Macadamia industry
Interim benchmark report
2009–2017 seasons
Acknowledgements

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The Queensland Government has also co-funded the project through the Department of Agriculture and Fisheries.

Disclaimer

Results presented in this report are based on data provided by industry participants. To ensure the confidentiality of individual farm data this report includes group averages only. Figures presented are based on summary statistics using underlying data that is not included in this report.

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About the benchmarking project

Yield, quality and planting information has been collected annually from macadamia farms throughout Australia since 2009. These data are provided either directly by growers or by processors on their behalf. Each season benchmarking participants receive a personalised report that confidentially compares their individual farm performance with the average performance of similar farms based on a range of criteria including region, locality, farm size, management structure, irrigation status and tree age. These reports also highlight individual and average farm performance trends over multiple seasons.

Industry reports such as this one are produced to provide growers, consultants, investors and other stakeholders with a summary of emerging yield and quality trends across industry.
Interim report scope and coverage

This interim report on the 2017 season is based on available data collected up to December 18th, 2017. Data from a total of 178 farms was available by this date. These farms total 4837 hectares and account for almost 28% of current total industry production. This proportion is based on the Australian Macadamia Society’s estimate of 46 000 tonnes of nut-in-shell at 10% moisture content, published in December 2017. The regional breakdown of farms in the interim sample is shown in Figure 1. A final report for the 2009–2017 seasons will be distributed following collection and analysis of all remaining data from the 2017 season.

This year’s interim sample represents approximately 66% of last year’s full benchmark sample by number of farms and 48% by planted area. The size and composition of the interim sample is sufficient to provide a good cross section of farms by tree age, farm size and region.

Figure 2 compares averages for the 2017 interim benchmark sample with the long-term average for the full benchmark sample for 2009–2016 (shown in brackets). Average nut-in-shell and saleable kernel yield are for mature farms only, with an average age of 10+ years (174 farms).

Although average nut-in-shell yield for the 2017 interim sample was slightly lower than the long term average, higher than average kernel recoveries resulted in higher-than-average production of saleable kernel.
What you need to know about the data

The following rules have been applied to information presented in this interim report:

- Any results shown for the 2017 season are based on the interim sample of 178 farms. Where trends are shown over multiple seasons, results prior to 2017 are based on the full benchmark sample in each of those years.

- Averages presented for any given season or region are based on data from a minimum of ten farms. This minimum is applied to safeguard the confidentiality of individual farm data.

- All weights presented are based on the industry-standard moisture content of 10% for nut-in-shell and 1.5% for kernel.

- Plantings less than five years of age are generally excluded from estimates of bearing hectares. This is important for consistency across the benchmark sample.

- The reject kernel category values presented add up to the total reject kernel recovery percentage, rather than totalling 100%. This standard is applied across the benchmark study to ensure uniformity.

- While we try to use well recognised terms to describe kernel recovery and reject analysis categories, different processors may sometimes use different terminology to describe similar reject categories.

- Unless otherwise stated, all averages presented are unweighted. This means that all farms in the sample exert an equal influence on the average regardless of their size.

- The term farm year is used to describe data for an individual farm for a given year. A total of 2043 farm years of yield and quality data have been collected between 2009 and 2017. Unless otherwise specified, averages that span multiple seasons are derived from all available seasons.

What is included in this report?

This report summarises macadamia farm yield and quality results for the 2009–2017 production seasons. Many of the yield benchmarks presented are based on tonnes of saleable kernel per bearing hectare as this is a widely accepted measure of orchard productivity. Results are divided into the following sections:

Observations from the 2017 season

The most recent Benchmark Group meetings were held in all major production regions in August to November 2017. This section includes a preliminary summary of findings and feedback from those meetings.

Seasonal yield and quality trends

This section presents emerging yield and quality results for the 2017 season. It also compares these results with findings from previous seasons.

Regional yield and quality trends

This section provides insight into typical farm sizes and tree ages in each of the major production regions. It also identifies seasonal differences in yield and quality between each of those regions.
Observations from the 2017 season

This section contains observations and feedback on the 2017 production season. As part of the data collection process, all benchmark participants were asked to nominate the major factors affecting production on their farm in 2017, as well as the most significant pests and diseases. These issues were also discussed and similar feedback sought during Benchmark Group meetings in each of the major production regions from August to November 2017. At these meetings participants had the opportunity to discuss these and other aspects of their farm management such as nutrition and canopy management.

This section contains a summary of the responses received from 170 farms in the interim benchmark sample as well 65 responses from Benchmark Group participants (representing 87 farms). In some cases respondents nominated multiple limiting factors so the following charts show the proportion of each limiting factor relative to the total number of responses received.

Figure 3 shows the major factors nominated by benchmarking participants as limiting production in the 2017 season.

The most common factors reported as limiting production in 2017 were weather related (60%). These included hot dry conditions and lack of water through to storms, hail, floods and wet weather. Growers in some regions reported a combination of both extended dry periods followed by storms or wet weather events.

The next most commonly reported limiting factor was pests (16%), followed by impacts associated with tree or limb removal (5%), nutrition or poor soil health (4%), tree height or crowding (2%) and disease (2%). The “Other” category (7%) included erosion, biennial bearing, labour or machinery issues, stick-tights and management. Approximately 4% of respondents indicated there were no factors affecting production on their orchard in 2017.

![Figure 3: Major factors affecting production in 2017](image-url)
Participants were also asked to nominate the major pests and diseases affecting production on their farms. A total of 154 benchmark participants nominated one or more specific pests that limited production on their farm in the 2017 season. A summary of these responses is shown in Figure 4.

Fruitspotting bug was identified as the major pest affecting production in 2017 (48%), followed by Sigastus weevil (29%), rats (7%), lace bug (6%), cockatoos (3%) and flower caterpillar (2%). The “Other” category (5%) included nut borer, feral pigs, mistletoe and kernel grub.

Six percent of Benchmark Group participants reported that rats were a significant pest in their orchard in 2017. The biggest losses due to rat damage in 2017 were reported by growers in South East Queensland and the Mid North Coast of NSW.
A total of 105 benchmarking participants nominated one or more diseases that limited production on their farm in the 2017 season. A summary of these responses is shown in Figure 5.

The disease most commonly reported by participants was *Phytophthora* (48%) followed by flower diseases (29%) and husk spot (17%). Responses relating to flower diseases included *Botrytis* flower blight, dry flower and unspecified flower disease. The “Other” category (6%) included husk rot, unspecified fungi, Abnormal Vertical Growth (AVG), dieback and *Dothiorella*.

An APVMA permit has now been issued for foliar and trunk application of Phosphorous acid for the management of Phytophthora in macadamias. Always check the currency and conditions of the permit before application.

A video on how to manage Phytophthora in macadamias is now available on macSmart and the Queensland Agriculture YouTube channel. Visit [http://www.youtube.com/watch?v=znAn1TjU7xs](http://www.youtube.com/watch?v=znAn1TjU7xs).
Seasonal yield and quality trends

This section includes seasonal trends in orchard productivity and quality from 2009–2017. Averages from 2009–2016 are based on the full benchmark sample in those years while 2017 averages are based on the interim sample. This provides insight into long-term productivity and quality trends, as well as seasonal variability within the sample. Some trends provide averages for the whole benchmark sample while others also provide averages for the top and bottom 25% of that sample.

Figure 6 shows trends in the average nut-in-shell (NIS) and saleable kernel yield (SK) per bearing hectare for mature farms in the benchmark sample from 2009–2017. Average saleable kernel recovery (SKR) for all farms in the sample is also shown.

Productivity decreased slightly in 2017 following three successive seasons of increases from 2013–2016. The major factors limiting production reported by participants were weather related, including hot dry conditions as well as rain, hail, flood and storm events.

Average SKR for farms in the 2017 interim sample was higher than the long term average from 2009–2016. This increase in 2017 partially offset the reduction in NIS yield and resulted in a SK yield (0.88) that was slightly above the long term average of 0.85 tonnes per bearing hectare.

Figure 6: Average yield and kernel recovery trends 2009–2017

<table>
<thead>
<tr>
<th>Year</th>
<th>NIS yield</th>
<th>SK yield</th>
<th>SKR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>2.97</td>
<td>0.91</td>
<td>32.9%</td>
</tr>
<tr>
<td>2010</td>
<td>2.69</td>
<td>0.87</td>
<td>34.7%</td>
</tr>
<tr>
<td>2011</td>
<td>2.13</td>
<td>0.66</td>
<td>32.9%</td>
</tr>
<tr>
<td>2012</td>
<td>2.69</td>
<td>0.84</td>
<td>33.7%</td>
</tr>
<tr>
<td>2013</td>
<td>2.21</td>
<td>0.67</td>
<td>32.2%</td>
</tr>
<tr>
<td>2014</td>
<td>2.72</td>
<td>0.89</td>
<td>34.7%</td>
</tr>
<tr>
<td>2015</td>
<td>2.96</td>
<td>0.95</td>
<td>34.2%</td>
</tr>
<tr>
<td>2016</td>
<td>3.00</td>
<td>0.96</td>
<td>34.2%</td>
</tr>
<tr>
<td>2017 (interim)</td>
<td>2.65</td>
<td>0.88</td>
<td>35.3%</td>
</tr>
<tr>
<td>Average 2009–16</td>
<td>2.68</td>
<td>0.85</td>
<td>33.7%</td>
</tr>
</tbody>
</table>

Figure 6: Average yield and kernel recovery trends (whole benchmark sample 2009–16, interim sample 2017)
Figure 7 shows factory reject trends from 2009–2017. Results from 2009–2016 are based on averages of the full benchmark sample in those years and the 2017 average is based on the interim sample of 178 farms.

Approximately 15% of participants indicated that insect damage was their major limiting factor in 2017. Although insect damage levels in the interim sample were generally lower in 2017 than the previous two seasons, it remained the leading cause of factory rejects. Discolouration, brown centres and immaturity were also lower in 2017 than the previous season, while mould and germination increased slightly.
Figure 8 shows seasonal trends in average saleable kernel production per bearing hectare for the top 25%, bottom 25% and mature farms in the whole benchmark sample (2009–2016) and the interim sample (2017). Only farms with a weighted average tree age of 10 years or more are included, which equated to 174 farms in the interim sample.

Average kernel yield was slightly lower across the interim benchmark sample in 2017 (0.88) than the previous season (0.96). This change was particularly evident within the top 25% of the sample.

![Saleable kernel yield trends by percentile 2009–2017](Mature farms only)

<table>
<thead>
<tr>
<th>Year</th>
<th>Top 25%</th>
<th>All farms</th>
<th>Bottom 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1.50</td>
<td>0.91</td>
<td>0.36</td>
</tr>
<tr>
<td>2010</td>
<td>1.42</td>
<td>0.87</td>
<td>0.38</td>
</tr>
<tr>
<td>2011</td>
<td>1.13</td>
<td>0.66</td>
<td>0.26</td>
</tr>
<tr>
<td>2012</td>
<td>1.33</td>
<td>0.84</td>
<td>0.37</td>
</tr>
<tr>
<td>2013</td>
<td>1.14</td>
<td>0.67</td>
<td>0.25</td>
</tr>
<tr>
<td>2014</td>
<td>1.46</td>
<td>0.89</td>
<td>0.32</td>
</tr>
<tr>
<td>2015</td>
<td>1.53</td>
<td>0.95</td>
<td>0.39</td>
</tr>
<tr>
<td>2016</td>
<td>1.53</td>
<td>0.96</td>
<td>0.42</td>
</tr>
<tr>
<td>2017 (interim)</td>
<td>1.41</td>
<td>0.88</td>
<td>0.38</td>
</tr>
<tr>
<td>Average 2009–16</td>
<td>1.42</td>
<td>0.85</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Figure 8: Average saleable kernel yield per bearing hectare for mature farms (whole benchmark sample 2009–16, interim sample 2017)
Figure 9 shows seasonal trends in average saleable kernel recovery (SKR) for the top 25%, bottom 25% and all farms in the whole benchmark sample for 2009–2016 and the interim sample for 2017. In 2017 average SKR increased to its highest average level since benchmarking began in 2009. This increase was evident across all quartiles in the interim sample.

Approximately 60% of participants in the interim benchmark sample indicated weather events were the main limitation affecting production in their orchards in 2017. These included hot dry conditions and lack of water through to storms, hail, floods and wet weather.
Figure 10 shows seasonal trends in average reject kernel recovery (RKR). These include the top 25%, bottom 25% and all farms in the whole benchmark sample for 2009–2016 and the interim sample for 2017.

Average RKR decreased in 2017 compared with the previous season. This was particularly evident in the bottom 25% of the sample (top line) in which average RKR was 1% lower in 2017.

![Reject kernel recovery trends by percentile 2009–2017](chart)

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Top 25%</strong></td>
<td>1.15%</td>
<td>0.99%</td>
<td>1.39%</td>
<td>0.97%</td>
<td>1.55%</td>
<td>1.22%</td>
<td>1.02%</td>
<td>1.17%</td>
<td>0.98%</td>
<td>1.15%</td>
</tr>
<tr>
<td><strong>All farms</strong></td>
<td>2.83%</td>
<td>2.60%</td>
<td>3.05%</td>
<td>2.28%</td>
<td>3.39%</td>
<td>2.77%</td>
<td>2.43%</td>
<td>2.75%</td>
<td>2.15%</td>
<td>2.76%</td>
</tr>
<tr>
<td><strong>Bottom 25%</strong></td>
<td>5.15%</td>
<td>4.93%</td>
<td>5.32%</td>
<td>3.95%</td>
<td>6.07%</td>
<td>4.95%</td>
<td>4.37%</td>
<td>4.86%</td>
<td>3.86%</td>
<td>4.99%</td>
</tr>
</tbody>
</table>

Figure 10: Average reject kernel recovery by season (whole benchmark sample 2009–16, interim sample 2017)
Regional yield and quality trends

This section provides analyses similar to those in the previous seasonal trends section for each of the major production regions in Australia. These provide insight into long-term productivity, quality and seasonal variability within each region.

Figure 11 shows information about the farms from each of the major production regions in the 2017 interim benchmark sample. This includes the number of participating farms and average farm size, tree age, saleable kernel productivity and saleable kernel recovery.

![Diagram showing participating farms by region in the 2017 interim sample]

- **Central Queensland**
  - 28 farms
  - Average bearing ha = 60.7 ha
  - Average tree age = 13 years
  - Average saleable kernel = 1.0 t/ha
  - Average Saleable KR = 35.3%

- **South East Queensland**
  - 45 farms
  - Average bearing ha = 21.8 ha
  - Average tree age = 22 years
  - Average saleable kernel = 0.7 t/ha
  - Average Saleable KR = 34.5%

- **Northern Rivers**
  - 91 farms
  - Average bearing ha = 20.5 ha
  - Average tree age = 23 years
  - Average saleable kernel = 0.9 t/ha
  - Average Saleable KR = 35.4%

- **Mid North Coast**
  - 14 farms
  - Average bearing ha = 13.3 ha
  - Average tree age = 20 years
  - Average saleable kernel = 0.7 t/ha
  - Average Saleable KR = 36.8%
Figure 12 compares average regional nut-in-shell (NIS) yield per bearing hectare for mature farms (10 or more years old). Results for the 2017 season are based on the interim sample. Results for previous seasons are for the whole benchmark sample from those years. Averages shown are unweighted, meaning all farms exert equal influence regardless of their size.

In 2017 NIS yield in the Northern Rivers region of NSW (NRNSW) was consistent with the previous season but declined in all other regions, most notably in South East Queensland (SEQ) where average NIS productivity fell by more than 1 tonne per hectare. Yield declines in 2017 in Central Queensland (CQ), SEQ and the Mid North Coast of NSW (MNNSW) followed 2016 yields that were well above the long term average for these regions.

Average NIS yield in 2017 for the interim sample was above the long term average in CQ and NRNSW but below the long term average in SEQ and MNNSW.

![Regional nut-in-shell yield trends 2009–2017](image)

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>CQ</td>
<td>3.59</td>
<td>2.72</td>
<td>2.35</td>
<td>2.80</td>
<td>2.29</td>
<td>2.26</td>
<td>3.14</td>
<td>3.41</td>
<td>3.07</td>
<td>2.83</td>
</tr>
<tr>
<td>SEQ</td>
<td>3.19</td>
<td>2.62</td>
<td>2.91</td>
<td>3.02</td>
<td>1.81</td>
<td>2.45</td>
<td>2.58</td>
<td>3.42</td>
<td>2.30</td>
<td>2.74</td>
</tr>
<tr>
<td>NRNSW</td>
<td>3.09</td>
<td>2.66</td>
<td>1.88</td>
<td>2.71</td>
<td>2.37</td>
<td>2.88</td>
<td>3.15</td>
<td>2.79</td>
<td>2.79</td>
<td>2.71</td>
</tr>
<tr>
<td>MNNSW</td>
<td>1.36</td>
<td>2.83</td>
<td>1.67</td>
<td>2.03</td>
<td>1.85</td>
<td>2.74</td>
<td>2.26</td>
<td>2.84</td>
<td>2.02</td>
<td>2.23</td>
</tr>
<tr>
<td>All regions</td>
<td>2.97</td>
<td>2.69</td>
<td>2.13</td>
<td>2.69</td>
<td>2.21</td>
<td>2.72</td>
<td>2.96</td>
<td>3.00</td>
<td>2.65</td>
<td>2.68</td>
</tr>
</tbody>
</table>

Figure 12: Average regional nut-in-shell yields per bearing hectare (whole benchmark sample 2009–16, interim sample 2017)
Figure 13 shows regional trends in average saleable kernel production per bearing hectare for mature farms in the whole benchmark sample (2009–2016) and the interim sample (2017). In this case mature farms includes those with an average tree age of 10 or more years.

Average saleable kernel production generally followed a similar trend to NIS production, with all regions other than NRNSW experiencing a drop in 2017. The 2017 increase in saleable kernel yield in NRNSW was due to consistent NIS production combined with increased average saleable kernel recovery. As with NIS yield, saleable kernel production in 2017 for the interim sample was above the long term average in CQ and NRNSW but below the long term average in SEQ and MNNSW.

Northern Rivers NSW was the only region in the 2017 interim benchmark sample that maintained average nut-in-shell productivity similar to the 2016 season. In 2017 saleable kernel production increased among participating farms in this region due to an increase in saleable kernel recovery.
Figure 14 compares average saleable kernel recovery (SKR) for all farms participating in major production regions from 2009–2017. SKR includes both premium and commercial grade kernel. Results shown for the 2017 season are based on the interim sample of 178 farms. Averages shown are unweighted, meaning all farms exert equal influence regardless of their size or production.

Average SKR in 2017 increased in SEQ, NRNSW and MNNSW, while CQ saw a slight decrease. Some growers indicated that prolonged dry weather during summer resulted in smaller nut sizes, which may have contributed to a lower average SKR on some farms. Average SKR for the interim 2017 sample was higher than the long term average in all production regions.
Figure 15 compares average reject kernel recovery (RKR) for all major production regions from 2009–2017. Results for the 2017 season are derived from the interim sample. Averages shown are unweighted, meaning all farms exert equal influence regardless of their size.

Average RKR for farms in the interim benchmark sample in 2017 was lower than 2016 in all production regions. This was primarily due to reduced insect damage in all regions other than the MNNSW. Despite this reduction, insect damage remained the most significant cause of factory rejects in all production regions in 2017. Average RKR for the interim 2017 sample was lower than the long term average in all production regions.

![Regional reject kernel recovery trends 2009–2017](chart)

<table>
<thead>
<tr>
<th>Year</th>
<th>CQ</th>
<th>SEQ</th>
<th>NRNSW</th>
<th>MNNSW</th>
<th>All regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>3.03%</td>
<td>3.07%</td>
<td>2.62%</td>
<td>3.03%</td>
<td>2.83%</td>
</tr>
<tr>
<td>2010</td>
<td>2.94%</td>
<td>2.00%</td>
<td>2.48%</td>
<td>3.81%</td>
<td>2.60%</td>
</tr>
<tr>
<td>2011</td>
<td>2.89%</td>
<td>2.57%</td>
<td>3.38%</td>
<td>2.71%</td>
<td>3.05%</td>
</tr>
<tr>
<td>2012</td>
<td>2.13%</td>
<td>1.61%</td>
<td>2.35%</td>
<td>3.6%</td>
<td>2.28%</td>
</tr>
<tr>
<td>2013</td>
<td>3.77%</td>
<td>3.56%</td>
<td>2.98%</td>
<td>4.85%</td>
<td>3.39%</td>
</tr>
<tr>
<td>2014</td>
<td>2.72%</td>
<td>3.41%</td>
<td>2.58%</td>
<td>2.71%</td>
<td>2.77%</td>
</tr>
<tr>
<td>2015</td>
<td>2.26%</td>
<td>1.76%</td>
<td>2.55%</td>
<td>4.10%</td>
<td>2.43%</td>
</tr>
<tr>
<td>2016</td>
<td>2.69%</td>
<td>2.51%</td>
<td>2.74%</td>
<td>3.49%</td>
<td>2.75%</td>
</tr>
<tr>
<td>2017 (interim)</td>
<td>2.10%</td>
<td>2.14%</td>
<td>2.04%</td>
<td>3.21%</td>
<td>2.15%</td>
</tr>
</tbody>
</table>

Average 2009–16:
- CQ: 2.78%
- SEQ: 2.55%
- NRNSW: 3.50%
- MNNSW: 2.76%
- All regions: 2.76%

Figure 15: Average regional reject kernel recovery trends (whole benchmark sample 2009–16, interim sample 2017)
Figure 16 shows regional insect damage trends for the whole benchmark sample (2009–2016) and the interim sample (2017).

In 2017 average insect damage levels were lower than those in 2016 in all regions except the MNNSW. Fruit spotting bug was reported as the major insect pest by benchmark participants in all regions. *Sigastus* weevil was also regarded as a significant pest on many farms in the NRNSW. Other reported insect pests included nutborer, mirid bug, kernel grub and *Leptocoris*.

![Figure 16: Average regional insect damage reject levels (whole benchmark sample 2009–16, interim sample 2017)](image)

**Regional insect damage trends 2009–2017**

(All farms)

<table>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CQ</strong></td>
<td>0.49%</td>
<td>0.22%</td>
<td>0.56%</td>
<td>0.60%</td>
<td>0.73%</td>
<td>0.68%</td>
<td>0.80%</td>
<td>0.98%</td>
<td>0.60%</td>
<td>0.67%</td>
</tr>
<tr>
<td><strong>SEQ</strong></td>
<td>0.65%</td>
<td>0.74%</td>
<td>1.05%</td>
<td>0.58%</td>
<td>0.86%</td>
<td>0.50%</td>
<td>0.87%</td>
<td>1.13%</td>
<td>0.72%</td>
<td>0.81%</td>
</tr>
<tr>
<td><strong>NRNSW</strong></td>
<td>0.88%</td>
<td>0.82%</td>
<td>1.08%</td>
<td>1.05%</td>
<td>0.99%</td>
<td>0.79%</td>
<td>0.85%</td>
<td>1.12%</td>
<td>0.75%</td>
<td>0.95%</td>
</tr>
<tr>
<td><strong>MNNSW</strong></td>
<td>0.96%</td>
<td>1.84%</td>
<td>0.96%</td>
<td>1.59%</td>
<td>2.50%</td>
<td>0.96%</td>
<td>2.10%</td>
<td>1.73%</td>
<td>1.77%</td>
<td>1.58%</td>
</tr>
<tr>
<td><strong>All regions</strong></td>
<td>0.81%</td>
<td>0.84%</td>
<td>1.09%</td>
<td>1.04%</td>
<td>1.15%</td>
<td>0.79%</td>
<td>0.99%</td>
<td>1.22%</td>
<td>0.79%</td>
<td>0.93%</td>
</tr>
</tbody>
</table>

*Sigastus* weevil was nominated by benchmarking participants as the second most significant pest overall during 2017 (after fruit spotting bug). This pest has so far affected only farms in the Northern Rivers region of NSW.

Orchard hygiene, monitoring, effective spray timing and adequate coverage are important for minimising the impact of this pest.
Figure 17 shows regional mould trends for the whole benchmark sample (2009–2016) and the interim sample (2017). Average mould levels in 2017 were lower for NSW farms in the interim sample compared with 2016. Average mould levels in SEQ however were twice those reported in 2016. Some Benchmark Group participants in Gympie and Bundaberg reported increased mould levels. It was suggested that at least some of this increase was due to prolonged exposure of wet nut rather than insect damage.
Figure 18 shows regional discolouration trends for the whole benchmark sample (2009–2016) and the interim sample (2017).

In 2017 average discolouration levels were lower than those in 2016 in all regions except SEQ where discolouration was significantly higher than in 2016. The reduction in discolouration levels since 2011 is largely due to the introduction of a commercial grade amongst some processors at that time.

![Regional discolouration trends 2009–2017](chart)

**Figure 18:** Average regional discolouration reject levels (whole benchmark sample 2009–16, interim sample 2017)
Figure 19 shows regional brown centres trends for the whole benchmark sample (2009–2016) and the interim sample (2017).

Average levels of brown centres in 2017 were lower for farms in the interim benchmark sample in CQ, NRNSW and MNNSW regions than 2016 levels. Some high levels of brown centres were reported early in the season in the CQ region but this was not widespread. Brown centres increased slightly in SEQ in 2017 but remained generally lower than the long term average for this region.
Figure 20 shows regional immaturity trends for the whole benchmark sample (2009–2016) and the interim sample (2017).

Immaturity was nominated as a quality issue by some Benchmark Group participants in Bundaberg, NRNSW and MNNSW in 2017. Queensland participants indicated that hot dry periods and a lack of water created challenging growing conditions. Despite this, average immaturity levels in the 2017 interim sample were lower than 2016 levels in all regions except MNNSW. Some Benchmark Group participants in MNNSW reported periods of high temperatures during oil accumulation resulting in shriveled kernel, particularly with the variety A38.

Many growers reported extended periods of hot, dry weather in December and January, particularly in Queensland. Although some growers reported the presence of smaller nuts, average immaturity levels generally remained lower than those in 2016.
Figure 21 shows regional germination trends for the whole benchmark sample (2009–2016) and the interim sample (2017).

Average germination levels in the 2017 interim sample were higher than 2016 levels all regions. The largest increase was evident in the MNNSW region where high levels of stick-tights and germination were reported. Some Benchmark Group participants suggested that the warm, dry winter followed by significant rain events and wet periods resulted in higher than average germination levels.

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Benchmark reports such as this are made possible by ongoing industry participation.

The project team would like to acknowledge the cooperation and efforts of the many growers, processors and consultants who have participated in the project and provided the data on which reports such as this are based.