



# SeedBytes

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## Pink Rot of Potatoes

By Dr. Khalil Al-Mughrabi—Potato Development  
Specialist—Pathology

Pink rot is a fungal disease that occurs sporadically in many soils worldwide wherever potatoes are grown. The disease develops in soils approaching saturation from poor drainage, excessive precipitation, or irrigation. Tuber decay is most rapid at 25 °C. Infected tubers are usually found in wet, low-lying areas during harvest, and symptom development occurs soon after tubers are placed in storage facilities. The fungus survives in soil for several years. Red-skinned potatoes are generally more susceptible than russet varieties. When cut and exposed to air, recently infected surfaces change from cream-colored to salmon pink in 20-30 minutes and then to black in one hour.

### Recommended Practices to Reduce Pink Rot Incidence

- Plant clean, disease-free seed.
- Carry out a regular three year crop rotation.
- Plant potatoes in well-drained soil.
- Prior to harvesting, check low areas in the field and rogue diseased plants and tubers.
- Avoid harvesting during wet conditions and kill vines at least two weeks before harvest-



(Pink rot symptom photo courtesy of Dr. Khalil Al-Mughrabi—DAFA)

ing. Delay harvest until the pulp temperature is between 7 and 10 °C.

- Tubers with significant pink rot should be harvested and stored separately for immediate grading and marketing.
- Grade out rotted tubers before placing them in storage. In storage, turn on ventilation systems immediately to keep air moving through the pile in order to dry any rotting tubers. Cool tubers as quickly as possible. Keep the humidity low to prevent secondary bacterial infection from developing. The fungus is usually inactive at temperatures below 40 °F (4.4 °C).
- Fungicides applied in-furrow at planting or applied to the foliage during early tuberization can reduce pink rot losses.

*For chemical control and other guidelines, please refer to the recent issue of the Potato Crop, Variety, Weed and Pest Control Guide for New Brunswick.*

For further information, contact Dr. Khalil Al-Mughrabi at the Potato Development Centre at 1- 866-778-3762 or by e-mail at [khalil.al-mughrabi@gnb.ca](mailto:khalil.al-mughrabi@gnb.ca).

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### Upcoming Events:

25th Annual National Potato Council Seed Seminar—December 7th—9th, 2006 in Chicago, Illinois.

For more details visit [www.wisconsinpotatoes.com](http://www.wisconsinpotatoes.com) or call (715) 623-7683.

*Electronic versions of all Seed-Bytes issues can be found online at [www.gnb.ca](http://www.gnb.ca), then click language preference, Departments and Agencies/Agriculture, Fisheries and Aquaculture/ Potatoes/SeedBytes and select the month for the issue.*

The newsletter link has been emailed to all recipients. If you do not have the link, contact Andrew Sullivan at [andrew.sullivan@gnb.ca](mailto:andrew.sullivan@gnb.ca) or 1-866-778-3762.

# Seed tuber physiological age and the current growing season

By Dr. Loretta Mikitzel — Potato Development Specialist—Physiology



An important factor affecting seed potato performance is physiological age (see the April 2006 issue of Seedbytes), and one of the most influential factors affecting seed tuber physiological age is the accumulation of heat units or exposure to warm temperatures. Heat units accumulate during the seed growing season and during seed storage. In this article, I will concentrate on the effect of growing season (or weather) on crop age.

Both warm and cool temperatures influence seed age. Generally, the warmer the growing season, the physiologically older seed tubers will be at harvest. Conversely, the cooler the growing season, the physiologically younger seed tubers will be at harvest. Keep in mind that growing season also includes the temperature experienced by the tubers during the period between top kill and harvest. Stress during the growing season (moisture, nutrient, pests) also accelerates tuber physiological age.

Of the past three growing seasons, 2004 accumulated the most heat units, had the highest average temperatures and the least amount of rainfall. From a seed potato point of view, 2004 was a stressful (ie. warm and dry) growing season. 2005 was cooler than 2004 (fewer heat units and lower average maximum tem-

peratures) with more rain. 2005 was a more moderate or seed potato-friendly growing season. The effect of these growing seasons on seed physiology is reflected in the number of stems produced per plant the following year. Compare stem numbers of New Brunswick seed planted in 2005 and 2006. The 2004 crop was physiologically older than the 2005 crop, and when planted produced substantially more stems per plant.

How is the 2006 crop shaping up? Heat units so far are lower than the previous two years, especially in August. Maximum temperature is comparable to 2005 and rainfall is adequate. At the time of writing this article, the crop is still in the ground, making it especially difficult to speculate about the age of the crop going into storage, and September can be an unpredictable month. If the weather remains moderate – no early frost, no excess moisture or heat, no drought – seed age may be comparable to that of the 2005 crop. Should September be a cruel month – seed age may more closely resemble that produced in 2004.

### Pre-storage conditions that may indicate the crop is physiologically aged:

- Warmer than ‘normal’ growing season
- Exposure to stress during the grow-

ing season (moisture stress, nutrient deficiency, pests)

- Early senescence due to stress, and/or disease or insect pressure (chemically or naturally)
- High soil and air temperatures between top kill and harvest

### Pre-storage conditions may indicate the crop is physiologically young:

- Cooler than ‘normal’ growing season
- Adequate and un-fluctuating soil moisture level
- Low insect and disease pressure
- Top kill not dictated by disease or insect pressure: long growing season
- Minimal stress between top kill and harvest

### You suspect your crop is physiologically young. What do you do?

Store tubers at the seed holding temperature until several weeks before planting. Slowly increase storage temperature to 50°F. Maintain the warmer temperature for several weeks to age the seed and promote sprout growth.

### You suspect your crop is physiologically old. What do you do?

Store tubers at a low and constant temperature for as long as possible in the spring. Monitor the crop early and regularly for signs of growth. Use of an ‘indicator’ cultivar may be helpful to

### Behaviour of physiologically aged seed

- Breaks dormancy early in the storage season, could be several weeks earlier than usual
- Sprouts develop early in the storage season
- Once planted, emerges faster and produces multiple stems
- Develops more tubers which will be smaller
- Produces less vine growth and senesces earlier
- Yield may or may not be compromised

*Growing degree days °C (base temperature 5°C) from tuber initiation to the end of August*

| Month      | 2004  | 2005  | 2006  |
|------------|-------|-------|-------|
| June 10-30 | 307   | 281   | 292   |
| July       | 438   | 441   | 470   |
| August     | 442   | 419   | 312   |
| Total      | 1,187 | 1,141 | 1,074 |
| Change     | --    | -46   | -113  |

*Average maximum temperature (°C) and Total Rainfall (mm)*

| Month           | 2004 | 2005 | 2006 |
|-----------------|------|------|------|
| June 10-30      | 27   | 18   | 19   |
| July            | 26   | 19   | 20   |
| August          | 28   | 19   | 18   |
| Average max °C  | 27   | 19   | 19   |
| Season Rainfall | 140  | 188  | 218  |

# How New Brunswick became free of Potato Spindle Tuber Viroid by 1980

By Dr. Rudra Singh— Potato Research Centre—Agriculture and Agri-Food Canada



I began my career at the Potato Research Centre, Fredericton, in 1966 on a NRC Postdoctoral Fellowship. I had just graduated from North Dakota State University, Fargo and had experience with potato spindle tuber disease. Fifteen months later, I became a permanent AAFC staff member. My assignment was to determine the distribution and importance of potato spindle tuber “virus” (PSTV) in New Brunswick seed potato production. This disease was a major constraint for seed potato export to European countries. Over the next two summers, with the guidance of New Brunswick and Prince Edward Island seed potato inspectors, I identified PSTV symptoms under field conditions. A survey resulted in 1969 that revealed that the degree of PSTV infection was relatively low in the seed crop, but the commercial potato stocks were heavily infected. PSTV infection ranged from 0 to 16% in commercial lots. In subsequent years a series of regulatory and cultural measures were incorporated into New Brunswick seed potato production to curtail PSTV, and other viral, bacterial and viroid diseases.

These measures included:

**A)** Establishment of the Bon Accord Elite Seed Potato Centre and the Plant Propagation Centre to provide disease-free nu-

clear, Pre-Elite and Elite I stock to seed growers.

**B)** Introduction of new federal Seed Potato Certification Regulations in the early 1970’s that required all Elite seed be grown from virus-free cuttings, plants or tubers, and Elite I, II, and 10% of Elite III seed be planted in “tuber units” with three field inspections during the growing season, and also that field-grown potatoes in each seed class automatically drop to a lower seed class the following year.

**C)** Voluntary introduction of a PSTV laboratory test using polyacrylamide gel electrophoresis: this laboratory test showed that the potato spindle tuber organism was not a virus, but a small circular RNA called a “viroid”.

**D)** Because PSTV can be transmitted through the true potato seeds used by breeders in variety development, there was a possibility of PSTV introduction to elite seed farms through the use of promising new seedlings or varieties. Potato breeders implemented the practice of pre-testing and eliminating any PSTV-infected parental material from their programs and thoroughly testing all potato selections and varieties prior to regional field trial testing or release for commercial production.

**E)** To reduce the build-up of virus or viroid diseases, the Province of New Brun-

wick passed the Potato Disease Eradication Act in 1979, which included spindle tuber as a “prescribed” disease. As a prescribed disease, if PSTV was confirmed by an inspector, the infected plants must be isolated and properly disposed of and the farm thoroughly disinfected. The Seed Potato Certification Act was further strengthened in 1980, with the inclusion of “zero tolerance” for PSTV in any seed potato field at the first, second or third field inspection.

**F)** In conjunction with provincial regulations, the major potato processing company in the region in 1978-1979 mandated that contract growers plant Foundation class seed instead of Certified class seed.

The unparalleled cooperation between governments, industry and seed growers, and the evolution of regulations, practices and products enabled the New Brunswick seed potato industry to stop the spindle tuber disease in its tracks by 1980. The percentage of fields with PSTV decreased dramatically over the next 12 years. Subsequent surveys up until 2002, using the most up-to-date and sensitive methods to detect the viroid, have not found spindle tuber viroid in New Brunswick, or in the rest of Canada.

## Seed tuber physiological age (cont.)

indicate age of the crop – Superior, Red Norland or Pontiac will break dormancy very early when physiologically aged. You may need to adjust the storage temperature to slow sprout growth.

Maintain conditions that will NOT age the seed further – avoid long periods of elevated storage temperature; prevent or slow sprout growth; avoid the need to desprout; avoid bruising or damaging tubers during handling.

Seed tuber physiological age is complex

and is dependent upon factors that can be controlled (storage environment) and others that cannot (weather). Even though we

*Stem number per plant – DAFA Research Plots (Seed stored at 4°C)*

| Cultivar       | 2005 | 2006 |
|----------------|------|------|
| Russet Burbank | 4.0  | 2.8  |
| Shepody        | 3.3  | 2.5  |
| Atlantic       | 3.5  | 2.5  |
| Chieftain      | 3.3  | 2.0  |

cannot predict, with any accuracy, the age of any given seed crop, observing the growing season and comparing it to previous years will arm you with information you need to help you manage storage and produce seed of the most productive physiological age next Spring.

For questions on physiological aging, feel free to contact Dr. Loretta Mikitzel at the Potato Development Centre, Wicklow at 1-866-778-3762 or [loretta.mikitzel@gnb.ca](mailto:loretta.mikitzel@gnb.ca).



## Accelerated Release of Potato Selections from Agriculture and Agri-Food Canada

By Dr. Richard Tarn—Potato Research Centre—AAFC

The AAFC Potato Research Centre in 1998 introduced an **Accelerated Release** procedure for the release of its new selections to industry. The procedure was developed in response to the expressed wish of some industry collaborators to be involved in selection decisions prior to variety release, and the desire of AAFC to have a more effective means to transfer new selections to industry. The process is designed to be open to all bona fide Canadian companies and organizations, to operate in a manner that is transparent to participants, and to provide all participants with a fair opportunity to be successful in obtaining exclusive rights to a selection.

The **Accelerated Release** procedure has two stages. In the first stage the breeding program provides selections for two years of non-exclusive industry evaluation: 10 kg of seed is provided in the first year and 20 kg in the second year, along with standard check varieties. The breeding program provides seed each year on a first come first served basis. The seed is sufficient for collaborating companies and organizations to grow small evaluation plots and to conduct limited post-harvest testing for traits of interest. A material transfer agreement that specifies the conditions for the non-exclusive evaluation is signed with each collaborator. During this time AAFC continues disease resistance evaluation and shares the resulting information with collaborators. A total of 76 selections have been offered at this stage and 21 companies (processors, seed companies, packers and individual growers) and industry organizations from eight provinces have participated in the process.

At the end of the two years, if companies are sufficiently impressed by the performance of a selection, they have the opportunity to bid for the second stage of exclusive evaluation. A cash bid is used for this purpose with the selection going to the highest bidder. Bids have mostly been in the hundreds of dollars. An evaluation and field testing agreement is signed with the successful bidder to cover the exclusive testing of the selection for up to three more years and AAFC provides a one-time amount of approximately 200 kg of CFIA certified Breeder's Selection seed. *In vitro* disease-free plantlets are also usually available at this time if required by the collaborator. The successful bidder also wins the first right to negotiate a commercialization licence for the selection. At the end of the three years of exclusive evaluation the collaborator assesses the information gained. If the results support a decision to commercialize the selection AAFC will negotiate a commercialization agreement with the collaborator. This agreement addresses propagation and marketing, territory, royalties and fees, business plans, reports and related matters for a first term of about six years, and is renewable for the duration of protection of the new variety under plant breeders' rights.

Since the start of the program, 35 have advanced to the exclusive second stage testing and to-date five commercialization licences have been signed. Two of these have gone to French fry companies, one to a chip company, one to a seed exporter and the highest profile release, Rochdale Gold-Dorée, to Co-op Atlantic. Additional licence agreements are in the negotiation process.

## All Eyes on Them

By Samantha Grice, National Post

(article originally appeared in the August 17th edition of the National Post)

Between the mashed potato, baked potato, french fries, potato pancakes, scalloped potatoes, potato soup, roasted potatoes, Mr. Potato Head, rosti and tater tots, the spud is among the most versatile members of the vegetable kingdom.

And yet, the Ontario Potato Board wants to do more. They want you to have potatoes for dessert.

Specifically, they'd like to see the citizens of Canada's most populous province enjoying Mayan Chocolate & Orange Potato Cheesecake, Cardamom-Espresso Potato Cakes, Pineapple Macadamia Potato Cupcakes and White Chocolate-Cherry Almond Potato Ice Cream. But why would anyone want to put potatoes in their ice cream?

The concept was born when the Ontario Potato Board, likely looking to counter the Atkins carb-free craze, learned that health-conscious home cooks were regularly substituting lowerfat versions of traditional ingredients in their cooking.

In light of the fact one medium potato has only 100 calories, zero fat and contains "good" complex carbohydrates along with nutrients such as folic acid and potassium, a marketing paradigm was shifted.

The project, named Spudstitution Revolution, can be found at [www.OntarioPotatoes.ca](http://www.OntarioPotatoes.ca), the website of the Ontario Potato Board.

