# Payback Period for Strawberries Grown Under Plastic High Tunnels in Queensland

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- Information was collected on the economics of growing strawberries under high tunnels on the Sunshine Coast in Queensland
- The time taken to recover the cost of the tunnels generally varied from 3 to 10 years, depending on the annual rainfall, relative production losses, and base productivity
- The estimated pay-back period for higher-yielding crops (750g/plant) under average rainfall conditions was 4 years but under wetter conditions, it was 3 years

In the last edition of the Australian Berry Journal (Spring 2024 Pages 79-83), we compared the performance of strawberries grown under high tunnels to those grown in the open field in Palmwoods on the Queensland Sunshine Coast. Trials over two seasons demonstrated the benefits of growing under high tunnels with 24% and 38% higher marketable yields achieved compared with open-field grown strawberries. Rain damage was the primary cause of lower yields outside the tunnels, particularly in May and June when the crop is more valuable.

*This article reports on the economics of growing strawberries under high tunnels on the Sunshine Coast using the results of these trials combined with historical weather data.*

**Experimental strawberries planted under the tunnels at Palmwoods. The open-field strawberries used for comparison can be seen off to the right in the image.** Photo credit: Christopher Menzel

**Overseas, strawberries are grown under protected cropping to reduce the impacts of rain, cold weather and frosts. Most of the research has been conducted in Europe, the United States and Canada, where the emphasis is on developing strategies to extend the production season or protect the crop from extreme weather. There have been some studies in California and Florida that are relevant to production in Queensland, however, it's much drier in California than in Queensland and rain is less of an issue in Florida; they have more concerns about cold weather.**

Trials in California and Florida indicate that tunnels generally increase yields and profitability compared with plants outdoors. Higher production was associated with earlier cropping and protection from frosts and rain. There was also generally less grey mould under plastic. Differences in fruit quality under tunnels or outdoors were small, with mixed effects on fruit size, fruit appearance, levels of sugars or soluble solids and taste.

During the field trials at Palmwoods, total rainfall during harvest was 20 to 30% below the long-term average and mainly fell in the first two months of the harvests. Yield data from four cultivars (*Festival*, *Rubygem*, and two breeding lines) grown under the tunnels and outdoors over two years were collected. Marketable yields were 38% higher under the tunnels than outdoors in year one, and 24% higher in year two. The plants under the tunnels had more marketable fruit in May and June when the crop was more valuable. Average returns were 38% higher for the plants under the tunnels.

## Estimating return on investment

Information from the trials at Palmwoods was used to estimate the yield losses that could be expected under different harvest-season rainfall conditions (Table 1). Losses have been classified as moderate or severe. In years where rainfall is spread more evenly over the season, losses are classed as severe as more fruit is exposed to rain damage. Where the same total rainfall occurs over a smaller number of days the losses would be less severe (moderate).

**Table 1. Estimated yield losses (percentage) for strawberries grown outdoors under different harvest-season rainfall scenarios**

| | Very dry (<200mm) | Dry (200-300 mm) | Average (300-400 mm) | Wet (400-500 mm) | Very wet (> 500 mm) |
|---|---|---|---|---|---|
| **Moderate losses (less days with rain)** | 10% | 15% | 25% | 30% | 35% |
| **Severe Losses (more days with rain)** | 15% | 20% | 30% | 35% | 40% |

Table 2 shows the number of years it would take to pay back the initial cost of plastic high tunnels for strawberries grown on the Sunshine Coast. The initial cost of the simple plastic tunnels in 2018 was $115,000/ha and calculations were based on replacing the plastic every six years. The price for fruit in 2018 was $1.50/punnet. The additional costs of picking and packing the extra crop under the tunnels of $0.75/kg were considered in the analysis. The analysis also assumed a loss of 15% of the planting area due to the structure of the tunnels. The plants under the tunnels received two to three additional sprays to control powdery mildew however, these extra sprays were not considered in the economic analyses. Sprays for botrytis were calendar-based and not varied between the two growing environments.

**Table 2. Estimated pay-back period (years) of plastic high tunnels for Sunshine Coast strawberries under different rainfall scenarios**

| | | Very dry | Dry | Average | Wet | Very wet | *Weighted mean** |
|---|---|---|---|---|---|---|---|
| **Average yield (500 g/plant)** | **Moderate losses** | 15 | 10 | 6 | 5 | 4 | ***7*** |
| | **Severe losses** | 10 | 8 | 5 | 4 | 4 | ***6*** |
| **Above average yields (750 g/plant)** | **Moderate losses** | 10 | 7 | 4 | 3 | 3 | ***5*** |
| | **Severe losses** | 7 | 5 | 3 | 3 | 3 | ***4*** |

* Weighted means were estimated using the historical harvest-season rainfall totals over the last 61 years at Palmwoods.

**Historical harvest-season rainfall records at the Palmwoods site over the past 61 years:**

- **8 years** (13% of years) were very dry (< 200 mm)
- **9 years** (15%) were dry (200-300 mm)
- **21 years** (34%) were average (300-400 mm)
- **9 years** (15%) were wet (400-500 mm)
- **14 years** (23%) were very wet (> 500 mm).

## Implications for commercial producers

The time taken to recover the cost of the tunnels varied mostly from 3 to 10 years, depending on the annual rainfall, relative production losses, and base productivity. The estimated pay-back period for higher-yielding crops (750g/plant) under average rainfall conditions was 4 years; under wetter conditions, it was 3 years.

This analysis relates to the productivity of plants growing at Palmwoods. It is not known if the response of berries growing in other commercial fields would be the same as the response of plants in this study. Yields can be lower under tunnels if temperatures build up during warm, sunny days. New tunnels have more sophisticated ventilation, which allows the temperatures to stay in the optimum range for the berry plants. The life of the tunnels varies with the type of plastic used, the growing environment and whether the plastic is stored over summer. Light transmission is about 90% when the plastic is new and decreases by a few percent each year. The tunnels are susceptible to damage by strong winds that occur during storms in the area. The actual risks from extreme weather will depend on the type of tunnel, bracing, general engineering and the individual growing area.

Queensland Government

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