University of Idaho
College of Agriculture

Cooperative Extension System
Agricultural Experiment Station

Current Information Series No. 860

Cultural Management Of Gemchip Potatoes

Stephen L. Love, Joseph J. Pavek, Dennis L. Corsini, James C. Whitmore and Timothy P. Baker

Gemchip is a round, white chipping potato released by the Northwest Potato Variety Development Program in 1989. It produces excellent yields, has good quality and is well adapted to irrigated areas of the West. Gemchip differs from other chipping or russet varieties in its growth and storage requirements. This publication provides some management tips for successful production of Gemchip potatoes. Growers should adapt this information to their own situations as experience dictates.

Seed Management and Spacing

Gemchip seed should be cut to an optimum size of 2 to 2.5 ounces. A seed treatment is advised.

Gemchip will benefit from fairly close seed piece spacing due to its relatively low tuber set. A 9- to 10-inch within-row spacing on a 36-inch row width is ideal under most conditions. Wider spacing may result in excess oversized tubers. Seed potatoes should be planted closer; 7-inch spacing provides a good seed size distribution.

Fertility

No research information is available concerning the requirements of Gemchip for phosphorus, potassium or micronutrients. Follow the recommendations developed for Russet Burbank potatoes (University of Idaho CIS 261, *Idaho Fertilizer Guide: Potatoes*).

Any plan for nitrogen management should take into account that Gemchip is late maturing and that its tubers must be mature before harvest. Gemchip will benefit from split or seasonal applications of nitrogen and will use 5 to 10 percent less nitrogen than the Russet Burbank variety. Total crop need is based on yield potential. Until experience indicates otherwise, use Table 1 to predict yield potential for specific areas of southern Idaho.

When all or most of the nitrogen is applied preplant, use a soil test to estimate residual nitrogen, then determine the amount of nitrogen to apply (Table 2). If seasonal application of nitrogen is desired, use Table 3 to determine preplant nitrogen rates and Table 4 for a suggested application schedule. Avoid nitrogen applications later than the dates given in Table 4.

Petiole nitrate-nitrogen (NO_3-N) testing to monitor Gemchip's nitrogen status will be difficult due to its unusual seasonal response. Regardless of the amount of nitrogen applied, petiole nitrate levels in Gemchip decrease rapidly over time. At tuber initiation, petiole NO_3-N concentrations typically are lower than in most varieties, usually around 15,000 ppm. From that point they will decrease at a constant rate and reach 4,000 to 6,000 ppm by the onset of vine senescence (see Table 5 for suggested petiole NO_3-N levels).

Do not try to maintain petiole nitrates at a high level as is common with Russet Burbank. This can result in the application of excess nitrogen and delayed maturation. Even when grown under conditions that usually

Table 1. Potential yield of Gemchip in southern Idaho.

Growing area	Potential yield[1]
	(cwt)
East[2]	350 to 450
Central	450 to 550
West	550 to 650

[1]Due to the variability of conditions within each growing area, a range of potential yields is given. If yields in your locale are traditionally lower or higher than in other locales within the area, determine your potential yield from the corresponding end of the range.

[2]East includes all of the upper Snake River plain south and west to American Falls and all high-altitude seed areas.

cause severe early dying in Russet Burbank, Gemchip grown with excess nitrogen will not produce increased yields and may have storage problems.

Irrigation

Total water use by Gemchip is similar to use by Russet Burbank until late in the season. Since vines do not die early, Gemchip tends to use a significant amount of water right up to vine kill. Available soil water content should be maintained above 65 percent throughout the active growth phase. In seed production areas, quicker vine kill and tuber maturation may result from ceasing irrigation 2 weeks before the projected vine kill date.

Weed Control

Gemchip is moderately sensitive to metribuzin (Sencor, Lexone) injury. Use the following precautions to avoid injury. Apply no more than ½ pound active ingredient per acre in any season, less if possible. Apply metribuzin just before the plants emerge. If irrigation is used to incorporate the metribuzin, apply less than ½ inch of water with the first irrigation to avoid leaching the metribuzin into the root zone. Gemchip is not sensitive to other herbicides labeled for potatoes.

Diseases

Use of certified seed is recommended to reduce problems with viral diseases, ring rot and blackleg. Seed growers should make careful inspections to rogue potato plants with virus Y. Gemchip has a moderate level of tolerance to this pathogen.

Gemchip is moderately resistant to the foliar phase of early blight, which seldom reaches levels high enough to affect yield. However, Gemchip is moderately susceptible to the tuber phase of early blight, and storage losses can occur when tubers are stored at the higher temperatures required to meet chipping requirements. The inoculum for tuber early blight is provided by the foliar phase of the disease. Very low levels of foliar early blight can provide sufficient inocula for tuber infection.

Table 3. Preplant nitrogen rates, based on a soil test, for Gemchip potatoes grown in three areas of southern Idaho when petiole testing and seasonal nitrogen applications are planned.

Soil test nitrogen[1]	Application rate		
	East	Central	West
(ppm NO_3-N)	(lb N/acre)		
0	85	95	110
5	55	70	85
10	30	40	55
15	0	15	30
20	0	0	0

[1] NO_3-N in the first 12 inches of soil.

Table 4. Suggested seasonal application dates and rates for nitrogen in three southern Idaho growing areas when petiole testing is planned.

Application number	Rate	Application date		
		East	Central	West
	(lb N/acre)			
1	40	July 5	July 1	June 25
2	40	July 25	July 15	July 15
3	40	Aug 15	Aug 1	Aug 1
4	40			Aug 15

Table 5. Suggested optimum petiole NO_3-N levels for Gemchip potatoes at different stages of growth in three southern Idaho growing areas.

Stage of growth	Suggested petiole NO_3-N level[1]	Approximate date of growth stage		
		East	Central	West
	(ppm)			
Tuber initiation	15,000	July 5	July 1	June 25
Early bulking	12,000	July 25	July 15	July 15
Late bulking	8,000	Aug 15	Aug 20	Sept 5
Beginning of senescence	5,000	Sept 1	Sept 5	Sept 15

[1] See University of Idaho CIS 743, *Tissue Analysis — A Guide to Nitrogen Fertilization for Russet Burbank Potatoes,* for petiole sampling techniques.

Table 2. Total nitrogen fertilizer requirements for Gemchip potatoes, based on soil test and potential yield, when all or most of the nitrogen is applied preplant.

Soil test nitrogen[2]	Nitrogen requirement based on potential yield[1]				
	250	350	450	550	650
(ppm N)	(lb N/acre)				
0	90	135	180	225	270
10	55	100	145	190	235
20	20	65	110	155	200
30	0	30	70	120	160
40	0	0	35	80	125
50	0	0	0	45	90
60	0	0	0	0	55

Note: Add 15 pounds N for each ton of grain straw from the previous crop, up to 50 pounds per acre.

[1] Requirement is based on yield potential in cwt per acre.

[2] Total ppm NO_3-N and NH_4-N in 0- to 12-inch and 12- to 24-inch soil samples.

If Gemchip potatoes are intended for extended storage, two steps should be taken to avoid storage losses due to early blight. First, control foliar early blight with fungicides (see University of Idaho CIS 239, *Control of Early Blight of Potato in Eastern and Southeastern Idaho*). Second, make sure the tubers are mature before harvest by avoiding excess nitrogen fertilizer and initiating vine kill at least 3 weeks before digging.

Scab is a potential problem in Gemchip. It is recommended that Gemchip not be grown in fields with a history of scab problems.

Vine Kill and Harvest

One potential problem with Gemchip in the southeastern part of Idaho is late vine maturity. This can result in reduced yield, vines that are difficult to kill and storage problems. This can be managed by planting reasonably early (April 15 to May 10) and avoiding excess nitrogen.

Timely kill of the vines is important in order to mature the tubers. Gemchip will nearly always require vine killing with a good vine kill program.

Storage

Proper tuber maturation and a bruise-free harvest are the keys to successful storage of Gemchip (for bruise-free handling information see University of Idaho CIS 858, *Potato Harvester Modifications for Bruise Reduction*). Store well-matured, healthy tubers only. The harvest and storage of immature tubers can lead to increased rot and dehydration.

Gemchip potatoes destined for the chipping market should be stored at 50°F with adequate ventilation. Humidity above 90 percent is essential to avoid dehydration. Gemchip has a longer dormancy than Norchip, but sprout inhibition will be required for tubers stored longer than 3 months. For seed, hold the storage temperature at 37°F to 38°F until just prior to cutting. All other sound practices for potato storage should be followed (see Pacific Northwest publication 257, *Potatoes — Storage and Quality Maintenance in the Pacific Northwest*, and University of Idaho CIS 297, *Potato Storage — Construction and Management*).

Management Summary

Seed: Seed piece size should be 2 to 2.5 ounces. Seed piece spacing should be 9 to 10 inches for commercial crops, 7 inches for seed crops.

Fertility: Use recommendations developed for Russet Burbank for phosphorus and potassium. Apply 10 percent less nitrogen than is common for Russet Burbank. Use split applications, if possible, and avoid excess or late-season applications of nitrogen.

Weed control: Metribuzin can cause injury. Avoid application of more than ½ pound per acre.

Diseases: Control foliar early blight to avoid infection of the tubers in storage; avoid scab-infested soil.

Vine kill: Kill vines early enough to completely mature the tubers before harvest.

Storage: Potatoes destined for the chip market should be stored at 50°F and at greater than 90 percent relative humidity. Sprout inhibition will be required after about 3 months.

Authors — Stephen L. Love is potato variety development specialist and assistant professor at the University of Idaho Research and Extension Center at Aberdeen. Joseph J. Pavek is research geneticist-potato breeder and Dennis L. Corsini is research plant pathologist, both with the USDA Agricultural Research Service at Aberdeen, Idaho. James C. Whitmore is superintendent of the UI Research and Extension Center at Tetonia. Timothy P. Baker is research associate at the UI Research and Extension Center at Aberdeen.

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1,500, March 1990

35 cents per copy