

1984

## EC84-408 Grain as Food

Anna Mac Brenner

Harriet Kohn

Katherine Riddle

Follow this and additional works at: <http://digitalcommons.unl.edu/extensionhist>

---

Brenner, Anna Mac; Kohn, Harriet; and Riddle, Katherine, "EC84-408 Grain as Food" (1984). *Historical Materials from University of Nebraska-Lincoln Extension*. 4428.

<http://digitalcommons.unl.edu/extensionhist/4428>

This Article is brought to you for free and open access by the Extension at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Historical Materials from University of Nebraska-Lincoln Extension by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

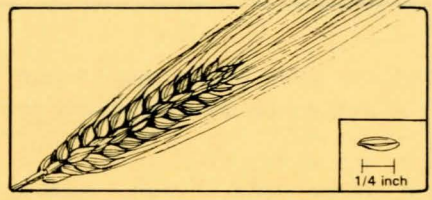
AGRI  
S  
85  
E7  
84-408  
c.1



AMARANTH



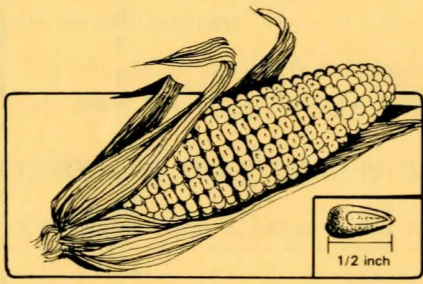
WHEAT



BARLEY



PROSO MILLET




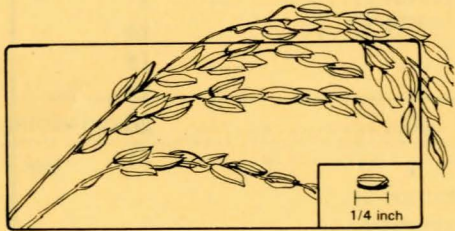
CORNMEAL

Nebraska Cooperative Extension Service—EC84-408

UNIVERSITY OF NEBR  
DEC 10 1984  
Nebraska Documents  
Collection

# GRAINS as food

h Issued in furtherance of Cooperative Extension work,  
Acts of May 8 and June 30, 1914, in cooperation with the  
U.S. Department of Agriculture. Leo E. Lucas, Director of  
Cooperative Extension Service, University of Nebraska.  
Institute of Agriculture and Natural Resources.

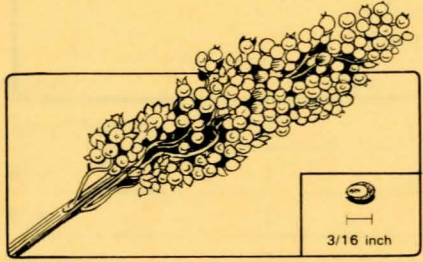
RICE



BUCKWHEAT



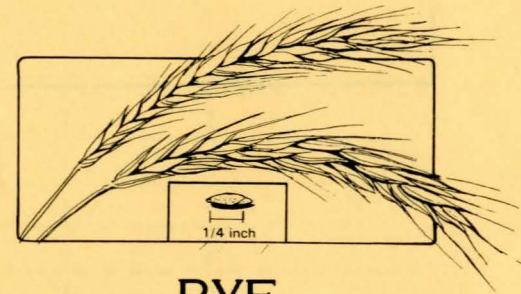
POPCORN



SORGHUM



OATS



RYE

# GRAINS AS FOOD

Anna Mae Brenner, Extension Food Service Mgt. Specialist  
Harriet Kohn, Extension Food & Nutrition Specialist  
Katharine P. Riddle, Extension Food & Nutrition Specialist  
Charles E. Walker, Associate Professor-Cereal Technology

## Contents

Introduction .....	3
Grains:	
Amaranth .....	4
Barley .....	4
Buckwheat .....	5
Cornmeal .....	6
Oats .....	6
Popcorn .....	7
Proso Millet .....	7
Rice .....	8
Rye .....	9
Sorghum .....	9
Wheat and Bulgur .....	10
Recipes:	
Amaranth .....	13
Barley .....	13
Buckwheat .....	14
Cornmeal .....	15
Oats .....	16
Popcorn .....	16
Proso Millet .....	17
Rice .....	18
Rye .....	18
Sorghum .....	19
Wheat and Bulgur .....	20
Nutrition Information .....	21

## Acknowledgment

The authors acknowledge the assistance of Ms. Kathy Ryland in the preparation of this publication.

## INTRODUCTION

Sorghum, buckwheat, proso millet, barley...these are just a few of the many grains that can be used by today's consumers for preparing cookies, cakes, soups, casseroles and many other dishes. Cookbooks seldom mention these less common grains.

Of the eleven cereals and other grains described here all but three, amaranth, barley and rice, are important to the economy of Nebraska. (amaranth grows here but is considered a weed). Recent increases in production of grains and research on their uses for human consumption have both contributed to the public interest in, and desire for information on, grains as food.

The various cereal grains have very similar structures. They contain three basic parts; the bran, endosperm, and germ. The bran is the outside protective cover of the grain. The endosperm, which is the middle starchy area, provides energy in the form of carbohydrate to the germinating plant. The germ, also called the embryo, is the part which develops into a new plant. The embryo contains oil and protein.

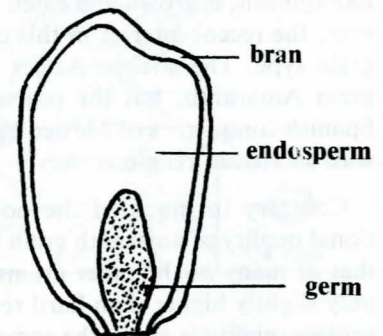
The oils are the most efficient form of energy storage for the plant, but oil can become rancid. Once milled in-

to flour, the germ may become rancid quite rapidly. Therefore, the germ is usually removed during processing.

The endosperm protein "gluten" which occurs in many cereal grains (see chart on gluten content) contributes significantly to the "rising ability" of their flours. It is also a substance to which some people are allergic.

The bran is sometimes removed because of its dark color and coarse texture. However, many nutrients contained in bran are lost by this removal. Though the resulting flour is white it has to be "enriched" if the nutrient value is to approximate the original whole grain product. Many people now want the bran to be ground along with the endosperm so nutrients are not lost.

Diagram of wheat grain



### REGIONS OF THE WORLD WHERE CEREALS ARE GROWN

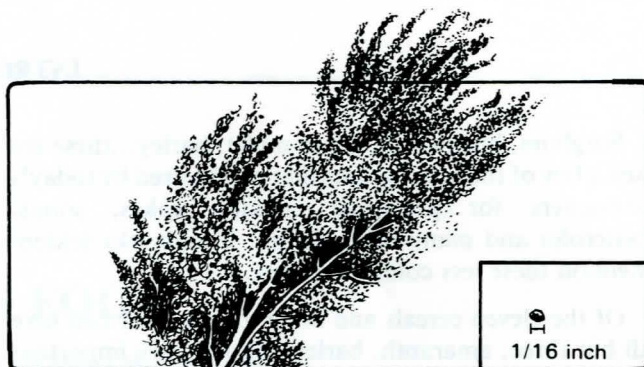
**KEY: Major Crop 2, Minor Crop 1, No Crop 0**

Specific Areas	North America	South America	Western Europe	Eastern Europe & Russia	Africa	Middle East	Far East	Australia & Oceania
Amaranth	1	No Cultivated		Crop-----				
Barley	1	1 (2-Eastern Pampas)	2	1	1	1	(1-Upper Ganges Plain) (2-Yangtze Basin)	1
Buckwheat	1	0	0	2	0	0	(1-China)	0
Corn	2	1 (2-Eastern Pampas)	1	2	1 (2-Nile Valley) (2-Maize Triangle)	1	1-2	1
Oats	2	0 (1-Eastern Pampas)	2	2	1	1	1	1
Popcorn	1	No Cultivated		Crop-----				
Proso Millet	2	1	1	2	2	1	2	1
Rice	1	1	1	0	1	1	2	1
Rye	1	1	2	2	0	1	0	0
Sorghum	2	1	1	1	2	1	2	0
Wheat	2 (2-Eastern Pampas)	1	2	2	1	2	2	2

# AMARANTH

FAMILY: *Amaranthaceae*

GENUS SPECIES: *Amaranthus cruentus*



## History and Botany

Amaranth is a very old plant that has received a lot of attention in recent years. Botanically, it is not a cereal grain (all the cereals are members of the grass family, Gramineae), but rather a relative of the common pigweed. It grows in many parts of the world, often as a weed. A vegetable variety, producing large leaves much like spinach, is grown and eaten in parts of India. However, the recent interest in this country has been in the grain type. The ancient Aztecs grew large amounts of grain Amaranth, but the practice was banned by the Spanish conquerors of Mexico because of its association with sacrificial religious rites.

Contrary to much of the popular press, the nutritional quality of amaranth grain is not vastly superior to that of many of the other grains. Its protein content is only slightly higher than hard red spring wheat, and its protein quality is about the same. Amaranth contains a higher percentage of lysine in its protein than does wheat, but it is inferior to wheat in some other respects. The oil in amaranth seed is higher in polyunsaturated fatty acids than the oils from any other grains. However, the amount is so low that it probably would not be a significant contribution to the diet.

## Availability, Processing, and Storage

Amaranth is available in only a few health food stores, and by mail, but has been attracting an unusual

amount of attention. Many people are growing their own amaranth. It grows relatively well on poor soil, requiring less water, fertilizer, and care than the grains we are more familiar with. The very small seeds (less than 1/16 inch in diameter) are borne in brush-like clusters at the top of largeleafed plants about three feet high. After the crop matures and turns dry, the seeds may be threshed and stored for over one year if kept dry. Because of its oil content, however, amaranth flour, like most other whole grain flours, should be used immediately after milling or stored under refrigeration.

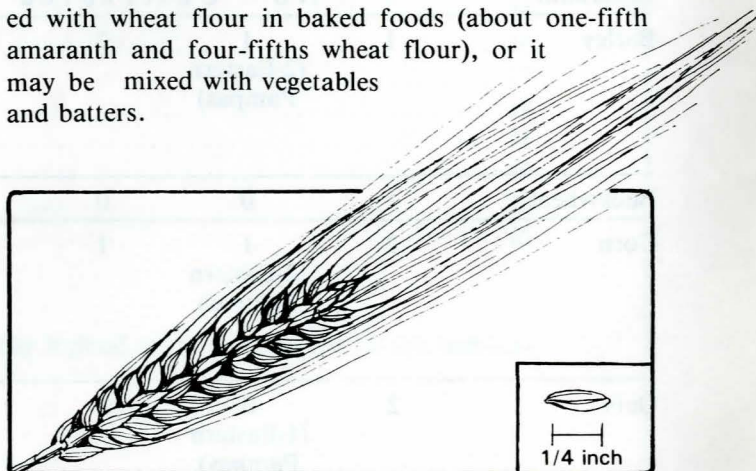
## Cooking Characteristics

Amaranth starch has a higher water binding capacity than does wheat starch, and it gelatinizes at a higher temperature. Amaranth starch is like a "waxy" cereal starch or tapioca starch, in that it thickens but does not set into a firm gel upon cooling. The protein in amaranth does not contain gluten, so it cannot be used by itself to make light yeast-leavened foods. Amaranth may be eaten as a whole grain, cooked cereal, or popped for a snack, and it may be milled from a flour and mixed with wheat flour in baked foods (about one-fifth amaranth and four-fifths wheat flour), or it may be mixed with vegetables and batters.

# BARLEY

FAMILY: *Gramineae*

GENUS SPECIES: *Hordeum vulgare*



## History and Botany

Six row barley, *Hordeum hexatichum*, was found in the earlier sites of Mesopotamia, Egypt, and Cilicia in 5000 B.C., Western India and Greece by 3000 B.C., and in Europe by the 10th century. It is a widely adopted crop and can produce a reasonably good yield of grain under poor soil and moisture conditions. Today, in

Europe and North America, it has been replaced by wheat and rye. In the United States, the major use of barley is for the production of malt, used in alcoholic beverages. Minnesota, North and South Dakota, California, Wisconsin, and Nebraska are the chief barley producing states. Barley as bread was part of the diet of David's army (II Samuel 17:28). It was used before wheat and rye.

### Availability, Processing, and Storage

Pearled barley, in regular and quick forms, is found in most supermarkets. Pearled means that the barley has the outer hull removed from the grain kernels by abrasive action. Barley hulls do not soften, even with long hours of cooking, so barley is sold only after being pearled. Scotch barley is husked grain, roughly ground. Barley flour is made by grinding the "pearls."

Pearled barley and flour should be stored in a metal or glass container with a tight fitting lid. Keep in a dry area at room temperature or under refrigeration.

### Cooking Characteristics

Malted barley has been allowed to sprout for a short period and then dried. It is used as a flavoring agent for

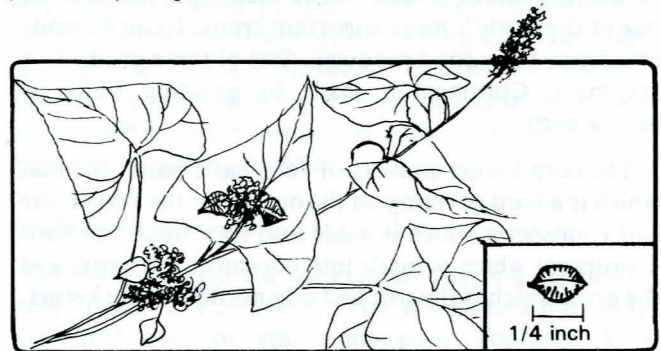
cereal breakfast foods and for malted milk. Small amounts of malted barley are used by commercial bakers in bread doughs to promote active yeast fermentation.

Instant pearl barley can be added to boiling water to make a hot granular cereal in 10 minutes. Regular pearl barley has been used in Scotch broth and other soups which need to cook slowly for an hour or more. Barley flour contains some glutenlike protein. While the gluten is not strong enough to make good bread by itself, it may be enough to affect those people allergic to wheat flour. In recipes, substitute barley flour for 1/4 of the wheat flour. In substitution for 1 cup of wheat flour use 1 1/4 cups of barley flour. It can give a moist texture (like cake) to quick breads.

# BUCKWHEAT

FAMILY: *Polygonaceae*

GENUS SPECIES: *Fagopyrum esculentum*



### History and Botany

Buckwheat is not a wheat at all, for it is not one of the true cereal grains, which are members of the grass (Gramineae) family. Rather, it is a herbaceous plant. The fruit (so-called seeds) can be used in much the same way as the cereal grains, so many people think of it as a cereal. The triangular shape seeds are covered with a dark, gray hull which can be removed by commercial milling equipment. Their shape resembles a miniature beechnut; hence, our name, derived from the German buckweizen, or "beechwheat."

Buckwheat has been a staple food in China for over 1,000 years, and has been grown in Europe for over 500 years. Today, it is still a staple food in Eastern Europe and in Russia, where millions of acres are grown. Much buckwheat was grown in this country a century ago, and is now enjoying a rebirth in this decade, following a steady decline in popularity for many years. Interest in this new-old world food has increased substantially since the 1970s and a rebirth in interests for natural foods. The plant likes a cool, moist climate. It will grow almost anywhere, even in poor, arid soils, and matures in only 60 days.

### Availability, Processing, and Storage

Pennsylvania and New York are especially known for their buckwheat production, but the growing area has been expanding in recent years, and moving westward into the Michigan to Minnesota area. It is available in a

few large grocery stores, as well as in food coops and health food stores. In addition to the ubiquitous buckwheat pancake mix, you can buy the dehulled seed, or groat, both in the whole and cracked forms, and as light and dark flours. Buckwheat is very bland in its natural form and is often roasted to develop its characteristic nutty, strong flavor.

Home-ground flours usually contain a high level of the hull, resulting in a very dark gray appearance. The whole grain will keep for a year, and commercially milled flours may be stored for several months, if kept dry and cool. All homemilled flour should be refrigerated if it is not going to be used within a few days.

### Cooking Characteristics

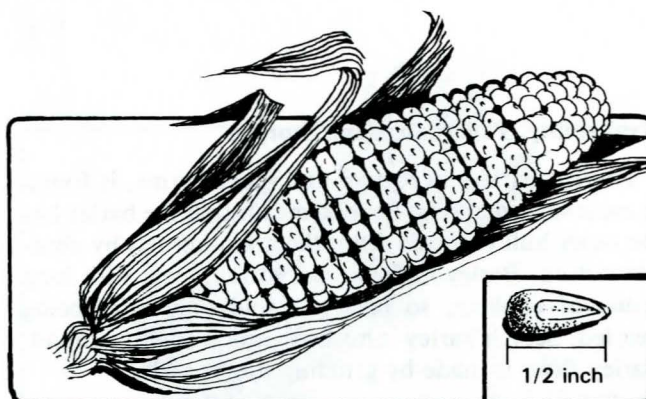
Kasha is the Russian name for cooked buckwheat, and is the term used in Jewish cookery for a thick porridge made by boiling cracked groats. The bland, unroasted groats may be used for stuffings or pilafs, much like rice, or for a cooked cereal much like Cream of Wheat. The light flour can be used in baked goods and sauces, often in combination with wheat flour, and the strong, dark flour is usually used alone for pancakes.

The light flour is a relatively easily digested cereal for babies or invalids. Because buckwheat is not a wheat at all, it does not contain gluten and may be eaten by many people who are sensitive to the proteins in wheat flour. Because it lacks these dough-forming glutes, however, it cannot be used to make traditional light breads.

# CORNMEAL

FAMILY: *Gramineae*

GENUS SPECIES: *Zea mays*



## History and Botany

Corn, known as Maize in most of the world, botanically named *Zea mays*, is a native of America. Indians grew white, yellow, red, and blue corn for 2,000 years before Columbus landed. Since then corn has become one of the world's most important crops. It can be made into many basic food products. One of these products is cornmeal. Cornmeal is made by grinding white or yellow corn.

The corn kernel consists of four basic parts: the hull which is a hard covering on the outside of the kernel; the soft endosperm which is made into corn flour; the hard endosperm which is made into cornmeal and grits; and the germ which is the soft and oily portion of the kernel.

## Availability, Processing, and Storage

Corn is available almost all over the world. Cornmeal and grits can be purchased in grocery stores, small mills, or from health food stores.

The corn kernels are processed to produce a variety of products. First the kernels are cleaned and steamed. The

hull and germ are removed. Removing the germ, which is high in fat and can become rancid, increases the shelf life of the corn products. The endosperm is then broken into granules. The large size granules are called grits, the medium ones are called cornmeal, and the finest are used for corn flour. Cornmeal can be stored tightly covered on a cool shelf for 4 to 6 months or longer refrigerated.

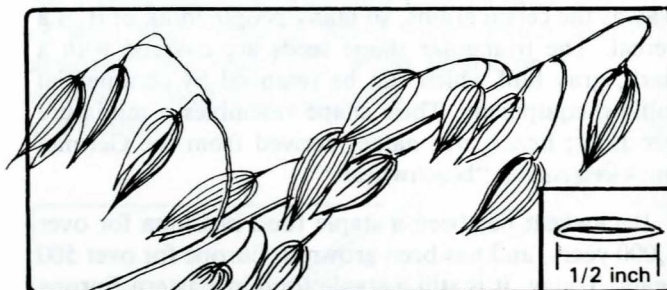
## Cooking Characteristics

Since cornmeal and grits are not made from the whole grain, they can be enriched with niacin, riboflavin, thiamin, and iron in the same amounts as found in enriched white flour. Be sure to purchase the enriched cornmeal or grits since unenriched forms are available, too. Cornmeal and grits can be used to make hot cereal. The cornmeal or grits should be mixed with cold water and then added to boiling water while stirring. This helps prevent lumps. Follow the directions on the package. Cornmeal can be used in main dishes, breads, cookies, and puddings. A light sprinkling of cornmeal under bread dough helps prevent sticking.

# OATS

FAMILY: *Gramineae*

GENUS SPECIES: *Avena sativa*



## History and Botany

Oats, *Avena sativa*, is a whole grain used to make rolled oats. Oats originated in western Europe from two varieties of wild oats—the common and the red. Now they are grown in northern climates of Europe and North America. Oats have been an important staple food in Scotland and their Scottish Oatcake is famous. Our familiar rolled oats was originated by Alexander Hornby of New York.

## Availability, Processing, and Storage Time

Before hulling, oats are dried and toasted. Then the hulls are removed and the groats are rolled into finished flakes. Quick cooking oats are divided into smaller

flakes to reduce the cooking time. Regular or "old fashioned" oats are left whole. Many types of processed oat products are available including uncooked and ready-to-eat oat cereals. Scotch oatmeal (coarsely ground), oats groats, and oat flour are available in specialty stores. Rolled oats can be stored for 3 months tightly covered on a cool shelf or longer if refrigerated.

## Cooking Characteristics

Oats have many uses in cooking in addition to being cereal. Oats can be used to extend the flavor of meat in meat loaves and casseroles. Oats add variety to breads and cookies and can be used to thicken soups, stews, and desserts. When oats are mixed with liquid ingredients the liquid combines with the starch in the oats and causes it to swell and thicken.

To make oatmeal, sprinkle rolled oats slowly into boiling water. This helps prevent lumping. Stir frequently while cooking. Follow the directions on the

# POPCORN

FAMILY: *Gramineae*

GENUS SPECIES: *Zea mays everta*

## History and Botany

There is evidence that popcorn may have been the first type of corn raised for human consumption. Ancient clay and metal poppers have been found in North, South and Central Americas. Popcorn was introduced to Europe by Christopher Columbus. According to legend, popcorn was introduced to the English colonists at the first Thanksgiving feast by Quadequina, brother of the chief. Commercial popcorn sales began about 1885 in the United States. The average consumption per person in the U.S. today is approximately 2 1/2 pounds or 40 quarts of popped corn. Two-thirds of all the popcorn produced in the world has been consumed at home. However, 85% of the movie theaters in the U.S. report popcorn sales as a profit maker. Popcorn has been recommended by the American Dental Association and American Diabetic Association as a delicious low calorie, low sodium, high fiber, and low sugar snack food.

## Availability, Processing and Storage

Popcorn is readily available at most grocery stores, health food stores, and by mail. Nebraska has been the leading popcorn producing state in the U.S. The plant grows readily on most soils that are warm, arable and

# PROSO MILLET

FAMILY: *Gramineae*

GENUS SPECIES: *Panicum miliaceum*

## History and Botany

Millet is the common term for a number of small seeded annual cereal grasses in the family Gramineae, especially adapted to hot, dry climates. They have been grown since prehistoric times, extensively cultivated for man, birds, and animals. While they are not common human food in this country, the millets, along with sor-

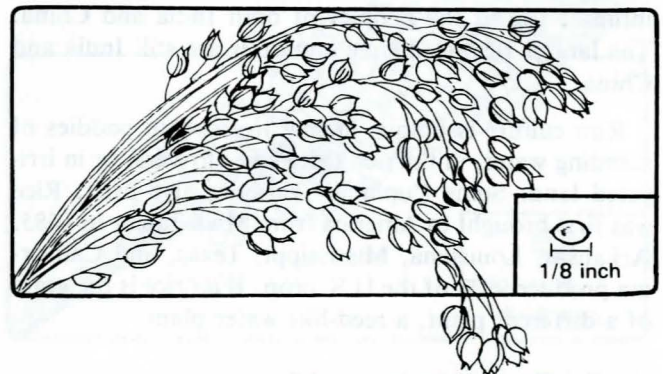
ghum, are the staple foods for over two hundred million of the world's poorest people. They serve as a reliable food supply because, though lacking the high yields and other desirable properties of wheat and rice, they will almost always yield a crop, even during a severe drought. Over 34 million metric tons (75 billion pounds) per year were being harvested in the late 1970's.



have available moisture. Development of hybrid popcorn has led to both white and yellow grain popcorn with less hull when popped. The popcorn stalks are smaller and shorter than regular corn stalks. When fully matured the ears are harvested, cleaned and shelled. Kernels that are sealed from the air in plastic bags, jars or cans will keep for over a year without refrigeration if stored in a cool dry location.

## Cooking Characteristics

Moisture content for the greatest popping expansion varies from 13% to 14.5%. Too dry kernels may only split partly open or remain unpopped. Too moist kernels pop into pieces that are small, jagged and tough. If popcorn is too dry, one tablespoon of water per quart of kernels will raise moisture approximately 1 1/2 per cent. The best popping temperature is between 400°F to 500°F. Generally, the best results with oil requires 1/3 cup oil for each 1 cup of kernels. Salt should not be added to the oil as it pits heating surface. Popcorn may also be popped in hot air poppers without oil. Popcorn may be eaten popped without salt or with added seasonings. It can be used in desserts, meat products, etc. Popped corn ground into flour can be a low calorie substitute for flour in baked products.



ghum, are the staple foods for over two hundred million of the world's poorest people. They serve as a reliable food supply because, though lacking the high yields and other desirable properties of wheat and rice, they will almost always yield a crop, even during a severe drought. Over 34 million metric tons (75 billion pounds) per year were being harvested in the late 1970's.



### Availability, Processing, and Storage

Proso, or common, millet is grown in this country, especially in western Nebraska. Generally sold as a bird seed, it is becoming more widely available in food coops and health food stores. You will want to buy the dehulled type for most food uses. The hulls are quite hard and fibrous and make it difficult to cook the grain to the desired degree of tenderness.

Be sure to clean or wash non-dehulled seed thoroughly before using it. Millet may be used as a flour, or as the whole grain. You may grind your own flour with a coffee mill or the small plate or stone mill sold by coops and health food stores for that purpose. You should grind your flour as fine as possible, and make it fresh each day. Like all home-milled whole grain flours, it should be refrigerated if it is not going to be used within one or two days. The oil naturally present in the germ has been smeared throughout the flour by the milling process, and this causes the flour to turn rancid rapidly.

# RICE

FAMILY: *Gramineae*

GENUS SPECIES: *Oryza sativa*

### History and Botany

Rice is the world's greatest crop, the staple food of over half the human race. Its importance can hardly be exaggerated. Rice was being cultivated in southeast Asia in 3,000 B.C. The word for "rice" is the same as the word "food" in some languages. In one Chinese dialect, "rice-culture" is the same as "agriculture." The growing of rice, the success or failure of the crop, affected the history, art, literature, ceremonies, and the intimate life of the peoples of both India and China. The largest rice producing countries are still India and China.

Rice culture is unique in that it grows in paddies of standing water, in the rich delta soil of rivers, or in irrigated land. Some "upland" varieties also exist. Rice was first brought to America from Madagascar in 1685. Arkansas, Louisiana, Mississippi, Texas, and California produce 99% of the U.S. crop. *Wild rice* is the grain of a different plant, a reed-like water plant.

### Availability, Processing, and Storage

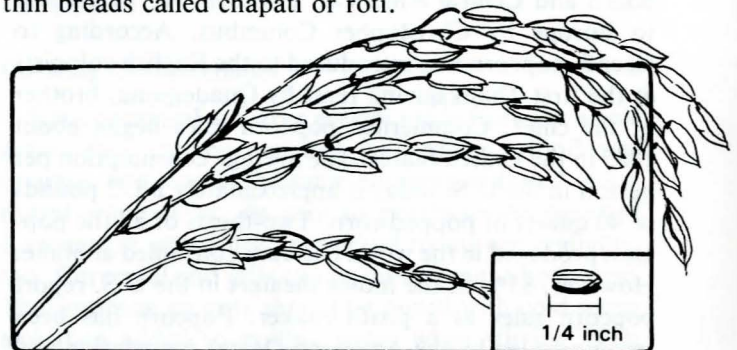
Most of the world's rice crop is consumed as an intact polished grain. Rice grains are rubbed against abrasive discs, to remove the hull and leave the underlying kernel, which is *brown rice*. Further rubbing polishes the grain to the white glossy finish or *polished rice*. Rice may be long, medium, or short grain, depending on the variety. Whole grain rice that has been steeped in hot

Unground millet may be stored for several months if kept dry and cool.

### Cooking Characteristics

Proso can be used in many ways. Millet flours do not contain the special gluten forming proteins present in wheat. So, they cannot be used by themselves to make the light, white, bland bread and pastries familiar to the American palate. They can be blended (about one-fourth of the total flour) with wheat flour to produce baked foods with an appealing flavor and texture.

Most of the people who eat millet as a staple food consume it in one of three forms largely unfamiliar to Americans. It may be boiled whole or eaten much like rice. It can be ground into a coarse meal and cooked into a thin gruel or a thick paste. Also, millet is made into a stiff dough which is flattened and baked into very thin breads called chapati or roti.



water or steamed, then dried before the removal of the husk and polishing, is known as *parboiled* or *converted rice*. This treatment results in retention of 70-90% of water-soluble nutrients. The nutritional value of converted rice is intermediate between the brown rice and polished rice. *Enriched rice* is white or polished rice to which vitamins and iron have been added. *Rice starch* and *flour* are used in products such as pancake flour and by persons who are allergic to wheat. *Precooked rice* is long-grain rice cooked, rinsed, and dried by a patented process. This type of rice needs little preparation. Dry rice can be stored for long periods of time, especially if kept cool.

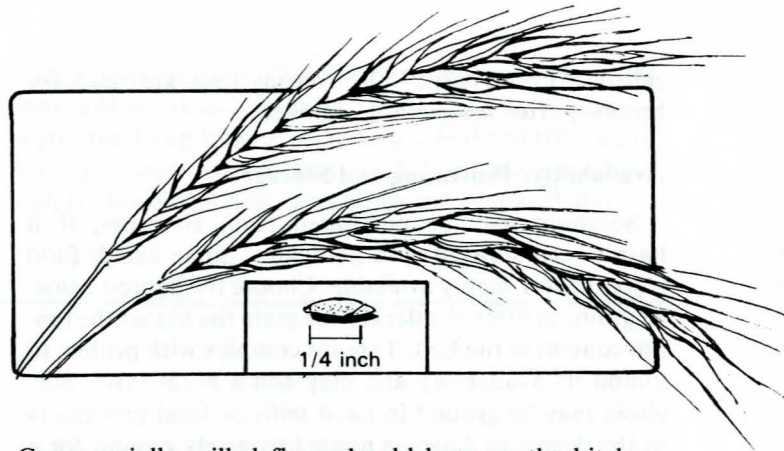
### Cooking Characteristics

The variety of rice grain (short, medium, or long) used in cooking depends on personal preference. The varieties of rice tend to vary in stickiness. Each of these, whether polished, enriched, parboiled, or brown may be cooked in a variety of ways. Rice can be boiled, steamed, oven-cooked, or fried. Uncooked white, parboiled, or brown rice, yields 3-4 cups of cooked rice; 1 cup pre-cooked rice yields from 1 cup to slightly more than 2 cups. To keep as many nutrients as possible in cooked rice follow these procedures: Do not wash rice before cooking. Packaged rice is clean. Use only the amount of water that the rice will absorb during cooking. Do not rinse rice after cooking.

# RYE

FAMILY: *Gramineae*

GENUS SPECIES: *Secale cereale*



## History and Botany

Rye is a member of the grass family, and closely related to wheat. It is among the hardiest of the grains, able to thrive on poor soils and cool, damp climates. As a result it is grown extensively in Eastern Europe, Russia, and in Scandinavian countries for human food. The U.S. grows much less than other countries. In the U.S., it is used for cattle, either as a pasture or as a grain. Rye is not as ancient as barley and emmer and probably originated as a weed that was too difficult to kill so it was simply harvested with the rest of the crop. It was cultivated B.C. and was a major European crop of the Middle Ages. Its use was often accompanied by widespread cases of St. Anthony's Fire, poisoning caused by eating grain contaminated by the ergot fungus. While its use has been declining, it is still the most dependable grain for vast areas of the Old World.

## Availability, Processing, and Storage

Rye flours, light, medium or dark, are often available in supermarkets. Health food stores usually sell the whole grain and occasionally a coarse mill, cracked kernels (grits), or rolled rye flakes. You may also grind your own rye flour from the whole grain in small mills often sold for that purpose by food coops. Whole grain may be stored for a year or longer if kept cool and dry.

Commercially milled flour should keep on the kitchen shelf for several months. Nearly all home-ground whole grain flours should be prepared fresh and used within a few days. They still contain the germ which is high in oil and, once ground, tend to go rancid rather quickly.

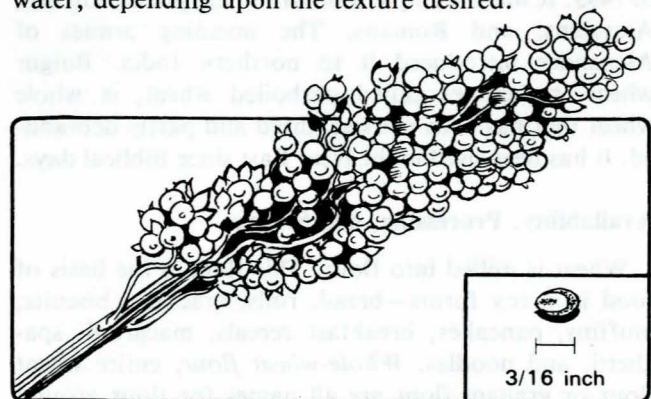
## Cooking Characteristics

Most of the rye used for food in this country is used as a flour in rye bread, where it is normally blended with wheat flour, one-third rye to two-thirds wheat. The bread is often a caramel color and frequently contains caraway seeds for characteristic flavor. The heavy, coarse, black pumpernickel breads more nearly resemble the rye breads of Eastern Europe. Like wheat, rye contains the special gluten proteins necessary to hold gas cells so bread can rise. However, rye gluten is much weaker than wheat gluten. Your bread will be quite heavy unless you use a mixture of rye and wheat flours. In addition to the rye breads, whole rye is popular in crispy snack crackers. Rye has also been used in pancake flours. Rye has a much stronger flavor than wheat. Flakes and grits can be used for breakfast cereals, much like rolled oats and corn grits. They may also be used for stuffings. Like other dry cereal grains, each cup of rye flakes or grits will require two to three cups of water, depending upon the texture desired.

# SORGHUM

FAMILY: *Gramineae*

GENUS SPECIES: *Sorghum bicolor*



## History and Botany

Sorghum grain is a basic food for mankind in Africa and India because it can be grown in areas where wheat or corn fails from lack of rain and poor soil conditions. It was grown in Egypt as early as 2200 B.C. *Sorghum vulgare* has been raised in the U.S. for forage and sweet

sorghum syrup from the stalks. *Sorghum bicolor* has been adapted to the drier hot climate of the midwest and southwest U.S. for production of grain, where it is commonly called "milo." The grain is small and round like buckshot. It grows on a brush fibrous head, 10 to 14 inches long, at the top of the stalk. In another species

called "Broom-corn," the fibrous tops are used for brooms, after the grain is removed.

#### Availability, Processing and Storage

Sorghum may be purchased from elevators, if it hasn't been sprayed with pesticides. Some health food stores have a supply available. Choose the lightest colored grain, as often the darker the grain the higher the tannin content in the hull. Tannins complex with protein to inhibit its availability and may add a bitter taste. Sorghum may be ground in hand mills or food processors to the degree of fineness needed (coarsely ground for a cooked cereal, finely ground for flour). Hulls can be sifted from flour when grain is first cracked. Very little grain is milled commercially in the U.S. Flour should be prepared fresh and used within a few days. Whole grain,

if kept cool and dry, may be stored for over a year without becoming moldy or rancid. Store sorghum flour in metal or plastic containers with a tight lid.

#### Cooking Characteristics

Coarsely ground sorghum will soften when cooked in boiling salt water and will thicken into a gruel-like texture similar to whole rolled oats. It will not thicken and become firm like cornmeal mush when cold. The flour of sorghum lacks the gluten protein that is found in wheat. When substituted for wheat flours in yeast and quick breads, use one-third to one-half of the total amount of wheat flour as sorghum flour. It will give the bread a somewhat nutty flavor. Sorghum may also be popped like popcorn, to produce small tender kernels.

# WHEAT

FAMILY: *Gramineae*

GENUS SPECIES: *Triticum aestivum*



#### History and Botany

Wheat belongs to the great family of grasses. It is the most widely grown and used grain in the world. A thousand varieties are grown commercially. They belong to the classification "Triticum vulgare" meaning common wheat. The kernel of wheat is a store-house of nutrients needed and used by humans since the dawn of civilization. It was probably grown first in southwestern Asia and introduced into the New World by Columbus in 1493. It was the staple food of the Egyptians, Greeks, Assyrians, and Romans. The invading armies of Alexander introduced it to northern India. Bulgur wheat, sometimes called parboiled wheat, is whole wheat that has been cooked, dried and partly debranned. It has been used in the Near East since Biblical days.

#### Availability, Processing, and Storage

Wheat is milled into flour. This flour is the basis of food in many forms—bread, rolls, crackers, biscuits, muffins, pancakes, breakfast cereals, macaroni, spaghetti, and noodles. *Whole-wheat flour*, entire wheat flour or graham flour are all names for flour ground from the entire kernel so that the natural constituents of wheat are all present.

*White flour* results from the milling (removal of bran and germ) and the sifting of clean wheat. This initial product is called "unbleached flour." A further process of whitening produces "bleached flour." All white flour is "enriched," i.e., thiamin, niacin, riboflavin,

and iron are added at a level set by law to approximate the original levels in whole wheat.

The bulgur form of wheat can be cooked as whole granules or it is "cracked" into fragmented form. Whole wheat grains and bulgur store well for long periods, but whole wheat flour tends to get rancid in hot weather. To prevent rancidity, persons who use whole wheat products, as in India, grind their flour fresh daily or at frequent intervals. White flour will keep well for longer periods. The nutrient composition of wheat varies slightly in different kinds of wheat. By comparing whole wheat and white flours, one can see that with enrichment they are very similar in value. Whole wheat still has the bran (or fiber) and contains slightly more protein than milled white flour. However, that bran may trap the vitamins, and one of its components, phytate, ties up the minerals. In effect, people may get more nutrient value from white flour products than from whole wheat.

#### Cooking Characteristics

Wheat flour is unique. Of all the grains, only wheat contains the two proteins, gliadin and glutenin, in just the right proportions so that when liquid is added to flour, and the mixture is kneaded, gluten is developed. It is gluten that gives baked products their porous structure and enables batters and doughs to hold the leavening gas that makes them light.

Bulgur may be used as an alternate for rice in many

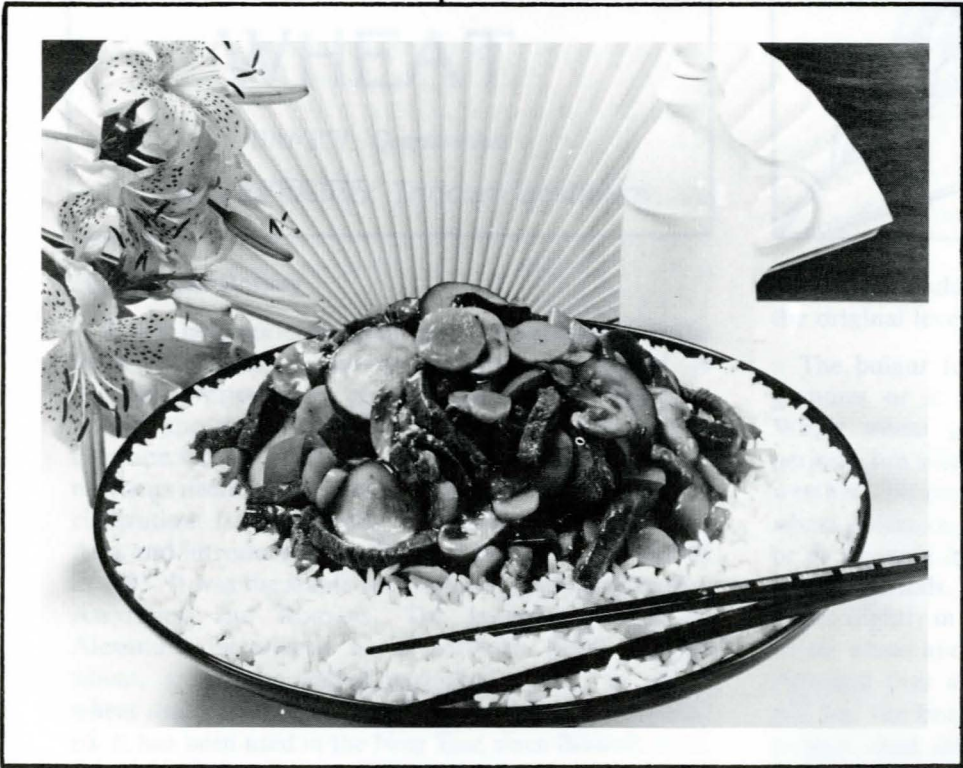
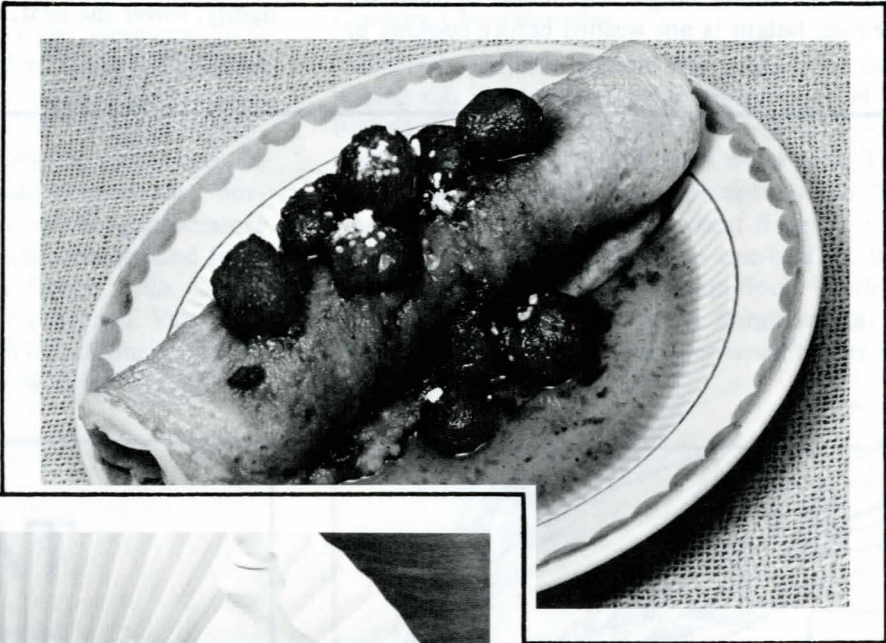
recipes. It can be used as a hot, cooked cereal for breakfast; as a side dish with meat or fish; in bread products; or in main dishes, casseroles, or meat loaf.

Cooking methods for bulgur are similar to those for rice. Like rice, bulgur is not washed before cooking or

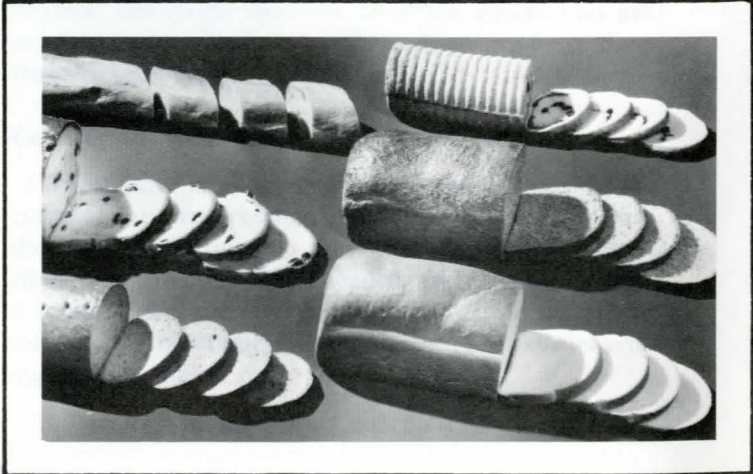
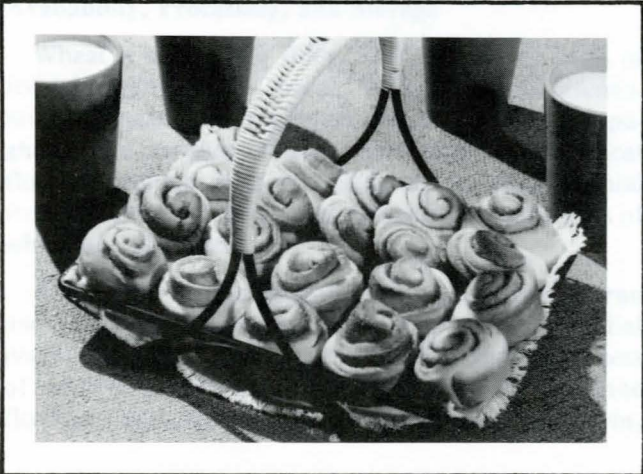
rinsed after cooking. Cook in just the amount of water that will be absorbed during cooking, i.e., 2 cups of water for 1 cup bulgur. Add bulgur and 1/4 tsp. salt to boiling water. Stir slightly until boil returns. Cover tightly, lower the heat, and allow it to cook 25 min.

GRAINS  
in  
recipes





**GRAINS**  
in  
recipes



## RECIPES USING AMARANTH

### Basic Amaranth Grains

- 1 cup amaranth, cleaned
- 3 cup cold water

Combine amaranth and water in a saucepan with a tight-fitting lid. Bring to a boil. Cover, lower heat, and simmer for 25 min. Grains will absorb the water and bind together. Use immediately or store in the refrigerator for up to one week. Makes 2 1/2 cups.

### Date-Nut Bread

- 2 eggs
- 1/2 cup mild honey
- 1/4 cup butter, melted
- 2 cup whole wheat flour
- 1 cup chopped dates, soaked 3/4 cup boiling water
- 1 teaspoon baking powder
- 1/2 teaspoon baking soda
- 1 cup cooked amaranth grain
- 1 cup chopped walnuts
- 1 teaspoon vanilla extract

In a large mixing bowl, beat eggs well. Add honey and melted butter and beat again. Stir in flour and then half the dates and half the soaking water. Add all remaining ingredients and the rest of the dates and soaking water and blend well. Pour into a greased 9 x 5 x 3 inch loaf pan. Bake at 350°F for 1 hour and 15 min, or until knife inserted in the center comes out clean. Let cool for 10 min on a wire rack before removing from pan and then cool completely on rack before slicing. Makes one loaf.

### Stuffed Mixed Vegetables

Filling:

- 2 tablespoon butter
- 2/3 cup finely chopped scallions
- 2/3 cup finely chopped celery

- 2 cup coarsely chopped mushrooms
- 1 tablespoon finely chopped chives
- 1/2 teaspoon dried tarragon
- Freshly ground black pepper to taste
- 1 cup cooked amaranth grain
- 1/2 cup grated cheddar cheese (or any sharp, firm cheese)

Melt butter in a medium skillet and saute the scallions, celery, and mushrooms until wilted. Add chives, tarragon, pepper, and amaranth and combine well. Remove from heat, let cool, and stir in grated cheese. Set aside while preparing vegetables for stuffing.

Vegetables:

- 6 small cigarlike zucchini (to total no more than 2 lbs)
- 3 medium-size tomatoes
- 3 medium-size green peppers
- 1 to 2 cup chicken stock

Cut about 1/2 inch from each end of the zucchini and reserve. Using long-handled teaspoon, scoop out the pulp, leaving 1/2-inch-thick shells. Cut about a 1/3-inch slice from top of each tomato and reserve. Scoop out seeds, leaving shells about 1/2 inch thick. (Reserve the pulp of the tomatoes and zucchini for another use). Cut about a 1/3-inch slice from stem end of each pepper and reserve. Remove and discard seeds.

Stuff the zucchini and replace ends. Stuff the tomatoes and peppers and recap with top slices. Place all vegetables in a baking dish or two so that they fit comfortably in a single layer. Pour enough stock around vegetables to reach about 1 inch up the sides of the tomatoes and peppers but not to cover the zucchini. Bake in a 350°F oven for 1 hour. Arrange vegetables on a large platter and serve warm. Makes 6 servings.

---

## RECIPES USING BARLEY

### Scotch Broth

- 1 tablespoon oil
- 3/4 lb lean lamb (cut into 1/2 to 3/4 inch cubes)-beef cubes may be substituted for lamb
- 1 1/2 quarts cold water
- 2 tablespoon chopped parsley
- 2 tablespoon paprika
- 1/8 teaspoon pepper
- 1/2 teaspoon salt
- 1 whole allspice
- 1/4 cup regular pearl barley
- 1/2 cup chopped celery, with leaves

- 1/4 cup chopped onion
- 1/2 cup diced carrots
- 1 cup stewed tomatoes
- Parsley for garnish

Place the oil in a heavy 4 or 6 quart pan with lid. Lightly brown lamb cubes for medium heat. Add water and bring to a boil. Add parsley, paprika, pepper, salt, and allspice. Reduce heat to low, cover, and simmer for 30 min. After simmering, add barley, celery, onion, and carrots. Cover and simmer on low heat for 1 hr. Add stewed tomatoes. Simmer 15 min. Serve in individual bowls. Garnish with fresh parsley. Serves 8 cups.

### Barley Cheddar Casserole

- 3 cup water
- 1 cup quick pearl barley
- 4 tablespoon chopped green pepper
- 4 tablespoon chopped onion
- 2 tablespoon margarine
- 1 cup mushroom stems and pieces, canned
- 2 cup stewed tomatoes, drained
- 1/2 lb sharp cheddar cheese

Bring 3 cups of water to a boil. Stir in barley. Cover; simmer 10-12 minutes or until tender, stirring occasionally. Drain. Saute onion in margarine. Put barley, mushrooms, onion, green pepper, and stewed tomatoes into a small casserole dish. Grate or shred the cheese. Mix half of the cheese with the barley mixture and sprinkle the rest of the cheese over the top. Bake at 350°F until the cheese is melted and is a light gold color, about 10-15 minutes. Makes 4 servings.

### Barley Muffins

- 1 cup all-purpose flour
- 1 1/4 cup barley flour
- 3 teaspoon baking powder
- 2 to 5 tablespoon sugar
- 1 cup milk
- 1 egg well beaten
- 1 teaspoon salt
- 2 to 4 tablespoon liquid or solid fat

Sift dry ingredients together. Add milk to egg. If solid fat is used, cut into dry ingredients. If liquid, add to milk-egg mixture. Combine dry and liquid mixture. Stir only enough to mix ingredients slightly. Batter will be lumpy. Drop batter into oiled muffin pans, filling 2/3 full. Bake at 425°F for 15 to 20 minutes. Remove from pan at once. Makes 18 small muffins.

---

## RECIPES USING BUCKWHEAT

### Buckwheat Pancakes

- 1 egg
- 1 cup buttermilk
- 4 tablespoon vegetable oil
- 1/2 cup all-purpose flour
- 1/2 cup buckwheat flour
- 1 tablespoon sugar
- 1 teaspoon baking powder
- 1/2 teaspoon baking soda
- 1/2 teaspoon salt

Beat egg, add remaining ingredients in order listed and beat with rotary beater until smooth. Using 1/4 cup measure, pour batter onto hot lightly greased griddle. Bake until top is bubbly and golden brown. Turn and bake other side. Makes 10 four-inch pancakes.

### Creamy Buckwheat Grits, Prunes, and Orange Souffle

- 8 pitted prunes, cut in small pieces; reserve a few pieces for garnish
- 2 large navel oranges
- 1/3 cup mild honey
- 2 eggs, separated
- 1 tablespoon grated orange rind
- 1 cup cooked creamy kernel buckwheat grits
- 3 tablespoon butter
- 4 tablespoon light buckwheat flour
- 1/4 teaspoon ground cloves

Butter a 1 1/2 quart souffle dish. Place prunes on the bottom and set dish aside. Cut oranges in half. Scoop out insides of oranges. Save juice and pulp. Peel membranes away from orange sections. Discard seeds and membrane. There should be about 1 1/4 c of pulp and egg yolks. Add orange rinds and creamy grits. Beat well and set aside.

In a saucepan, melt the butter and stir in the buckwheat flour with wire whisk. Add orange-egg yolk mixture. Whisk over low heat until thick. Remove from heat. Stir in cloves. Let mixture cool. Beat egg whites until stiff. Add 1 cup of mixture to egg whites. Stir and then fold egg whites gently into the orange mixture. Pour at once into prepared souffle dish. Bake in a 350°F for 30 to 45 min. Sprinkle with a few chopped prunes. Serve at once. Serves 6.

### Blinis with Melted Butter, Chives, and Sour Cream

In Russia, the *blini* binge usually starts a week before Lent. These delicate crepelike pancakes, not at all like our American buckwheat griddle cakes, herald the return of the spring sun. Traditionally served with black caviar, this version is less costly, but equally elegant.

- 1 pkg dry yeast (1/4 oz)
- 4 tablespoon lukewarm water
- 1/2 teaspoon mild honey
- 1 1/2 cup milk
- 1/2 cup dark buckwheat flour
- 1/2 cup unbleached white flour
- 2 eggs, separated
- 4 tablespoon butter, melted
- 2 tablespoon sour cream
- Clarified butter for greasing crepe pan

#### Garnish:

- Melted butter
- 2 tablespoon finely minced chives
- Sour cream

In a medium-size bowl, sprinkle yeast over warm water. Add honey and stir to dissolve. Let stand for 10 min until frothy. Then stir in the milk, sift both flours over the bowl, and beat well with a wooden spoon. Cover with a tea towel and let stand for 1 hour in a warm place until doubled in bulk.

Beat the egg yolks only until yellow and add to the yeast mixture along with the melted butter and sour cream. Beat well again, cover once more, and let rise for another hour. Then whip the egg whites with an egg-beater until soft peaks form. Beat down batter and fold in beaten egg whites.

Heat a 6-inch crepe pan with a nonstick surface and brush lightly with clarified butter (plain melted butter may burn). Pour about 3 tablespoon of batter at a time

into pan. Remove pan from heat and rotate to cover bottom evenly with batter. Cook over medium heat until edges start to look dry. Remove from heat and cool for a few seconds for easier lifting. Lift with a round spatula, turn, and cook for about 30 seconds. Turn out onto a tea towel and keep warm until all the batter is used up. Serve with extra melted butter mixed with chives, and a bowl of sour cream. Makes about 36 six-inch blinis.

---

## RECIPES USING CORNMEAL

### Cornbread

- 1 cup yellow cornmeal
- 1 cup enriched flour or whole wheat flour
- 2 tablespoon sugar
- 1/2 teaspoon salt
- 4 teaspoon baking powder
- 1 large egg
- 1/4 cup oil
- 1 cup milk

Mix all dry ingredients together in a bowl. Beat the egg, oil, and milk together in a bowl. Add the egg mixture to the dry ingredients; blend with a spoon only until all the flour is moistened. Do not overbeat because large air holes or tunnels will result. Pour into a greased 8" square pan or 9" pie plate. Bake at 425 °F for about 25 min or until golden brown. Makes 9 servings.

### Corn Muffins

Pour batter into 12 greased muffin or corn stick pans two-thirds full. Bake at 425 °F for about 15 to 20 min or until golden brown.

#### Creative Ideas

1. Instead of the fluid milk, add 1/2 cup nonfat dry milk powder to the dry ingredients. Use 1 cup of water instead of milk.
2. Add grated carrot to the batter.

### Spoon Bread

- 1/2 cup cornmeal
- 1/2 teaspoon salt
- 1 cup milk (to be heated)
- 2 tablespoon margarine or butter
- 1 cup milk
- 2 eggs
- 1 teaspoon baking powder

Put cornmeal and salt in a saucepan. Slowly stir in 1 cup milk. Stir while heating over medium heat until it starts to boil. Lower heat and continue cooking and stirring for 3 to 4 min or until thickened. Remove from heat. Stir in margarine and 1 cup cool milk. In a medium-sized bowl, beat the eggs with a rotary beater until thickened. Beat in baking powder. Gradually mix in the cornmeal milk mixture. Beat until smooth. Pour into a greased 1 1/2 quart casserole, a 9" square pan, or a 9" pie pan. Bake at 375 °F for 35 to 45 min or until puffed and light brown. Serve with a spoon and eat with a fork or spoon. Makes 4 servings.

*Chicken or ham spoon bread.* Use a greased 1 1/2 or 2 quart baking pan. Make the spoon bread with 1 teaspoon of chicken flavored instant bouillon *instead* of the salt. Just before pouring the batter into the pan, mix in 1 cup diced cooked chicken or ham and 1/4 cup finely chopped parsley or green pepper. Bake at 350 °F for 40 to 50 min or until puffed and brown.

---

### Cooked Cornmeal Mush

- 1 cup cornmeal
- 1 cup cold water
- 1/2 teaspoon salt
- 3 cup boiling water

Mix cornmeal, cold water, and salt. Slowly stir cornmeal mixture into the boiling water in a saucepan. Cook and stir until thick. Lower heat. Cover and cook 15

minutes, stirring as needed to keep from sticking. Makes 6 servings.

#### Fried Cornmeal Mush

Put hot cornmeal mush in a loaf pan. Cool in refrigerator until firm. Remove mush from pan and cut into slices. Dip slices into nonfat dry milk solids or flour. Put slices of mush in heated, greased fry pan and brown on both sides.



## RECIPES USING OATS

### Homeground Outflour

Place 1 1/4 cups quick or old fashioned oats in your dry blender. Blend about 60 seconds. Makes about 1 cup of ground oats flour. The oat flour may be used in recipes using wheat flour. Substitute the oat flour for up to 1/3 of the wheat flour.

### Oatmeal Griddle Cookies

- 1 cup margarine (1/2 lb)
- 1 1/4 cup brown sugar, packed
- 1/4 cup water
- 1 teaspoon baking soda
- 1/2 teaspoon salt
- 2 teaspoon vanilla
- 1 cup nonfat dry milk powder
- 2 cup flour
- 3 cup rolled oats, quick cooking, or regular

Mix margarine, brown sugar, water, baking soda, salt, and vanilla thoroughly in a mixing bowl. Blend in dry milk, flour, and oats one at a time. Form into 2 long rolls on waxed paper or foil. Wrap well and refrigerate for 3 or more hours or until firm. Slice 1/8 inch thick. Press thinner with fingers if you like. Bake on a non-stick or lightly greased griddle or frypan heated to medium-low temperature. Bake on one side for about 3 min or until nicely browned. Watch carefully. Turn and brown second side. Cool on a rack or plate. Or bake on an ungreased cookie sheet for 12 to 15 min in a 375 °F oven. Makes about 6 dozen.

### Top of Range Meat-Oat Loaf

- 1 chopped or grated onion
- 1 1/2 lbs ground beef
- 1 cup uncooked quick rolled oats
- 1 cup (8 oz can) tomato sauce or milk
- 1 egg
- 1 teaspoon salt
- 1/8 teaspoon pepper, if you like
- 1/4 cup water

Mix all ingredients except water. Shape into two loaves. Place loaves in fry pan or pot with water. Bring water to boiling. Cover tightly and simmer gently about 1 hour or until meat is well done. Skim fat from gravy before serving. Makes 12 servings.

### Oriental Golden Oats

- 1/4 cup green onion slices
- 1/4 cup chopped green pepper
- 2 tablespoon salad oil
- 1 1/2 cup rolled oats (quick or old fashioned, uncooked)
- 1 egg, beaten
- 1 8-oz can water chestnuts, drained, sliced (optional)
- 2/3 cup water
- 2 tablespoon soy sauce

Saute onion and green pepper in oil in a 10-inch skillet. Combine oats and egg in medium-sized bowl. Mix until oats are thoroughly coated. Add oat mixture to onion mixture. Cook over medium heat about 2 min or until oats are dry, separated and lightly browned, stirring constantly. Add water chestnuts and remaining ingredients. Continue cooking about 5 min or until liquid evaporates, stirring occasionally. Makes 4 servings.

---

## RECIPES USING POPCORN

### Popcorn

- 1/2 cup popcorn
- 3 tablespoons oil

This amount popped will make 2 quarts popcorn. Corn usually pops better in amounts to equal no more than 2 quarts at a time.

Seasonings:

#### *Fiesta Butter*

- 2 tablespoons butter
- 1/3 teaspoon salt
- 1/3 teaspoon chili powder
- 1/3 teaspoon parsley flakes
- 2/3 teaspoon grated parmesan cheese
- 2 quarts popped corn

Melt butter over low heat. Add other ingredients and pour over popped corn.

#### *Peanut Butter*

- 1 tablespoon chunky peanut butter
- 2 tablespoons butter
- Salt to taste

Melt two butters over low heat and pour over 2 quarts of popcorn.

#### *Creative Ideas*

1 teaspoon of whole mild spices as caraway seed, 1 1/2 to 2 teaspoons of powdered dip mix, 1 to 2 tablespoons of powdered soup mix, or 1 tablespoon of powdered seasoning mix may each be added to 2 tablespoons of butter for seasoning.

### **Butterscotch Brownies**—*especially good when warm*

1 cup dark-brown sugar, firmly packed  
1/4 cup vegetable oil  
1 egg  
1/2 cup chopped nuts  
1 teaspoon vanilla  
3/4 cup finely ground, popped popcorn  
1 teaspoon baking powder  
1/2 teaspoon salt

Preheat oven to 350°F. Butter an 8 inch square baking pan. In a large bowl, stir together brown sugar, oil and egg until smooth. Mix in nuts and vanilla. Mix together ground popcorn, baking powder and salt. Add to oil mixture stirring well. Spread evenly in the buttered pan. Bake 20 minutes or until browned. Cut into squares while warm. Makes 16 brownies.

### **Muffins**

1 egg  
1/2 cup milk  
1/4 cup oil  
1 cup all-purpose flour  
1/2 cup ground popped popcorn flour  
1/2 cup sugar  
2 teaspoons baking powder  
1/2 teaspoon salt

Heat oven to 400°F. Grease bottom of muffin cups. Beat egg, stir in milk and oil. Mix in remaining ingredients, just until flour is moistened. Bake 20 minutes or until golden brown. Makes 12 muffins.

---

## **RECIPES USING PROSO MILLET**

**Basic Preparation:** Boil like rice or brown first and then add liquid. Use like rice, barley, and other cereals for porridge or in pilafs.

### **Millet Porridge**

1/2 cup dehulled proso millet  
1 cup water  
1 teaspoon salt

Combine and place in a saucepan. Bring to a boil for one minute. Cover and simmer for 15 min or until soft. Millet thickens while cooking. If necessary, thin with a little hot water or milk. Serve as any other hot cereal with cream, honey, syrup, raisins, or other fruit. Makes 2 servings.

### **Miss Liou's Millet Pudding**

1 cup dehulled proso millet  
4 cup water  
1/2 lb ground beef  
1/4 cup chopped carrots  
1/4 cup chopped cabbage  
1/4 cup sliced mushrooms  
1/4 cup chopped celery  
1/4 cup chopped green onion  
1 teaspoon soy sauce  
1/4 teaspoon sesame oil

Cook millet and water until millet is almost done. Add ground beef, chopped carrot, and cabbage. Cook for 15 min. Add chopped celery and sliced mushrooms.

Cook over low heat for one hour to develop flavor and aroma. Stir often, adding more water if the pudding becomes dry.

Add salt, soy sauce, sesame oil, and green onion about 5 min before serving. Makes 6 servings.

### **Millet Bread**

3 eggs  
3/4 cup boiling water  
1 1/2 cup proso millet flour  
1 cup grated carrots  
1 tablespoon honey  
1 teaspoon salt  
3 tablespoon cooking oil  
3 tablespoon cold water

Separate the eggs and beat the whites very stiff. Set aside. Preheat oven to 350°F and place an oiled bread pan in the oven at the same time.

Pour the boiling water over the millet flour, then add the carrots, honey, salt, and oil. Beat the egg yolks and add 3 tablespoon cold water. Add to the millet mixture. Fold in the egg whites last. Pour the batter in the by now very hot oiled bread pan and bake about 45 min.

This bread tastes and looks like cornbread but is a richer yellow and moister because of the carrots. Makes 1 loaf.

### *Creative Ideas*

1. Serve millet bread hot or cold with butter.
2. Slice, dip in egg, and fry.

## RECIPES USING RICE

### Boiled White Rice (Fluffy)

- 1/4 teaspoon salt
- 2 cup water
- 1 cup white rice, uncooked
- 1/2 teaspoon butter, margarine or oil (optional)

Add salt to water and bring to a boil. Stir rice in rapidly boiling water. Add fat to reduce foaming. Bring back to boiling point and lower heat until water is just bubbling. Cover tightly and simmer gently 20 min. Do not uncover or stir during cooking. Stirring may mash the grains and make rice gummy. Rice is done when a grain of rice pressed with a spoon or between 2 fingers is soft throughout. For *oven-cooked rice*, use an oven-proof pan or dish. Cover it tightly when you take it off the stove and put it in the oven at 350°F and bake for 25 min. Makes 4 servings.

#### *Creative Ideas*

Leftover rice (cooked) can be used in most combination dishes that call for cooked rice. Cooked rice can be kept up to 1 week in the refrigerator. It may also be frozen and kept in a freezer at 0°F, or below for 6-8 months. To reheat cooked rice, steam in a colander or sieve over boiling water. Or add 2 tablespoon water for each cup of cooked rice, and reheat in a covered pan over low heat or in the oven. Stir gently, occasionally, while rice is heating. If rice is frozen, thaw and reheat as for refrigerated rice.

### Fried Rice

- 1/2 cup thinly sliced onions or green onions with tops
- 1/2 cup diagonally sliced celery
- 2 cup diced cooked meat (roast beef, pork, chicken, etc.)
- 2 tablespoon butter, margarine, or bacon drippings
- 3 cup cold cooked rice
- 1 can (16 oz) bean sprouts
- 1/2 teaspoon salt
- 1/8 teaspoon pepper

- 1 egg, slightly beaten
- 3 tablespoon soy sauce

Saute onions, celery, and meat in butter until vegetables are tender crisps. (Note: Do not overcook). Add rice and bean sprouts (rinsed with cold water and drained).

Combine seasonings, egg, and soy sauce. Stir into rice mixture. Cook, stirring 2-3 minutes or until heated. Makes 6 servings.

### Baked Rice Pudding

- 1/2 cup uncooked regular rice
- 1 cup water
- 1/2 cup sugar
- 1 tablespoon cornstarch
- Dash salt
- 2 eggs, separated
- 2 1/2 cup milk
- 1 tablespoon lemon juice
- 1/2 cup raisins
- 1/4 cup sugar

Stir together rice and water in saucepan. Heat to boiling. Stir once or twice. Reduce heat. Cover and simmer 14 min without removing the cover or stirring. All water should be absorbed. Blend 1/2 cup sugar, cornstarch, and salt. Add beaten egg yolks and milk to sugar-cornstarch mixture. Beat with rotary beater. Stir in rice, lemon juice, and raisins. Pour into ungreased 1 1/2 qt casserole. Place casserole in pan of very hot water (1 inch deep). Bake 1 1/2 hours or until pudding is creamy and most of the liquid is absorbed, in a 350°F oven. Remove casserole from oven but not from pan of hot water.

Increase oven to 400°F. Beat egg whites until foamy. Beat in 1/4 c sugar, 1 tablespoon at a time. Continue beating until stiff and glossy. Spread over pudding. Bake 8 to 10 min or until meringue is golden brown. Serve warm. Makes 6 servings.

---

## RECIPES USING RYE

### Whole Groat Cereal

- 1 cup whole rye groats
- 2 1/2 cup water

Pick over dry grain, removing any foreign matter. Rinse in cold water, drain, and soak overnight in 2 cups of water. When ready to cook, drain soaking water and measure. Add enough fresh water to make 2 1/2 cups. Bring water to boil and add groats. Bring to a boil again, stir, lower heat, cover pot, and simmer for 45 min. Let stand, covered, with a piece of paper towel under pot lid to absorb moisture. Makes 2 1/4 cups.

### Double Rye and Caraway Seed Dinner Muffins

- 1 1/2 cup rye flour
- 2/3 cup gluten flour
- 1/4 cup toasted rye flakes
- 1 teaspoon baking powder
- 1/8 teaspoon pepper
- 2 teaspoon caraway seeds
- 1 1/2 cup potato water
- 1 egg, beaten
- 1 tablespoon mild honey
- 2 tablespoon butter, melted, or corn oil

Combine rye flour, gluten flour, rye flakes, baking powder, pepper, and caraway seeds in a large bowl and set aside. In another bowl, mix remaining ingredients

together. Add liquid ingredients to dry ingredients and stir just until moist. Spoon batter into greased muffin tins. Bake at 375°F for 20 to 25 min. Serve warm. Makes 12 muffins.

### **Pattie's Black Rye Bread**

- 4 cup unsifted rye flour
- 3 cup unsifted white flour
- 1 teaspoon sugar
- 2 teaspoon salt
- 2 cup whole bran cereal
- 2 tablespoon caraway seed, crushed
- 2 teaspoon instant coffee
- 2 teaspoon onion powder
- 1/2 teaspoon fennel seed, crushed
- 2 pkgs active dry yeast
- 2 1/2 cup water
- 1/4 cup vinegar
- 1/4 cup dark molasses
- 1 oz unsweetened chocolate
- 1/4 cup margarine
- 1 teaspoon cornstarch
- 1/2 cup cold water

Combine rye and white flours. In large mixer bowl thoroughly mix 2 1/3 cups flour mixture, sugar, salt, cereal, caraway seed, instant coffee, onion powder, fen-

nel seed, and undissolved active dry yeast. Set aside. Combine 2 1/2 cups water, vinegar, molasses, chocolate, and margarine in a saucepan. Heat over low heat until liquids are very warm (120°F-130°F). Margarine and chocolate do not need to melt. Gradually add to dry ingredients and beat 2 min at medium speed of electric mixer, scraping bowl occasionally. Add 1/2 cup flour mixture. Beat at high speed 2 min, scraping bowl occasionally. Stir in enough additional flour mixture to make a soft dough. Turn out onto lightly floured board. Cover. Let rest 15 min. Then knead until smooth and elastic, about 10 to 15 min (dough may be sticky). Place in greased bowl, turning to grease top. Cover; let rise in warm place, free from draft, until doubled in bulk, about 1 hour. Punch dough down. Turn out onto lightly floured board. Divide in half. Shape each half into a ball about 5 inches in diameter. Place each ball in the center of a greased 8-inch round cake pan. Cover; let rise in warm place, free from draft, until doubled in bulk, about 1 hour. Bake at 350°F, 45 to 50 min, or until done. Meanwhile, combine cornstarch and cold water. Cook 1 min over medium heat, stirring constantly. As soon as bread is baked, brush cornstarch mixture over top of loaves. Return bread to oven and bake 2 to 3 min longer, or until glaze is set. Remove from pans and cool on wire racks. Makes 2 round loaves.

---

## **RECIPES USING SORGHUM**

### **McGee's Sweet Roll Dough**

- 1/2 cup melted shortening
- 2 cup scalded milk or 2/3 cup non-fat dry milk and 2 cup water
- 1 cup sugar
- 1 cake yeast or 1 pkg dry yeast, dissolved in 1/2 cup warm water with 1 teaspoon of the sugar added to the water
- 6 cup all purpose flour
- 2 cup milo flour

Dissolve yeast. Combine scalded milk, sugar, and shortening. Cool to lukewarm. Add softened yeast and egg to milk mixture. Stir in part of the all-purpose flour and the milo flour. Work in the rest of flours until a soft dough is formed. Place dough in an oiled bowl. Cover. Let rise until double in size. Punch down dough. Knead well. Shape into rolls. Let rise until double in bulk. Bake at 400°F for 15-20 min or until rolls are done. Makes 4-5 dozen rolls.

### **Peanut Butter Cookies**

- 1/2 cup fat
- 1/2 cup granulated sugar
- 1/2 cup brown sugar
- 1 egg, unbeaten
- 1/2 cup peanut butter
- 1 teaspoon soda
- 1 cup all-purpose flour
- 1/2 cup milo flour

Cream fat and sugar together until soft and fluffy. Stir egg into creamed mixture. Add peanut butter. Stir until smooth. Add soda and flours to mixture. Roll into balls 1 inch in diameter. Place on ungreased baking sheet. Flatten with fork. Bake at 425°F for 10 to 12 min. Makes about 30 cookies.

### **Sorghum Coffee of the Prairie Pioneer**

- 2 cup sorghum grain

Toast sorghum grain for 10 min on a baking sheet at 350°F. Grind coarsely and toast again until dark brown. Let cool. Store in air-tight container.

- 2 teaspoon ground sorghum coffee
- 1 cup water

Combine and boil for 5 to 7 min. Serve hot with sugar and cream.

## RECIPES USING WHEAT

### Bulgur Cookie Bars

- 1 cup flour
- 1/2 teaspoon baking powder
- 1/4 teaspoon salt
- 1/2 teaspoon soda
- 1 cup dry milk powder
- 1/2 cup margarine or shortening
- 1 1/2 cup brown sugar, packed
- 2 eggs, unbeaten
- 1 teaspoon maple flavoring (or vanilla)
- 1 cup bulgur

Sift dry ingredients (including milk) together. Cream shortening and sugar; add eggs and flavoring; mix well. Add dry ingredients gradually, mixing well after each addition. Stir in bulgur until evenly distributed. Turn into greased pan 11" x 7" (batter should be 1/2" deep). Bake at 350°F for 20-25 min. Cut into bars while warm. Makes 24 bars.

### Date Loaf

- 3 cup whole wheat flour
- 1 teaspoon soda
- 1 teaspoon salt
- 1 cup dates, chopped
- 1 egg
- 1 tablespoon vegetable oil
- 1 1/2 cup sour milk or buttermilk
- 1/2 cup corn syrup or brown sugar syrup

Mix dry ingredients and add dates. Add egg, oil, milk, and syrup. Mix well and place in loaf pan and bake 325°F for 1 hour. Makes one loaf.

### Whole Grain Breadsticks

- 2 cup all-purpose flour, unsifted
- 1 1/2 teaspoon salt
- 2 pkgs active dry yeast
- 1/2 cup wheat germ
- 1 tablespoon honey or molasses
- 1/2 cup salad oil
- 1 1/4 cup hot water (120°-130°F)
- 1 1/2 cup whole wheat flour (about)
- 1 egg white or yolk beaten with 1 tablespoon water
- Coarse salt, sesame seed, or poppy seed (optional)

In large mixer bowl stir together all-purpose flour, salt, yeast, and wheat germ. Add honey and oil. Gradually beat in hot water. Beat at medium speed for 2 min. Add 1 cup of the whole wheat flour and beat for 2 more min. With a heavy-duty mixer or wooden spoon, stir in enough of the remaining whole wheat flour to form a soft dough.

Turn dough out onto a well-floured board, and gently knead. Work into a smooth ball. With a knife, cut the ball into 32 equal pieces. Roll each piece of dough into a 12-inch rope. Arrange ropes an inch apart on greased baking sheets. Set sheets in a warm place, cover, and let dough rise for 15 min or until slightly puffy (sticks will puff more as they bake).

With a soft brush, paint each stick with the egg mixture, then sprinkle them lightly with salt or seeds if desired. Bake in a 375° oven for 15 min or until golden brown. Cool slightly on racks, then serve. Or cool completely and package in foil; freeze if desired. To re crisp, place thawed breadsticks (unwrapped) in a 300° oven for 5 min. Makes 32 12-inch breadsticks.

## FLOUR SUBSTITUTIONS

Type	Amount to use (for making light breads)	Amount to substitute for 1 cup white flour	Containing gluten (as wheat flour)
Amaranth	Not recommended	—	No
Barley	1/4 of total amount	1 1/4 cups	Yes
Buckwheat	Not recommended	—	No
Corn (Corn flour)		1 cup	No
Oats (Oat flour)	1/3 of total amount of flour	1 1/3 cup	Yes
Proso Millet	About 1/4 of total flour	1 cup	No
Rice (Rice flour)		3/4 cup	No
Rye	1/3 of total amount	1 1/3 cup	Yes
Sorghum	1/3 to 1/2 of total amount	1 cup	No
Soy Flour	1/4 to 1/3 of total amount (changes flavor and color)	1 1/3 cup	No

## NUTRITIVE VALUE OF GRAINS

	Amaranth	Barley	Buckwheat	Cornmeal, Enriched	Oats	Popcorn (Popped)	Proso Millet	Rice, Brown	Rice, Enriched White	Rye	Sorghum	White Flour, Enriched	Whole Wheat Flour
<b>Grams</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>6</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>
Calories	190	175	168	182	195	23	164	180	182	167	166	182	167
Protein, g	8	4.1	5.9	4	7.1	<1	5	3.8	3.4	6	5.5	5.3	6.7
Carbohydrate, g	31	39	37	39	34	5	37	39	40	37	37	38	36
Fat, g	3.8	<1	1.2	<1	3.7	<1	1.5	1	<1	<1	1.7	<1	1
Sodium, mg	<1	1.5	<1	<1	1	<1	<1	4.5	2.5	<1	<1	1	1.5

Notes: All grains and cereals are uncooked, except for popcorn which is popped, plain.

< = less than.

50 grams of most grains, when cooked, will provide about a 1 cup serving.

PERCENT OF U. S. RECOMMENDED DAILY ALLOWANCES (Adult)

	Amaranth	Barley	Buckwheat	Cornmeal, enriched	Oats	Popcorn (popped)	Proso Millet	Rice, brown	Rice, enriched white	Rye	Sorghum	White flour enriched	Whole wheat flour
Grams	50	50	50	50	50	6	50	50	50	50	50	50	50
	%	%	%	%	%	%	%	%	%	%	%	%	%
Protein	12	6	9	6	11	*	8	6	5	9	8	8	10
Vitamin A	*	*	*	4	*	*	*	*	*	*	*	*	*
Vitamin C	3	*	*	*	*	*	*	*	*	*	*	*	*
Thiamin	5	4	20	15	20	*	24	11	15	14	13	15	18
Riboflavin	9	*	*	8	4	*	11	2	*	6	4	8	4
Niacin	3	8	11	9	3	*	6	12	9	4	10	9	1
Calcium	13	*	6	*	3	*	*	2	*	2	*	2	*
Iron	42	6	9	8	13	*	19	4	8	10	12	8	9

\*Contains less than 2% of the U.S. RDA for these nutrients.

Note: All grains and cereals are uncooked, except for popcorn which is popped, plain. The nutrients (except for those in Amaranth) are from *Composition of Foods*, Agricultural Handbook No. 8, 1963 (reprinted 1975). The nutrients for Amaranth were obtained from Rodale Research Center.





The Cooperative Extension Service provides information  
and educational programs to all people without regard  
to race, color, national origin, sex or handicap.