PACKING THIS SEASON’S TABLE GRAPES

BY

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AUGUSTUS 2022
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  - 11. SO2
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OVERVIEW OF TABLE GRAPE INDUSTRY: RSA

OVER LAST DECADE:
- TABLE GRAPE INDUSTRY WAS RELATIVELY SOUND
- HA PLANTED GREW BY 53%
- EQV CARTONS EXPORTED GREW BY 42%
- GOOD QUALITY
- PREFERRED SUPPLIER TO UK/EU
- PROFITABILITY WAS GOOD
- WEATHER WAS MOSTLY GOOD

<table>
<thead>
<tr>
<th>HA PLANTED</th>
<th>2011</th>
<th>2021</th>
<th>INDEX</th>
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</thead>
<tbody>
<tr>
<td>NP</td>
<td>997</td>
<td>2575</td>
<td>258</td>
</tr>
<tr>
<td>OR</td>
<td>4501</td>
<td>5626</td>
<td>125</td>
</tr>
<tr>
<td>OIF</td>
<td>720</td>
<td>1168</td>
<td>162</td>
</tr>
<tr>
<td>BR</td>
<td>3288</td>
<td>4789</td>
<td>146</td>
</tr>
<tr>
<td>HR</td>
<td>3956</td>
<td>6406</td>
<td>162</td>
</tr>
<tr>
<td>TOTAL RSA</td>
<td>13462</td>
<td>20564</td>
<td>153</td>
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<table>
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<tr>
<th>EQV CARTONS EXPORTED (In m's)</th>
<th>2011/2</th>
<th>2021/2</th>
<th>INDEX</th>
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<tbody>
<tr>
<td>TOTAL RSA</td>
<td>54,7</td>
<td>77,7</td>
<td>142</td>
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</table>

HOWEVER, FROM 2020/1 THE SITUATION CHANGED!
WHAT HAS CHANGED?: TRADE ENVIRONMENT

1. TRADE GIVEN PANDEMIC AND WAR
   COVID-19
   WAR IN UKRAINE

2. PRODUCTION COSTS
   INFLATION AND HIGHER INTEREST RATES
   INPUT COSTS I.E. FUEL, ELECTRICITY, LABOUR, PACKAGING, ETC.

3. LOGISTICAL ISSUES
   SHIPPING TIMES & CONTAINER AVAILABILITY
   STATE OF SA HARBOURS: DELAYS
   DELAYS IN OVERSEAS’ HARBOURS

4. GLOBAL SUPPLY OF TABLE GRAPES AND DEMAND
   COMPETITION I.E. FROM PERU IN TRADITIONAL MARKETS (UK/EU)
   CONSUMER PREFERENCES: NEW VARIETIES AND EATING QUALITY

5. PROFITABILITY OF TABLE GRAPE SALES DROPPED

DID WE ADAPT QUICKLY ENOUGH TO THE CHANGING TRADING ENVIRONMENT?
WHAT HAS CHANGED?: TWO WET SEASONS

PRIOR TO 2020/21 MOSTLY DRY SEASONS

2020/21 & 2021/2022 WET SEASONS

• INCREASED SUPPLY OF TABLE GRAPES FROM SA
• IN GENERAL POOR QUALITY TABLE GRAPES
• MANY CLAIMS
• LOWER PRICES, LOWER PROFITABILITY
• SA SLOWLY LOOSING ITS COMPETITIVE ADVANTAGE

DID WE ADAPT QUICKLY ENOUGH TO THE WET WEATHER?
WHAT CAN WE DO?

**PROFIT = (PRICE X QUANTITY) MINUS COSTS OR** \( Pr = (PXQ) - C \)

**PRICE:** WE ARE A PRICE TAKER (TABLE GRAPES A COMMODITY?)

**COSTS:** WORK THROUGH COST CHAIN AND SAVE, BUT NOT ON **QUALITY**!

**QUANTITY:** WE HAVE CONTROL. **QUALITY** OF FRUIT VERY IMPORTANT!

**PAY ATTENTION TO:**

YIELD VERSUS QUALITY

OPTIMUM HARVEST RIPENESS

DO NOT SAVE ON PRE-HARVEST SANITATION AND BOTRYTIS SPRAYS

CORRECT PACKAGING MATERIAL

**PRODUCE HIGHEST QUALITY GRAPES AT**

COMPETITIVE/AFFORDABLE PRICES AND

LOWEST COST

**NEED PRACTICAL ADJUSTMENTS**

"FRUIT MUST HAVE LEGS" (MOET BENE Hê)

NEXT - CONCENTRATE ON POST-HARVEST QUALITY OF TABLE GRAPES
CHINA: CASE STUDY

HARVEST THROUGHOUT THE DAY
PACK GRAPES UNDER CANOPY
IN CLOSED LINERS
WITH PAPER/MAMS
GRAPES STAY DRY
FORCED AIR COOLING RIGHT AFTER PACK

REMEMBER UNIFRUCO PROTOCOL! FORCED AIR COOLING WITHIN 6 HOURS AFTER HARVEST

STORE GRAPES FOR UP TO 24 WEEKS (6 MONTHS)
FROM SEPTEMBER TO JAN/FEB – CHINESE NEW YEAR
FACTORS INFLUENCING QUALITY OF GRAPES
BASED ON A PRESENTATION BY:

ALWYN VAN JAARSVELD
“MOISTURE & SO2 IN PACKED GRAPES”
24 JUNE 2021
What is terroir?

- **Terroir** (/tɛˈrwaːr/, French: [tɛʁwaʁ]; from terre, "land") is a French term used to describe the environmental factors that affect a crop's phenotype, including unique environment contexts, farming practices and a crop's specific growth habitat.

  Wikipedia
2. FROM PICKING GRAPES TO PRE-COOLER

- PICK AND TRANSPORT TO PRE-COOLER IN LIGHT COLOUR CRATES
- MEASURE RH
- MANAGE PRE-COOLER ON/OFF ACCORDING TO:
  - RH
  - AREA
  - TEMPERATURE
  - TIME OF DAY
## 2. Relative Humidity: Snapshot in March – Typical of Season

**Weather Station Area: De Doorns**

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Temp Min (°C)</th>
<th>Temp Max (°C)</th>
<th>RH Min (%)</th>
<th>RH Max (%)</th>
<th>RH Ave (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021/03/17</td>
<td>Wed</td>
<td>13.1</td>
<td>24.4</td>
<td>29</td>
<td>89</td>
<td>63</td>
</tr>
<tr>
<td>2021/03/18</td>
<td>Thu</td>
<td>14.4</td>
<td>25</td>
<td>32</td>
<td>90</td>
<td>63</td>
</tr>
<tr>
<td>2021/03/19</td>
<td>Fri</td>
<td>11.7</td>
<td>21.7</td>
<td>48</td>
<td>90</td>
<td>72</td>
</tr>
<tr>
<td>2021/03/20</td>
<td>Sat</td>
<td>11.1</td>
<td>19.4</td>
<td>51</td>
<td>95</td>
<td>78</td>
</tr>
<tr>
<td>2021/03/21</td>
<td>Sun</td>
<td>10.4</td>
<td>23.3</td>
<td>32</td>
<td>89</td>
<td>67</td>
</tr>
<tr>
<td>2021/03/22</td>
<td>Mon</td>
<td>11.7</td>
<td>34.7</td>
<td>32</td>
<td>94</td>
<td>67</td>
</tr>
<tr>
<td>2021/03/23</td>
<td>Tue</td>
<td>13.4</td>
<td>27.3</td>
<td>28</td>
<td>82</td>
<td>62</td>
</tr>
<tr>
<td>2021/03/24</td>
<td>Wed</td>
<td>14.9</td>
<td>28.9</td>
<td>28</td>
<td>84</td>
<td>59</td>
</tr>
<tr>
<td>2021/03/25</td>
<td>Thu</td>
<td>18.1</td>
<td>31.3</td>
<td>20</td>
<td>69</td>
<td>48</td>
</tr>
</tbody>
</table>

*Cool season*  
*High humidity!*

- **Lowest Temperature @ 5 am (below dew-point)**
- **Highest Temperature @ 2-5 pm**
3. RELATIVE HUMIDITY & BOTRYTIS

- The weather factors displaying the strongest influence on *Botrytis cinerea* mean daily conidia counts were temperature (especially dew-point) and humidity. Both parameters are considered critical for grey mould spore germination and the development of infection.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Annual Spores (spores/m³)</th>
</tr>
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<tbody>
<tr>
<td>2004</td>
<td>5022</td>
</tr>
<tr>
<td>2005</td>
<td>1700</td>
</tr>
<tr>
<td>2006</td>
<td>4881</td>
</tr>
<tr>
<td>2007</td>
<td>15331</td>
</tr>
<tr>
<td>2008</td>
<td>37299</td>
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</table>

Highest spore levels after fruit ripening

22X more *Botrytis* spores in wettest year than driest year!

4. MODERN VARIETIES

- Vigorous/High yielding
- Firm texture (crunchy/crispy)
- Thin skin
- Sweet
- Lack of astringency

What the market prefers!

Also what *Botrytis* prefers...
5. ARE WE FARMING THE SAME?

- Valley monoculture
- Nets
- Plastic
- Canopy management
6. WHAT IS BOTRYTIS GOOD AT?

- Can grow on any organic material
- Needs high humidity and prefers free moisture
- Is well adapted to growing at zero degrees Celsius
- But actually prefers higher temperature
6. WHAT DOES BOTRYTIS LIKE?

- *Botrytis* likes damaged material (it needs an entry point) – is a **wound pathogen**

  - Flower infection, can lead to internal/ endogenous/ inherent *Botrytis* infection

  - Hairline cracks/rain damage can lead to *Botrytis* infection including “slipskin” *Botrytis*
6. WHAT DOES BOTRYTIS LIKE?

- Botrytis has a sweet tooth...
7. PACKAGING: THE SKIN OF THE PALLET

- A pallet has a skin of carton and plastic
- Cartons MUST have ventilation on all sides
- Cartons should cross-vent (channels to remove heat)
- Liners should be ventilated for use with forced-air cooling
- BOTH need to work in tandem to be successful (perforations line up)
7. PACKAGING: THE SKIN OF THE PALLET

Perforations in liner should line up with those in carton.

Cartons should be perforated on long AND short side; these holes MUST line up (cross-vent)
7. PACKAGING: WHEN WET

When it goes wrong! These grapes will travel for **weeks in water**...

Box height too low, **punnet sealed off** top & bottom **despite perforated liner**

Grapes are **too wet**, visible RIGHT after cooling
7. PACKAGING: TOO WET

Wet grapes = 4 problems

Splits

Hairline cracks

Sulphur burn

Botrytis

Botrytis growing on a split berry

Hairline cracks

SO$_2$ bleaching
7. INTERNAL PACKAGING

- What if you don’t get the water out?
- Absorb with Paper/MAM options
- Ensure punnets are not shut in
- Bags should not block airflow or $SO_2$
8. CAN YOU COOL TOO FAST?

Stomata **only** on stems, not on berries

**SO₂** also has a preservative function, keeping stems **green**

Stem condition when grapes had **no delay** in cooling

The SAME grape stem with cooling **delayed 9 hours from picking**

Flame Seedless table grape stem condition after 0, 3, 6 and 9 hours delayed cooling (79°F, 30% rh and 25 fpm air velocity) followed by 7 days cold storage (32°F, 95% rh and 10 fpm air velocity).
9. BREAKS IN COLD CHAIN

- Use a logger!
- Check your logger data
- Breaks in cold chain form **more condensation**

48 h period of temperature going as high as 4.5°C
10. COVID RELATED LOGISTICS

World bank index ranks Port of Cape Town 347th out of 351 container ports (above Durban and Gqeberha).

Availability of containers and ships.

Transhipment delays...

PLAN FOR LONGER SHIPPING TIME
11. SO2

First stage must exceed 100ppm/h to kill active *Botrytis*

Second stage below 10ppm/h to avoid MRL exceedance.
11. WET GRAPES & SO2 DON’T MIX WELL

- **Wet Berry:**
  - Water
  - *Botrytis* spores
  - No Sulphite residue, SO$_2$ dissolves in water
  - *Botrytis* spores germinate

- **Dry Berry:**
  - Sulphite residue
  - *Botrytis* spores
  - *Botrytis* spores are neutralized
11. COVERAGE IS KING – FIT THE RIGHT SIZE

• The SO$_2$ sheet should cover at least 80% of the surface of the carton
• SO$_2$ gas is heavy and sinks down into the grapes
• The old way of thinking: 1g of Na$_2$S$_2$O$_5$ per kg of fruit is not valid anymore

These punnets are unprotected

SO$_2$ sheet is too small

MAM sheet is better used on top of SO$_2$ sheet
11. WHAT IF IT RAINS?
11. WHAT IF IT RAINS?

Dry grapes are happy grapes – inspect fruit after cooling – if too wet, increase liner perforation size and/or add paper on top of SO\(_2\) sheet (MAM sheet) UNTIL fruit is dry right after cooling

Use a good dual release SO2 sheet

You can also add additional SO\(_2\) sheets (1\(\frac{1}{2}\) to 2 sheets/carton) on loose/bagged grapes (extra sheet upside down on bottom)

Use a full-sized (9kg) SO\(_2\) sheet on punnets (only one sheet on top)
SUMMARY

- “IF YOU DO NOT MEASURE, YOU CANNOT MANAGE”.
- **CONSENTRATE ON WHAT YOU CAN CONTROL**: QUANTITY AND QUALITY
- PRODUCE HIGHEST QUALITY FRUIT WITH “LEGS” TO TRAVEL
- ADD VALUE (I.E. PUNNETS) AND MANAGE PACKAGING ON DAILY BASIS
- OPTIMISE YIELD/HA FOR QUALITY, DO NOT MAXIMIZE YIELD
- KEEP GRAPES DRY AND USE CORRECT SO2 SHEET PER CARTON SIZE

### PRODUCTION COST & FARM INCOME/PROFIT

<table>
<thead>
<tr>
<th>AVERAGE FOR RSA (SATI)</th>
<th>2020</th>
<th>HIGHER YIELD</th>
<th>HIGHER YIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCTION COST + DEPRECIATION/HA</td>
<td>R485 565</td>
<td>R541 974</td>
<td>541 974</td>
</tr>
<tr>
<td>CARTONS PRODUCED/HA</td>
<td>3 549</td>
<td>5 000</td>
<td>5 000,00</td>
</tr>
<tr>
<td>PRODUCTION COST/CARTON</td>
<td>R136,80</td>
<td>R108,39</td>
<td>R108,39</td>
</tr>
</tbody>
</table>

**SOURCE**: SATI FOR 2020

### SAME YIELD & 10% HIGHER PRICE FOR QUALITY

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>AT HIGHER YIELD</th>
<th>AT HIGHER YIELD &amp; PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCOME/CARTON</td>
<td>R136,80</td>
<td>R136,80</td>
<td>R150,48</td>
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<tr>
<td>PROFIT/CARTON</td>
<td>R0,00</td>
<td>R28,41</td>
<td>R42,09</td>
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<tr>
<td>PROFIT/HA</td>
<td>R0</td>
<td>R142 026</td>
<td>R210 426</td>
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THANK YOU
DANKIE

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