Harvest and Post-Harvest Tips for Best Onion Bulb Quality
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As a general rule of thumb, cool and wet growing seasons result in higher yields and bigger bulbs that tend to be of lesser quality mostly due to various bulb rot problems. Moderate seasons are favorable for onion growth, but ample rainfall and cooler temperatures also tend to favor leaf and bacterial diseases. Hot and dry growing seasons tend to result in smaller bulb size, but of very good quality. When onions are intended for storage, best management practices should be followed throughout harvest, curing and storage to ensure best bulb quality.

Pulling and windrowing
Ideally, onions should not be pulled until at least 50% of the plants have lodged. Another indication is to pull on the individual plants: if they easily come out of the ground, they are ready for pulling. If not, this is an indication that the roots are still functioning and that the plant has not yet completed bulbing. After lodging, bulb size increases an additional 25 to 33%. See article, “Harvesting Storage-Bound Onions That Are Still Standing”.

- Do not pull onions and leave them in the hot sun when temperatures are in the high 80s and into the 90s, because they can get sunscald, especially if the relative humidity is high and they are pulled on the green side. Secondary bacterial pathogens invade tissue damaged by sunscald resulting in rotten bulbs. See article, “Concerns Harvesting Onions During Hot and Humid Weather”.
  - A common technique used for field drying is to orient the pulled onions so that the leaves lay over top of the bulbs.
  - Some growers move the pulled onions with the tops on into a greenhouse or high tunnel to dry (Fig. 1). Temperatures should be held below 85 °F, which will probably require leaving everything wide open. Black shade curtain/cloth over the house can also help to moderate temperature. Ensure good air movement.

Topping and harvesting
- Do not harvest onions when conditions reach 90 °F and 90% relative humidity, because black mold could develop. Harvest dry onions during the cooler part of the day as long as they are not wet from dew or rain or wait until a cooler day. See article, “Concerns Harvesting Onions During Hot and Humid Weather”.
- Storage-bound onions should only be topped when the neck is dry and has no green tissue (i.e. the tissue does not slide when you roll the neck between your fingers). Bacterial diseases, Botrytis neck rot (caused by the fungal pathogen, Botrytis allii) and black mold can enter into and move through green tissue into the bulbs. These diseases do not infect or move in dry tissue. Fig. 2.
- Leave 2-3 inches of neck on the bulb when topping. This increases the distance from the cut surface to the bulb for fungal and bacterial pathogens to travel. Theoretically, if the neck dries down before the disease gets to the bulb, the bulb should be sound in storage.
- If onions are “dying standing up” due to excessive leaf dieback caused by disease or other stress, and they are not lodging, they should be pulled and note that it may take a bit longer for the necks to dry on these onions. See article, “Harvesting Storage-Bound Onions That Are Still Standing”.

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Fig. 2. Bacterial diseases, Botrytis neck rot (caused by the fungal pathogen, Botrytis allii) and black mold can enter into and move through green tissue into the bulbs. These diseases do not infect or move in dry tissue.
• Conduct harvest practices when the weather is dry. Ideally, onions should not be handled when wet to prevent skin quality issues from Brown Stain, caused by Botrytis cinerea and Black mold. When wet harvested onions are placed into boxes, it takes longer for them to cure properly, and the added moisture can stimulate disease development and rooting, which in turn will stimulate sprouting.

• Avoid bruising during harvest procedures. Bruises provide direct entry points for diseases to get started.
  o Reduce drops to 6” and pad sharp surfaces.
  o On mechanical harvesters, minimize mechanical injury during harvesting by adjusting the chain speed to make sure the chain is always full. This will help reduce rolling and bumping of the bulbs.

Curing
For optimum storage quality, onions must be cured soon after harvest. Curing decreases the incidence of neck rot and bacterial diseases, reduces water loss during storage and is desirable for development of good scale color.

• Optimum conditions are 68-86°F and 70% relative humidity for at least 12 to 24 h. Best skin color develops at 75-90°F.
• Artificial curing can be done with outside air, which is heated to approximately 77°F or 3-5 °F above the ambient air temperature. Higher temperatures, up to 90°F can be used if onions are of high quality with several layers of good skins.
• Avoid temperatures greater than 90°F, because this is favorable for development of bacterial diseases.
• Avoid temperatures greater than 82°F, because Black mold is more likely to develop at this temperature.
• A lower temperature, down to 68°F should be used if onions are poorly skinned, have been touched by frost or have bacterial diseases.
• Relative humidity should not fall below 65% or exceed 80%. RH going into the boxes should ideally be 50% and less than 100% coming out.
• Airflow should be no less than 3 cubic feet per minute per cubic foot of product.

Onion Storage
To ensure maximum storage life, onions should be stored after curing. The optimum temperature for long-term storage of onions is 32°F with 65-70% relative humidity, but it is important to bring them down to this temperature slowly.

• Get them out of the sun or protect them from direct sunlight; exposure to light after curing will induce greening of the outer scales.
• Damaged or rotten bulbs should be graded out before putting them into storage. Damaged bulbs give off moisture which is favorable for development of diseases in storage. Rotten bulbs can ooze onto healthy bulbs and stain them.
• Avoid condensation by not circulating air onto onions that is a warmer temperature than the onions.
Fig. 1. Onions drying in a high tunnel covered with shade cloth. Onions are placed on benches with lot’s of air circulation. Photo credit: C. Hoepting.

Fig. 2. Freshly pulled storage-bound onions will not be topped until the neck is dry and tight to ensure best bulb quality. Photo: C. Hoepting.
Fig. 3. Various small-scale onion stores. The optimum temperature for long-term storage of onions is 32°F with 65-70% relative humidity with regular air circulation. Photo credits: USC Canada & Teimo.