Summary

Outlines minimum quality requirements, approximate shelf life, harvesting methods, cooling and storage conditions and post-harvest disorders and diseases for cucumber, lettuce and tomato.

Cucumber

Minimum requirements

Cucumbers should be clean, intact, firm and fresh in appearance and have a green colouring typical of the variety. They should be sufficiently developed. The cucumbers must neither be bitter nor have any off-smell and taste. They should not be appear wilted, bruised, discoloured or affected by decay or disease.

Approximate shelf life

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>3°C</td>
<td>3</td>
</tr>
<tr>
<td>6°C</td>
<td>6</td>
</tr>
<tr>
<td>9°C</td>
<td>8</td>
</tr>
<tr>
<td>12°C</td>
<td>10</td>
</tr>
<tr>
<td>20°C</td>
<td>8</td>
</tr>
</tbody>
</table>

Ideal conditions

10 to 12°C, 90 to 95 per cent relative humidity
**Recommended temperature**

10 to 14°C

**Harvesting**

Harvest cucumbers when they are smooth, shiny, dark green and tender. Size tends to be variety dependent and generally is not a good index of readiness for harvest. Harvest two to four times a week for maximum yield and high grade fruit. Yellowing and shrivelling of the skin, and the development of bitter off-flavour in some varieties indicates over maturity.

Cut or clip the fruit rather than pluck or twist it off.

**Cooling and storage**

Cucumbers are usually not pre-cooled. Temperature is usually brought down over a 24- to 48-hour period. However, cucumbers can be hydro-cooled from 24°C to about 13°C in 4°C water in about 15 minutes. The ideal storage conditions are 10 to 12°C and 90 to 95 per cent relative humidity. Below 10°C, chilling injury symptoms such as surface pitting and discolouration develop rapidly. At storage temperature above 16°C, cucumbers tend to yellow rapidly. This colour change is accelerated by mixed storage with tomato, fruits and other ethylene-producing commodities.

**Post-harvest disorders and diseases**

*Wilting.* Cucumbers quickly become flaccid and shrivelled at the blossom end unless they are under high humidity, that is, 90 per cent or higher relative humidity. Wrapping with suitable plastic film, packaging in perforated plastic bags or waxing are some methods of minimising water loss.

*Chilling injury.* Cucumbers are susceptible to chilling at temperatures below 10°C. Fruit held at 7°C or below develops surface pitting or dark-coloured, watery areas on the skin. Cucumbers can be held at lower temperatures (for example, three days at 3°C) if they are consumed immediately after removal from cold storage.

*Yellowing.* As cucumbers mature and ripen, they become yellow, which is a sign of senescence. Yellowing is accelerated by higher temperatures and the presence of ethylene gas.
**Diseases.** Post-harvest diseases of cucumbers include anthracnose, bacterial soft rot, bacterial spot and rhizopus rot.

**Lettuce**

**Minimum requirements**

Lettuce must be crisp, firm and fresh. The heads should be free from damage, insects and diseases. The head should be cut off directly below the lowest leaf.

**Approximate shelf life**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Days</th>
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</thead>
<tbody>
<tr>
<td>0°C</td>
<td>12</td>
</tr>
<tr>
<td>2°C</td>
<td>8</td>
</tr>
<tr>
<td>4°C</td>
<td>6</td>
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<tr>
<td>8°C</td>
<td>4</td>
</tr>
<tr>
<td>12°C</td>
<td>3</td>
</tr>
<tr>
<td>20°C</td>
<td>1</td>
</tr>
</tbody>
</table>

**Ideal conditions**

0°C, 95 to 100 per cent relative humidity

**Recommended temperature**

0 to 2°C

**Harvesting**

Proper maturity is important because of yield, shelf life and eating quality. Immature heads will be soft and lightweight, and shelf life will be reduced. Over-mature heads will be very compact with a tendency to split. Over-maturity usually is accompanied by elongation of the core and reduced shelf life.

Appearance alone is not sufficient to established optimum maturity for harvest, which is best judged by a combination of characteristics including size, shape, firmness, duration of growth and general appearance.
Cooling and storage

Lettuce is highly perishable and deteriorates rapidly at ambient temperatures. It should be pre-cooled to below 2°C very soon after harvest and stored at 0°C and 95 to 100 per cent relative humidity for maximum retention of quality and shelf life.

Vacuum cooling is the preferred method of pre-cooling. Air circulation around pre-cooled lettuce is important. Stack cartons to attain maximum circulation.

Post-harvest disorders and diseases

*Russet spotting* appears as small tan, brown or olive spots randomly distributed over affected leaves. When severe, these spots may join and form irregular discoloured areas. Russet spotting develops after exposure to ethylene gas.

*Tipburn* is due to unfavourable, that is, hot, growing conditions near maturity.

*Marginal browning* is caused by hot and dry growing conditions.

*Pink rib* is due to over maturity.

Common post-harvest *diseases* include bacterial soft rot, grey mould, downy mildew and watery soft rot. Bacterial soft rot is the most severe disease in transit and storage. It is much less serious at 0°C than at higher temperatures.

Tomato

Minimum requirements

Tomatoes should be intact, fresh and sound. They should be clean, free from foreign matter, off-smell or taste. Tomatoes should be firm, without spots, cracks, bruises or chilling injury (which could result in a glassy appearance). They should be regular in shape and colour typical of the variety.
Approximate shelf life

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>8°C</td>
<td>3</td>
</tr>
<tr>
<td>10°C</td>
<td>8</td>
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<tr>
<td>12°C</td>
<td>10</td>
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<tr>
<td>14°C</td>
<td>13</td>
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<tr>
<td>18°C</td>
<td>10</td>
</tr>
<tr>
<td>20°C</td>
<td>8</td>
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</tbody>
</table>

Ideal conditions

Mature green 12 to 16°C, 90 to 95 per cent relative humidity
Firm ripe 6 to 8°C, 90 to 95 per cent relative humidity

Recommended temperature

Mature green 12 to 18°C
Firm ripe 6 to 10°C

Harvesting

A typical mature green tomato will have jelly-like flesh in all locules. Its seeds are sufficiently developed. External indicators of fruit maturity are position on the plant, size, shape, and surface (waxy gloss or sheen). Use a combination of these factors to determine when tomatoes are ready to be harvested. Delaying harvest until a small percentage of fruits start to show colour in the field helps to insure that green fruits are fully mature.

Cooling and storage

Pre-cooling to about 10°C will be necessary for tomatoes of advanced maturity. Tomatoes are adversely affected by exposure to low temperatures. Unripe tomatoes are susceptible to chilling injury below 10°C. Low temperature exposure also adversely affects the development of flavour and colour.

Post-harvest disorders and diseases

Chilling injury. The less ripe a tomato, the more susceptible it is to chilling injury. Mature green fruit will be injured by
temperatures below 12°C. Ripe fruit will be injured at temperatures below 5°C. Chilling injury in tomatoes is characterised by delayed and blotchy colouration and greater susceptibility to decay.

**Heat injury.** Temperatures above 32°C will cause heat injury in tomatoes, which is characterised by a translucent streaky appearance to the fruit.

**Bacterial soft rot (Erwinia).** Rot may occur at injuries anywhere over the surface of the fruit. Bacterial soft rot is easily recognised by the soft, mushy consistency of the affected tissues and is generally associated with a bad colour.

**Rhizopus rot.** This disease is distinguished from bacterial soft rot by the presence of coarse mould that can be seen by gently pulling apart the diseased tissue. Under humid conditions, the mould may grow out over the lesion.

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**Further reading**

- Farmnote No. 44/94 'Post-harvest handling of Brassica vegetables' (Agdex 254/56).
- Farmnote No. 3/96 'Mixed storage of fruit and vegetables' (Agdex 201/60).

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