



**Raisins**  
South Africa

# **Grape Drying Facilities: The Way Forward**

**2022**

# Background

Raisins are enjoyed worldwide as a healthy snack and worldwide production in 2020/21 was 1.2 Mil tons of which SA contributed 75 000 tons.

The main reasons to dry fruit is to improve storage time and transportation while maintaining nutrition

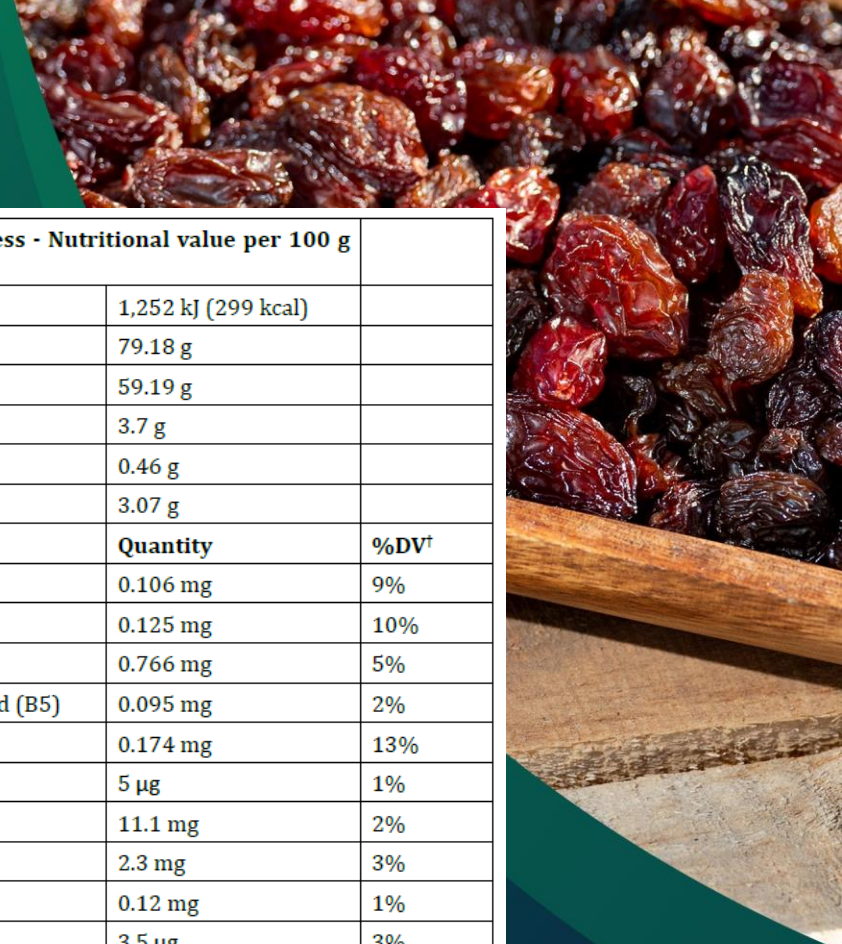
Speed of drying and quality aspects



# Background

Nutrient	Units	Composition/100 g	
		<i>V. labrusca</i>	<i>V. vinifera</i>
Water	g	81.3	80.5
Energy	kcal	67.0	69.0
Protein	g	0.63	0.72
Total lipid (fat)	g	0.35	0.16
Ash	g	0.57	0.48
Fibre (total dietary)	g	0.9	0.9
Carbohydrate (by difference)	g	17.1	18.1
Sugars (total)	g	16.2	15.5
<i>Minerals</i>			
Calcium (Ca)	mg	14.0	10.0
Iron (Fe)	mg	0.29	0.36
Magnesium (Mg)	mg	5.0	7.0
Phosphorus (P)	mg	10.0	20.0
Potassium (K)	mg	191	191
Sodium (Na)	mg	2.0	2.0
Zinc (Zn)	mg	0.04	0.07
Copper (Cu)	mg	0.04	0.13
Manganese (Mn)	mg	0.72	0.71
<i>Vitamins</i>			
Vitamin C (total ascorbic acid)	mg	4.0	10.8
Thiamin	mg	0.09	0.07
Riboflavin	mg	0.06	0.07
Niacin	mg	0.30	0.19
Pantothenic acid	mg	0.02	0.05
Vitamin B <sub>6</sub>	mg	0.11	0.09
Folate (total)	mcg	4.0	2.0
Vitamin A	IU	100.0	66.0
Vitamin E (alpha-tocopherol)	mg	0.19	0.19
Vitamin K (phylloquinone)	mcg	14.6	14.6
<i>Others</i>			
Amino acids	g	0.50	0.57
Carotenoid pigments	mcg	131	111

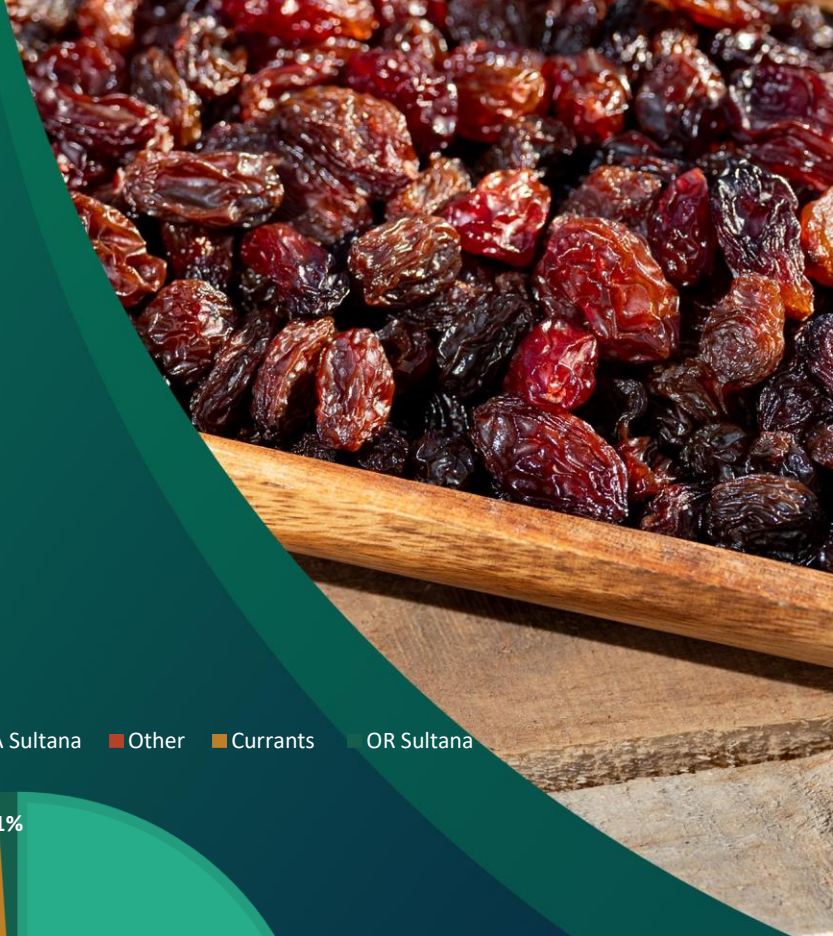
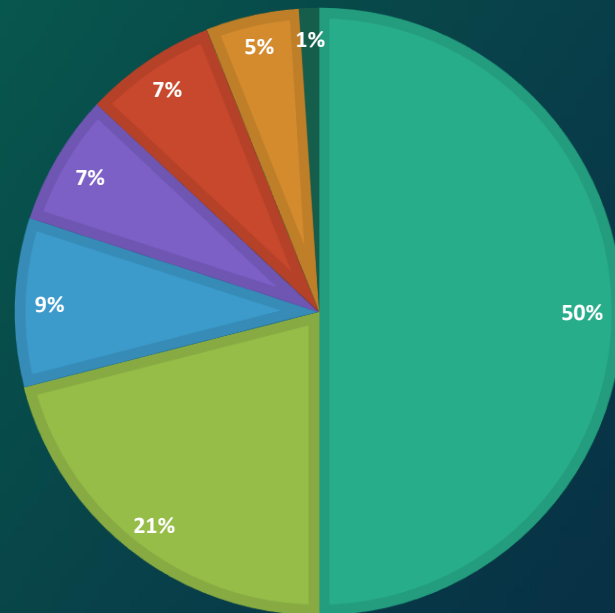
Raisins, seedless - Nutritional value per 100 g (3.5 oz)		
Energy	1,252 kJ (299 kcal)	
Carbohydrates	79.18 g	
Sugars	59.19 g	
Dietary fiber	3.7 g	
Fat	0.46 g	
Protein	3.07 g	
<b>Vitamins</b>	<b>Quantity</b>	<b>%DV†</b>
Thiamine (B1)	0.106 mg	9%
Riboflavin (B2)	0.125 mg	10%
Niacin (B3)	0.766 mg	5%
Pantothenic acid (B5)	0.095 mg	2%
Vitamin B6	0.174 mg	13%
Folate (B9)	5 µg	1%
Choline	11.1 mg	2%
Vitamin C	2.3 mg	3%
Vitamin E	0.12 mg	1%
Vitamin K	3.5 µg	3%
<b>Minerals</b>	<b>Quantity</b>	
Calcium	50 mg	5%
Iron	1.88 mg	14%
Magnesium	32 mg	9%
Manganese	0.299 mg	14%
Phosphorus	101 mg	14%
Potassium	749 mg	16%
Sodium	11 mg	1%
Zinc	0.22 mg	2%
<b>Other constituents</b>	<b>Quantity</b>	
Fluoride	233.9 µg	



# Background



Legend for the pie chart: Thompsons (Teal), Goldens (Light Green), Flame (Blue), SA Sultana (Purple), Other (Red), Currants (Orange), OR Sultana (Dark Green).



# Background

## Sun dried methods

- Thompson rakke
- Cement slabs
- Wooden trays
- Gravel slabs
- Organic matter base
- Dry on Vine (DOV)



# Background



# Introduction

- Raisins SA tesame iPlan.
- Hooffokus – Impak van droogfasilitieite op droog tempo en kwaliteit.
- Projek:
  - 2 omgewings: Oranje- en Olifantsrivier.



# Methods

- Climatic measurements
  - Automatic weather station
  - LogTag temperature and RH logger
- Drying rate
  - Cluster weights
- Grading
  - Air stream sorter and colour charts

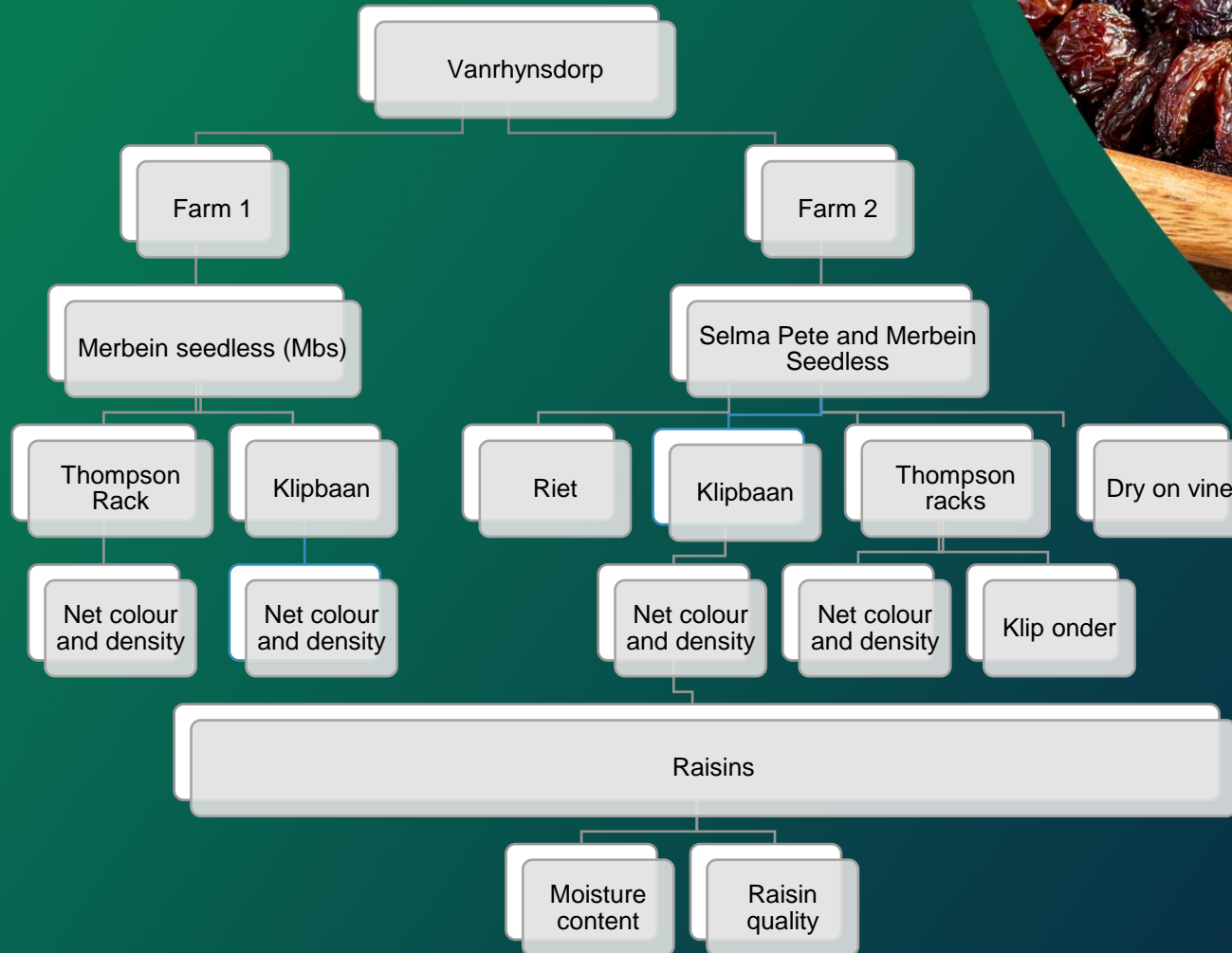




Vanrhynsdorp



# Setup



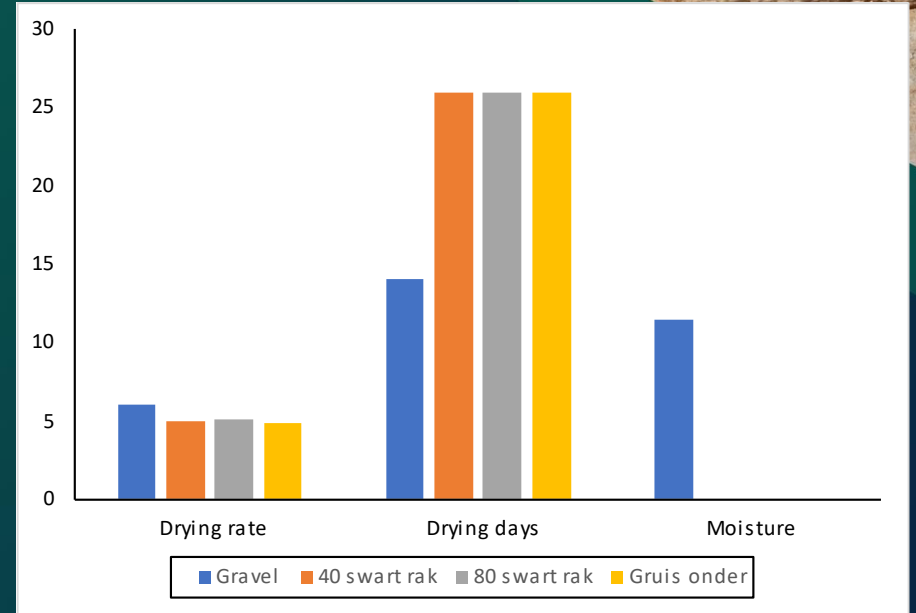
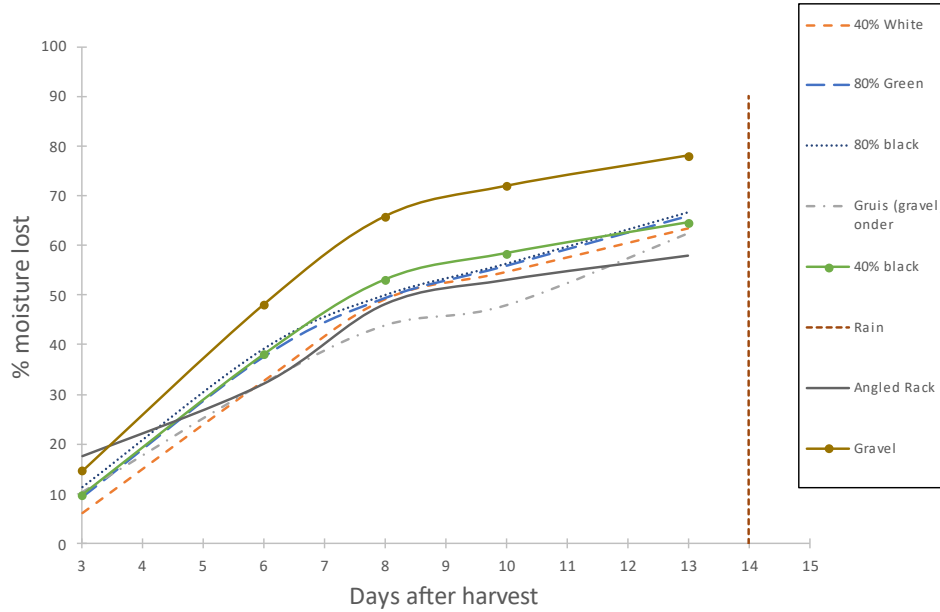
# Materials

Site	Cultivar	Harvest date	°Brix
Farm 1	Mbs	2 Feb 2022	24.4
Farm 2	Selma Pete	8 Feb 2022	24.0
	Mbs	9 March 2022	23.4

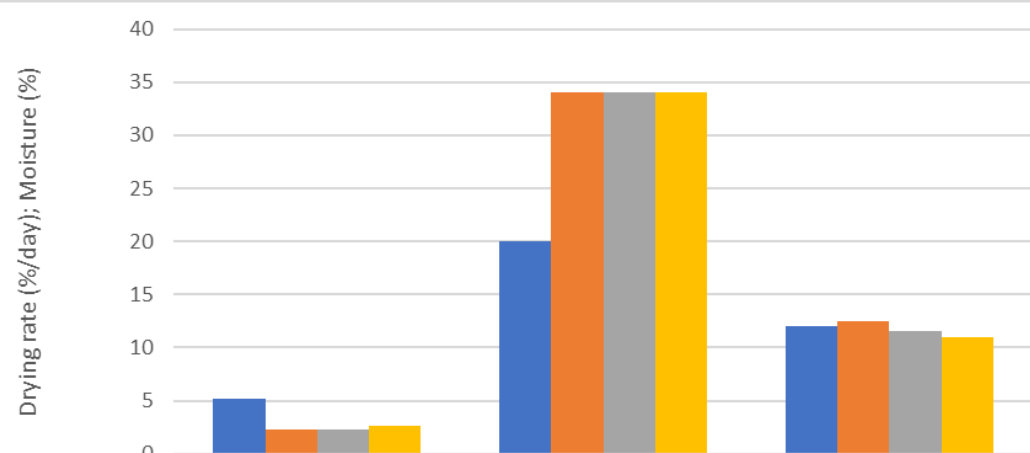


# Drying Rate

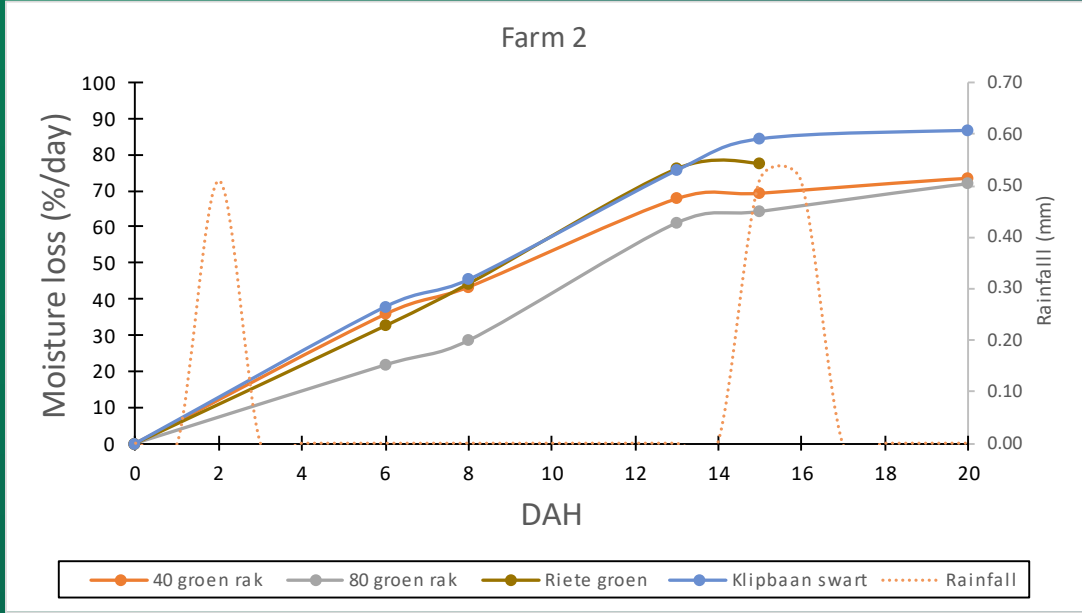
Farm 1: Moisture loss



# Droogtempo



	drying rate	drying days	moisture
Riete	5.2	20	12
40 groen rak	2.3	34	12.5
80 groen rak	2.3	34	11.5
klipbaan	2.6	34	11



# Grading

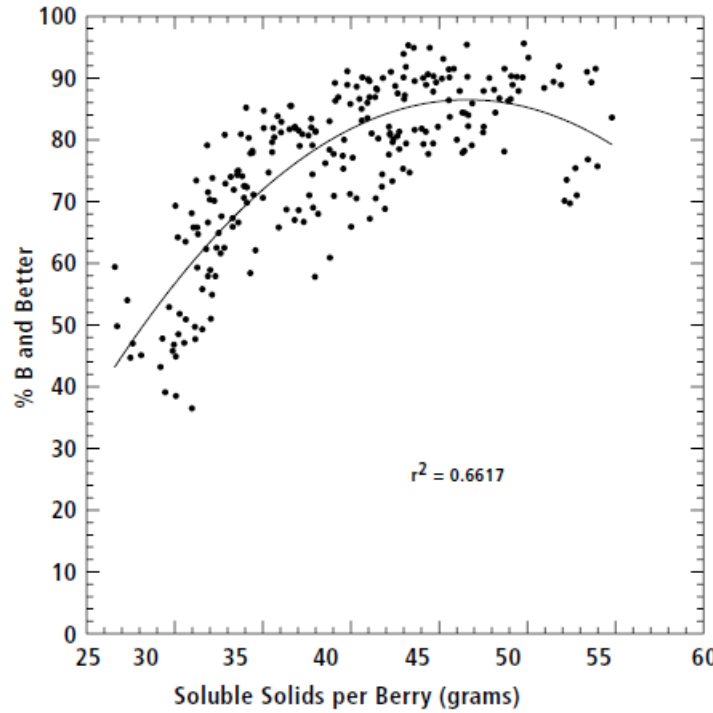
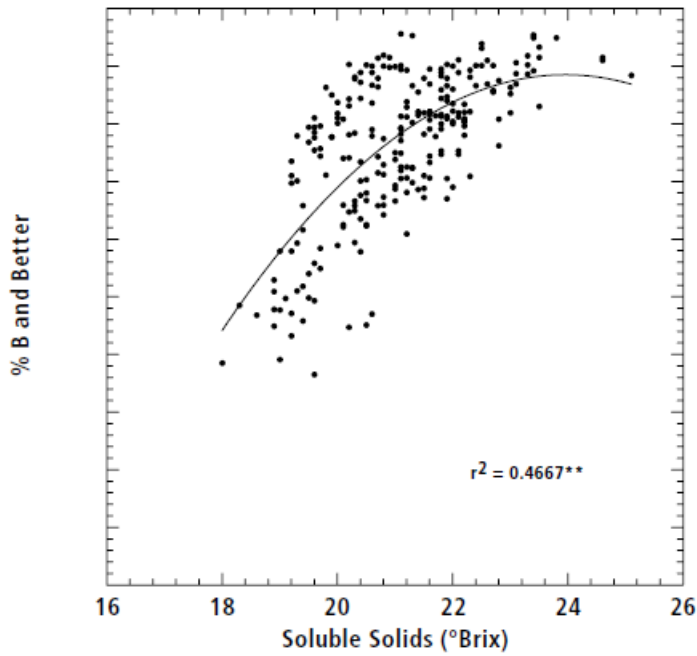


Figure 30.3 The influence of berry soluble solids (°Brix) on percentage B and better raisin grades

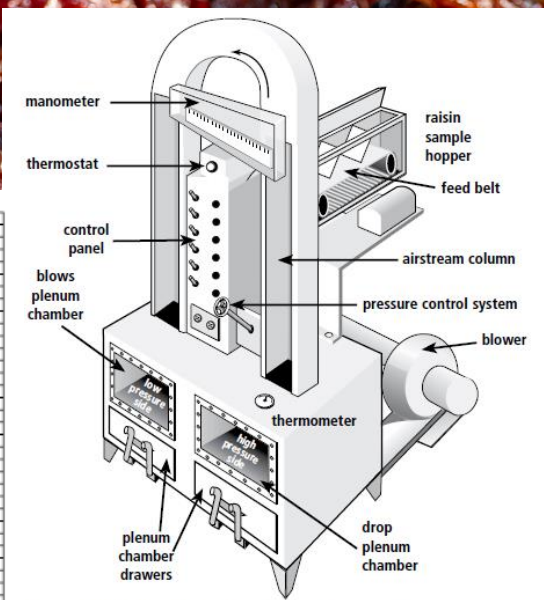


Figure 30.1 The main features of the airstream sorter



## Three Quality types

1. Choice grade
2. Standard grade
3. Industrial grade

# Raisin browning

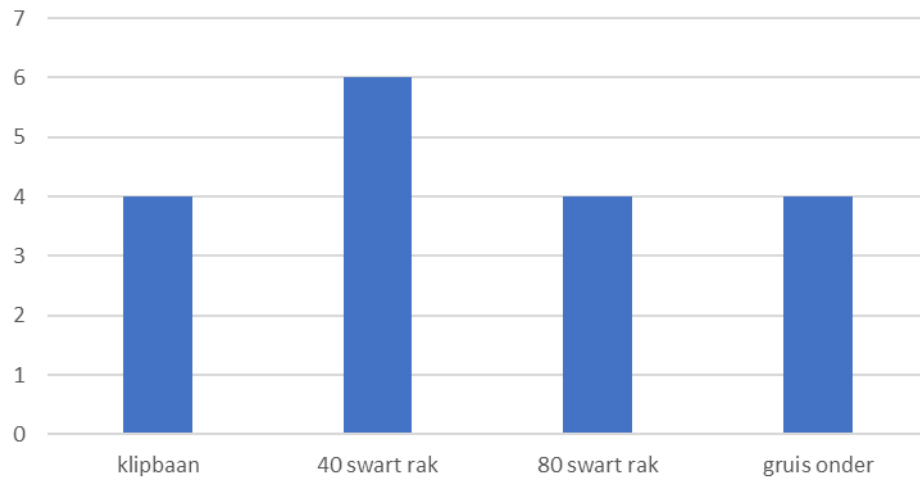
Enzymatic polyphenols reactions

Milliard reaction

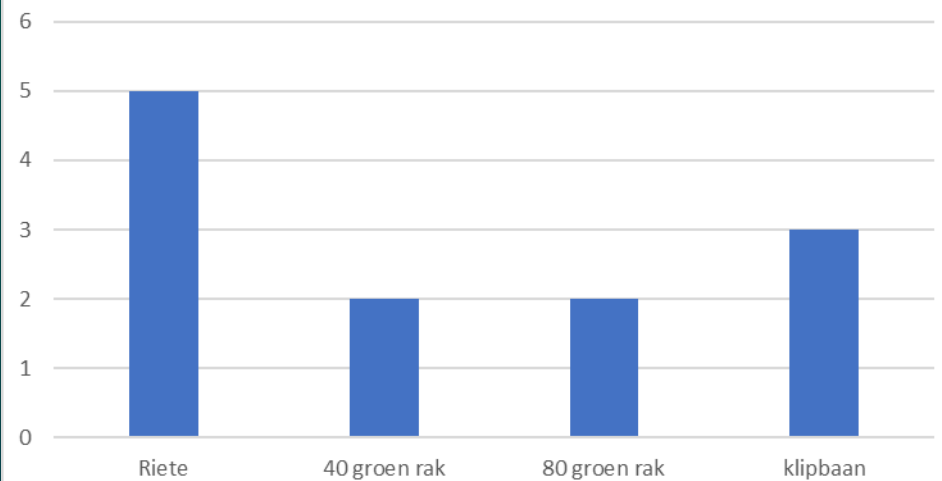


# Grading

% Kluer gering (Farm 1)



% Kleur gering (Farm 2)

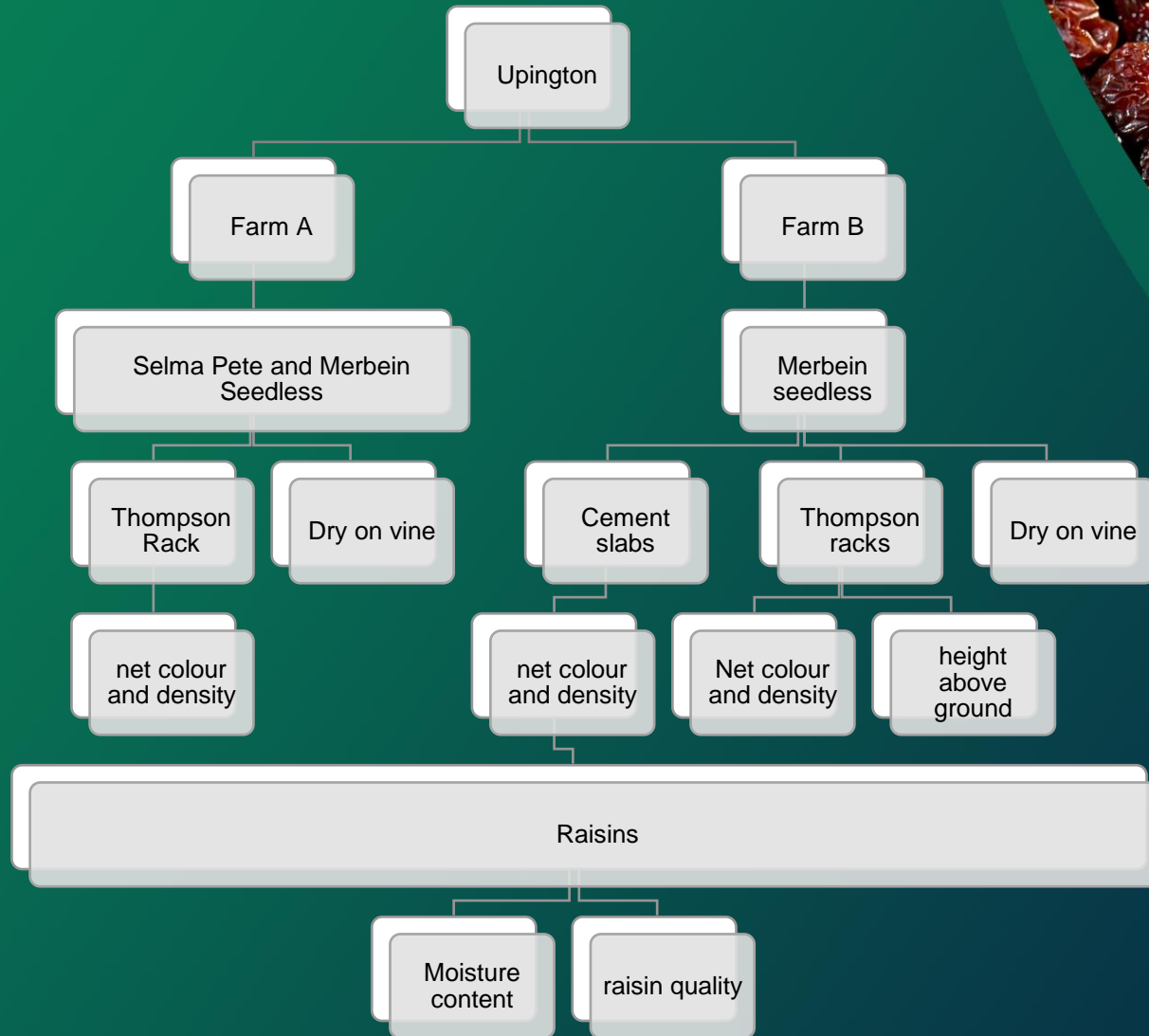




# Orange River



# Setup



# Net experiment

- **Beskrywing:**
  - Toets verskillende net digthede en kleure.
- **Hipotese:**
  - **Digtheid:** Onderzoek invloed op kontaminasie.
    - Laer digtheid > lugvloei (TR); Meer kontak met grond (grondbane)
    - Digthede getoets: 40% en 80%.
  - **Net Kleur:** Onderzoek invloed op kwaliteit en droogtyd.
    - Net kleure: Swart, Wit, Groen en Blou.



# Materials

Table 0.1. Harvest date and sugar content (°Brix) for 2021/22 season

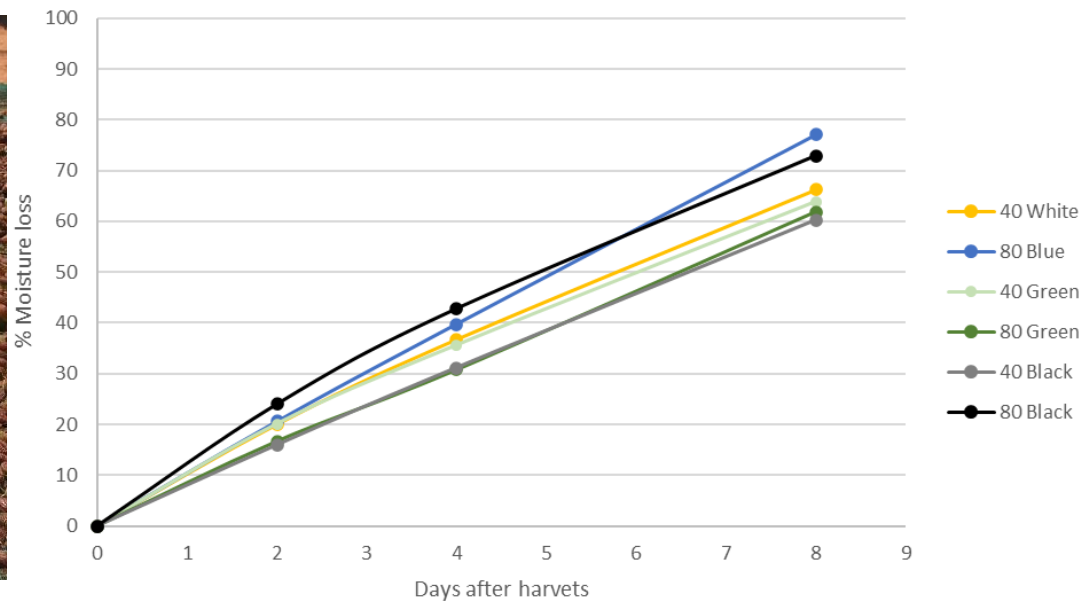
Location	Variety	Harvest date	°Brix
Farm A	SP	19-Jan	21
	Mbs	21-Feb	18.0
Farm B	Mbs	9-Feb	20
	Mbs	28-Feb	20.3



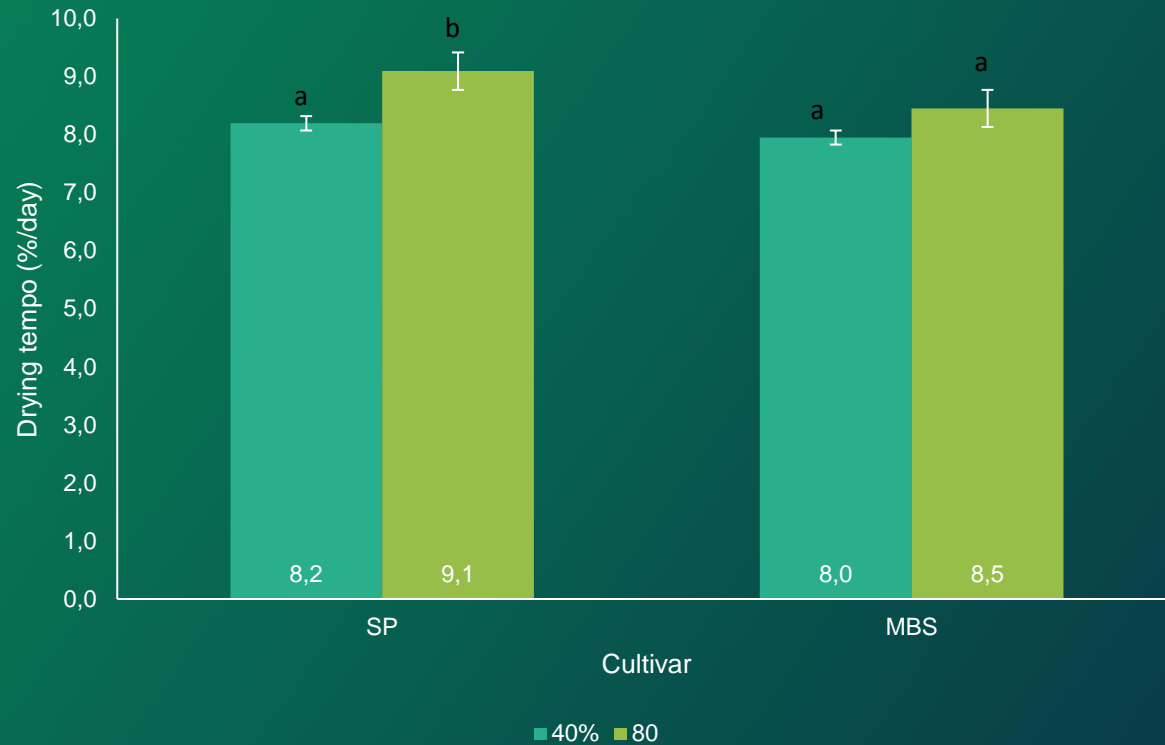
# Drying rate (Farm A)



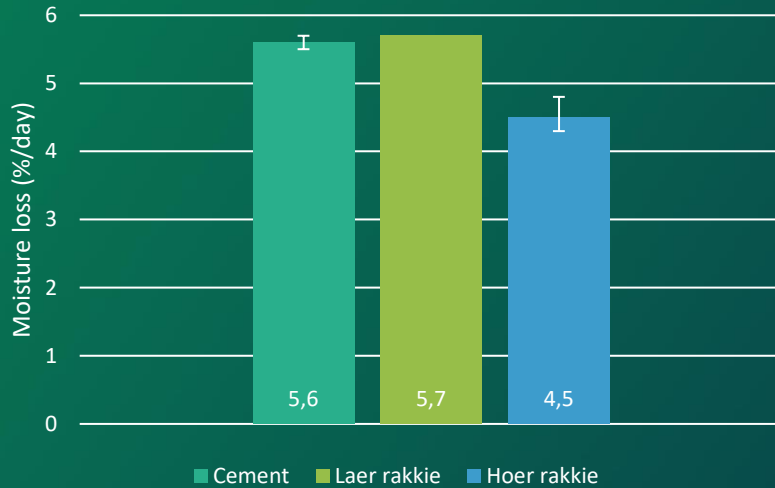
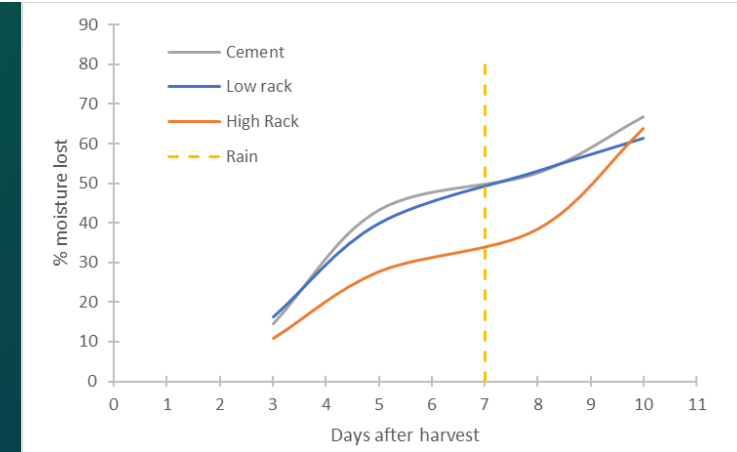
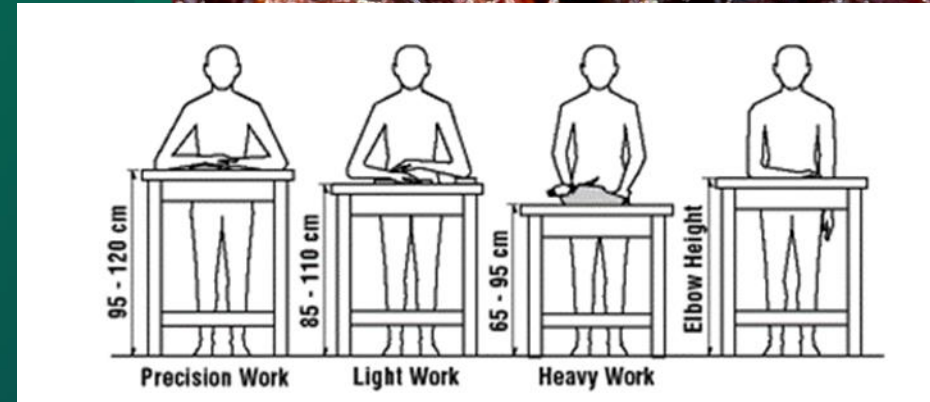
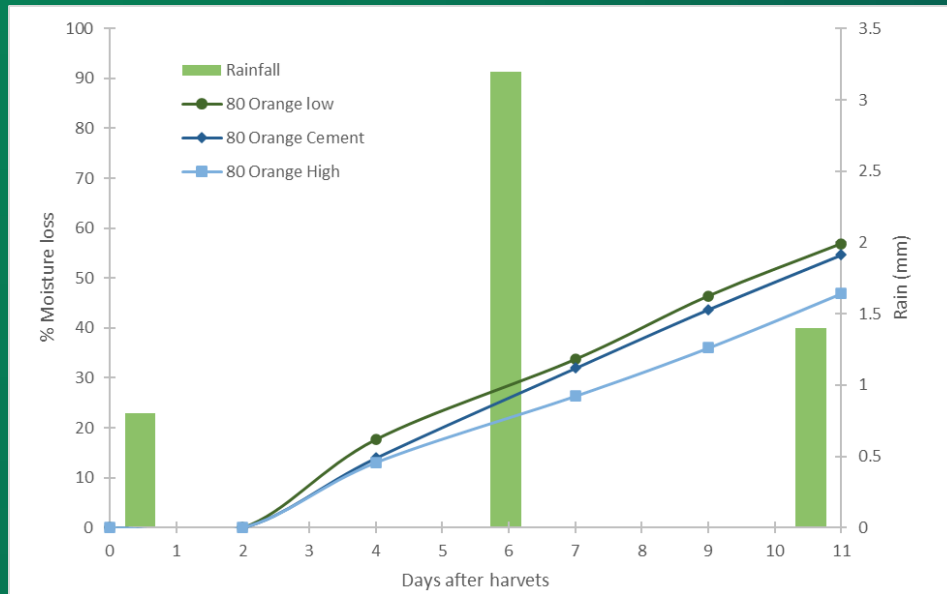
Mbs



# Drying rate (Farm A)



# Drying rate (Farm B)



Hoog Thompson rakkie	86 cm
Laer Thompson rakkie	65 cm

# Dry on Vine (DOV)

- Droogtempo

Droogdae	Selma Pete	Merbein Seedless
2020/21	27	41
2021/22	35	-

- Gradering

		°Brix	Choice %	Std. %	VGW %	Ind. %
Selma Pete	2020/21	24.5	97	0	3	0
	2021/22	21.0	89	0	4	7
Mb seedless	2020/21	21.2	70	22	2	6

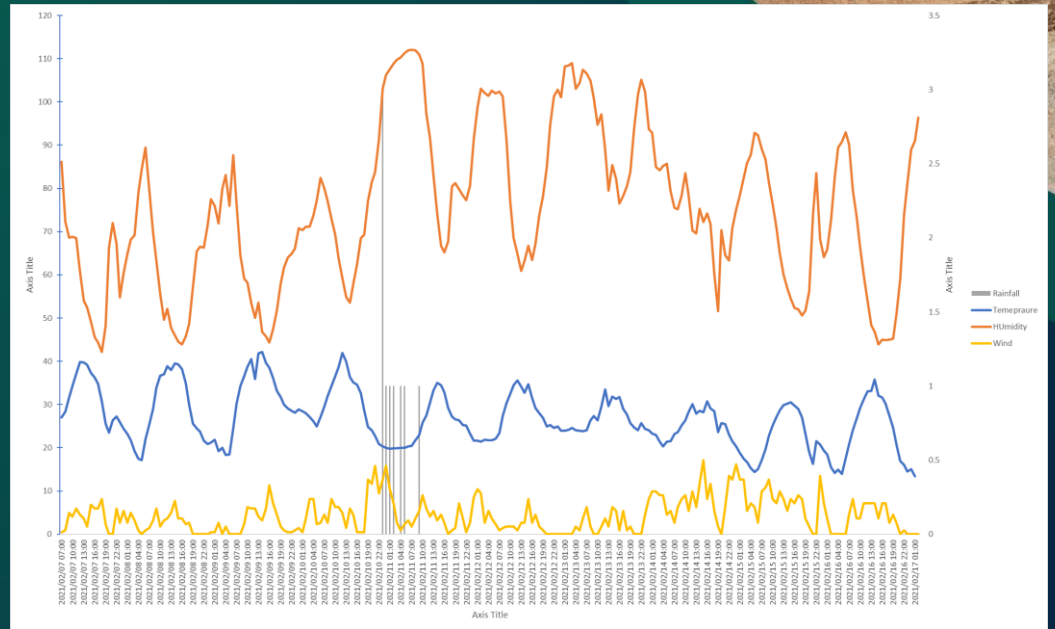
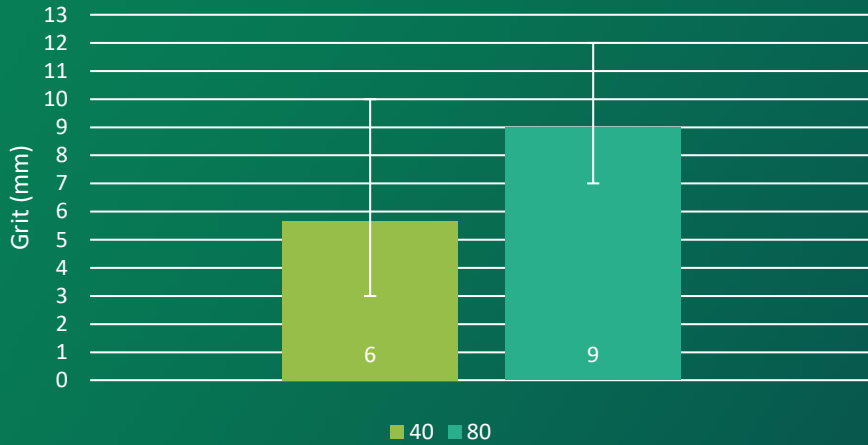
- DOV is goed geskik vir vroeë rywordende kultivars





# Potential contamination

SP



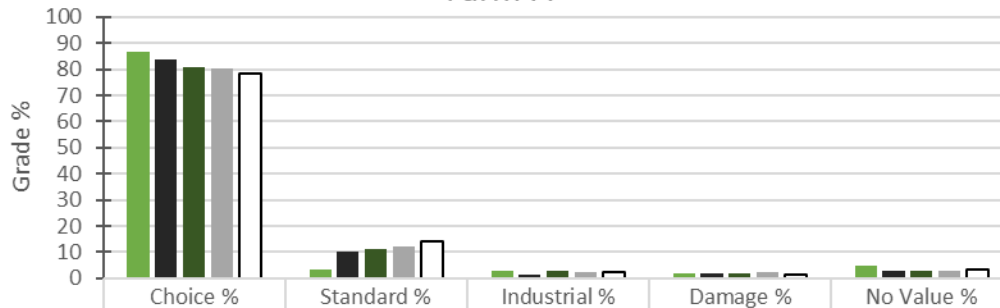
# Potential contamination



# Grading

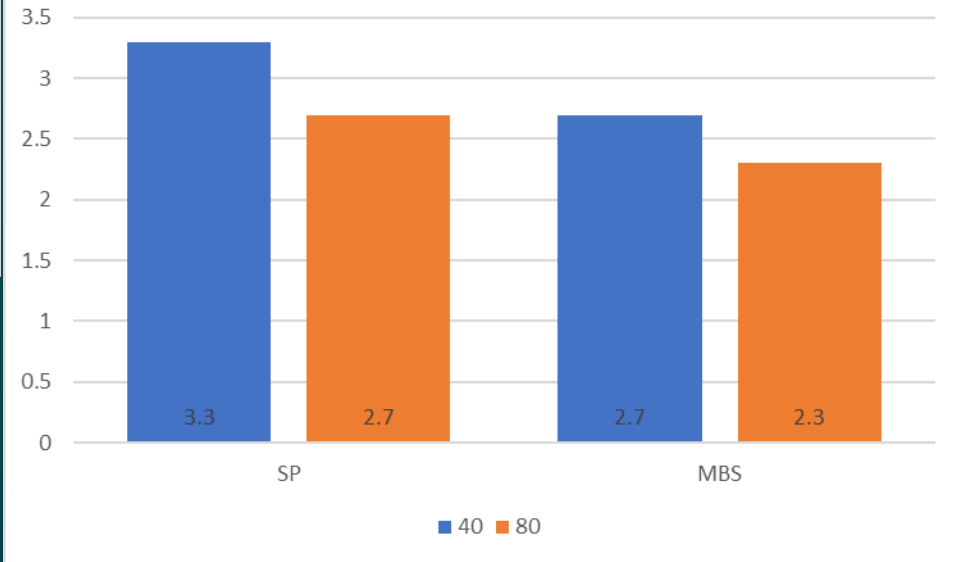


Farm A



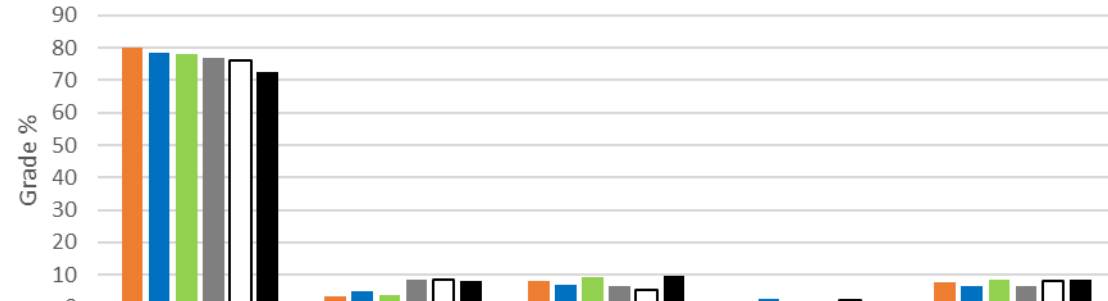
	Choice %	Standard %	Industrial %	Damage %	No Value %
40% Green	87	4	3	2	5
80% Black	84	10	2	2	3
80% Green	81	11	3	2	3
40% Black	81	12	2	2	3
40% White	79	14	3	2	4

Slight Colour deviations



# Grading

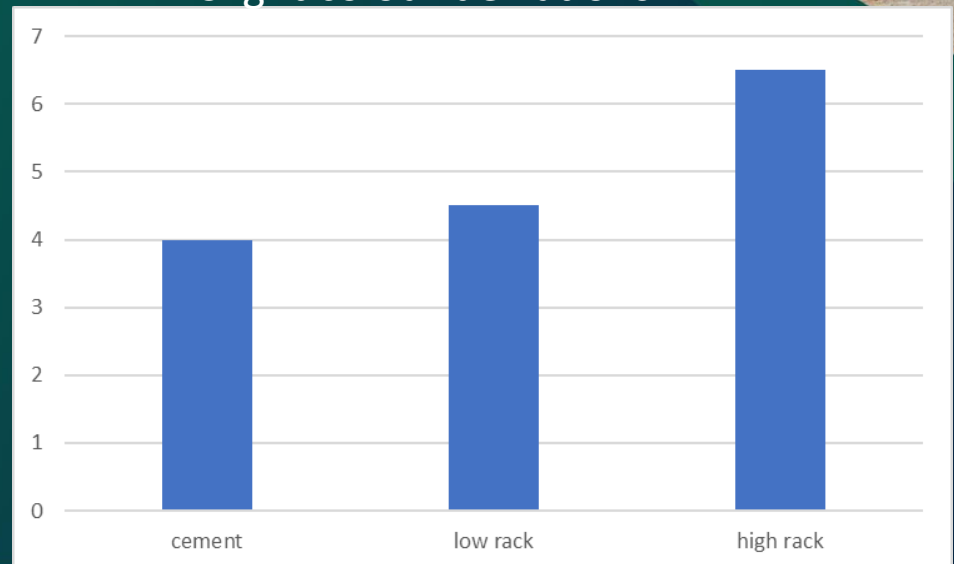
Farm B



	Choice %	Standard %	Industrial %	Damage %	No Value %
80% Orange	80	3	8	1	8
80% Blue	79	5	7	3	7
40% Green	78	4	9	1	8
40% Black	77	8	7	2	6
40% White	76	9	6	2	8
80% Black	73	8	10	1	8



Slight colour deviations



# Conclusion

- Nets – review advantages and disadvantages of less/more dense nets
- Height of drying - Grapes closer to the ground surface dry at a faster but are more susceptible to contamination.
- D.O.V. – High quality raisins, particularly in rainy conditions, but have long drying times and theft
- Quality



Thank You