



## Preventing post-harvest mould in chestnuts

Once chestnuts are harvested, they become vulnerable to a range of moulds and rots.



Freshly harvested chestnuts being sorted and graded for quality before storage and distribution. (Image: CAI)

### 1. Introduction

Post-harvest decay is one of the most significant threats to chestnut quality and marketability in Australia.

While small harvests may avoid serious issues, larger volumes increase the risk of mould spreading rapidly from compromised nuts to healthy ones during storage.

### 2. Mould in storage

White mould observed on chestnuts is commonly caused by *Coniophora puteana*, a wood-rotting fungus.

It typically begins on a compromised or poor-quality nut and spreads across others in the storage bin.

However, this is not the only concern. Other fungal species associated with post-harvest spoilage include:

- *Penicillium* spp
- *Botrytis cinerea*
- *Sclerotinia sclerotiorum*
- *Acrospora mirabilis*
- *Botryosphaeria ribis*
- *Gibberella* spp.

These fungi often take advantage of weakened nuts or poor storage conditions and can lead to substantial losses—up to 25% in some cases.

### 3. Storage conditions

The most effective defence against mould is maintaining proper storage conditions immediately after harvest.

Chestnuts should be stored in a clean, sanitised facility with good airflow and low temperatures.

#### Target storage temperature

- The optimal storage temperature is close to 0°C (just above freezing).
- Chestnuts will not freeze at 0°C due to their sugar content.

*Never allow chestnuts to freeze (i.e. below -2°C), as thawing causes tissue damage, off-flavours, and spoilage.*

#### Airflow and movement

Storage bins should allow airflow, or nuts must be rotated or "poured" into clean bins every 2–3 weeks.

This prevents localised mould from spreading between nuts and promotes uniform cooling.

#### Bin types

Commercial growers commonly use ventilated apple bins (300–500 kg capacity).

Small-scale growers can use stackable crates with slotted sides or mesh bins.

## 4. Harvesting & sorting

### a) Timing the Harvest

Chestnuts fall naturally in waves; the best-quality nuts are typically in the middle of the season.

Early and late-falling nuts are more likely to have compromised quality or physical damage.

### b) Initial sorting

After harvest, wash and float-sort chestnuts.

Floating nuts are often lower quality—due to internal damage, air pockets, or early signs of rot—but should be assessed individually.

### c) Sizing

Avoid grading equipment that scratches the shell, as this creates entry points for fungi.

## 5. Sanitising chestnuts before storage

### Why Sanitise?

Sanitising chestnuts reduces surface fungal loads and improves storage stability.

It is not a substitute for good hygiene or temperature control, but an important supplement.

### Approved sanitisers

Hydrogen peroxide and peracetic acid blends are preferred (e.g. *Peratec* or *OxySan*), some of which are certified for organic use.

Avoid using unapproved or unsafe products (e.g. *chlorine-based sanitisers are not registered for food use in Australia*).

**Note:** Always check APVMA registration and follow product instructions for concentration, contact time, and handling.

### Application

Chestnuts can be treated by dipping in a sanitiser vat or spraying in a rotating drum.

Floating nuts should be removed during sanitisation.

### Repeat treatments

If storage is prolonged or conditions are less than ideal, sanitising may need to be repeated several times.

Frequency depends on:

- Nut quality
- Storage hygiene
- Ambient temperature
- Bin movement frequency

## 6. Facility preparation

### a) Clean before storage

Before the season begins, thoroughly clean and sanitise all surfaces, storage rooms, and equipment.

Remove all organic debris, sweep down walls and floors, and apply a food-grade disinfectant.

### b) Monitor temp. & humidity

Calibrated thermometers and hygrometers can help track storage conditions.

A small data logger can help identify temperature fluctuations over time.

## 7. Other factors

### a) Cultivar choice & tree health

Healthy trees and well-managed orchards produce fewer compromised nuts.

Select cultivars suited to your climate and soil type, and maintain proper fertilisation and irrigation throughout the season.

### b) Pollination compatibility

Internal kernel breakdown (IKB) can result from pollination incompatibility, particularly between Chinese and European/Japanese hybrids.

Avoid mixing incompatible tree types unless compatible pollen sources are confirmed.

### Brown rot vs. storage mould

It's important to differentiate between storage mould (e.g. white surface mould) and kernel infections like brown rot caused by *Gnomoniopsis smithogilvyi*, which occurs before harvest and presents as internal browning.

Storage mould can sometimes be washed off without affecting nut quality.

Brown rot, however, originates in the orchard and requires flower-stage management and orchard hygiene strategies.

Action	Purpose
Harvest during peak drop	Better nut quality, fewer compromised kernels
Wash and sort post-harvest	Remove floaters and poor-quality nuts
Sanitise with approved products	Reduce surface moulds and bacteria
Store near 0°C	Slow respiration and microbial activity
Use ventilated bins or rotate stock	Prevent localised mould development
Monitor temperature and humidity	Ensure stable storage environment
Clean facilities pre-season	Minimise cross-contamination risk
Record sanitiser use and storage data	Support traceability and continuous improvement

Summary of Best Practice Recommendations



# Post-harvest mould prevention checklist

## *Is your post-harvest system protecting chestnut quality?*

Use this checklist to evaluate your orchard and packing operation's readiness to prevent mould and decay. Tick each box that applies. The more you check, the better your risk management

<b>Harvest Timing &amp; Handling</b>	
<input type="checkbox"/>	Do you collect nuts promptly after natural drop, especially during warm or wet weather?
<input type="checkbox"/>	Are early and late drops sorted separately from the main harvest?
<input type="checkbox"/>	Do you avoid excessive handling or damage that could bruise or crack the shells?
<input type="checkbox"/>	Are staff trained to recognise and remove damaged, diseased, or poor-quality nuts?
<input type="checkbox"/>	Is harvest equipment cleaned and sanitised regularly during the season?
<b>Sorting &amp; Washing</b>	
<input type="checkbox"/>	Are nuts washed promptly post-harvest using clean water?
<input type="checkbox"/>	Do you use float sorting or visual inspection to remove compromised nuts?
<input type="checkbox"/>	Is the washing line and water changed frequently to avoid cross-contamination?
<input type="checkbox"/>	Are nuts allowed to surface dry before storage?
<input type="checkbox"/>	Is water quality (including pH and chlorine, if used) regularly monitored?
<b>Sanitising Treatments</b>	
<input type="checkbox"/>	Do you use a food-grade, APVMA-approved sanitiser (e.g. peracetic acid or hydrogen peroxide)?
<input type="checkbox"/>	Is sanitiser contact time, concentration, and temperature carefully managed?
<input type="checkbox"/>	Are sanitised nuts re-rinsed only with potable water (if needed) and handled with clean gloves?
<input type="checkbox"/>	Is sanitisation repeated for long-term storage batches as needed?
<input type="checkbox"/>	Do you maintain records of sanitiser use and treatment timing?
<b>Storage Facility Conditions</b>	
<input type="checkbox"/>	Is the storage room cleaned and sanitised prior to each season?
<input type="checkbox"/>	Do you use calibrated thermometers and hygrometers to monitor conditions?
<input type="checkbox"/>	Are chestnuts stored as close to 0°C as possible, without freezing?
<input type="checkbox"/>	Is airflow maintained either through ventilated bins or periodic turning?
<input type="checkbox"/>	Is the storage area protected from pests and external contamination?
<b>Storage Containers &amp; Rotation</b>	
<input type="checkbox"/>	Do you use food-safe, ventilated bins or crates?
<input type="checkbox"/>	Are full bins not stacked too high to allow for airflow and temperature control?
<input type="checkbox"/>	Are bins rotated or "poured" regularly to prevent localised mould development?
<input type="checkbox"/>	Do you clean and sanitise all bins before and after each use?
<input type="checkbox"/>	Is each batch labelled and tracked for traceability?
<b>Overall Hygiene &amp; Risk Monitoring</b>	
<input type="checkbox"/>	Do you keep daily or weekly records of temperature, humidity, and nut condition?
<input type="checkbox"/>	Are you monitoring for visible mould growth and removing compromised batches promptly?
<input type="checkbox"/>	Do you maintain a separate clean zone for nuts prepared for market?
<input type="checkbox"/>	Have you trained all staff on hygiene, food safety, and mould identification?
<input type="checkbox"/>	Do you evaluate post-season losses and review procedures annually?



## How Did You Score?

✓ **0–9: “At Risk”** – Significant gaps exist in your post-harvest hygiene and storage practices. Begin with key areas such as sanitisation and temperature control.

✓ **10–18: “Developing System”** – Some good practices are in place, but consistency and monitoring need strengthening. Review where quality is most often compromised.

✓ **19–25: “Operationally Sound”** – Your systems are working well. Focus on refining procedures, documentation, and staff training for further improvement.

✓ **26–30: “Best Practice Leader”** – Outstanding. You have robust, well-documented systems in place. Maintain standards and keep adapting to seasonal and market conditions.

How did you score? \_\_\_\_\_

What areas need improvement?

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