4th Australian and New Zealand Avocado Growers Conference

Crop Yield Loss You Can't See

Heat, Light and Water

- Essential for plant growth and crop production
  - Too much or too little can cause problems
  - They are related in their impact on plants
    - Too little water can cause plants to overheat
    - Too much light raises temperatures, damages plant tissues and increases water use
    - Too high temperatures impairs photosynthesis and increases water loss from crop and soil

When there's too much of a good thing

1. Light radiation (UV, visible, IR) is energy
2. Energy added to the plant is converted to heat
3. Plant uses water in an attempt to keep cool
4. At high internal temperatures, crop begins to malfunction, system begins to shut down
5. Light energy continues to be absorbed
6. Shutdown systems cause damage to the crop.

Photosynthesis is affected first

- As high temperatures and light increase, photosynthesis decreases
  1. Electron transport affected, photoinhibition occurs
  2. The capture of CO_2 decreases
  3. Chloroplasts continue to absorb light
  4. Light energy not used in photosynthesis is then converted to free radicals
  5. Free radicals damage leaf tissue
  6. Tree uses stored carbohydrates to repair damage at night.

Why does this matter?

- Less carbohydrate may lead to smaller fruit
- Lower carbohydrate supports fewer fruit
- Less carbohydrate reduces shoot, root and trunk growth
- Lower stored carbohydrate levels can impact on flowering and fruit set next season

Less carbohydrates = Lower grower returns.

All crops have optimum temperature ranges (°C)

Crop	High	Low	Optimum
Citrus	30-33	2-12	25-32
Mango	36	8	20-30
Avocado	**29**	**1.5**	**20-24**
Macadamia	29	12	16-25
Litchi	34	6	27-33
Papaya	36	17	25-28
Pineapple	30	15	15-24
Banana	38	1.5	20-24

Source: KwaZulu Natal, SA Department of Agriculture and Environmental Affairs – KZN Agri-Report N/A/2006/24

Grafton – 1905-1990

1. November
    1. **Mean Max 28.3C**
2. December
    1. **Mean Max 30.1C**
3. January
    1. **Mean max 30.0C**
4. February
    1. **Mean max 29.8C**

Cairns – 1905-1990

1. November
    1. **Mean max 32.1C**
2. December
    1. **Mean max 32.6C**
3. **January**
    1. **Mean max 32.7C**
4. **February**
    1. **Mean max 31.2C**
5. **March**
    1. **Mean max 31.4C**

Bundaberg 1905-1990

1. November
    1. **Mean Max 30.0C**
2. December
    1. **Mean Max 31.3C**
3. January
    1. **Mean max 30.4C**
4. February
    1. **Mean max 30.3C**

Tauranga NZ 08/09

1. November
    1. **Max temp 23.8C**
2. December
    1. **Max temp 21.9C**
3. **January**
    1. **Max temp 22.5C**
4. **February**
    1. **Max temp 25.4C**

What can be done?

- A number of options to deal with the problem
  - Shade cloth or netting
  - Increased irrigation
  - Grow in cooler climates
  - Ignore it
  - Particle Film Technology (PFT)

What are PFT's

PFT's are a physically applied material that either selectively or non-selectively, reflects/refracts or blocks light.

- Screen®
- Surround®
- Parasol®
- Raynox®

What to use?????

- All PFT products will have positives and negatives.

- What you are looking for is a product that:
  - Is easy to handle product (liquid or WP)
  - Reflects preferential UV & IR light, not blocks
  - Has no detrimental effect on insect predators
  - Can be satisfactorily removed from the produce
  - Has a positive or neutral effect on photosynthesis
  - Is cost effective to use and works.

Screen on trees

Post Harvest

What is Screen?

1. Kaolin is a naturally occurring, safe, inert, ph neutral white mineral particle.
2. Screen is based on kaolinite...the purest form of kaolin.
3. Kaolinite means the highest purity for safety on food crops (pharmaceutical grade)
4. Screen ‘kaolin’ is currently mined in Australia.
5. Safe to predatory insects.
6. Easy to mix wettable powder formulation
7. Ideal for use in tank mix applications

AGRICROP
The proven alternative for your product needs.

SCREEN™

What does Screen do?

1. Screen has the ability to **reflect** harmful UV, IR, and visible light.
2. Reduces the mean crop canopy temperature, keeping plants cooler by up to 10ºC
3. Provide sunburn protection to susceptible fruit.
4. It has better weathering capabilities compared to standards – 0.2um particle size average.

Helps to reduce heat stress in plants.

AGRICROP
The proven alternative for your product needs.

SCREEN™

Sprayer

Summary

- Many private growers have now used / trialed Screen on their own blocks
- Post harvest equipment must be trialed first for residue removal
- Application frequency will be 4 -6 applications
- Early application is essential
- Anecdotal grower results are both decrease in sunburn incidence and increase in premium fruit graded.