

# HORT SNACKS

Welcome to another edition of Hort Snacks. This month's newsletter is brought to you by the letter "W", with wild, warm and wacky weather well represented this past month. We've gone from sweltering heat to much more mild temperatures, all in the space of days. Hopefully, frosts will hold off for a bit longer, or those that happened were reasonably mild and we can still get a bit more growth. A bit of rain wouldn't go amiss pretty much anywhere in the province. And the smoky air could leave any time. And those are my wishes.

In this edition, you'll find a few bits and pieces of information on new programs, extension events looming in the future, and other things to get you thinking. There is an article on some of the potential roles that farmers might take in educating the public, as well as some thoughts by various people on the same topic. You'll also find a bit of info on some home invading insects and some post-harvest injury problems (in the hopes that you can avoid them before they occur).

As you head into the home stretch for harvest (some of you have a long way to go), be safe, be careful and enjoy the benefits of working in such a great industry. If you want to drop a note on progress or to sum up your season when you finish up, feel free. As always, if you have ideas/thoughts on content for the newsletter, I'd welcome the input.

Rob Spencer, Commercial Horticulture Specialist  
 Alberta Ag-Info Centre, Alberta Agriculture & Forestry  
 310-FARM (3276)



ARD Horticulture Microsite – click the image

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## THINGS TO DO / THINGS TO THINK ABOUT THIS MONTH

### **Strawberries**

- Good soil moisture must be maintained in June bearing strawberries to ensure maximum branch crown and flower bud formation (next year's production)
- Old weeds should be removed this month. Reducing the amount of foliage and trash will facilitate proper placement of herbicides later this or next month. Cultivation between rows to eliminate weeds, incorporation of straw and aeration of the soil should also be done
- Day-neutral strawberry producers often find irrigation for frost protection beneficial during fall months. Very often producers experience 1 or 2 frosty nights in late August-September followed by weeks of "Indian Summer"
  - Frost protection has proved invaluable during this brief period
  - Water releases heat as it freezes on the plant, thereby keeping the plant parts above freezing. Protection can be obtained down to approximately  $-6.6^{\circ}\text{C}$ . At temperatures of  $-1^{\circ}\text{C}$  at plant level frost may cause slight injury to open flowers. Medium injury may occur to open flowers at temperatures of  $-2^{\circ}\text{C}$ . Producers should have accurate thermometers stationed throughout their field, especially in lower areas
  - Irrigation should commence when temperatures at ground level reach  $+1^{\circ}\text{C}$ . Ice may not form immediately. Ice formation of 1 cm in thickness may form without serious damage to the plants. Irrigation should continue until the ice melts off the plants. A thermometer in the field at ground level in a location not frost protected may assist in determining field temperature
  - Field warming through the use of irrigation during periods of frost is a relatively inexpensive form of insurance. Much of the year's income can be wiped out in one chilly night. Straw mulch within the row is also a definite asset. Some producers find that fibre/fabric row covers provide  $1-2^{\circ}\text{C}$  frost protection

- Do not apply 2,4-D or Lontrel in September due to flower bud initiation. September is a good time to apply Devrinol or Sinbar to control winter annuals
- Strawberry growers should be making arrangements for obtaining clean rye or wheat straw for mulch this fall. Personally walking farmer's fields to decide how clean (free from weeds) the straw will be might be a good idea prior to purchase.

### **Apples**

- Stop watering/irrigation to encourage shut down and winter acclimation. Apples will continue to grow if water is available

### **Raspberries**

- Prune out spent or fruited canes, as well as weak or diseased canes
- Reduce irrigation this month to encourage hardening
- Consider fall herbicide applications in established plantings – some restrictions apply to certain products (e.g. Casoron)

### **Saskatoon berries**

- Disease pruning and weeding
- If you are planning to rejuvenate (mow-off) your orchard next spring, do not use Casoron this fall

### **Vegetables**

- Remove mature product and cool quickly to ensure maximum post-harvest life
- Field covers can be used to protect crops from fall frosts
- Curing of some crops (potatoes, bulb veg, pumpkins) can help in wound healing and post-harvest lifespan
- Fall planting may be done for some crops (e.g. garlic, spinach, etc.) – timing varies – too late can result in winter injury and poor survival

### **General / Other**

- Mow grass and weeds around plantings to discourage mice as well as reduce insect and disease overwintering sites

### **Pest Management / Monitoring**

- Monitor insects and control if necessary (to reduce overwintering stages)

### **NEWSLETTER USE RESTRICTIONS**

Please feel free to share all or portions of this newsletter with other interested parties.  
If you want to use content from this newsletter in other media, please request permission before doing so.

### **MENTAL SNACKTIME – Informing the Public**

- "I know of no safe depository of the ultimate powers of the society but the people themselves; and if we think them not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them but to inform their discretion." – Thomas Jefferson
- "Forget words like 'hard sell' and 'soft sell.' That will only confuse you. Just be sure your advertising is saying something with substance, something that will inform and serve the consumer, and be sure you're saying it like it's never been said before." – William Bernbach
- "Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do." – Albert Bandura

## Q&A

### Q: What do you feel is your role in informing / educating the public?

A: By doing all thing right. People see better then they hear

A: As I am currently building and harvesting from a smaller organic food forest, I take every opportunity to share, tour and advise my property and the steps and principles followed for a permaculture related food forest. Including, the benefits of local, hands on food production and cooking.

A: 1. I am in an employment role where I used to facilitate and work towards informing the public and encouraging them to learn more about horticulture, agro-ecology and farming and now the hard push from upper level is a sales approach and I'm not fond of that. 2. I love informing and encouraging the public to learn about horticulture and agro-ecology and farming and in that learning encourage them to find the answers for themselves as well. Get them to not take my word as gospel but to increase overall knowledge by promoting where to look, find answers, seek conversation and show them what I know and hopefully I can learn from them in return.

A: Helping the landowners start management practices that lend to social license

A: My role is to educate the producer so they become more comfortable in talking to consumers.

A: Front line! With so many farmers' market vendors dealing in the resale business, selling imports out of local or impossible for local seasons, we feel we are CONSTANTLY explaining why we don't have asparagus right now, or spinach, or peas, or broccoli

A: Very important they need to know how the product is grown and why it is better to buy our product.

A: Our role as producers is to keep the public educated and informed as to production practices and new products as well as any benefits these new products may have for the consumer.

A: Vital. Most of today's generation are 2 to 3 generations away from the farm and they need to know that food comes from a farm before it gets to the store or from online shopping.

A: We have a direct role to be proactively promoting the benefits our products to our customers/consumers/public.

A: Be honest. Do what you say. Don't say what you do. Work towards making tomorrow better for our kids

Next Month's ? → [How do you prepare/help out the next generation in the industry?](#)

## Upcoming Conferences / Workshops

### September 2018

- **2018 Canada's Outdoor Farm Show**  
Sept 11-13, 2018 – Woodstock, ON  
[www.outdoorfarmshow.com](http://www.outdoorfarmshow.com)
- **CanWest Hort Expo**  
Sept 26-27, 2018 – Tradex – Abbotsford, BC  
[www.canwesthortexpo.com](http://www.canwesthortexpo.com)
- **Potato Europe 2018**  
Sept 12-13, 2018 – Rittergut Bockerode bei Hannover  
<http://www.potatoeurope.com/>

### October 2018

- **Canadian Greenhouse Conference**  
October 3-4, 2018 – Scotiabank Convention Centre, Niagara Falls, ON  
[www.canadiangreenhouseconference.com](http://www.canadiangreenhouseconference.com)
- **PMA Fresh Summit International Convention & Exposition**  
October 18-20, 2018 – Orange County Convention Center, Orlando, Florida, USA  
<http://www.freshsummit.com/>
- **ISA Prairie Chapter – There's a Fungus Amungus**  
Oct 22-23, 2018 – Pomeroy Olds at Olds College - Olds, AB  
<http://www.isaprairie.com/annual-isa-prairie-chapter-conference-2018-theres-a-fungus-amungus>

### November 2018

- **Saskatchewan Green Trades Conference & Tradeshow**  
Nov 8-10, 2018 – Saskatoon Inn, Saskatoon, SK  
<http://saskgreentradesconference.com/>
- **Potato Growers of Alberta Annual General Meeting**  
Nov 13-15, 2018 – The Marriott Edmonton River Cree, Enoch, AB  
[www.albertapotatoes.ca](http://www.albertapotatoes.ca)
- **Green Industry Show & Conference**  
Nov 15-16, 2018 – Edmonton Expo Centre at Northlands, Edmonton, AB  
**Pre-conference Workshops**  
Nov 14, 2018 – Edmonton, AB  
[www.greenindustryshow.com](http://www.greenindustryshow.com)

## Canadian Agricultural Partnership (CAP) PROGRAMS

Have a look at the new Canadian Agricultural Partnership (CAP) Program website ([www.cap.alberta.ca](http://www.cap.alberta.ca)). CAP is a five-year, \$3 billion federal-provincial-territorial investment in the agriculture, agri-food and agri-based products sector. It is the successor of the 2013-18 Growing Forward 2 (GF2) partnership.

In Alberta, CAP represents a federal - provincial investment of \$406 million in strategic programs and initiatives for the agricultural sector. The roll-out of the CAP program suite in Alberta began in April, 2018, and will consist of a phased roll-out of 15 programs over the spring, summer and fall of 2018. Applications and program details consisting of cost-shares and eligible activities and/or items will be released with the opening of each program. The criteria for eligibility will be made available along with the program details.

Please note, there are some differences between CAP and GF2 programs, including many of the programs being merit-based (as opposed to 1<sup>st</sup> come/1<sup>st</sup> served), with specific intake periods staged throughout the year. Check each program for specifics.

In Alberta, CAP will deliver programs developed in consultation with stakeholders, and is organized under five themes: Environmental Sustainability and Climate Change; Products, Market Growth and Diversification; Science and Research; Risk Management; and Public Trust.

If you had subscribed to receive updates from the GF2 website, you will have to re-subscribe for updates from CAP. Click on the **ORANGE** button in the upper right of the CAP homepage, to subscribe.

[www.cap.alberta.ca](http://www.cap.alberta.ca)

As of September 1, 2018, details on 3 of the 5 themes of programs have been released and are open, however details on the additional programs will likely be announced in September and October. The following programs are included:

<p><b><u>Environmental Sustainability &amp; Climate Change Theme</u></b></p> <ul style="list-style-type: none"><li>• Environmental Stewardship and Climate Change - Group</li><li>• Environmental Stewardship and Climate Change - Producer</li><li>• Farm Water Supply</li><li>• Irrigation Efficiency</li></ul>	<p><b><u>Products, Market Growth and Diversification</u></b></p> <ul style="list-style-type: none"><li>• Products to Market</li><li>• Value-added Products to Market</li></ul>
<p><b><u>Public Trust Theme</u></b></p> <ul style="list-style-type: none"><li>• Agriculture and Food Sustainability Assurance Initiatives</li><li>• Public Agriculture Literacy</li><li>• Youth Agriculture Education</li></ul>	

### In the News

- [Know how to control nematodes in market garden crops](#) – Fruit and Vegetable article
- [A Radical Way for Growers to Make a Profit \[Opinion\]](#) – Growing Produce article
- [The Art of the Multilateral Deal](#) – Crop Trust Science Blog
- [How England Got Its Curvy Cucumbers Straightened Out](#) – Atlas Obscura article
- [Your vegetables are going to be picked by robots sooner than you think](#) – Tech Crunch article
- [What Growers Need to Know About Biopesticides](#) – Growing Produce article
- [Do You Have One of the Best or Worst Jobs in 2018?](#) – Growing Produce article
- [When roots crack and worms crunch](#) – ETH Zurich article
- [Generate More Profits with Organic Berry Production](#) – Growing Produce article
- [Fresh produce laser can engrave up to 6,000 cucumbers per hour](#) – HortiDaily article
- [Innovative Approach to Breeding Could Mean Higher Yields and Better Crops](#) – SpudSmart article
- [A Beginning Greenhouse Grower? Avoid Beginner Mistakes](#) – Growing Produce article
- [Receptor networks underpin plant immunity](#) – Science magazine
- [Weird new fruits could hit aisles soon thanks to gene-editing](#) – The Guardian article
- [Resistance and rotation - the value of biorationals](#) – HortiDaily article
- [5 Advantages of Energy Curtains Not to Miss](#) – GGS Structures Inc. article
- [Water or Land? It doesn't matter - Plants control their photosynthesis similarly, regardless of their origin](#) – Max Planck Institute of Molecular Plant Physiology article

## The Farmer's Role in Informing/Educating the Public

People in our society derive understanding and learn about various topics of interest to them from a range of sources. In some cases, they gather information through research (online, in-person, word-of-mouth, etc.) or they might learn through experience. I suppose that it depends on their personal preferences and the most convenient and available method.

When it comes to the public's knowledge of agricultural production (for the purpose of this discussion, let's drill that down to horticultural crop production), historically, there was a decent amount of applied or innate knowledge about the food that we eat. People had reasonably recent ties to the farm, or had some amount of personal experience with growing and/or harvesting various (seasonal) products. However, over time, we've seen a swift erosion in the amount of knowledge that people have about how the foods they enjoy come into being and arrive at the market or store that they frequent. Often, there are significant misunderstandings or misconceptions about production, which can influence (negatively) their purchases and their expectations.

As a farmer, what is your role in educating or informing the public? On the surface, the responsibility of the farmer is minimal. Historically, farmers grew what they grew and that was that. In the present day, the short answer is "it's complicated". Why is it complicated? Because, while educating the customer isn't technically required, it is a foolish operator that shuts that door. Educating and connecting with the customer can increase your markets and, in this day of instant information, can mean the difference between acceptance and losing customers.

Depending on how you market, and the degrees of separation between you and your customer, the ability that you have to reach your customers in a meaningful way can vary. Direct connections or influence may entice customers to purchase your products, but it will give you a chance to increase their understanding of how and WHY you do what you do. Theoretically, every producer has the opportunity to re-educate the public on the industry and to re-ignite their interest in where their food comes from.

While all of this is lovely in theory, the practical application of taking a role in educating or informing the public can be challenging. The definition of INFORM is "to provide facts or information", whereas EDUCATE means "to give instruction or training (in a particular area)". There is no set formula for educating anyone, mainly because everyone is different. Generations of schoolchildren have effectively shown that you can throw plenty of facts, figures and information at someone, but that isn't necessarily going to make them learn it, much less understand.

The ways of educating and informing are many. You can educate through conversations on-farm or at the market, tours, Open Farm Days, websites, social media, newsletters, newspaper articles, local presentations, product label design, and the list goes on. Personally, I think that growers today can really have a major impact on education/informing the public about WHY and WHO, through three focus areas.

First, producers can serve as a REALITY CHECK for the public. In the midst of global markets and everything available always (for a price), producers can show that they are real, living, breathing individuals, with families and a stake in the game. They can show the public that they face challenges and that there isn't some sort magical vending machine that pumps out cheap, identical products, on demand. They can learn about the weather, seasons, pests, how hard it is to grow things and can just generally what it means to be a horticultural producer on the Canadian prairies.

Second, producers can educate through DEMONSTRATION. Show the public how things are grown. This requires a bit of a more hands-on approach and will certainly be easier if they are coming onto your farm. If you don't have on-farm interactions, help them to visualize your operation through your website or through social media. When they picture the produce that you grow, you want them to picture you and your farm.

Lastly, producers can educate through their EXAMPLE. Much of the lack of knowledge in the public has resulted in trust issues (derived by internet searches). By showing the public what you do and why, they will gradually regain their trust in the industry, for the benefit of everyone. You will have to make the connection between your practices and the outcomes, but once you do it, things will improve.

In the end, as producers, you have the opportunity (and perhaps the responsibility) to interact and reclaim some of the ground that has been lost over the past several generations. It is a challenge, but I can think of many places that it is working.

## End-of-Season Checklist for Managing Late Blight

In recent years, late blight has, at times, been confirmed in parts of Alberta and has then spread through various regions. With the intent of returning to late blight-free status, increased awareness efforts have been instituted in both the industry and the public. Everyone was encouraged to increase early and season-long monitoring of fields, gardens and greenhouses in order to protect crops from late blight, as well as have a quicker response to any perceived infections.

As the 2018 season wraps up, it seems like the hot and dry conditions that prevailed over much of Southern and Central Alberta throughout the summer appear to have helped keep late blight in check, as there were no samples submitted for testing. As always, it is recommended that all growers of potato or tomato (commercial or home garden) take specific steps to prevent the carryover of disease into future years, as a number of valuable crop industries in Alberta could be impacted by repeated outbreaks.

In the late parts of the growing season, ensure that plants die down quickly using top-killing treatments such as chemical desiccant (diquat) or mechanical treatments.

At the end of the growing season, gardeners should dispose of all above-ground plant materials (stems and foliage), whether infected or not, either by burial, freezing or composting. The purpose is to ensure that living tissues do not survive the winter and will break down completely, thus preventing carryover of the late blight pathogen. Avoid placing infected materials in uncovered compost piles as spores may be produced and spread the disease to nearby plantings of susceptible crops. Piles may be covered with a tarp until the materials have frozen and are completely dead.

Since tubers represent the primary method of disease carryover in potatoes in Alberta, every effort should be made to prevent the survival of infected tubers. Recognize that some of the recently prevalent strains of the late blight pathogen are more aggressive on tubers. Carefully grade and sort harvested potato tubers in an effort to remove any infected tubers. Commercial seed growers should be prepared to further grade seed tubers in the spring, and mancozeb-based seed treatments may be applied to try and protect developing crops from seed-borne late blight.

Culled tubers should be disposed of in such a way as to encourage them to breakdown over winter. Culled tubers can be fed to livestock or may be chopped, incorporated and buried, or can be placed in covered piles until they freeze completely. Ensure that potatoes do not volunteer (grow in another crop).

The late blight pathogen normally cannot survive away from living tissues. While the disease can survive for a time on tomato fruit, spores will not carry over on tomato seed. The disease can be introduced on living tomato transplants that are brought in from areas where late blight survives the winter.

In Alberta, the late blight pathogen does not survive or overwinter in the soil, so growers should not worry about re-infection by planting in or adjacent to a field where late blight has occurred, provided there are NO surviving tubers that could reintroduce the disease through infected volunteer plants. However, rotating between locations is always recommended, whenever possible, to prevent the build-up of other diseases.

All growers should take the time to assess the past growing season and the level of risk of late blight infection or re-infection that they will face for the next growing season. Determine where disease might have come from and put preventative measures in place to protect against infection. It is in EVERYONE'S best interest to manage late blight, as this is a community disease. It is also critical that everyone take an active role in submitting suspect material to improve detection and management.

If you have questions regarding identifying or dealing with late blight, or wish to submit a sample for testing, please contact 310-FARM (3276) for assistance. For more information on late blight, consult the following document – [FAQ – Late Blight of Potatoes and Tomatoes](#).

## Home Invaders - Root weevils & Maple Bugs

Each year, whether summer or fall, a number of insects will gather together and make attempts to enter buildings to shelter and/or overwinter. Most are not plant pests, and are merely nuisance insects that invade our residences. This article is meant to provide a bit more information on a couple of invaders that you might encounter.

### Maple Bugs / Box Elder Bugs

**Causal Agent:** *Boisea trivittata*

**Host plants:** Various species of maple (*Acer*) and ash (*Fraxinus*); No agricultural crops

#### Description:

- Adults are narrow, 14mm (1/2 inch) long insects, black/dark grey in colour, with red along the edges of their wings, and three distinctive stripes on their thorax (upper back/shoulders).
  - Stripes form a subtle X on the back when wings are folded flat (similar insects have a more distinct X)
- Nymphs (immature stages) are bright red, with black wing buds
- Nuisance pest
  - Stain surfaces when squished
  - Crushed bugs emit a foul odor
  - Poop can stain fabrics

**Adult and various nymphal stages of Box Elder Bug**  
 Photo by: William M. Ciesla, Forest Health Management  
 International, Bugwood.org



#### Life Cycle:

- Adults emerge in the spring to lay eggs on the leaves and bark of host trees
- Nymphs feed on seeds, foliage, twigs and fruit
  - Nymphs progress through several developmental stages until they become adults and begin reproducing immediately
  - Feeding on host trees does little damage
- 2<sup>nd</sup> generation of adults will overwinter
- Large numbers of nymphs and adults will be observed on the trunks of trees in early fall, just prior to migration
- Insects seek a protected location to overwinter
  - Locations must be warm enough to be above freezing while they hibernate, but not so warm that they will expend all of their energy reserves and die
    - 4-10°C (40-50°F) is the preferred temperature range
  - Only adults have sufficient energy to survive the winter; the remainder of the insects (nymphs) will die

#### Management:

- Block entrance points into buildings by caulking gaps and ensuring screens are intact
- Vacuum up rogue invaders to avoid stains or odors
- Spray groupings of mature/immature insects prior to migration with a mixture of water and dish soap (3-4% solution)
  - Contact with soapy solution will suffocate insects – insects not contacted with solution are unaffected
- Removing host trees may remove breeding sites

### Root Weevils (Strawberry root weevil)

**Causal Agent:** *Otiorhynchus ovatus*

**Host plants:** strawberries

For information on Strawberry root weevil in strawberry crops, visit [Root Weevils – Ontario IPM](#)

#### Description:

- Adults are shiny, dark brown-black beetles, about ¼ inch in length, with blunt snouts and antennae that have elbows
  - Root weevils will drop to the ground when disturbed, do not fly and are nocturnal, emerging only at night to climb plants
- Larvae are pale and legless

#### Life Cycle:

- Root weevils overwinter as nearly fully grown larvae
- Pupation is completed in the soil, with adults emerging in early summer
- Eggs are laid near plant crowns
- Larvae feed on host plant roots, whereas adults feed on leaves (resulting in leaf margin notching symptoms)
- Adults often migrate into homes in late spring and late summer, perhaps to avoid hot, dry conditions

**Strawberry Root Weevil adult**  
 Photo by: Whitney Cranshaw,  
 Colorado State University,  
 Bugwood.org



#### Management (around structures):

- Block entrance points into structures
- Vacuum up beetles found crawling around residences
- Insecticidal treatments are generally unnecessary and/or ineffective – may be applied around the exterior of a structure

## Post-harvest physical injury

Crops Affected: various fruits and vegetables

### Symptoms

- Post-harvest physical injury can occur on most fruit and vegetables during any of the many handling processes or during storage. Injuries may include:
  - *Impact splits* – fruits, roots and tubers from the impact when they are dropped
  - *Internal bruising* – not visible externally, caused by impact
  - *Superficial* – surface grazes, skinning or scratches to the skins and outer layer of cells
  - *Crushing/compression* – leafy vegetables and other soft produce; may also occur in firmer produce in some situations
  - *Shatter cracking* - result of physical injury, due to rough handling
    - High turgor (full of water) carrots tend to be more prone to damage
  - *Cuts* – penetrating slices or cuts which damage deeper tissues
  - *Breakage* – portions of the produce may be broken off completely (e.g. roots, leaves, etc.)
  - *Wilting* – loss of turgor in leaves, roots, etc., may manifest as shrivelling, rubberiness, colour loss, etc.

### Causes

*Blackspot Bruising* – Individual cells are ruptured below the skin without breaking the skin. Bruises develop within a couple of days and are only visible when potatoes are peeled.

*Shatter Bruising* – Typically due to rough or improper handling. Thin cracks or splits occur in the flesh of the tuber, particularly in larger tubers. Thumbnail cracks, which occur when cold tubers are handled in storage, are a form of shatter bruising.

*Crushing/Compression* – Depending on the crop and the severity, can range from pressure bruises to cracking. Occurs as a result of excessive weights or bulk pile depths. Softer produce is more susceptible to crushing.

*Splits/Cuts* – Improper belt speeds, insufficient padding or belt/roller loading, sharp edges or corners, damaged pallets or handling equipment with pointy, sharp or rough protrusions

### Harvest Conditions and Post-harvest Injury

Crop maturity, harvest temperatures and moisture conditions have a significant influence on harvested produce quality.

Ideally, all produce should be fully (or appropriately) mature when harvested. For potatoes, tops should have naturally died down or have been killed prior to harvest. Top killing encourages skin set.

### Harvest Conditions

- Potatoes should ideally be harvested at temperatures between 7°C and 15°C and with good, average soil moisture.
  - When potatoes are harvested at warmer temperatures (greater than 18-20°C) and under drought stress, expect more **blackspot bruising** and potentially more storage diseases, such as leak and pink rot.
  - When potatoes are harvested at temperatures less than 7°C and with increasing soil moisture and tuber water content, you can expect to see a greater incidence of **shatter bruising**. This is true with other root vegetables.
  - Repeated exposure of tubers to temperatures less than 5°C can lead to sugar to starch conversion and darker fry colour.
  - Frozen tubers will occur when temperatures go below 0°C. It is almost impossible to store a crop of potatoes with more than 5 percent frozen tubers.
  - Other vegetables will also be affected by freezing – in some cases, allowing them to thaw prior to harvest will be acceptable

### Management:

- Avoid harvesting carrots (and other root vegetables) at cooler soil temperatures (e.g. avoid early mornings) or when they are fully turgid
- Store bulk vegetables according to established pile guidelines (depth, aeration, temperature)
- Store produce in appropriate sizes/volumes to prevent compression or bruising injury
- Rough handling of produce during harvest, grading and in the post-harvest and storage stages can result in increased incidence of storage diseases, reduce quality and crop value.
  - Ensure all equipment is properly calibrated prior to use. Avoid drops of greater than 12 inches and avoid over-piling. Ensure that handling equipment is properly operated, to minimize damage
- Proper post-harvest curing for wound healing is also an important step