



**SPECTRE**  
**EXCLUSIVE ACCURACY DATA**

***Hectre***

**EMPOWERING  
FRUIT GROWERS AND ENTERPRISE**

*WITH THE WORLD'S SIMPLEST  
ORCHARD TECHNOLOGIES*

## Understanding The Problem

Due to a lack of early accurate data for apple sizes upon receiving, the strength of decision making regarding storage, packing and selling was compromised.

Traditional sizing methods on receiving, involved orchard and warehouse staff using metal calipers to “randomly” sample (impossible for humans) a small sample size (often about 25 apples) and then judgements were made about storage and sales timings.

When the apples got pulled out from storage and the packing line set up for the packing run, with staff placement and packaging at the ready, the apples would then pass through the multi million dollar grader machine and only then would the grader detect that the apples were not the right fit for the pack or the sale.

The packing line would need to be stopped (an expensive exercise), packaging and bagged fruit disposed of and the process would start all over again with the hope that the next packing run wouldn't have the same issue.

Ill informed decisions meant costly mistakes: bins of apples were being stored incorrectly, unnecessary stoppages on the packing line were occurring, and important sales opportunities were being missed. More costs / less revenue.

### *Why Apples First?*

With NZ having the highest apple production per hectare in the world, and many of our customers both in NZ and the US specialising in apple growing, storage, packing and sales, it made sense for Hectre to invest the first set of Spectre efforts into apple detection.

## Traditional Sizing Methods

- Small sample sizes: typically 25 - 60 fruit per 100,000
- Slow, time consuming process
- Subjectivity Bias. Inaccurate sampling
- Sub-Optimal Results. Poor data for decision making.





## SPECTRE FOR APPLES

### Apples

The Hectre team worked with some **fantastic apple growers** and packhouses in NZ to test design and user friendliness and to gain apple imagery which was used to **optimise the Spectre model**.

During the 2020 US harvest, more than **nine million** Spectre for Apples images were captured, creating a wealth of data and enabling Hectre to optimise Spectre further.

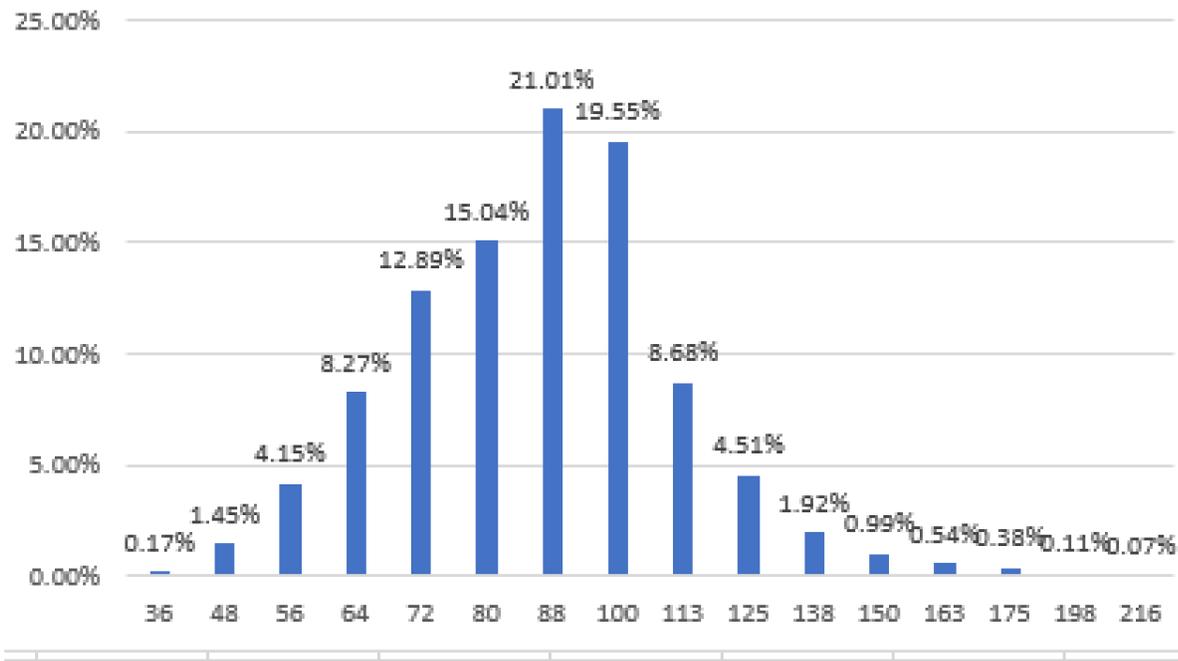
Now apple growers, apple packhouse and sales desks in **both NZ and the US** are using Spectre for Apples.

One of the key advantages for Spectre customers is that the Spectre user process is so **incredibly simple**.

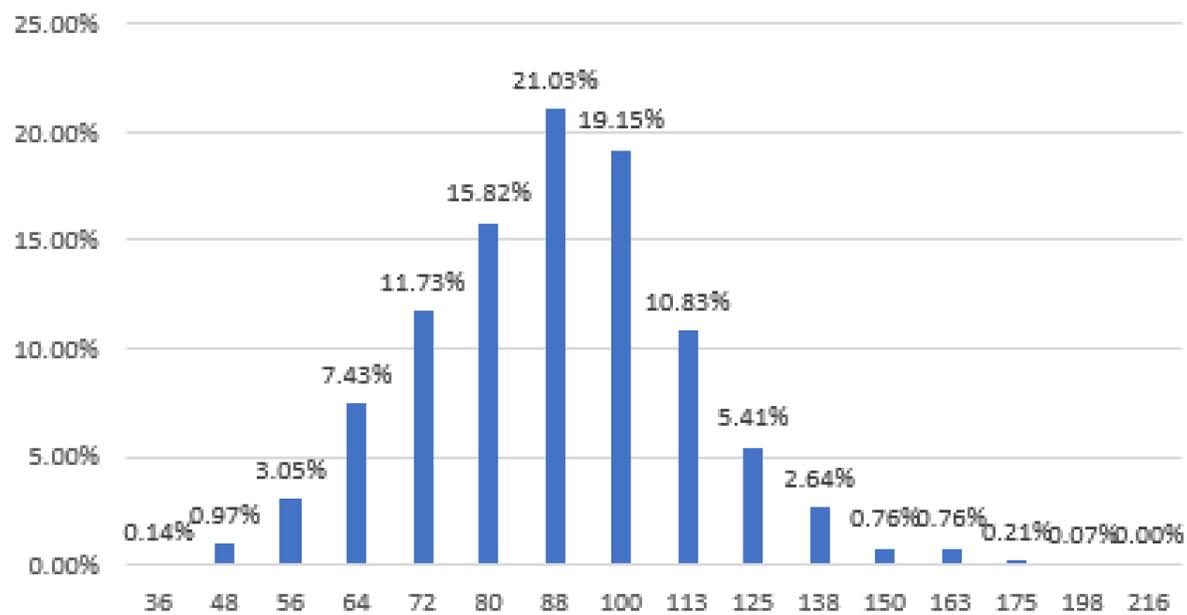
Take a photo of your full apple bin on your iPhone or iPad and Spectre does the rest, sampling extremely high volumes and delivering size **results within 4 seconds!**

Spectre results( bottom) get compared to a multi-million dollar grader (top), achieving extremely high accuracy levels.

Grader - 19 bins - Lucy Rose - B432



Spectre - 12 bins - Lucy Rose - B432



## Apple Accuracy

The fact that such simple to use technology also provides such high levels of accuracy, instils great confidence in decision-making. We regularly undertake accuracy tests and do this by comparing Spectre results, with those of the multi-million dollar grader machine.

Even with the naked eye, you can see how closely Spectre tracks the grader result, particularly the critical sizes and average accuracy rates are 95% or higher.

*It's important to note that comparing Spectre which requires only a standard iPad/iPhone, is fully portable, takes no time to set up and delivers results within 4 seconds - against a commercial grader machine which uses complicated proprietary hardware, is a massive piece of fixed machinery, and costs millions of dollars, is rather unfair. .. But we do it anyway!*



## SPECTRE FOR CITRUS

As news of Spectre and the quick, accurate, easy and affordable results it could provide spread, **other fruit type** producers and marketers started getting in on the action.

By late 2020, **NZ citrus leader**, First Fresh NZ had joined the party and the Hectre team were busy optimising Spectre for Citrus.

As of May 2021, **Spectre for Citrus** was being used in both **NZ and South Africa** with California expected to be the next region to take up the benefits of Spectre for Citrus.

# Citrus Accuracy

## Oranges

The first release of Spectre for Citrus saw navel oranges as the priority, and grader comparisons undertaken saw high accuracy comparison rates of 95%. Here's one of the raw data sizing comparisons.

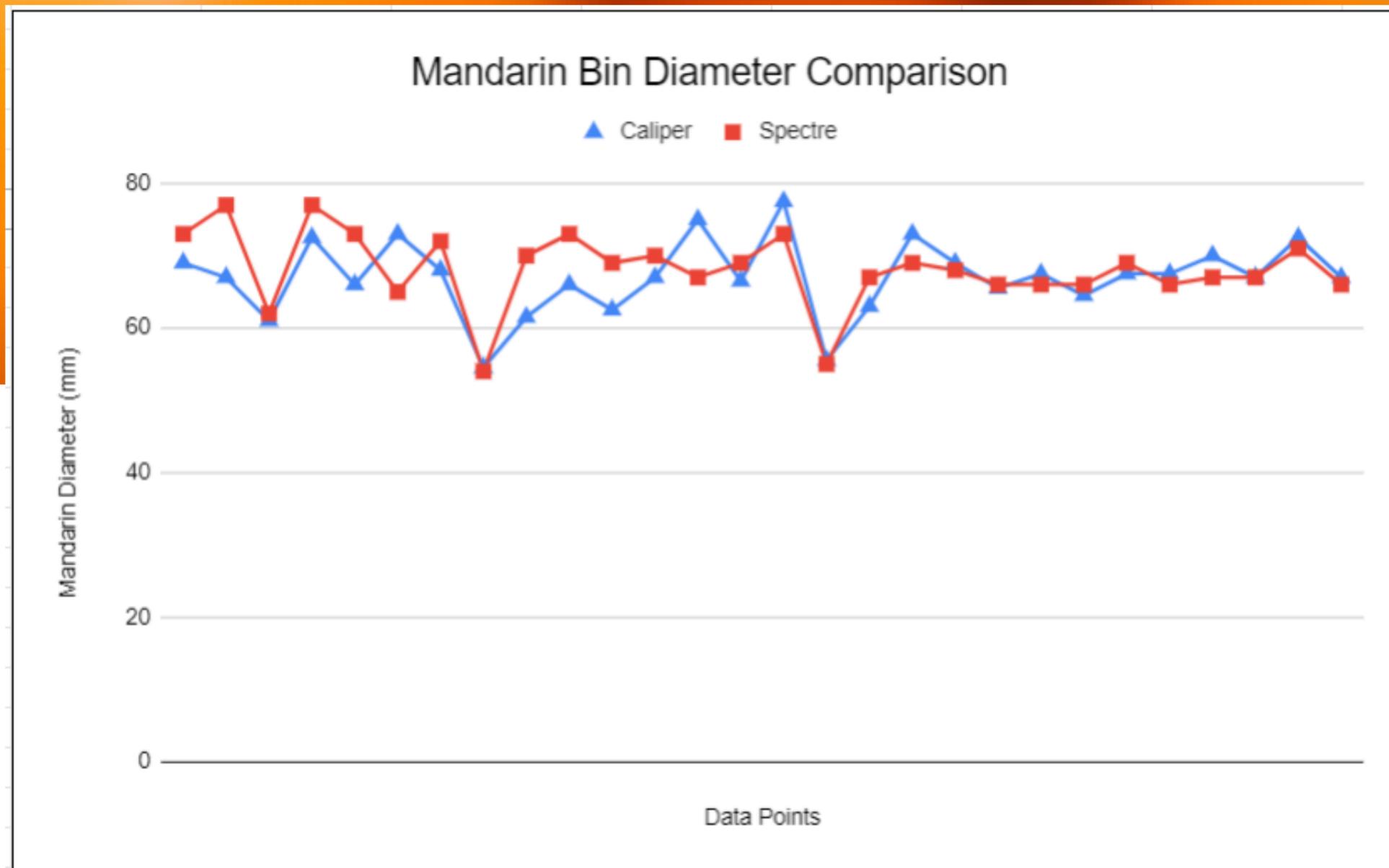
Raw size data showing the average size detected by Spectre (left) when compared to the multi-million dollar grader machine. 97%+ accuracy.

### Spectre for Citrus Grader Comparison - Navel Oranges

	Spectre Size Avg (mm)	True Size Avg (mm) from grader machine	Avg Piece Size Diff (mm)
Navel Oranges	79.29	77.32	3.9

## Mandarins

Mandarins (which include tangerines) are second only to oranges when it comes to global production on the citrus world stage. In response to demand, the Spectre team are currently optimising Spectre for mandarins with early ground truthing results showing 95%+ accuracy levels.

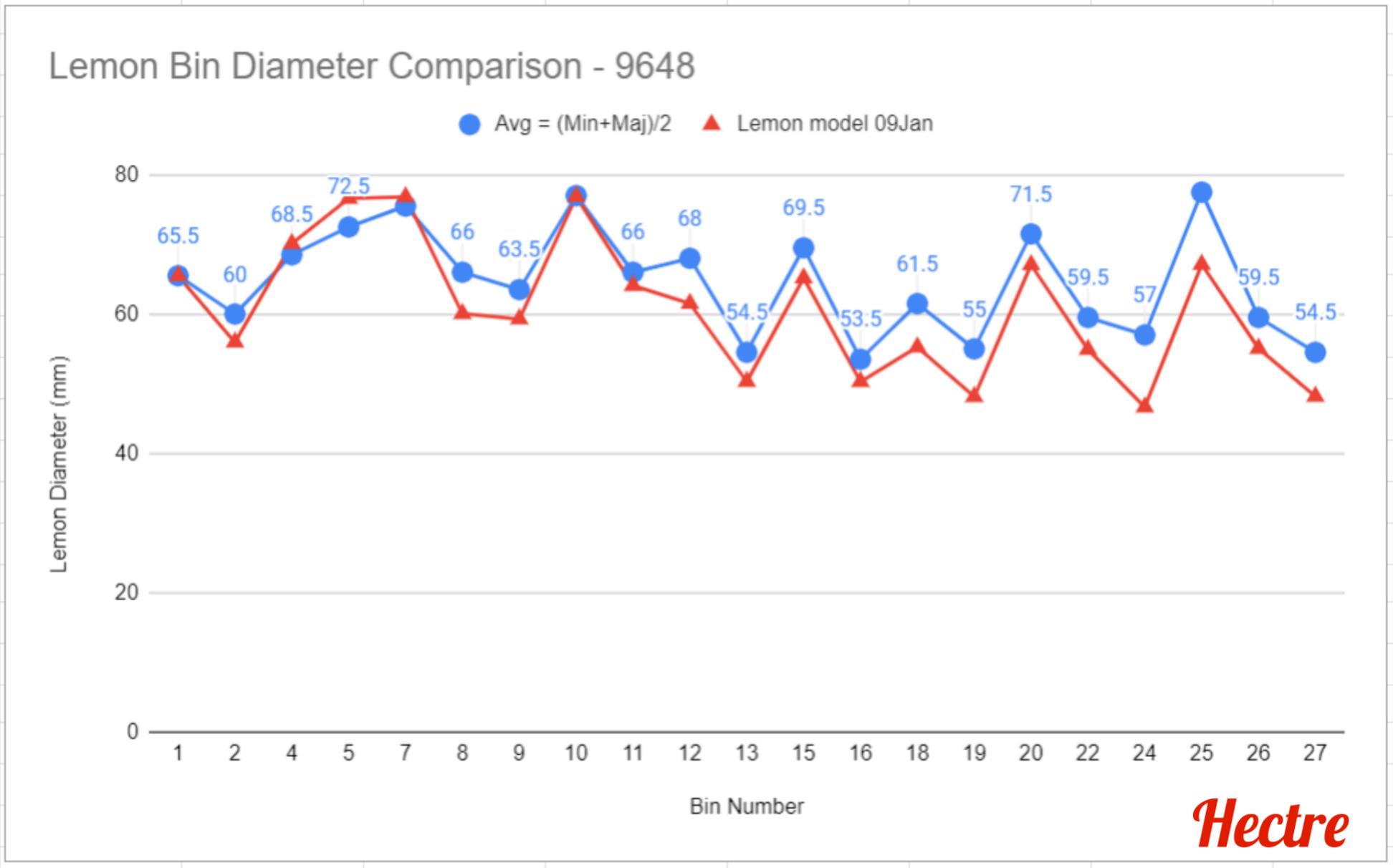


Lemons dominate NZ's citrus exports, with five times more lemons being exported than any other NZ citrus type, so lemons quickly followed.

Once again, mountains of work went on behind the scenes, teaching Spectre how to detect a lemon, how to accommodate its shape, and how to size lemons accurately.

Even at the early stages of optimisation, grader comparisons showed accuracy levels of 92%+ when compared against the multi-million dollar grader.

*The Spectre lemon model when compared against a multi million dollar grader.*



## Running concurrently with new fruit type optimisation, has been the development of Spectre for Colour.

As many fruit selling decisions include both size and colour considerations, and which market you sell into, determines the requirements for each, having access to early colour data provides critical information for decision making so selling opportunities are maximised.

The Spectre team created a colour calibration system to enable users to calibrate for the different environments they use Spectre in. This accommodates different light settings such as bright lighting in a packhouse, a cloudy day outside, a sunny day outside etc.

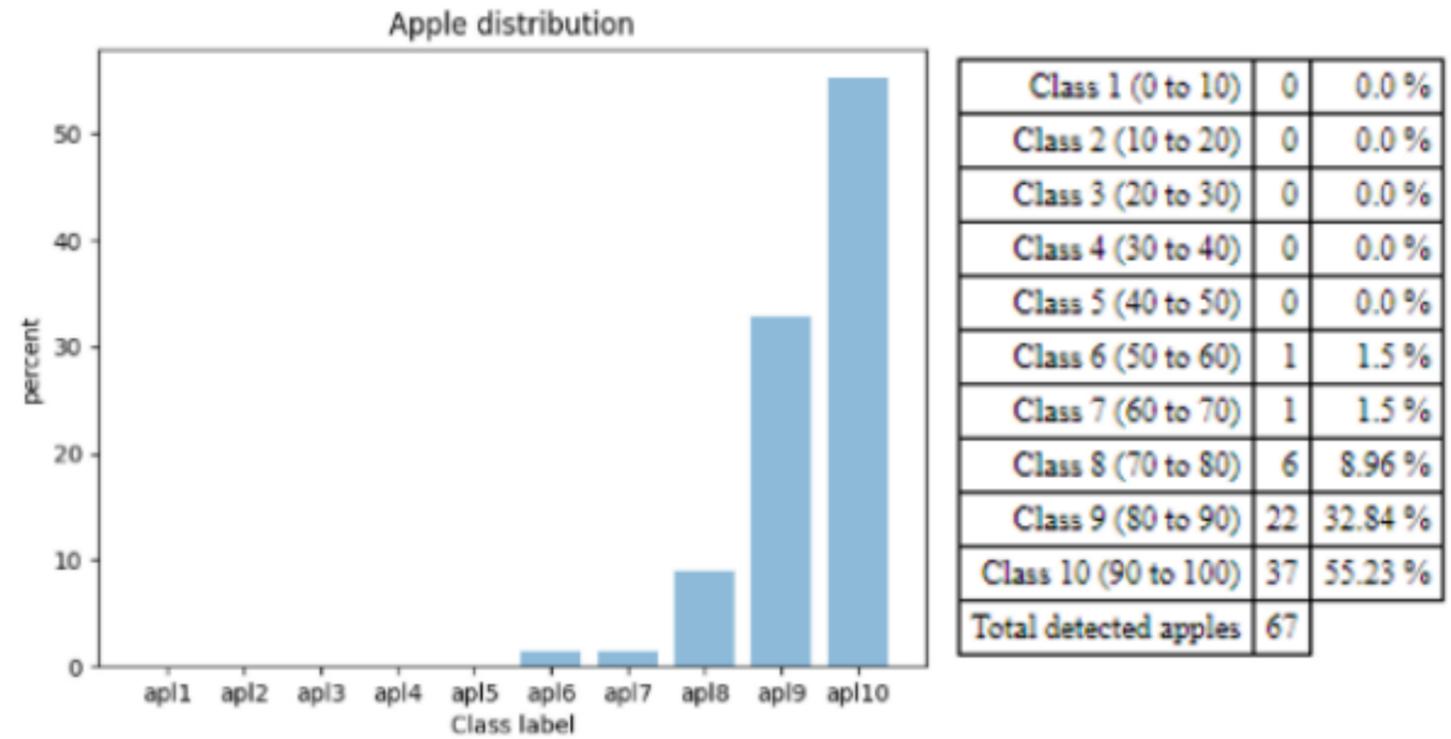
Users have the ability to set up their own customised environments and calibrate the Spectre for Colour for those environments.



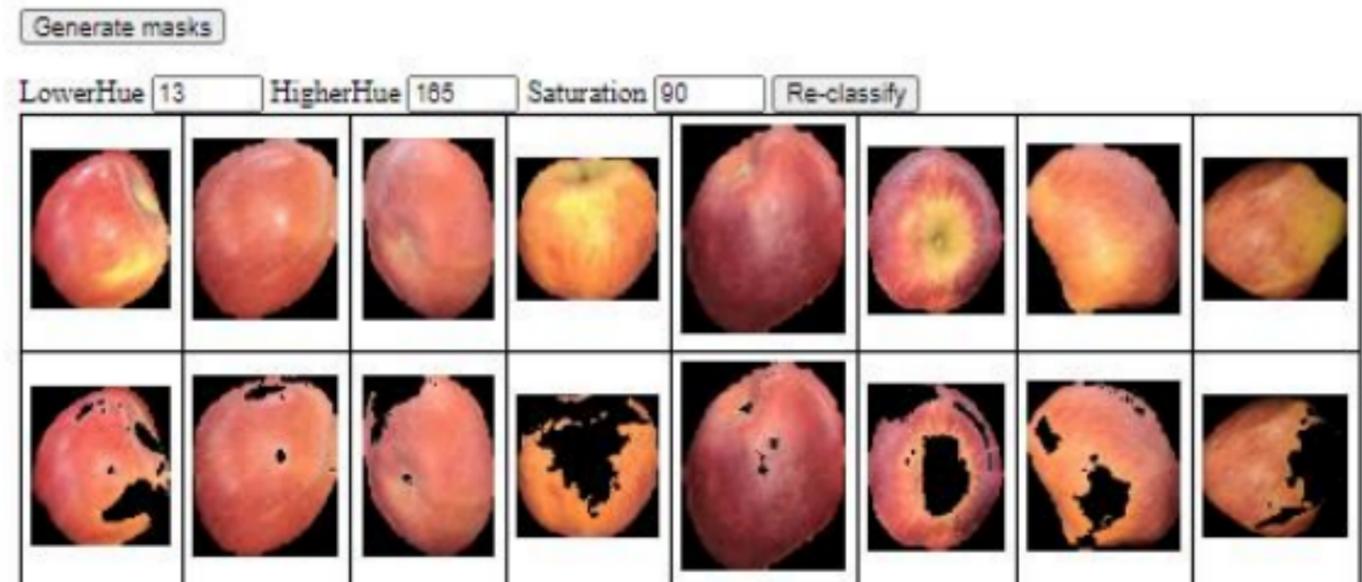
With the same click of an iPad/iPhone that captures the bin image for sizing, Spectre for Colour can also run colour estimations.

Spectre for Colour comparison showing Spectre results compared against multi million dollar grader.

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	Real grader info			Spectre Color		
	Grade 3 (0-40%)	Grade 2 (40-80%)	Grade 1 (80-100%)	Grade 3 (0-40%)	Grade 2 (40-80%)	Grade 1 (80-100%)
<b>Bin 2</b>	0%	11.90%	88.10%	0.000%	11.940%	88.060%



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Any questions?

Keen to see how Spectre might be able to help support your success?

We'd love to talk with you.  
Please email us at  
[hi@hectre.com](mailto:hi@hectre.com)



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