

Hot + bothered



The reasons behind the poor Japanese plum harvest.
By Anna Mouton

Add the Japanese plum harvest to the list of disappointments for this year. At least fifteen percent fewer cartons were exported than anticipated given the potential production. Several factors conspired to reduce yields but one that stands out is poor fruit set.

“I asked one of the farm managers how their Angeleno harvest was,” recalls Prof. Wiehann Steyn, assistant general manager at Hortgro Science. “He said he reckons he could have put the fruit from all their Angeleno orchards into one of his pockets.” Angeleno had been the second-biggest cultivar by volume exported in recent years.

Ruby Star also suffered poor fruit set — it was the seventh-biggest export cultivar last year. Angeleno and Ruby Star together accounted for about 17% of plum exports in the 2018–2019 season. That will not be the case for 2019–2020.

What went wrong? And how can we prevent it from happening again?

Spring fever

The problems with poor fruit set were most acute in warmer areas with the Boland

emerging relatively unscathed whereas the Klein Karoo suffered significant losses.

Temperature data for the Robertson area show that the 2019 spring was a sizzler. The first day with temperatures above 30 °Celsius was 21 August — in 2018 it was a whole month later on 24 September. On 8 September 2019 the temperature reached 35.5 °Celsius and on 26 September 2019 it reached 37.8 °Celsius.

In addition to these peak temperatures, there were also several heat waves characterised by more than two successive days of unusually high temperatures.

Most experts believe that high temperatures coupled with low humidity during flowering was the primary cause of poor fruit set. Low humidity affects pollination by drying out pollen and stigmas. High temperatures narrow the window for fertilisation by reducing the viability of ovules.

Prof. Karen Theron holds the Chair in Applied Preharvest Deciduous Fruit Research at Stellenbosch University. She expects that the lifespan of ovules will start to deteriorate as temperatures rise above 25 °Celsius. High temperatures also impact pollen germination.

Theron explains that a heat wave just before full bloom can be equally damaging. “Some of the most important differentiation of a flower takes place in the two to three weeks before full bloom because that’s when the pollen and ovules are formed. Those processes are affected by temperature.”

“Some cultivars flowered, but when you took a closer look you saw that there were no female organs in those flowers,” recalls Carl Hörstmann, stone-fruit evaluator at Provar. “The ovaries were completely absent — there’s no possibility that a fruit will set from those flowers.”

Hot weather can continue to cause problems even after full bloom. Some growers reported that their trees came into

leaf at the same time as they flowered. This deprived flowers of their usual head start and fruitlets had to compete with vigorous vegetative growth in the warm days after full bloom. Strong competition increases the risk of fruitlets dropping.

A hot mess

Autumn and winter temperatures were also higher than usual in 2019. “Stress in autumn can have a negative effect on flower differentiation,” says Theron. “So drought or heat in the previous season can already reduce flower quality.”

“During a hot winter the trees burn through their reserves and may end up with insufficient reserves in spring,” adds Steyn. “The higher the temperatures, the higher the respiration rate of the trees.”

“So drought or heat in the previous season can already reduce flower quality.”

Lack of winter chill also leads to other complications. The flowering time of a specific cultivar may shift depending on its chill requirements and winter temperatures. Cultivars that usually flower at the same time could end up with no overlap after a warm winter.

“Some of the cultivars from abroad that have high chill requirements may be more likely to shift than cultivars with a low chill requirement,” clarifies Theron. This could have contributed to poor cross-pollination during the past season. Planting three

cultivars in one orchard can provide some insurance against fickle flowering.

The bee factor

Mike Allsopp is an expert on bees with the Agricultural Research Council. He believes that a lack of pollination may have been the reason for the poor fruit set of the 2019–2020 season — and that this has happened before.

“Every few years, especially in the Robertson area, growers will say that the bees won’t work on the plums. The bees are all in the mountains on the fynbos,” recalls Allsopp.

Allsopp says that both beekeepers and growers reported less bee activity on certain plum cultivars last spring. He thinks this is because the bees had access to more desirable food sources. Plum cultivars are not developed to be attractive to pollinators and some cultivars yield little nectar.

“When you have cultivars that are marginal for bees to work on, then it is not surprising that the bees stop working on them when they have other options available,” explains Allsopp. “The hot weather would also have dried out the nectar in the flowers more quickly, making the plum blossoms even less attractive.”

Flowers develop their nectaries shortly before opening. Theron points out that high temperatures prior to full bloom could have disrupted this process and led to flowers that had nothing at all to offer bees.

Other factors that could have added to the fruit-set failure include excessive use of rest-breaking agents. But not everyone who experienced poor set applied rest-breaking agents.

Steyn is confident that the heat in late winter and early spring was the primary driver of poor fruit set in the 2019–2020 season. “The long-term solution is to have cultivars that are less sensitive,” he asserts. “The adaptability of cultivars is very important. We need to start making that information available to growers.” ■■■