Climate Monitor – Quick Guide for new users.

"Climate Monitor – is an online interactive Agriculture and Horticulture focussed, climate interrogation and analysis tool"

Climate Monitor uses official BoM and Qld Dept of Environment and Science "SILO" real-time data to enhance & improve Agriculture and Horticultures' climate risk decision-making and adaptive capacity to today's ever-change climate impacts".

The Welcome Screen *introduces and explains this DCAP web tool.*

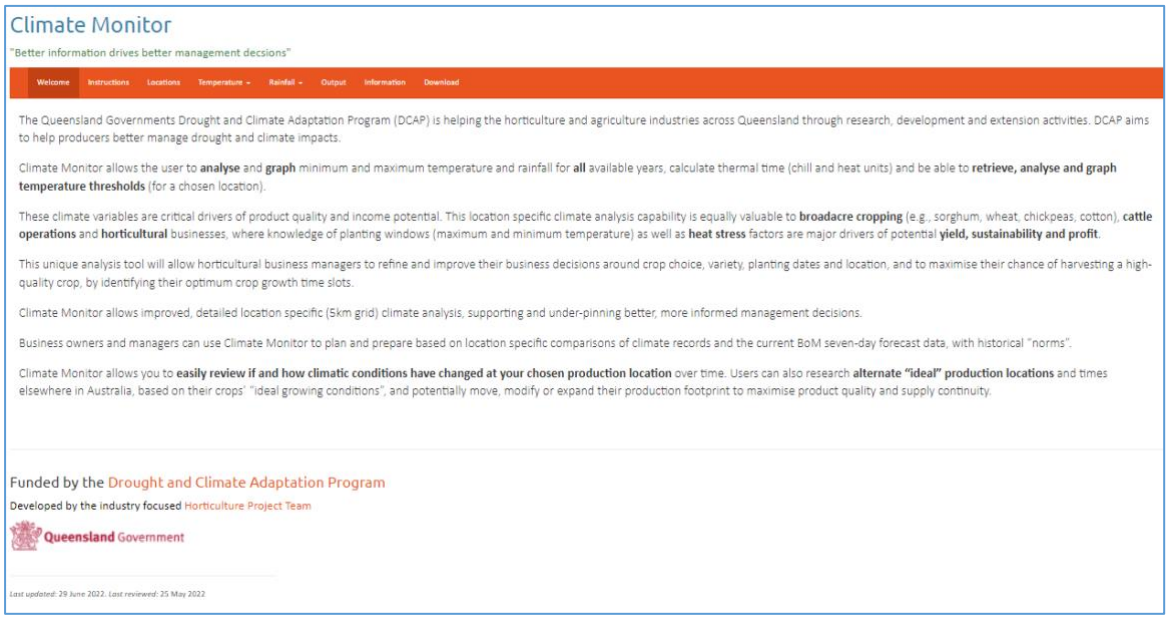

Figure 1. Climate Monitors' welcome screen highlights the DCAP initiative and explains the aim and capability of the web tool.

Updated: 9 December 2022

Instructions.

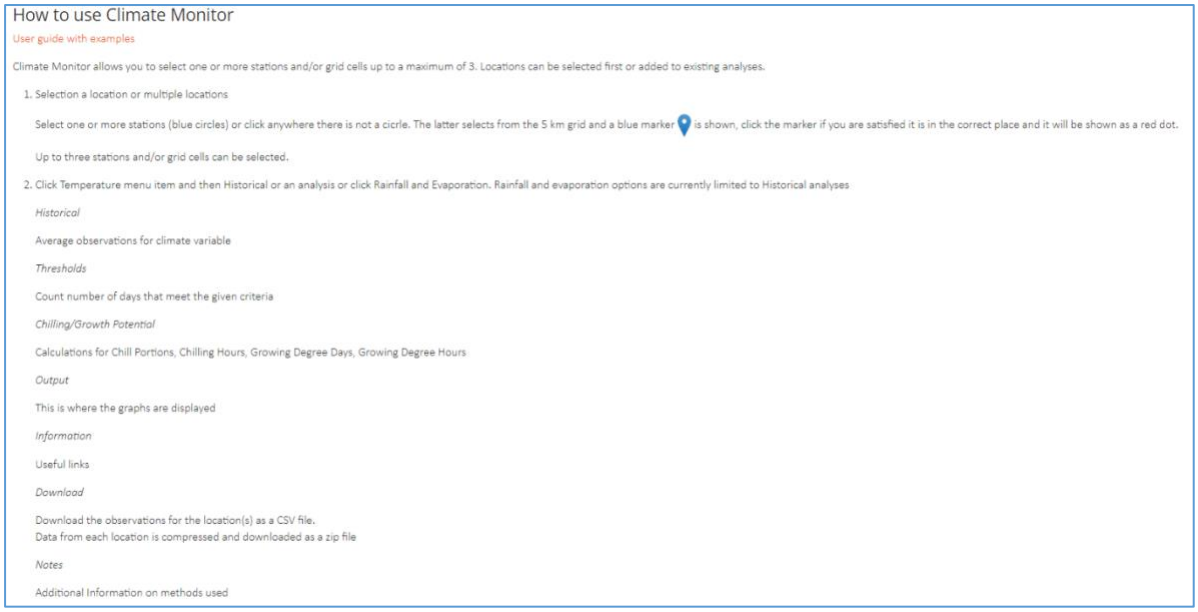

Figure 2. The instruction screen explains how to conduct a location base analysis.

Locations

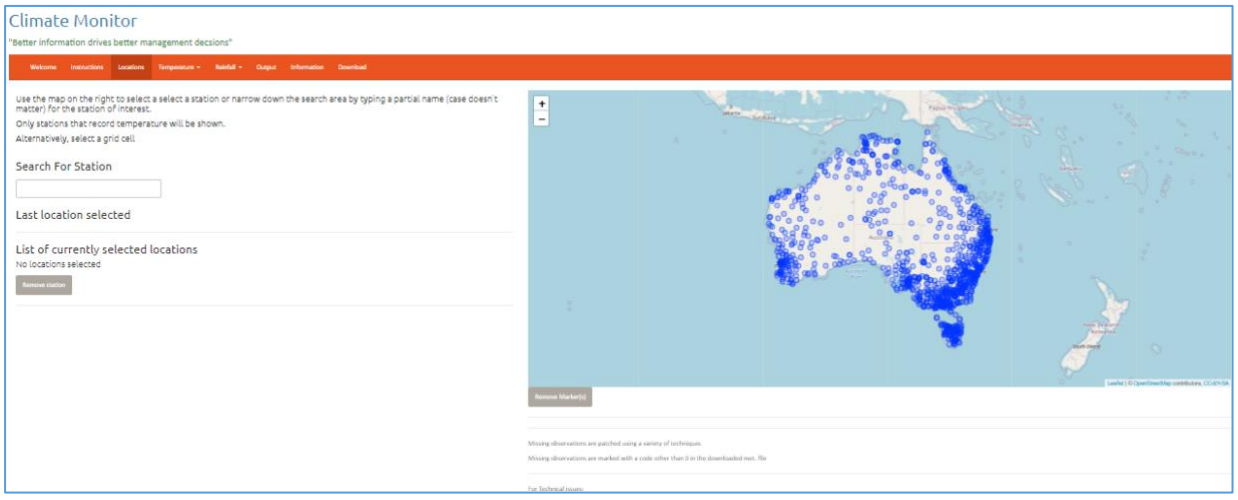

Figure 3. The locations tab allows the user to type in or select their chosen location or locations (up to 3 high-quality BoM weather stations or grid locations (5 km x 5 km) can be compared).

Compare two locations - e.g. Kingaroy & Murgon (historical range).

The location on the map is **only selected for analysis when you see the red dot** – you may have to double-click your mouse on the spot. See the graphic below. The blue pin location is not actually selected until it turns to a red dot.

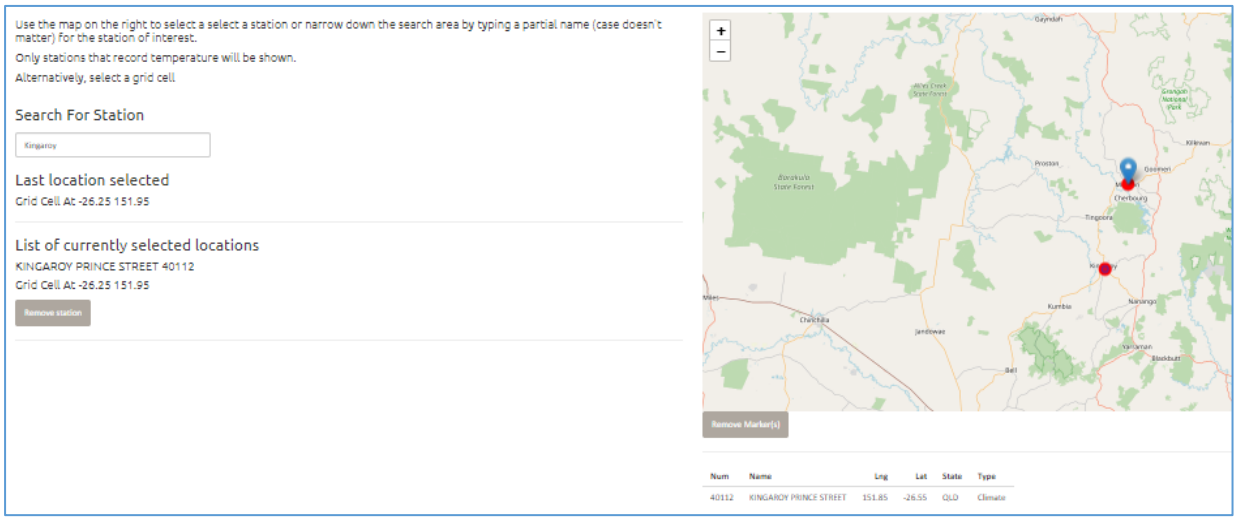

Figure 4. The user selects a location (or locations) by choosing a BoM station or marking a chosen location (farm site) on the map.

The user then chooses the weather parameter they wish to learn more about. e.g., temperature, then selects which temperature analysis type (Historical/ Thresholds or Chill/ Growth Potential) they are interested in. Below is an example of an Historical analysis and graphed results.

The Temperature tab > Historical analysis chosen

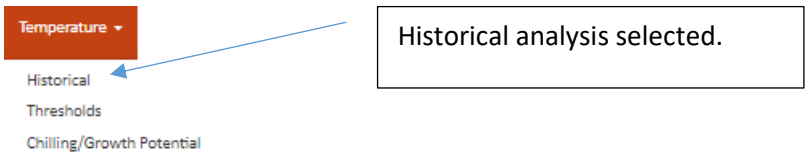

Figure 5. The Temperature Tab has several sub-options.

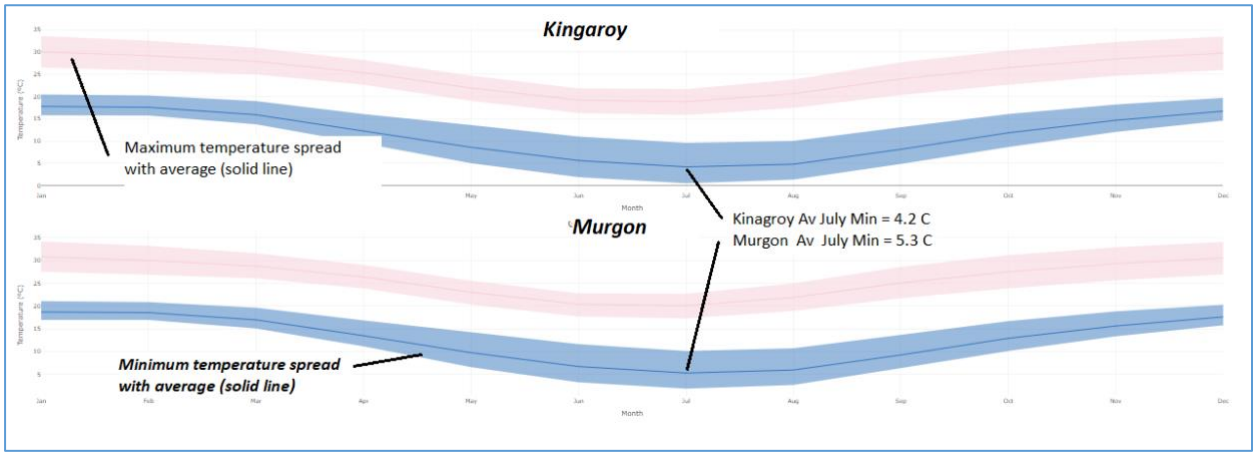

Figure 6. Graphic output from a requested historical temperature comparison. On the actual Web-tool screen - rolling the mouse displays the actual data (July average figures typed for this user guide).

Temperature - Threshold analysis

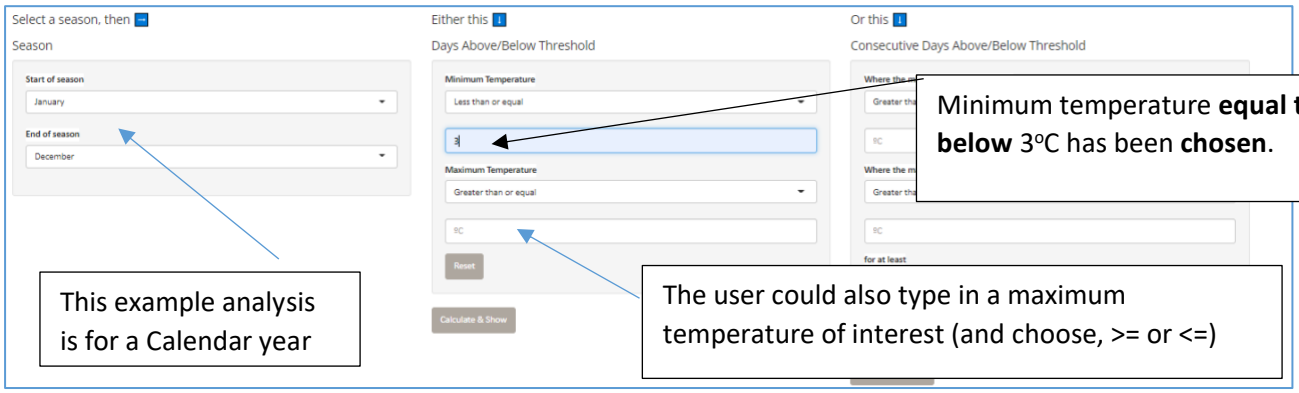

Figure 7. The user has chosen to analyse minimum temperature and days equal to or less than 3ºC.

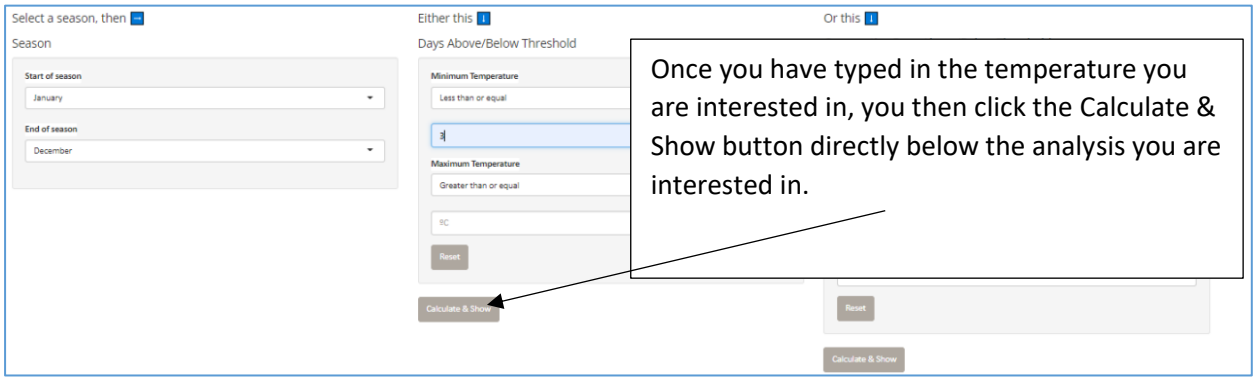

Figure 8. The user has chosen to analyse minimum temperature and the number of days less than or equal to 3ºC at this location.

The Temperature tab, (Thresholds analysis).allows the user to analyse minimum temperatures or maximum temperatures (above or equal to a specific temperature they choose or below and equal to that threshold). In this example below the user has selected the number of days in every available year where the temperature has been equal to, or below 3ºC. The output **results appear as an easily read graph.** In this example the chosen locations for comparison were the UQ Gatton BoM weather station and the Cambooya township (on the Eastern Darling Downs). Gatton is a winter leafy vegetable

production area, while Cambooya is a summer production location. The colder winter temperatures in Cambooya reduce plant growth rates and the higher number of cold days mean vegetable quality is inferior in Cambooya in winter, compared to Gatton. The vertical axis shows the number of days at the chosen location that were 3°C or colder for each month and all years. **Importantly,** <u>the vertical axis for all compared locations is **displayed with the same scale, allowing quick, easy comparison**</u>.

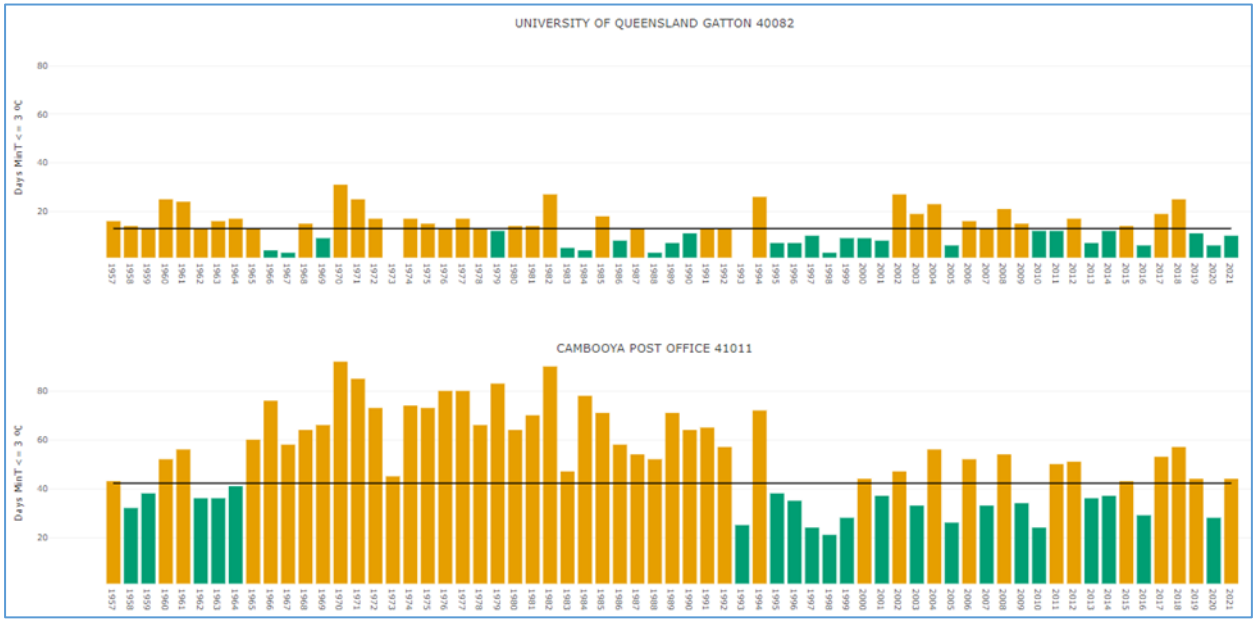

Figure 9. The results of the analysis are displayed with overall mean (horizontal black line) for the location. When using the Web-tool, the actual total day number for each year is displayed to the user as they move their mouse across the graph.

This analysis shows why a major Queensland salad growing and packing business, farms in the Lockyer Valley through winter, not at their Cambooya farm. They use the Cambooya farm in summer to maximise year round quality – it's just too hot for the leafy crops in the Gatton summer. This business moves production location so as to optimise crop growth, so maximising yield, quality & shelf life.

The Climate Monitor comparison displayed below analyses the **number of days at or above 34°C** at both locations and allows easy comparison of the differences.

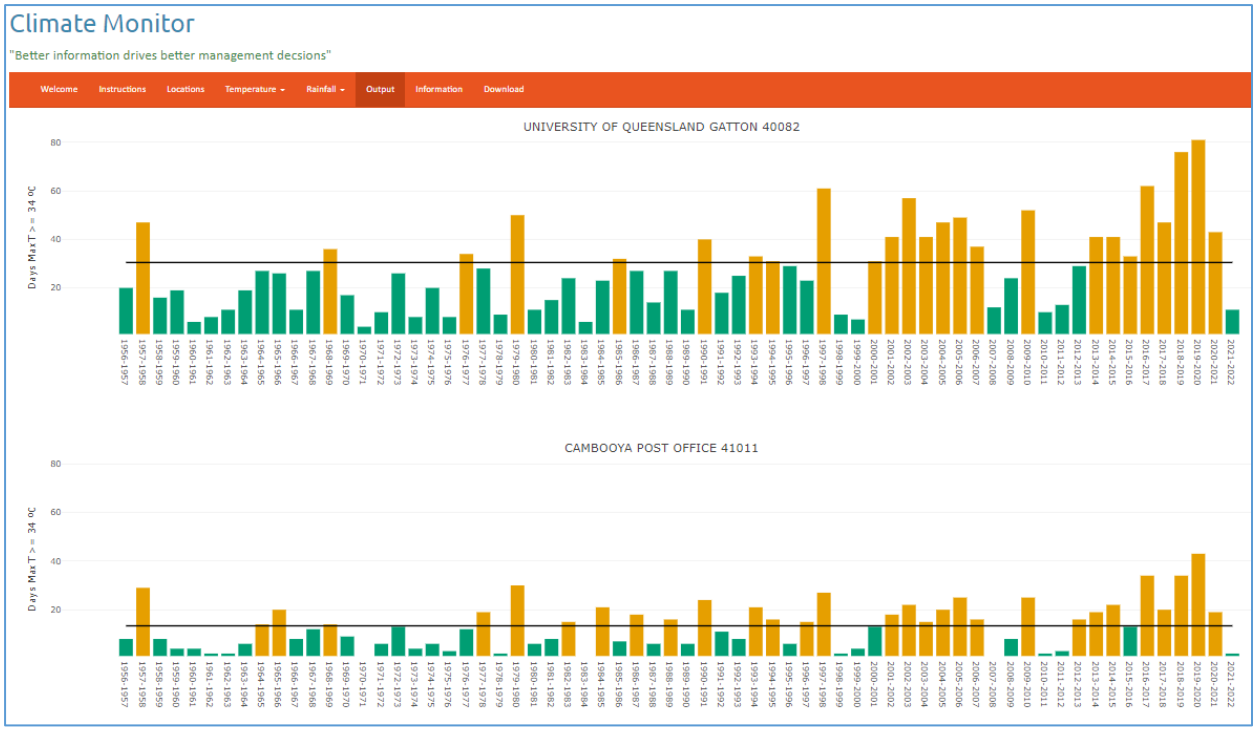

Figure 10. Climate Monitor used to compare days that reached 34 °C or avbove in the two farming locations.

Climate Monitor is a powerful and useful tool allowing a grower or supply chain manager to compare and contrast locations by looking for the specific climatic conditions they know are required to grow a quallity crop. A grower / business manager can compare their current production locations climate with any other location they choose. Business managers know what and when they can best grow at their current location, so can easily compare and decide if an alternate location is viable, should be avoided or offers the opportunity to extend their current production window.

Temperature - Threshold analysis consecutive days.

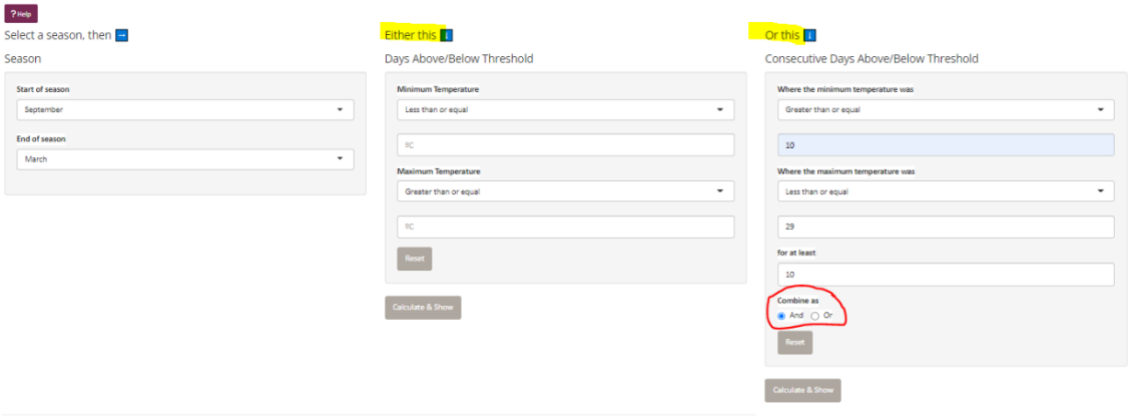

Figure 11. The user is interested in temperature data from Sept to March and number of times the temperature "envelope"of 10°C to 29°C inclusive occurred for 10 consecutive days. Note that **and is circled** to include both variables.

The analysis above, for the location of Applethorpe produces the output below.

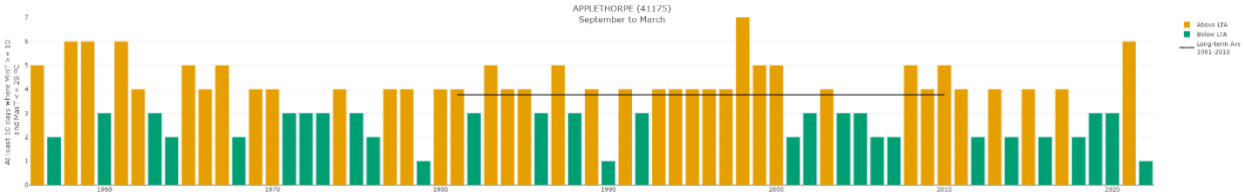

Figure 11. Applethorpe analysis for at least consecutive days where minimum temperature was above 10 C and maximum was 29 C or below.

Temperature - Chill or Growing Degrees.

The final temperature tab analysis option allows the user to analyse, compare and track Chill and Growing Degrees. Chill is a standard measure analysis while growth potential (growing degrees), uses a **base temperature chosen by the grower** who knows from experience at which temperature the crop performs at its best. The user selects the month or months they are interested in analysing using the **Season drop-down box**. This allows complete flexibilty and means the user can analyse just part of a year (growth slot) that they are interested in for at the location of interest. 😊

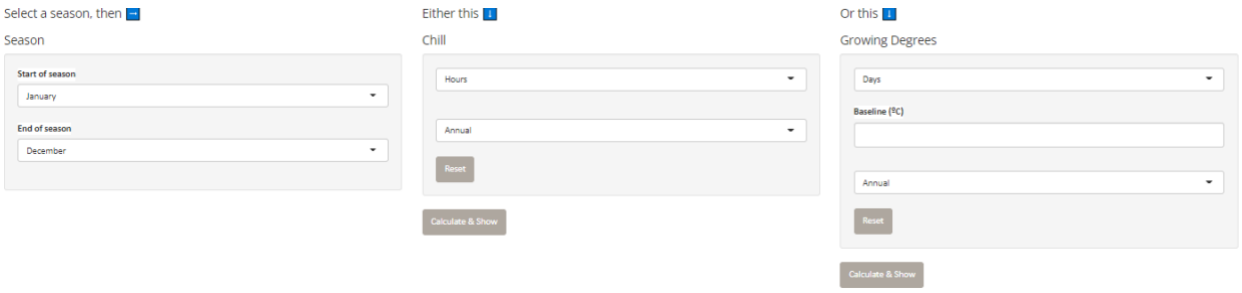

Figure 12. Above is a "screen shot" of the Chill & Growing Degrees analysis sub-options. In this example a full year (Seasons) is selected and Annual is selected for the Chill and Growing Degrees analysis.

This powerful analysis lets the user choose to compare any season or part of a season for all years (See Figures 12 & 13), Applethorpe annual chill all years to-date (Annual analysis) or compare a **slected year and period** to previous years historical (Figure 13)

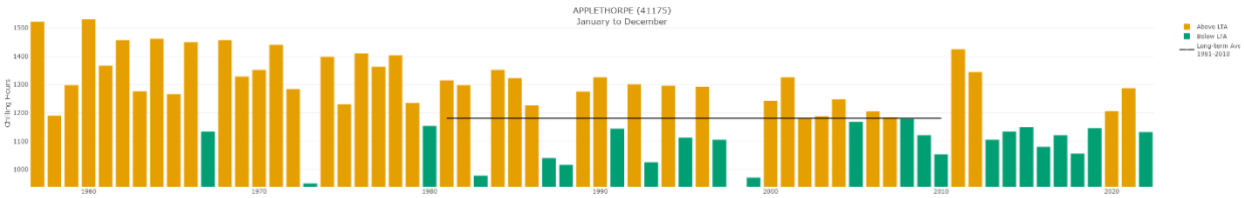

Figure 12. Applethorpe annual chill hours totals for all months and years.

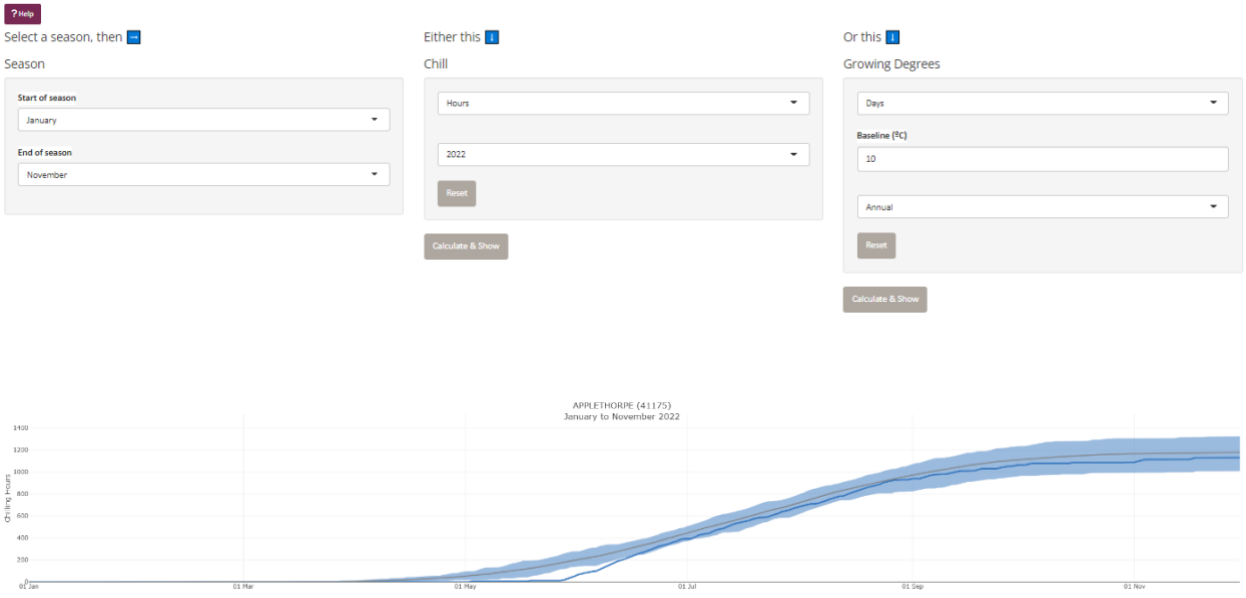

Figure 13. Applethorpe Chill Hours 2022 (dark blue line) in 2022 compared to the average and all years (for Jan to Nov).

A cotton or sorghum grower in Emerald may be interested in the number of days above 25°C at their farm this year to-date compared to previous years (seasons). This could help with a better understanding of the current crop's potential maturity date. This is easily achieved with Climate Monitor.

Figure 14 below shows that 2022 (red line) is below the average (grey line) and sits low in the spread of all years (the red band).

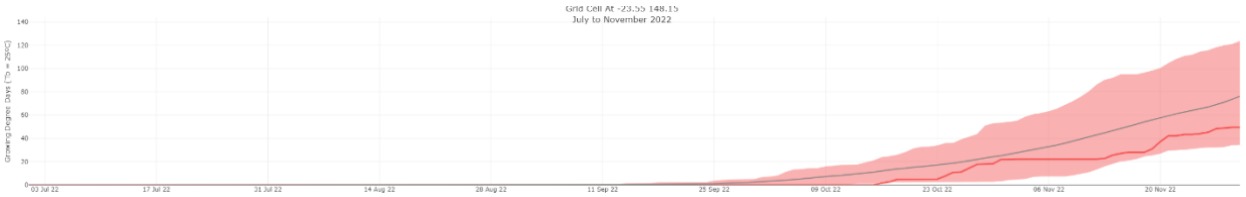

Figure 14. Emerald growing degree days that reached 25 C in 2022 to date.

Rainfall

Annual, **Seasonal** or **Monthly** rainfall can be analysed for up to three locations and can be compared at the same time. This is valuable and useful information for a business wanting to expand or even lease country in another location. Users can compare annual data, single months, or an entire season. The historical chance of rainfall in a single month at a chosen location is easily seen.

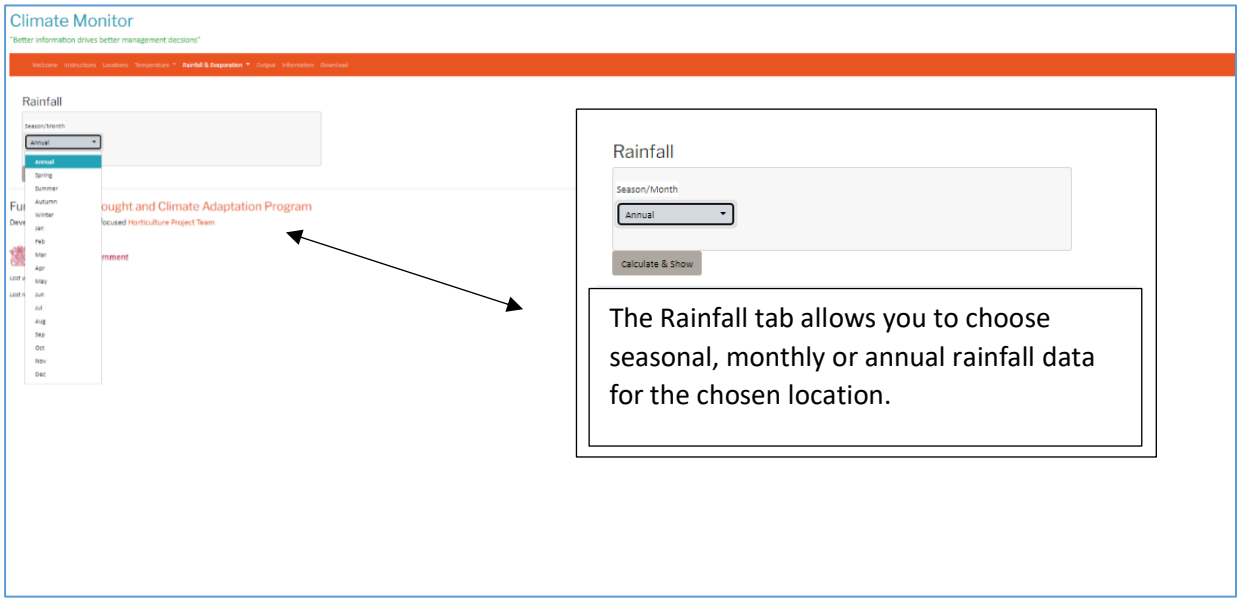

Figure 15. The rainfall tab presents the user with extra analysis options.

Several rainfall analysis options are available – two examples are below.

Annual rainfall graphic - Charleville.

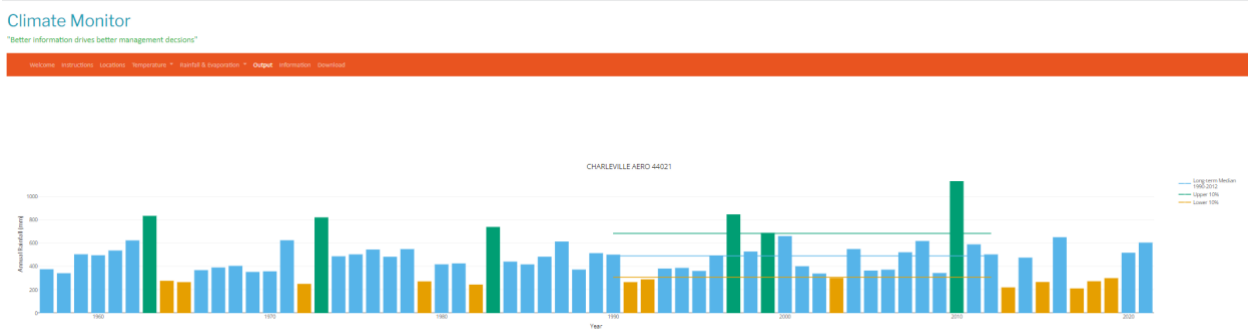

Figure 16. Annual rainfall

Spring rainfall at Charleville.

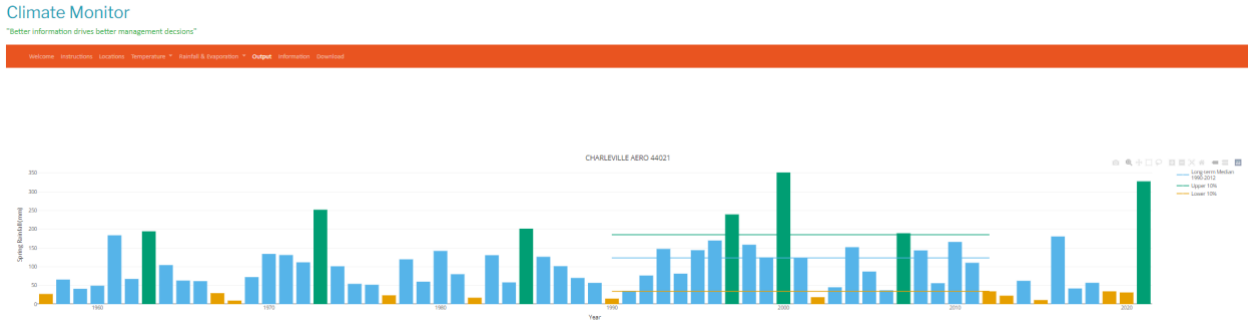

Figure 17. Seasonal rainfall (Spring).

The **rainfall tab** also displays the evaporation data for the chosen location beneath the rainfall graph.

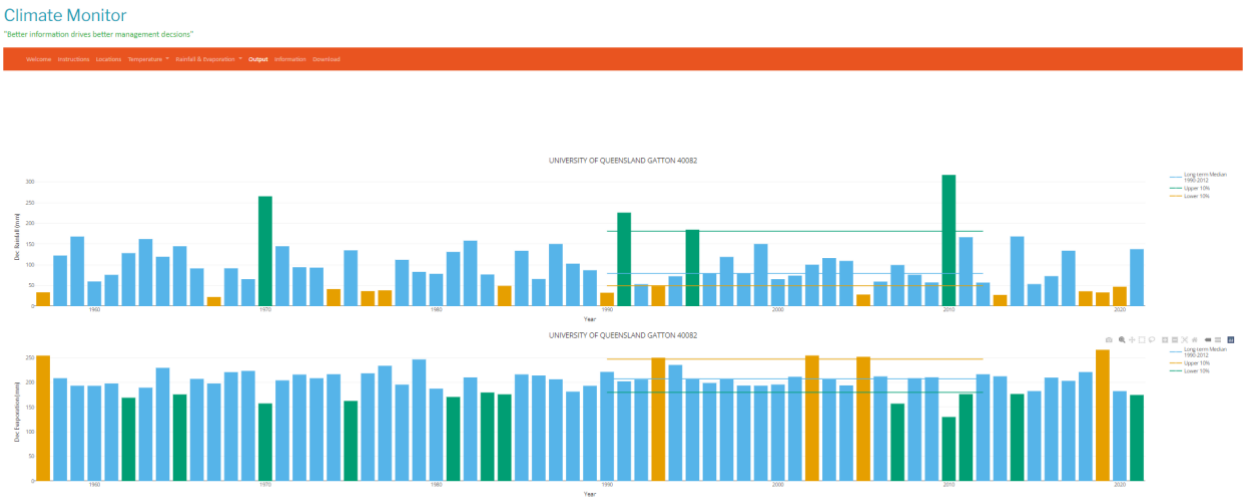

Figure 18. The December rainfall analysis for Gatton (The University of Queensland BoM station) with evaporation displayed below.

Information

Easy access to quality real-time science-based information.

Climate Monitor also contains an **Information tab** **that offers links to relevant BoM temperature, rainfall and forecast products (Heatwave Forecast, Seasonal Outlook and Enso).**

Valuable decision-aide tools for all agricultural business managers.

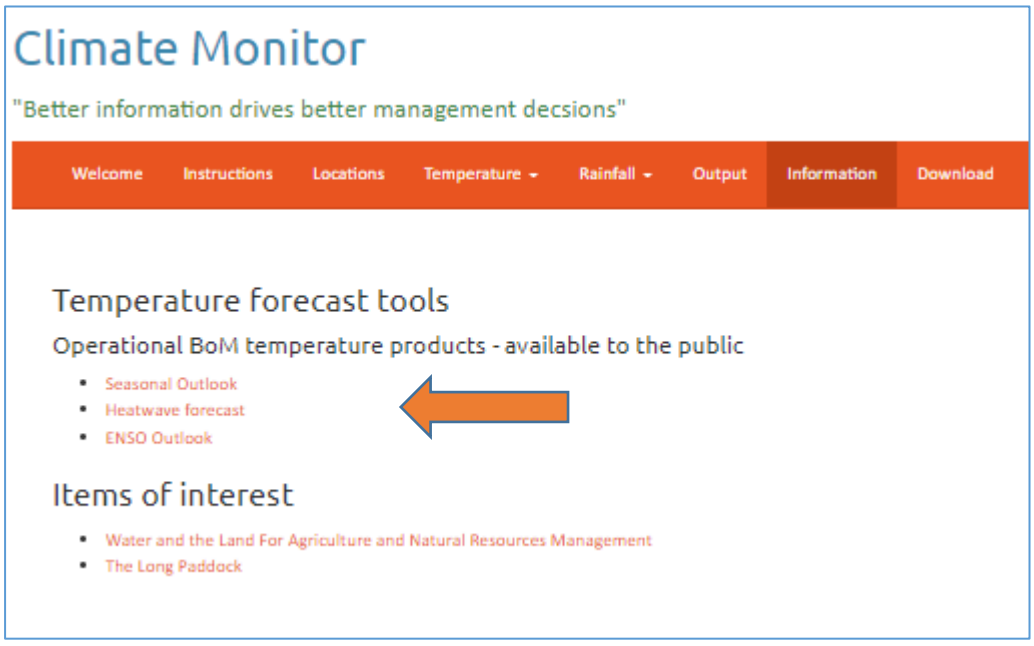

Figure 19 Climate Monitor's Information Tab provides access to relevant BoM forecast products.

Climate Monitor – information for all agricultural sectors

Climate Monitors' location (farm) specific climate analysis capability is equally valuable to broadacre cropping (e.g. sorghum, wheat, chickpeas, cotton) and cattle operations, where knowledge of planting windows (maximum and minimum temperature) as well as heat stress factors, are major drivers of animal performance, yield potential and profit.

Climate Monitor

Project staff have already utilised Climate Monitor to analyse and compare production locations and climate variables for several commercial operators that have approached staff since seeing a live demonstration. Several of these Climate Monitor location comparisons are described in Appendix 1.

Climate Monitor is publicly available on the **DCAP website.**

The Project team would like to thank the Queensland Government,

the DCAP Manager & the Steering Committee for the funding and oversight of this work.

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Climate Monitor – example analysis.

Climate Monitor, real-life decision support request # 1.

A local Southeast Queensland business manager was interested in comparing and contrasting monthly temperature ranges and extremes at two locations within the Granite Belt production area.

The business operates in multiple Queensland locations on the Southwestern side of Stanthorpe. They were interested in leasing more land locally and became aware of an available farm with adequate water on the north-eastern side of Stanthorpe, near Dalveen, but needed to gain knowledge or information on how the temperatures and seasons in that area compared to his existing production site. After asking several "locals", they "thought" it would be slightly warmer in winter at Dalveen, with fewer frosts but similar summer temperatures.
Below we used Climate Monitor's "historical analysis" capability to investigate and compare the two farm locations of interest. It is slightly warmer at Dalveen than at Amiens during winter.

Climate Monitor allows the user to easily compare the actual July and December Median temperatures at both locations– providing certainty, enhancing knowledge and improving decision-making.

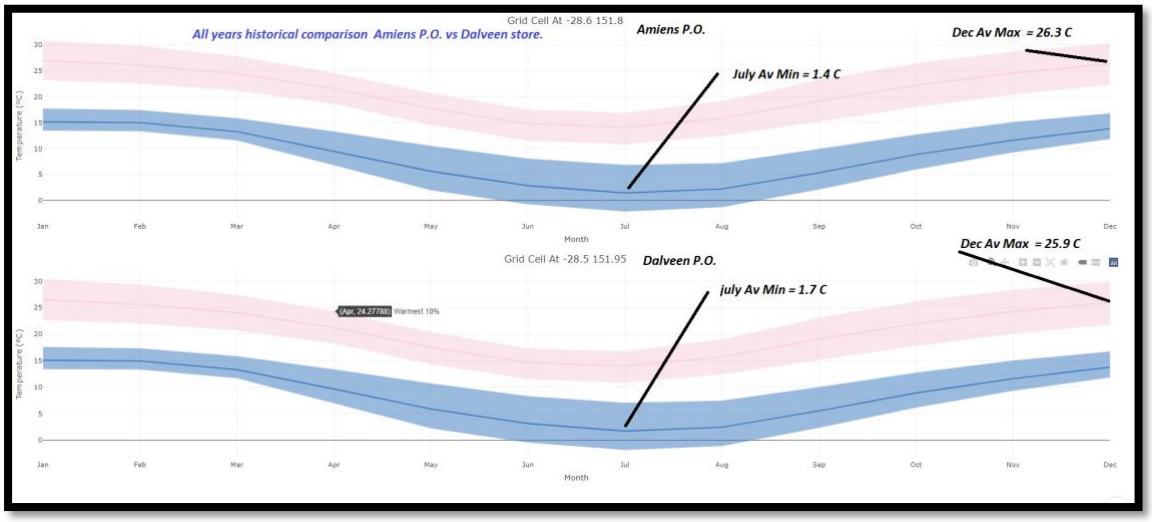

Figure 20. Climate Monitor's detailed analysis and graphical display of the monthly temperature range at the requested farm comparison locations.

Climate Monitor – analyses years of ***complex climate data*** *and provides* ***accurate, easily understood graphical information*** *as requested by the user.*
Complex data is analysed and graphed – ***allowing informed, science-based decisions****.*

Figure 21. The two farming locations are only 25 km apart, but the climatic and growing conditions between the two farms are quite different. These differences will impact crop quality and yield potential. A Climate Monitor analysis quickly highlights and quantifies these differences.

Thanks to Climate Monitor - the business manager had better information and could make a better, more informed decision.