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Potatoes

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Potatoes

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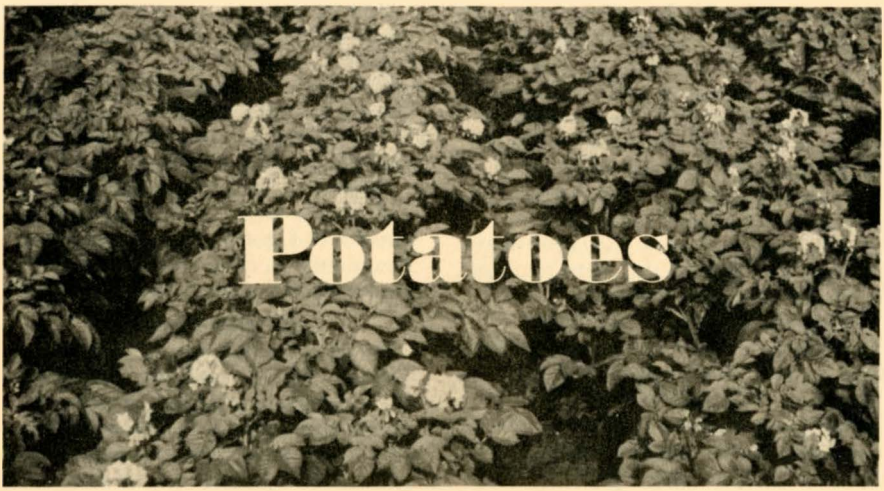

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Potatoes are harvested somewhere in the world every month of the year. They are grown in all 50 states, and, in the past, on most South Dakota farms.

In the last 25 years, the South Dakota growing area has shifted to the northeastern part of the state, and individual potato acreages have expanded to provide major parts of farm incomes.

The northeastern area has a sandy loam soil and a climate that is ideal for growing potatoes. Relatively high elevations cause the cool nights necessary for potato production, and rainfall is sufficient in most years.

The potato grower has felt a greater impact of technology in the past 20 years than have most other crop producers. New machinery, such as mechanical seed cutters, harvesters, and unloaders have, for the most part, taken the heavy labor out of producing potatoes.

Varieties

The following varieties are recommended for South Dakota. (Specific gravity is important in selecting varieties that will eventually end up as potato chips. The higher the specific gravity, the more chips per 100 pounds of potatoes.)

Bison. Medium maturity. Tubers are red and very smooth. Fair yield and specific gravity. Good boiling, and fair chip and baking, variety. Resistance to certain races of late blight and moderate resistance to scab.

Early Ohio. Early maturity. Round, oblong, somewhat cylindrical tubers with smooth, pink skin and numerous, medium deep eyes, and white flesh sometimes with color in cortex. Susceptibility to all potato diseases. This variety has very limited use in commercial potato production in South Dakota but can be used in the home gardens where earliness is the main consideration.

Kennebec. Medium to late maturity. Tubers elliptical to oblong with shallow eyes, and white skin and flesh. High yield, medium specific gravity, and good cooking and processing quality. Resistance to late blight, mosaic, and net necrosis of the tuber. Susceptibility to scab, verticillium wilt, and most potato virus diseases. High yielding and all purpose type of potato.

Norchief. Medium to late maturity. Tubers are bright red, smooth, and shallow eyed. High yield and specific gravity. Susceptibility to late and early blight and to most potato virus

diseases. Very likely to have poor suberization (it will have a watery texture). Moderate scab resistance.

Norchip. Medium early maturity. Tubers are round, oblong, and have white skins and flesh. Total solids are high and yield is medium high. Excellent chipping variety. Scab resistance and field resistance to certain potato insects. Susceptibility to early and late blight. Very popular with the chipping industry.

Norland. Very early maturity. Tubers are oblong to round, and the skin usually has a bright red color. Medium yield and low specific gravity. Resistance to common scab is excellent. Early market potato. Susceptiblity to late and early blight and most potato virus diseases.

Red LaSoda. Medium late maturity. Semi-round to slightly oblong tubers with bright red skin color. Specific gravity low but yield is generally high. Susceptiblity to most potato diseases.

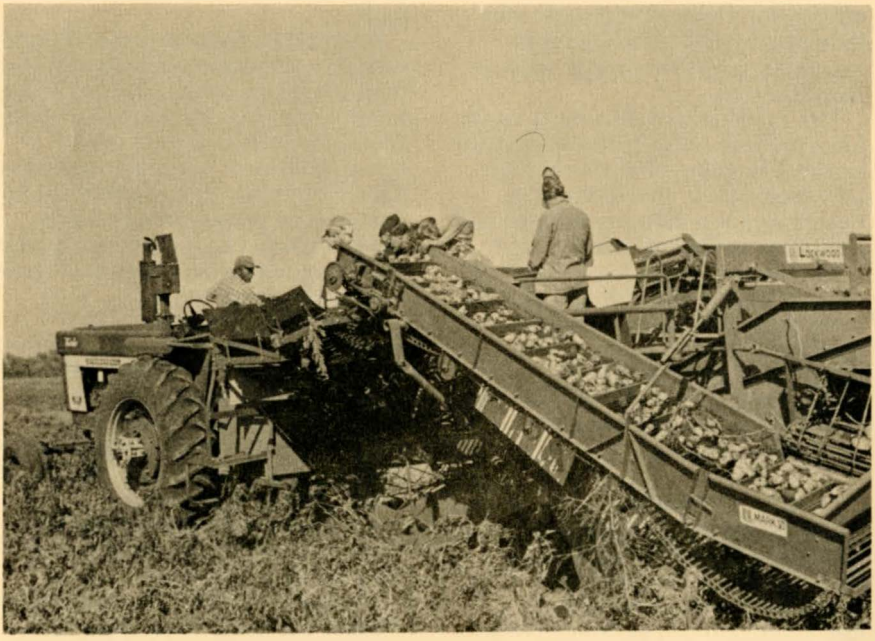
Red Pontiac. Late maturity. Tubers round to oblong with thin, flaky, light red skin, medium deep eyes, and white flesh. Susceptibility to most common potato diseases. The variety is known for its high yield and low specific gravity.

Superior. Medium maturity. Tubers are white with high specific gravity and good chipping quality. Resistance to common scab, but susceptibility to early and late blight.

Soil and Fertilizer

Yield is a reflection of soil type, climate, variety, and management. Set your yield goal before you determine fertilizer requirements. You can use the area average as your yield goal if you are a new grower. If fertilizer recommendations are based on the soil test and yield goal, you will have the right amount of nutrients in the right balance for the yield and quality you want.

Nitrogen fertilizer recommendations are based on the amount of



Technology has moved faster in the potato industry than in most other crop areas. While back breaking chores are not so common any more, certain times of the year are still labor intensive. This harvesting crew gets a rest because vines were still a little green.

nitrate-nitrogen in the soil, and yield goal can be figured out as following:

1. Soil test indicates 50 lbs of nitrate-nitrogen in the soil.
2. Yield goal is 250 cwt per acre.
3. The total requirement for this yield is 125 lbs (Table 1).
4. Subtract the nitrate-nitrogen in soil from the total requirement and apply the difference (125 — 50 = 75 lbs of nitrogen).

It is advisable to plow down half to two thirds of the total added nitrogen before planting. The rest should go on as side dressing just about the time of flowering.

Table 1. Nitrogen requirement based on yield goals.

Yield cwt/A	Total lbs of nitrogen/A
150	75
175	88
200	100
225	113
250	125
275	138
300	150

Phosphorous and potassium are immobile nutrients. Because they do not move with water in the soil, their levels do not change rapidly. The required amount of each should be plowed down before planting. Examples of the amount of phosphate and potash recommended for several yield goals are shown in Table 2.

Seed Bed Preparation

A seed bed for potatoes should be well prepared and packed to retain moisture. Planting in dry soil will almost always result in many decayed seed pieces and a poor stand. Depth of planting will depend on the soil and moisture content, but the usual depth is 3-4 inches. In sandy soil the furrows can be completely covered, but in heavy soils the covering should be shallow. This will help to check rhizoctonia and blackleg infection.

In general, heavy soil benefits most from fall plowing because frost, snow, and winter rain make the soil more mellow. Fields which are likely to be washed by winter rains and rapidly melting snow or which may blow should be plowed in the spring.

Prevention of soil erosion cannot be overemphasized. Any waste of top soil ultimately means a serious loss of capital to the potato grower. Erosion problems should be discussed with your county Extension agent or local soil conservation specialists.

Organic Matter

One of the most important soil problems in South Dakota is that of

Table 2. Phosphate and potash recommendations at various soil test levels.

	Soil test*									
	P lbs/A					K lbs/A				
Yield in cwt/A	Very low <6	Low 6-15	Medium 15-25	High 26-35	Very high >36	Very low <50	Low 51-120	Medium 121-210	High 211-300	Very high >300
	Plant Food Element Recommendations									
	lbs of P_2O_5/A					lbs of K_2O/A				
150	50	40	30	20	0	75	25	0	0	0
175	50	40	30	20	0	75	25	0	0	0
200	50	40	30	20	0	100	50	25	0	0
225	75	55	40	25	0	100	50	25	0	0
250	75	55	40	25	0	125	75	50	25	0
275	75	55	40	25	0	125	75	50	25	0
300	100	70	50	30	0	150	100	75	25	0

*Soil test according to SDSU Soil Testing Laboratory

supplying and maintaining soil organic matter. Besides the other advantages which organic matter offers, potatoes generally develop and maintain their normal shape better where there is adequate soil organic matter. Tuber shape is an important consideration in marketing the crop.

Seed

You cannot tell by looking at potato tubers whether they will be good for seed. A few symptoms of a disease which may endanger the next potato crop can be seen on tubers. But other diseases may go unnoticed. Even the most experienced grower cannot detect the tuber infected by mosaic or leaf roll disease and some other seed-born diseases.

Certified seed is very important in potato production because a number of potato diseases affecting both yield and quality are caused by infections carried inside the tuber and are not affected by external treatment.

Before cutting begins, always allow the seed potatoes to warm up (normally about 2 weeks), especially if they have been held in cold storage. Warming seeds prior to cutting increases the rate of wound healing. Varieties differ in their rate of wound healing.

Blocked seed pieces cut by machine are desirable. The planter can handle the blocked seed pieces better than nonuniform ones, and they are less likely to decay in the ground if the weather is unfavorable.

The amount of potatoes needed to plant one acre varies considerably and depends on the spacing and the size of the seed pieces. The general practice in this area is to use large seed pieces. The larger the seed pieces, the greater the total amount of seed required per acre (Table 3).

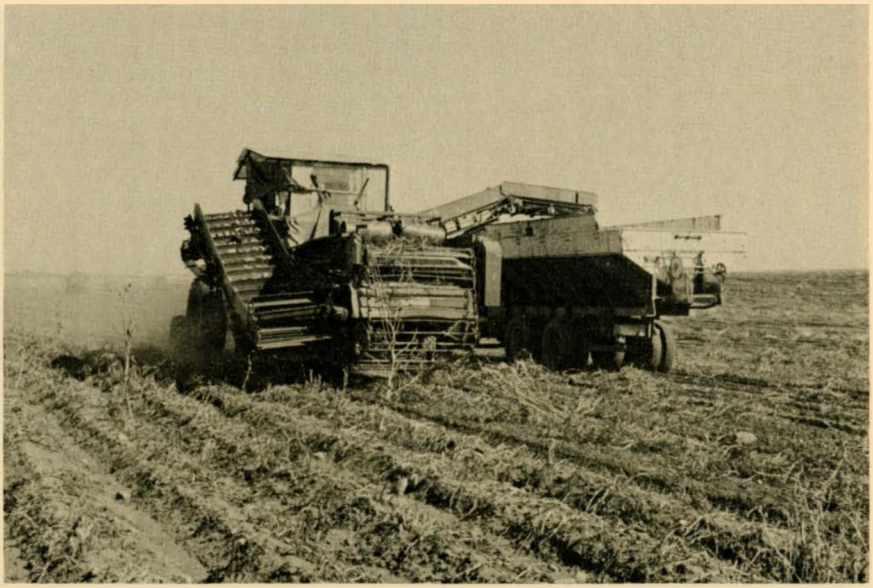
Our experiments show that potatoes cut by automatic cutters do not give uniformly sized seed pieces. If 3% of the smallest pieces are replaced by large pieces, yield is significantly increased. This will require more seed than shown in Table 3.

Seed Treatment

The cut tuber is very susceptible to infection. Several different fungicidal and bactericidal dusts can be applied to slow down growth of bacteria and fungi on the cut surface of the seed. Dusts must thoroughly cover the cut

Table 3. Seed potatoes required to plant an acre at different spacings and weights.

Space between rows (inches	Space between seed pieces within a row (inches)	Hundredweight (cwt) of potatoes required per acre when seed pieces weigh an average of: 1½ oz	2.0 oz
34	8	21.6	28.8
	12	14.4	19.2
	16	10.8	14.4
36	8	20.4	27.2
	12	13.5	18.1
	16	10.2	13.6
38	8	19.3	25.8
	12	12.9	17.2
	16	9.7	12.9
40	8	18.4	24.5
	12	12.3	16.3
	16	9.2	12.3
42	8	17.3	23.3
	12	11.7	15.6
	16	8.7	7.8



Cultivate often, to destroy weeds and gradually ridge the rows to protect the tubers. The best potato fields are on sandy loam, and the grower must make every effort to prevent serious soil erosion.

surface of the seed pieces and should be used with an applicator specifically designed for this purpose.

Seed treatment, however, is not a substitute for good storage and handling, and cultural practices. Neither will seed treatment guarantee a scab-free crop. If scab organisms are in the soil, tubers may be scabby regardless of the treatment.

Planter

The automatic picker type planter is the most widely used. It has been gradually improved for operating at high speed by increasing the number of pickers per wheel. Good results may be obtained with planters of this type if the seed potatoes are cut in blocked pieces of uniform size.

If seed pieces are not spaced properly, the yield is reduced. Our experiments show that there is no significant reduction in yield if the field has a 95% stand. Below that density, the yield reduction is directly related to the population.

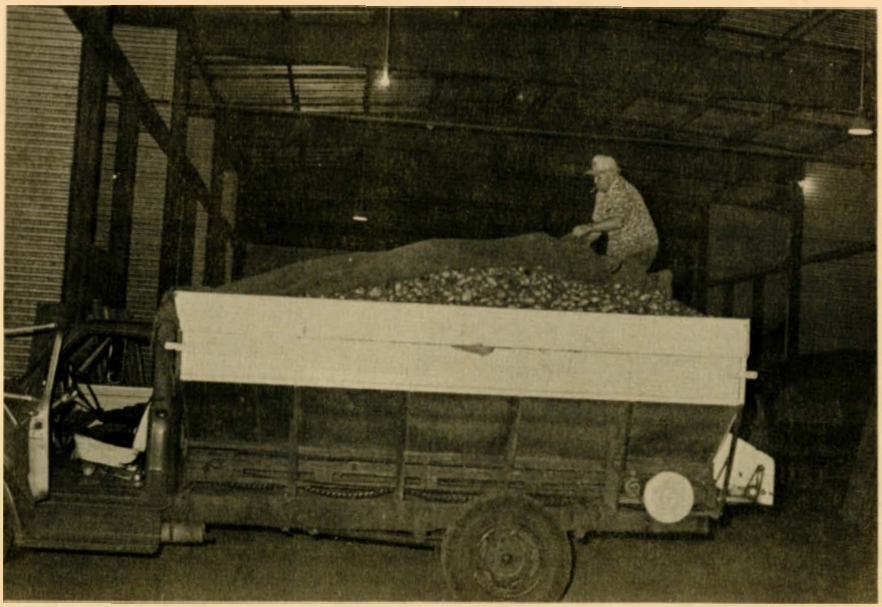
In commercial plantings we also found that 85% of the missing plants were due to missed spots or no seed piece planted. This is why the planter should be as accurate as possible.

Potatoes are planted by 2- or 4-row planters. If in good working condition and properly operated, both types are good.

Spacing

The natural fertility of the soil, its moisture holding capacity, the amount of water available during the growing season, the variety grown, and the amount of fertilizer applied usually determine the spacing within the row and the distance between rows. To make best use of mechanized equipment, growers prefer a row spacing of 34-42 inches between rows and a hill spacing of about 8-16 inches within the row. Under dry conditions wide spacings are best, while the opposite is true for irrigation.

Some varieties, when grown under irrigation, require close spacing to keep the tubers from growing too large, to minimize growth cracks and hollow heart, and to produce



Since light turns tubers green, storage must be in total darkness. A high relative humidity allows the tubers to heal any harvesting injuries, and carefully regulated temperatures keep them from sprouting.

maximum yields. In general, heavy yielding or poor setting varieties should be spaced closer to reduce the yield of oversized tubers.

Weed Control

If you follow good cultural practices, weeds are not often a serious problem. A number of early season annual weeds can be controlled by herbicides applied immediately after planting and before the potatoes come up. Some of the common herbicides are Dacthal W-75, Eptam 7E, and Treflan 4-EC.

Directions for safe use of herbicides are given on the manufacturer's label and should be carefully read and followed. These directions give the correct time, rate, method of application, crop on which use is approved, precautions for the user, the weeds the herbicide will control, and the limitations. When in doubt about correct use, contact your county Extension agent.

Very little potato acreage in South Dakota is presently treated with herbicides for controlling weeds. The trend, however, is toward increased use.

Cultivation

The objectives in cultivation are to destroy weeds and aerate the soil, and to gradually ridge the rows to provide soil covering for the developing tubers. As soon as potato plants are visible in the rows, cultivate deeply in the middle between the rows but shallow close to the plants. With each cultivation use discs or attachments to form a ridge. Cultivation and hilling are done in one operation.

Discontinue cultivation as soon as the plants come into full bloom or when the vines meet in the rows.

Irrigation

Unquestionably the amount and distribution of rainfall is the most important factor in potato production over which the producer has no control. In some seasons, insufficient or uneven rainfall distribution greatly reduces potato yields even though

seed, fertilizer, and cultural operations have been the best.

Potatoes need 2 inches of water per week during the season of heavy vine growth to make the best yield.

For this reason increasing numbers of growers are depending on supplemental irrigation to insure against crop losses from drought. If irrigation is available, soil moisture should never be allowed to drop to less than 50%. Greater fluctuation of soil moisture often results in misshapen tubers with secondary growth, reducing the yield of marketable tubers.

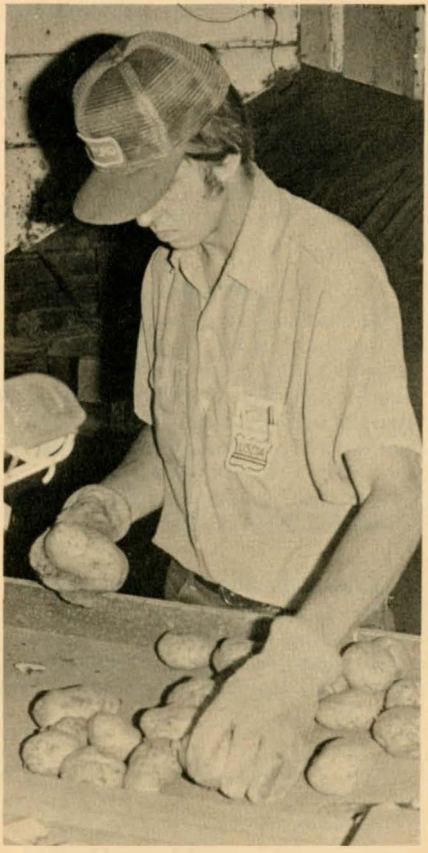
Rotation

Grow potatoes in a planned crop rotation. This keeps the soil fertile, maintains a loose friable texture, checks weeds, builds up organic matter, and reduces crop loss from insect damage and plant diseases. A potato grower must develop the rotation best suited for his conditions. In general, a long rotation of 3 or more years is particularly good for reducing potato losses caused by soil-born organisms.

Dryland farmers normally plant potatoes on summer fallow land or after a cultivated crop such as corn or beans. Sometimes a small grain crop such as oats or barley can precede potatoes on dryland. Small grain and particularly corn and barley are good rotational crops from the standpoint of verticillium control.

Summer fallowed land is suggested for dryland production, but most growers feel the cost is prohibitive under today's tax structure. Many growers follow a 2-year small grain, 1-year potato rotation with good results. From the standpoint of disease control and maintenance of tilth and fertility this is also a good rotation.

The best soil moisture storage conditions for dryland potatoes are maintained by summer fallowing the land before potatoes are grown. For maximum yield potatoes require 18-20 inches of water. A preceding crop that depletes soil moisture reserves can clearly reduce potato yield in dry years.



An inspector grades the tuber. To avoid serious disease and insect problems, buy certified seed stock, use the proper chemicals during the growing season, follow a long rotation if scab is a problem, and use recommended cultural practices.

Vine Killing

Unless the vines are killed by early frost, it becomes necessary to destroy the vines before harvesting. This can be done by mechanical or chemical means or by a combination of the two methods. Machines such as beaters with rubber or steel flails are being extensively used and do a good job of destroying the vines, but they only cover two rows at a time. Certain chemical sprays can be applied with regular 4- to 12-row sprayer equipment.

Sprout inhibiting is important for long-term storage of potatoes, and

several chemical sprout inhibitors are currently approved. Use maleic hydrazide at the rate of 1 gal per acre applied 4-5 weeks before harvest. On stored potatoes, CIPC or TCNB can be used, if you follow the directions.

Use only the latest recommendations for all chemicals, and follow the manufacturer's directions carefully.

Harvesting

Mechanical injury to potatoes during harvest is one of the most serious problems in potato production. Researchers have shown that the best conditions for harvesting potatoes are in the afternoon and evening. There is more bruising injury to the potatoes in the morning when the soil is cold.

Diseases and Insect Control

It is beyond the scope of this publication to discuss the diseases and insects which attack potatoes. These few tips can help control most of them. (For details you can get a copy of USDA Handbook 474.)

1. Always buy certified seed stock.
2. Spray or dust, from the beginning until the crop is harvested, with proper fungicides and/or insecticides to control insects and diseases during the growing season.
3. Follow a long rotation where scab is a problem.
4. Follow recommended cultural practices in potato production.

Storage

Store potatoes the first 2 weeks at about 65 degrees F and 85-95% relative humidity to allow injuries to heal. For the remainder of the storage period, the temperature should be 38-40 degrees F with 85-90% relative humidity. Prolonged storage above 40 degrees F results in sprouting. Total darkness is necessary in a potato storage since light turns potatoes green. Greening makes the tubers unfit for table use. Discard extremely green potatoes.

Trade names are used for reader convenience and do not imply product endorsement.

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