



Willis Towers Watson 

Key risks for Australian macadamia growers and potential insurance options to manage financial losses

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Summary & key findings

The Australian macadamia industry has a farm gate of ~ 280 million dollars and is the world's leading producer macadamia kernels, accounting for 30% of global supply (AMS, 2017). However, the macadamia industry faces major challenges from extreme climate and weather events, which are projected to increase in the future as a result of climate change.

In 2017 extreme weather events, such as cyclones, droughts and excess rainfall were attributed to yield losses by many macadamia growers (ABC report, 2017). While the industry and growers can adapt to and manage some climate variability, there will inevitably continue to be some weather events which result in significant yield loss. Where the impact of weather variability cannot be avoided, mitigated or managed, then risk-transfer options, such as insurance, can provide much needed liquidity at times of extreme need.

This report is for the Australian macadamia industry and growers. It includes:

- **A summary of the key risks to production and their importance, as identified by macadamia growers across numerous growing regions**

Based on preliminary surveys of macadamia growers, the following key risks were identified:

- Drought for macadamia growers in Bundaberg, Kempsey and Marburg.
 - Hail for macadamia growers in Bangalow, Byron Bay and Lismore.
 - Pest and disease for macadamia growers in Wollongbar and Nashua respectively.
 - Excess rainfall and heat for macadamia growers in multiple regions.
- **An overview of insurance products that are currently available or which could be developed to provide a mechanism for transferring some of these key risks.**

There is currently very little availability of affordable insurance products to address the key risks of macadamia growers. This report explores the potential for the development of weather-index policies to address these needs.

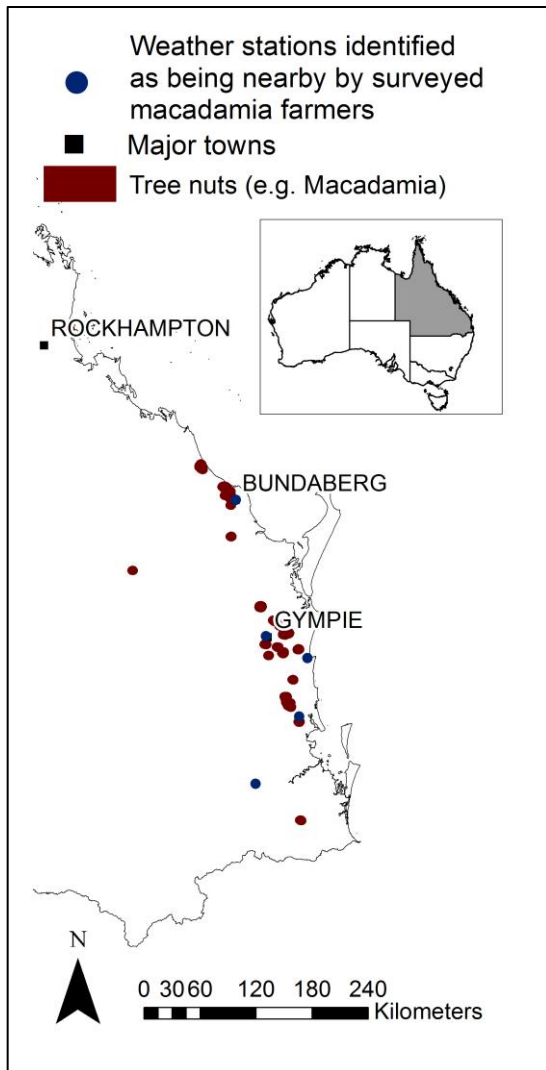
The application of weather-index products to the agriculture sector in Queensland is currently being investigated as a part of a Queensland Government funded project (Drought and Climate Adaptation Programme - DCAP).

The DCAP project team will work with macadamia growers to tailor weather-index products to meet their needs and budget. Initially these will be developed for low rainfall in Bundaberg, Kempsey and Marburg, but products can also be developed to address low rainfall in other regions, excess rainfall, heat and cyclone risks.

Data

The data underlying the report are summarised in the following pages. This includes the farm characteristics of the surveyed growers and the key risks identified by these growers.

Farm characteristics of surveyed macadamia growers



Twenty-six macadamia growers provided responses regarding their key risks to production.

Average farm size was approximately 30 ha, although farm size varied substantially with some farms less than 10 ha and others greater than 50 ha.

Survey data is available from the DCAP project team as an excel sheet.

A map of macadamia growing areas in central and southern Queensland, alongside nearby weather stations that could be used in the design of insurance products is shown in Figure 1 below.

Figure 1 Location of tree nut crops in central and southern Queensland showing station identified as nearby by macadamia growers.

Key risks identified by macadamia growers

Risk assessment

Macadamia growers were asked to assess the likelihood of a range of risks occurring, the potential severity of impact should the risk occur and estimated percentage losses from these risks. The risks considered were:

- Drought
- Season rain
- Harvest rain
- Hail
- Heat
- Sunburn disease
- Pests
- Flood
- Prices

Risks were assessed by area. Note in some areas there were no responses or only responses from one farmer and the findings will reflect this one farmer's response. In areas with multiple farmers the figures show the average responses from all farmers in that area.

Table 1, below, shows the ranking of all risks for each surveyed area. These estimated expected losses are calculated as the likelihood of occurrence multiplied by the estimated percentage losses.

Table 1 Key risks (highlighted in bold blue) identified by macadamia growers.

Area / Weather Station	Drought	Season rain	Harvest rain	Hail	Heat	Sunburn	Disease	Pests	Flood	Prices
Bangalow (Newrybar)	0.00	0.80	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00
Bundaberg	0.31	0.25	0.25	0.15	0.15	0.15	0.15	0.19	0.31	0.00
Byron Bay	0.23	0.68	0.75	1.97	0.21	0.09	0.27	0.92	0.26	0.81
Kempsey	1.80	0.40	0.00	0.30	0.40	0.40	0.40	0.40	0.00	0.00
Lismore	0.39	0.51	0.35	0.88	0.33	0.30	0.21	0.52	0.11	0.60
Marburg	2.50	0.00	0.30	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Nashua	0.00	0.10	0.10	0.00	0.00	0.00	0.40	0.10	0.00	0.00
Wollongbar	0.10	0.20	0.20	0.06	0.00	0.01	0.04	0.30	0.04	0.06

Likelihood

The most likely risks, as scored by surveyed macadamia growers, were excess rainfall, drought, hail and pests. Excess rain was scored as one of the risk most likely to occur in Ballina, Bangalow, Beerburrum, Bundaberg, Lismore, Kempsey, Nashua and Smoky Cape. Hail was also ranked as highly likely in Bangalow and Smoky Cape. Drought was ranked as highly likely in Beerburrum, Bundaberg, Marburg and Smoky Cape. Pests were ranked as a high likelihood risk in Wollongbar, Byron Bay, Bundaberg, Smoky Cape and Nashua. The average likelihood scores of all risks for each area are shown in Figure 2.

Severity of risks

The severity of each risk was ranked differently amongst growers in the different areas surveyed. Pests were ranked as one of the most severe risks in Ballina, Lismore, Byron Bay, Smoky Cape and Wollongbar. Drought was scored as most severe in Bundaberg, Marburg and Kempsey, while excess rain / flood were ranked as severe in Bundaberg, Smokey Cape and Wollongbar. Disease was ranked as one of the most severe risks in Nashua and Kempsey. The average severity scores of all risks for each area are shown in Figure 3.

Losses from risks

The risks associated with the greatest estimated losses varied between areas. Hail was associated with the highest estimated losses in Bangalow, Byron Bay and Lismore. Drought were associated with the highest losses in Bundaberg (where losses from flood were estimate to be equally high), Marburg and Kempsey. Pests were associated with the highest estimate losses in Wollongbar and disease in Nashua. The average estimated losses from all risks for each area are shown in Figure 4.

Ranking of risks (losses x likelihood)

The importance of risks was ranked by calculating the likelihood of loss multiplied by the percentage losses associated with that risk. Using this measure hail was the highest ranked risk in Bangalow, Byron Bay and Lismore. Drought was most the highest ranked risk in Bundaberg, Kempsey and Marburg. Disease was most important in Nashua and Pests in Wollongbar.

Drought and climate adaptation program

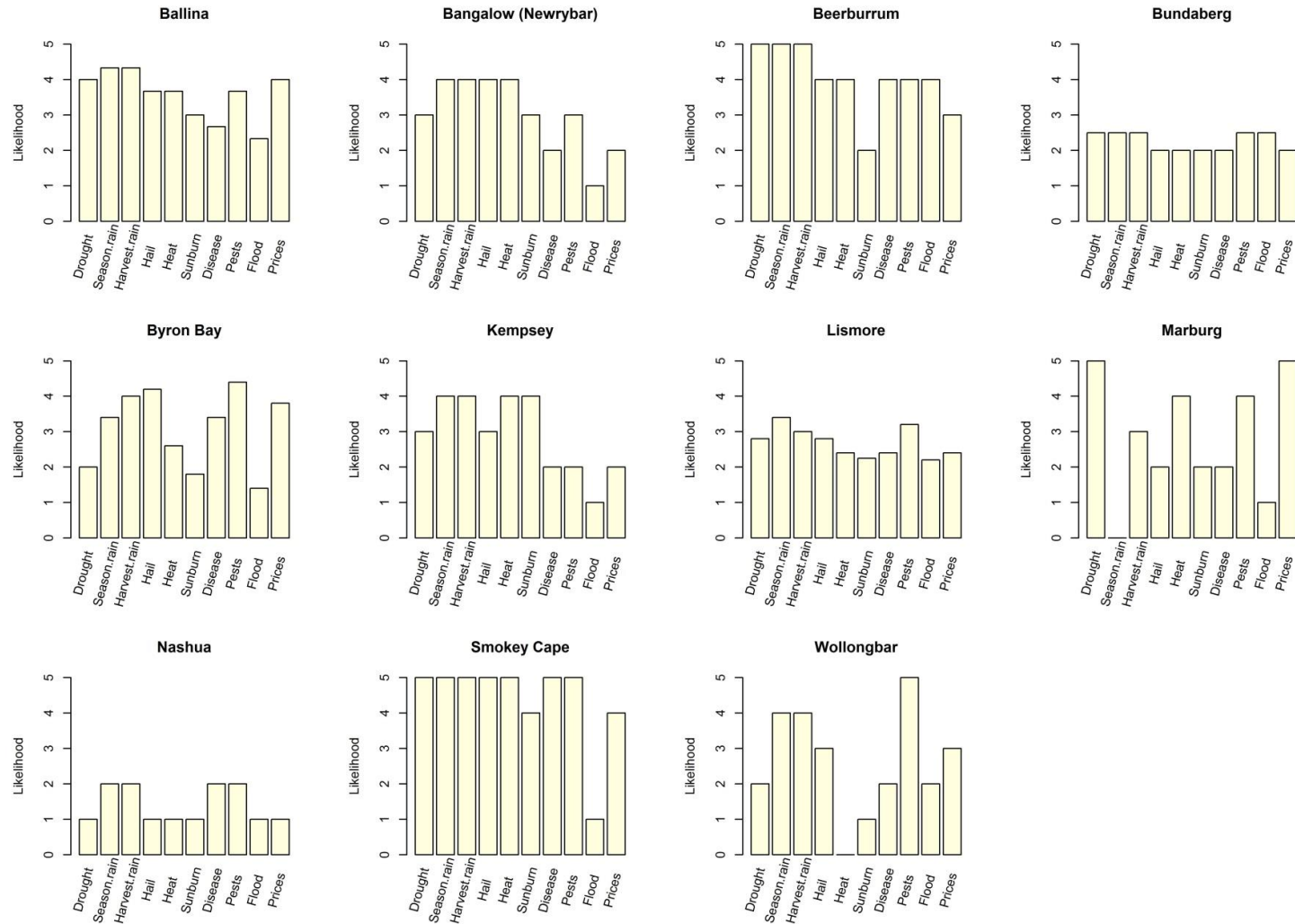


Figure 2 Likelihood of risks occurring according to surveyed macadamia growers

Drought and climate adaptation program

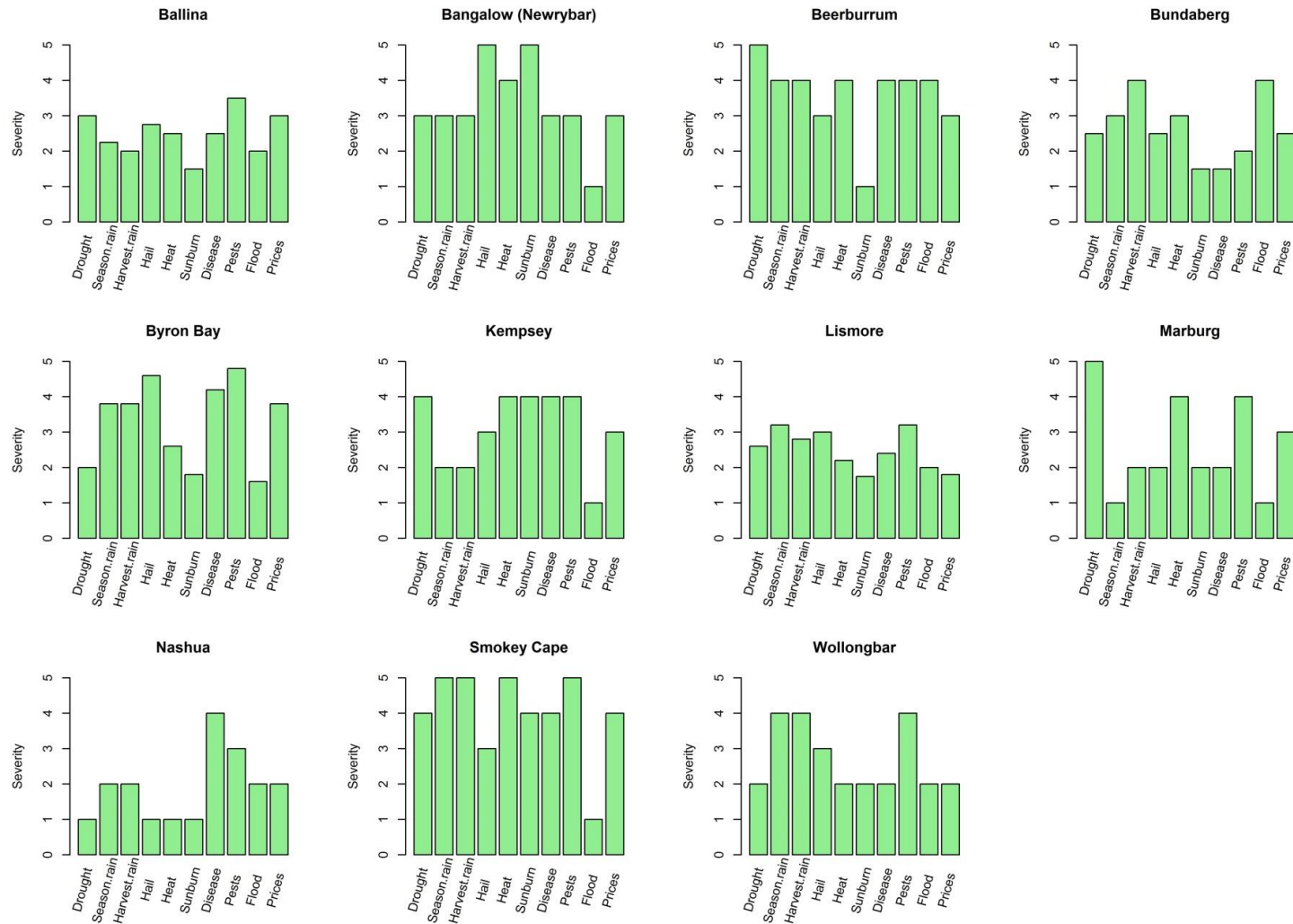


Figure 3 Severity of risks according to surveyed macadamia growers

Drought and climate adaptation program

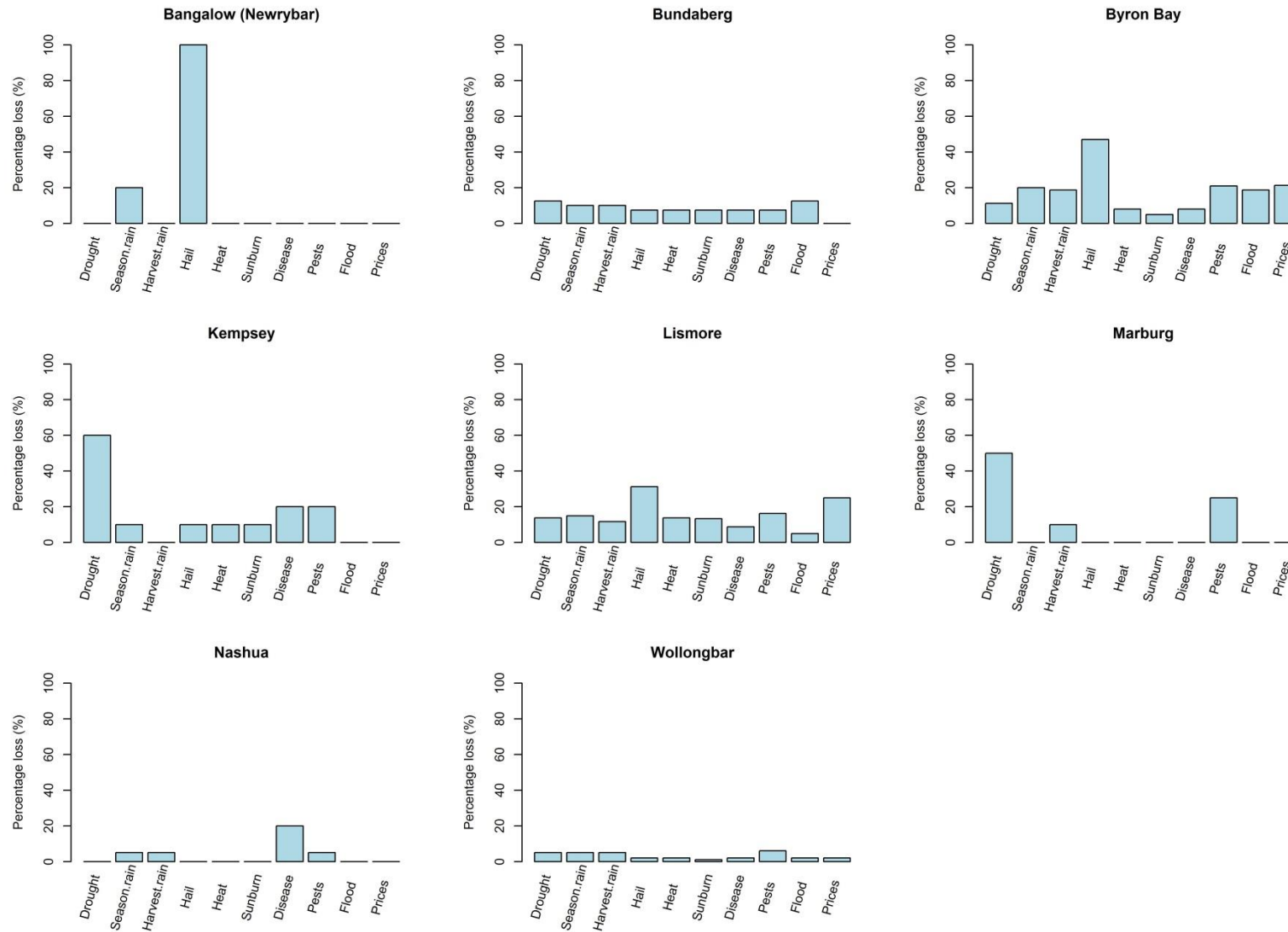


Figure 4 Estimated percentage losses attributable to different risks according to surveyed macadamia grower

Risk transfer options

What are the current insurance options for macadamia growers in Australia

Although insurance can provide an efficient mechanism for growers to transfer the risks of weather variability on crop yields, there is currently limited appetite on the part Australian insurers to provide traditional forms of crop insurance.

The types of insurance covers available (or under consideration) for macadamia growers are as follows:

- **Single/'named' peril crop insurance:** typically hail, storm, frost or fire cover but very postcode specific with insurers excluding hail and storm affected areas.
- **Multi-peril crop insurance:** typically whole farm yield loss protection (equivalent to 'all risks') where exclusions are specified in the policy, for example, failure to carry out good farming practice. To the best of our knowledge this is not currently being offered to macadamia growers in Australia.
- **Area yield coverage:** covers loss of yield based upon the performance of a specified region. Again, to the best of our knowledge, this not currently being offered to macadamia growers in Australia.
- **Weather-index insurance:** provides a simpler way for growers to protect themselves against natural catastrophes (such as cyclones) or adverse weather events (such as drought). This type of insurance policy is readily available via specialist global insurance markets.

The application of weather-index products to the agriculture sector in Queensland is currently being investigated as a part of a Queensland Government funded project (Drought and Climate Adaptation Programme - DCAP).

<https://www.daf.qld.gov.au/business-priorities/environment/drought/dcap/about-dcap>

Details of the operation and application of weather-index insurance is provided in the next section.

What is weather-index insurance and how could it serve the Australian macadamia industry?

Weather-index policies are utilised by companies across many industry sectors to protect against the impact of weather uncertainty on revenues and costs. These policies respond to movements in an agreed weather-denominated index or the occurrence of a pre-defined event (usually a natural catastrophe) of a pre-specified magnitude during the policy period.

The reference index is typically constructed from weather data --temperature, rainfall or wind-speed, for example -- as provided by an independent arbiter of actual weather conditions, such as the Bureau of Meteorology (BOM) in Australia.

Each policy is tailored to the precise exposures of the insured. Key contract variables such as weather parameter, location, attachment points, pay-outs and limits are structured to compensate the buyer (in this case a grower or farming industry group) for a pre-defined weather outcome that could

negatively impact the business, as opposed to actual loss (or strict indemnity i.e. conventional insurance). For this reason, the analysis and structuring components of the cover are critical in order to eliminate, or at least minimise, basis risk - i.e. the risk that actual losses are not well represented by the index. Correlating weather outcomes to increased costs, or reduced revenue, is an actuarially driven process using either actual or modelled financial and historical weather data.

Claims payments are made once the policy triggers are met with the claim value being calculated according to a pre-agreed formula applied to the value of the index. This eliminates the need for on farm loss adjustment, avoids contract disputes and ensures that claims are paid rapidly.

Rather than competing with any existing insurance arrangements in place through other agricultural insurers, this approach provides macadamia growers with a totally distinct risk transfer alternative.

Group buying power

Macadamia growers are in a position to use the size and scale of their grower base as a way of providing more cost-effective cover. Mechanisms, such as a captive insurer or discretionary mutual fund (DMF), can be used to pool risks common to growers. Such arrangements can facilitate efficient risk sharing among growers by aggregating low value, high frequency losses and funding these from a dedicated pool of shared capital and premiums, meaning that external insurer capital would only be used - and paid for - to protect against an accumulation of smaller losses or one-off large losses in excess of the industry's group risk appetite.

Next steps and engaging with growers to develop prototype weather-index insurance products that are tailored to macadamia industry needs

Industry and grower participation is important for the DCAP project as it enables products to be developed which meet the needs of the industry.

The project team will work closely with the Australian Macadamia Society to identify opportunities to engage with growers to better understand the specific risks faced by individual farms.

Case studies will be developed proving costed insurance products for specific risks, locations and risk periods, e.g. low rainfall in Bundaberg in January, which can be used to demonstrate how these policies operate, the design characteristic and the likely cost.

Based on preliminary surveys of macadamia growers the initial focus will be to develop case studies for low rainfall in Bundaberg, Kempsey and Marburg. Case studies for excess rainfall and heat will also be developed subject to further grower input.

References

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