





# Harvest

Peanuts are an indeterminate crop, which means that from about 4 weeks onwards, the crop will continue with both flowering and vegetative growth. Commonly, the crop is still flowering at harvest. Because the crop does not mature evenly, it can be difficult to determine the best time to dig.

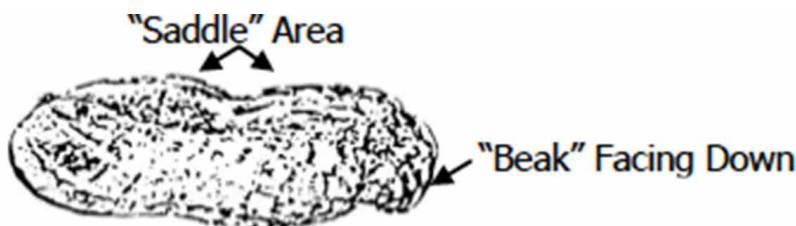
If the crop is dug too early, significant weight and quality loss may occur because the pods have not properly filled out. If it is dug too late, the peanuts may be over-ripe and often the largest and best pods are left in the soil during digging.<sup>1</sup>

## 12.1 Hull scrape test

The most common method for determining crop maturity is called the hull scrape test. This involves taking note of colour changes under the outer skin of the shell to indicate kernel maturity.

The outer skin of the pod (exocarp) is removed, which exposes the colouring underneath. The exocarp can be removed by scraping the pod with a pocket knife or 'blasting' the pods with the stream of water from a high-pressure water cleaner. The pods are usually placed in a mesh basket while the exocarp is removed.

It is important to note the colour in the saddle area of the pod (Figure 1). This is where the colour changes first occur on the pod.



**Figure 1:** The saddle area of the pod is where colour changes first appear.

The colours that occur are:

- black: mature to over-mature
- dark brown: mature
- orange/light brown: close to mature
- yellow: immature
- white: immature to underdeveloped.

Approximately 200 pods should be scraped. This means digging carefully by hand at least six or seven representative bushes from different parts of the paddock. Excess soil should be removed (usually by washing). All pods with a diameter greater than that of a ballpoint pen (i.e. 5–8 mm) should be removed. Growers should take note of the peg strength as each pod is removed.

Pods should be placed in maturity categories as they are scraped. The colours will fade as the pods dry out, and keeping them moist will avoid this. Sometimes it is difficult to tell the difference between orange and brown. Colour charts are available for colour comparisons. Alternatively, growers can shell-out any peanuts they are unsure of and look at the inside of the shell and the kernel.

Peanuts that are mature will be dark brown inside the pod and the seed coat will be thin and tight on the kernel. With experience, growers become more adept at observing the maturity differences.

<sup>1</sup> G Wright, L Wieck, P Harden (2015) Peanut production guide, August 2015. Peanut Company of Australia, <http://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf>

Growers must consider the other factors listed below in determining when to dig, but as a general guide, the crop is ready for digging when the following maturity levels are reached:

- Virginia varieties: dig when 60–65% brown and black
- runner and ultra-early varieties: dig when 65–80% brown and black. <sup>2</sup>

## 12.2 When to dig

The crop's maturity is assessed to determine harvesting time. Harvesting is a two-part operation. First, the taproot is cut and the plant shoots and peanut pods inverted to dry partially in the field for several days before a separate threshing operation is done.

The hull scrape test should be used as a guide only for determining when to dig. Other factors will also influence the decision and must be considered together. These include:

- peg strength
- disease (bush health)
- weather conditions
- soil conditions
- area to be harvested. <sup>3</sup>

### 12.2.1 Peg strength

The peg extends from the branches of the peanut plant and it is the 'lifeline' connecting the pod, below the soil, to the rest of the bush. If the peg becomes weak and detaches from the pod, then the pod cannot be recovered during harvesting and is lost.

The main factors reducing peg strength include:

- over-maturity
- foliar disease
- soil-borne disease.

To test peg strength, carefully dig several bushes from different parts of the paddock (usually when collecting the maturity sample). Shake the bushes to simulate the mechanical digging action. If a significant number (10–20%) of the pods fall off, then peg strength is declining and urgent digging needs to be considered. The hull scrape test should be done though; this may still determine the final digging date.

### 12.2.2 Disease

Sometimes it is evident that disease is spreading rapidly through the crop, and there is not sufficient time to wait for the crop to mature properly. In such situations, a decision may have to be made to dig the crop early to salvage the peanuts.

### 12.2.3 Weather conditions

Growers must take into account the expected weather conditions when determining the time to dig. For example, if prolonged wet weather is forecast, it may be better to dig a little early and have the peanuts properly inverted in a windrow, rather than still in the ground. This may be especially so if the crop is diseased.

Soil trafficability following heavy rain must also be considered.

<sup>2</sup> G Wright, L Wieck, P Harden (2015) Peanut production guide, August 2015. Peanut Company of Australia, <http://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf>

<sup>3</sup> G Wright, L Wieck, P Harden (2015) Peanut production guide, August 2015. Peanut Company of Australia, <http://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf>

### 12.2.4 Soil conditions

Growers sometimes dig based on their experience of when their soil is most friable. A soil that sets very hard when dry may make it almost impossible to avoid large losses when digging. It may be necessary to irrigate and dig such paddocks before they become too dry.

Heavy soils usually have only a 'narrow window' available in which to harvest in relation to soil moisture.

### 12.2.5 Area to be harvested

If a grower has a very large area to be harvested and the crops appear to be maturing all at once, it may be necessary to dig some paddocks earlier than the optimum in order to avoid losses resulting from the last dug peanuts being over-mature.<sup>4</sup>

## 12.3 Digging and inverting

A specially designed digger or puller is used to remove the peanuts from the soil. These machines are linkage-mounted and may come in 2-, 4- or 6-row configurations. Cutter blades are usually either attached to the digger or mid-mounted on the tractor. It is essential to keep these blades sharp and to check that they are not cutting either too deep or too shallow.

During digging, the taproot of the plant is cut just below the level of the peanuts and the soil around the pods is loosened. The bush, with pods attached, is usually carried to the back of the digger where it is then inverted. This leaves the peanuts lying in a windrow. Two rows of peanuts are normally combined into one windrow.

It is important that the peanuts are properly inverted to allow good air circulation to facilitate drying (Photo 1). If the peanuts are well inverted, they are less likely to be damaged if rain falls. It also keeps the pods up away from the soil surface for easier harvesting and a cleaner sample.

A moisture content of 12–16% is optimal for threshing. Controlled drying brings the peanuts slowly to safe storage moisture content and ensures optimum quality. Extended periods of paddock drying can cause higher losses, more splits, poorer quality and increased risk of rain damage.<sup>5</sup>

A combine or thresher is used to separate the peanuts from the bush.<sup>6</sup>

Factors influencing harvest losses:

- Soil type and soil management. Hard-setting and heavy soils are unsuitable.
- Poor late-season disease control can reduce pod quality and harvestability.
- Harvest management and timely access to harvesting equipment is critical.
- Crop maturity should be carefully assessed to optimise yield and quality.
- Kernel quality losses and aflatoxin can result from delayed threshing and drying.<sup>7</sup>

Several practices, outlined below, have been shown to reduce actinomycete growth post-harvest, and thus reduce the chance of 'off-flavour' contamination.

- When windrows remain wet from rain after cutting, fluffing is essential to improve aeration and ensure rapid dry-down of pods in order to minimise actinomycete growth on and around the pods.

<sup>4</sup> G Wright, L Wieck, P Harden (2015) Peanut production guide, August 2015. Peanut Company of Australia, <http://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf>

<sup>5</sup> Peanut Company of Australia, <http://www.pca.com.au/>

<sup>6</sup> G Wright, L Wieck, P Harden (2015) Peanut production guide, August 2015. Peanut Company of Australia, <http://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf>

<sup>7</sup> G Mills, R Rachaputi, G Wright, Y Chauhan, J Barnes (2004) Yield potential of peanuts at Mackay. What are the key barriers to obtaining it? GRDC Update Papers February 2004, <http://grdc.com.au/Research-and-Development/GRDC-Update-Papers/2004/02/Yield-potential-of-peanuts-at-Mackay-What-are-the-key-barriers-to-obtaining-it>

- Short digging-to-threshing intervals (3–5 days) can minimise the time that pod or kernel moisture is in a range suitable for actinomycete growth (i.e. >15% pod moisture). Windrows should not be left in the paddock for >5 days, because actinomycete growth on pods (and thus off-flavour contamination) is likely to occur. This is especially important in areas such as North Queensland, where post-harvest rainfall is likely.
- Thorough pre-cleaning of harvested pods removes extraneous matter including dirt, sticks, corn cobs, gherkins, immature pods and potatoes. If the product is not cleaned, build-up of extraneous materials can cause wet, hot spots and subsequent off-flavour contamination in storage bins.<sup>8</sup>



**Photo 1:** A peanut crop with well-inverted and aerated windrows allows rapid drying after wet weather at harvest.

Photo: PCA

## 12.4 Windrowing

Peanuts usually contain 40–50% moisture when dug. The peanuts are left inverted in the windrow for several days to bring the moisture content down to the optimum for threshing, which is 12–16%. This may take 3–10 days, depending on prevailing weather conditions.

Growers without access to dryers often have to let the peanuts dry down to 10% moisture in the windrow. This may take 5–14 days. The risk of damage to the crop from inclement weather increases the longer the crop remains in the paddock. Also, as the crop dries down to <12%, the pegs may become weaker and more brittle and crop losses are likely to increase.

In addition, the risk of aflatoxin contamination is much higher if the peanuts are left for more than a few days in the windrow. The best option is always to thresh early and artificially dry.

<sup>8</sup> GRDC (2013) Peanut off-flavour. GRDC Fact Sheet, [www.grdc.com.au/GRDC-FS-PeanutOffFlavour](http://www.grdc.com.au/GRDC-FS-PeanutOffFlavour)

## 12.5 Threshing

Threshers or peanut combines are designed to pick up the windrow from the paddock and separate the pods from the bush. The pods are delivered to a bin on top of the thresher while the bush is carried out of the machine and either spread over the paddock or dropped in a windrow for hay-baling. Threshers come in configurations of 2–8 rows. Most of the modern machines are imported from the USA and are attached to the draw bar and hydraulics of the tractor. AMADAS Industries and John Deere, however, have also developed self-propelled threshers in either 6- or 8-row configurations.

The ideal moisture content for threshing is 12–16%. Below 12%, threshing losses can increase from the pick-up, pods and kernels may be damaged, and the incidence of loose shell kernels (LSKs) increases.

The thresher should be checked and maintained regularly. Excessive drum speed can also result in damaged pods. In addition, fans and blowers may need appropriate adjustments.<sup>9</sup>

## 12.6 Wet harvest issues and management

Wet conditions at the time of harvest can encourage the growth of actinomycetes, and increase the chance of crop contamination. A long interval from cutting to threshing (>5 days) in combination with poorly aerated windrows, which prevent the plant and pods from drying rapidly down to safe moisture (i.e. <10% pod moisture within 2–4 days) can lead to conditions ideal for microbial growth.<sup>10</sup>

9 G Wright, L Wieck, P Harden (2015) Peanut production guide, August 2015. Peanut Company of Australia, <http://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf>.

10 GRDC (2013) Peanut off-flavour. GRDC Fact Sheet, [www.grdc.com.au/GRDC-FS-PeanutOffFlavour](http://www.grdc.com.au/GRDC-FS-PeanutOffFlavour)