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Production of Buckwheat In Northern Idaho

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Buckwheat (*Fagopyrum sagittatum* Gilib) was domesticated in China and introduced into Europe in the 15th century. European settlers brought this crop into the U.S. in the early 17th century. Since that time, it has been grown as a low value crop in the East and upper Midwest of the U.S. Some limited production also occurs in the southern areas of Canada.

Because of its ability to produce mature seed crop in 60 to 90 days, buckwheat is often planted when principal crops are lost late in the growing season. Limited markets and low net returns have historically limited the production of buckwheat. Because of interest in "natural" foods as well as expanding export markets, production of this crop has increased in recent years.

Buckwheat is the only cereal grain grown in this country that is not a grass. It's distant relative, wild buckwheat (*Polygonam convolvalus* L.), occurs in large areas of the northern U.S. including Idaho. Because of its extreme sensitivity to the herbicides used in cereal production and lack of seed dormancy, volunteer plants of tame buckwheat have not presented problems as weeds.

In 1983 and 1984, a series of trials were conducted in northern Idaho to identify adapted varieties and develop cultural practices to allow commercial production of buckwheat. The data presented in this publication represent yield measurements from small experimental test plots that are often higher than yields which could be obtained under commercial production. Commercial yields in the Tammany area near Lewiston, Idaho, have ranged from 800 to 1,600 pounds per acre.

Establishment of Buckwheat

Buckwheat should be seeded into a fine, firm seedbed of a field that does not have a history of serious weed infestations. Grain drills should be set to plant 50 to 55 pounds of pure live seed per acre in 6 or 7 inch rows. Buckwheat should not be seeded deeper than 2 inches. Certified seed of varieties of proven adaptation and market acceptance should be used. Commercial seed should be treated with registered seed treatments before planting to reduce seedling diseases.

Because Japanese importers pay a premium for large seed size, the three commercial large seeded cultivars were included at all locations (Fig. 1). The larger seeded buckwheat varieties have a lower test weight, higher percent of hulls and a higher groat recovery. Three smaller seeded cultivars were also included in the Moscow trial in 1984. All cultivars were seeded at three dates at each location to determine the optimum planting date.

The larger seeded varieties (Mancan, Manor and Royal) did not differ in seed yield, seed weight or test weight at any of the three locations (Table 1). Among the three smaller seeded cultivars (Silverhull, Tokyo and CD-6183), which were seeded at Moscow in 1984, only CD-6183 (a breeding line) yielded less than the larger seeded varieties. However, because of the premium paid for large seed size, growers should not grow varieties with 100 seed weights less than 2.8 grams unless the seed is marketed under a pre-arranged contract.

At Moscow in 1983, the early May planting date produced the highest seed yield (Table 1). At the other two locations, differences in seed yield were not detected in the different planting dates. Seed weight and test weight were not generally sensitive to planting date. There was also no interaction between variety and planting date in these studies. Planting buckwheat in early May allows the plants to make more effective use of soil moisture than planting at later dates.

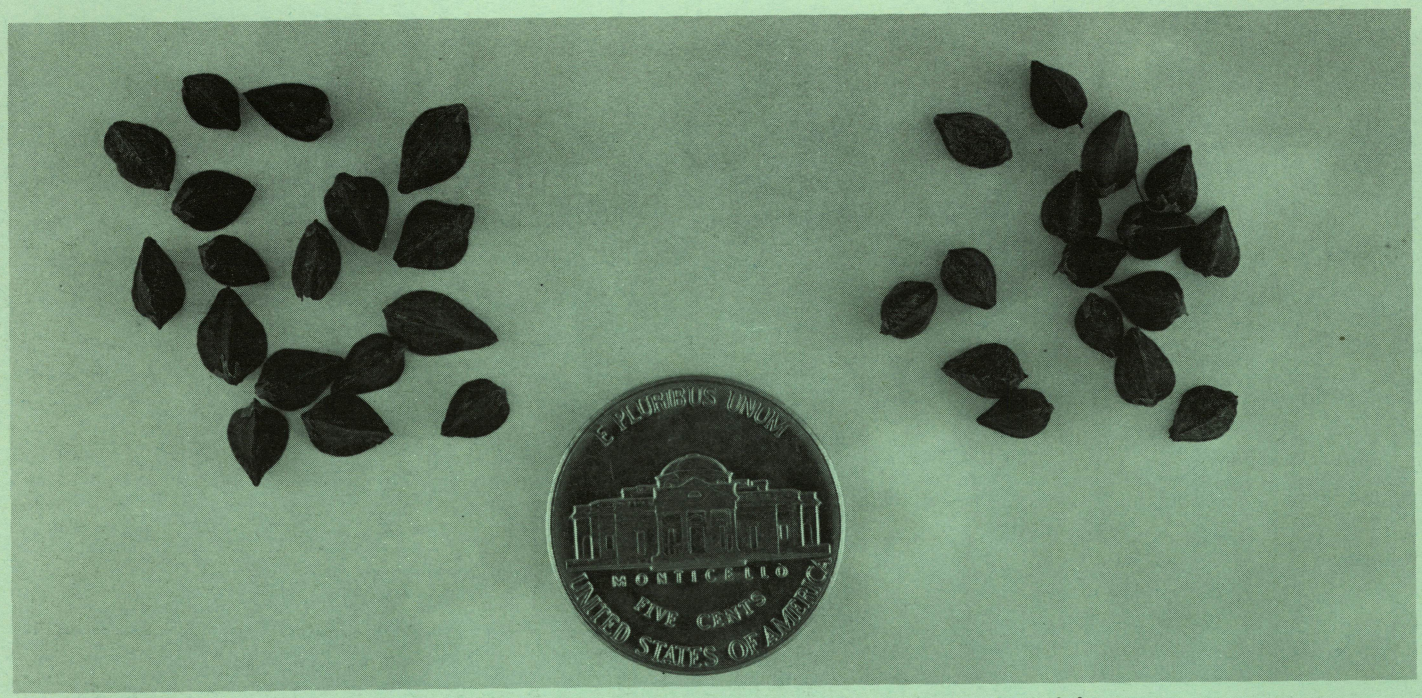

Fig. 1. Comparison of large seed buckwheat, left, with small seed buckwheat varieties, right.

Table 1. Effect of planting date on several buckwheat varieties grown in northern Idaho in 1983 and 1984.

	Seed yield			Seed weight			Test weight		
	Moscow		Tammany	Moscow		Tammany	Moscow		Tammany
Treatment	1983	1984	1984	1983	1984	1984	1983	1984	1984
	------- lb/acre -------			------ g/100 seed ------			-------- lb/bu --------		
Planting date									
Early May	1,860a*	890a*	1,040a*	3.19a*	2.50a*	2.93a*	38.4b*	37.5a*	35.4a*
Mid May	1,580b	1,070a	1,200a	3.11a	2.39a	2.88a	38.6b	37.3a	35.6a
Late May	1,180c	1,230a	1,040a	3.21a	2.41a	2.80a	40.5a	37.7a	35.0a
Variety									
Mancan	1,450a*	1,100a*	1,070a*	3.15b*	2.59a*	2.87a*	38.9a*	36.1c*	35.0a*
Manor	1,510a	990ab	1,200a	3.08b	2.57b	2.89a	39.1a	37.0bc	35.5a
Royal	1,660a	1,260a	1,000a	3.28a	2.70a	2.85a	39.4a	36.4bc	35.5a
Silverhull	-	1,110a	-	-	2.27c	-	-	40.2a	-
Tokyo	-	1,180a	-	-	2.29c	-	-	38.1b	-
CD-6183	-	750b	-	-	2.20c	-	-	37.0bc	-

*Means not followed by the same letter differ at the 0.05 level of probability by Duncan's new multiple range test.

Table 2. Effect of nitrogen fertilizer on three buckwheat varieties grown at Moscow, Idaho, in 1983 and 1984.

	Seed yield		Seed weight		Test weight		Nitrogen content		Phosphorus content
Treatment	1983	1984	1983	1984	1983	1984	1983	1984	1984
	----- lb/acre -----		-- g/100 seed --		------ lb/bu ------		------- % -------		-- % --
Nitrogen fertilizer (lb/acre)									
0	1,600a*	1,290a*	3.1a*	2.6a*	36.2a*	37.9a*	2.3a*	2.2a*	0.4a*
35	970a	1,150a	3.0a	2.7a	36.4a	38.1a	2.3a	2.3a	0.4a
70	1,150a	1,200a	3.0a	2.6a	36.0a	37.4a	2.3a	2.3a	0.4a
Variety									
Royal	1,390a*	1,320a*	3.1a*	2.7a*	36.5a*	38.3ab	2.3a*	2.3b*	0.4ab*
Mancan	1,170a	1,210a	3.0b	2.7ab	36.1a	36.6b	2.3a	2.4a	0.5a
Manor	1,150a	1,130a	2.9b	2.6a	36.0a	39.1a	2.3a	2.3b	0.4b

*Means not followed by the same letter differ at the 0.05 level of probability by Duncan's new multiple range test.

Fig. 2. Small plot combine harvest of a buckwheat variety trial after a mid-September frost at Moscow, Idaho, in 1983.

Buckwheat seedlings are extremely sensitive to frost and must be seeded so that the seedlings emerge after the last frost. At Moscow and Tammany in 1984, frosts in mid-May reduced the stand as well as the seed yield of the buckwheat that was seeded in early May. At the higher elevations in Idaho where frost can occur in any month of the year, buckwheat has very limited adaptation. Even at intermediate altitudes and in cold air drainages, growers should not plant until mid to late May to avoid stand loss because of frost.

Variety × Fertility

The three large seed cultivars were planted in mid-May at Moscow in 1985 and 1984 and fertilized with 0, 35 and 70 pounds of nitrogen per acre applied as ammonium nitrate. The three varieties differed only slightly in seed yield, seed weight, test weight, nitrogen content or phosphorus content (Table 2). The buckwheat varieties did not respond to nitrogen fertilizers despite levels of soil nitrogen that would have been insufficient for the production of a spring barley crop.

Earlier work has shown that buckwheat is very effective in extracting both phosphorus and nitrogen from acid soils. This research indicates that nitrogen fertilizers should be applied only in soils with less than 60 pounds per acre of available nitrogen.

Pests of Buckwheat

Buckwheat in our trials and earlier research has not had serious losses to diseases or insect pests. Game birds, deer and elk reportedly have fed on the green plants and the mature seed of buckwheat. Losses to animals are usually minimal under most commercial production conditions.

Weeds are the most serious pest of buckwheat. Because buckwheat is extremely sensitive to most herbicides, it has been hard to obtain labels for use of herbicides, and there are no registered herbicides on buckwheat in Idaho. Growers should avoid planting buckwheat in fields with a history of severe weed infestations. Because buckwheat is so competitive, it can tolerate a moderate level of weeds if it establishes before the weed species.

Pollination Requirements of Buckwheat

Buckwheat flowers require cross pollination to set seed. Both bees and wind can carry buckwheat pollen. Canadian researchers recommend a minimum of one beehive for each acre of buckwheat production. Buckwheat flowers allow honey bees to produce up to 150 pounds per acre of dark, strongly-flavored honey.

Harvesting Buckwheat

Buckwheat varieties are very indeterminate and continue to flower and set seed until soil moisture is exhausted or the plants are exposed to a killing frost. In northern Idaho, growers have had the best commercial results harvesting shortly after a late September frost or swathing in early September and allowing 10 days for the crop to dry (Fig. 2). Swathing may be preferred by many growers since a late September harvest could interfere with planting of winter wheat. When seed moisture exceeds 14 percent, the crop should be dried to a 10 percent moisture level before storage using low temperatures (less than 113°F).

Marketing Buckwheat

Commercial and experimental plots of buckwheat have produced large quality seed that is in demand in Japanese markets. The dehulled and ground buckwheat seed is used in concentrations of 80 to 20 percent with wheat flour to produce soba noodles, which are used in ethnic Japanese foods. The U.S. consumption of buckwheat has been generally supplied by limited production in the upper Midwest.

Growers should have a firm contract with a reputable firm before seeding buckwheat. Japanese importers prefer to purchase fresh crops and will buy stored buckwheat only at a discount, since the crop tends to darken as it ages. The contract price will vary, but to be economically competitive, the net return from a buckwheat crop must be equal to or higher than the net return expected from other rotational crops, such as peas and barley.

Summary

Commercial production of buckwheat has been most successful in the Tammany area above Lewiston. Because of its susceptibility to frost and extremely late maturity, buckwheat will be only marginally adapted to the higher elevations of the Palouse and Camas prairies of northern Idaho. Buckwheat has been successfully grown after an early maturing cereal crop in the warmer, irrigated basin of the Pacific Northwest.

Because the plants flower through July and August, the lack of rainfall during this period also tends to limit yields under dryland conditions. Growers are encouraged to initially establish small acreages of this crop to ensure its adaptation to a given area. Growers should grow the crop under contract and carefully follow the production guides suggested in this and other production publications.

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