

# Cultural Management of Russet Norkotah Potatoes

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Russet Norkotah is an early-maturing variety with long to oblong tubers and dark russet skin that was released in 1987 by North Dakota State University. This variety is well-adapted for the fresh market because of an attractive tuber shape, but not well-suited for processing due to low specific gravity. Russet Norkotah is very susceptible to verticillium wilt and early blight, which may affect management practices. It is susceptible to most viruses and field diseases such as pink rot.

Since the original release of Russet Norkotah, several other line selections have been developed from the breeding programs in Colorado and Texas. These line selections have different growth patterns that result in slightly later maturity and higher yield potential. The latest maturing and highest yielding line selection is designated CO#3. A group of line selections consisting of CO#8, TXNS112, TXNS278, TXNS223 and TXNS196 are all very similar in growth and development, with maturities and yields that are intermediate between the original Russet Norkotah and CO#3. In this bulletin, CO#8, TXNS112, TXNS278, TXNS223 and TXNS196 line selections will be referred to as the “intermediate line selections.” Because these line selections have vine growth and development, maturity, and yield characteristics that are different from Russet Norkotah, they require unique management.

This publication provides management guidelines for producing high-quality Russet Norkotah and Russet

Norkotah line selection potatoes in southern Idaho. Information in this bulletin is based partially on research data, but also contains information derived from the experience of producers and field consultants working with this variety. Producers are highly encouraged to use this information only as a guideline and to adapt the information to their specific farming situations.

## Field Selection and Preparation

Russet Norkotah and the intermediate line selections should not be planted in fields with a history of severe verticillium wilt and/or early-die diseases. It is better to plant Russet Norkotah and the intermediate line selections in fields that have not been planted with potatoes for four to five years, or to consider fumigating the field. Line selection CO#3 is more tolerant of Verticillium wilt and/or early-die diseases than

Russet Norkotah, so it can be planted in fields that are considered suitable for Russet Burbank. However, line selection CO#3 will also likely benefit from fumigating.

## Seed Management and Planting

Use similar seed management practices for Russet Norkotah and all Russet Norkotah line selections. Always use seed storage and handling practices that promote good seed health. Store seeds at 38 to 40°F until seed cutting to avoid yield reductions associated with advanced physiological age. Tubers of Russet Norkotah and the line selections have a dormancy period that is slightly shorter than Russet Burbank.

Optimum seed size is 2.0 to 2.5 ounces—the same as Russet Burbank. Avoid tuber bruising that can result in problems associated with Fusarium dry rot. Use a seed piece treatment that will help control seed piece decay problems.

**Table 1. Within-row seed piece spacing and seed needed per acre for Russet Norkotah and Russet Norkotah line selection potatoes.**

| Market class       | Seed piece spacing <sup>1</sup> Seed per acre <sup>2</sup> |          |
|--------------------|--|----------|
|                    | (inches)   | (cwt)    |
| Fresh              |  |          |
| Russet Norkotah    | 11 to 13   | 25 to 21 |
| Intermediate Lines | 10 to 12   | 27 to 23 |
| CO#3               | 9 to 11  | 30 to 25 |
| Seed               |  |          |
| Russet Norkotah    | 8 to 10  | 34 to 27 |
| Intermediate Lines | 8 to 10  | 34 to 27 |
| CO#3               | 7 to 9   | 39 to 30 |

<sup>1</sup>Recommendation based on a 36-inch row width.

<sup>2</sup>Based on a 2.5 ounce average seed piece size, but does not take into consideration seed cutting waste.

Table 1 shows the recommended seed piece spacing for Russet Norkotah and the line selections. Intermediate line selections will require slightly closer seed piece spacing, and CO#3 should be planted even closer. It is especially important not to plant the intermediate line selections and CO#3 at an excessively wide seed piece spacing because of the potential for developing large tubers that are susceptible to hollow heart. Planting and/or final hilling depth should be approximately 6 inches as measured from the top of the hill to the top of the seed piece.

### Fertility

No research information is available concerning phosphorus, potassium, or micronutrient requirements for Russet Norkotah and the line selections. Therefore, follow recommendations developed for Russet Burbank potatoes. See Tables 2 and 3 for recommended phosphorus and potassium fertilizer application rates based on soil tests. Russet Norkotah and the line selections generally have a small root system compared to Russet Burbank; therefore banding phosphorus at planting may be highly beneficial. Additionally, if soil tests indicate low zinc, it may be beneficial to add zinc in a band application.

Variability among fields, field cropping history, and disease pressure in the field can all influence nitrogen requirements, making it difficult to determine optimum application rates for Russet Norkotah and the line selections. In short growing-season areas, such as the seed-growing areas in Idaho, all nitrogen can be applied preplant. In commercial-production areas, split-apply the nitrogen with part preplant, and apply the remainder during the growing season as discussed below.

These are two key points to remember and follow in managing nitrogen for Russet Norkotah and the intermediate line selections. First, nearly all of the nitrogen should be applied by the end of flowering. This is important because Russet Norkotah and the line selections all have a very determinate growth habit and developing a healthy canopy requires early nitrogen applications. Second, irrigation water applications need to be very closely monitored to prevent leaching nitrogen below the root zone.

**Table 2. Preplant phosphorus (P) fertilizer recommendations for Russet Norkotah and Russet Norkotah line selection potatoes based on recommendations developed for Russet Burbank potatoes with a yield goal of 400 cwt/acre. 3**

| Soil test P<br>(0 to 12 inches)<br>(ppm) <sup>1,2</sup> | Percent free lime                        |     |     |     |
|---|--|-----|-----|-----|
|   | 0  | 4   | 8   | 12  |
|   | (lb P <sub>2</sub> O <sub>5</sub> /acre) |     |     |     |
| 0   | 320                                      | 360 | 400 | 440 |
| 5   | 240                                      | 280 | 320 | 360 |
| 10  | 160                                      | 200 | 240 | 280 |
| 15  | 80                                       | 120 | 160 | 200 |
| 20  | 0  | 40  | 80  | 120 |
| 25  | 0  | 0   | 0   | 40  |
| 30  | 0  | 0   | 0   | 0   |

<sup>1</sup>Apply an additional 40 to 80 pounds P<sub>2</sub>O<sub>5</sub>/acre as a starter at planting for soil test P levels below 30 ppm.

<sup>2</sup>Add 25 pounds P<sub>2</sub>O<sub>5</sub>/acre for each additional 100 cwt/acre yield goal above 400 cwt/acre.

<sup>3</sup>Recommended petiole phosphorus concentrations for Russet Burbank should be kept above 0.22 percent through tuber bulking. However, grower experience has indicated that 0.18 to 0.20 percent may be adequate for Russet Norkotah and the line selections.

**Table 3. Potassium (K) fertilizer recommendations for Russet Norkotah and Russet Norkotah line selection potatoes based on recommendations developed for Russet Burbank potatoes.<sup>1</sup>**

| Soil test K<br>(0 to 12 inches)<br>(ppm) | Yield goal (cwt/acre)      |     |     |     |
|--|----------------------------|-----|-----|-----|
|  | 300                        | 400 | 500 | 600 |
|  | (lb K <sub>2</sub> O/acre) |     |     |     |
| 25                                       | 550                        | 600 | 650 | 700 |
| 50                                       | 450                        | 500 | 550 | 600 |
| 75                                       | 350                        | 400 | 450 | 500 |
| 100                                      | 250                        | 300 | 350 | 400 |
| 125                                      | 150                        | 200 | 250 | 300 |
| 150                                      | 50                         | 100 | 150 | 200 |
| 175                                      | 0                          | 0   | 50  | 100 |

<sup>1</sup>Petiole potassium concentrations should be kept above 7 percent through tuber bulking.

**When all Nitrogen is Applied Preplant**—Obtain a soil test representative of the intended production field for nitrogen (nitrate-N + ammonium-N) to a depth of 12 inches. Use Table 4 to predict potential yield until experience provides a better estimate. Use Table 5 and the footnotes included with that table to determine the amount of recommended nitrogen fertilizer, and apply the entire amount prior to, or at planting.

For example, a producer has chosen to grow CO#8 in a field that is on a three-year potato rotation, has not been fumigated, and has three tons of straw residue. Anticipated potential yield is 300 hundredweight (cwt) per acre and a soil test indicates 10 ppm nitrogen. The recommended nitrogen application from Table 5 is 120 pounds (or units)

per acre. Adjustments indicated in the footnotes recommend adding 40 units because the field was not fumigated, plus adding another 45 units nitrogen for the straw residue. Therefore, the total application is 205 pounds nitrogen per acre (120 + 40 + 45 = 205).

**When In-Season Nitrogen Applications are Made**—Obtain a representative soil sample for nitrogen (nitrate-N + ammonium-N) to a depth of 12 inches from the intended production field. Use Table 4 to predict a potential yield in your area until experience provides a better estimate. Use Table 5 and the footnotes included with that table to determine the amount of recommended nitrogen fertilizer to apply. See the discussion above, in the section, “When all Nitrogen is Applied Preplant,” to deter-

**Table 4. Potential yield of Russet Norkotah and Russet Norkotah line selection potatoes in southern Idaho.**

| Growing area      | Potential yield <sup>1</sup> |
|-------------------|------------------------------|
|                   | (cwt/acre)                   |
| East <sup>2</sup> | 300 to 400                   |
| Central           | 300 to 400                   |
| West              | 400 to 500                   |

<sup>1</sup>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 yields in most other locales within the area, determine your potential yield from the corresponding end of the range.

<sup>2</sup>East includes all of the upper Snake River Plain south and west to American Falls and all high-altitude seed areas.

**Table 5. Total nitrogen (N) fertilizer recommendations for Russet Norkotah and Russet Norkotah line selection potatoes grown in fields that have been fumigated or out of potatoes for at least four years. Application rates include preplant and seasonal applications.<sup>1</sup>**

| Soil test N        | Russet Norkotah                    | Intermediate Line Selections | Line Selection CO#3   |
|--------------------|------------------------------------|------------------------------|-----------------------|
|                    | <sup>2</sup> Yield goal (cwt/acre) | Yield goal (cwt/acre)        | Yield goal (cwt/acre) |
| (0-12 inches)      | 300 400 500                        | 300 400 500                  | 300 400 500           |
| (ppm) <sup>3</sup> | —(lb N/acre) —                     | —(lb N/acre) —               | —(lb N/acre) —        |
| 0                  | 200 240 280                        | 160 190 220                  | 130 155 180           |
| 5                  | 180 220 260                        | 140 170 200                  | 110 135 160           |
| 10                 | 160 200 240                        | 120 150 180                  | 90 115 140            |
| 15                 | 140 180 220                        | 100 130 160                  | 70 95 120             |
| 20                 | 120 160 200                        | 80 110 140                   | 50 75 100             |
| 25                 | 100 140 180                        | 60 90 120                    | 30 55 80              |

<sup>1</sup>If a field has not been fumigated or has not been out of potatoes for at least four years, then add 40, 50, and 60 pounds nitrogen for the 300, 400, and 500-yield goals, respectively.

<sup>2</sup>Soil test N = Nitrate-N + Ammonium-N.

<sup>3</sup>Add 15 pounds N/acre for each ton of grain straw residue up to 60 pounds N/acre.

**Table 6. Sufficiency range of petiole NO<sub>3</sub>-N for Russet Norkotah and Russet Norkotah line selection potatoes during five growth stages.**

| Growth stage | Description                    | Sufficiency range <sup>1</sup> |
|--------------|--------------------------------|--------------------------------|
|              |                                | (ppm)                          |
| I            | Emergence through tuberization | 20,000 to 24,000               |
| II           | Tuberization                   | 18,000 to 20,000               |
| III          | Early tuber bulking            | 16,000 to 18,000               |
| IV           | Late tuber bulking             | 14,000 to 16,000               |
| V            | Maturation (after Aug 10)      | 8,000 to 10,000                |

<sup>1</sup>See CIS 743, *Tissue Analysis—A Guide to Nitrogen Fertilization for Russet Burbank Potatoes*, for petiole sampling techniques.

mine the total amount of nitrogen to apply, and the discussion below to determine when nitrogen applications should be made.

*Russet Norkotah and the Intermediate Line Selections*—Apply 60 to 70 percent of the total nitrogen preplant. Make in-season applications in small increments of 20 to 30 units of nitrogen with 70 to 80 percent of the nitrogen being applied by the end of the first flush of flowers. All the nitrogen should be applied before the first signs of plant senescence. Use the petiole nitrate-N sufficiency ranges in Table 6 to guide seasonal nitrogen application decisions.

*Line Selection CO#3*—The plant growth habits and tuber bulking of line selection CO#3 is more similar to Russet Burbank than it is to the other Russet Norkotah line selections; therefore, fertilizer nitrogen application practices are different. High levels of nitrogen prior to tuber initiation may delay tuber set and cause rough tubers in CO#3. Grower experience has indicated that at least 50 to 60 percent of the total seasonal nitrogen should be applied preplant with the remaining nitrogen applied through the early bulking period, or at about the time plants touch across the rows. In-season nitrogen fertilizer applications need to be based on petiole nitrate-N levels (Table 6) and in-season soil nitrogen tests. The bulking period for CO#3 is longer than the other line selections. Consequently, nitrogen applications should continue slightly later into the season.

## Irrigation

Russet Norkotah and the intermediate line selections will use less total seasonal water than Russet Burbank because they have shorter growth periods and smaller vines. They will also benefit from more frequent irrigations with smaller quantities of water applied each time because of a shallow root system. CO#3 has a water-use pattern similar to Russet Burbank. For Russet Norkotah and all line selections, keep available soil moisture above 65 percent throughout the growing season. It is critical to avoid drought stress early in the growing season because stressing the crop at this time can make it more susceptible to early die disease. However,

grower experience has shown that CO#3 and CO#8 are more tolerant of early season moisture stress than Russet Burbank.

Late-season watering, beginning with the first signs of plant senescence, needs to be closely monitored. Late-season water use for Russet Norkotah and the line selections declines more rapidly and abruptly than for Russet Burbank. Applying too much water during late season can result in serious pink rot tuber infections, or open lenticels on tubers. Open lenticels cause an appearance problem that is not readily accepted by consumers. Problems with pink rot have also been observed when too much water is applied at each application, resulting in saturated soil conditions near the bottom of the hill.

## Weed Control

Because of a smaller plant size compared with Russet Burbank, Russet Norkotah and the intermediate line selections are less able to compete with weeds. For this reason, it is important to control weeds at all stages of plant growth. Although Russet Norkotah has shown tolerance to labeled rates of metribuzin applied in small plots, use caution when using this herbicide. If plant injury occurs, Russet Norkotah and the line selections do not recover well. Growers have observed metribuzin injury on Russet Norkotah and the line selections especially if the plants had experienced environmental stress, such as frost, before the chemical was applied. Also from grower experience, it is better to use a low rate of metribuzin followed by a tank mixture of other herbicides to control weeds. No injury has been observed resulting from applying other herbicides that are currently labeled for use on potatoes.

## Diseases

Russet Norkotah is very susceptible to potato virus Y (PVY). Plants do not show strong symptoms of PVY, which makes growing seed challenging. However, seed certification helps to

minimize the consequences of PVY for commercial growers. Seed growers should use the best practices available to minimize spread of PVY within the crop. These practices include isolation among and between generations, limiting the number of generations, planting PVY-free seed, and utilizing best-sanitation practices.

Use certified seed to reduce problems with virus diseases, bacterial ring rot and blackleg. Russet Norkotah and the line selections have susceptibilities to storage diseases similar to Russet Burbank. Russet Norkotah and the line selections are susceptible to root-knot nematode and corky ring spot. Avoid planting in fields with a history of nematodes, or treat the field with a fumigant.

Russet Norkotah and the line selections are very susceptible to early blight. It is important to aggressively scout for early blight and apply fungicides as necessary to manage this disease. The foliage of Russet Norkotah and the line selections are very susceptible to late blight. It is important to have a preventative fungicide applied before late blight is detected, especially if there is a high risk of late blight in your area. Frequency of applications after detection should be similar to that used to manage late blight in Russet Burbank.

Tubers of Russet Norkotah and the line selections are very susceptible to late blight tuber rot. Lots with the potential for infection should be carefully monitored in the field and in storage. If late blight has been found in the field, it is essential to continue fungicide applications until the vines, including stems, are completely dead. This will reduce inoculum in the immediate area and help reduce late blight tuber infection. When late blight is present during the growing season, prepare tubers for harvest and storage as per University of Idaho recommendations.

## Vine Kill and Harvest

Russet Norkotah and the intermediate line selections generally begin senescing long before harvest; therefore, it may be necessary to kill vines only 16 to 21 days before the intended harvest date. Tubers of line selection CO#3 are more difficult to mature than the other line selections, so it may be necessary to kill vines closer to 21 days before digging the tubers.

## Storage

Store only healthy tubers that are relatively free of handling injury. Depending on the year, Russet Norkotah has a dormancy period of approximately 120 to 130 days at 45°F, which is slightly shorter than the dormancy period for Russet Burbank. Apply a chemical sprout inhibitor to potatoes held longer than three months at 45°F. Storing at temperatures colder than 45°F will allow for a longer storage period prior to applying a sprout inhibitor. However, colder storage temperatures may have a negative impact on eating quality because of the conversion of starch to sugars.

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