten, and butter. Cook as other griddle cakes. $1\frac{1}{2}$ cups of sour milk may be used in place of sweet with 1 teaspoon of soda in place of baking powder.

PROSO CAKES

Use $\frac{1}{4}$ teaspoon of salt and 1 teaspoon butter to 1 cup of proso meal and just dampen with boiling water, thin with cold milk but have them stiff enough to hold their shape. Cook as other griddle cakes.

PROSO GRIDDLE CAKES

Left over steamed proso may be used as follows:

1 cup milk	1 egg
1 cup steamed proso	1 tablespoon melted butter
$\frac{1}{2}$ teaspoon salt	$\frac{7}{8}$ cup flour

Pour milk over proso and salt, add egg well beaten, butter and flour and cook as usual.

PROSO NUT LOAF

1 cup hot boiled proso
 1 cup nut meats finely chopped
 1 cup cracker crumbs
 1 egg
 1 cup milk
 $1\frac{1}{2}$ teaspoons salt
 $\frac{1}{4}$ teaspoon pepper
 1 tablespoon melted butter

Mix proso, nut meats and crumbs; then add egg well beaten, milk, salt and pepper. Turn into a buttered small bread pan, pour over butter, cover and bake in a moderate oven 1 hour. Turn into a platter and pour around the following sauce: Cook three tablespoons butter with two slices onion three minutes, stirring constantly. Add three tablespoons flour and stir until well blended; then pour on gradually while stirring constantly one and one-half cups milk. Bring to the boiling point and add one-half teaspoon salt and a few grains pepper and strain.

PROSO YEAST BREAD

- 1 pint scalded milk
- 2 teaspoons salt
- 6 tablespoons sugar
- ½ cup prepared yeast, either dry compressed or liquid,
as preferred
- 1 cup rye flour
- 1 cup proso flour or proso meal
- 3 plus cups durum wheat flour, or ordinary wheat
flour may be used

Pour the scalded milk over the salt and sugar. Cool to lukewarm and add the yeast, which has been prepared by soaking in water, add the flour using enough wheat flour to make it stiff enough so that it will not stick to the board in kneading. Let rise until double in bulk. Mold into loaves, allow to rise again until double in bulk and bake.

A higher proportion of proso in the bread seems to yield a rather strong bitter taste, but it is necessary to do further work along this line to determine the exact cause of this. The above proportions gave very good bread in flavor, texture, color, shape, etc. Wheat flour might be used in place of the rye flour.

EARLY INTRODUCTIONS OF PROSO

The following is a list of early introductions of Proso by the writer appointed as Agricultural Explorer for the United States Department of Agriculture. This list covers the first three tours to Siberia.

The later importations of Proso by M. A. Carleton, Frank N. Meyer and others of the United States Department of Agriculture are listed in the Inventories of the Section of Seed and Plant Introduction.

The history of all introductions in all lands shows that small samples of any new crop are often lost because they do not get into the right hands or the right localities. Established methods and varieties are not usually changed quickly. But progress comes slowly but surely. The repeated drouths such as those of 1910, 1911, 1912 and 1913 over

wide areas of our western states tend strongly to depopulate those regions. The farmers give up the struggle to farm in dry regions with the methods and varieties adapted to moist regions, and go back east. However, enough hardy pioneers remain who bravely keep up the fight. The need is more clearly seen of cultivating varieties of plants from similar dry climates of the old world. Note what changes have come from the introduction into the west of drouth-resistant grains like Kafir, Milo, Proso and Kaoliang.

But new introductions in the plant line or any other line, usually do not come without opposition. So many folks are immune to a new idea. Are you one of them?

LIST OF 32 IMPORTATIONS OF PROSO

By N. E. Hansen

Proso gathered by N. E. Hansen, as Agricultural Explorer for the United States Department of Agriculture on the first trip to Russia, Turkestan and Siberia, 1897-1898. The numbers refer to those given in the Inventory of the Seed and Plant Introduction Section of the United States Department of Agriculture.

S. P. I. 227—Panicum Miliaceum—Millet

From North China. Received through Prof. N. E. Hansen, March 1898. (1 package.) "Me-sa".

Chinese black; does not shell when ripe.

481—Panicum Miliaceum—Millet

From South Ussurie, Siberia. Received through Prof. N. E. Hansen, March, 1898. (1 package.)

514—Panicum Miliaceum—Millet

From Orenburg Province. Received through Prof. N. E. Hansen, March, 1898.

561—Panicum Miliaceum—Millet

From Astrakhan Province. Received through Prof. N. E. Hansen, March, 1898. (1 package.)

562—Panicum Miliaceum—Millet

From Astrakhan Province. Received through Prof. N. E. Hansen, March, 1898. (1 package.) Summer variety.

848—Panicum Miliaceum—Millet

From Russia. Received through Prof. N. E. Hansen, May, 1898. (3 packages.)

859—Panicum Miliaceum—Millet

From Russia. Received through Prof. N. E. Hansen, May, 1898. (1 package.) Milled sample; inferior method.

862—Panicum Miliaceum—Millet

From Vernoe, Turkestan. Received through Prof. N. E. Hansen, May, 1898. (1 package.) Wild, black.

874—

From Vernoe, Turkestan. Received through Prof. N. E. Hansen, May, 1898. Millet eaten with milk or alone; a soup cooked of it.

895—Panicum Miliaceum—Millet

From Vernoe, Turkestan. Received through Prof. N. E. Hansen, March, 1898. (1 package.) Used for a gruel. Milled sample. Much used by the peasants.

919—Panicum Miliaceum—Millet

From Neretchinsk, Siberia. Received through Prof. N. E. Hansen, May 24, 1898. Collected by Mr. Roborovsky. (4 packages.)

1001—Panicum Miliaceum—Millet

From Staniza Krasnov on the Uralsk railroad. Received through Prof. N. E. Hansen, May 24, 1898. (1 package.)

Red millet grown especially by the Kirghiz Tartars, but always on new land. With the chaff removed it is used as human food.

1046—Panicum Miliaceum—Millet

From Orenburg, Russia. Received through Prof. N. E. Hansen, May 24, 1898. (1 package.) "Best for dry sections."

1336—Panicum Miliaceum—Millet

From Russia. Received through Prof. N. E. Hansen, February, 1898. (10 packages.)

From Orenburg, Russia, on the boundary between European Russia and Siberia. Endures very severe drouth. The seed is large and is much used, when hulled, for food by the peasants and the Kirghiz Tartars. "Red lump variety."

1384—Panicum Miliaceum—Millet

From Tashkend, Russian Turkestan. Received through Prof. N. E. Hansen, June 4, 1898. From Mr. Durrschmidt. (30 packages.) Native red variety.

1387—Panicum Miliaceum—Millet

From Tashkend, Russian Turkestan. Received through Prof. N. E. Hansen, June 4, 1898. From Mr. Durrschmidt. (30 packages.) Native white variety.

1388—Panicum Miliaceum—Millet

From Tashkend, Russian Turkestan. Received through Prof. N. E. Hansen, June 4, 1898. From Mr. Durrschmidt. (10 packages.) Native black variety.

Proso collected in 1906 by N. E. Hansen, as Agricultural Explorer for the United States Department of Agriculture in England, Scandinavia, Russia, Siberia and returning through China and Japan.

S. P. I. 20640—Panicum Miliaceum—Broom-Corn Millet

From Northwestern China. No. 120.) Meeza.

20678—Panicum Miliaceum—Broom-Corn Millet

From Manchuria. "(No. 158.) The common millet of Manchuria. The present seed was brought by a Russian student-soldier from Manchuria after the Russo-Japanese war." (Hansen.)

20749—Panicum Miliaceum—Broom-Corn Millet

From Turgai province, Siberia. "(No. 229) Native name Salma-bastara. A large-seeded yellow millet. A promising variety, as it is native on dry steppes." (Hansen.)

20751—Panicum Miliaceum—Broom-Corn Millet

From Turgai province, Siberia. "(No. 231). Native name Karsakajak-tara. This appears to be much the same as No. 229 (S. P. I. No. 20749). Both are promising, as they are native on dry steppes." (Hansen.)

20753—Panicum Miliaceum—Broom-Corn Millet

From Turgai province, western Siberia. "(No. 233). Native name Krenak-tara. A wild millet. Much the same as Nos. 229 and 231 (S. P. I. Nos. 20749 and 20751), but with smaller seeds." (Hansen.)

20754—Panicum Miliaceum—Broom-Corn—Millet

From Turgai province, western Siberia. "(No. 234. Native name Kisil-ala-tara. The seeds of this wild millet are large, mostly white, ripening to yellow. All the native millets from Turgai province are used for porridge by the natives. This common dish is called 'Kasha' by the natives." (Hansen.)

20755—Panicum Miliaceum—Broom-Corn Millet.

From Turgai province, western Siberia. "(No. 235) Native name Yak-tara. A wild millet, the seeds of which are large and white." (Hansen.)

20765—Panicum Miliaceum—Broom-Corn Millet

From Turgai province, Siberia. "(No. 245). Native name Sara-

tara. Native millet from the dry steppes; the largest white seeds are used for human food. Considered to be a very good variety." (Hansen.)

20767—Panicum Miliaceum—Broom-Corn Millet

From Turgai province, Siberia. "(No. 247). A yellow-seeded millet, native to dry steppes. Taken out of No. 235 (S. P. I. No. 20755)" (Hansen).

20768—Panicum Miliaceum—Broom-Corn Millet

From Turgai province, Siberia. "(No. 248). A yellow-seeded millet, native to dry steppes. Taken out of No. 245 (S. P. I. No. 20765)". (Hansen.)

21720—Panicum Miliaceum—Broom-Corn Millet

"Ak-kunak. (No. 296). From Tashkent, Russian Turkestan. A native millet." (Hansen).

21722—Panicum Miliaceum—Broom-Corn Millet

"Bulbul-kunak. No. 298). From Moha, via Tashkent, Russian Turkestan. A red millet." (Hansen).

21724—Panicum Miliaceum—Broom-Corn Millet

"Tschiljaki-taryk. (No. 300). From Tashkent, Russian Turkestan. Seed of native white millet." (Hansen).

1908 introductions of Proso by Prof. N. E. Hansen, while traveling as Agricultural Explorer for the United States Department of Agriculture. Seeds received December 3, 1908.

24560—Panicum Miliaceum L.—Millet

"(No. 136) 'Orenburg red millet', grown at Tashkend, Turkestan. May prove to be the same as the **Red Lump Orenburg millet** I introduced from my 1897 trip to Russia. Everything from Orenburg ought to be specially adapted to dry-farming conditions." (Hansen).

24561—Panicum Miliaceum L.—Millet

"(No. 188) 'Chinese black millet' from Tashkend, Turkestan. Appears similar to the lot I obtained in Turkestan in 1897. Afterwards Mr. M. A. Carleton secured the Black Voronesh millet. 'Voronesh' appears a better spelling than 'Voronezh.' These large black-seeded millets produce heavily in South Dakota, even when sown late on new breaking, and are useful in stock feeding. The Kirghiz Tartars of northern Turkestan use these and other large-seeded native millets extensively as an important part of their daily diet. For their value in feeding steers, see South Dakota Agricultural Experiment Station Bulletin No. 97, by James W. Wilson and H. G. Skinner." (Hansen).

Proso introduced 1913 by N. E. Hansen.

From the circular "Plants for Dry Western Uplands," N. E. Hansen, South Dakota Experiment Station, February 9, 1914:

These seeds were gathered upon my fourth expedition to Siberia on the dry, open steppes near Semipalatinsk, Southern Siberia. This is a region with a total annual precipitation of eight inches, including both rain and snow, and with a temperature range of from 106 degrees in summer to 50 degrees below zero Fahrenheit in winter, often without snow. The expedition was authorized by the South Dakota State Legislature, March, 1913.

Hansen's White Siberian Proso—A large seeded white

grained millet of the proso type, grown by the Kirghiz Tartar nomads in the Semipalatinsk region as a grain for their stock, also eaten extensively by the Kirghiz themselves. The corner stone of their agriculture is this 8-inch rainfall climate. The hay is not used except for feeding to horses for a few days in the spring to hasten shedding. The farmers upon our driest uplands in our western states from our Mexican to our Canadian boundary, ought to be able to raise this grain millet in our driest years.

KAOLIANG THE RESULT OF THE NORTHWEST SPREAD OF SORGHUM, A TROPICAL PLANT.

The sorghum plant is native of the tropical and subtropical parts of Africa and Asia and has been cultivated from prehistoric times.

Carleton R. Ball in "The History and Distribution of Sorghum,"* gives an interesting description of its early history. In Egypt is recorded the earliest known mention of its cultivation. Under cultivation the range of the plant has been gradually extended northward to northern China, Manchuria and eastern Siberia. This northernmost group of sorghums is known as Kaoliang. The plant has varied to a marvelous extent under cultivation, including such widely different groups as Sorghum or sweet sorghum cultivated for sugar and syrup, broom corn, and the various grain sorghums, such as kafir, milo, shallu, durra, feterita and kaoliang. Throughout Africa the various varieties of sorghum furnish the chief cereal food of the natives, and in India and the southern half of Asia this grain is one of the chief articles of human food.

All these cultivated sorghums are considered by botanists to have originated from the plant known as *Andropogon Sorghum*, Brotero or *Sorghum vulgare*, Person, and by botanists are all considered to have been developed from the wild plant known as *Andropogon Halepensis*, (L.) Brot. Halepensis refers to the town Aleppo in Asiatic Tur-

*History and Distribution of Sorghum, Carleton R. Ball, Bulletin 175 Bureau Plant Industry, United States Department of Agriculture, Washington, D. C., Issued April, 1910.

key. Von Mueller considers Aleppo grass is the right name of this plant but when introduced into the United States it was called Johnson grass. Although valuable for forage, its habit of underground spreading perennial root stocks makes Johnson grass a weed throughout the south. In the spring 1909 another wild species of this plant was introduced from the Sudan region of Africa by the United States Department of Agriculture and is now winning wide favor as Sudan grass, a drouth-resistant forage plant. Sudan grass is free from the spreading root stocks.

THE HISTORY OF KAOLIANG.

The history of Kaoliang illustrates the fact that a tropical annual plant may be extended far north of its original limits by its selection for earliness. Common Indian corn or maize is another example. The native home of Indian corn is supposed to be under the equator in Peru and adjacent regions where it grows to be 20 feet in height and needs seven months for maturity, and with immense kernels about $\frac{5}{8}$ by $\frac{3}{4}$ inch. In the course of many centuries the cultivation was extended by the Indians northward into Canada by selection for greater earliness and shorter stature of plant. This work was done before Columbus came to America. In a similar way the sorghum plant was found by prehistoric man to vary rapidly under cultivation, and its cultivation gradually extended northward into northern China, Manchuria and eastern Siberia. The work of selection is now taken up in the United States and there is no reason why Kaoliang cannot be extended north as far as Indian corn on this continent.

In the endeavor to improve sorghum for syrup and sugar, a few samples of Kaoliang from China reached America as early as 1866, and again in 1881 and 1890. These were all promptly discarded and lost since they proved to be of no value for sugar making.

The first introduction of Kaoliang from Siberia, and the first permanent introduction from China was made by the present writer.

Carleton R. Ball writes :*

"The official introduction of Kaoliang varieties into the United States by the United States Department of Agriculture began with the receipt of S. P. I. No. 225 from North China in the year 1898. Between that time and the close of the year 1910 a total of 51 direct and 3 indirect introductions from eastern Asia had been made."

My endeavor in these expeditions has been to secure seeds and plants from as far north as possible in Asia so as to get the benefit of many centuries of selection by the people of these short season regions. Selection is a sieve by which the plants not adapted to the climate are discarded.

In visiting Turkestan in 1897 I first obtained samples of cultivated grain sorghum which proved to be a form of the white durra similar to that raised in northern Africa. But Kaoliang was not found in cultivation until Siberia was reached. The original name was Gaolan, (S. P. I. 225) which evidently is the same word as Kaoliang. As a matter of fact it is impossible to render this Manchurian and Chinese word exactly into English. Gaolan has the merit of being the shorter northern form of the word.

The second introduction of Kaoliang was received by the United States Department of Agriculture by way of Japan in the spring of 1906. The fall of 1906 on my second trip through Siberia, returning by way of Japan, I brought several more samples of Kaoliang, and also the interesting news that during the Russo-Japanese war whole regiments of Cossack Cavalry had maneuvered in the immense fields of Kaoliang in eastern Manchuria. In the third expedition to Siberia in 1908 a large sackful was brought from north-western Manchuria where an arm of the Gobi Desert crosses the Siberian railway.

The history of Kaoliang shows what difficult and slow work it is to introduce a new plant. During the severe drouth during several seasons over in the prairie West,

*"The Kaoliangs: A New Group of Grain Sorghums"—By Carleton R. Ball, Agronomist in charge of Grain-Sorghums and Broom-Corn Investigations, Bulletin 253, Bureau of Plant Industry, United States Department of Agriculture, Washington, D. C. Issued January 11, 1913.

Kaoliang proved to be an extremely drouth-resistant plant, valuable both for grain and forage, and from now on it is evident that it will make steady progress. For the value of Kaoliang for feeding pigs see Bulletin No. 157, South Dakota Experiment Station, by James W. Wilson. For information on the field culture of Kaoliang see Bulletin No. 156, South Dakota Experiment Station, by A. N. Hume and Manley Champlin. South Dakota No. 290, which has proven to be the earliest for South Dakota, is descended from my second introduction of the Manchu Brown Kaoliang in 1906, (S. P. I. 20612, 20620, 20621, and 20627), South Dakota No. 289 is descended from the Manchu Brown Kaoliang, received by the United States Department of Agriculture from Manchuria by way of Japan in the spring of 1906. The first importation of the Manchu Brown Kaoliang was the one I obtained from Siberia in 1897 as S. P. I. 939. When first introduced, Kaoliang grew too large and was too uneven in ripening for the best results, but this has been remedied by selection, and the work is still under way.

GRAIN SORGHUMS AS HUMAN FOOD.

Carleton R. Ball writes concerning grain sorghums as human food:*

“Meal made from the grain sorghums ground locally is not infrequently used in the making of batter cakes and similar articles of food on the farm. The general testimony is that these are delicious in quality. Some experiments are now being conducted in a small way to determine the value of the meal for more extended use. There seems little reason why, when properly milled, it should not be used in much the same manner as corn meal. Throughout Africa, India, and the other parts of Southern and eastern Asia, where these crops are largely grown, they are not only commonly used as human food, but in many countries they furnish the chief article of diet.”

*The Importance and Improvement of the Grain Sorghums”—By Carleton R. Ball, Agronomist in Charge of Grain-Sorghum Investigations. Bulletin 203, Bureau of Plant Industry. United States Department of Agriculture, Washington, D. C. Issued January 20, 1911.

MILLING KAOLIANG WITH A CLOVER HULLER.

H. L. Jeffries of Sansarc, Stanley County, South Dakota grew Kaoliang in 1913 from samples sent him by the South Dakota Experiment Association, and reports as follows:*

“The kaoliang you sent me is what I call a success in every way. I tried to thresh it in a clover huller, but it made a coarse meal of it. We tried some for breakfast food and for pudding, and all who have sampled it like it better than any of the patent breakfast foods. It takes three-quarters of an hour to cook it.

“When all the wind was turned on the huller it cleaned it very nicely. I will send you a sample. A clover huller could prepare about 600 pounds of meal per hour from the heads.”

THE MILLING OF KAOLIANG.

At the same time that the milling of Proso was undertaken at this station it was decided to test Kaoliang also. By use of a coffee mill and the same set of sieves, samples corresponding to the various grades of flour were prepared from Kaoliang seed. However, it became evident that it was much more of a task to mill Kaoliang satisfactorily than it was to mill Proso. It appears very probable that the milling of Kaoliang will present no difficulty to the practical miller using ordinary milling machinery. The work was continued at this time only long enough to mill the necessary samples.

POP KAOLIANG.

Incidentally during the experiment one sample was parched before grinding. Many of the kernels “popped,” much the same as popcorn. Samples of this Pop Kaoliang were served January 6th along with the Proso. If dried one year as is usual with pop corn most of the kernels would no doubt pop.

*The Dakota Farmer. Feb. 1, 1915, page 135.

ANALYSIS OF KAOLIANG FLOUR.

The flour made from Kaoliang using a No. 100 screen, corresponding to patent wheat flour, was analyzed for fat, crude fiber and protein by Guy E. Youngburg, first assistant chemist of this station. The percentages are as follows:

Fat	2.09
Crude fiber65
Crude protein	7.81

This screen takes out too much protein. In Bulletin 157 of this station the percentage of crude protein in coarsely ground Kaoliang meal is 14.93, fat 2.56, crude fiber 1.19. In corn meal: crude protein 10.15, fat 1.19, crude fiber 2.17.

RECIPES FOR USING KAOLIANG FLOUR.

The fact that Kaoliang forms an important article of food for millions of people in China, Manchuria, Mongolia and eastern Siberia, and the fact that it will make a crop in seasons too dry for Indian corn make this subject one worthy of investigation. In the endeavor to balance the lack of gluten in Kaoliang flour with rye and wheat flour the following recipe for Kaoliang bread was originated by Miss Nola K. Fromme, who also in the two next recipes shows that Kaoliang may be used as the only flour.

KAOLIANG BREAD.

1½ teaspoon salt	2 cups kaoliang flour
1 pint liquid	2 cups rye flour
½ cup prepared yeast	2 cups wheat flour

The yeast may be homemade, dry or compressed. Scald the milk (liquid may be milk or water), dissolve the salt in it and when lukewarm add the yeast. Beat in the flour using enough white flour at the last to make a stiff dry dough but do not knead. Let stand until it cracks open. Pour in oiled tins and when well risen bake in a moderate oven.

KAOLIANG PUDDING

One cup of brown sugar, one cup of buttermilk, one

cup of chopped raisins, one-half cup molasses, two cups Kaoliang flour, four tablespoonfuls of melted butter, one teaspoon of soda, spices to taste. Steam three hours. Serve with whipped cream or any favored pudding sauce.

KAOLIANG MUSH

$\frac{3}{4}$ cup Kaoliang flour
3 cups boiling water
1 teaspoon salt

Stir the Kaoliang into the boiling water and cook for five minutes directly over the flame. Then cook in double boiler 2 hours.

SUBSTITUTING KAOLIANG FOR KAFIR FLOUR.

The fact that Kaoliang is closely allied to Kafir and in fact may be considered a northern extension of Kafir, indicated the advisability of testing the substitution of Kaoliang for Kafir flour. The culinary possibilities of Kafir flour have already been investigated by Dr. C. F. Langworthy, Chief of Nutrition Investigations and Caroline L. Hunt, Expert in Nutrition, of the United States Department of Agriculture and the results published October 16, 1913 as Farmers' Bulletin 559. With this work as a basis the following dishes were prepared in the Department of Home Economics under the direction of Miss Nola K. Fromme, the only change made being the substitution of Kaoliang for Kafir. The public test was made March 10, 1915, and the consensus of opinion as to flavor and quality was very favorable. The recipes for Kaoliang pancakes and waffles were based on Farmers' Bulletin 565, "Corn Meal and the Ways of Using It," by the same authors, the only change being that Kaoliang was substituted for corn meal.

KAOLIANG COTTAGE PUDDING.

$\frac{1}{2}$ cup flour	$\frac{1}{2}$ cup sugar
$\frac{1}{2}$ cup kaoliang flour	$\frac{1}{2}$ cup milk
2 teaspoons baking powder	$\frac{1}{8}$ teaspoon salt
2 tablespoons butter	1 egg

Cream the butter, add sugar and egg well beaten. Add

flour sifted with baking powder and milk alternately. Bake in a small cake tin 25 minutes in a moderate oven. Serve with lemon sauce.

LEMON SAUCE.

Juice and rind of one lemon	1 pint water
1 cup sugar	2 tablespoons butter
$\frac{1}{4}$ cup flour	1 egg

Grate the rind of lemon and pour juice over it. Mix sugar and flour, pour in the water boiling and cook from five to ten minutes. Add butter and juice and rind. The egg if used may be blended in before straining.

KAOLIANG PANCAKES

2 cups flour	1-3 cup sugar
$\frac{1}{2}$ cup kaoliang	$1\frac{1}{2}$ cups boiling water
$1\frac{1}{2}$ tablespoons baking powder	
$1\frac{1}{2}$ teaspoons salt	$1\frac{1}{4}$ cups milk 1 egg

Add kaoliang to boiling water and boil 5 minutes; turn into bowl, add milk and remaining dry ingredients mixed and sifted, then the egg well beaten, and butter. Cook on a greased griddle.

KAOLIANG GINGERBREAD.

2 cupfuls kaoliang	1 cupful wheat flour
$2\frac{1}{2}$ cupfuls sour milk or buttermilk	
1 teaspoonful salt	2 tablespoonsful butter
2 teaspoonfuls powdered ginger	
1 teaspoonful powdered cinnamon	
$\frac{1}{2}$ teaspoonful powdered cloves	
$1\frac{1}{2}$ teaspoonfuls soda	$\frac{3}{4}$ cupful sugar 1 egg

Mix thoroughly the kaoliang, buttermilk, and salt in a double boiler, and cook over hot water one-half hour or longer. Stir the butter into the mush while it is still warm. Sift together the flour, spices, and soda. When the mush is cool combine all the ingredients. Beat thoroughly and bake in a moderate oven in shallow iron pans.

DOUGHNUTS WITH KAOLIANG.

2 cupfuls milk, or milk and water	
1½ cupfuls kaoliang	2¾ cupfuls wheat flour
1 teaspoonful salt	1 teaspoonful cinnamon
¼ cupful butter	2 teaspoonfuls baking powder
¾ cupful sugar	2 eggs

Heat the first three ingredients for a half hour or longer in a double boiler. Add the sugar and butter, and cool. Sift together the flour, cinnamon, and baking powder, and add to the cooled mush. Add the eggs well beaten and proceed as with other doughnuts.

KAOLIANG AND PEANUT COOKIES.

2 tablespoonfuls butter	¼ cupful sugar
1 teaspoonful baking powder	2 eggs
2 tablespoonfuls milk	¼ teaspoonful salt
1 teaspoonful powdered ginger	½ cupful kaoliang
½ cupful finely chopped peanuts	

Cream the butter, add the sugar and the eggs, and beat well. Mix and sift baking powder, salt, flour, and ginger, and add them to the first mixture. Add the milk and the peanuts, and again beat thoroughly. Drop the mixture from a teaspoon onto an unbuttered pan, bake 15 minutes in a slow oven. Or spread it in a very thin layer on the bottom of a dripping pan, bake in a slow oven, and while still warm cut into squares.

BUTTERMILK WAFFLES.

3 cups water	4 eggs
2 cups kaoliang	2 tablespoons butter
2 cups wheat flour	2 teaspoons salt
1 cup sweet milk	1½ teaspoons soda

Buttermilk or sour milk enough to make a thin batter.

Cook the kaoliang, water, salt, and butter together in a double boiler for 10 minutes. When the mush is cool add the eggs, beaten separately until very light. Sift the flour and soda together. Add the flour and the sweet milk alternately to the kaoliang mixture. Finally add the buttermilk. This mixture is improved by standing a short time.

KAOLIANG YEAST BREAD.

2 tablespoonfuls sugar	2 cupfuls kaoliang
3 teaspoonfuls salt	2 cupfuls water
Wheat flour	
2 tablespoonfuls butter, lard or other fat	
$\frac{1}{2}$ yeast cake (or 1 cake if haste is an object) dissolved in $\frac{1}{4}$ cupful of lukewarm water	

Cook the kaoliang, sugar, salt, and water together in a double boiler for an hour; add the butter and cool. Stir in the yeast mixed with a little water. Add enough wheat flour to make a soft dough (about 1 cupful). Turn onto a board and mold thoroughly. Form into a loaf and put in a warm place to rise. When light, bake in a moderate oven.

KAOLIANG MUFFINS.

1 cupful kaoliang	1 teaspoonful ginger
$1\frac{1}{4}$ cupfuls buttermilk	$\frac{1}{2}$ teaspoonful soda
$1\frac{1}{2}$ tablespoonfuls butter	$\frac{3}{4}$ teaspoonful salt
1 tablespoonful sugar	

Cook the kaoliang and the buttermilk together in a double boiler for a half hour or longer. While the mush is still warm, add the butter. When it is cool, add the other ingredients, dissolving the soda in about a tablespoonful of water. Bake in gem pans.

BOYS' KAOLIANG CLUBS.

Boys' Corn Club Contests are a popular feature of the extension work of the South Dakota State College of Agriculture and Mechanic Arts. Early this Month Prof. W. M. Mair, Superintendent of boys' and girls' club work, arranged with the Agronomy Department to furnish 250 pounds of Kaoliang seed for this work in co-operation with the county superintendents of a number of counties in central South Dakota. Each boy is to receive 1 pound of seed, sufficient to plant about one-fourth acre. It is evident that such clubs will contribute materially to a more general knowledge of this important crop.

EARLY INTRODUCTIONS OF KAOLIANG.

Varieties of kaoliang from the first tour to Siberia, 1897, by N. E. Hansen.

The numbers refer to the Inventories of the Seed and Plant Introduction Division of the United States Department of Agriculture.

225—Sorghum Vulgare

From North China. Received through Prof. N. E. Hansen, March, 1898. (1 package). "Ga-oo-lan." Used for human food. This variety has been classified and named **Hansen Brown** by Carleton R. Ball in Bulletin 253.

472

From Siberia. Received through Prof. N. E. Hansen March, 1898. (3 packages.) "Gaolan." Imported into Amur Province, Siberia, from China.

476.

From South Ussurie, Siberia. Received through Prof. N. E. Hansen, March, 1898. (4packages). "Gaolan."

939.—Sorghum

From Nertchinsk, Siberia. Received through Prof. N. E. Hansen, May 24, 1898. Collected by Mr. Roborovsky. (4 packages.)

This variety has been named **Manchu Brown** by Carleton R. Ball in Bulletin 253.

KAOLIANG introduced from the second tour to Siberia, 1906, by N. E. Hansen :

20612—ANDROPOGON SORGHUM—Sorghum

From Manchuria. (No. 92) Gaolan. Brought by a Russian student-soldier from Manchuria after the Russo-Japanese war." (Hansen).

This variety has been named **Manchu Brown** by Carleton R. Ball in Bulletin 253.

20620—ANDROPOGON SORGHUM—Sorghum

From Ussurie province, Siberia "(No. 100). Gaolan. This variety grows from 20 to 25 feet in height, and during the Russo-Japanese war the Cossacks on horseback found trouble in getting through the sorghum fields, as they would be lost from view even with their spears." (Hansen).

This variety has been named **Manchu Brown** (?) by Carleton R. Ball in Bulletin 253.

20621—ANDROPOGON SORGHUM—Sorghum

From Ussurie province, Siberia "(No. 101) Gaolan. For description see No. 100 (S. P. I. No. 20620). The head does not appear as compact as in No. 100. Seed brought from Manchuria by Russian student-soldiers after the Russo-Japanese war." (Hansen.)

This variety has been named **Paperhull** by Carleton R. Ball in Bulletin 253.

20627—ANDROPOGON SORGHUM—Sorghum.

From Manchuria. "(No. 107.) Native name Tjie-choo-meedzha. This variety is used for brooms in Manchuria. Seed brought from Manchuria by a Russian student-soldier after the Russo-Japanese war." (Hansen.)

This variety has been named **Manchu Brown** by Carleton R. Ball in Bulletin 253.

20706—ANDROPOGON SORGHUM—Sorghum.

From south Ussurie, Pacific coast section, Siberia. "(No. 186.) Gaolan." (Hansen.)

This variety has been named **Baird Brush** (?) by Carleton R. Ball in Bulletin 253.

KAOLIANG brought from the third tour to Siberia, 1908,
by N. E. Hansen:

2478—ANDROPOGON SORGHUM (L) BROT—Kowliang

(No. 85.) Variety Gaolan from Harbin district, bought in a Chinese bazaar at Station Manchuria, the first station in Chinese territory going east on the Siberian Railway. The favorite variety of northern Manchuria. (Hansen.)

Received from Manchuria through Prof. N. E. Hansen, Agricultural Explorer, December 3, 1908. This has been named **Manchu Brown** by Carleton R. Ball in Bulletin 253.

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