

# Buckwheat Production in North Carolina

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## Buckwheat in Bloom

In the mountain counties of Western North Carolina, buckwheat is at present a staple crop and can be made of much greater importance.

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RALEIGH AND WEST RALEIGH

## BUCKWHEAT PRODUCTION IN NORTH CAROLINA

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The true or common buckwheat (*Fagopyrum esculentum*) is a native of Europe and Northern Asia. Strictly speaking it is not a cereal, such as wheat or oats, but belongs to another family. This family includes several well-known troublesome weeds such as sorrel and dock, or smart weed and bind-weed. However, since its seeds are used for the same purpose as other cereals it is usually classed as such. Common buckwheat has been cultivated for centuries in France, England, Italy, and Spain. In China and Siberia it grows wild. It has been used for food purposes in China, Japan, and Russia for many centuries, chiefly by the poorer classes. The crop was probably introduced into Eastern United States by the settlers of New York and Pennsylvania during the early part of the nineteenth century, and from here its growth has gradually spread to other States.

The production of buckwheat in the United States has varied considerably from year to year, reaching its highest mark in 1866, when a total of 23,000,000 bushels was produced. Following this the acreage varied considerably, and the production declined until 1916, when about half that amount was produced. In 1916, buckwheat was produced mainly in fourteen different States in the United States.

The following table shows these States listed in the order of the amount produced, together with the acreage, production and farm value.

STATE	Acreage	Production	Value on Dec. 1, 1915
New York .....	290,000	3,480,000	\$4,246,000
Pennsylvania .....	270,000	3,780,000	4,196,000
Michigan .....	75,000	825,000	949,000
West Virginia .....	36,000	657,000	666,000
Virginia .....	25,000	480,000	456,000
Ohio .....	19,000	336,000	370,000
New Jersey .....	15,000	255,000	308,000
North Carolina .....	10,000	175,000	149,000
Maryland .....	10,000	189,000	208,000
Minnesota .....	10,000	150,000	168,000
Iowa .....	10,000	150,000	188,000

### THE CROP IN NORTH CAROLINA

Buckwheat is being grown to some extent in practically all the mountain counties of the State and a number of the counties in the Pied-

mont region lying east of and adjacent to the mountains. Alleghany County ranked first in the production of buckwheat in North Carolina in 1910, producing a total of 51,358 bushels; Ashe County coming second with a crop of 47,698 bushels; Watauga third with a yield of



FIG. 2—Buckwheat on mountain-side.

34,729 bushels; and Wilkes, Buncombe, Surry, and Davidson, Mitchell, Haywood, and Macon, in the order named, producing smaller quantities.

#### THE GROWING PLANT

Buckwheat is an annual plant and grows erect, maturing seed in about seventy days. Only one stem is produced from each seed, but when seeded on good ground and not too thickly it branches freely. On very good land the plants will grow to a height of five feet and will yield 40 or 50 bushels per acre. The ordinary yields will usually range from 15 to 20 bushels per acre. These yields could be greatly improved upon by giving the soil and crop better care.

#### VARIETIES

The Japanese and Silver Hull are the most common varieties grown in North Carolina. The Silver Hull, or a mixture of Silver Hull and Japanese (half and half), is preferred by many.

Japanese buckwheat seed is the larger of the two. They are brown to black in color and triangular in shape, being about three-eighths of an inch long and three-sixteenths of an inch wide. The seed of the Silver Hull variety are smaller and have a silver luster.

Two other varieties known locally as the "Wild Goose" or "Calcutta" and the "Bloomless" or "Duckwheat" are grown to a limited extent. The "Wild Goose" is grown in the vicinity of Laurel Springs in Alleghany County, and the "Bloomless" variety or "Duckwheat" was introduced into the territory near Boone, in Watauga County, by L. N. Perkins during 1912. Both of these varieties are frequently sown in May.



FIG. 3—Japanese Buckwheat Plant, Showing Upright Habit of Growth

They mature seed early in August. The "Bloomless" buckwheat as it is known locally, or "Duckwheat" as it is listed in seed catalogues, is Tartary buckwheat or India wheat (*Fagopyrum Tataricum*). It has been grown for many years in the mountain regions of Asia and also some in Canada and Maine. The plants of the duckwheat, or India wheat, are more

the stem. The seed are small and form along the stem almost from the ground up. Duckwheat, or India wheat, is considered somewhat more hardy than buckwheat.

Hot rains in blooming time do not seem to produce blasted seed, and for this reason it is believed that Duckwheat has a wider adaptation to soils and climate than the common buckwheat.

#### SEEDING BUCKWHEAT

In seeding this crop, it is true as with other crops, probably no simple operation is more neglected and greater loss caused thereby than has been by the failure to thoroughly prepare the seed-bed. When buckwheat is to follow small grain, such as wheat or oats, the stubble ground should be thoroughly disked, if possible, immediately after the small grain is cut and while shocks are still standing, in order to con-

serve the large amount of moisture. Additional diskings and thorough harrowing may then be all that will be required in preparation of seed-bed on such fields.

Where buckwheat is to be sown on sod fallow or pasture land, which is preferred by many, the soil should be plowed several weeks in advance of the time of seeding, and be disked or harrowed occasionally. This method not only obviates the necessity of plowing when land is dry and hard, but will help the soil to retain the moisture necessary at seeding time, and thereby reduce the cost of preparation of the seed-bed. On mountain slopes especially the plowing should be done deeply. Ten inches of plowed soil well pulverized and compacted will hold two inches of rainfall, while two inches of rain may carry off two inches of soil where it is plowed only two inches deep. If the seed-bed at sowing time is cloddy underneath, the air spaces formed by such clods result in a dry soil, and seeds will either not germinate or will germinate and perish.

A drill is preferred and used by most farmers for seeding, the seed being drilled  $1\frac{1}{2}$  to 2 inches deep. To prevent erosion, the seed should be drilled around the slopes in contour fashion, rather than straight up and down the slopes. One or two pecks of Duckwheat or Tartary buckwheat per acre is sufficient, but four or five pecks of common buckwheat per acre will usually be needed for a good seeding. Buckwheat will mature seed in about seventy days. It may be sown any time after the last frost in the spring so as to be mature before the first frost in the fall. The "Wild Goose" and Tartary types are earlier than the Japanese and Silver Hull and are frequently sown in May. An old rule among pioneer farmers was to sow buckwheat any time when chestnut trees are in bloom. In the mountain valleys in Western North Carolina, July 10 is considered the latest favorable date for seeding buckwheat. Cool weather seems to be desirable for maturing buckwheat best.

#### SOILS FOR THE CROP

Some think that buckwheat will grow on the poorest of land. While this is true in a sense, farmers recognize that for best success it should be sown on fairly fertile lands, such as grass, pasture or manured lands. On the best land a somewhat heavier seeding is usually given. It is held that the denser growth produced thereby will prevent lodging somewhat.

Farmers generally insist that buckwheat is "hard on land," since it leaves the ground so loose that it blows or washes away. To what extent the washing or blowing is due to the buckwheat or to the time and

methods of preparation of seed-bed is a question for investigation. Summer plowing of well-drained land, especially when some organic matter is turned under, very frequently leaves the land loose and mellow regardless of the crop seeded, or even though no crop is planted. If land is dry and hard, as is frequently true when plowed in June or July, the tendency is to plow too shallow. This shallow surface becomes dry and detached from deeper soil, and hence is likely to be carried away by wind or rain.

As may be seen by an examination of the following table, a crop of buckwheat, including both grain and straw, removes considerably more nitrogen and potash from the soil than does an equal crop of wheat, including straw; but bushel for bushel, wheat contains more nitrogen, phosphoric acid and potash than does buckwheat. Buckwheat straw contains a larger per cent of nitrogen and potash than wheat straw and practically an equal amount of phosphoric acid. For convenience in comparing the two crops, equal quantities of both grain and straw are given. On account of its fertilizing value, the buckwheat straw should be returned to the soil as such or after it has been used for hay or bedding.

CROP	Amount	Pounds Nitrogen	Pounds Phos. Acid	Pounds Potash
Wheat, grain .....	25 bus.	30	12.82	6.0
Wheat straw .....	$1\frac{1}{4}$ tons	6.25	3.95	15.0
Total for crop .....		36.25	16.77	21.
Buckwheat, grain .....	25 bus.	18.75	7.5	3.66
Buckwheat straw .....	$1\frac{1}{4}$ tons	31.25	3.78	28.62
Total for crop .....		50.00	11.28	32.28

The buckwheat crop not only draws quite heavily on the plant-food, particularly the nitrogen and potash in the soil, but its period of growth is short. As stated above, buckwheat matures in about seventy days, thus requiring rapid nourishment, whereas wheat grows more or less through a much longer period, maturing ordinarily in about 240 days.

#### ROTATION WITH OTHER CROPS

As is true with all crops, if insects and diseases are to be avoided, and if soil fertility is to be maintained economically and profitably, buckwheat should be grown in a rotation with other crops, including legumes. In view of the fact that the soils in the western part of the State are deficient in nitrogen, together with the fact that buckwheat uses so much of it, it is doubly important to grow legumes such as clover, cowpeas, soybeans. This class of crops are able to gather nitro-

gen from the air when conditions are right, and when plowed under they supply nitrogen for the buckwheat crop. In some cases it might be wise to feed these leguminous crops to live stock and carefully conserve the manure and apply it back to land intended for buckwheat.

The two following rotations are examples of what might be used in many cases:

No. 1

*First Year:* Corn, crimson clover seeded in corn at last cultivation.

*Second Year:* Buckwheat, rye after buckwheat.

*Third Year:* Soybeans, wheat.

*Fourth Year:* Wheat, red clover.

*Fifth Year:* Red clover.

Buckwheat is sometimes used as a nurse crop for clover, and where this is the case the rotation may be modified to meet the need.

No. 2

*First Year:* Corn.

*Second Year:* Rye, clover (red or sweet).

*Third Year:* Clover.

*Fourth Year:* Buckwheat.

*Fifth Year:* Clover (crimson).

Before seeding either of the clovers mentioned above on soils which are acid or sour, a liberal application of limestone, shells or marl should be given the land. For the best success with sweet clover not less than three tons per acre of these materials should be applied some time in advance of the seeding, but two tons per acre may be sufficient for the crimson or red clover. Where heavy applications are made, a second may not be needed for four or five years, but where only two tons per acre are used a second treatment of about the same amount should be given in three or four years.

In addition to this soil treatment, the legumes as well as the corn, wheat, rye and buckwheat will need phosphoric acid. An application of 200 to 400 pounds of acid phosphate per acre annually, or an application of one-half ton of raw rock phosphate once in every three or four years turned in with green manure (entire clover or rye crop) or with manure made in feeding these crops. Such materials plowed under would not only be a decided advantage to the immediate crop, but would also increase the fertility and permanent producing power of the land. The nitrogen needed for these crops could be secured from the legumes of the rotation. If inoculated, the legumes, such as clover, will collect a portion of their nitrogen from the air. By turning these in or feeding it and turning it back to the land as manure, nitrogen is furnished for the growth of other crops in the rotation. If legumes are not grown frequently in the rotations and plowed under, or fed and the

manure saved and applied on the land, it will be necessary to buy nitrogen in some commercial forms, such as nitrate of soda or cottonseed meal of the rotation. A mixture of one part cottonseed meal and two parts of acid phosphate applied at the rate of 300 pounds per acre



FIG. 4—Buckwheat Sowed Among Deadened Trees.

should give good results with buckwheat. If used at this rate the mixture will help to provide for the temporary needs of the immediate crop. If nitrate of soda is used it should be applied broadcast over the grain and alongside the corn a few days before blooming or tasseling time.

#### COST OF GROWING BUCKWHEAT

The amount and cost of man and horse labor required to grow an acre of buckwheat in West Virginia was found to be as follows:

OPERATION	Man	Horse	Cost
Plowing .....	.77	1.48	2.63
Fitting .....	.38	.77	1.34
Seeding .....	.16	.25	.49
Cutting and shocking .....	.75	.09	1.22
Hauling .....	.43	.30	.94
Threshing .....	.42	.09	.72
Total.....	2.91	2.98	7.34

Calculated in this way, it required 2.91 man days and 2.98 horse days, at a cost of \$7.34, to grow an acre of buckwheat. Under present conditions this cost would be considerably more.

### HARVESTING BUCKWHEAT

Methods of harvesting buckwheat vary somewhat, depending on the

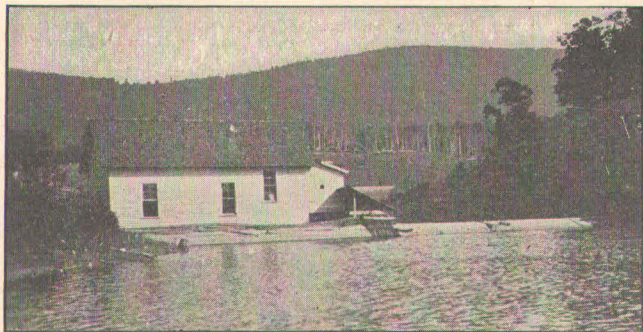


FIG. 5.—Water-power Mill, Alleghany County, Where Buckwheat Flour is Made.

lay of the land, the acreage, and the machinery available for use.

When buckwheat is sown on new land among stumps or trees, a cradle or scythe is about the only means of cutting it, but in land free from stumps and trees and not too rolling a mowing machine with buncher attachment is a more economical and rapid method of harvesting.

As this crop in shock will not "turn water" the bunches as soon as thoroughly dry should be hauled to shelter. If left in the fields in large piles or shocks they should be covered with canvas or duck to protect them from rains.

### THRESHING

The old method of threshing buckwheat was by means of a flail in the old barns with split-log floors, but in many instances now it is threshed by means of a small grain separator.

When too dry, buckwheat shatters off badly, and when damp it is hard to thresh. When threshing dry buckwheat, the concaves of the separator should be taken out, but if it is damp they should be left in, and in either case the screens must be adapted to suit the size of the seed. One-twentieth of the buckwheat seed are usually taken as payment for threshing.

### MILLING BUCKWHEAT

In the buckwheat growing sections of North Carolina there is generally an abundance of water power, and most buckwheat is ground at

water mills. For grinding, one-tenth of the buckwheat is usually taken as toll. A bushel of buckwheat makes from 22 to 32 pounds of flour, the amount secured depending on the variety. The hulls and shorts are fed to live stock, but the hulls are coarse and are not considered of much value as feed, for this reason are sometimes removed from the shorts.

Mountain farmers frequently haul their buckwheat flour from the mills to other towns and exchange it for common wheat flour, pound for pound.

### MARKET NEEDED

The buckwheat growing section of North Carolina needs better transportation facilities. Of course, in view of the excellent agricultural opportunities, in addition to its healthful climate and natural resources, in time, adequate transportation will be provided. At present, better local markets are sorely needed for all of the various products grown in the buckwheat growing sections of the State. Better markets which would insure better prices for all farm products such as rye, beef, potatoes, clover seed, apples, cheese, buckwheat flour, etc., would not only insure a much larger production of these staple products, but a more rapid development of the section as well.

The establishment of feed and seed houses in the section, preferably by local men using local capital and the advertisement of the products of the section throughout the State, especially in the eastern section of the State and also in adjacent States, are the two things offering the greatest promise at the present time.

### USES OF THE CROP

Buckwheat is used not only for human food, but for feed for live stock as well.

According to Henry, buckwheat and buckwheat products show the following percentages, composition, and feeding value:

PRODUCTS	Per Cent Protein	Crude Fiber Per Cent	N. Free Exact Per Cent	Ether Exact Per Cent
Buckwheat .....	10.	8.7	64.5	2.2
Buckwheat flour .....	6.9	0.3	75.8	1.4
Buckwheat hulls .....	4.6	43.5	35.3	1.1
Buckwheat bran .....	12.4	31.9	38.8	3.3
Buckwheat shorts .....	27.1	8.3	40.8	7.6
Buckwheat middlings .....	28.9	4.1	41.9	7.1
Buckwheat straw .....	5.2	43.	35.1	1.3

The composition and fertilizing value of buckwheat and buckwheat straw is as follows:

PRODUCT	Pounds Nitrogen	Pounds Phos. Acid	Pounds Potash
Buckwheat, grain, 25 bushels.....	22.75	8.81	3.75
Buckwheat straw, 2¼ tons.....	40.75	15.87	13.28
	73.50	24.68	17.03

### BUCKWHEAT AS GREEN MANURE

In earlier days, buckwheat was quite commonly used as green manure crop, but as the value of legumes for green manure became recognized, the use of buckwheat in this way became less commonly practiced. As an average of eight tests made by the Ontario Agricultural College to determine the relative value of buckwheat, as compared with field peas as a green manure, wheat yielded 6½ bushels more per acre after peas than it did after buckwheat.

Besides being used for food and feed, buckwheat is often grown to make pasture for bees. Honey made by bees pasturing on buckwheat is considered of the best quality.

#### Food Value of Buckwheat Flour

1 cup buckwheat flour weighs 5½ oz.  
It contains 40 calories from protein.  
It contains 17 calories from fat.  
It contains 486 calories from carbohydrates.  
Total number of calories, 543.

#### Food Value of Wheat Flour

1 cup wheat flour weighs 4 oz.  
It contains 50 calories from protein.  
It contains 10 calories from fat.  
It contains 335 calories from carbohydrates.  
Total number of calories, 395.

*The calirific value of these two flours is practically the same per ounce.*

#### Buckwheat Cakes with Yeast

2 cups buckwheat flour  
½ cup corn meal  
½ cup liquid yeast or ½ cake dry or compressed yeast  
2 cups warm water  
1 tablespoon molasses or syrup  
1 teaspoon soda.

Sift the flour and meal together, dissolve the dry yeast or mix liquid yeast with water which should be milk warm, stir into flour, beat well, pour into bowl or crock, cover with thick cloth and set in warm place over night. It should rise and fall by morning. Beat well, add soda mixed with molasses, and salt beaten into egg. Try one cake and if sour add more soda. The molasses makes cakes brown nicely. Bake on hot, slightly greased griddle.

#### Buckwheat Cakes Without Yeast

2 cups buckwheat flour	1 teaspoon salt
½ cup corn meal	2 teaspoons baking powder
1 egg	1 tablespoon molasses
2 cups water or milk	1 tablespoon melted shortening

Stir together all the liquids, sift in dry ingredients, add well-beaten egg and melted shortening. Mix well and bake on hot griddle.

Sour milk or buttermilk and soda may be used instead of the water or sweet milk and baking powder.