May 2014

CC183 Potato Production Guide for Nebraska 1961

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Potato Production Guide for Nebraska 1961

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in cooperation with
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Department of Entomology,
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Lincoln, Nebraska
TEN POINT CENTRAL AND EASTERN NEBRASKA POTATO PROGRAM

TO INCREASE YIELD AND IMPROVE QUALITY

1. Plant only Certified seed - it is the best insurance for avoiding losses due to diseases.

2. Warm seed potatoes so that sprouting is underway by planting time. Treat cut seed to avoid seed piece rot.

3. Plant after sweet clover or alfalfa on land that has not grown a potato crop for the last three years.

4. Irrigate early and frequently after plants emerge. Be cautious with late season irrigations near harvest time -- resort to it only in case of very dry weather. Late irrigations may seriously delay tuber maturity.

5. Spray fields two or three times for insect control.

6. Be prepared to control late blight with high pressure spraying if weather favors blight development.

7. Use vine beater or puller and root cutting as a mechanical convenience for hastening harvest.

8. Handle potatoes carefully to prevent mechanical injury and peeling. Protect potatoes from heat and wind from the time they leave the ground until they are in the car or truck.

9. Load and ship in pre-iced cars. Pre-cool or ice as soon as possible after cars are loaded. Do not over-ice chipping potatoes.

10. Operate washers in such a manner as to prevent peeling.
TEN POINT WESTERN NEBRASKA POTATO PROGRAM
TO INCREASE YIELD AND IMPROVE QUALITY

1. Plant only Certified seed. Arrange purchase at earliest possible date. Treat seed in hot formaldehyde in March or April to reduce sprout growth and for scab control when scabby seed is to be planted.

2. Summer fallow for dryland production. Soil should be moist to a depth of three or more feet at planting time. With irrigation, plant after alfalfa or sweet clover. Do not plant potatoes on land that has grown potatoes within the last 3 years.

3. Warm seed potatoes for 10 days prior to planting. Treat cut seed to avoid seed piece rot. Pre-cut and healed seed can be used to an advantage. Care should be taken to avoid overheating and asphyxiation of seed.

4. Dispose of or destroy all piles of cull potatoes so that their sprouts will not serve as a source of psyllids, flea beetles and late blight.

5. If planting is prior to June 10, be aware of cultural problems. Early blight, Fusarium, Scab and Rhizoctonia are favored by early planting.

6. Insure good stands by planting sound seed in moist soil.

7. Irrigate early and frequently after plants emerge. Be cautious of irrigating late because it may seriously delay tuber maturity.

8. Spray timely, properly and thoroughly for control of flea beetles, psyllids and early and late blight.

9. Reduce mechanical injury at harvest time. Make careful plans, rebuild or adjust equipment and instruct workers.

10. Store properly. Maintain high temperature (60° F.) and high humidity for the first two weeks, then cool storage to 40° F. as quickly as possible. If ring rot, pink rot or late blight are known to be present, cool storage to 40° F. immediately. If potatoes are to be used for chipping, 50° F. storage should be used. Field treat plants with MH-30 or treat tubers with CIPC in storage to prevent sprouting.
METHODS FOR PRODUCING
MAXIMUM YIELDS OF HIGH QUALITY POTATOES
IN NEBRASKA

The production of maximum yields of high quality potatoes means labor saved in production and marketing as well as more efficient use of transportation. Studies have shown that as yields per acre increase, production costs per bushel decrease. Potato growers can obtain these results by adopting methods proven by years of experimental work and practical application by growers. This is accomplished by thoughtful management and intelligent use of available labor and equipment.

I. First Requirement is the Use of Certified Seed the Most Essential
Characteristics of Which Are:

A. Freedom from seed-borne diseases (nature of disease determines the amount to be tolerated).
   1. Must be free from certain serious diseases such as bacterial ring rot.
   2. Should be practically free from other diseases that reduce yields or impair quality.
      a. Diseases that can be detected by looking at the tuber are fusarium stem-end rot, verticillium stem-end rot, black leg rot, spindle-tuber, common scab, rhizoctonia, pink rot, and late blight.
      b. Virus diseases as a rule, cannot be detected by looking at the tuber.
   3. Be cautious of any lots containing wet, rotting tubers. (If uncertain about such lots, seek the advice of a potato inspector or the Potato Extension Specialist.)

Nebraska State Certified Seed Potatoes meet all these requirements.

B. Good type medium size tubers are desirable but not necessary if stock is practically free of disease.
   1. Tuber type is influenced by growing conditions. "Off type" tubers, the result of variable growing conditions, are satisfactory as seed but require more care for proper cutting.
   2. Small tubers from certified fields are equal or superior to large tubers. They should be avoided if from non-certified fields because such fields usually have a higher percentage of diseased plants. They are most suitable for late planting, especially if soil is dry.
3. Large tubers are best choice if disease content of the field in which they were produced is unknown. It is often difficult to get good stands from large tubers because the seed pieces cut from such tubers have a large amount of cut surface and are more likely to rot when planted.

   a. Eastern Nebraska: seed cut from large tubers should be planted last, after the soil has warmed up somewhat.

   b. Western Nebraska: seed cut from large tubers should usually be planted first to avoid the hot dry soil, common late in the planting season.

C. Major varieties:

   1. Western Nebraska: Progress, Red Pontiac, Red Lasoda, Bounty and Excel for seed and table stock; Haig, Kennebec and Blanca for seed and processing potatoes.

   2. Central and Eastern Nebraska: Dazoc, Red Lasoda, Excel and Bounty for table stock; Haig, Irish Cobbler, Kennebec and Blanca for processing potatoes.

II Proper Care of Seed Potatoes in Spring Before and During Planting Is Very Important.

A. Seed potatoes should have sprouts about one-fourth inch long at planting time to insure prompt and uniform emergence:

   1. In Central and Eastern Nebraska:

      a. If dormant, store the seed in a warm place for one to three weeks.

      b. Delaying planting to warm the seed tubers is more desirable than planting dormant seed pieces early in cold soil.

   2. In Western Nebraska:

      Sprouting of seed potatoes should be retarded as much as possible until within ten days to two weeks before planting. This can be accomplished by:

      a. Maintaining low cellar temperatures as long as possible:

         1) By proper ventilation.
         2) By hauling ice or snow into cellar.
         3) By artificial refrigeration.

      b. Storing seed tubers in shallow piles that are turned over several times, or in sacks stacked to assure adequate circulation of air.
c. Treating seed potatoes for scab control with hot formaldehyde about the time first sprouts begin to show.

B. Treat seed potatoes:

1. Protect the seed piece against rot organisms and assure better stands by treating them with a fungicide such as 7.5 percent Captan or 10 percent Zineb dusts. Apply the proper amount of dust onto the tubers immediately after cutting, then plant as soon as possible after treatment.

2. Scabby seed potatoes should be treated with formaldehyde before cutting if they are to be planted in relatively scab-free soil.

   Method: 1 pint formaldehyde, 15 gal. water, heat to 121-124°F, dip 3-4 minutes, cover with canvas cloth for about one hour, then spread out potatoes in bulk or in sacks to dry quickly. Cool potatoes before restoring.

   This treatment may be carried out several weeks before planting time in order to reduce peak labor requirements at planting time and to retard sprouting.

C. Seed potatoes may be cut weeks or months in advance of planting time in order to reduce peak labor requirements at planting time.

1. When properly handled a layer of wound cork develops at the cut surface. This layer prevents the entrance of rot-producing organisms and drying out.

2. The prompt, effective development of this protective layer is accomplished by: holding the cut seed pieces in a layer not over 6 inches deep, in a warm place (60-70°F), in a humid atmosphere (90% relative humidity) avoiding direct sunlight. Potatoes should be turned over once or twice during the first day. After 5 to 7 days cut seed can be stored and stacked in the same way as whole potatoes.

   Caution: Never Place Freshly Cut Seed Pieces in a Deep, Unventilated Pile.

3. Properly healed seed pieces produce better stands than fresh cut seed during hot weather.

D. Large seed pieces are recommended:

1. Under irrigation, 1.5 to 2 oz. pieces;
2. With dryland, 1.0 to 1.5 oz pieces;
3. Seed size is governed somewhat by planting distance.

A. Soil fertility test:

1. Tests will show whether your soil will need nitrogen, phosphorus, or potash. The recommendations tell you how much to apply. Upon request, special tests are made for soluble and injurious salts, such as chlorides and sulfates of calcium, magnesium, sodium and potassium.

2. The effectiveness of soil tests depends upon the soil samples from which they are made. Poor samples result in misleading tests. Good samples result in good tests and good recommendations which can make you money. Therefore, recommended soil sampling procedures should be followed in obtaining the samples.

(Soil testing information and soil boxes can be obtained at your local county agent's office.)

B. On dryland in Western Nebraska:

1. Good crops of potatoes can be produced every year if the soil is filled with moisture to a depth of 3 or more feet, even if no effective rainfall occurs during the summer.

a. Summer fallowing during the previous year is generally necessary to provide such a good moisture supply.

b. Yields considerably above average will usually be produced when several good rains occur in August or early September with fields that had 3 to 5 feet of moist soil at planting time.

c. Potatoes following small grain or corn may turn pale and ripen prematurely because of a shortage of nitrogen in the soil.

2. Rotation of crops is advisable to increase the length of time between potato crops to control soil borne diseases—fusarium, common scab and rhizoctonia.

3. Suggested rotation: Potatoes, spring crop (grain, corn, sorghum), fallow, winter wheat, fallow.

C. On irrigated land, rotations are necessary:

1. To maintain proper soil structure and to influence water absorption and retention.

2. To maintain proper fertility.
3. To rotate crops in such a manner that a legume will precede potatoes.

4. To help control the soil-borne diseases: fusarium, common scab and rhizoctonia.

5. Suggested rotations:

   a. Six year: Beets (beans or corn), alfalfa seed in small grain, 3 years alfalfa, potatoes. When using manure in this rotation, apply it after potatoes and before sugar beets.

   b. Four year rotation with potatoes after sweet clover; small grain or corn, sweet clover, potatoes.

IV. Time and Rate of Planting is Matter of Major Importance

   A. To get early production in central and eastern Nebraska:

      1. Planting in late March (after the 25th) and early April is essential to permit maximum plant growth during cool weather. Ideal time is when the soil temperature has reached 45°F, generally April 1-8.

      2. Early March planting is possible but hazardous because of danger of late spring frost setting back the crop.

      3. Rhizoctonia, black leg and seed piece rotting are more severe in cold soil.

   B. In Western Nebraska:

      1. In general, planting between June 10 and June 20 produces the highest yield of U.S. No. 1 potatoes, bright red tuber color with red varieties, and avoids or reduces insect and disease problems (scab, early blight, fusarium and rhizoctonia).

      2. If early planting (May 20 to June 1) is practiced for producing processing potatoes and/or mature tubers adapted to mechanical harvesting, irrigation, fertilizer and insect control practices must be adjusted accordingly (see section VIII).

   C. Suggested earliest planting dates possible with irrigation:

      Red Pontiac                June 1-10*
      Red Lasoda**              June 1-10* (vascular discoloration)
      Bounty**                  June 1-10* (vascular discoloration)
      Excel                     June 10-20
      Haig**                    May 20 - June 10 (vascular discoloration)

*Earliest date of range specified may be used with these varieties where scab is not a problem.

**Vascular discoloration, the result of Fusarium wilt, may occur with early planting if adequate and early irrigation is not available.
### D. Suggested planting rates and seed piece spacing:

1. **Planting rate** should be varied according to: (1) variety, (2) yield level and size of tubers desired, (3) soil fertility and (4) availability of soil moisture and irrigation water.

2. **With adequate fertility and optimum irrigation on soil moisture**, suggested planting rates for maximum percentage of $2^{1/4}$ to $3^{1/4}$ inch tubers are:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Irrigated 36 inch rows</th>
<th>Dryland 1/4 inch rows</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bu.</td>
<td>bu.</td>
</tr>
<tr>
<td>Blanca</td>
<td>30</td>
<td>18</td>
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<tr>
<td>Kennebec</td>
<td>35</td>
<td>23</td>
</tr>
<tr>
<td>Progress</td>
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<td>18</td>
</tr>
<tr>
<td>Red Pontiac</td>
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<td>23</td>
</tr>
<tr>
<td>Red Lasoda</td>
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<td>25</td>
</tr>
<tr>
<td>Haig</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>Bounty</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>Dozoc</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>Excel</td>
<td>30</td>
<td>18</td>
</tr>
</tbody>
</table>

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1/ On summer fallow with soil moisture to a depth of 3 to 5 feet; increase spacing if depth of soil moisture is less.

2/ In row spacing: seed per acre; irrigated rates based on results of field study in 1959.

### V. Seed and Soil Management at Planting Time

A. **Protect** seed potatoes at all times against hot sun or winds which may damage buds or destroy cells at cut surfaces.

B. **Guard against spread of bacterial ring rot or virus diseases at seed cutting time**:

1. Do not cut any rotting tuber or any tuber suspected of having spindle tuber or bacterial ring rot.

2. If using fixed knives, have disinfectant constantly dripping onto cutting surface. Mercuric chloride, 1 oz. in $3^{1/2}$ gallons of water is satisfactory. Chlorine disinfectants are also satisfactory.
3. When tuber-unit planting machines are used, the cutting surfaces must be disinfected thoroughly with a continual disinfectant spray (formaldehyde 1 pt/15 gal.).

VI. Cultivation

A. Objectives of cultivation:

1. To destroy weeds.

2. To keep soil surface loose for retaining water, aeration, and to prevent clods at digging time if the season is dry.

B. Procedure:

1. Blind cultivation (deep) particularly if soil was packed excessively in planting.

2. Use spring tooth weeder until plants are well established.

3. Cultivation should be shallow - especially close to the plants - to avoid cutting roots.

4. On dryland, throw up wide ridge several inches high during mid-September to provide additional protection for tubers against field frost and sun-greening.

VII. Irrigation and Fertilizer Application are Means of Greatly Increasing Yields and Altering Quality

A. Irrigate whenever necessary to keep crop growing steadily:

1. Early irrigation stimulates top growth -- increases set -- increases yield of medium size tubers -- and if followed by adequate irrigation, gives maximum yields. Use of tensiometers as indicators of need for irrigation can be beneficial.

2. Delayed or light irrigation results in light set -- tubers likely to be oversize -- yields below potential and immature tubers.

3. If amount of irrigation is limited, use sufficient water early to prevent serious checking of vine growth but use most water later -- at tuber development time.

4. Avoid a water logged soil. It causes swollen lenticels and favors pink rot and other tuber rotting organisms.

5. Unless weather is very hot and dry, do not irrigate after September 10 and then only to prevent severe soil drying.

6. If late blight appears in the field late in the season, irrigate only during bright, dry, warm weather, or following fungicide applications.
B. Principles of water economy with potatoes:

1. Potatoes use 16 to 22 inches of water per crop.

2. Depth of removal of water by irrigated potatoes: 50 to 65 percent from top foot of soil, 25 to 35 percent from second foot of soil, 5 to 10 percent from third foot of soil or below.

3. Within range of potato roots most soils store 5 to 7 inches of available water, but only about half of this or 3 to 4 inches is readily removed by plants.

4. Irrigations of 3 to 4 inches are, therefore, most economical.

5. In central and eastern Nebraska:
   a. Water use depends upon plant size, age and environmental conditions.
      1) Relatively low during May -- maximum during late June to mid-July.
      2) Daily use by large plants increases with daytime temperatures as follows: 70 to 80° F = 0.1-0.2 inches per day; 80 to 90° F = 0.2-0.3 inches per day; 90 to 100° F = 0.3-0.4 inches per day.
      3) There is a rapid decrease in the amount of water used as plants mature.
   b. Irrigation should be managed so that soil will not be hard and cloddy or muddy at harvest time.

6. In western Nebraska, with late crop:
   a. Maximum usage in late August.
   b. During September, daily usage decreases because of shorter day length and lower temperatures.
   c. To insure damp and non-cloddy soil at harvest time, to avoid some harvest injury and to facilitate mechanical harvesting, a light irrigation shortly before harvesting is desirable.

C. A few suggestions concerning mechanics of water application:

1. Avoid long rows, preferably not over 500 feet.

2. Types of ditches between rows: Light soils, wide and shallow; heavy soils, narrow and deep.

3. Size of water head: Light soils, large head for a short time; heavy soils, small head for a long time.
4. Plastic siphon tubes, gated pipe or other devices for delivering water from laterals to rows may require considerable work to set up but are more efficient because of uniform water spread and large amount of labor saved with later irrigations.

5. Use of tensiometers to indicate when to irrigate can be beneficial in taking the "guess work" out of irrigation.

D. Proper use of fertilizer:

1. Fertilizers should be applied according to recommendations derived from soil tests and cropping history. (Consult your county agent).

2. General recommendation:
   a. 40# phosphorus per acre following legume crop; 40# to 80# after corn, beets, etc.
   b. A good legume crop preceding potatoes generally supplies nitrogen needs; excessive nitrogen results in immature potatoes. Apply 0 to 40# after a legume crop; 60 to 80# after corn, beets, etc.
   c. Generally, soils in Nebraska are amply supplied with potassium.

VIII. Control of Insects and Diseases

The potato is attacked by many kinds of insect pests. The production of a marketable crop depends, largely, on the development of healthy plants that are not injured by these pests or by the diseases they transmit. Any method of controlling insects and keeping the plants healthy and free from injury helps to improve both the size and quality of the tubers.

A. Potato insect pests:

1. Potato psyllid: Psyllids cause the "psyllid yellow" disease of potatoes by injecting a toxic substance into the foliage while feeding. The disease prevents or retards the growth of the tubers. Control: Spray with either 2 quarts of DDT, 2 quarts Thiodan, or 1 pint of Endrin per acre. On early potatoes, begin control measures when the plants are 6 inches high and repeat every 10 to 14 days. On dryland potatoes, spray when the plants are 6 inches high, then repeat if necessary. On irrigated potatoes, begin control measures when the plants are 6 inches high and repeat in 14 days. Further applications can be applied if the situation warrants.

2. Tuber flea beetle: The larvae of these insects cause "worm tracks" on potato tubers and the adults eat small holes in the leaves. Control: For soil treatment, use 5 pints of
Aldrin containing 4 pounds of actual Aldrin per gallon or 1 gallon of Dieldrin per acre. Apply before planting. If soil treatment was not applied before planting, a foliage treatment may be made by using either 2 quarts of DDT, 2 quarts of Thiodan, 2 pounds of 50% Sevin wettable powder or 1 pint of Endrin per acre.

3. **Aphids:** The diseases that aphids transmit to potatoes are more serious than the direct feeding on the foliage. Aphids transmit such diseases as leaf roll, mild mosaic, and spindle tuber. Populations in this area are rarely very high, but control in some cases may be necessary, particularly on seed plots. Control: Spray with either 2 quarts of DDT, 2 quarts Thiodan, or 1 pint of Endrin per acre.

4. **Grasshoppers:** Often, grasshoppers damage potato fields because of their part in spreading spindle tuber or by defoliation of plants. Control: Spray early while the grasshoppers are small with either 2/3 pint of Dieldrin, 1/2 pint of Aldrin, or 1 pint of Endrin per acre.

5. **Potato leafhopper:** Potato leafhoppers are about 1/8 inch long and pale green in color. They inject a toxic substance into the leaves while feeding, causing the disease known as hopperburn. In some years, they have caused severe damage in eastern and central Nebraska, but rarely occur in abundance in western Nebraska. Other leafhoppers which cause damage to the potato crop because of the diseases they transmit, are the clover leafhopper and the six-spotted leafhopper which spread yellow dwarf, mosaic, and aster yellows or purple top, respectively. Control: Spray with either 2 quarts Thiodan, 1 pint of Endrin, or 2 quarts of DDT per acre.

6. **Wireworms:** These are the larvae of click beetles which feed on the roots and seed pieces of many crops. On potatoes they chew deep pits or holes in the tubers which in turn lowers the grade. Before planting, the soil should be examined to determine if wireworms are present. Control: Broadcast 3 quarts of Aldrin (4 lb/gallon) or 1 gallon of Dieldrin per acre and disk in before planting.

7. **Colorado potato beetle:** Both the adults and larvae are very destructive to the foliage when they are numerous. They are a more serious problem in eastern and central Nebraska than in western Nebraska. Control: Spray with either 2 quarts of DDT, 2 quarts Thiodan, or 1 pint of Endrin per acre.

B. Diseases controlled by spraying are early and late blight.

1. **Time of application:** spray when notified through public warning service. Those who wish to carry out a spray schedule should make first application when plants are 6 to 8 inches high and repeat every 7 to 14 days. If weather becomes favorable for late blight development, it will be necessary to spray every 5 to 7 days.
2. Method of application: high pressure spray (300 lbs. or greater) in order to get material onto undersides of bottom leaves. Vine lifters should be used if necessary.

3. Suggested materials and rate:

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Suggested Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maneb</td>
<td>1 to 2# of 70% material/100 gals. of water. 100-150 gals./A</td>
</tr>
<tr>
<td>Zineb</td>
<td>2# of 65% material/100 gals. of water. 100-150 gals./A</td>
</tr>
<tr>
<td>Nabam + Zinc</td>
<td>2 quarts of 19% nabam + 1# zinc sulfate/100 gals. water</td>
</tr>
<tr>
<td>Sulfate</td>
<td></td>
</tr>
<tr>
<td>Bordeaux Mixture</td>
<td>8# copper sulfate + 8# hydrated lime in 100 gals. of water</td>
</tr>
<tr>
<td>Fixed Copper</td>
<td>Follow manufacturer's directions.</td>
</tr>
</tbody>
</table>

C. Equipment and methods:

1. Power sprayer--300 to 400 pounds pressure--three nozzles per row.

2. Through covering--especially underside of leaf.

3. Dust can be used satisfactorily for insect control, but not for late blight control.

4. Do not waste materials or labor by unnecessary spraying or dusting, use of wrong materials or improper mixtures, careless manner of application, or applying materials at improper time.

IX. Harvesting and Handling Methods to Insure Delivery of Good Quality Products

A. Eastern and Central Nebraska:

1. Most serious difficulties encountered in harvesting central Nebraska potatoes are scuffing (or peeling) tuber surface and damage caused by bright sun or dry winds.

2. Nature of heat damage to tubers as recognized by USDA inspection service:

   a. Browning: brown discoloration of scuffed areas.

   b. Scald: destruction of tissues to considerable depth, generally followed by slimy wet surface rot. (The condition often referred to as "scald" in central Nebraska...
is considered as browning by the Inspection Service. True scald is seldom seen before potatoes are shipped.) Exposure to high temperatures increases susceptibility to bacterial soft rots.

3. Prevent losses due to digging in midsummer by:
   a. Constant attention to operation of digger or mechanical harvester to prevent damage to skin.
   b. Vine killing and root cutting may be used as a mechanical convenience to expedite harvest. Vine destruction ahead of digging impairs chip making quality.
   c. Avoid digging when air temperature in shade exceeds 85-90°F and on days with very strong, dry winds. (Temperature in sun at ground level may be more than 20° higher than that of air at 4 feet in the shade.)
   d. Pick up and haul potatoes promptly; avoid rough handling and jostling of tubers.
   e. Protect stacks of sacked potatoes from exposure to sun and wind.
   f. Pooling labor and equipment of several operators might expedite harvesting and greatly reduce these hazards.
   g. Tightly woven (heavy burlap or canvas) bags will prevent much sun and wind damage.

4. Loading and shipping methods:
   a. Washing greatly improves the market quality of potatoes but carrying quality may be impaired. Soft rots are favored by the moisture present on washed potatoes, making refrigeration or drying necessary. Dry pack processing potatoes.
   b. Shipping methods recommended:
      1) Pre-icing plus re-icing—best method for "table stock". Temperatures go down as long as some ice remains in bunkers. Avoid over-icing of chipping potatoes.
      2) Icing enroute: Satisfactory if temperatures are not too low when loading. Avoid on chipping potatoes.
   c. Refrigerator cars equipped with fans are most efficient because they provide much greater uniformity of temperature throughout the load.
B. Western Nebraska:

1. Mechanical injury problem at harvest time:
   a. Bruises, cracks and scuff damage ranges from as little as 3 percent to as high as 80 percent with various growers and varieties.
   b. Economic significance. Reduction of this damage by 10 percent would increase No. 1 grade potatoes to extent of 300,000 or more sacks per year.

2. Reasons why potatoes "harvest crack":
   a. Pressure within tubers increases greatly with increased water absorption. This occurs with a sudden decrease in water loss from leaves.
   b. Tubers may also develop higher pressures by absorbing moisture directly through imperfectly suberized but sound skin if soil is very wet, the result of late irrigations or rain.
   c. When under increased pressure, tubers crack very readily if subjected to even slight mechanical shock or injury. Varieties differ in susceptibility to "harvest cracking."

3. Prevention of most mechanical injury is possible by use of proven methods and intelligent organization.
   a. The following practices will help in reducing mechanical injury.
      1) Cutting roots 1 to 3 days before digging reduces supply of water to tubers. When rains saturate the soil, much of the benefit of root cutting may be lost.
      2) Proper construction, adjustment and operation of digger or mechanical harvester.
      3) Care in picking with proper equipment (hand or mechanical)
      4) Care in hauling to and in filling storage.
      5) Removing and killing vines is of help mainly in simplifying digging. Potatoes dug soon after vines are killed may crack more because no more water is lost through tops. Less cracking may result if vine killing is done a week or 10 days before digging to allow roots to die; however, kill vines by beating just ahead of digging chipping or processing potatoes.
b. Mechanical harvesting.

1) Mechanical harvesting offers the best possible solution to the dwindling supply and high cost of labor for harvesting the potato crop. In 1959 several growers successfully harvested their crops mechanically. These farmers operated with a substantially smaller labor group (8 average) than was previously required with hand picking methods (25 to 30). In many cases the savings in labor more than offset the added fixed costs of the mechanical harvesting machinery, thus decreasing harvest cost.

2) In addition to possible savings on harvesting and labor costs, mechanical harvesting offers the following advantages:

(a) Utilization of workers who are not physically able to stoop and lift.

(b) Ability to work 24 hours per day, if necessary, to decrease harvesting time.

(c) More consistent and closer control of factors that result in injuring potatoes.

(d) Reduced labor management problems associated with hiring, housing, and supervision of migrant workers.

4. Danger of spreading ring rot and late blight at harvest:

a. If ring rot is known to be present in a field of potatoes, harvest that field last. After harvest, carefully disinfect all machinery, baskets, etc. that have come in contact with the diseased lot.

b. When late blight is present, before harvesting, destroy the potato tops by spraying with a vine-killing chemical such as copper sulfate (30#/100 gal. water applied at the rate of 140 gal/acre) or sodium arsenite (1 gal. 23.5 percent material in 100 gal. water applied at the rate of 140 gal/acre), or use a rotobeater or the harvesting should be delayed until the foliage is dead as a result of maturity or killing by frost.

X. Potato Storage

No attempt is made in this circular to thoroughly discuss storage. The following are some of the principles that are recommended:*
A. To accomplish effective wound healing and reduce weight losses: Maintain high humidity and do not try to cool cellars below 55-60°F during first two weeks, then cool to 36° to 40° as quickly as possible.

B. Provide for temperature control by forced air circulation around not through potatoes in relatively tight bins. (If construction or rebuilding is contemplated, communicate with the Department of Horticulture and Forestry about principles to be considered.)

C. In storing seed potatoes for southern planting in December to early February, a period of warm storage (10 days to 2 weeks), prior to shipment appears to be desirable in order to induce prompter emergence in the South.

D. Disinfection of all cellars before storing the next crop is essential if ring rot has been found in the crop. For bins and runways, use copper sulfate spray (1 lb. in 10 gallons of water). For machinery use formaldehyde (1 pint in 10 gallons of water).

E. If potatoes are to be used for chipping, it is very important to have some available method of storing potatoes at 50°F but with little or no sprout growth, no accumulation of sugars, and a minimum loss of weight. Chemicals are available which will retard sprout growth and permit the storage of potatoes at this temperature. These are: (1) maleic hydrazide (MH 30) applied to the vines at the rate of one gallon per acre, four to six weeks prior to harvest, and (2) Chloro-IPC applied as a vapor to potatoes in storage (one gram/cwt of potatoes).

* The recommendations given in this section are for potatoes from fields free of late blight, pink rot, or bacterial ring rot. If these diseases were present in such a way as to permit infection of other tubers, the storage should be cooled as quickly as possible, and air should be forced through the piles of tubers (not in tight partitions or flues). Although dry-rot will be favored with such management it may prevent disastrous losses because of other diseases. When these diseases have been very serious, it may be advisable to sell and ship directly out of the field and consideration of long time storage may be very unadvisable.