BEST PRACTICE MANAGEMENT FOR MINIMIZING **ALBEDO BREAKDOWN** AND **RED SCALE**

by Camilo Garcés

MFC
MILDURA FRUIT COMPANY

ALBEDO BREAKDOWN

Rind disorder due to albedo tissue disintegration resulting in skin creasing.

- Downgrade in **quality**
- Reduce fruit **strength**

Disorder visible on the rind surface during **maturity**.

Some varieties are **more susceptible than others**

- Navelina
- Washington Navel
- Cara Cara
- Daisy

MFC
MILDURA FRUIT COMPANY

ALBEDO BREAKDOWN

When damage could be happening?

Week 41
(End petal fall)

Week 44
(10 mm)

Week 46
(18 mm)

Week 51
(40mm)

First stage
Cell division

Second stage
Cell expansion

Third stage
Maturity

Most of the volume growth is due to the rind

MFC
MILDURA FRUIT COMPANY

ALBEDO BREAKDOWN

Areas that have an influence

CROP LOAD	**NUTRITION**	**PLANT GROWTH REGULATORS**	**IRRIGATION**	**WEATHER CONDITIONS**

MFC
MILDURA FRUIT COMPANY

ALBEDO BREAKDOWN

Crop load

01. Flowering

Light or heavy

Leafy or leafless

Most desired

02. Crop load

Competition between fruitlets.

Availability of nutrients and fruit ability to get them (**sink effect**) are critical at this timing.

More fruitlets = Slower fruitlet growth rate = Effect on rind thickness

***Thinner rinds** are more prone to albedo breakdown*

MFC MILDURA FRUIT COMPANY

ALBEDO BREAKDOWN

Crop load. Heavy crop predicted

Target / Reduce competition between fruitlets

What can we do?

Manage flowering

01

Winter GA

At flower induction or bud initiation

02

Pruning

Early spring - Flowering

MFC MILDURA FRUIT COMPANY

Nutrition

Important information: Foliar Analysis - Soil Analysis

Soil Nutrition

Balanced soil nutrition program according to crop load

Soil texture and **pH** will have a big influence on nutrients

Any **nutrient limitation** will affect crop load and quality. (Liebig's Law of Minimums)

Combination between **soil** and **foliar nutrition** can give best results

Foliar Nutrition

Prevent punctual deficiencies during processes of high demand in certain nutrients

Calcium is very low mobile. Foliar applications in combination with **Boron** during cell division are critical

Biostimulants (Seaweed, Glycine – Betaine...)

Maximise foliar uptake:

- **Point of deliquescence** of foliar fertilizers.
- **Compatibility** of foliar products.

MFC MILDURA FRUIT COMPANY

ALBEDO BREAKDOWN

Foliar nutrition

Spring flush and flowering

Foliar nutrition /
Nitrogen, Zinc, Manganese and Magnesium

Stage I of fruit growth (Cell division)

Foliar nutrition /
Nitrogen, **Calcium**, Boron and Potassium

Stage II of fruit growth (Cell expansion)

Foliar nutrition /
Phosphorus and **Potassium**

MFC
MILDURA FRUIT COMPANY

ALBEDO BREAKDOWN

Plant growth regulators

Gibberellic acid

Timing of spray is **early cell expansion** (Oranges- 40 mm (Golf ball))

If Albedo breakdown is predicted to be an issue **sensitive varieties** or **blocks** may require a **second application** two weeks later

Adding **foliar fertilizers** to the GA spray can **improve** the result

Calcium nitrate plus Boron

or

Potassium nitrate plus MAP

Auxins

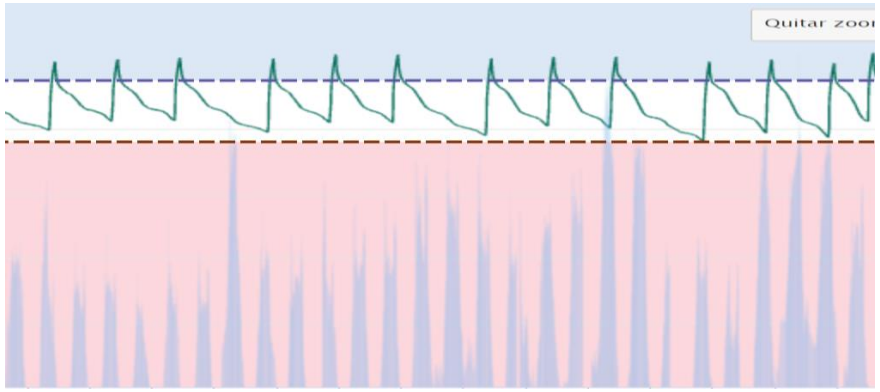
Auxins improve **rind strength** and **enhance the sink effect** of the fruit.

Petal fall: At this stage auxins are used in different citrus countries when a percentage of smaller fruitlets is wanted to be dropped

Fruit sizing: 2,4-DP (Corasil®) or 3,5,6-TPA (Tops®) applied to increase fruit size can reduce Albedo breakdown

MFC MILDURA FRUIT COMPANY

Irrigation



Identify **field capacity** and **refill point**. Adequate balance **oxygen** and **water** is important to maximise root activity.

Identify where the **root system** is located. **Reaching** all the **root profile** will ensure avoiding any water stress.

Adjust the **irrigation program** to the **actual uptake**. Over or under irrigate will cause a stress on the tree

Soil pits are a useful to identify the **soil type** through the profile and **acknowledge** any **potential limitation.**

ALBEDO BREAKDOWN

Weather conditions

CROP LOAD	NUTRITION	PLANT GROWTH REGULATORS	IRRIGATION

Weather conditions have a **direct influence on plant activity**

Nutrition & **irrigation** strategies will be determined by **transpiration** rates.

When **low temperatures** reduce nutrient uptake, **foliar nutrition** becomes critical. Soil temperatures below 13°C minimise root uptake.

Favourable weather conditions are critical when using **PGR's**

MFC MILDURA FRUIT COMPANY

Weather conditions

Mildura weather station
2022 - 2023

Temperature (°C)

Month	Mean maximum temperature		Mean minimum temperature		Mean temperature	
September	19.17	25	7.6	7.59	13.4	16.3
October	22.46	24.7	11.5	9.25	17	17
November	24	29.47	10.9	13.43	17.5	21.45
December	30	31.94	14.3	15.9	22.2	23.94

Relative humidity(%)

Month	Average RH 9am		Average RH 3pm	
September	75.3	53.2	50.1	28.12
October	78	57.7	51.2	29
November	68	55.4	41.86	27.2
December	49.7	55.45	25.77	27.45

Days with 75% or more of sky covered with clouds

Month	9am		3pm	
September	10	4	14	4
October	18	8	21	4
November	13	8	11	6
December	5	13	5	6

Each season can be different

MFC MILDURA FRUIT COMPANY

RED SCALE

Major pest in all citrus growing areas

From 3 to 5 generations per year depending on weather conditions.

Downgrades fruit quality and heavy infestations weakens the trees.

Can be located on **wood, leaves** and **fruits**.

MFC
MILDURA FRUIT COMPANY

RED SCALE MANAGEMENT

Key points

01

Time to take action (monitor and insect lifecycle)

02

Chemical used

03

Quality of the coverage.

Other methods

Pheromone mating disruption

Biological control

MFC
MILDURA FRUIT COMPANY

Insect lifecycle

Red scale lifecycle development depends on **temperature**

Require **650 Degree days** to complete the cycle.

Threshold temperature: **11.7°C**

An adult female can produce **100 - 150 crawlers**

Adult males live around **6 hours**

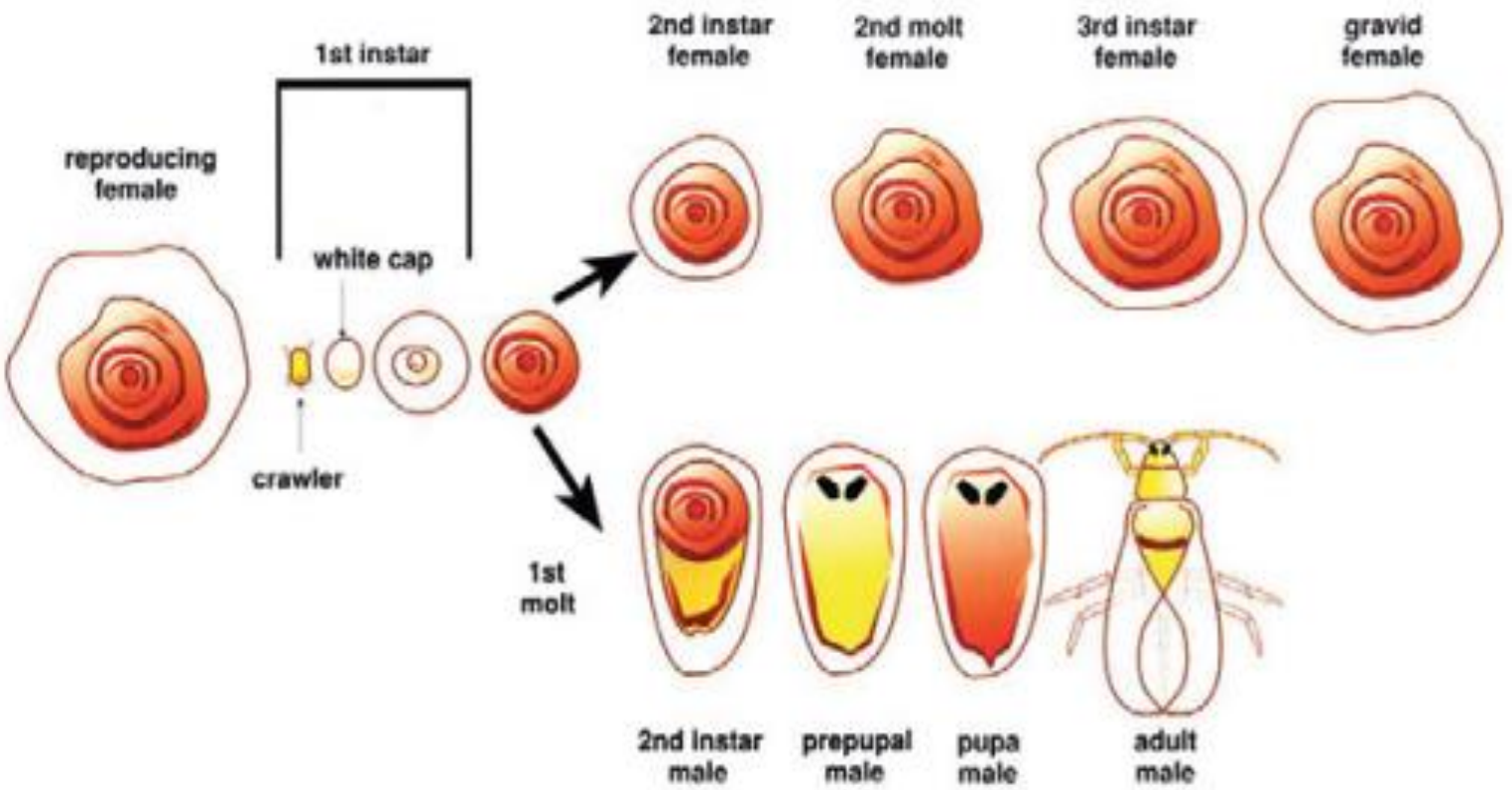


Figure: Life cycle of Aonidiella aurantii. Source: Forester et al.(1995)

MFC MILDURA FRUIT COMPANY

Degree days model

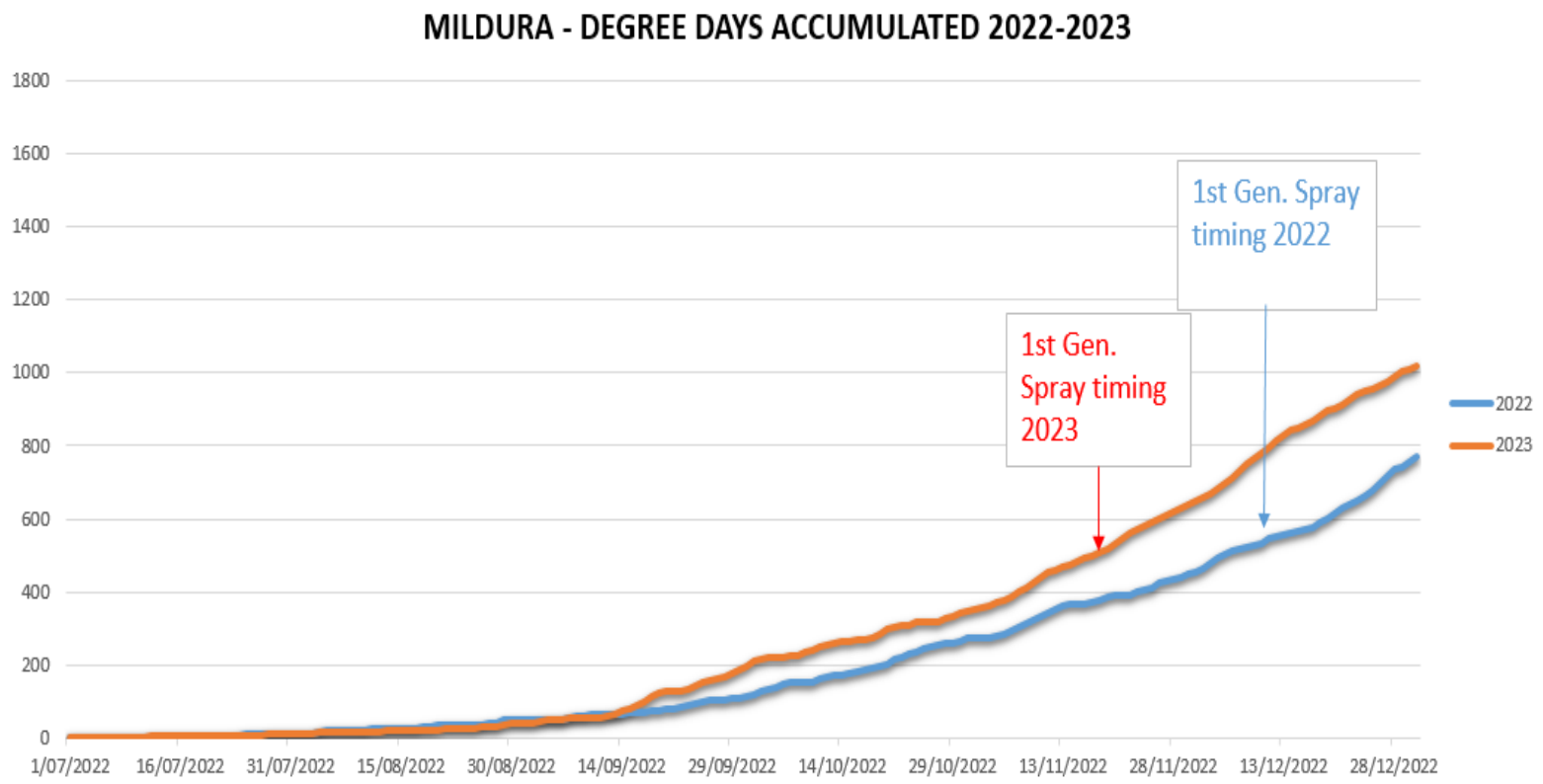
Helps to identify the **best timing to control a pest**

Degree day: Difference between average temperature of the day and threshold temperature(**11.7°C)**

1st of July start calculations

Crawlers and **whitecaps** are normally the **stages to target**

Target:
1st generation: 550 DD (Nov-Dec)
2nd generation: 1200 DD (Jan-Feb)



1ST Generation predicted spray timing 2022: 13th of December
1ST Generation predicted spray timing 2023: 21st of November

MFC MILDURA FRUIT COMPANY

Male pheromone trap

Helps to identify the **peak of male flight**

Weekly checks to monitor male activity

Peak emerge of crawlers **300 DD after peak male flight**

Male description: Two winged insect, yellowish body with a **dark band across the back**

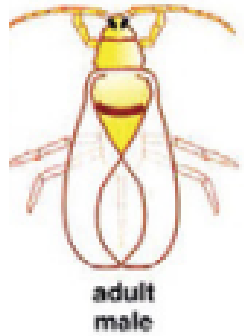


Figure: Male description.
Source: Forester et al.(1995)

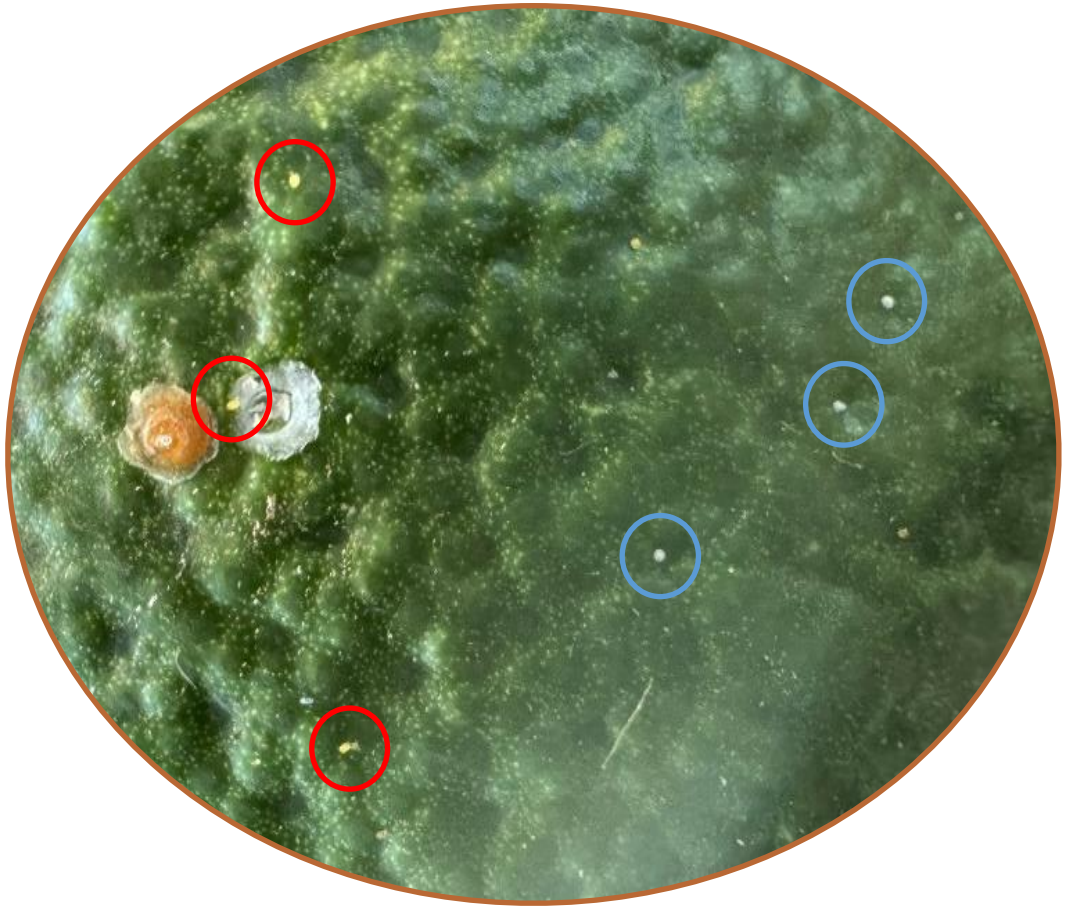
MFC MILDURA FRUIT COMPANY

RED SCALE

Degree days model

Peak of Male flight

FIELD CHECKS



Predict

Identify. Crawlers & Whitecaps

MFC MILDURA FRUIT COMPANY

Chemicals used

Foliar application

Insect growth regulators: Pyriproxyfen - Buprofezin

Lipid Synthesis Inhibitors: Spirotetramat

Paraffinic Oil

Insect growth regulators & oils require to **contact the pest** so the quality of application is critical

Spirotetramat has some **systemic effect**. When scale is on fruit and good **coverage** is **not guarantee**

Consider to control in **1st generation** if last season fruit was infested or pest pressure is high

2nd generation should be targeted if Red scale can be found on fruit in Summer

Best control when crawlers and **whitecaps** are targeted

Soil application

Neonicotinoids: Imidaclorpid - Clothianidin

Application method is critical to ensure plant uptake

MFC MILDURA FRUIT COMPANY

Coverage

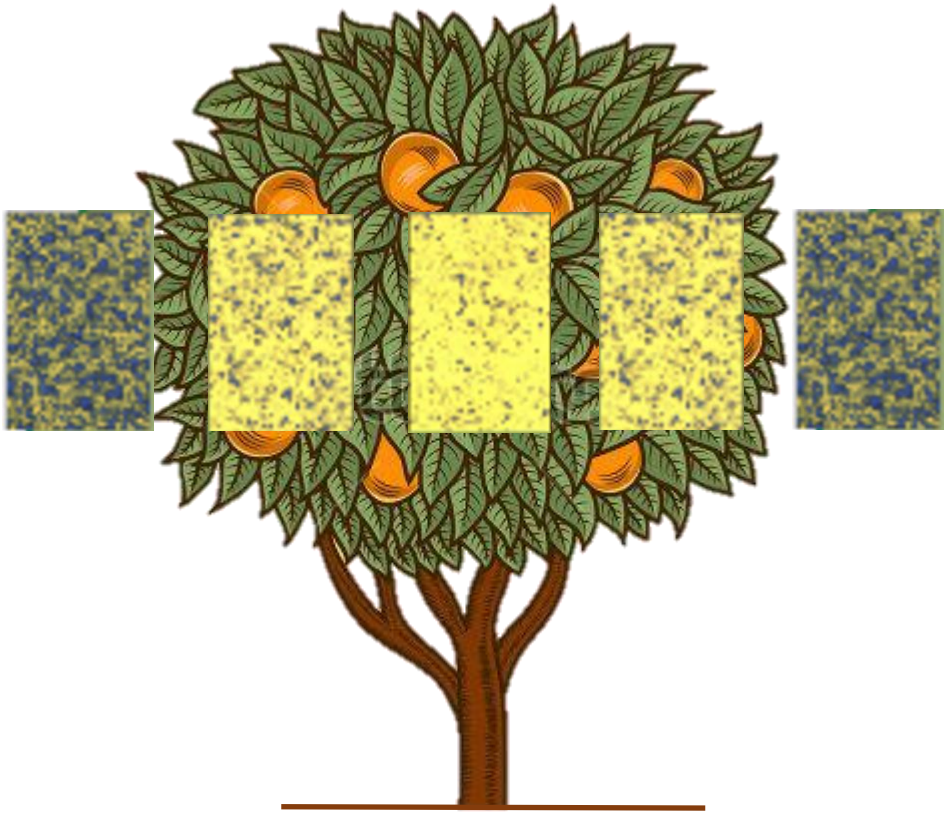
Good coverage is essential to control red scale

If only **fruit inside the canopy** is **affected** by Red scale a **coverage issue** might be happening

Pruning will help to reach all the canopy

Equipment calibration is essential to guarantee a good coverage

Test the quality of the spray using **water sensitive paper.**



Other control methods

Mating disruption

Interrupt the communication between male and female by increasing the levels of pheromone in the block.

400-500 dispensers per **ha** and year

Application **prior to first male flight**

First year of use might require to combine it with **other control method** if pest pressure is high.

Biological control

Parasitic wasp (Aphytis spp & Comperiella bifasciata) can provide a **good level of control in certain conditions**

Can **reduce** the use of **chemicals**

Selective chemicals will help to preserve them

Ants
Dust
Broad spectrum chemicals
Extreme weather conditions

↓ **Negative effects**

MFC MILDURA FRUIT COMPANY

THANK YOU FOR YOUR ATTENTION

MFC
MILDURA FRUIT COMPANY