

# Buckwheat Production

Duane R. Berglund

Professor Emeritus and Former Extension Agronomist

## **Buckwheat is a psuedo-cereal used for human food.**

It belongs to the Polygonaceae family of plants.

The species of buckwheat grown commercially for food in the United States is "*Fagopyrum sagittatum*."

This crop was grown in China before 1000 A.D., and was introduced in Europe in the 15th century and the United States in the 17th century. The name buckwheat originated from the Anglo-Saxon words boc (beech) and whoet (wheat). The three-sided angular seed resembles a small bechnut.

## **Adaptation**

Buckwheat grows best in a cool, moist climate under a wide range of soil conditions. It is sensitive to spring and fall frost, high temperatures, drying winds and drought. Stress factors can reduce yield, especially if they occur during the blooming period. Wind, heavy rainfall and excessive soil nitrogen can cause buckwheat to lodge, which makes it difficult to harvest and may result in yield loss.

Buckwheat should be planted when danger of spring frost has passed. It requires 10 to 12 weeks after planting to reach maturity. Buckwheat has an indeterminate

growth habit, with the top of the plant flowering while seed at the base of the plant already may be mature. When planted on low-fertility soils, buckwheat may outperform most small grains. On high-fertility soils with good water-holding capacity, small grains are usually more productive.

Buckwheat has a taproot with numerous lateral roots that may extend to a depth of 3 to 4 feet. The root system is small, usually consisting of only 3 percent of the total plant weight, compared with 6 percent to 14 percent in cereal grains. To produce good yields, adequate soil moisture must be available from early July through August during the time the crop is flowering and producing seed. Dry conditions, hot winds and other stress during blossoming can reduce buckwheat yields drastically by causing high levels of flower and seed abortion.

Buckwheat flowers are self-sterile and require cross-pollination. Bees, other insects and wind are required to distribute pollen.

## **Rotation**

Buckwheat usually is not included in a regular rotation. It is a heavy feeder of mineral fertilizers, especially phosphate, and this should be considered in fertilizing the crop following buckwheat. Buckwheat stubble adds very little organic matter and leaves the soil loose and more subject to erosion than small grains, corn, soybeans and/or field peas. Avoid planting buckwheat on canola, mustard or sunflower ground because these crops readily produce volunteer plants that are

**NDSU**  
**Extension Service**

North Dakota State University  
Fargo, North Dakota 58105

JUNE 2007

impossible to control in growing buckwheat. Buckwheat drops seed readily before harvest and volunteer growth often occurs in the following crop. A grower should be careful to select a crop that has buckwheat-control options available. Bromoxynil, dicamba, Curtail M and Harmony Extra herbicides easily control volunteer buckwheat in small grain. Growers should select a crop following buckwheat for which these types of herbicides are labeled and can be used safely.

Disease problems are rarely encountered in buckwheat. As a precaution, however, a minimum of three years should be left between successive buckwheat crops in a rotation.

## Variety Selection

Producer selection of varieties often is controlled by the contracting company. These same companies also will supply the seed or a seed source for purchase of high-quality seed. Since little breeding work or effort is being done on buckwheat, only a few varieties are available. Most of the buckwheat varieties are diploids. Since buckwheat is cross-pollinated, variety designations may not be valid except in certified seed lots. Varieties developed in Canada and Europe also should be considered.

## Seedbed

Buckwheat is established most easily on a well-prepared, firm seedbed similar to that for flax or other small-seeded crops. Early to mid-June planting permits adequate control of several weed seedling flushes prior to seeding. Under good growing conditions, buckwheat will germinate and shade the ground quickly. Cultural control of weeds is important because no herbicides are labeled for weed control in buckwheat.

**Table 1. Buckwheat agronomic traits (averaged over all locations±) 2006.**

Variety	Days to First Flower	Plant Height (inches)	Lodging++ (0-9)	Test Weight (lbs/bu)
Mancan	31	35	5.6	40.8
Koma	35	35	5.0	41.7
Manor	33	36	4.7	40.0
Koto	34	37	3.5	40.5

± Locations include NDSU Research Extension Center sites at Langdon, Carrington, Hettinger, Williston, Minot and Prosper, N.D.

++ Lodging: 0=flat, 9= erect.

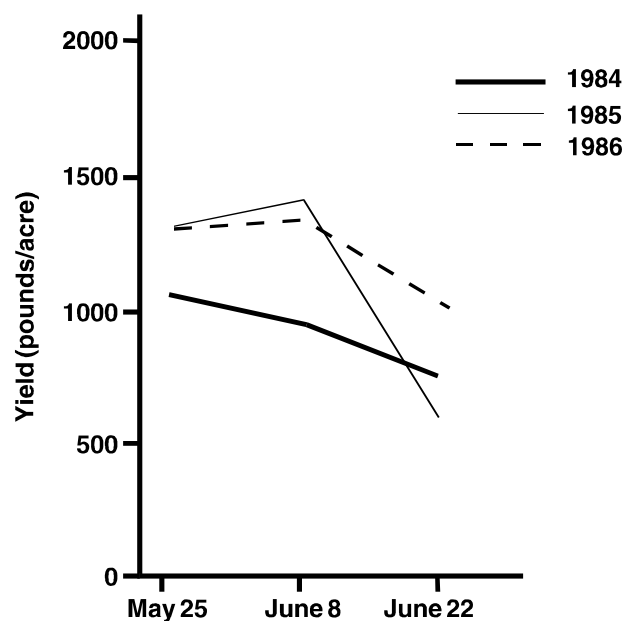
Source: NDSU Extension publication A-1105 (revised 2007)  
2006 North Dakota Alternative Crop Variety Performance

## Date of Seeding

Young seedlings are very sensitive to frost, so seeding should be delayed until all danger of spring frost is past. Buckwheat seed germinates best when the soil temperature is about 80 F, but will germinate at any temperature between 45 F and 105 F. Seeding from May 25 to June 10 is suggested. Uniform stands sometimes are hard to obtain due to cool soil temperatures. Seeding after May 25 in North Dakota allows additional time for weed control tillage and for soil to warm. Buckwheat seeding should be timed to allow plant growth to take place in warm weather and seed to form in the cool weather of late summer. Any type of stress, especially at flowering, can result in a poor seed set. Delayed seeding, however, does increase risk of fall frost damage. When seeding is delayed beyond mid-June, severe yield reductions may occur (Figure 1). Later dates of planting result in a shorter growth period, shorter plants, slightly lighter seed, lower bushel weights and reduced seed yield.

## Rate and Depth of Seeding

Buckwheat usually is sown with a grain drill or air seeder at the rate of 40 to 50 pounds of pure live seed per acre. Good stands help prevent lodging. Buckwheat does not tiller; each seed produces a single stem that branches toward the top as field space permits. The preferred seeding depth is 1 to 1.5 inches if the soil moisture for germination is adequate. Seeding deeper than 2 inches should be avoided.



**Figure 1. Planting date effect on yield of Mancan buckwheat during three growing seasons at Langdon, N.D.**

## Fertilizer

Buckwheat's response to phosphate fertilizer is similar to that of small grains. Nitrogen levels should remain relatively low because of the tendency of the crop to lodge. See Table 2 for soil nutrient needs of buckwheat based on yield goals. Also, NDSU Extension publication SF-724, "Fertilizing Buckwheat," has additional information on buckwheat nutrient needs.

## Green Manure Crop

Buckwheat can be used as a beneficial green manure crop since it can produce significant amounts of dry matter. Up to 3 tons of dry matter per acre has been obtained after seven to eight weeks of growth. When plowed or tilled under, the plant materials decay rapidly, making nitrogen and mineral constituents available for subsequent crops. The heavy, dense growth of buckwheat also tends to suppress weeds to some extent. When a second crop of green manure is desired, winter rye may be seeded into the worked-down buckwheat and plowed under in the following spring for even better soil-building results. Buckwheat green manure also may fit into a fairly tight rotation following an early crop harvest (mid-July) where sufficient growth will occur before incorporation with fall tillage. If volunteer buckwheat could be harmful in the succeeding crop, then the green manure crop of buckwheat should be destroyed and tilled under before going to seed. Many organic growers use buckwheat as part of their rotation plan to build healthy soils.

## Harvesting

The crop begins to flower four to five weeks after planting and continues to flower and produce seed until freeze-up. The crop should be swathed prior to a killing frost at a stage when the crop appears it will produce the largest seed yield. A killing frost on a standing crop results in considerable harvest difficulty plus yield loss due to shattering and lodging. Swathing sometimes is made difficult by the succulent nature of the stems. Research conducted in Canada indicates the optimum time for swathing to obtain maximum yields is when flowering is near completion and about 25 percent of the seeds are still green. If shattering becomes severe, the crop should be swathed immediately. The crop should be swathed in the morning when it is wet with dew or in damp periods to avoid seed shattering. Since stems are succulent, they require considerable time to dry. A frost while the crop is in the swath speeds drying.

Buckwheat is threshed with a combine set at a cylinder speed of 600 to 800 rpm. Producers should take care in threshing because cracking can result. If excessive cracking or hulling occurs, decreased cylinder speed or wider concave clearance may be necessary. Buckwheat can be stored safely at 13 percent moisture content for long-term storage. When shorter-term storage is needed and when environmental conditions are cool (under 50 F), buckwheat should be stored at 15 percent moisture or less. If the crop must be dried, the maximum drying temperature is 110 F. **Never**, under any circumstances, should producers mix old crop and new crop buckwheat because market grades differ and market discounts or loss of contract may occur.

Table 2. Fertilizing buckwheat.

Yield goal	Soil N plus fertilizer N required	Bray-1 Olsen	Soil Test Phosphorus, ppm					Soil Test Potassium, ppm				
			VL 0-5 0-3	L 6-10 4-7	M 11-15 8-11	H 16-20 12-15	VH 21+ 16+	VL 0-40	L 41-80	M 81-120	H 121-160	VH 161+
bu/a	lb/acre-2'		lb P <sub>2</sub> O <sub>5</sub> /acre					lb K <sub>2</sub> O/acre				
25	55		30	22	13	5	0	41	29	18	6	0
30	65*		36	26	16	6	0	49	35	21	7	0
35	75*		42	30	19	7	0	57	41	25	8	0
40	90*		48	35	21	8	0	65	47	28	9	0

Nitrogen recommendation = 2.2 YG - STN - PCC  
 Bray-I P recommendation = (1.320-0.066 STP)YG  
 Olsen P recommendation = (1.320-0.083 STP)YG  
 Potassium recommendation = 1.8600-0.0116 STK)YG

\*N fertilizer rates greater than 50 lb/acre can cause lodging in wet years.

Source: NDSU Extension publication SF-724, "Fertilizing Buckwheat"

## Pests

Buckwheat suffers relatively little damage from either diseases or insects. The diseases most common are leaf spot and root rot. Wireworms and aphids occasionally attack buckwheat.

## Weed Control

No herbicides are cleared for use on buckwheat in North Dakota. Since no herbicides are available, plant buckwheat on land that is relatively weed-free. However, under normal conditions, weed pressure usually is not great. When planted in warm soils with rapid emergence and growth, buckwheat is a strong competitor with most annual weeds. Avoid planting in fields with a history of perennial weed infestation and field history of crops that have high potential for volunteers, such as canola, mustard and sunflower.

## Yield

Grain yields at various Research Extension Center locations in North Dakota during the past few years have varied significantly, depending on the growing season (Table 3). Local growers have reported yields of 100 to 2,000 pounds per acre. Since buckwheat is so sensitive to many stress factors, predicting yield is hard. Weather is the most limiting yield factor.

## Marketing

Buckwheat almost always is grown under contract with seed of the preferred variety furnished by the contracting company. Buckwheat must be marketed the year it is produced, so most buckwheat is sold under contract. Not all local grain elevators handle buckwheat. Producers should inquire about possible contracts and market outlets before beginning a production program. Buckwheat is sold by the hundredweight. The North Dakota State Seed Department has established market-grading factors for buckwheat. Contact that office for grading standards information.

Table 3. Buckwheat variety performance.

Variety	Yield (lb/acre)						2006 Avg	2 yr Avg	3 yr Avg
	Location								
	Langdon	Carrington	Williston	Prosper	Minot	Hettinger			
Koma	2083	538	588	1058	463	775	918	1241	1253
Koto	2637	778	649	838	463	625	998	1249	1312
Mancan	3169	742	681	1081	467	560	1117	1381	1344
Manor	2792	691	743	1021	666	588	1084	1329	1325
Trial Mean	2375	592	573	926	461	613	—	—	—
LSD 5%	758	165	215	251	217	160	—	—	—

Source: NDSU Extension publication A-1105 (revised 2007) "North Dakota Alternative Crop Variety Performance"

This publication may be copied for noncommercial, educational purposes in its entirety with no changes. Requests to use any portion of the document (including text, graphics or photos) should be sent to [permission@ndsuent.nodak.edu](mailto:permission@ndsuent.nodak.edu). Include exactly what is requested for use and how it will be used.

For more information on this and other topics, see: [www.ag.ndsu.edu](http://www.ag.ndsu.edu)



A-687

County Commissions, North Dakota State University and U.S. Department of Agriculture cooperating. Duane Hauck, Director, Fargo, North Dakota. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. We offer our programs and facilities to all persons regardless of race, color, national origin, religion, gender, disability, age, veteran's status or sexual orientation; and are an equal opportunity institution. This publication will be made available in alternative formats for people with disabilities upon request. (701) 231-7881.

1M-11-03; 1.2M-6-07