Macadamia industry benchmark report

2023

Including trends since 2009

Project MC22000

Queensland Government

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Acknowledgements

This report has been produced as part of the “Macadamia industry benchmarking and sustainabilty insights 2022-27” project (MC22000). This is a joint initiative of the Department of Agriculture and Fisheries, the University of Southern Queensland, NSW Department of Primary Industries and the Queensland Alliance for Agriculture and Food Innovation.

The project has been funded by Hort Innovation, using the macadamia research and development levy and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture. 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. Figures shown are based on summary statistics using underlying data that is not included in this report.

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About the project

The benchmarking project is supporting improved productivity, profitability and sustainability within the Australian macadamia industry. The current project builds on previous benchmarking and best practice work conducted since 2001. Yield, quality and planting information has been collected annually from macadamia farms throughout Australia since 2009. This information is provided either directly by growers or by processors on their behalf. Production cost data has also been collected annually since 2013.

There are four key elements within the MC22000 benchmarking project, each of which offers different opportunities to participate and gain insight to support decision making:

Confidential farm benchmarking

All benchmarking participants receive a confidential, personalised farm benchmark report each season, comparing their individual farm performance with groups of similar farms based on a range of criteria such as region, tree age or farm size. Seasonal data collection commences in the last quarter of each calendar year, following completion of harvest. Minimum data required includes plantings (tree counts, area planted and tree ages) and consignment information (tonnes produced, kernel recoveries and factory rejects). Growers can provide their own consignment data or simply provide consent for data to be sourced from their processor(s). Optional additional data can include operating costs, seasonal limitations and resource inputs (e.g. water, electricity and fuel). Confidential benchmark reports are produced as soon as data collection is complete, typically during the first quarter of the following season.

Regional Benchmark Group meetings

Facilitated meetings are held in all major production regions each season to review and discuss findings from the previous season. All benchmarking participants who submit seasonal data are welcome to attend these meetings, which are typically run during the second quarter of each calendar year.

Industry reporting

This industry report provides all industry stakeholders with a summary of yield, quality and cost trends within the Australian macadamia industry. The report includes analysis of the previous season as well as long-term trends based on up to 15 years of data. Industry reports are published during the third quarter of every alternate calendar year.

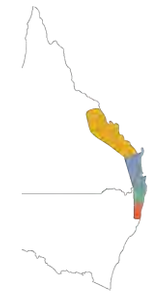
The team is also committed to providing information on request from bona-fide industry stakeholders (subject to available resources). The team typically produces many of these reports for growers, processors, investors and agencies each season. Contact the team at macman@daf.qld.gov.au for more information.

Key results from the benchmark study are also regularly published in industry media such as the AMS News Bulletin.

On-farm crop loss study

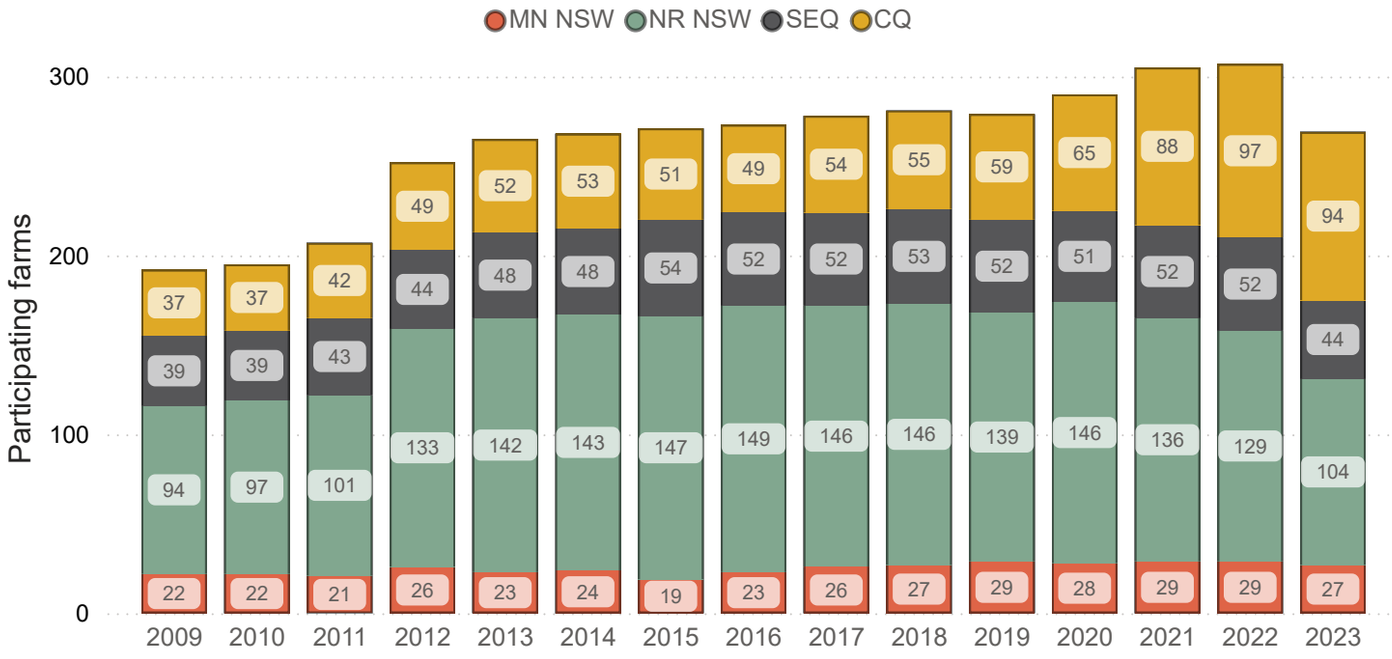
This intensive study is measuring on-farm crop loss over multiple seasons on a range of farms within major production regions. Factors being investigated include pests, diseases, harvesting, dehusking, sorting and climate. Identification and analysis of on-farm losses will provide insight into their economic significance to farm businesses and industry.

Scope and coverage



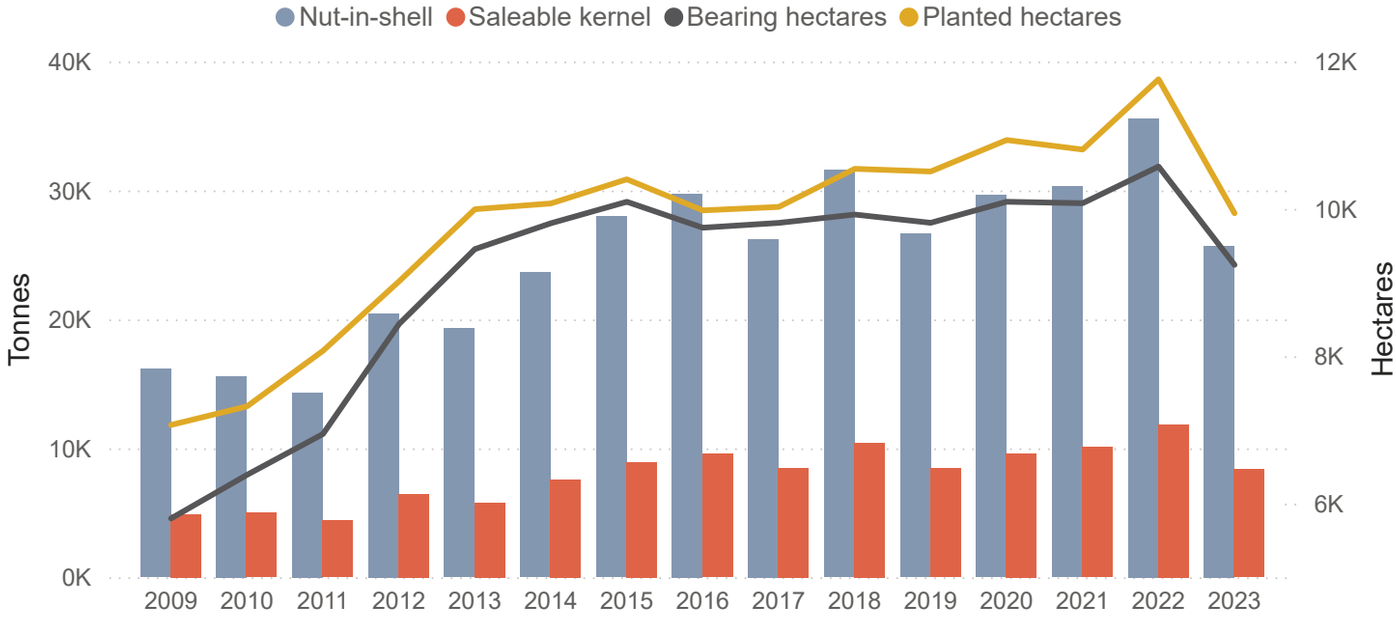
Results published in this report are based on available data collected up to April 30, 2024. A total of 269 farms covering 13,050 planted hectares submitted data for the 2023 season prior to this date. Yield and quality information was provided by 218 of these farms (9239 bearing hectares), which produced 25,705 tonnes of nut-in-shell at 10% moisture content. Cost data was provided by 79 farms, totaling 4545 planted hectares. A total of 146 farms provided resource use data for the 2023 season.

Benchmark sample participating farms

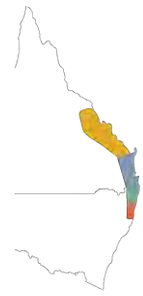


The benchmark sample represented approximately 50% of national industry production in the 2023 season, based on the Australian Macadamia Society's total crop estimate of 51,903 tonnes of NIS at 10% moisture content. This estimate is based on factory receipts of the Australian Macadamia Handlers Association (AMHA).

Benchmark sample production and plantings



Limiting factors for the 2023 season



The chart below shows the major factors limiting production in each major region during the 2023 season. These data are based on survey responses from benchmarking participants.

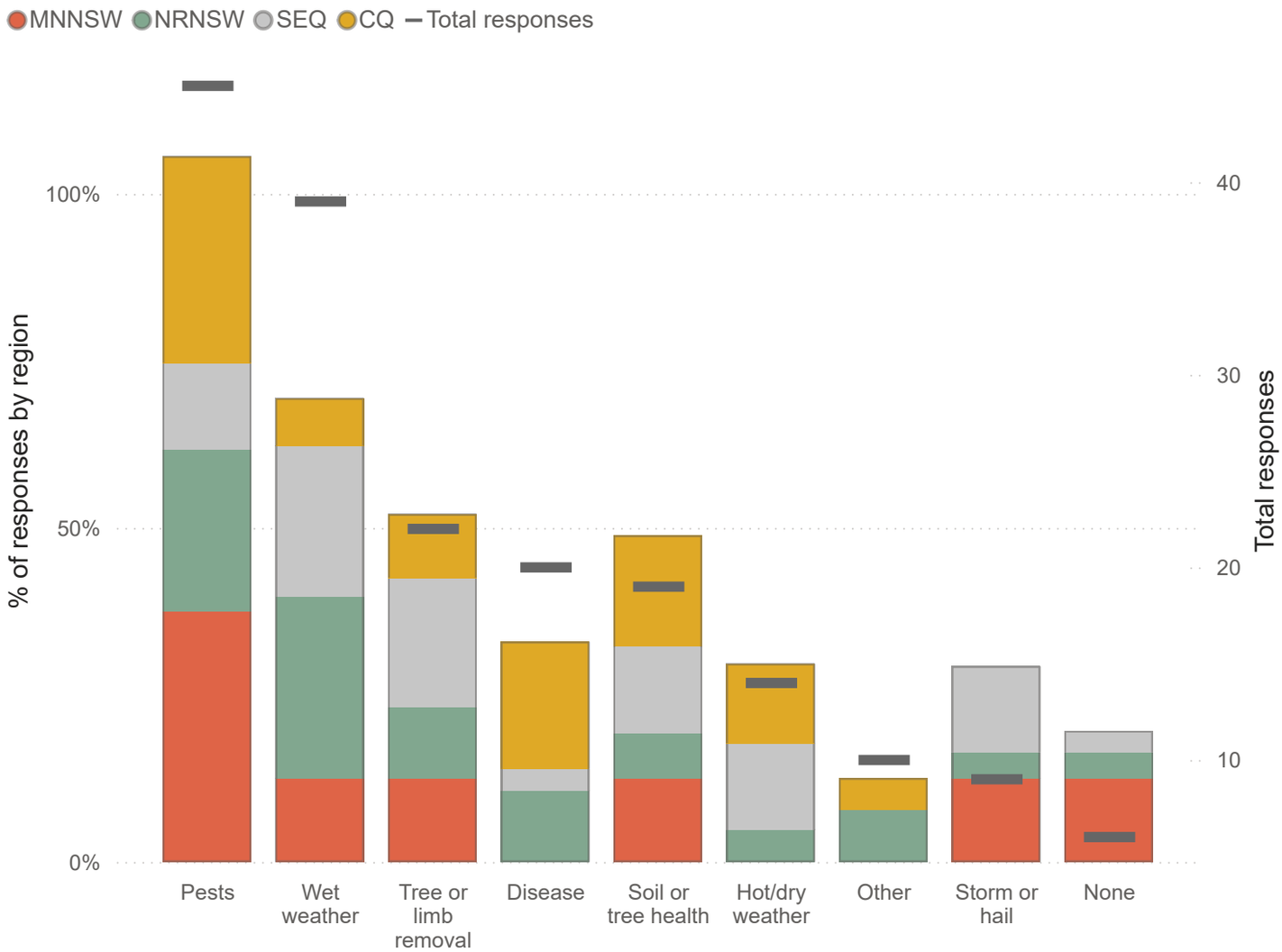
The coloured bars and left axis show the percentage of survey responses in each region for each of the limitations shown. These percentages are relative to the total number of responses for each region, rather than each limitation. The right axis shows the total number of responses received across the whole benchmark sample for each limiting factor.

Pests were the major limiting factor reported across the whole sample. A detailed breakdown of major limiting pests is shown on the following page.

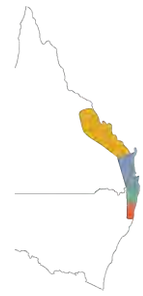
Wet weather, particularly during flowering and nut development, was the second most reported limitation for the 2023 season. Some growers indicated that the corresponding reduction in solar radiation impacted nut development, and subsequently productivity during this season.

Low NIS price was also reported as a limiting factor, accounting for over 60% of "other" limitations reported. Some farms indicated they reduced their harvesting to minimise costs given the low nut price, and in some cases growers reported that they did not harvest at all.

Factors limiting production



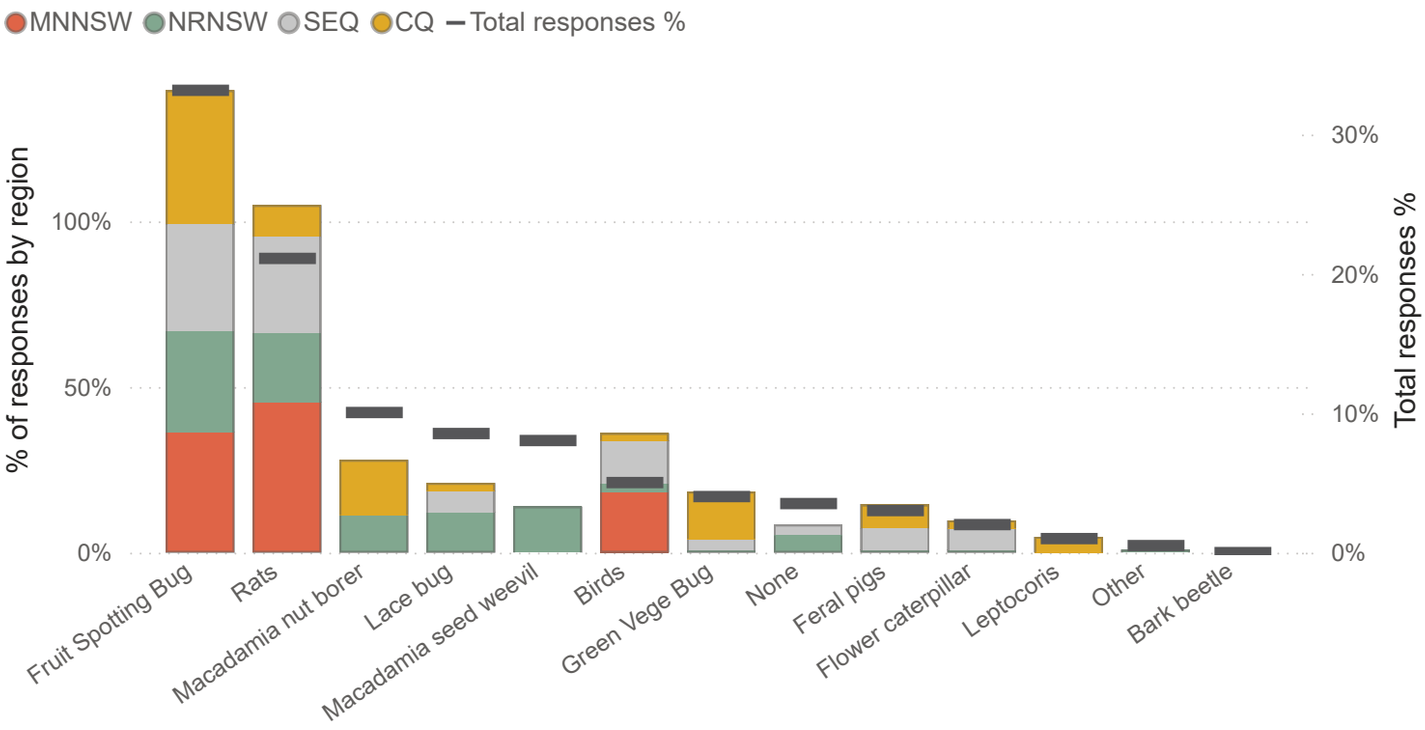
Limiting pests and diseases for the 2023 season



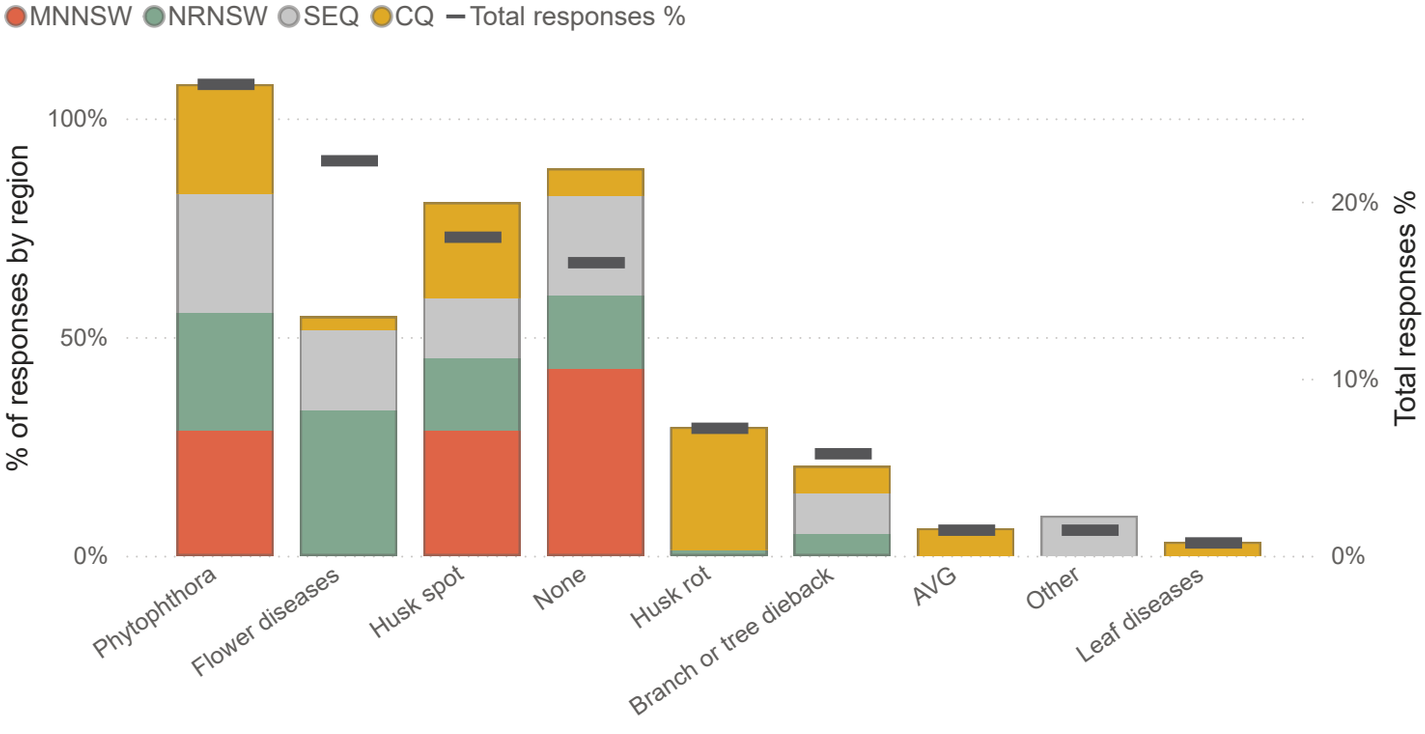
The charts below show the major pests and diseases limiting production in each major region during the 2023 season. These data are based on survey responses from benchmarking participants.

The coloured bars and left axes show the percentage of survey responses in each region for each of the limitations shown. These percentages are relative to the total number of responses for each region, rather than each limitation. The right axis shows the percentage of responses received across the whole benchmark sample for each limiting pest or disease.

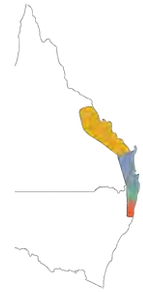
Limiting pests



Limiting diseases



Productivity trends



The table and chart below show seasonal trends in nut-in-shell and saleable kernel productivity for mature farms in the benchmark sample. Mature farms are those with a weighted average tree age of 10 or more years.

Productivity per bearing hectare

Mature farms only

Year	NIS t/ha (w)	NIS t/ha (uw)	SK t/ha (w)	SK t/ha (uw)
2009	2.95	2.96	0.88	0.91
2010	2.59	2.69	0.82	0.87
2011	2.03	2.13	0.61	0.66
2012	2.63	2.69	0.81	0.84
2013	2.16	2.21	0.63	0.67
2014	2.63	2.71	0.83	0.88
2015	2.95	2.95	0.93	0.94
2016	3.19	3.00	1.01	0.95
2017	2.74	2.60	0.88	0.85
2018	3.22	3.11	1.06	1.05
2019	2.75	2.76	0.87	0.87
2020	2.95	2.83	0.96	0.95
2021	3.06	3.00	1.02	0.98
2022	3.41	3.18	1.13	1.07
2023	2.80	2.66	0.91	0.86
Average	**2.85**	**2.79**	**0.91**	**0.90**

Both unweighted (uw) and weighted (w) averages per bearing hectare are shown in the table.

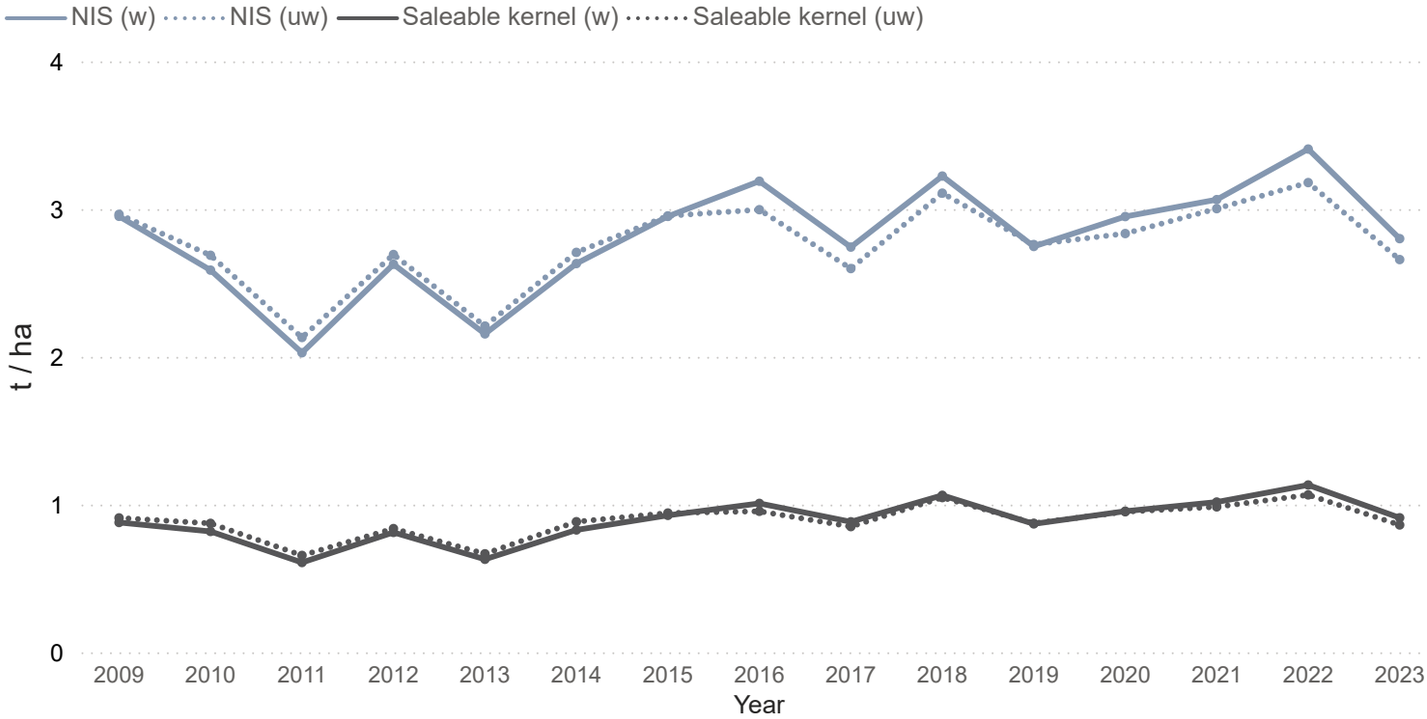
In the case of weighted averages, large producing farms exert more influence on the mean than small farms, which provides a better indication of average productivity as a whole sample.

For unweighted averages all farms exert equal influence regardless of size or production.

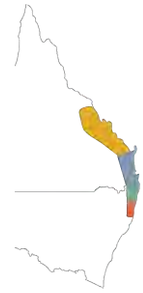
Average nut-in-shell and saleable kernel productivity were both below the long-term average in 2023. While productivity was slightly lower than the previous season in all production regions, the most significant reduction was evident in the CQ region. Some growers in that region suggested that the reduced productivity in 2023 was partly due to prolonged cloudy weather, limiting nut development.

Productivity trends per bearing hectare

Mature farms only



Productivity by tree age



The table and chart below show long-term average nut-in-shell (NIS) and saleable kernel (SK) productivity per bearing hectare for bearing farms of various age groups within the benchmark sample since 2009. Farms must have some trees aged five years or older to be considered bearing in any given year during that period.

Average saleable, premium, commercial and reject kernel recovery are also shown for each age group. The table also shows the number of farm-years (farms x seasons) in each of those age groups.

Long-term productivity by tree age

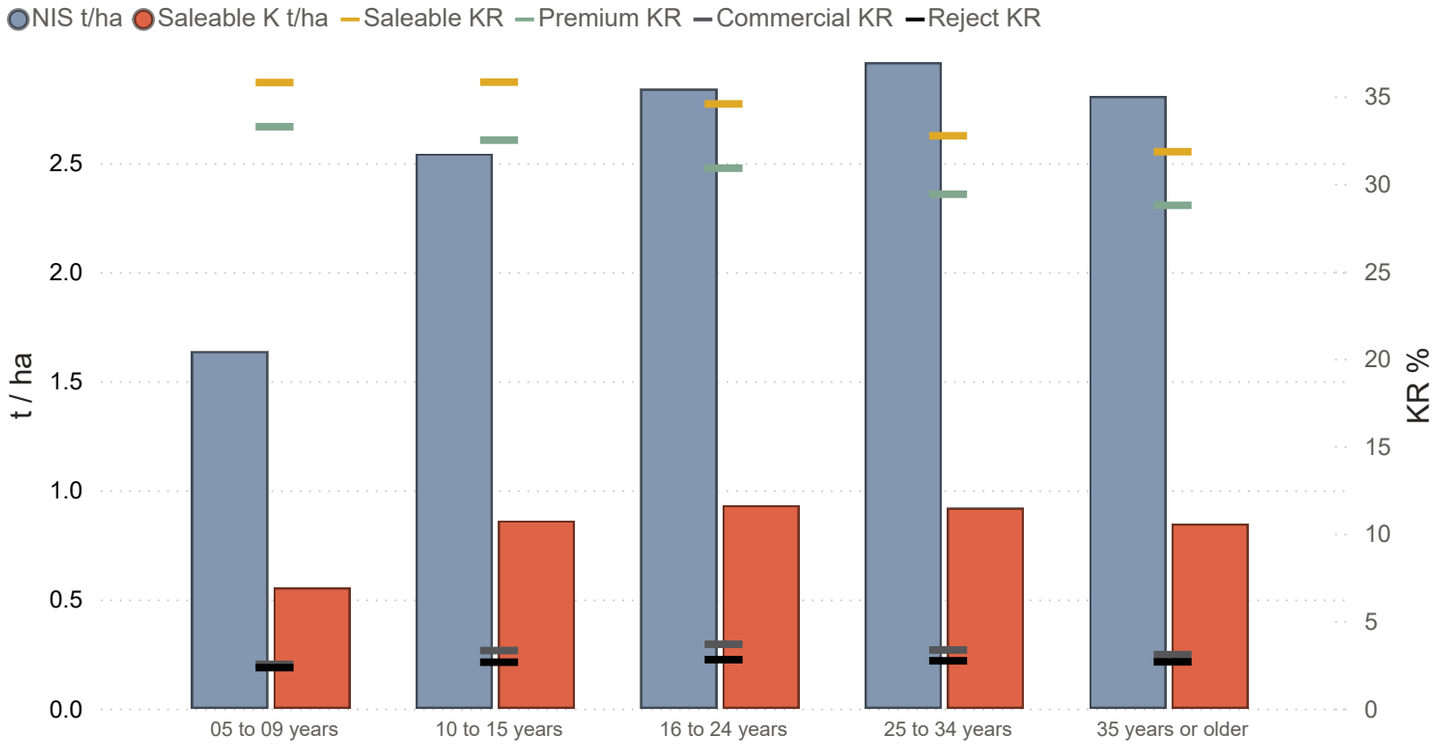
Unweighted averages for bearing farms

Age group	Average age	Bearing Ha	NIS t/ha	SK t/ha	Saleable KR	Premium KR	Commercial KR	Reject KR	Farm-years
05 to 09 years	7	56.4	1.6	0.55	35.8	33.3	2.5	2.3	345
10 to 15 years	13	47.2	2.5	0.86	35.8	32.5	3.3	2.6	775
16 to 24 years	20	31.7	2.8	0.93	34.6	30.9	3.7	2.8	1387
25 to 34 years	29	29.1	3.0	0.92	32.7	29.4	3.3	2.7	965
35 years or older	37	37.8	2.8	0.85	31.8	28.8	3.1	2.7	209
Average/total	**21**	**36.9**	**2.7**	**0.87**	**34.3**	**30.9**	**3.4**	**2.7**	**3681**

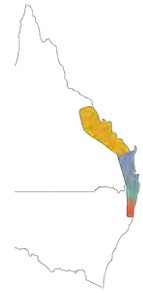
While there is a general decline productivity in farms aged 35 years or more, it is important to note that this trend varies from farm to farm and also across regions and there are many farms in this age group that have not observed yield decline. Many factors other than tree age can potentially impact productivity in older farms, including excessive tree height, crowded canopies, low light interception, and complications from lack of ground cover such as erosion and exposed roots.

Long-term productivity by tree age

Unweighted averages for bearing farms



Kernel recovery trends



The table and chart below show seasonal kernel recovery trends for all farms in the benchmark sample. These include saleable (SKR), premium (PKR), commercial (CKR) and reject kernel recovery (RKR).

Kernel recovery

All farms, weighted by bearing hectares

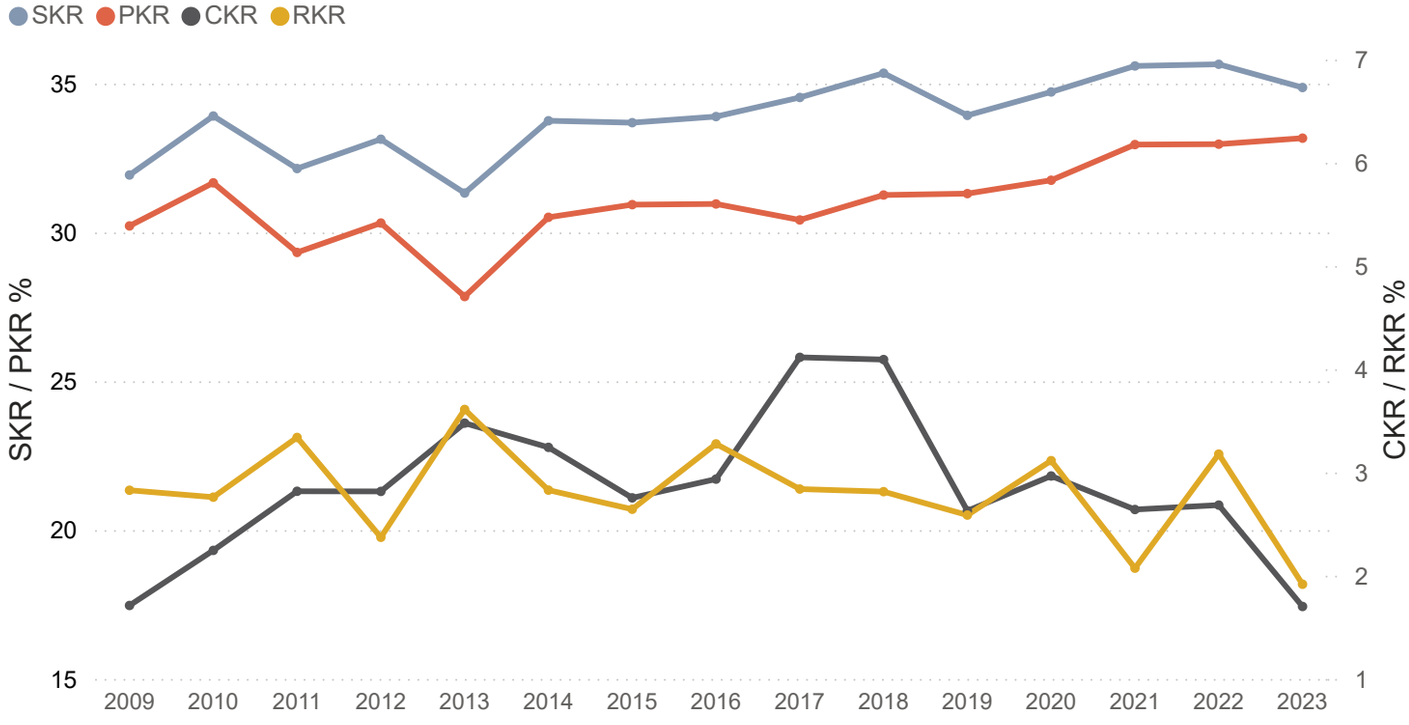
Year	Saleable KR%	Premium KR%	Commercial KR%	Reject KR%
2009	31.9	30.2	1.7	2.8
2010	33.9	31.7	2.2	2.8
2011	32.1	29.3	2.8	3.3
2012	33.1	30.3	2.8	2.4
2013	31.3	27.8	3.5	3.6
2014	33.7	30.5	3.2	2.8
2015	33.7	30.9	2.8	2.6
2016	33.9	31.0	2.9	3.3
2017	34.5	30.4	4.1	2.8
2018	35.3	31.3	4.1	2.8
2019	33.9	31.3	2.6	2.6
2020	34.7	31.8	3.0	3.1
2021	35.6	32.9	2.6	2.1
2022	35.6	33.0	2.7	3.2
2023	34.9	33.2	1.7	1.9
Average	**34.2**	**31.3**	**2.9**	**2.8**

Averages shown in the table are weighted by bearing hectares, meaning larger farms with more production exert more influence on the mean than small farms. This provides provides a better indication of average kernel recovery as a whole sample.

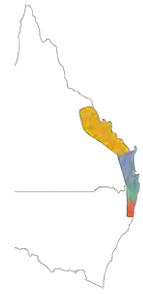
Average premium kernel recovery in 2023 was the highest recorded since benchmarking began, while commercial and reject kernel recovery were the lowest recorded. Many growers reported undertaking additional on-farm sorting to avoid recently introduced penalties imposed for high reject levels. Growers in most regions also reported dry weather during the 2023 harvest period, which also potentially contributed to lower-than-average rejects.

Kernel recovery trends

Weighted by bearing hectares



Factory reject trends



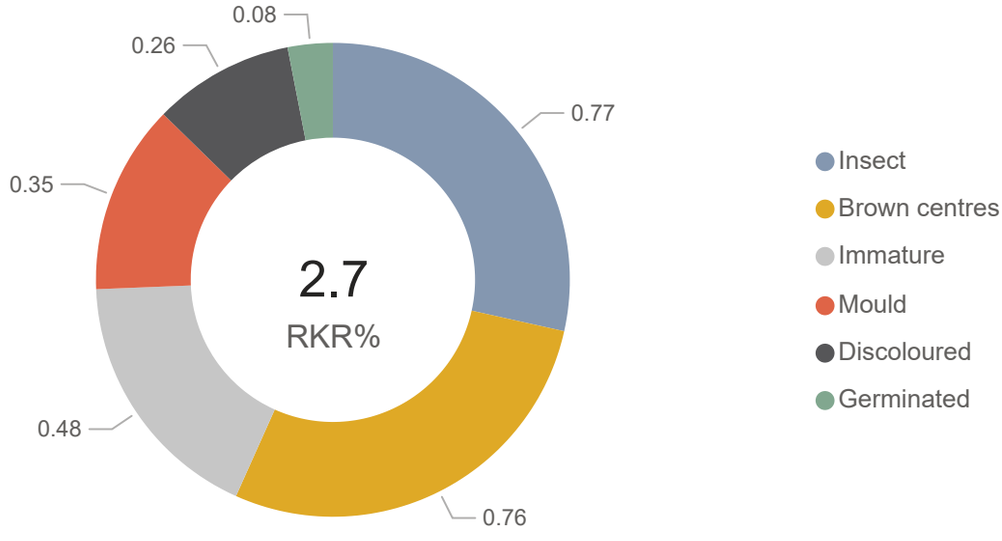
The charts below show seasonal factory reject trends for all farms in the benchmark sample. The top chart shows a breakdown of long-term average factory rejects for all seasons since 2009. The bottom chart shows seasonal trends for each major factory reject category. Averages shown are weighted by nut-in-shell production, so farms with higher production exert more influence on the mean. This provides a more representative view of typical rejects across the whole benchmark sample.

Major factory reject categories shown include insect damage, mould, discolouration, brown centres (internal discolouration), immaturity (shrivelled kernel) and germination (discoloured crest). Insect damage and brown centres account for the majority of factory reject losses in most seasons.

Rejects across all major categories were lower in 2023 compared with the previous season.

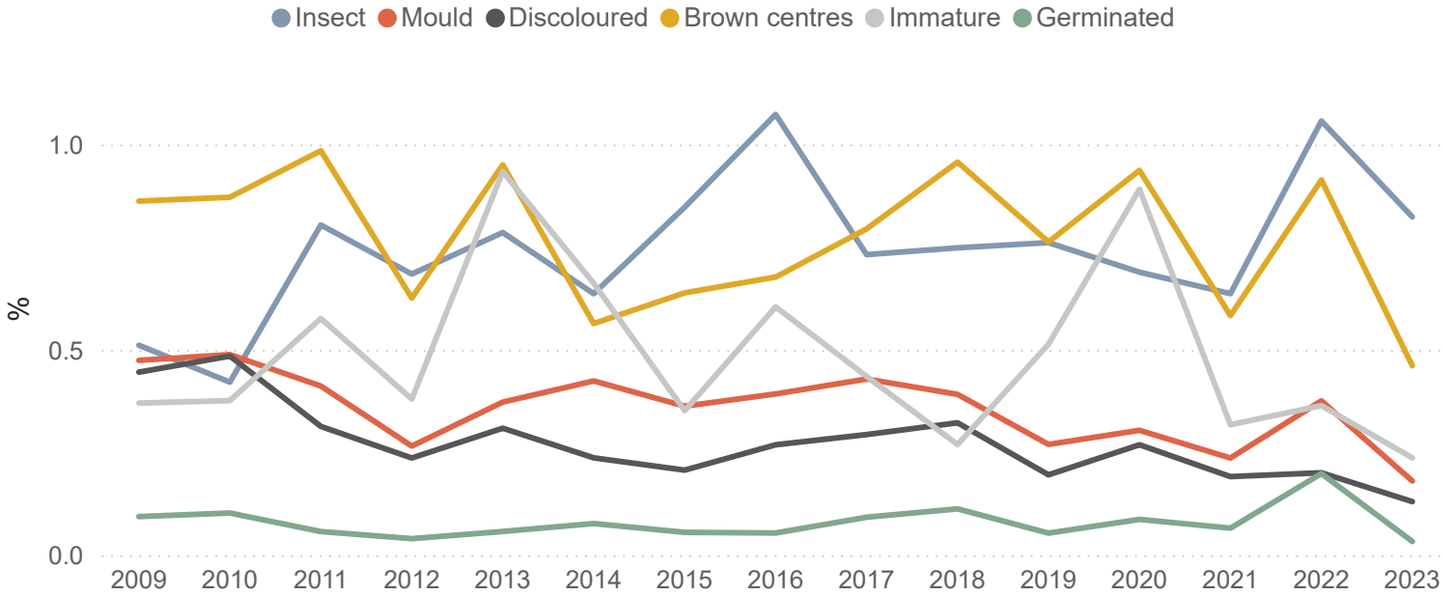
Long-term factory rejects by category

Bearing farms, weighted by NIS production

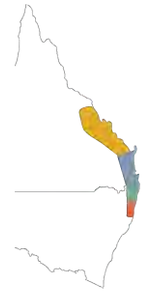


Seasonal factory rejects by category

Bearing farms, weighted by NIS production



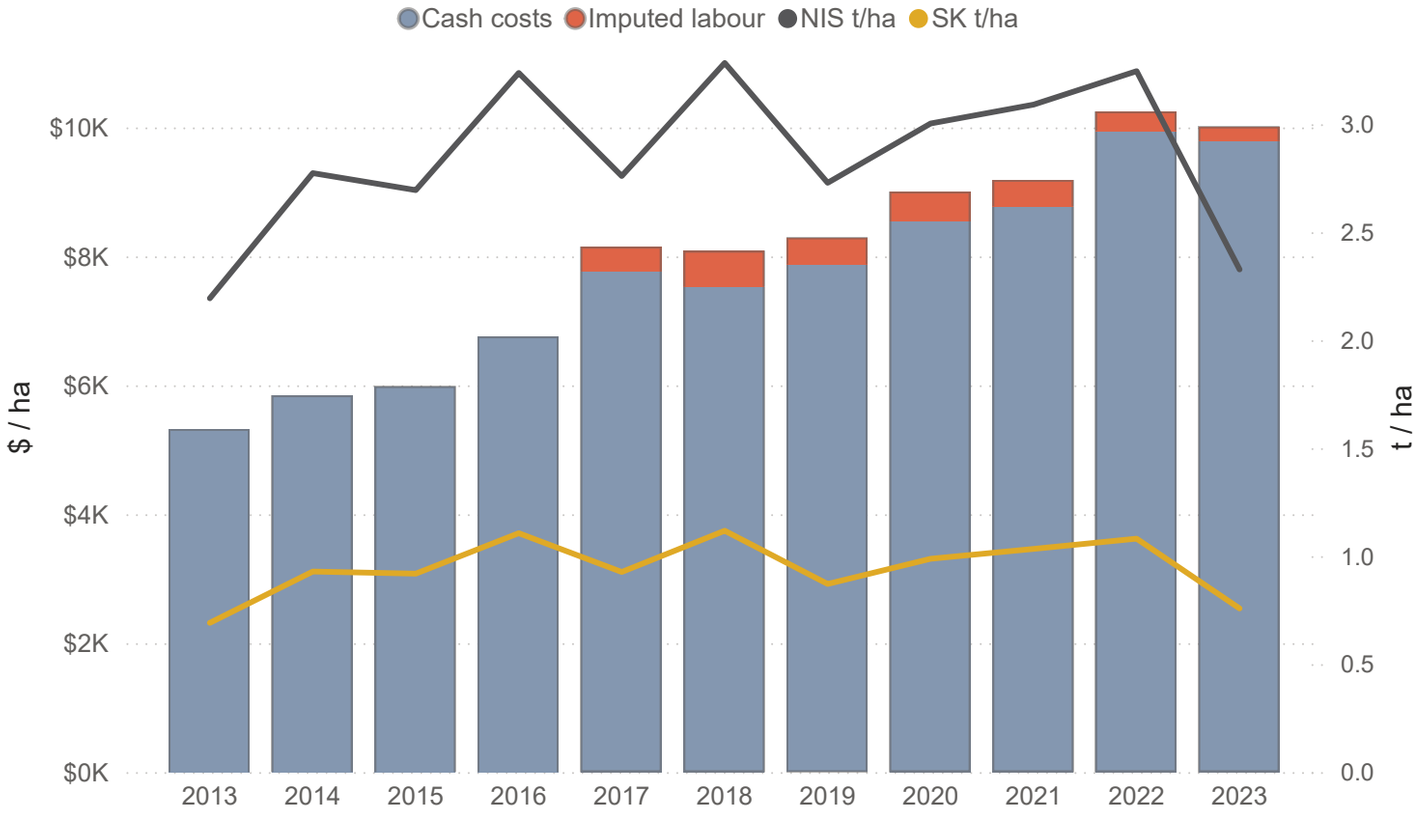
Expenditure trends per hectare



The chart below shows seasonal expenditure per planted hectare for bearing farms in the benchmark sample that provided cost data. Averages shown are weighted by planted hectares. Cash operating cost data has been collected since 2013 and unpaid labour hours have been collected since 2017. Unpaid labour hours are imputed at an hourly rate of $30, based on the Horticulture Award, to estimate an equivalent dollar value.

Seasonal average costs per planted hectare

Bearing farms only, weighted by planted hectares



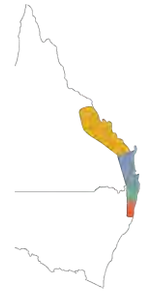
Average costs per hectare (2017 to 2023)

Bearing farms only, weighted by planted hectares

$8,688 Cash $/ha	$388 Imputed labour $/ha	$9,067 Total $/ha	$4,517 Std. deviation	586 Farm-years

Average cash operating costs per hectare have risen by almost 80% in the last 10 years and by more than 20% in the last 5 years. There was a slight reduction in average operating costs per hectare in the 2023 season. Anecdotal reports from growers suggest this was in response to reduced margins associated with the recent sharp decline in nut-in-shell price. It is important to note that the number of farms contributing cost data decreased from 85 in 2022 to 75 in for 2023, potentially accounting for some of the variation in the seasonal average in 2023.

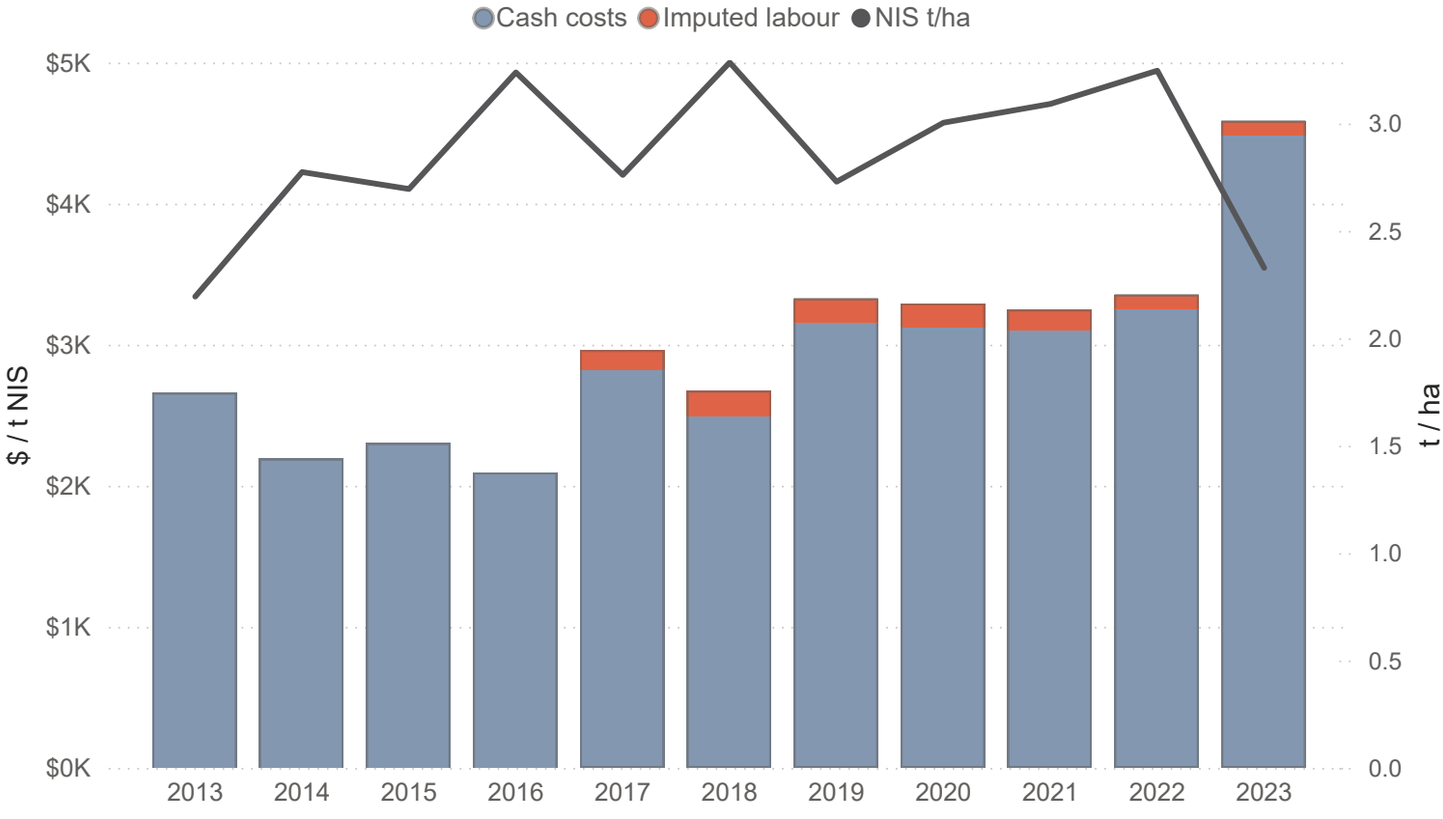
Expenditure trends per tonne of nut-in-shell



The chart below shows average seasonal expenditure per tonne of nut-in-shell for bearing farms in the benchmark sample that provided cost data since 2013. Averages shown are weighted by nut-in-shell production. Data relating to unpaid labour hours is also available from 2017, and imputed at the horticultural award rate of $30 per hour to estimate equivalent dollar values.

Seasonal average costs per tonne of nut-in-shell

Bearing farms only, weighted by NIS production

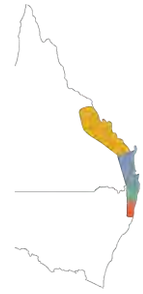


Average costs per tonne of nut-in-shell (2017 to 2023)

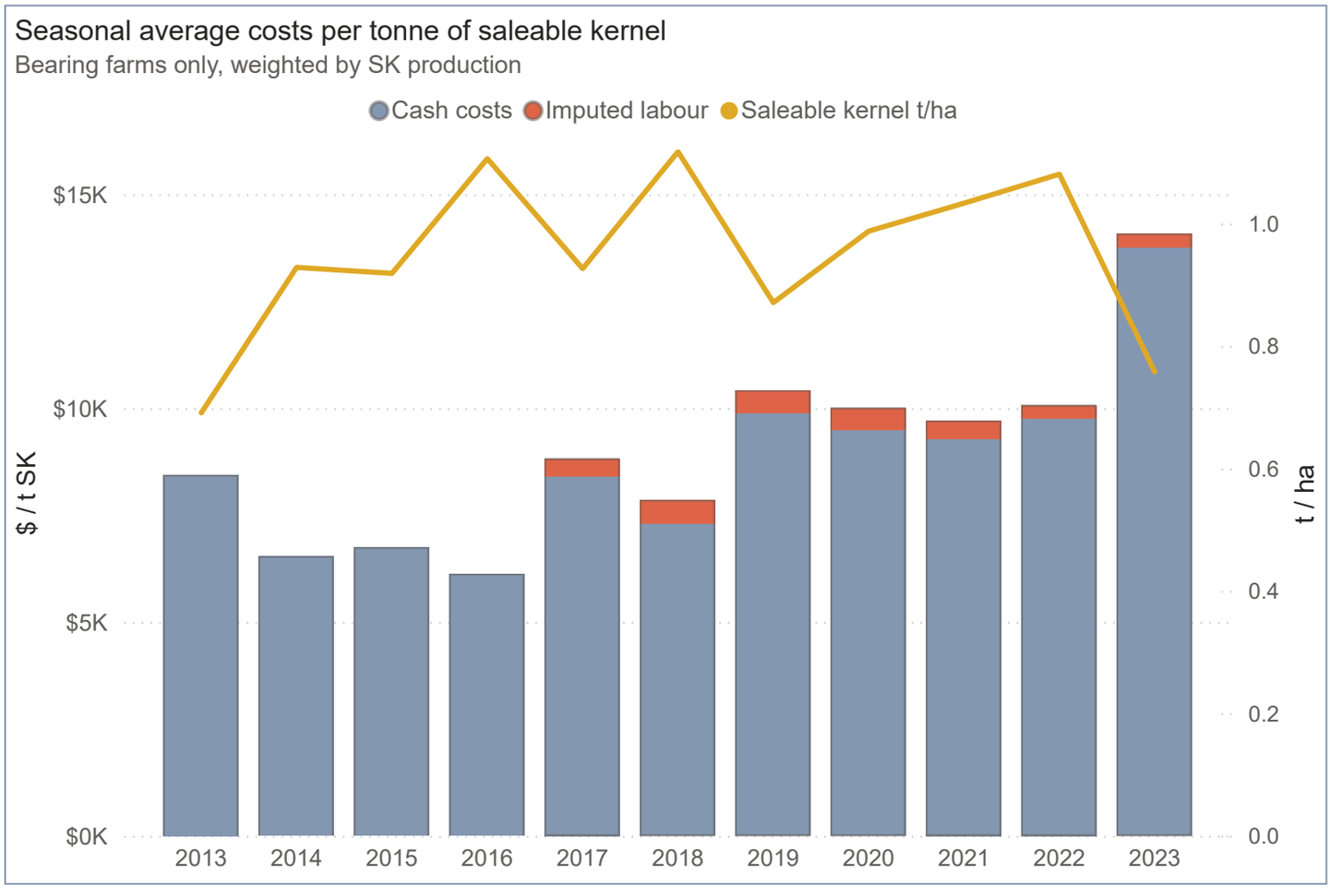
$2,978 Cash	$110 Imputed labour	$3,085 Total	773 Farm-years

Although average costs per hectare have generally increased each season, costs per tonne of nut-in-shell remained more stable from 2017 to 2022, partly due to rising average productivity. Costs per tonne of nut-in-shell increased significantly in 2023, primarily due to a 28% drop in nut-in-shell productivity for farms providing cost data that season. It is important to note that the number of farms contributing cost data decreased by almost 12% from 2022 to 2023, which also potentially accounted for some of the variation in average expenditure.

Expenditure trends per tonne of saleable kernel



The chart below shows average seasonal expenditure per tonne of saleable kernel for bearing farms in the benchmark sample that provided cost data since 2013. Averages shown are weighted by saleable kernel production. Data relating to unpaid labour hours is also available from 2017, and imputed at the horticultural award rate of $30 per hour to estimate equivalent dollar values.

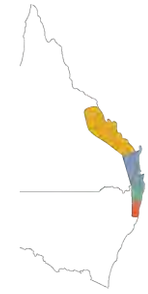


Average costs per tonne of saleable kernel (2017 to 2023)

$8,971 Cash	$330 Imputed labour	$9,293 Total	773 Farm-years

Although average costs per hectare have generally increased each season, costs per tonne of nut-in-shell remained more stable from 2017 to 2022, partly due to rising average productivity. Costs per tonne of saleable kernel increased significantly in 2023, primarily due to a 30% drop in productivity for farms that provided cost data that season. It is important to note that the number of farms contributing cost data decreased by almost 12% from 2022 to 2023, which also potentially accounted for some of the variation average expenditure.

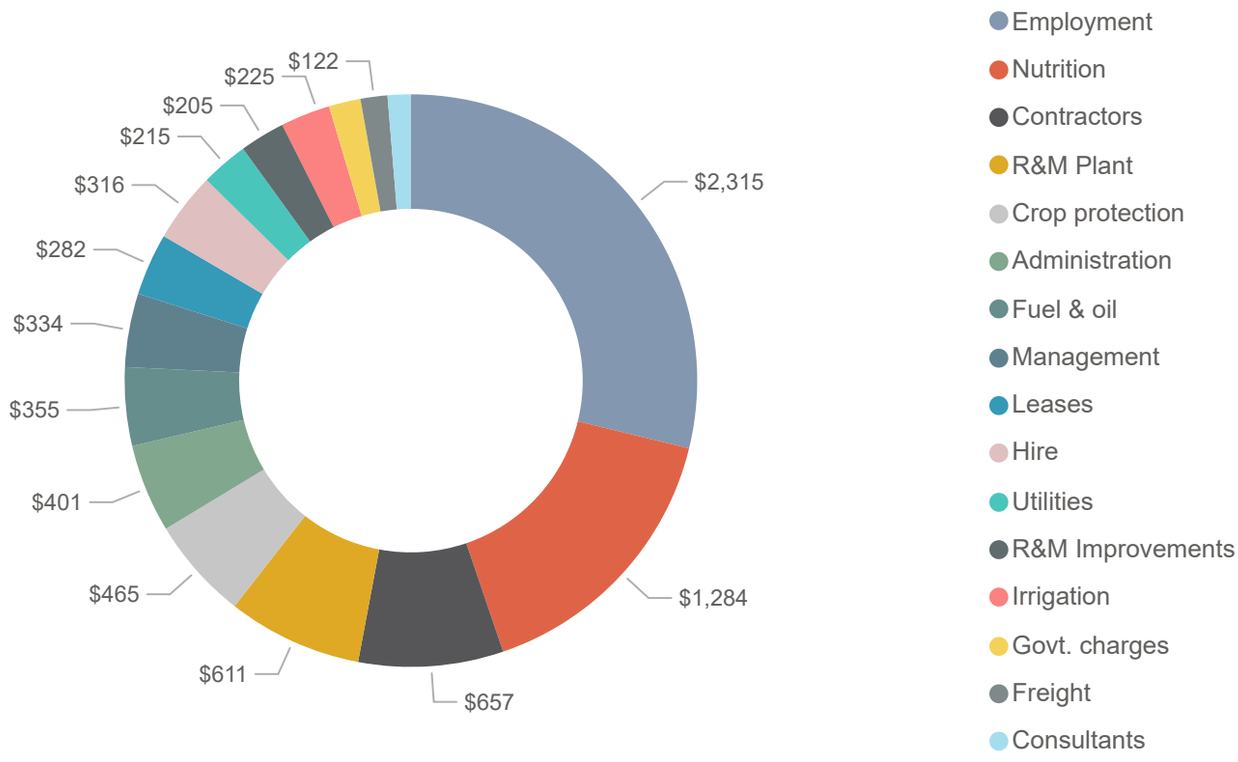
Heads of expenditure trends per hectare



The charts below show a breakdown of expenditure per bearing hectare for mature farms in the benchmark sample. The top chart shows long-term average costs for all major expense categories from 2013 to 2023. The bottom chart shows seasonal trends for the top 5 expense categories.

Long-term average expenditure per planted hectare

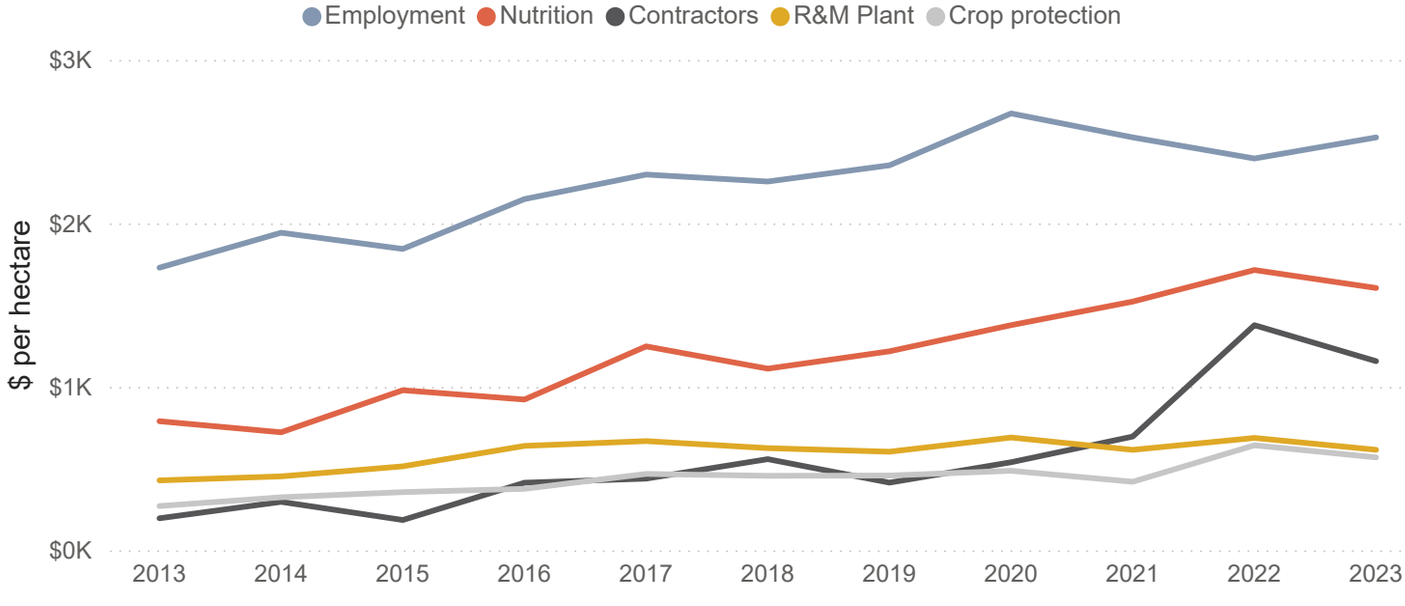
Mature farms (2013-2023)



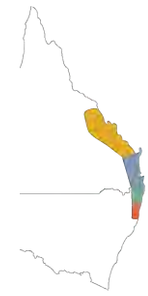
Labour is the most significant operating expense, averaging $2315 per hectare or 29% of total cash expenditure. The most significant increases over the eleven seasons shown were in employment ($1,729 to $2,672), nutrition ($722 to $1,714) and contractors ($185 to $1,377).

Seasonal trends in expenditure per hectare

Top five expense categories for mature farms



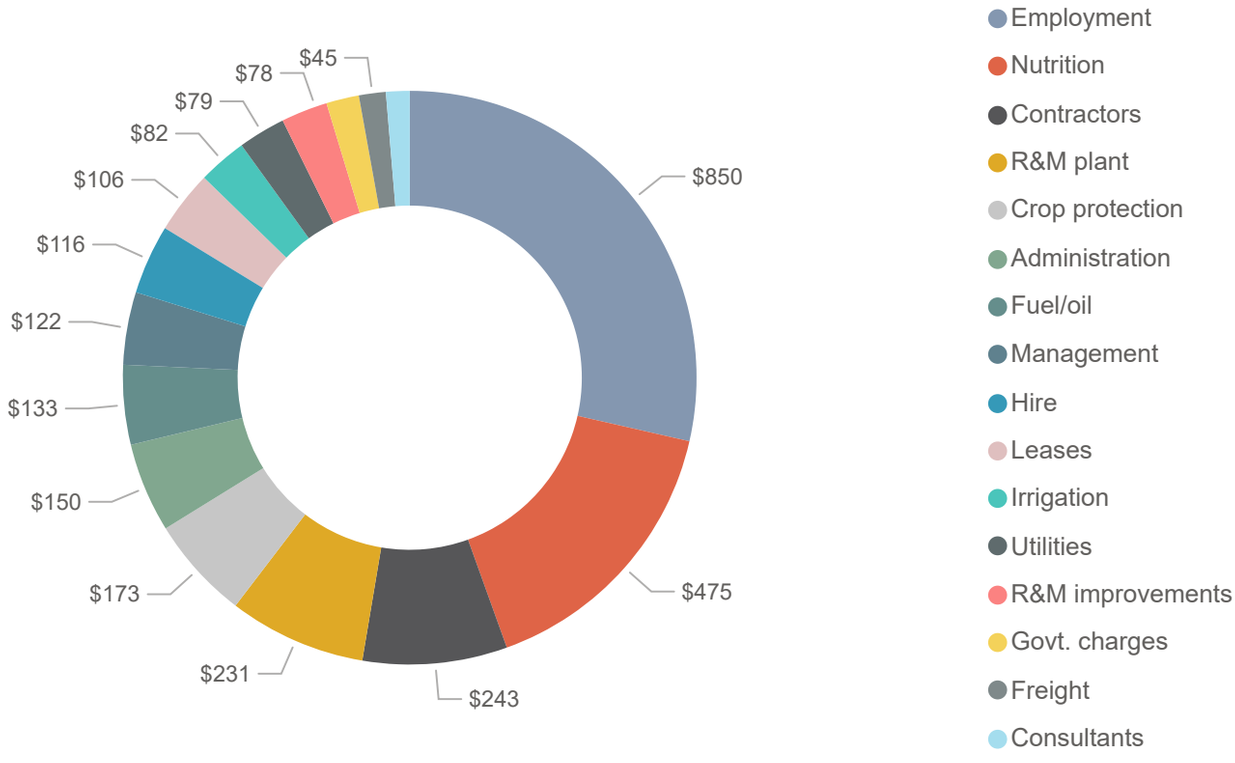
Heads of expenditure trends per tonne of saleable kernel



The charts below show a breakdown of expenditure per tonne of nut-in-shell for mature farms in the benchmark sample since 2013. The top chart shows long-term average costs for all major expense categories and the bottom chart shows seasonal trends for the top 5 expense categories.

Long-term average expenditure per tonne of nut-in-shell

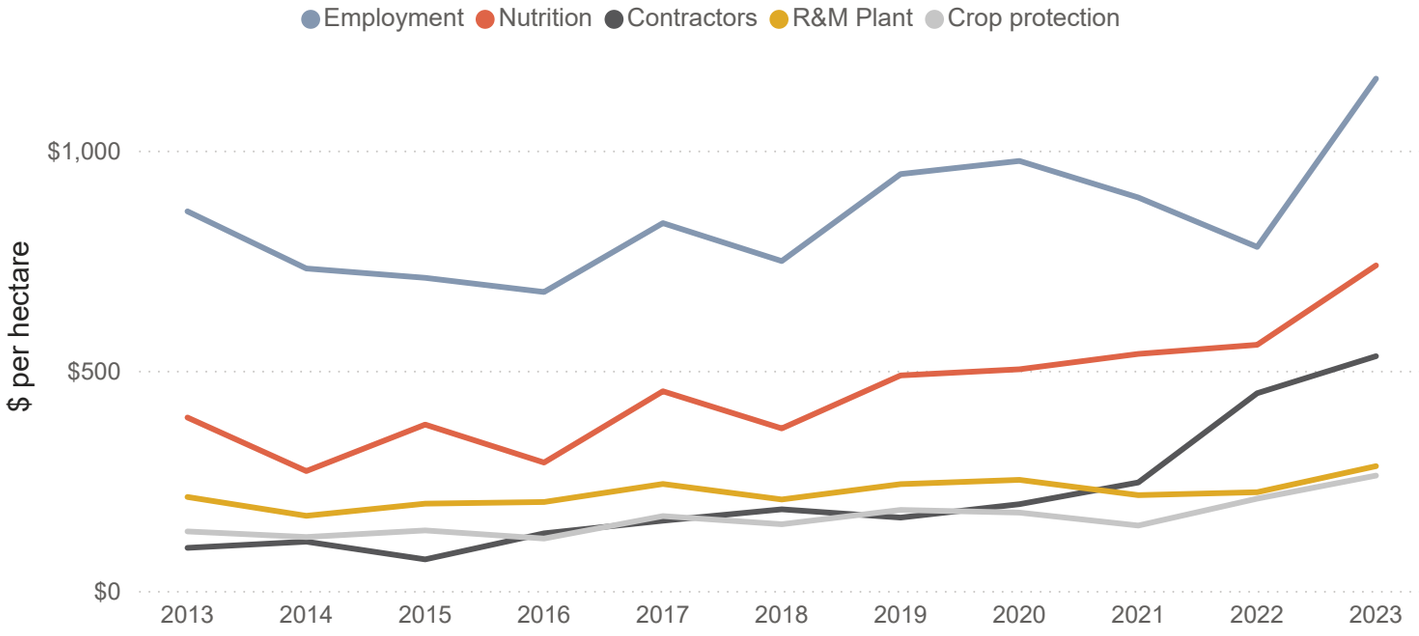
Mature farms (2013-2023)



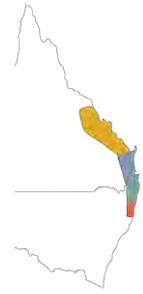
The most significant increases in expenditure per tonne of nut-in-shell over the eleven seasons shown were in employment ($679 to $1163), nutrition ($272 to $739) and contractors ($71 to $533).

Seasonal trends in expenditure per tonne of nut-in-shell

Top five expense categories for mature farms



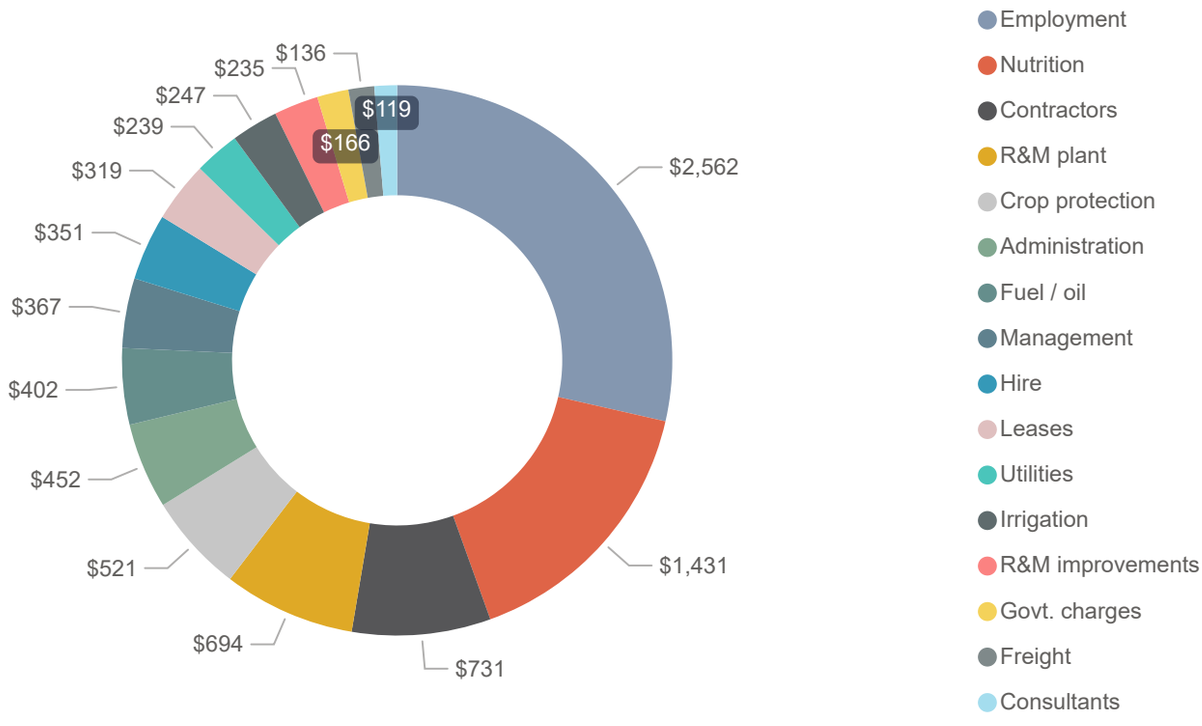
Heads of expenditure trends per tonne of saleable kernel



The charts below show a breakdown of expenditure per tonne of saleable kernel for mature farms in the benchmark sample since 2013. The top chart shows long-term average costs for all major expense categories and the bottom chart shows seasonal trends for the top 5 expense categories.

Long-term average expenditure per tonne of saleable kernel

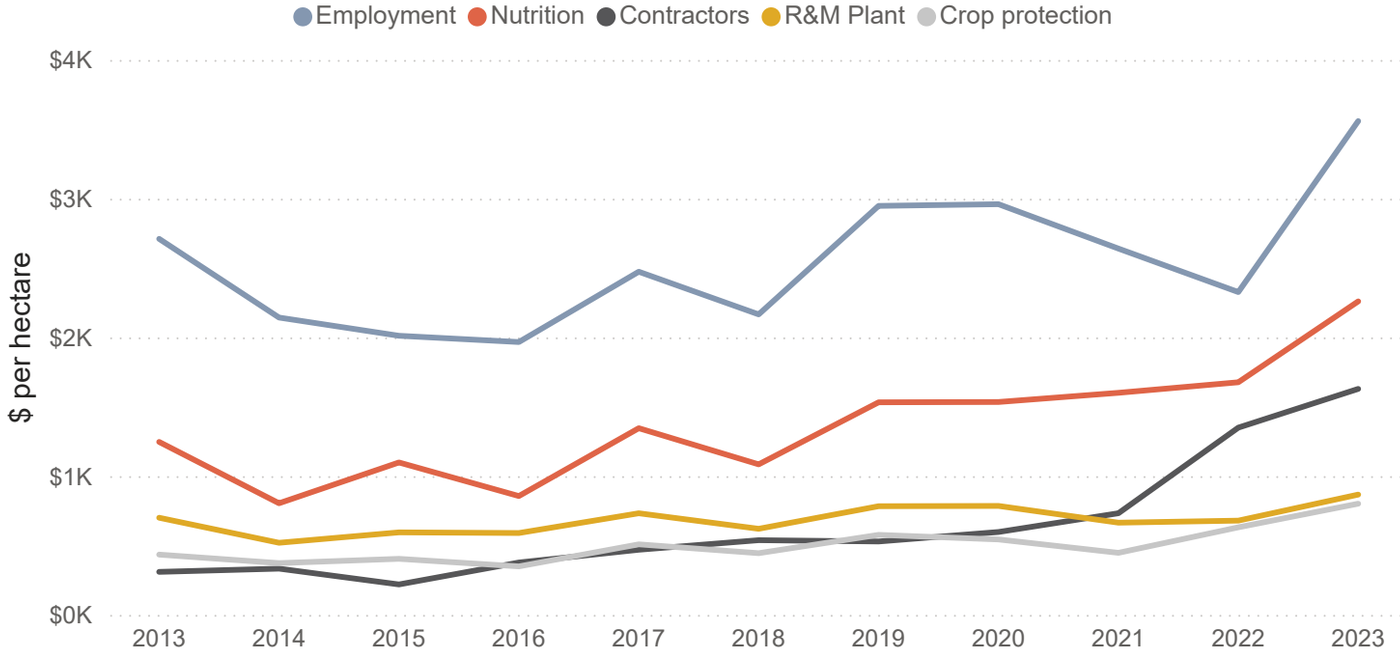
Mature farms (2013-2023)



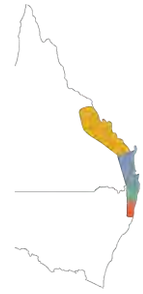
The most significant increases in expenditure per tonne of nut-in-shell over the eleven seasons shown were in employment ($1967 to $3560), nutrition ($804 to $2260) and contractors ($219 to $1629).

Seasonal trends in expenditure per tonne of saleable kernel

Top five expense categories for mature farms



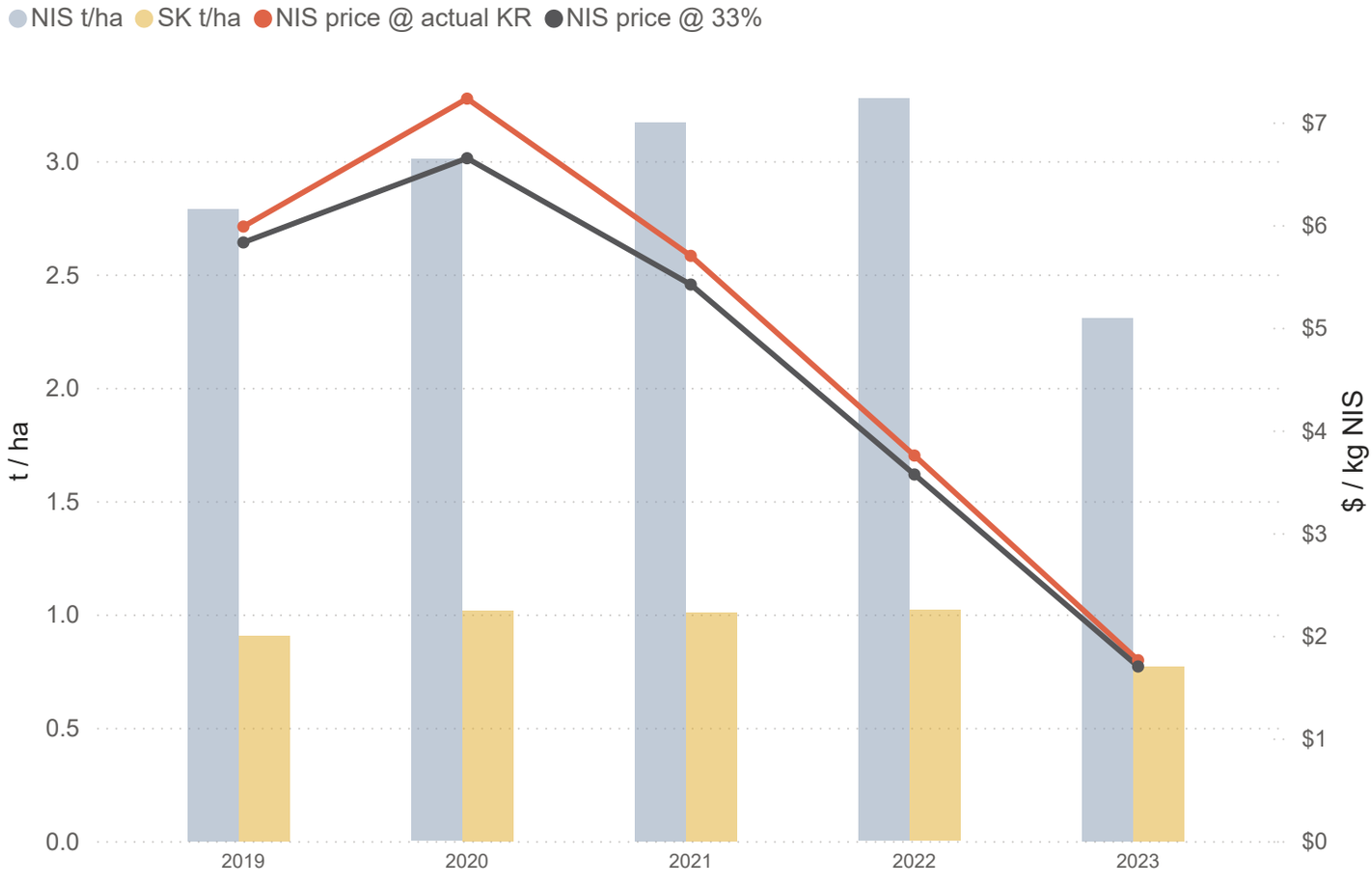
Price vs productivity trends



The chart below shows trends in price and productivity for farms in the benchmark sample that provided cost data over the last five seasons (2019-2023). An average of 82 farms per season provided data during this five-year period for a total of 409 farm-years.

All averages shown are weighted by either production or bearing hectares. Prices shown include the standard seasonal industry average nut-in-shell price at 33% kernel recovery as well as the estimated average adjusted nut-in-shell price based on actual kernel recovery for each participating farm and season.

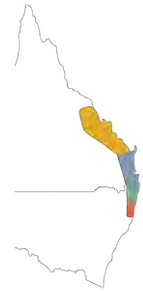
Productivity and price



5-year averages (2019-2023)

$4.78 Base price	$5.05 KR adjusted price	2.7 NIS t/ha	0.9 SK t/ha	34.4 SKR %	409 Farm-years

Gross margin trends



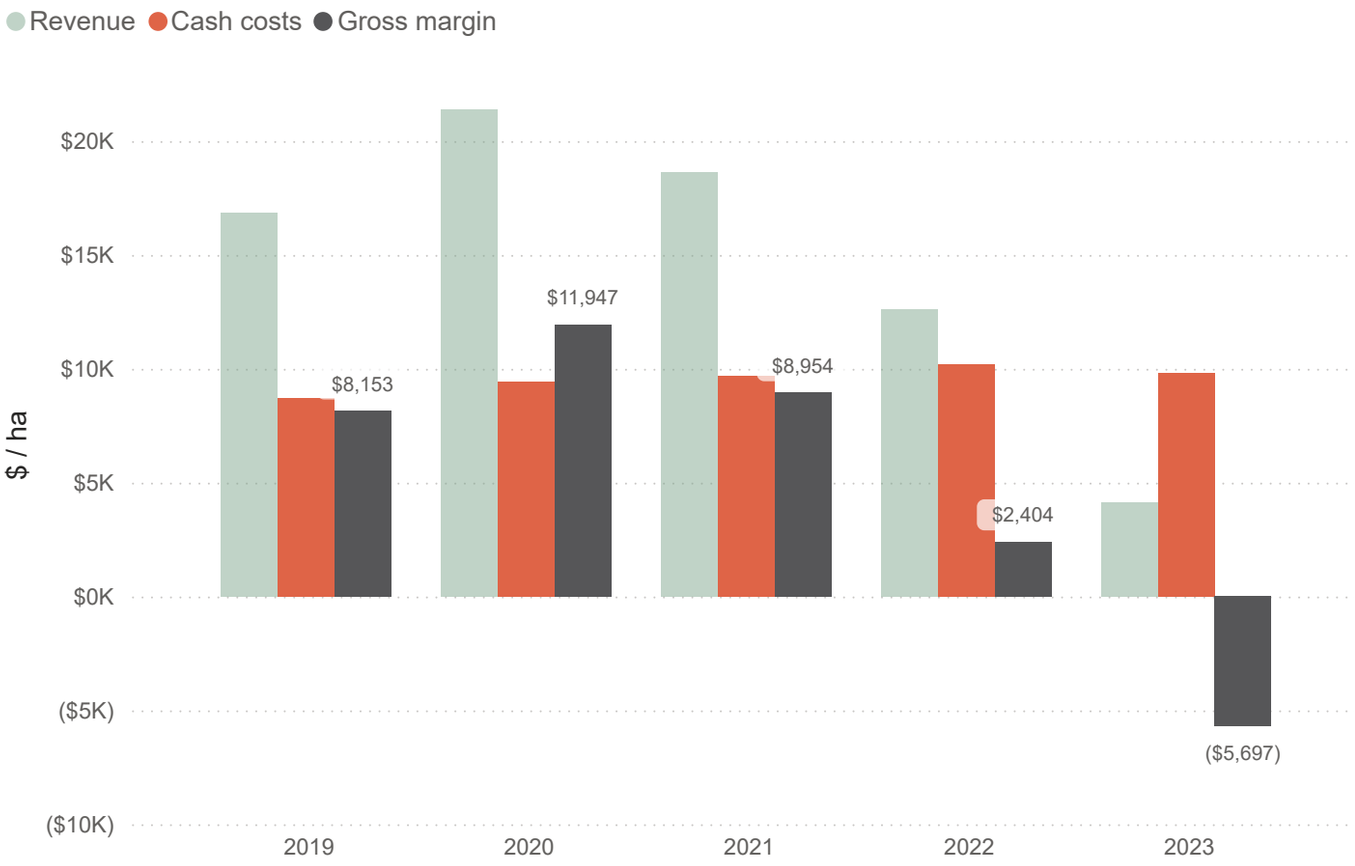
The chart below shows trends in revenue, costs and gross margin for farms in the benchmark sample that provided cost data over the last five seasons (2019-2023). An average of 82 farms per season provided data during this five-year period for a total of 409 farm-years.

Averages shown are weighted by either production or bearing hectares. Gross margins are derived from revenue minus operating cash costs. In this instance operating costs are based only on cash costs.

The nut-in-shell price used for estimating revenue each season is based on seasonal industry average base price at 33% saleable kernel recovery and adjusted according to the actual weighted average kernel recovery for each participating farm.

Declining nut-in-shell price has been the dominant factor impacting gross margins since 2020. Average costs declined slightly in 2023 following successive seasonal increases over previous years.

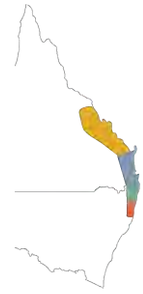
Revenue, costs and gross margin per hectare



5-year average revenue, costs and gross margins (2019-2023)

$14,582 Revenue / ha	$9,593 Cash costs / ha	$4,989 Gross margin / ha
$4,994 Revenue / t NIS	$3,285 Cash costs / t NIS	$1,708 Gross margin / t NIS
$4.99 Revenue / kg NIS	$3.29 Cash costs / kg NIS	$1.71 Gross margin / kg NIS

Nut-in-shell productivity distribution

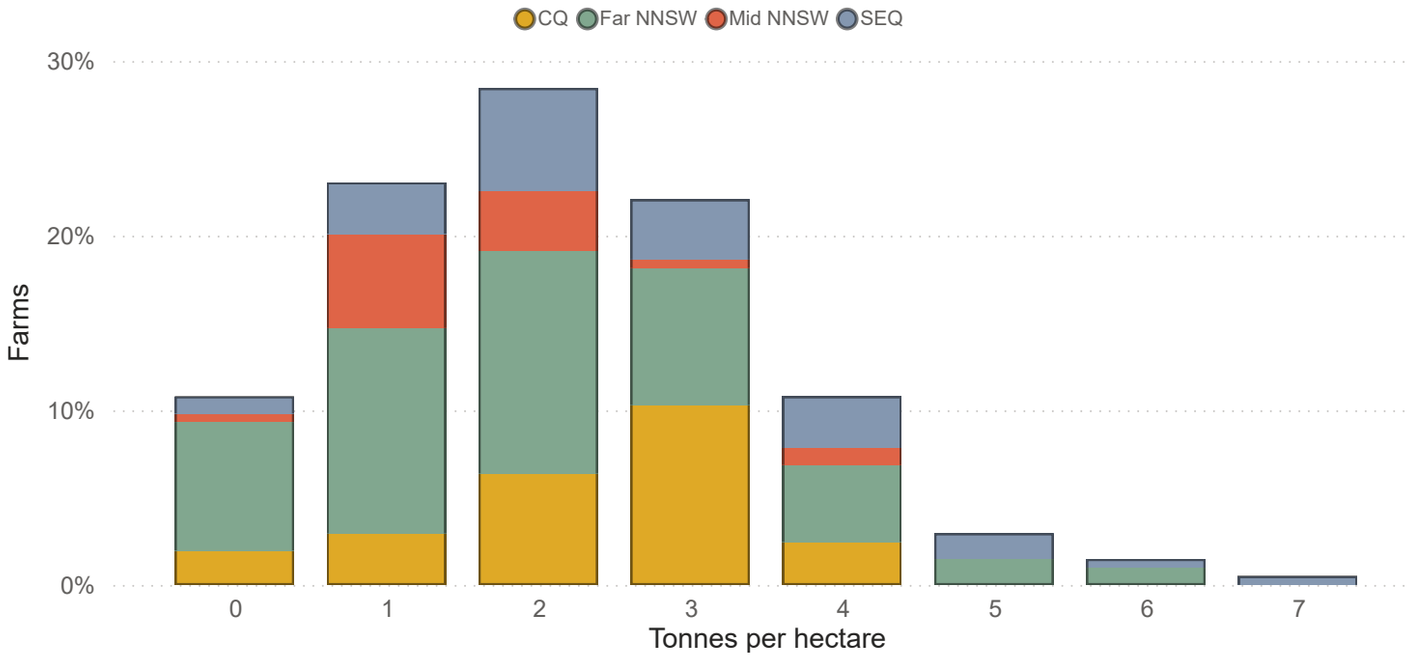


The charts below show the distribution of nut-in-shell productivity per hectare for mature farms in the benchmark sample in each major production region. Mature farms are those with a weighted average tree age of 10 or more years.

The top chart shows results for the 2023 season, while the bottom chart shows long-term averages for the previous 5 seasons.

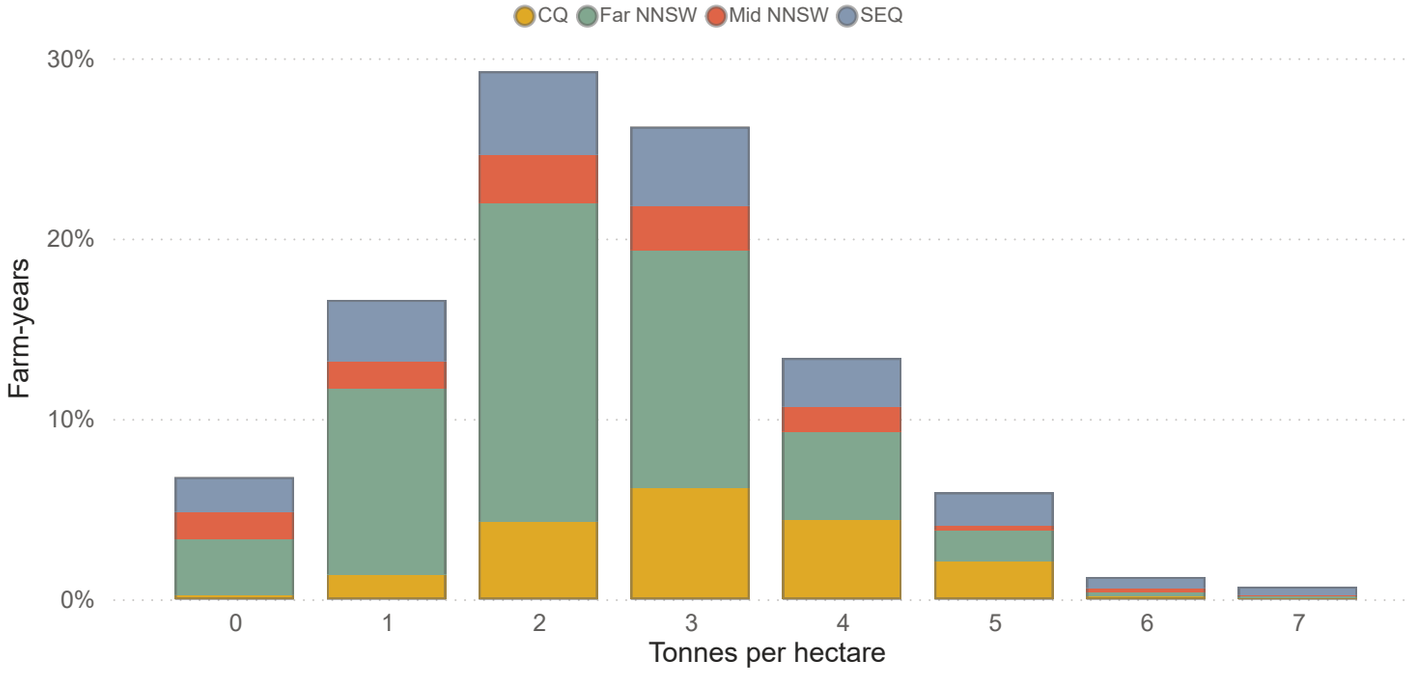
Nut-in-shell productivity distribution for the 2023 season

Mature farms only



Nut-in-shell productivity distribution 2018-2022

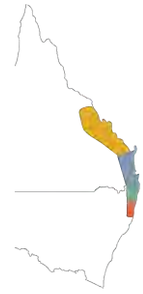
Mature farms only



Saleable kernel productivity distribution

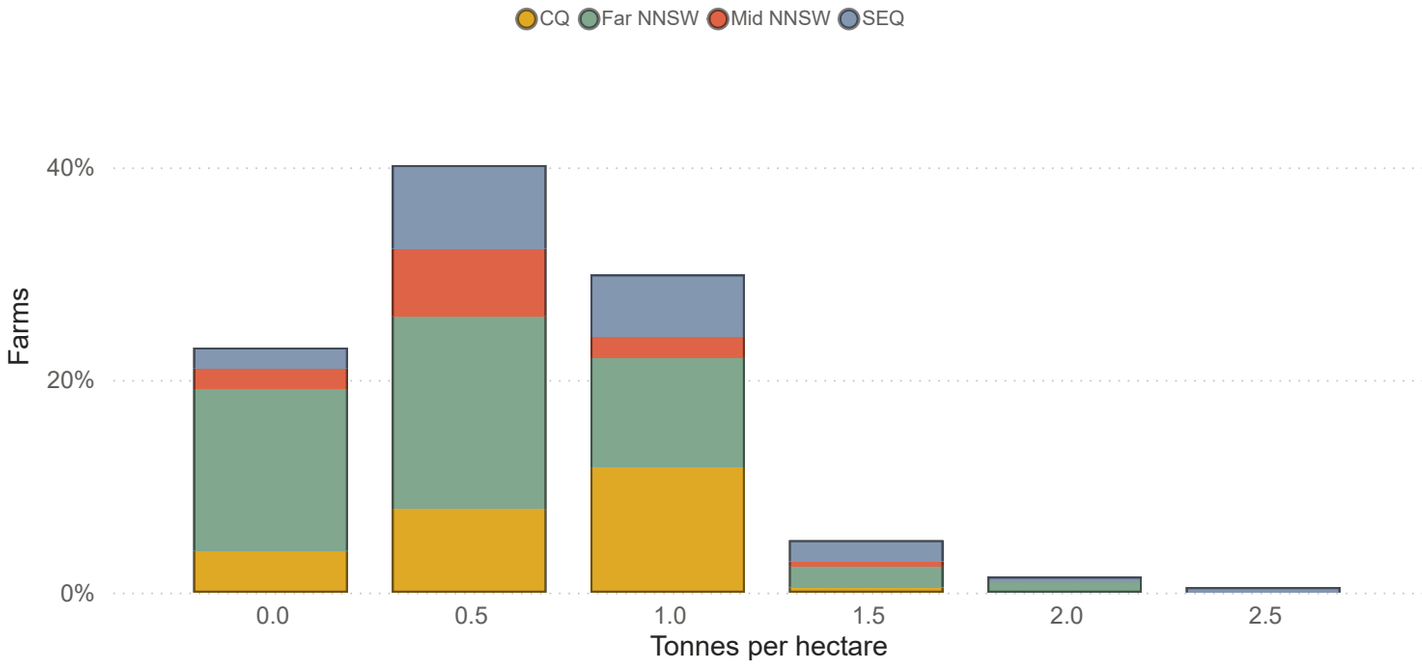
The charts below show the distribution of saleable kernel productivity per hectare for mature farms in each major production region. Mature farms are those with a weighted average tree age of 10 or more years.

The top chart shows results for the 2023 season, while the bottom chart shows long-term averages for the previous five seasons.



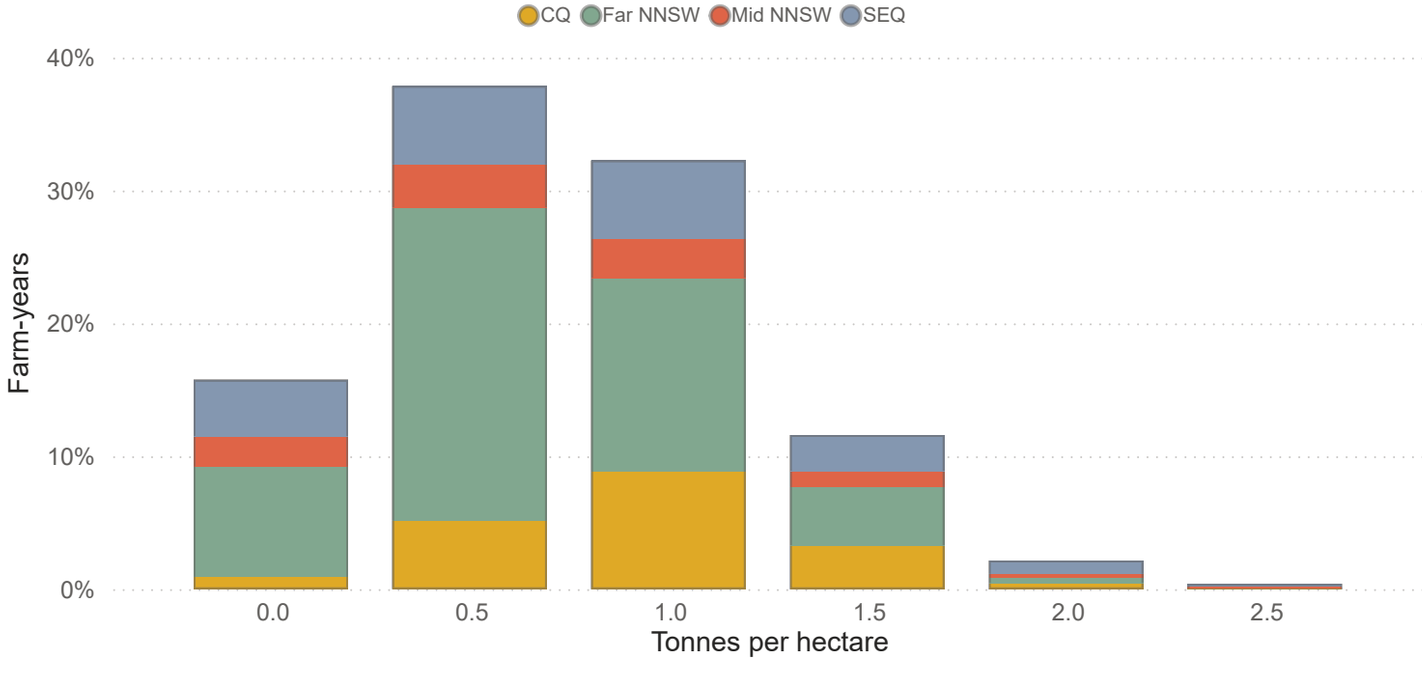
Saleable kernel productivity distribution for the 2023 season

Mature farms only

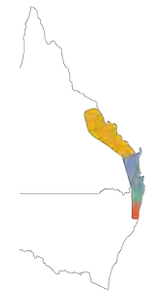


Saleable kernel productivity distribution 2018 to 2022

Mature farms only



Productivity distribution by tree age

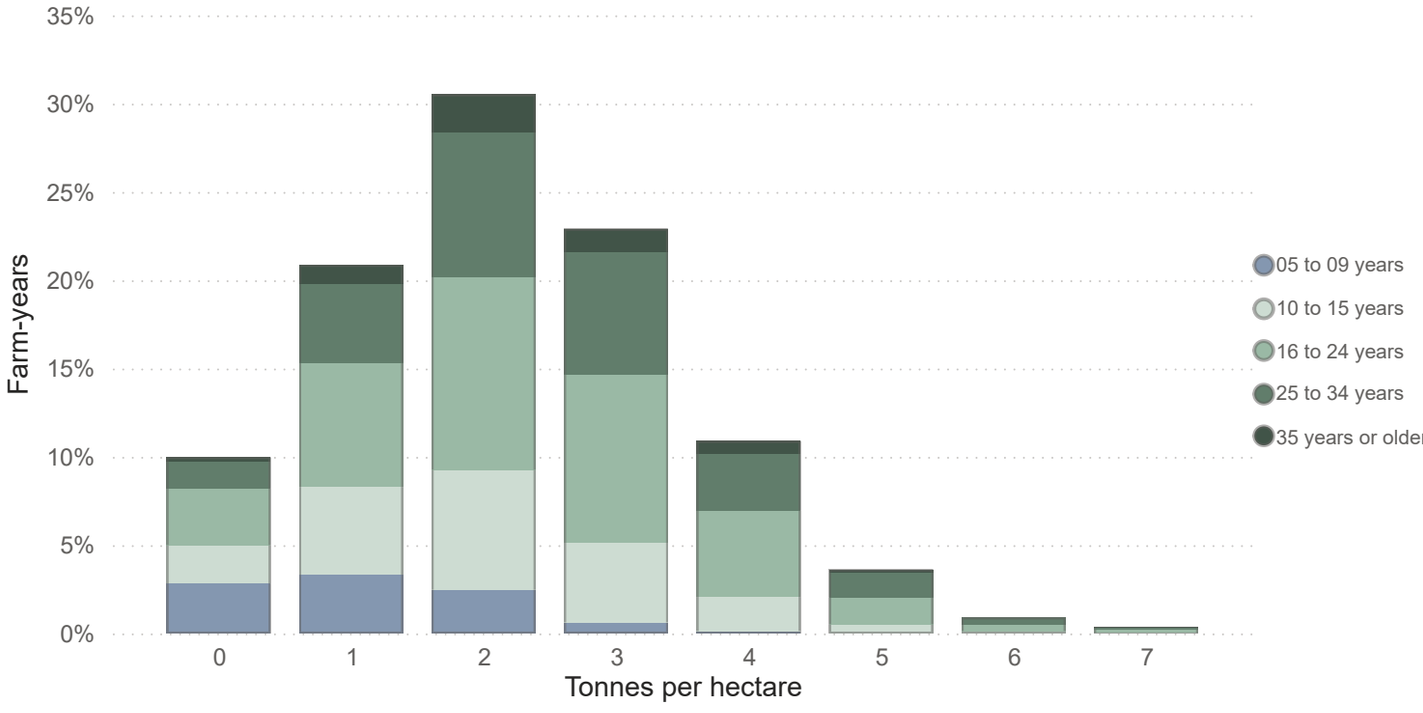


The charts below show the distribution of long-term productivity by tree age for bearing farms in the sample for all seasons since 2009 when benchmarking commenced. Farms must have some trees aged five years or older to be considered bearing.

The top chart shows nut-in-shell productivity and the bottom chart shows saleable kernel productivity. Each bar shows the percentage of farms in the sample exceeding the indicated productivity category.

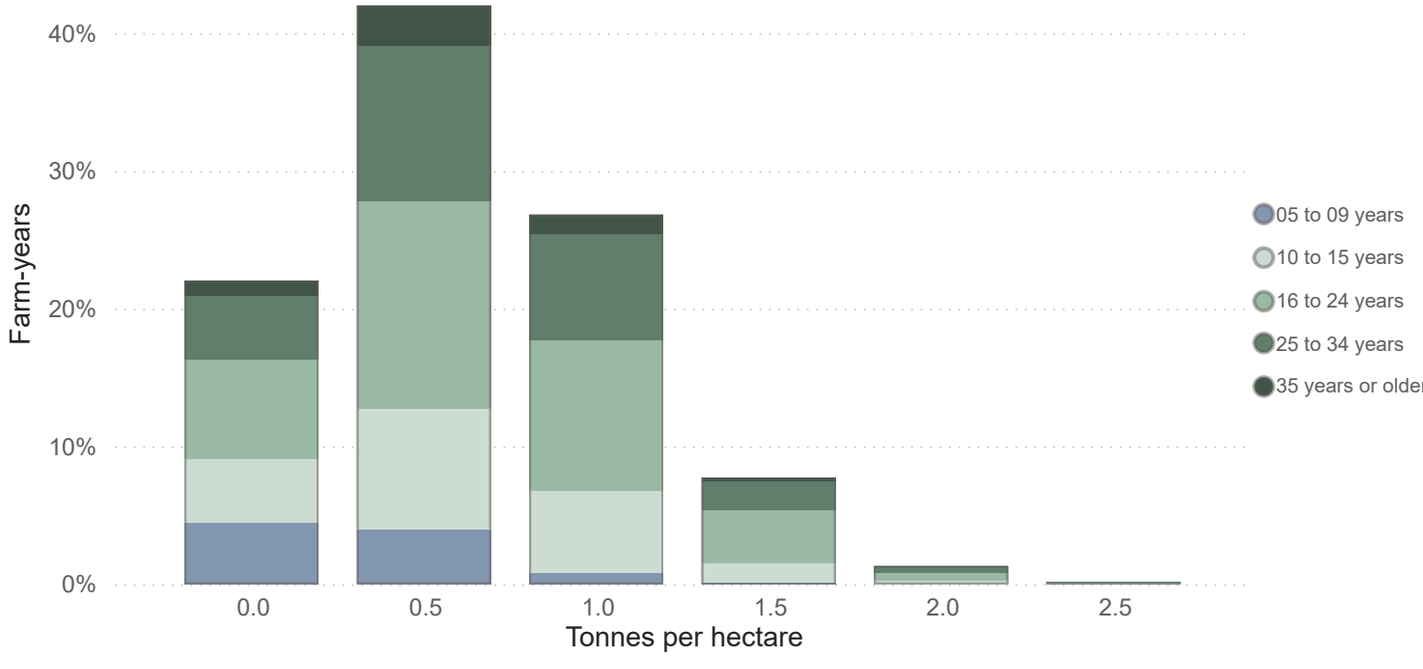
Long-term average nut-in-shell productivity by tree age

Mature farms only

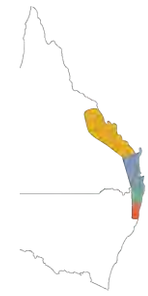


Long-term average saleable kernel productivity by tree age

Mature farms only



Productivity distribution by farm size

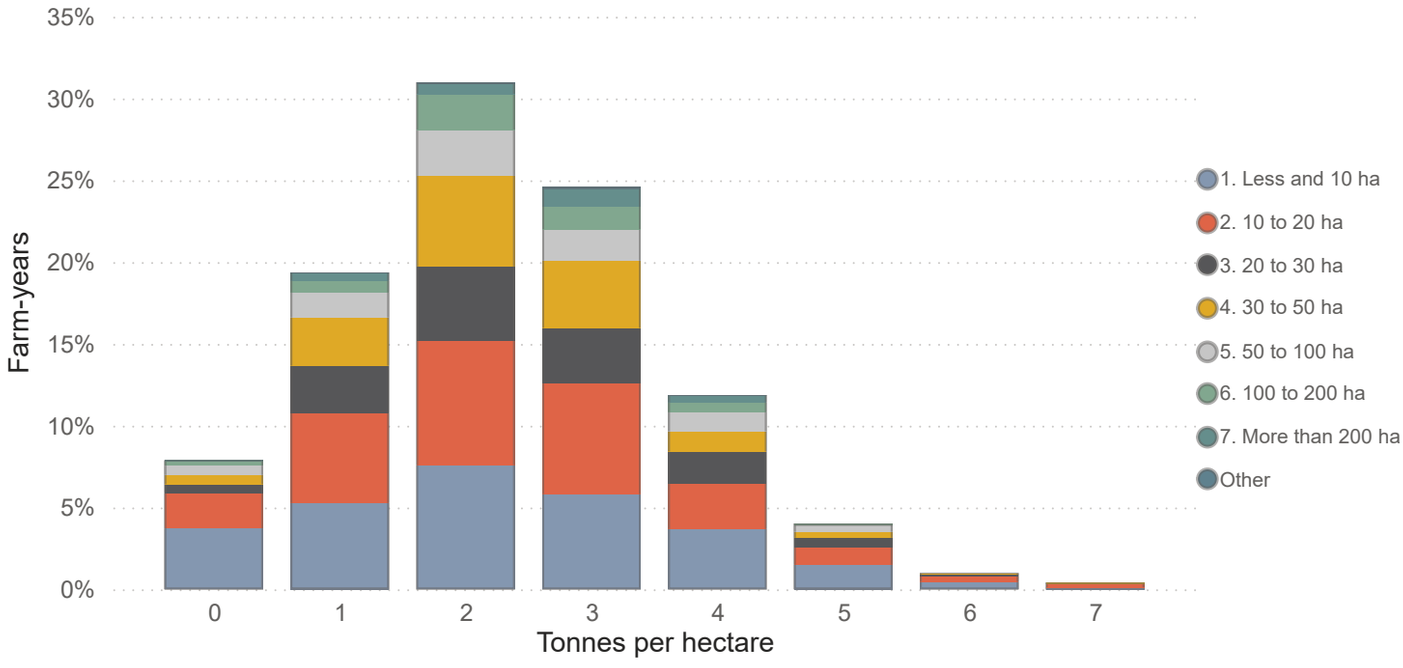


The charts below show the distribution of long-term productivity by farm size for mature bearing farms in the benchmark sample since 2009. Farms must have some trees aged five years or older to be considered bearing.

The top chart shows nut-in-shell productivity and the bottom chart shows saleable kernel productivity. Each bar shows the percentage of farms in the sample exceeding the indicated productivity category.

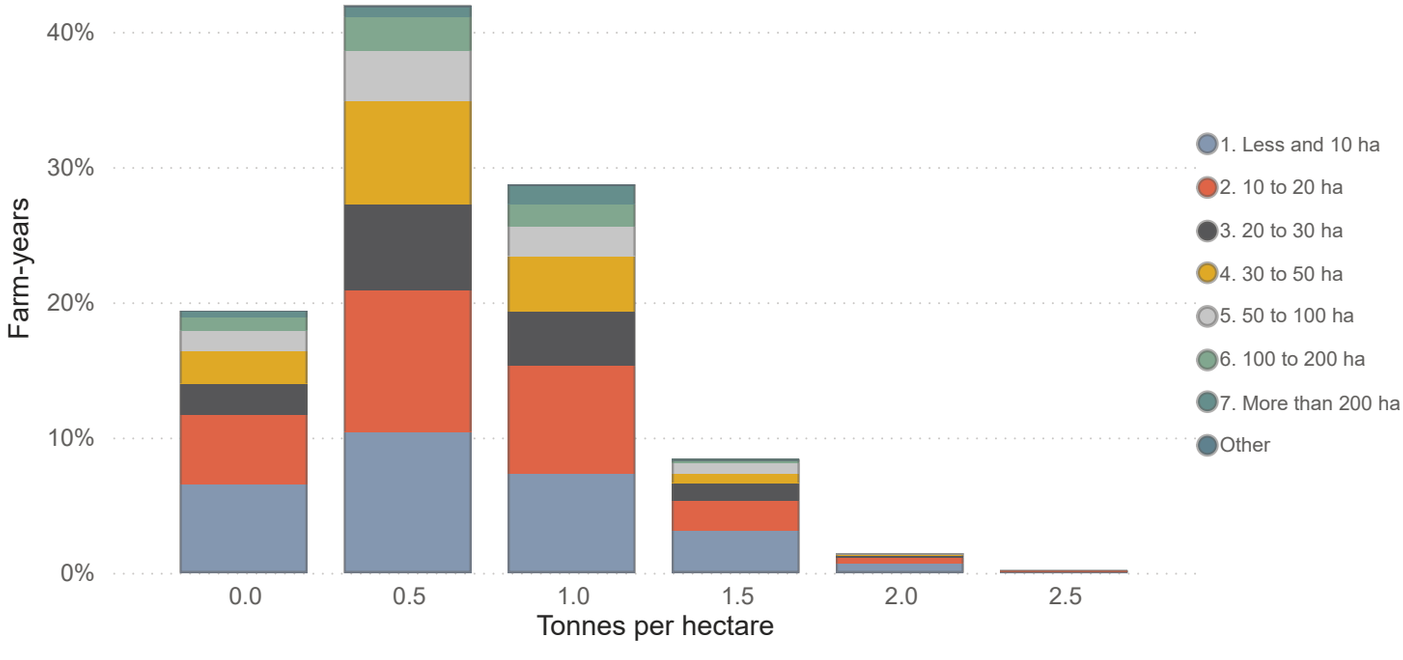
Long term nut-in-shell productivity by farm size

Mature farms only

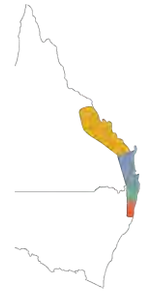


Long term saleable kernel productivity by farm size

Mature farms only



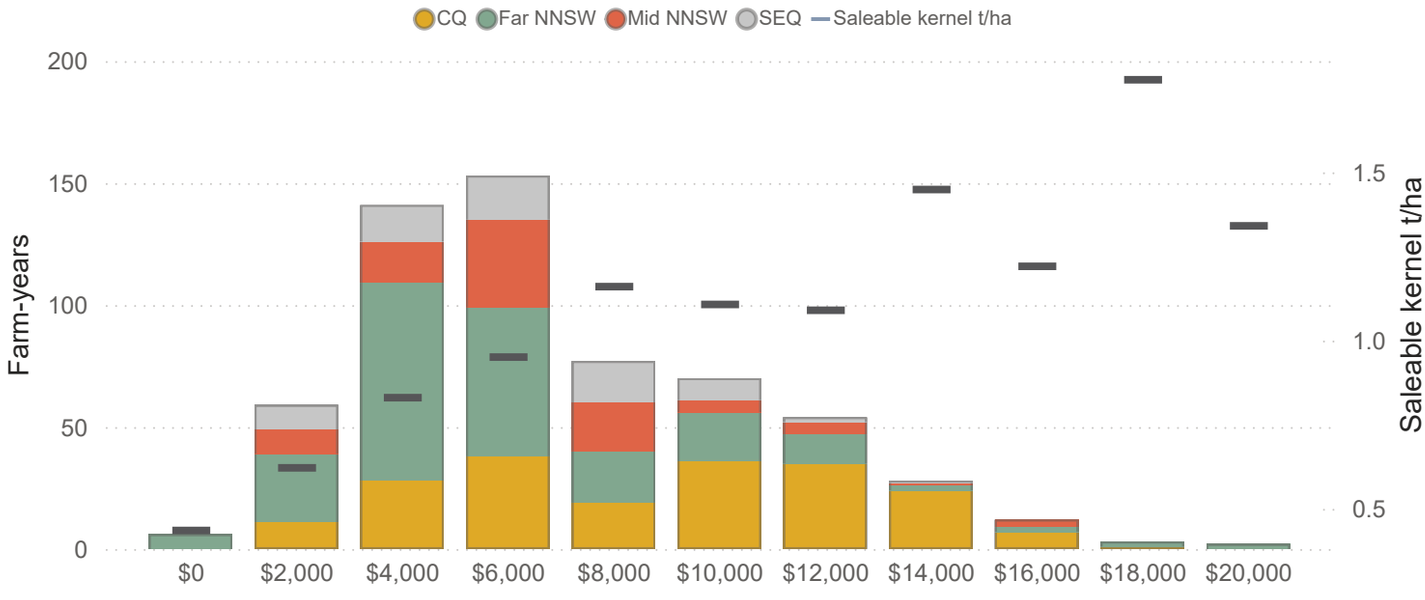
Cost distribution by region



The charts below show the distribution of long-term average cash operating costs for mature farms in each of the major production regions. Each bar shows the number of farms whose expenditure over multiple seasons (referred to as farm-years) falls within a specific range. In each case that range is from the value shown below each bar up to, but excluding, the value of the adjoining bar to its right. This is based on available seasonal cost data collected since 2013. The top chart shows costs per planted hectare and the bottom chart shows costs per tonne of saleable kernel produced. The corresponding saleable kernel productivity is shown for each cost group to provide insight into any apparent relationships between expenditure and productivity.

Distribution of long-term cash costs per planted hectare

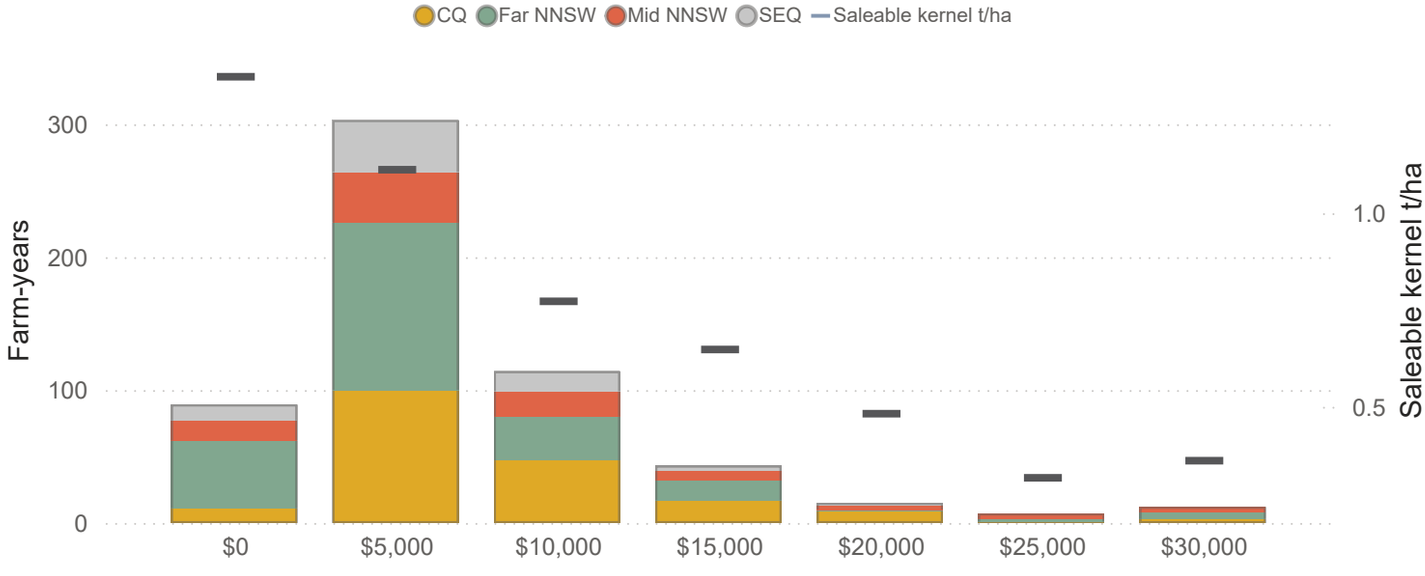
Mature farms only



These charts exclude non-bearing farms and those undertaking orchard rejuvenation, as these may skew averages. In the chart below also note that expenditure has been capped at less than $34,000 per tonne of saleable kernel to exclude specific instances where high seasonal expenditure, combined with low productivity, skewed results. Data for a total of 19 farm-years were excluded on this basis.

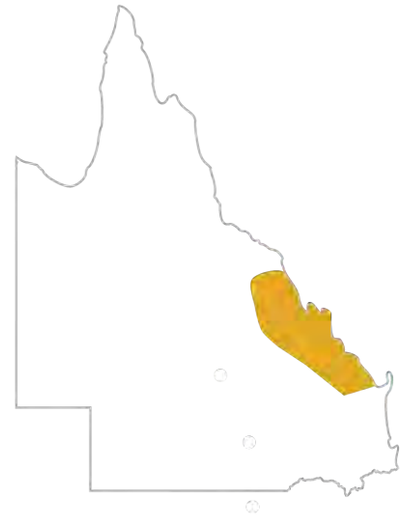
Distribution of long-term cash costs per tonne of saleable kernel

Mature farms only (capped at <$34K / tonne SK)



Central Queensland (CQ) region

The Central Queensland (CQ) region includes significant production areas in and around Bundaberg, Childers and Maryborough. It also includes currently outlying production areas such as Mackay and Rockhampton.



Plantings in 2023

Total farms	Bearing farms
94	61
Tree age (all)	**Tree age (bearing)**
12	17
Avg. planted hectares	**Avg. bearing hectares**
92	57

Planting data shown is from the 2023 season, while long-term productivity and cost averages are for bearing farms only over the last five seasons (2019-2023).

Averages are weighted by planted area to best illustrate results for the whole region.

An average of 59 farms in the CQ region have participated in benchmarking each season since 2009, although more recently numbers have increased significantly, averaging 93 farms per season over the last three years. A total of 94 farms provided data for the 2023 season, representing 35% of all farms in the benchmark sample.

The CQ region has the youngest average tree age of the four major production regions in Australia, at just 12 years. Approximately 38% of this region's plantings in the benchmark sample are less than five years of age, and therefore not yet considered bearing. In 2023 the average age of bearing farms in the region was 17 years.

In 2023 the average size of participating farms in the CQ region was 92 planted hectares and 57 bearing hectares.

Productivity 2019-2023

NIS t/ha	SK t/ha
3.2	1.1
Saleable KR%	**Premium KR%**
35.6	33.5
Commercial KR%	**Reject KR%**
2.0	2.8

Average long-term productivity per bearing hectare and average kernel recovery are shown for all bearing farms in the region for the last five seasons. These averages are based on 291 farm-years.

There was a sharp decline in productivity in this region in 2023 compared with the previous season, with mature farms down 28%. Despite large seasonal variation such as this, there has been a general increase in longer term productivity. In 2023 the 5-year average yield per hectare (2019-2023) was almost 40% higher than a decade earlier (2009-2013). Some of this increase may be attributed to young farms maturing and reaching their full bearing potential.

Costs 2019-2023

Cash $/ha	Total $/ha
$9,784	$9,802
Cash $/T NIS	**Total $/T NIS**
$3,617	$3,624
Cash $/T SK	**Total $/T SK**
$10,796	$10,816

Average operating costs are shown for the last five seasons (151 farm-years).

Costs have generally risen in most seasons since collection commenced in 2013. Average costs for this region can vary significantly between seasons and farms. The standard deviation in costs over the last five seasons was approximately $3800 per hectare, or 39% of the mean.

Average costs per hectare in CQ are generally higher than other regions, although average costs per tonne of saleable kernel are lower than NSW farms due to the relatively higher average productivity in the CQ region. The SEQ region has lower costs per tonne of saleable kernel compared to the CQ region, due to a combination of lower expenditure per hectare and slightly higher average productivity per hectare.

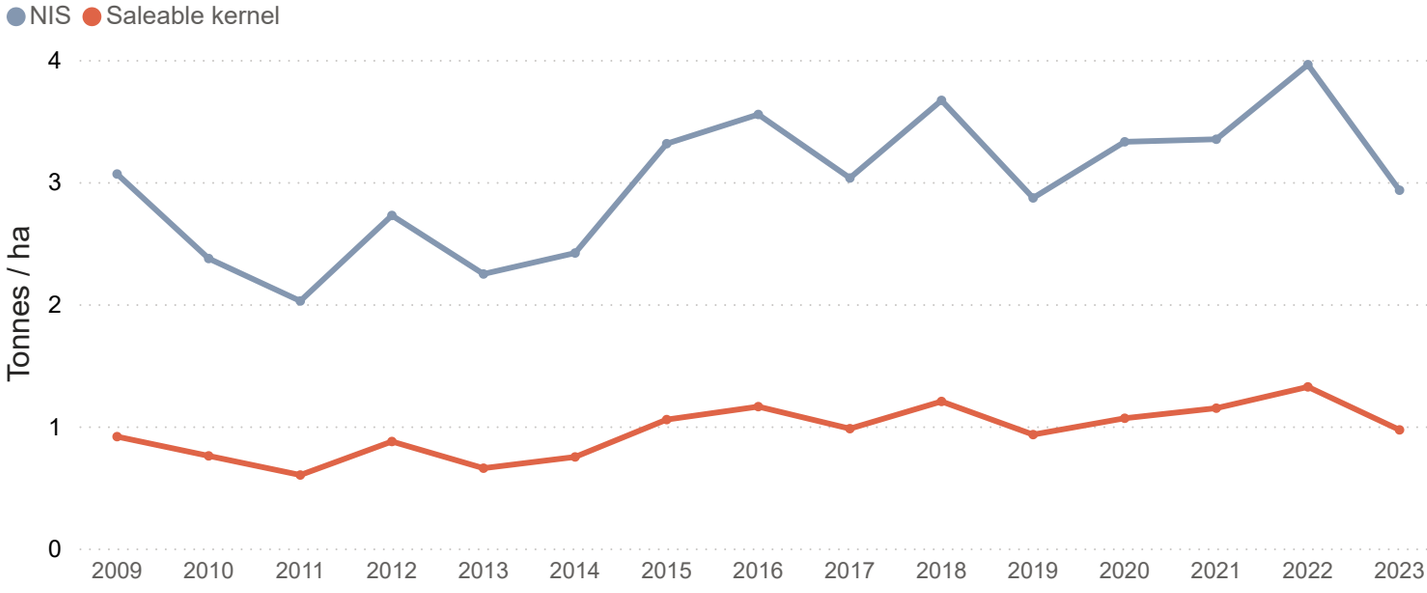
Seasonal productivity and kernel recovery trends in Central Queensland

The charts below show seasonal trends in average productivity and kernel recovery for farms in the Central Queensland region. The top chart shows average nut-in-shell and saleable kernel productivity for mature farms in the benchmark sample, weighted by production. Mature farms are those with a weighted average tree age of 10 or more years. The bottom chart shows average saleable, premium, commercial and reject kernel recovery for all farms in the region.

Farms in the CQ region had the most significant drop in average productivity in 2023. Some growers suggested that prolonged cloudy weather and resulting low solar radiation impacted nut growth during the season. In 2023 the CQ region also recorded its lowest average reject kernel recovery since benchmarking began.

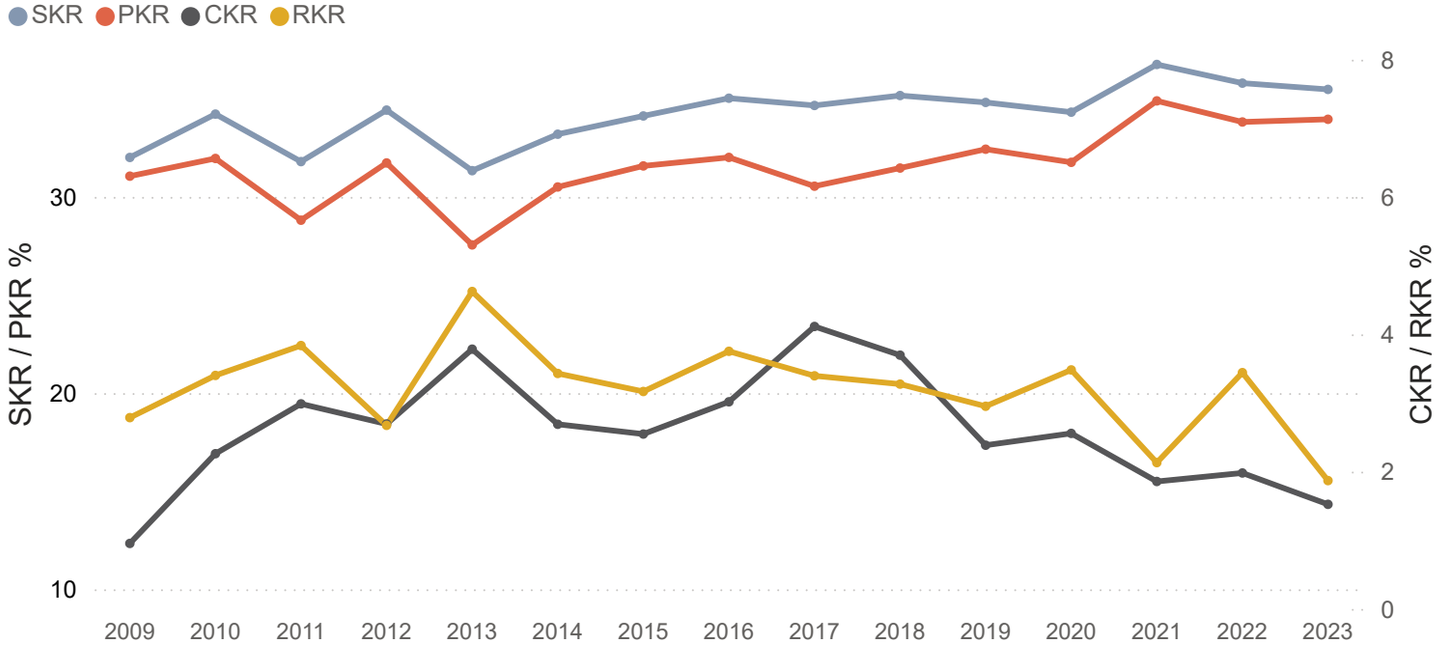
Productivity trends

Mature farms only, weighted by bearing hectares



Kernel recovery trends

Weighted by bearing hectares



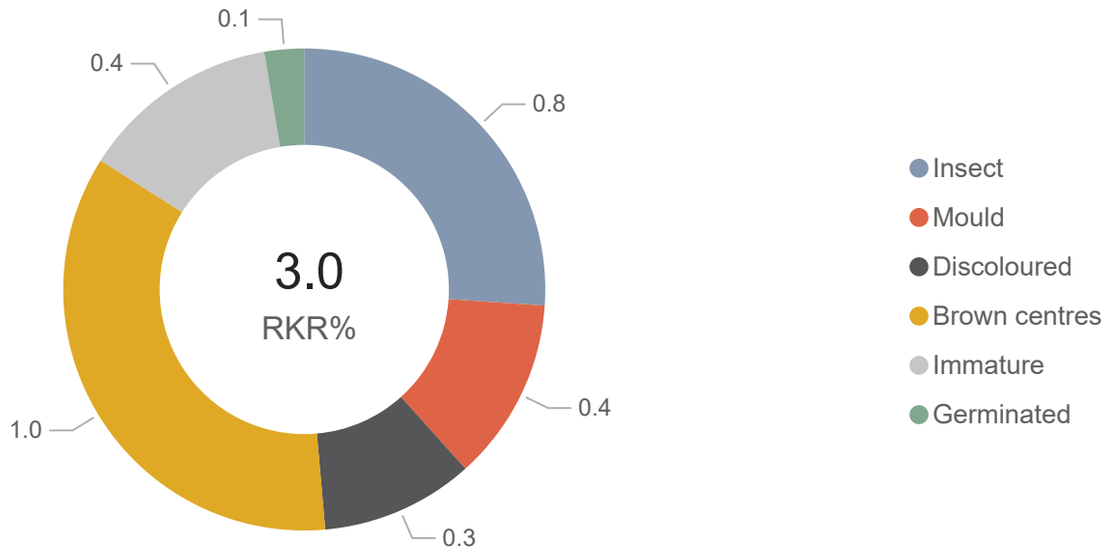
Seasonal reject trends in Central Queensland

The charts below show seasonal factory reject trends for farms in the benchmark sample within the Central Queensland region. All major factory reject categories are shown including insect damage, mould, discolouration, brown centres (internal discolouration), immaturity (shrivelled kernel) and germination (discoloured crest).

The top chart shows a breakdown of long-term average factory rejects since 2009, weighted by NIS production. The bottom chart shows seasonal factory reject trends, also weighted by NIS production.

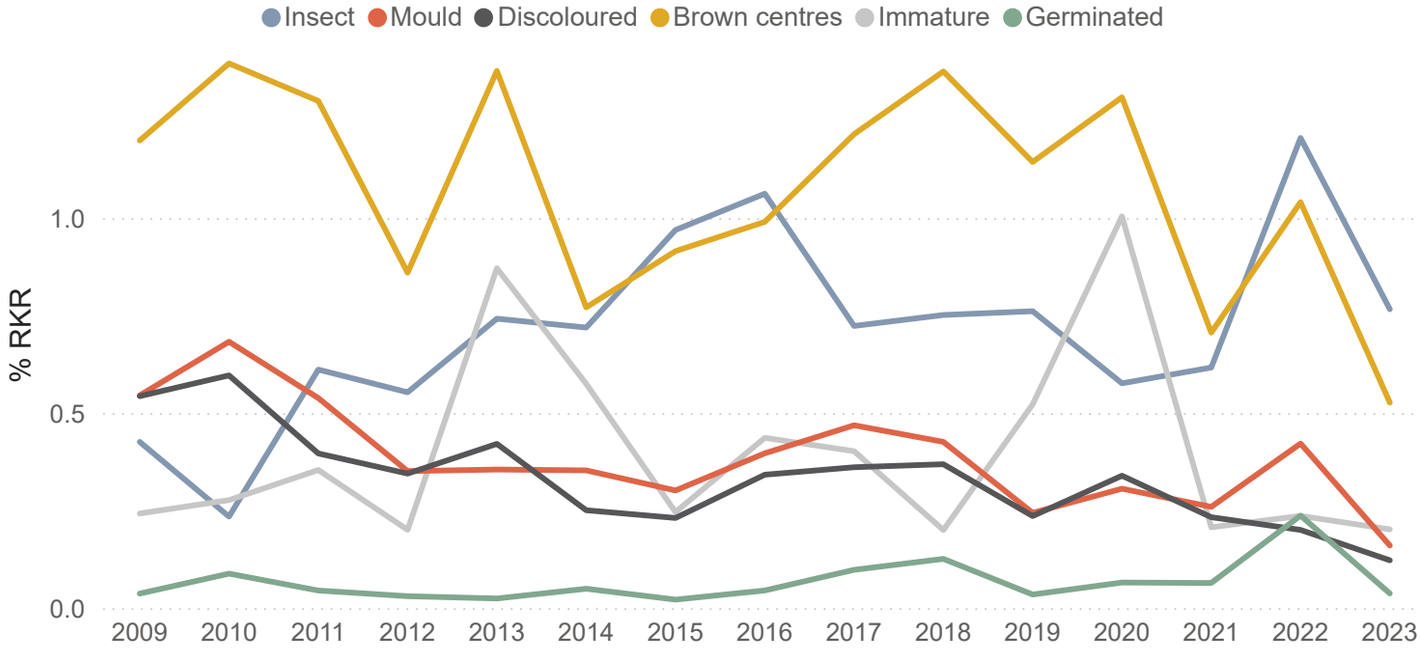
In 2023 the CQ region recorded its lowest average level of brown centres rejects since benchmarking began (0.53%). Brown centres has historically been the most significant cause of factory rejects for this region.

Long-term average factory rejects by category



Factory reject trends

Bearing farms, weighted by NIS production



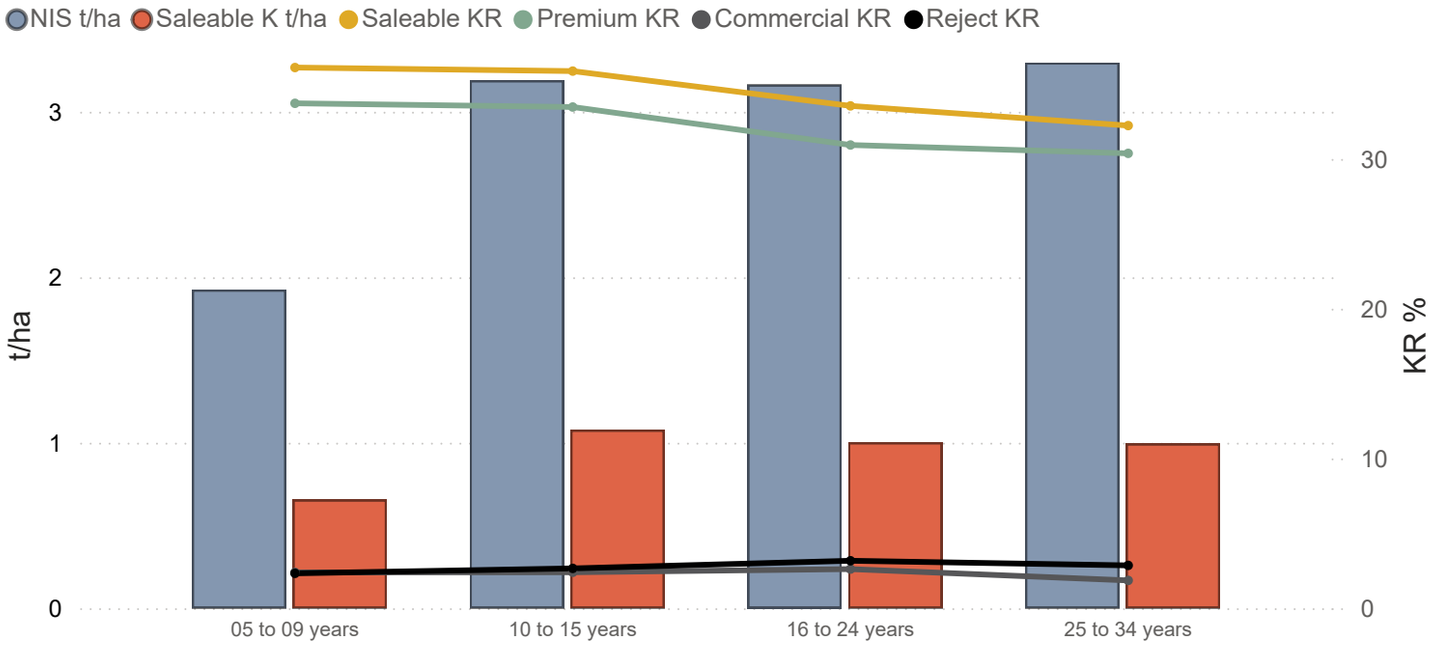
Long-term trends by tree age in Central Queensland

The charts below show long-term trends in productivity, kernel recovery and factory rejects for farms in the benchmark sample in the Central Queensland region since 2009.

The top chart shows the unweighted average productivity and kernel recovery for farms within various average tree age categories ranging from 5-9 years through to 35+ years. The bottom chart shows a breakdown of unweighted average factory reject categories for each of those tree age groups.

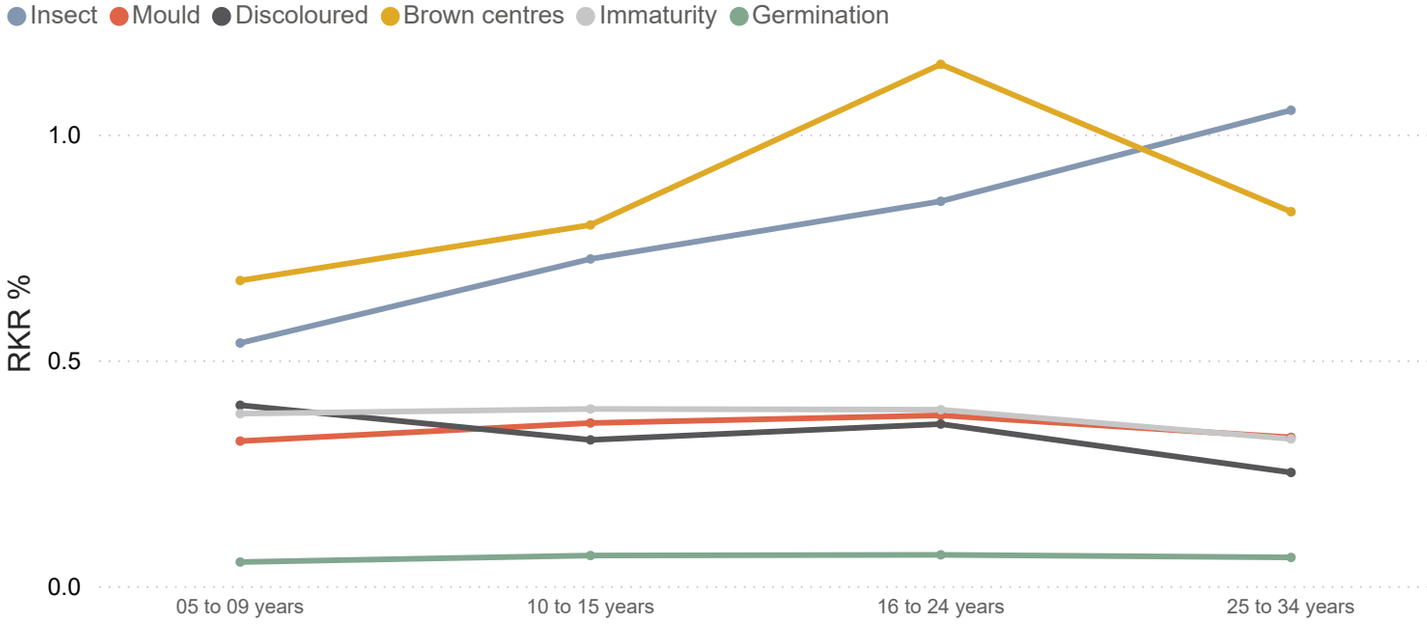
Productivity and kernel recovery by tree age

Unweighted averages for bearing farms



Factory rejects by tree age

Unweighted averages for bearing farms



South East Queensland (SEQ) region

The South East Queensland (SEQ) region includes the two main production areas of Glass House Mountains and Gympie. Approximately one third of the farms in this region are not irrigated, most of which are located in the Glass House Mountains area.

Plantings in 2023

Total farms	Bearing farms
44	38
Tree age (all)	**Tree age (bearing)**
26	27
Avg. planted hectares	**Avg. bearing hectares**
32	30

Planting data shown is from the 2023 season, while long-term productivity and cost averages are for bearing farms only over the last five seasons (2019-2023).

Averages are weighted by planted area to best illustrate results for the whole region.

An average of 48 farms in the SEQ region have participated in benchmarking each season since 2009 and 50 farms per season over the last five years. A total of 44 farms provided data for the 2023 season, including 24 farms from Gympe and 20 farms from Glass House Mountains. These farms represent 16% of the all farms in the benchmark sample.

Approximately 95% of this region's plantings in the benchmark sample are of bearing age. In 2023 the average age of bearing farms in the region was 27 years and the average total farm size was 32 hectares.

Productivity 2019-2023

NIS t/ha	SK t/ha
3.2	1.0
Saleable KR%	**Premium KR%**
34.0	31.9
Commercial KR%	**Reject KR%**
2.2	2.0

Average long-term productivity per bearing hectare and average kernel recovery are shown for all bearing farms in the region for the last five seasons. These averages are based on 244 farm-years.

Productivity in the SEQ region declined by 5% in 2023 compared with the previous season. Despite seasonal variation such as this, there has been a general increase in longer term productivity. In 2023 the 5-year average yield per hectare (2019-2023) was approximately 27% higher than a decade earlier (2009-2013).

Costs 2019-2023

Cash $/ha	Total $/ha
$9,317	$10,234
Cash $/T NIS	**Total $/T NIS**
$2,772	$3,045
Cash $/T SK	**Total $/T SK**
$8,524	$9,363

Average operating costs are shown for the last five seasons (44 farm-years).

Between 2013 and 2020 average cash costs increased each season, reaching almost $11,500 per hectare in 2020 with a standard deviation of 48%. Average cash costs were lower in 2020 and have remained around $8500 per hectare since that time. It should be noted that an average of just eight SEQ farms provided cost data per season, so these figures should be used with caution.

Average costs per hectare in SEQ are generally higher than NSW farms but slightly lower than farms in the CQ region. SEQ farms have a lower long-term average cost per tonne of saleable kernel than other regions.

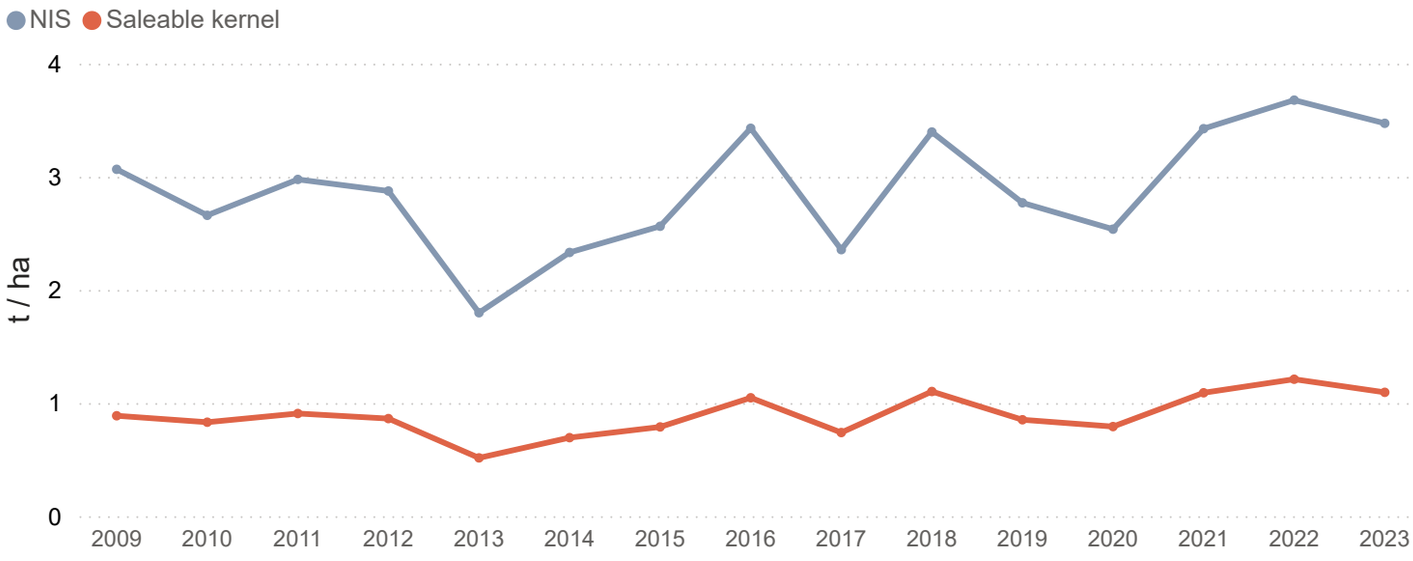
Seasonal productivity and kernel recovery trends in South East Queensland

The charts below show seasonal trends in average productivity and kernel recovery for farms in the South East Queensland region. The top chart shows average nut-in-shell and saleable kernel productivity for mature farms in the benchmark sample, weighted by production. Mature farms are those with a weighted average tree age of 10 or more years. The bottom chart shows average saleable, premium, commercial and reject kernel recovery for all farms in the region.

The SEQ region had the highest average nut-in-shell and saleable kernel productivity of all major production regions in 2023. Some growers in SEQ reported generally favourable growing conditions during this season, including adequate available soil moisture and a dry harvest period.

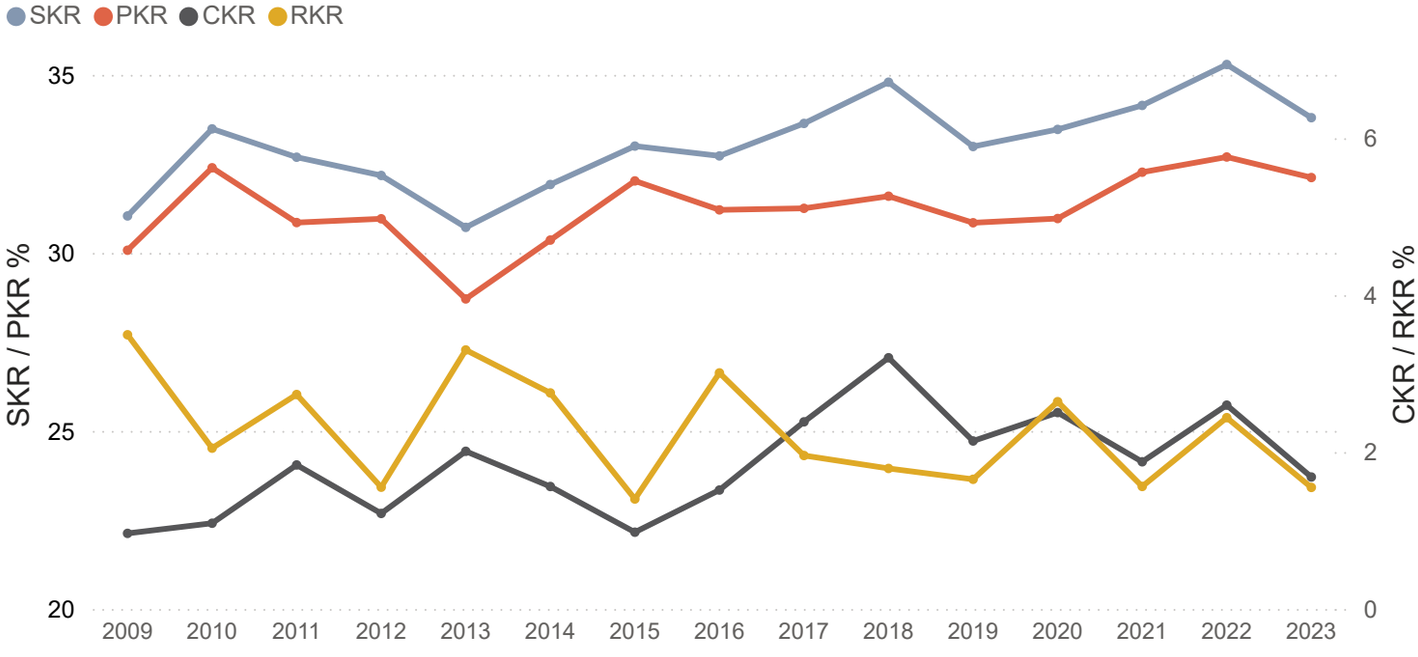
Productivity trends

Mature farms only, weighted by bearing hectares



Kernel recovery trends

Weighted by bearing hectares

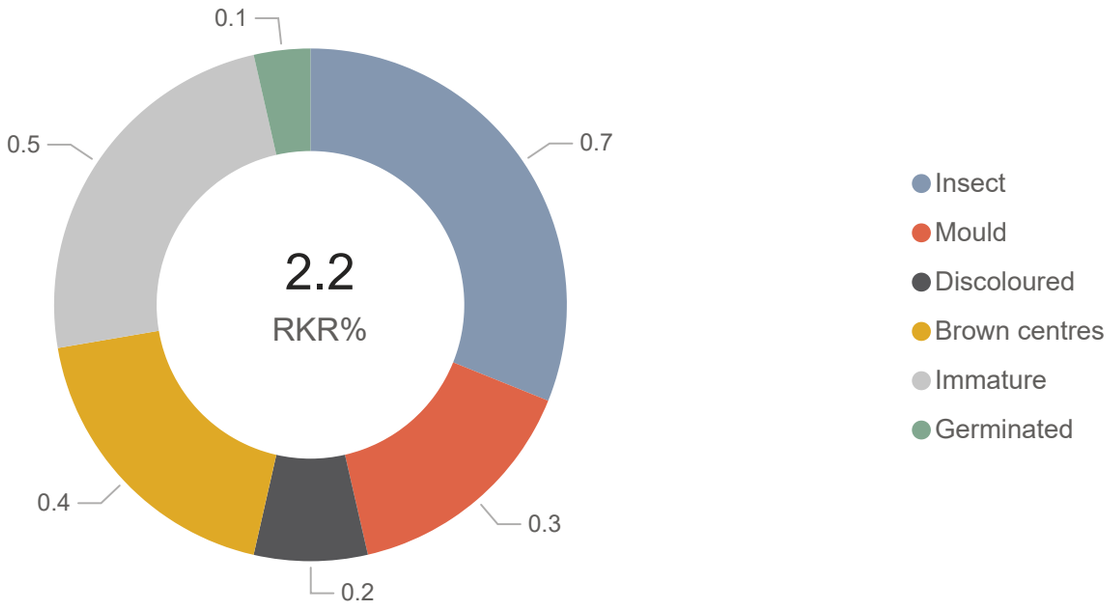


Seasonal reject trends in South East Queensland

The charts below show seasonal factory reject trends for farms in the benchmark sample within the South East Queensland region. All major factory reject categories are shown including insect damage, mould, discolouration, brown centres (internal discolouration), immaturity (shrivelled kernel) and germination (discoloured crest).

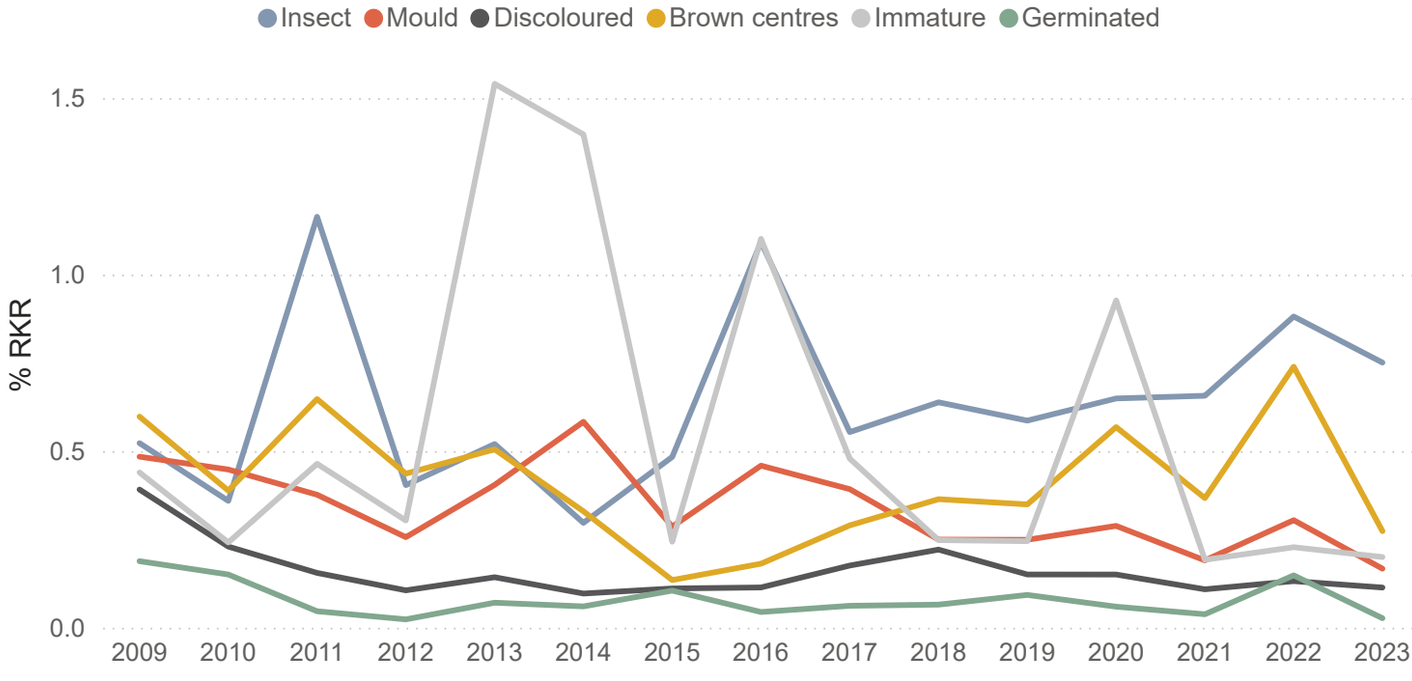
The top chart shows a breakdown of long-term average factory rejects since 2009, weighted by NIS production. The bottom chart shows seasonal factory reject trends, also weighted by NIS production.

Long-term average factory rejects by category



Factory reject trends

Bearing farms, weighted by NIS production



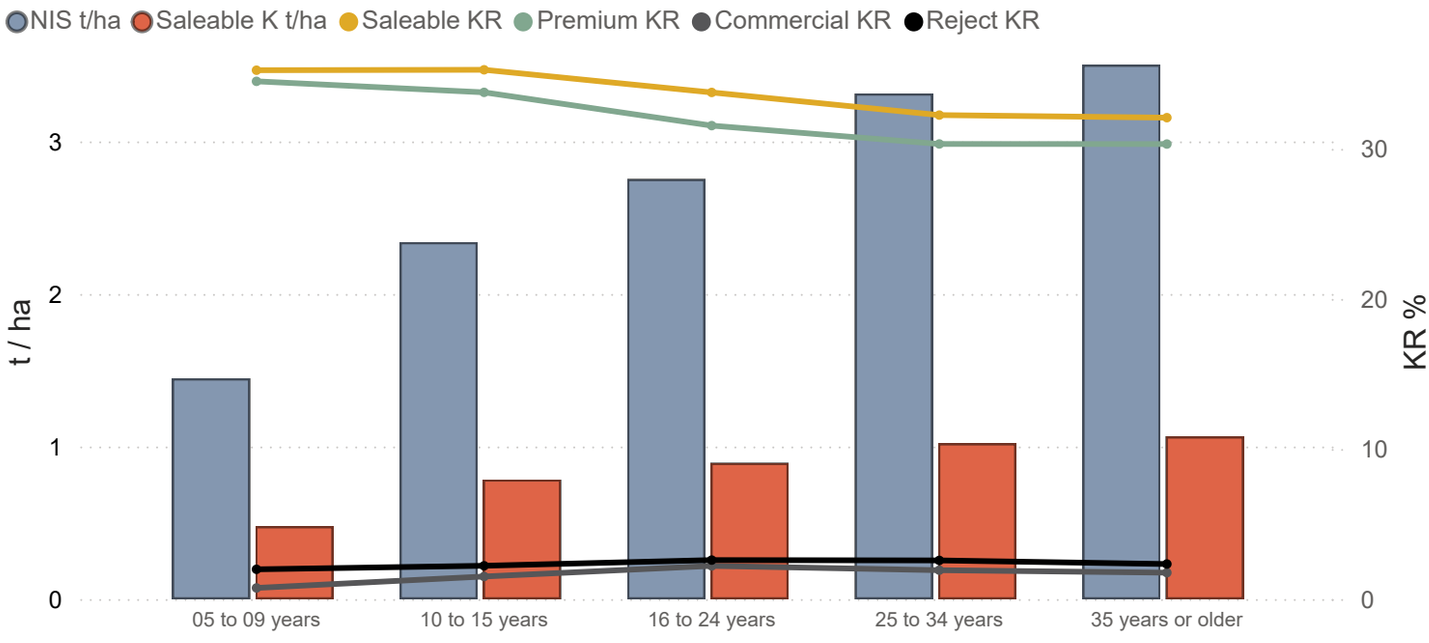
Long-term trends by tree age in South East Queensland

The charts below show long-term trends in productivity, kernel recovery and factory rejects for farms in the benchmark sample in the South East Queensland region since 2009.

The top chart shows the unweighted average productivity and kernel recovery for farms within various average tree age categories ranging from 5-9 years through to 35+ years. The bottom chart shows a breakdown of unweighted average factory reject categories for each of those tree age groups.

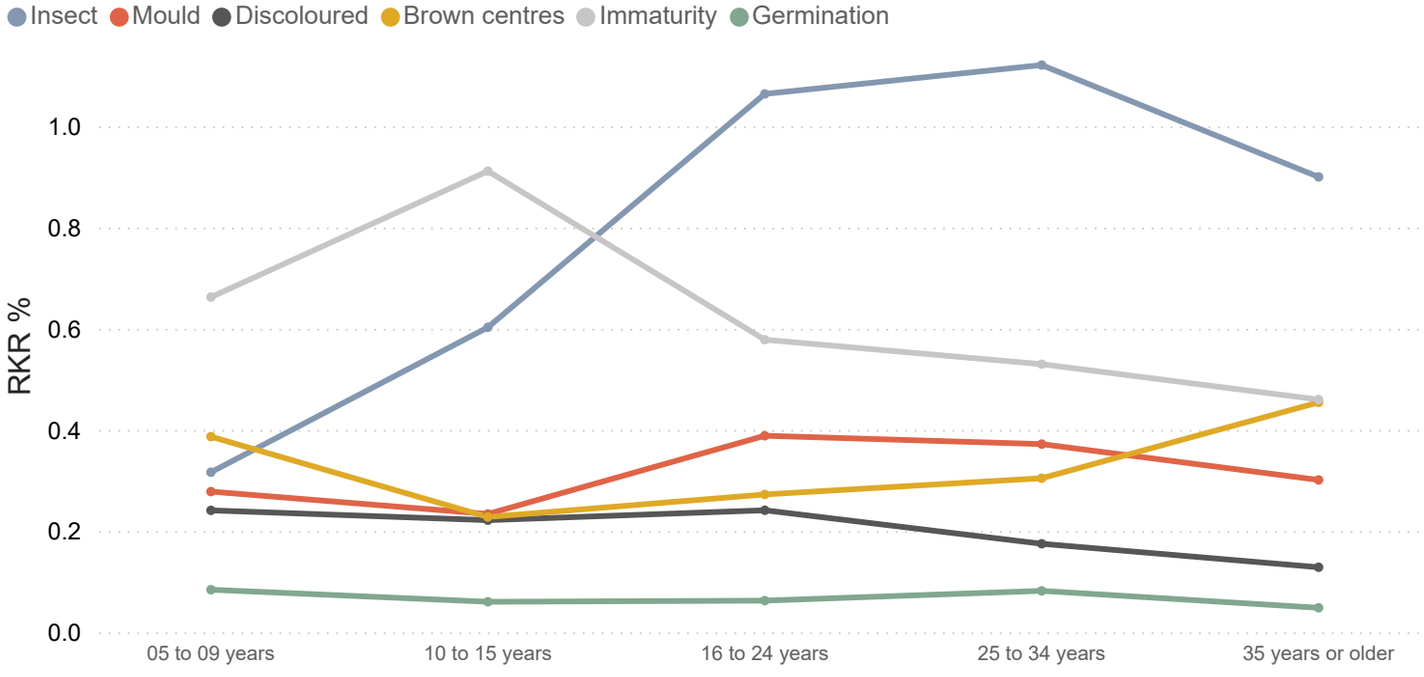
Productivity and kernel recovery by tree age

Unweighted averages for bearing farms



Factory rejects by tree age

Unweighted averages for bearing farms



Northern Rivers NSW (NRNSW) region

The Northern Rivers region stretches from the Queensland border down to the Maclean area in NSW. It includes significant production areas such as Alstonville, Bangalow, Clunes, Fernleigh, Knockrow, Newrybar, Rous, Tregeagle and Wollongbar. It also includes some farms further south around Maclean.

Plantings in 2023

Total farms	Bearing farms
104	97
Tree age (all)	**Tree age (bearing)**
27	28
Avg. planted hectares	**Avg. bearing hectares**
24	23

Planting data shown is from the 2023 season, while long-term productivity and cost averages are for bearing farms only over the last five seasons (2019-2023).

Averages are weighted by planted area to best illustrate results for the whole region.

An average of 130 farms in the NRNSW region have participated in benchmarking each season since 2009. There was a significant decline in 2023, with just 104 farms providing data for that season. Those farms represented 39% of all farms in the benchmark sample.

The NRNSW region is among the older production regions, with an average tree age of 27 years. Only 4% of this region's plantings in the benchmark sample are less than five years of age, and therefore not yet considered bearing. In 2023 the average age of bearing farms in the region was 28 years.

In 2023 the average size of participating farms in the NRNSW region was 24 planted hectares and 23 bearing hectares.

Productivity 2019-2023

NIS t/ha	SK t/ha
2.5	0.8
Saleable KR%	**Premium KR%**
34.1	30.7
Commercial KR%	**Reject KR%**
3.4	2.5

Average long-term productivity per bearing hectare and average kernel recovery are shown for all bearing farms in the region for the last five seasons. These averages are based on 635 farm-years.

There has been a general decline in seasonal productivity in this region since 2020. Although a similar trend has been observed in the 5-year average productivity since 2018, 5-year saleable kernel productivity has been more stable, primarily due to a general increase in saleable kernel recovery over the long term.

Costs 2019-2023

Cash $/ha	Total $/ha
$6,929	$7,757
Cash $/T NIS	**Total $/T NIS**
$3,210	$3,593
Cash $/T SK	**Total $/T SK**
$10,478	$11,729

Average operating costs are shown for the last five seasons (188 farm-years).

Average costs for this region have fluctuated between both farms and seasons, however they have generally risen by more than 30% since collection commenced in 2013. The standard deviation in cash costs over the last five seasons was approximately $4450 per hectare, or 64% of the mean.

Long-term average costs per hectare in NRNSW are generally lower than all other regions, although the standard deviation in those costs is higher than other regions, suggesting higher overall variability between farms and seasons.

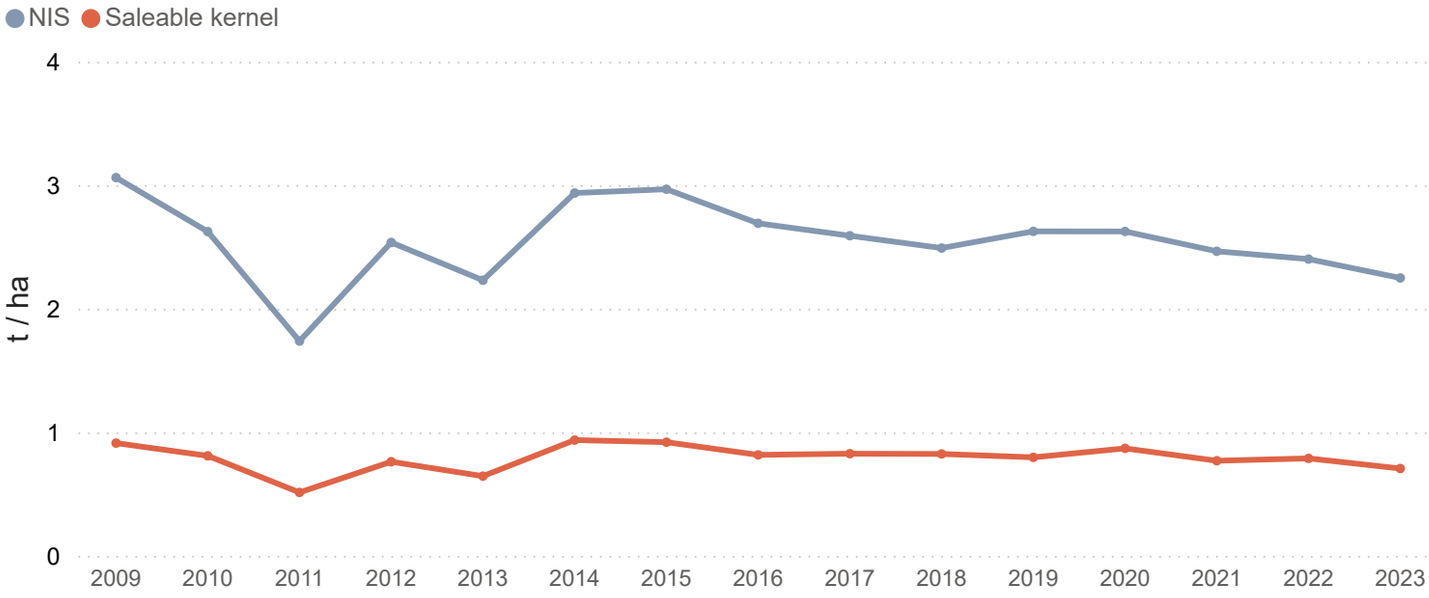
Seasonal productivity and kernel recovery trends in Northern Rivers NSW

The charts below show seasonal trends in average productivity and kernel recovery for farms in the Northern Rivers region of NSW. The top chart shows average nut-in-shell and saleable kernel productivity for mature farms in the benchmark sample, weighted by production. Mature farms are those with a weighted average tree age of 10 or more years. The bottom chart shows average saleable, premium, commercial and reject kernel recovery for all farms in the region.

Average yield for this region has been declining slightly since 2020. Some growers in this region suggested that extreme seasonal weather events and challenging conditions during harvest have contributed to this trend. Commercial kernel recovery in 2023 was the lowest on record for this region since benchmarking began.

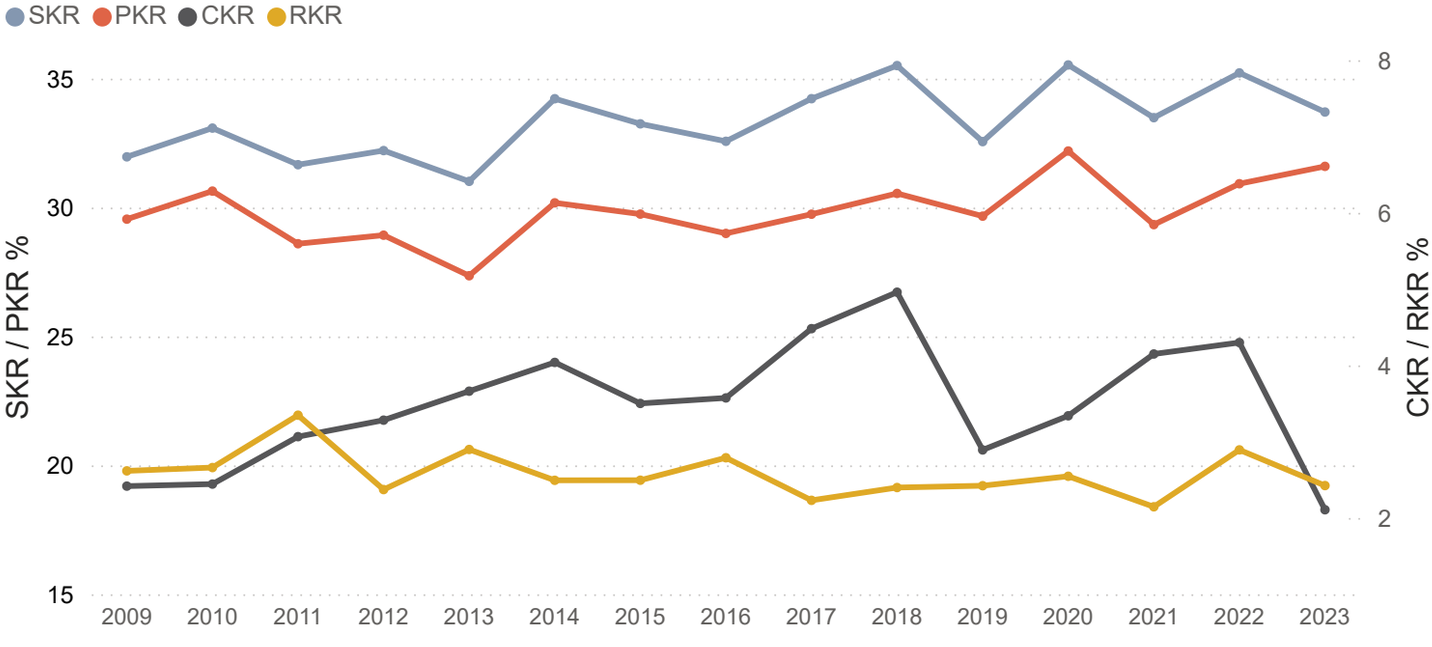
Productivity trends

Mature farms only, weighted by bearing hectares



Kernel recovery trends

Weighted by bearing hectares



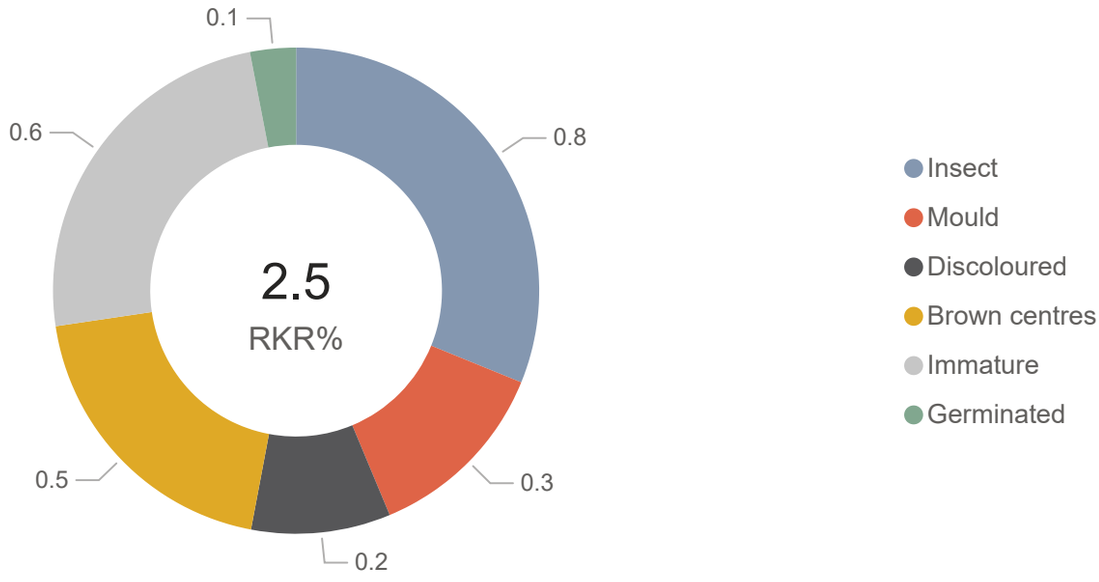
Seasonal reject trends in Northern Rivers NSW

The charts below show seasonal factory reject trends for farms in the benchmark sample within the Northern Rivers region of NSW. All major factory reject categories are shown including insect damage, mould, discolouration, brown centres (internal discolouration), immaturity (shrivelled kernel) and germination (discoloured crest).

The top chart shows a breakdown of long-term average factory rejects since 2009, weighted by NIS production. The bottom chart shows seasonal factory reject trends, also weighted by NIS production.

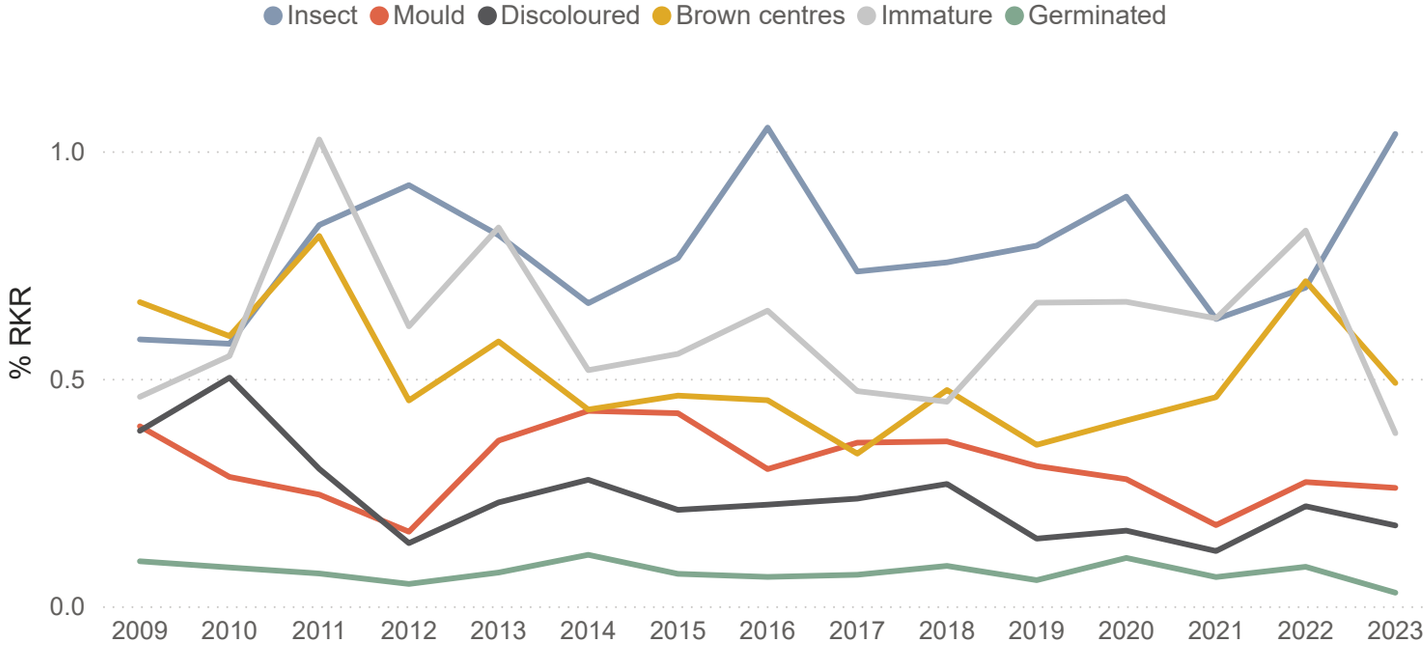
Some growers indicated that late season Fruit Spotting Bug damage was the major cause of the high average insect damage levels evident for the 2023 season.

Long-term average factory rejects by category



Factory reject trends

Bearing farms, weighted by NIS production



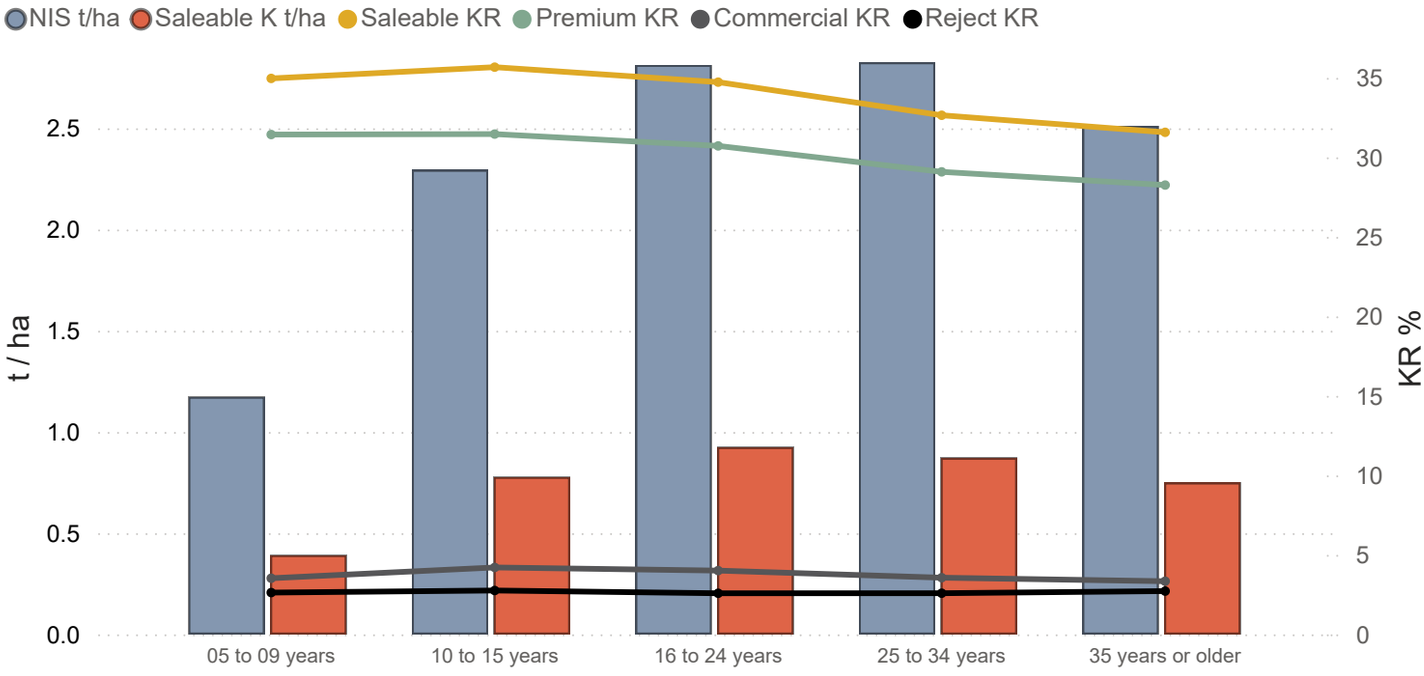
Long-term trends by tree age in Northern Rivers NSW

The charts below show long-term trends in productivity, kernel recovery and factory rejects for farms in the benchmark sample in the Northern Rivers region of NSW since 2009.

The top chart shows the unweighted average productivity and kernel recovery for farms within various average tree age categories ranging from 5-9 years through to 35+ years. The bottom chart shows a breakdown of unweighted average factory reject categories for each of those tree age groups.

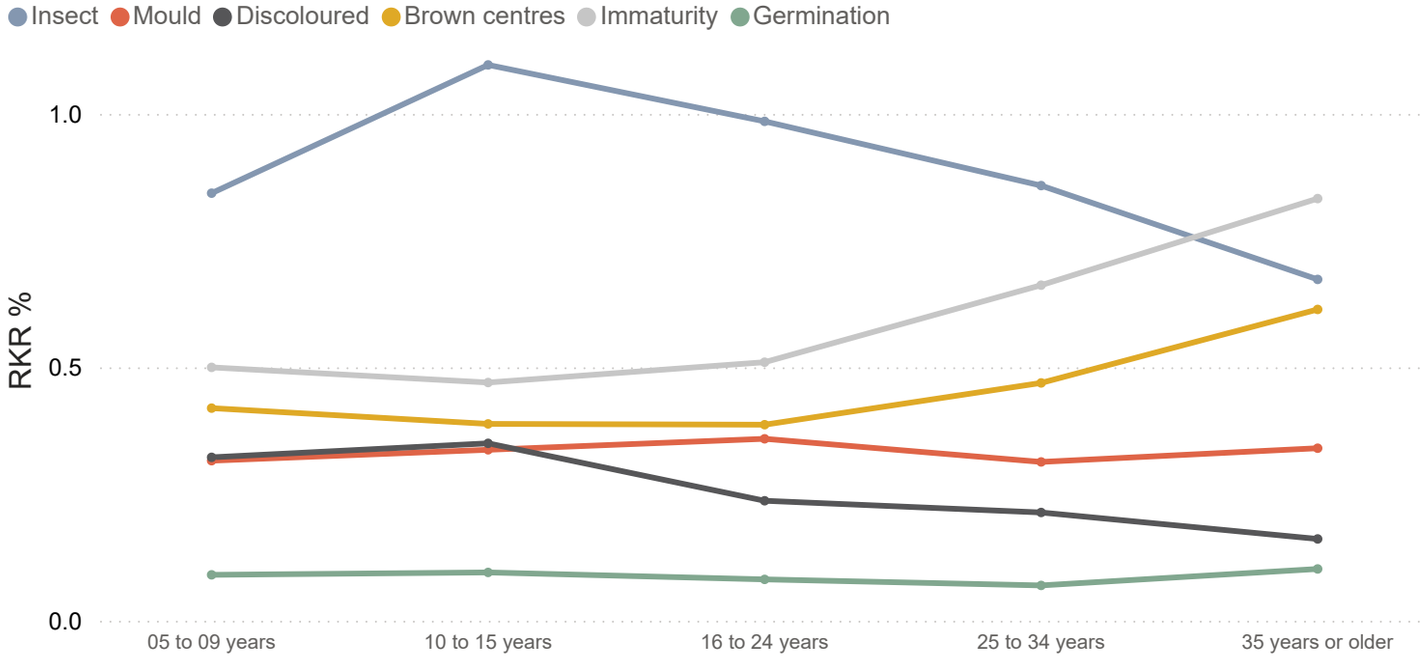
Productivity and kernel recovery by tree age

Unweighted averages for bearing farms



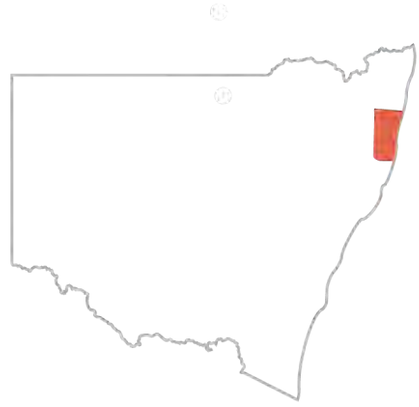
Factory rejects by tree age

Unweighted averages for bearing farms



Mid North coast NSW region

The Mid North Coast NSW (MNNSW) region includes areas in and around Valla, Nambucca Heads, Macksville and Yarrahapinni.



Plantings in 2023

Total farms	Bearing farms
27	22
Tree age (all)	**Tree age (bearing)**
25	26
Avg. planted hectares	**Avg. bearing hectares**
17	17

Planting data shown is from the 2023 season, while long-term productivity and cost averages are for bearing farms only over the last five seasons (2019-2023).

Averages are weighted by planted area to best illustrate results for the whole region.

An average of 25 farms in the MNNSW region have participated in benchmarking each season since 2009. A total of 27 farms provided data for the 2023 season, representing 10% of all farms in the benchmark sample.

The MNNSW region is among the older production regions, with an average tree age of 25 years. Less than 1% of this region's plantings in the benchmark sample are less than five years of age and therefore not yet considered bearing. In 2023 the average age of farms in the region was 26 years and the average farm size was 17 hectares.

Productivity 2019-2023

NIS t/ha	SK t/ha
2.3	0.8
Saleable KR%	**Premium KR%**
37.7	31.3
Commercial KR%	**Reject KR%**
6.5	2.9

Average long-term productivity per bearing hectare and average kernel recovery are shown for all bearing farms in the region for the last five seasons. These averages are based on 128 farm-years.

Productivity in the MNNSW region declined by 13% in 2023 compared with the previous season. Despite large variation in both NIS and saleable kernel productivity between seasons, there has generally been an 8% increase in 5-year average productivity in this region since benchmarking began.

Costs 2019-2023

Cash $/ha	Total $/ha
$8,053	$8,888
Cash $/T NIS	**Total $/T NIS**
$4,163	$4,595
Cash $/T SK	**Total $/T SK**
$11,628	$12,833

Average operating costs are shown for the last five seasons (63 farm-years).

Average costs for this region have fluctuated significantly between seasons and also between farms in some seasons. Over the long term, average costs have generally risen by approximately 7% since collection commenced in 2013, which is less than all other regions. The standard deviation in cash costs over the last five seasons was approximately $3178 per hectare, or 39% of the mean.

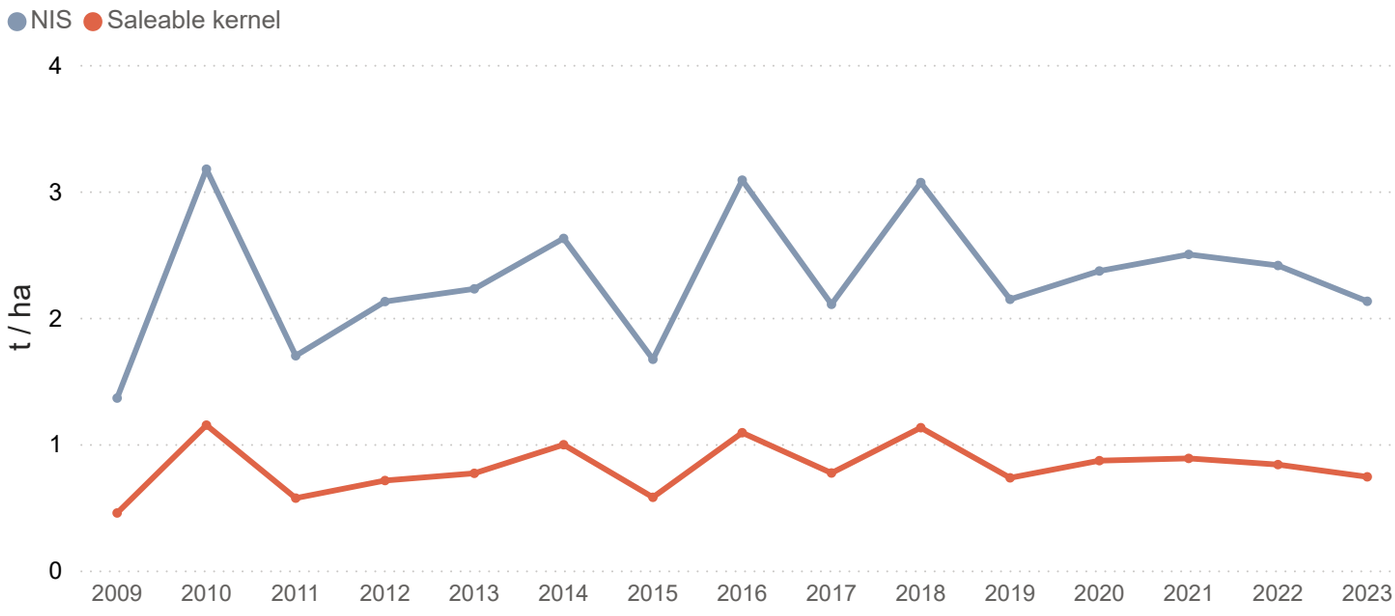
Seasonal productivity and kernel recovery trends in Mid North Coast NSW

The charts below show seasonal trends in average productivity and kernel recovery for farms in the Mid North Coast region of NSW. The top chart shows average nut-in-shell and saleable kernel productivity for mature farms in the benchmark sample, weighted by production. Mature farms are those with a weighted average tree age of 10 or more years. The bottom chart shows average saleable, premium, commercial and reject kernel recovery for all farms in the region.

Record low levels of both commercial and reject kernel recovery were evident in 2023. Reduced harvesting and increased on-farm sorting were reported by Benchmark Group participants, which may have contributed to these results.

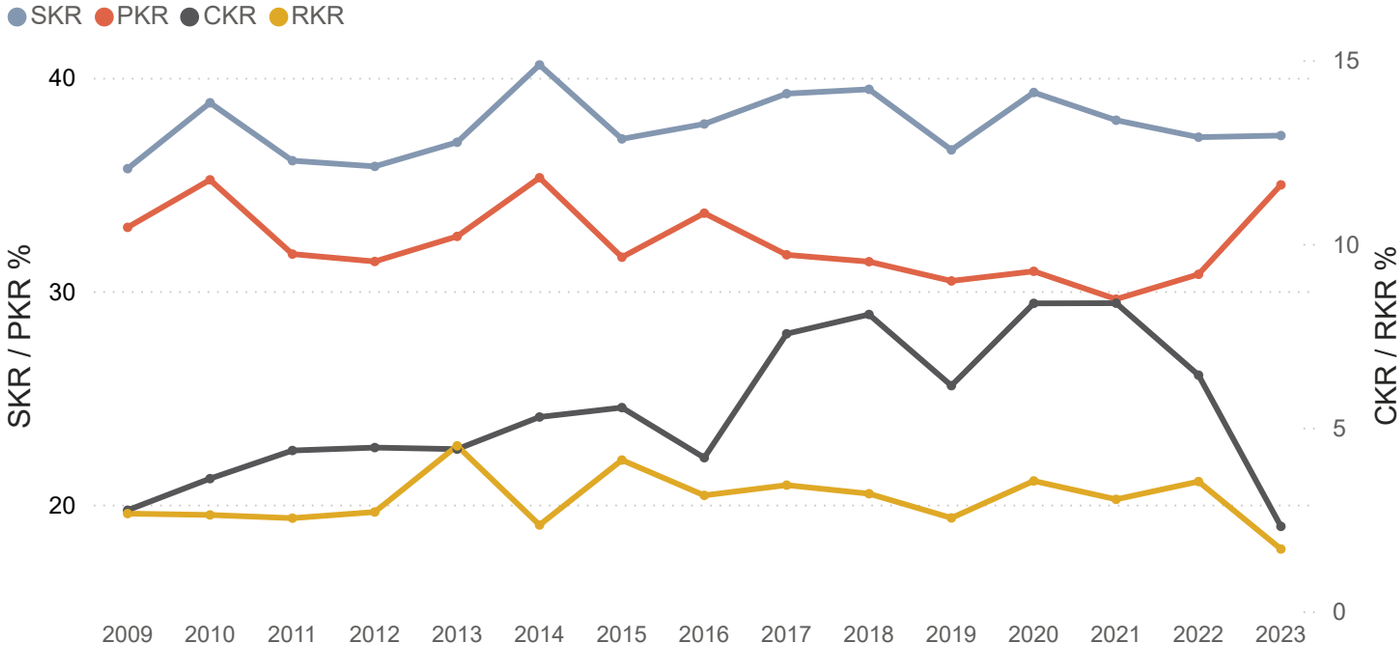
Productivity trends

Mature farms only, weighted by bearing hectares



Kernel recovery trends

Weighted by bearing hectares



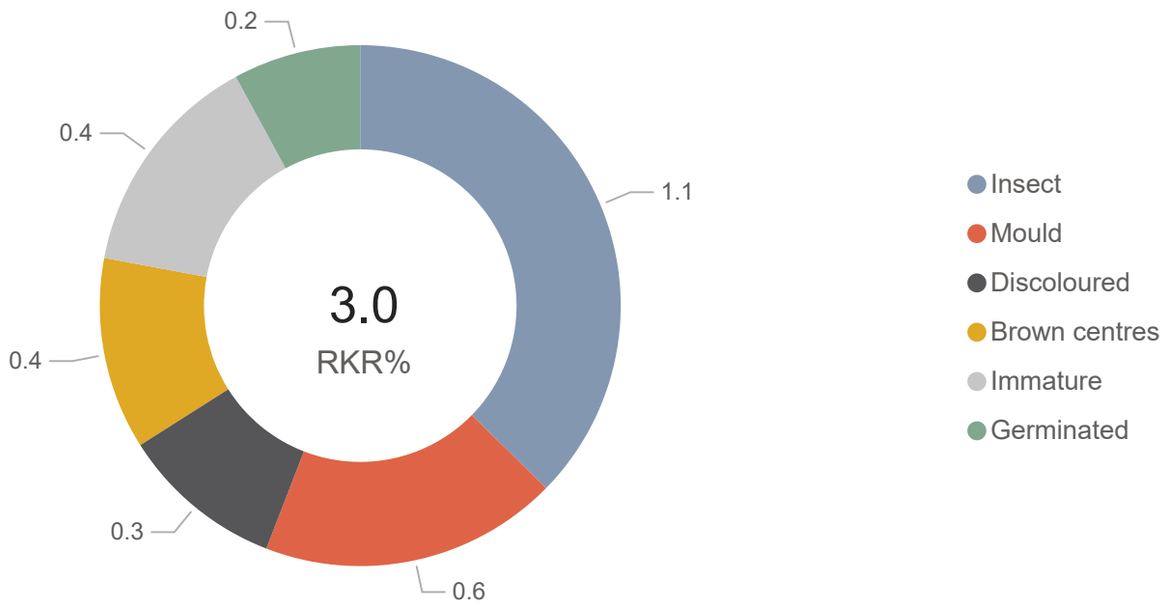
Seasonal reject trends in Mid North Coast NSW

The charts below show seasonal factory reject trends for farms in the benchmark sample within the Mid North Coast region of NSW. All major factory reject categories are shown including insect damage, mould, discolouration, brown centres (internal discolouration), immaturity (shrivelled kernel) and germination (discoloured crest).

The top chart shows a breakdown of long-term average factory rejects since 2009, weighted by NIS production. The bottom chart shows seasonal factory reject trends, also weighted by NIS production.

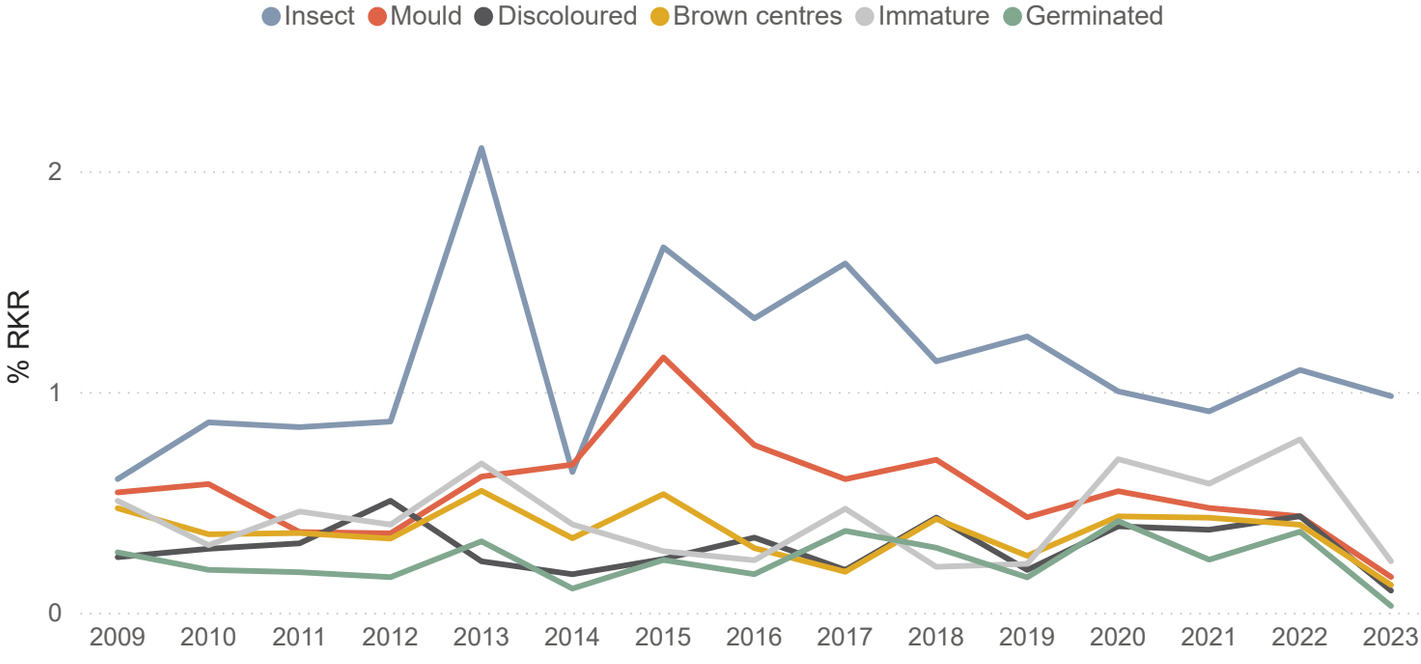
Insect damage is typically the major cause of factory rejects in the MNNSW region in most seasons. In 2023 growers reported high incidence of damage due to Fruit Spotting Bug and rats.

Long-term average factory rejects by category



Factory reject trends

Bearing farms, weighted by NIS production



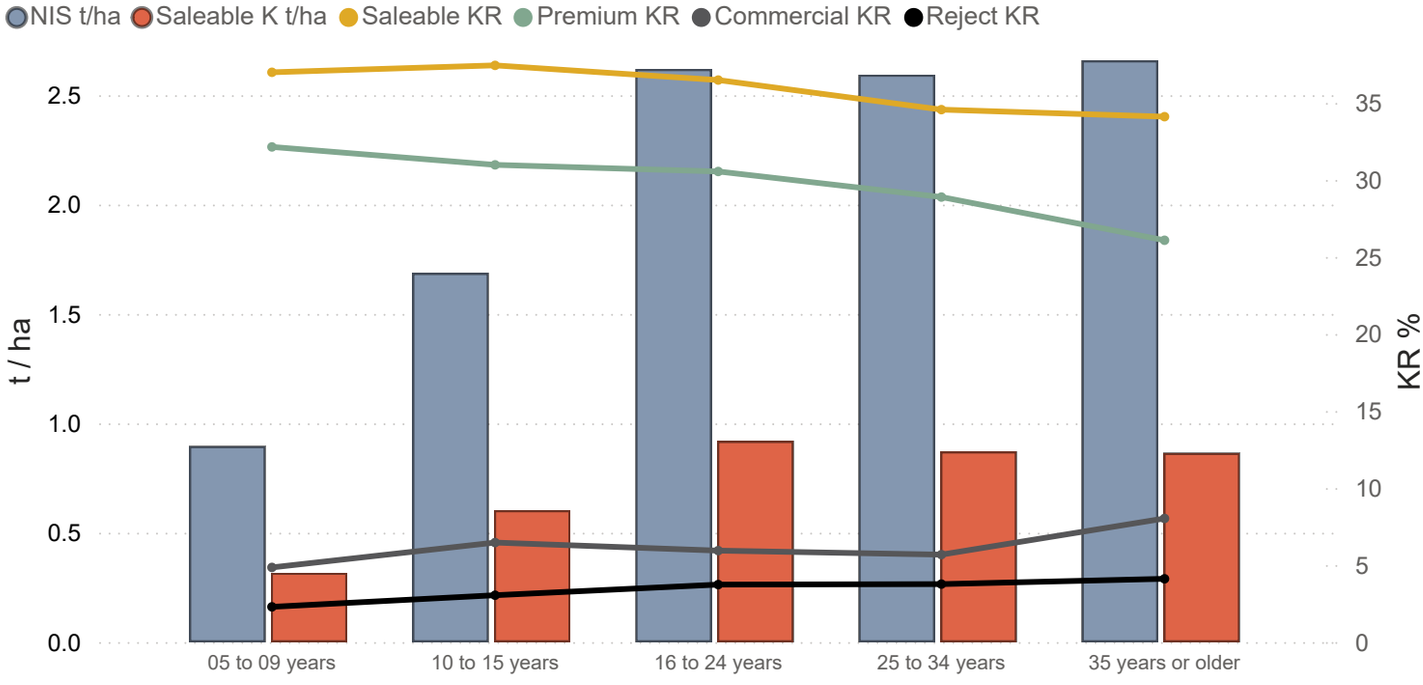
Long-term trends by tree age in Mid North Coast NSW

The charts below show long-term trends in productivity, kernel recovery and factory rejects for farms in the benchmark sample in the Mid North Coast region of NSW since 2009.

The top chart shows the unweighted average productivity and kernel recovery for farms within various average tree age categories ranging from 5-9 years through to 35+ years. The bottom chart shows a breakdown of unweighted average factory reject categories for each of those tree age groups.

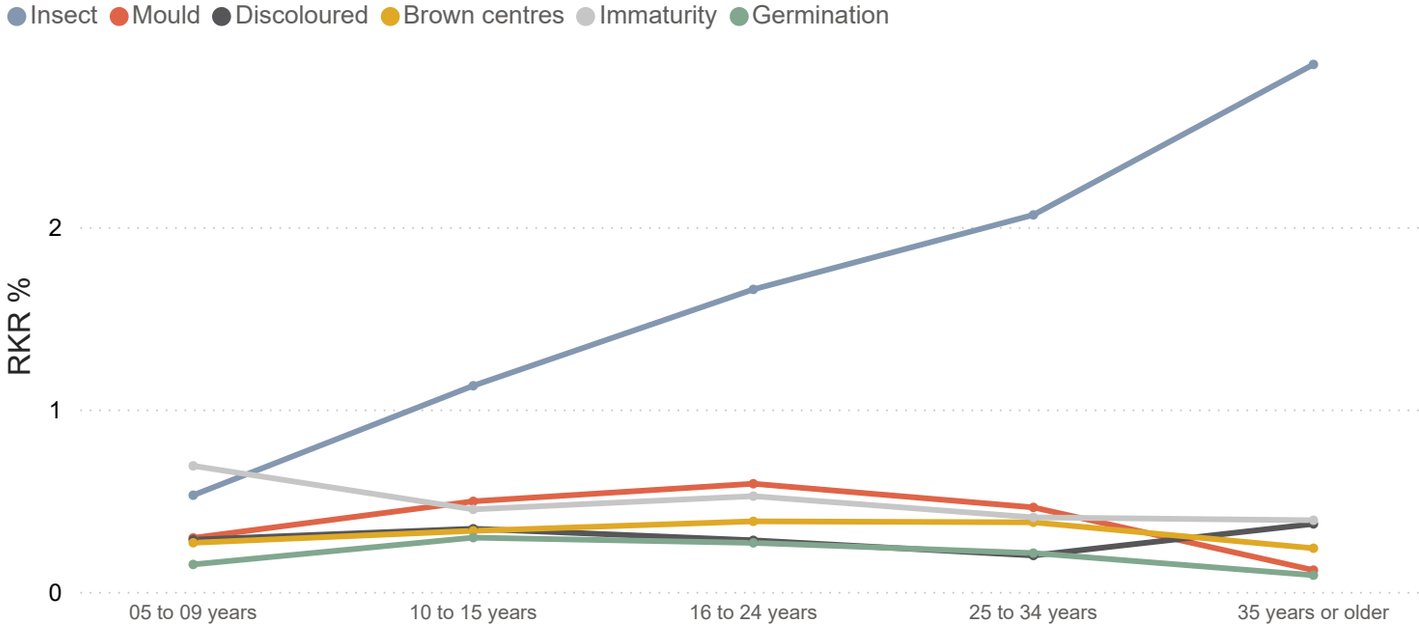
Productivity and kernel recovery by tree age

Unweighted averages for bearing farms

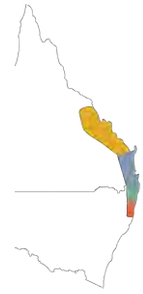


Factory rejects by tree age

Unweighted averages for bearing farms



Resource use and sustainability



The latest benchmarking project includes a focus on industry sustainability measures.

A survey of benchmarking participants was conducted in November 2023, to provide initial insight into key industry sustainability issues such as orchard floor management, biodiversity, nutrition, pollination and on-farm biosecurity.

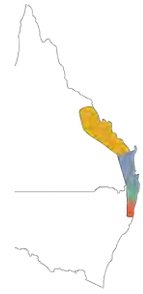
Responses were received from 112 participants, representing a total of 183 farms. These farms comprised 8169 planted hectares and produced 26,030 tonnes of nut in shell in 2022, which equates to almost 46% of national production that season. Key findings from the survey are shown in the table below.

More than 70% of respondents indicated they keep records relating to resource use on their farm(s), including water, energy and fuel. These metrics were subsequently added to the suite of data collected during the 2023 season and preliminary findings are shown on the following pages.

Sustainabilty survey responses

Indicator	Response
Objective measures guide more efficient water use.	23% of respondents indicated that they measure soil moisture or water demand to inform irrigation or other management practices, with 17% using soil moisture and sap flow meters and 6% using a range of other methods. 73% of respondents do not monitor soil moisture, with 56% from non-irrigated farms.
% farms with organic carbon in topsoil steady or improving.	>85% of respondents indicating soil organic carbon was either steady or increasing. Less than 15% of growers either did not measure or know their organic carbon levels.
Proportion of businesses using management practices to maintain ground cover for horticultural plantings.	89% of respondents reported that they actively maintain groundcover.
% farms with soil maps and/or descriptions.	39% of respondents have had their soil mapped. Soil mapping allows growers to identify zones within their orchard that require different levels of management and inputs such as nutrition and irrigation.
% producers using an informed strategy to match nutrient use to crop needs.	>90% of respondents reported that they undertake regular soil tests and almost 70% regularly take leaf tests. Almost 90% of respondents use an informed strategy to match nutrition inputs to crop use or needs.
Use of best practices to manage manures and composts.	95% of surveyed growers routinely apply organic matter including manures, compost, wood chip and tree prunings.
Use of erosion management strategies on drains and drainage areas in high-risk run-off areas	95% of respondents have undertaken erosion management on high-risk areas on their farm.
% businesses with land set aside for conservation / protection.	70% of growers maintain non-production areas for environmental benefit.
Involvement in activities to encourage biodiversity.	64% of growers have undertaken practices to encourage biodiversity on their farm.
Pollination services match demand.	81% of respondents use hives to improve pollination on their farm. The presence of honeybees or native bees during flowering is beneficial in increasing nut set.
Strategies used to protect and attract pollinators.	43% actively use strategies to attract pollinators.
% Producers who monitor and review electricity and fuel use.	More than 70% of growers can provide information about inputs and resource use such as fuel, gas and electricity.
% producers having a biosecurity management plan.	Only 35% of respondents have an on-farm biosecurity plan, although this increases to 66% when viewed as planted area.

Seasonal fuel use



The figures below show fuel use for bearing farms in the benchmark sample. All averages are weighted by bearing hectares. A total of 86 farms provided fuel use data for the 2023 season.

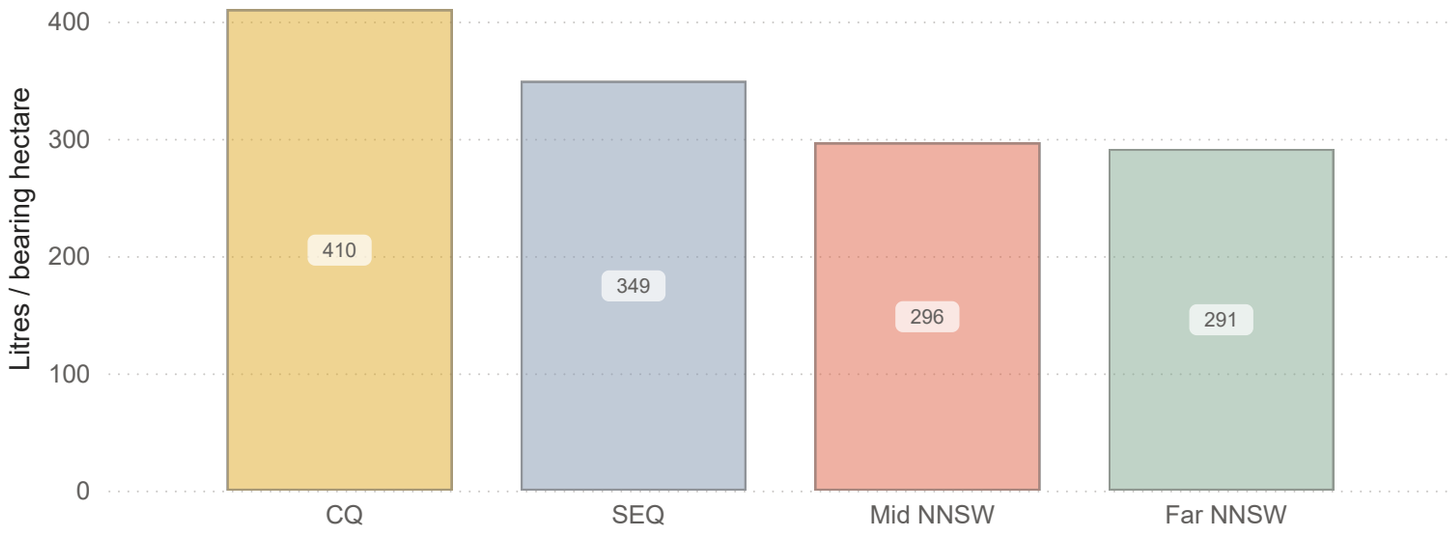
The table below shows averages for the whole benchmark sample and the charts show averages for each major production region. The top chart shows average fuel use per hectare and the bottom chart shows equivalent fuel use per tonne of nut-in-shell and saleable kernel production.

Average fuel use in 2023

337	137	422	86
Litres per bearing hectare	Litres per tonne NIS	Litres per tonne SK	Farms

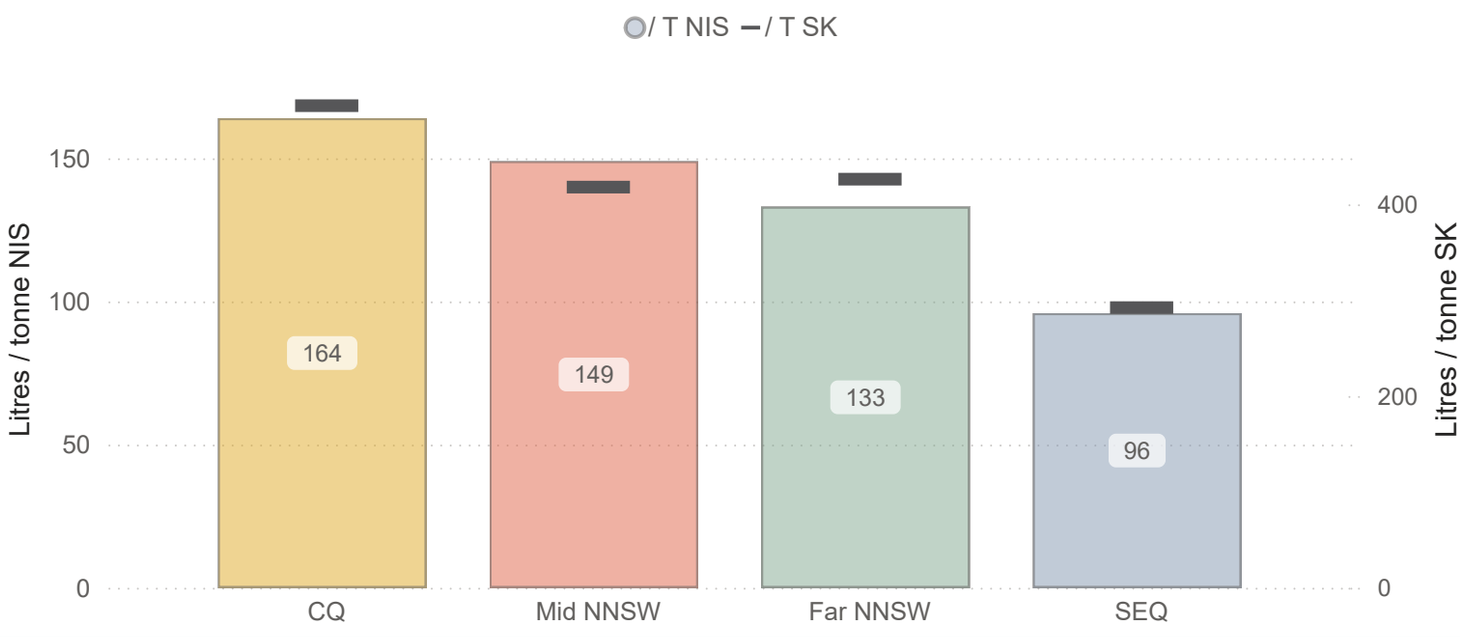
Average fuel use per hectare

Weighted by bearing hectares

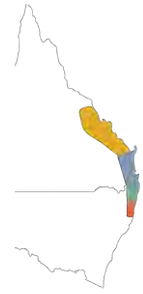


Average fuel use per tonne of NIS / SK

Weighted by bearing hectares



Seasonal electricity use



The figures below show electricity use for bearing farms in the benchmark sample. All averages are weighted by bearing hectares. A total of 65 farms provided electricity use data for the 2023 season.

The summaries shown below show averages across the whole benchmark sample. These are split into fully-irrigated and non-irrigated farms, as electricity consumption varies significantly between these groups. A total of 12 fully-irrigated farms and 53 non-irrigated farms submitted data. Caution should be used when interpreting results due to the relatively small sample size, particularly for irrigated farms.

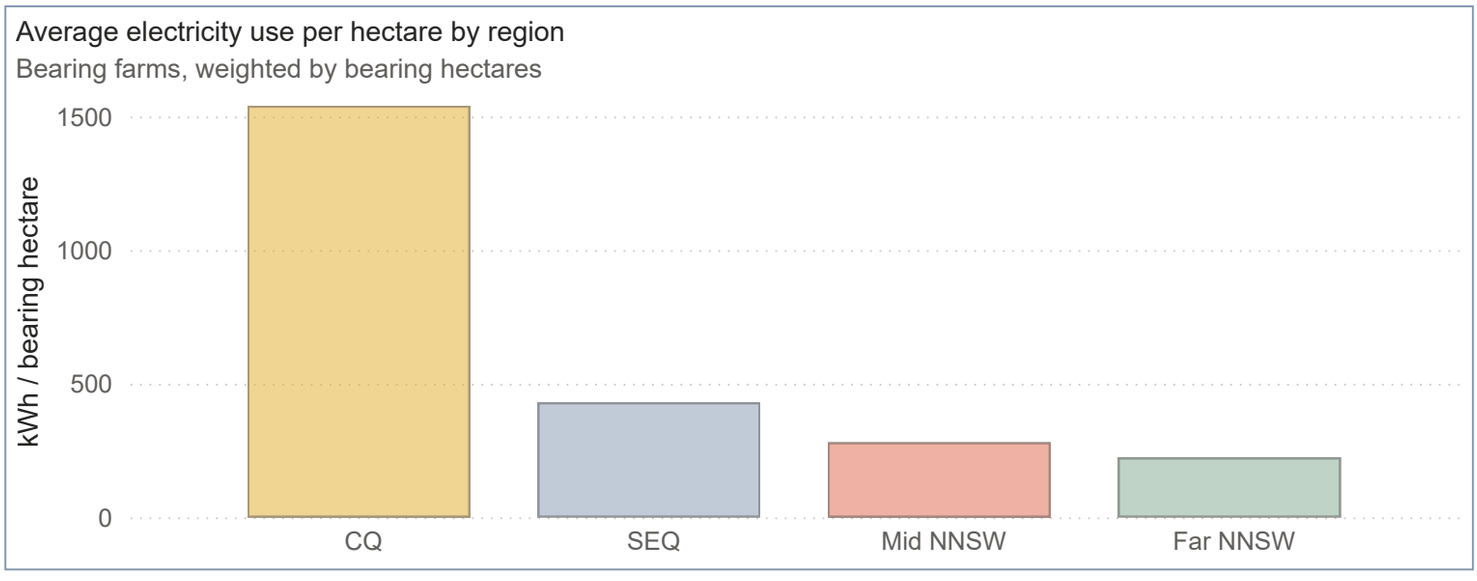
The charts show average electricity use for each major production region. The top chart shows use per hectare and the bottom chart shows equivalent use per tonne of nut-in-shell and saleable kernel production.

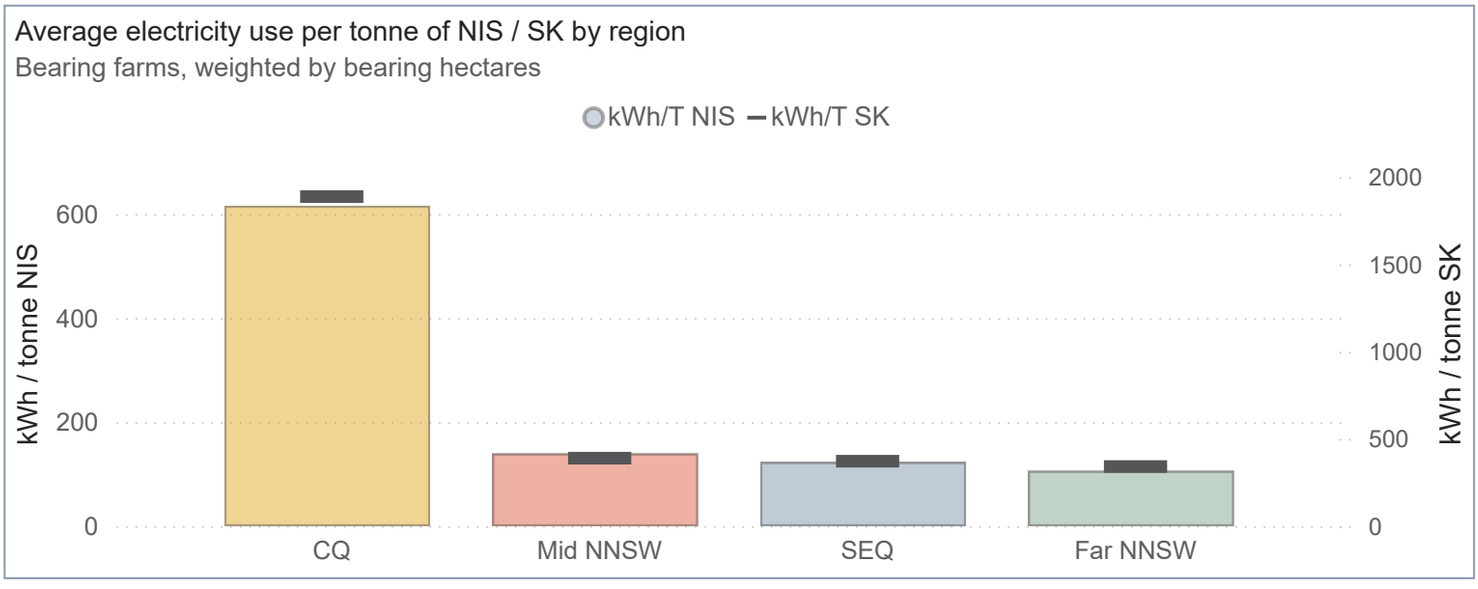
Average electricity use for fully irrigated farms in 2023

1497	590	1820	12
kWh per bearing hectare	kWh per tonne NIS	kWh per tonne SK	Farms

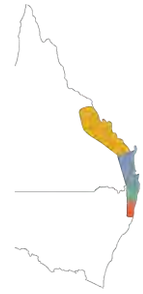
Average electricity use for non-irrigated farms in 2023

220	95	295	53
kWh per bearing hectare	kWh per tonne NIS	kWh per tonne SK	Farms





Seasonal water use



The figures below show average water use for bearing farms in the benchmark sample, weighted by bearing hectares. A total of 21 fully irrigated farms and 8 partially irrigated farms provided water use data for the 2023 season. Caution should be used when interpreting these data due to the relatively small sample size.

The summaries shown below show averages across the whole benchmark sample. These are split into fully-irrigated farms and those with partial or supplementary irrigation. The chart shows average water use for irrigated farms in the CQ and SEQ regions per hectare, tonne of nut-in-shell and tonne of saleable kernel.

Average water use for fully irrigated farms in 2023

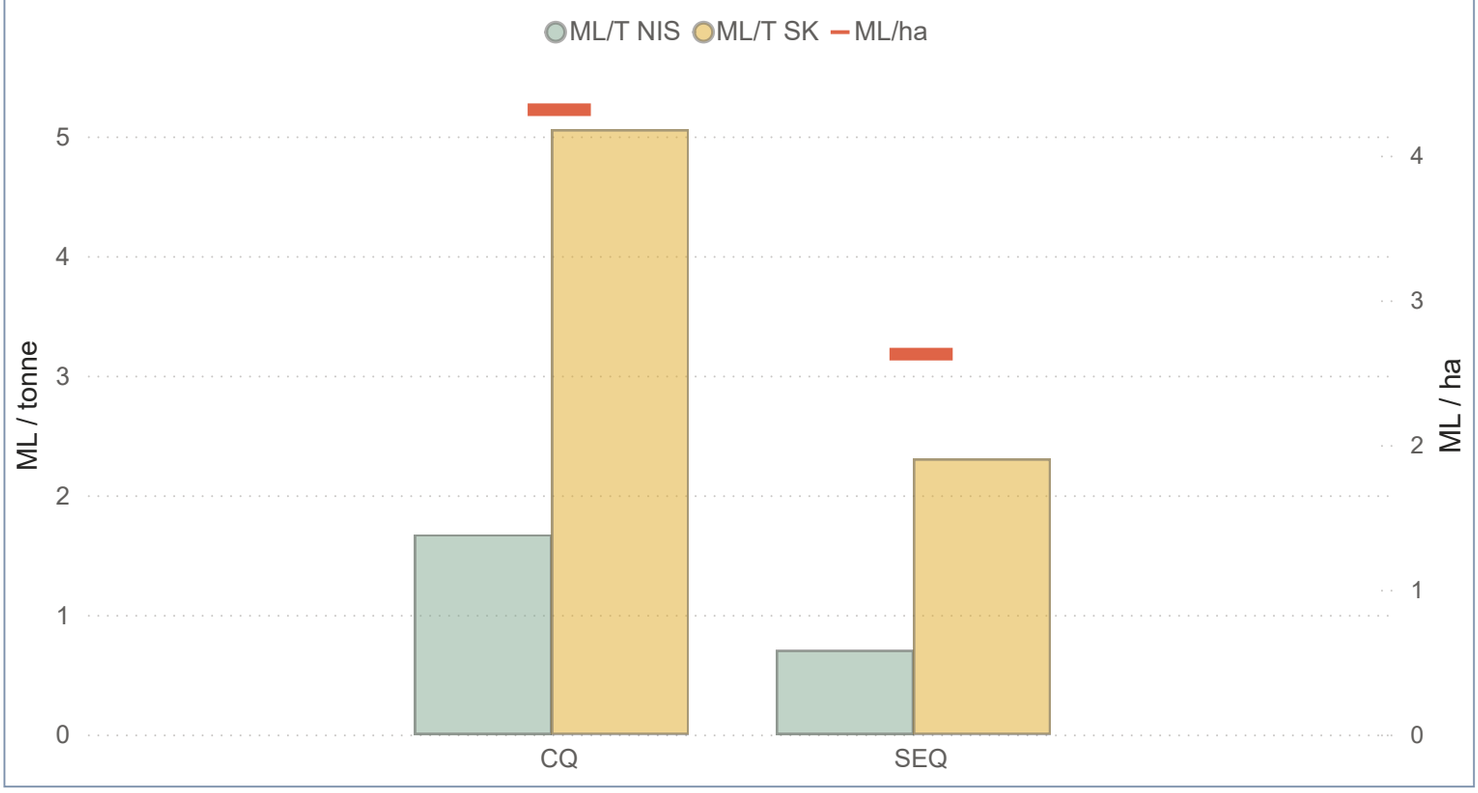
4.2	1.6	4.8	21
ML per bearing hectare	ML per tonne NIS	ML per tonne SK	Farms

Average water use for farms with partial/supplementary irrigation in 2023

0.6	0.2	0.5	8
ML per bearing hectare	ML per tonne NIS	ML per tonne SK	Farms

Average water use by region in 2023

Fully irrigated farms, weighted by bearing hectares



Data considerations

Farms and plantings

- The term farm-year is used to describe data for an individual farm for a given year.
- Plantings less than five years of age are generally excluded from estimates of bearing hectares. This is important for consistency across the benchmark sample.

Averages

- Averages presented for any given season are based on data from a minimum of ten farms. This minimum is applied to safeguard the confidentiality of individual farm data.
- Unless otherwise stated, averages presented are unweighted. This means that all farms in the sample exert an equal influence on the average regardless of their size.
- All weights presented are based on the industry standard moisture content of 10% for nut-in-shell and 1.5% for kernel.
- Averages that span multiple seasons are derived from all available seasons unless otherwise specified.
- Where potential for significant skewing of a data occurs (e.g., seasonal costs) medians rather than averages may be presented to provide an understanding of the mid-point of the sample.
- Some averages may be based on subsets of all available data. Atypical or non-representative data may be excluded from some analyses to avoid adversely skewing averages. Where this has occurred, it will be indicated in results (e.g. mature farms only).

Factory rejects

- The sum of reject kernel category values presented equates to the total reject kernel recovery percentage, rather than totalling 100%. This standard is applied for consistency across the benchmark study.
- Widely recognised terms are used wherever possible to describe kernel recovery and reject analysis categories, although some processors may use different terminology to describe similar reject categories or have their own additional reject categories.

Costs

- Cost data reported for any given season includes all expenditure incurred in the preceding financial year (e.g., 2012/13 financial year for 2013 production season).
- Costs such as capital expenditure, depreciation and taxation are excluded from this study.
- Unpaid labour hours have been collected since 2017. The value of this labour is imputed at a nominal rate of $30 per hour to derive a more complete picture of labour costs, particularly for owner-operated farms.
- All farm costs per hectare are based on total planted hectares unless otherwise stated. This may include non-bearing hectares for some farms as most businesses do not separate costs by tree age within their accounting systems.
- Heads of expenditure shown in this report are based on a standard chart of accounts, developed in conjunction with accountants and financial advisors. This is used to ensure consistent interpretation of costs across multiple farm businesses.