

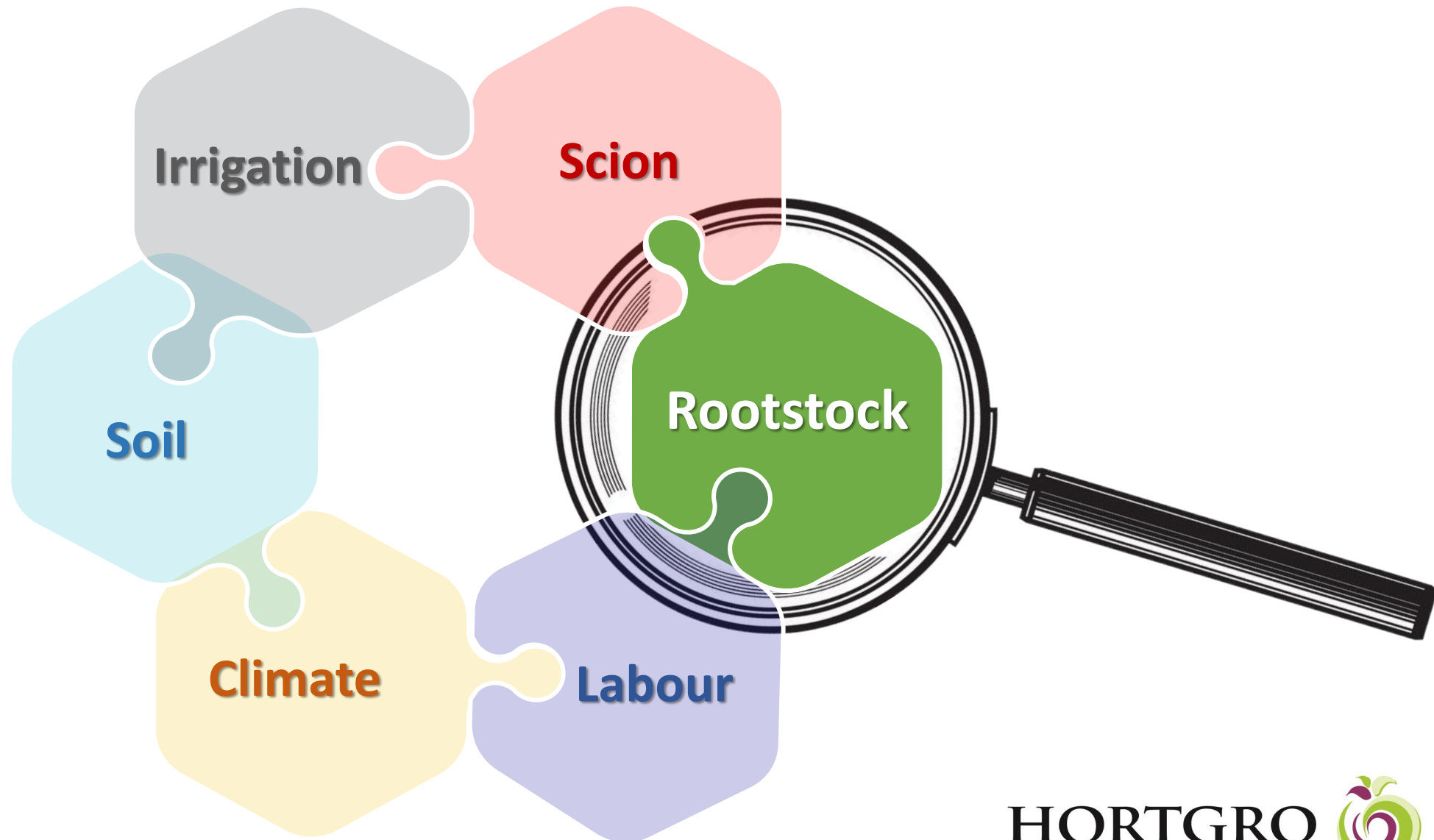
PROJECTED PROFITS FOR ORCHARDS PLANTED TO DIFFERENT ROOTSTOCKS BASED ON ROOTSTOCK EVALUATION DATA



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Research Implementation Manager

8 June | 2022

INTRODUCTION

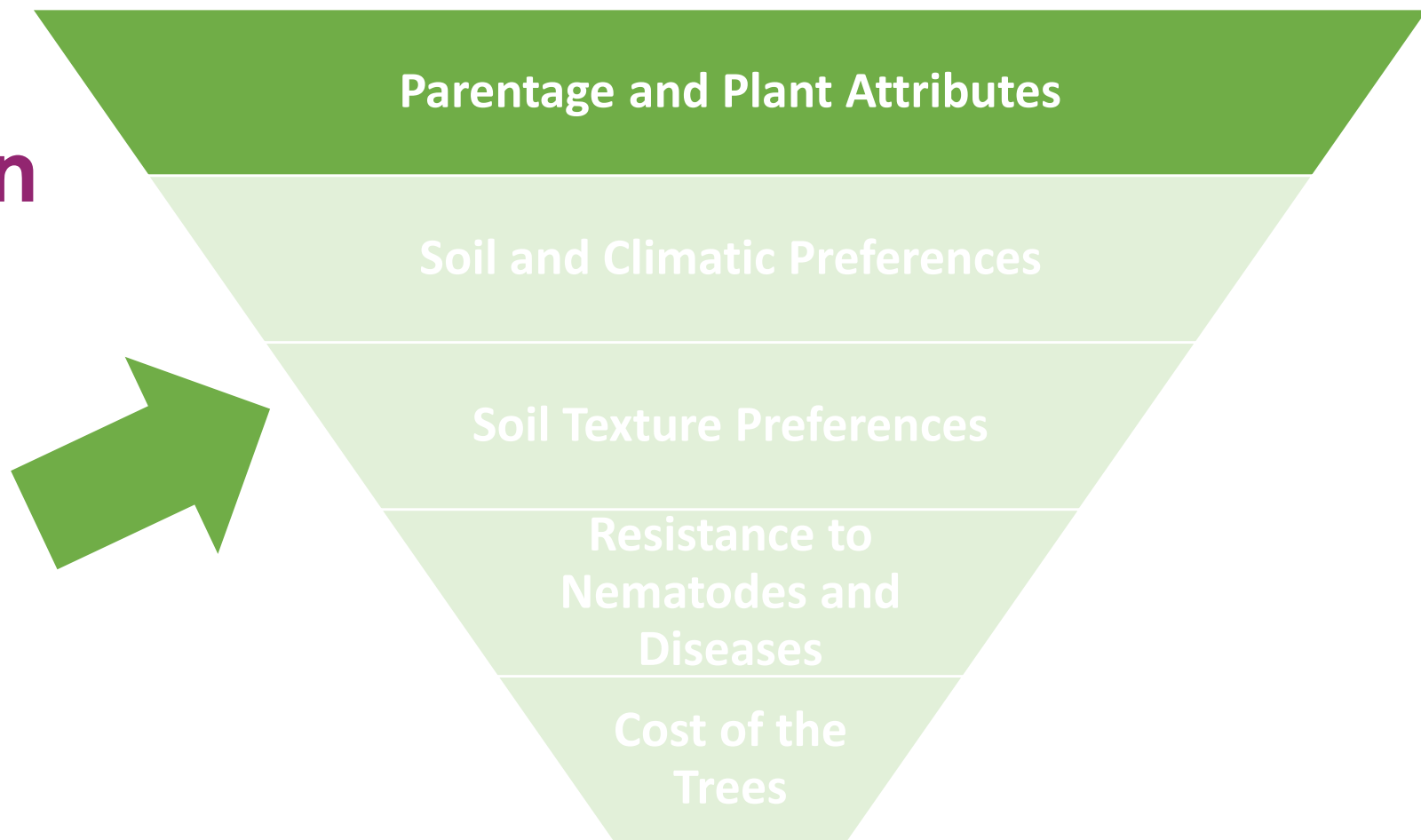


INTRODUCTION

Rootstock Selection



Rootstock Selection



WHY | PROJECT PROFITS FOR ORCHARDS PLANTED TO DIFFERENT ROOTSTOCKS

Parentage and Plant Attributes

Soil and Climatic Preferences

Soil Texture Preferences

Resistance to
Nematodes and
Diseases

Cost of the
Trees



WHY | PROJECT PROFITS FOR ORCHARDS PLANTED TO DIFFERENT ROOTSTOCKS

Parentage and Plant Attributes

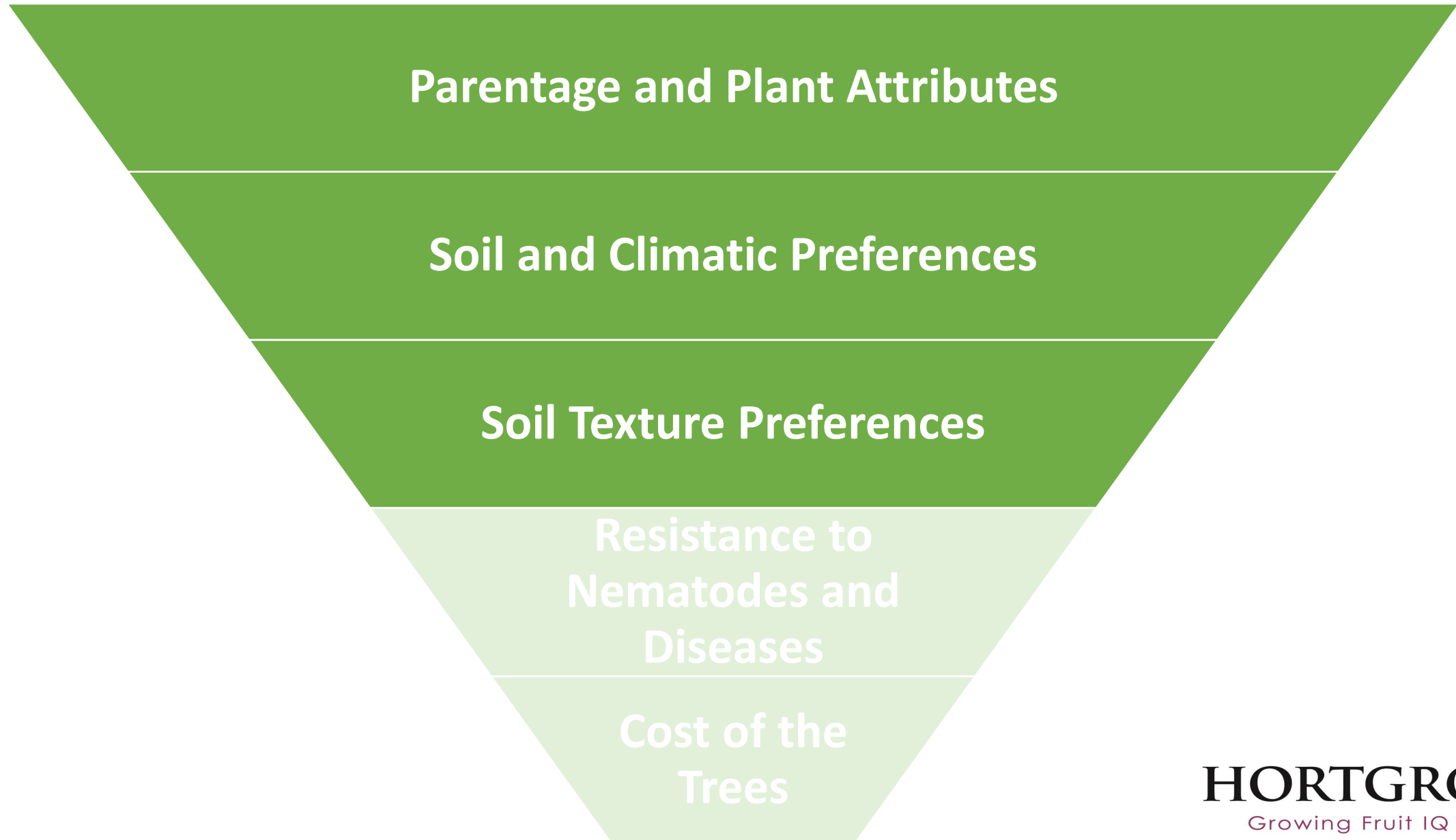
Soil and Climatic Preferences

Soil Texture Preferences

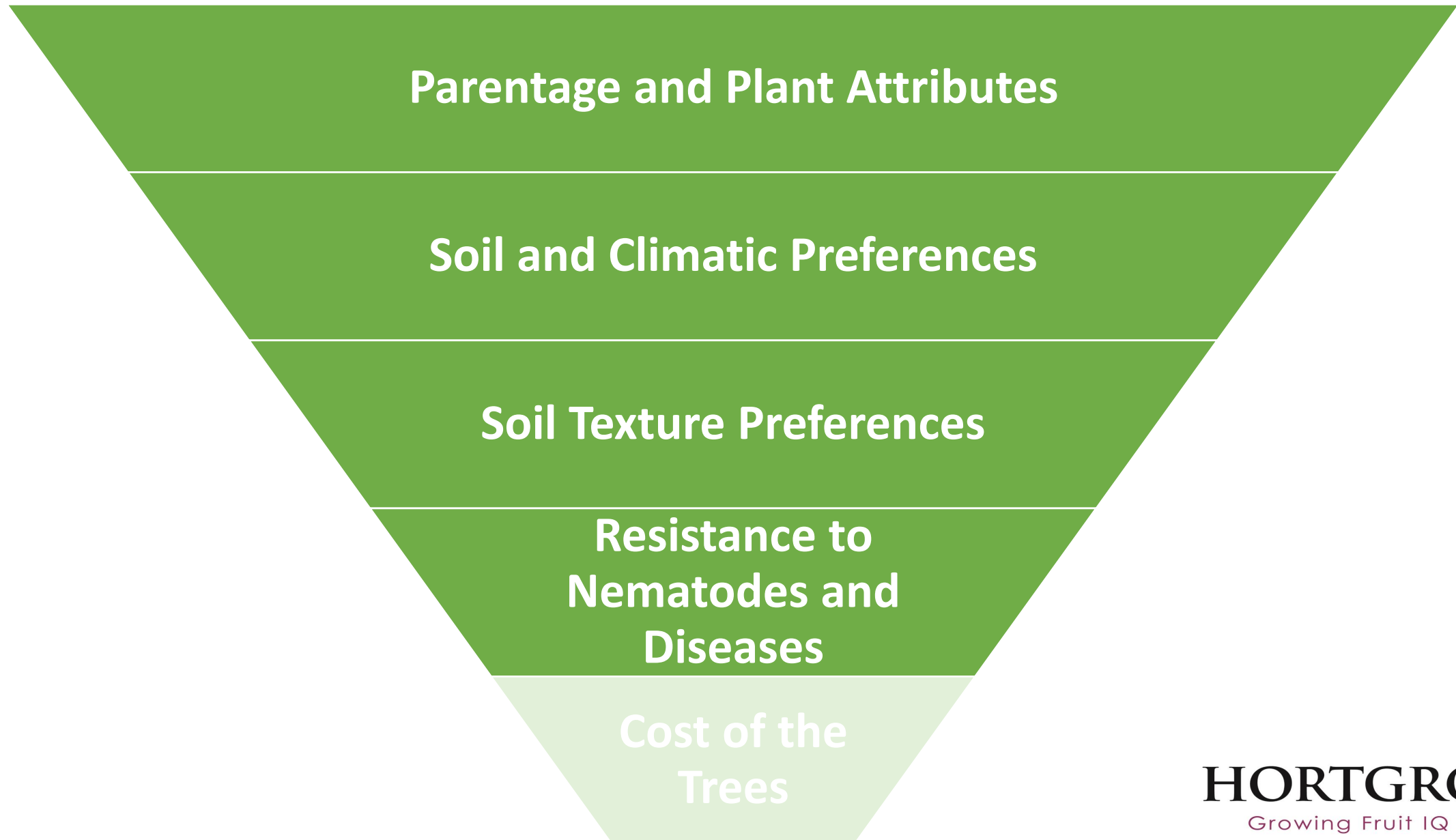
**Resistance to
Nematodes and
Diseases**

**Cost of the
Trees**

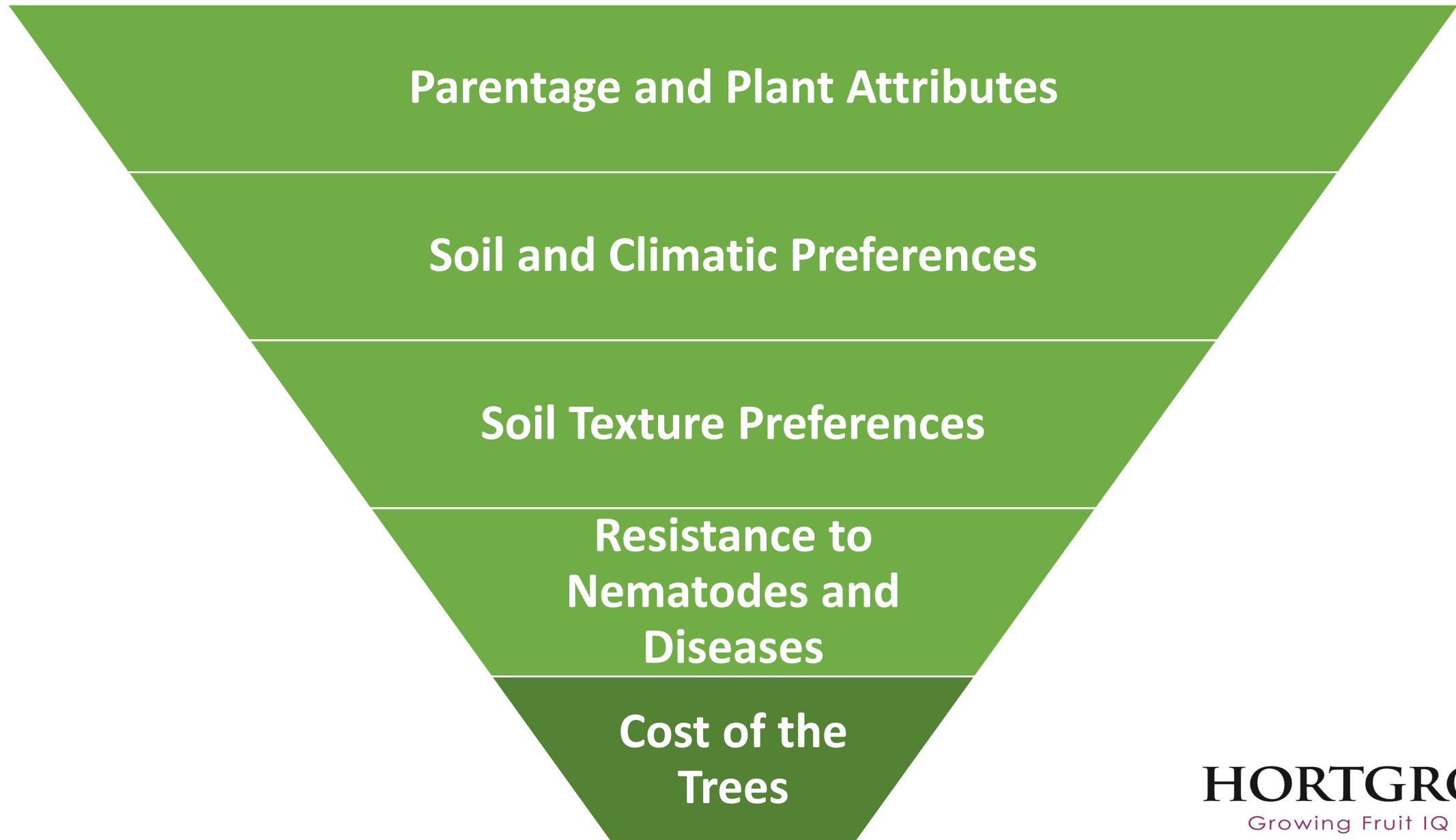
WHY | PROJECT PROFITS FOR ORCHARDS PLANTED TO DIFFERENT ROOTSTOCKS



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Parentage And Plant Attributes

ROOTSTOCK	PARENTAGE ¹	GROWTH VIGOUR	RIPENING	FRUIT SIZE	CHILLING REQUIREMENT
Atlas	<i>P. persica</i> x <i>P. davidiana</i> x <i>P. dulcis</i> x <i>Prunus</i> x <i>blireiana</i>	Moderately strong	Late	Very good	250 – 550+ PCU ²
Cadaman	<i>P. persica</i> x <i>P. davidiana</i>	Very strong	Middle	Good	250 – 550+ PCU ²
Flordaguard	<i>P. persica</i> x <i>P. davidiana</i>	Very strong	Early	Good but small if high numbers of ring nematodes occur	100 – 550 PCU ² Frost sensitive
Garnem	<i>P. persica</i> x <i>P. dulcis</i>	Very strong	Middle	Very good	350 - 550+ PCU ² Lower limit unknown
GF 677	<i>P. persica</i> x <i>P. amygdalus</i>	Moderately strong	Middle	Good but small with nectarines	250 – 550+ PCU ²
Guardian	<i>P. persica</i> <i>Nemaguard</i> cross	Moderately strong	Middle	Small like Kakamas seedling but better total yield	250 – 550+ PCU ²
Kakamas seedling	<i>P. persica</i>	Semi-dwarfing	Early	Small if under stress especially on sandy soils	200 – 550+ PCU ²
Marianna	<i>P. cerasifera</i> x <i>P. munsoniana</i>	Moderately strong	Middle	Good but small if high numbers of ring nematodes occur	350 – 550+ PCU ²
Maridon	Tetraploid of Marianna	Semi-dwarfing	Middle	Good but small if high numbers of ring nematodes occur	350 – 550+ PCU ²
Royal seedling	<i>P. armeniaca</i> cv. Blenheim Royal	Moderately strong	Middle	Good	350 – 550+ PCU ²
SAPO 778	<i>P. persica</i> x <i>P. amygdalus</i> x cold-hardy peach	Moderately strong	Middle	Very good	350 - 550+ PCU ²
Viking	<i>P. persica</i> x <i>P. davidiana</i> x <i>P. dulcis</i> x <i>Prunus</i> x <i>blireiana</i>	Moderately strong	Late	Good but small if high numbers of ring nematodes occur	250 – 550+ PCU ²

Soil and Climatic Preferences

ROOTSTOCK	SALINITY ¹	WET SOILS	DROUGHT SENSITIVITY	CALCAREOUS SOILS	CHLOROSIS
Atlas	Sensitive	Sensitive	Moderately tolerant	Tolerant	Shows lime-induced iron chlorosis under free lime conditions but influence on performance not detected
Cadaman	Sensitive	Sensitive	Moderately tolerant	Tolerant	Only minor yellowing symptoms
Flordaguard	Very sensitive	Very sensitive	Moderately tolerant	Very sensitive	100% leaf chlorosis
Garnem	Sensitive	Very sensitive	Moderately tolerant	Tolerant	Only minor yellowing symptoms
GF 677	Moderately sensitive	Very sensitive	Moderately tolerant	Tolerant	Only minor yellowing symptoms
Guardian	Sensitive	Sensitive	Moderately tolerant	Sensitive	Shows yellowing symptoms
Kakamas seedling	Very sensitive	Very sensitive	Sensitive in sandy soils	Very sensitive	100% leaf chlorosis
Marianna	Moderately tolerant	Moderately tolerant	Sensitive in sandy soils	Moderately sensitive	Shows yellowing symptoms
Maridon	Moderately tolerant	Moderately tolerant	Sensitive in sandy soils	Moderately sensitive	Shows yellowing symptoms
Royal seedling	Sensitive	Very sensitive	Moderately tolerant	Very sensitive	100% leaf chlorosis
SAPO 778	Very sensitive	Sensitive	Not for sandy soils and early cultivars	Very sensitive	100% leaf chlorosis
Viking	Moderately sensitive	Sensitive – tolerant	Sensitive	Tolerant	Show lime-induced iron chlorosis under free lime conditions but influence on performance not detected

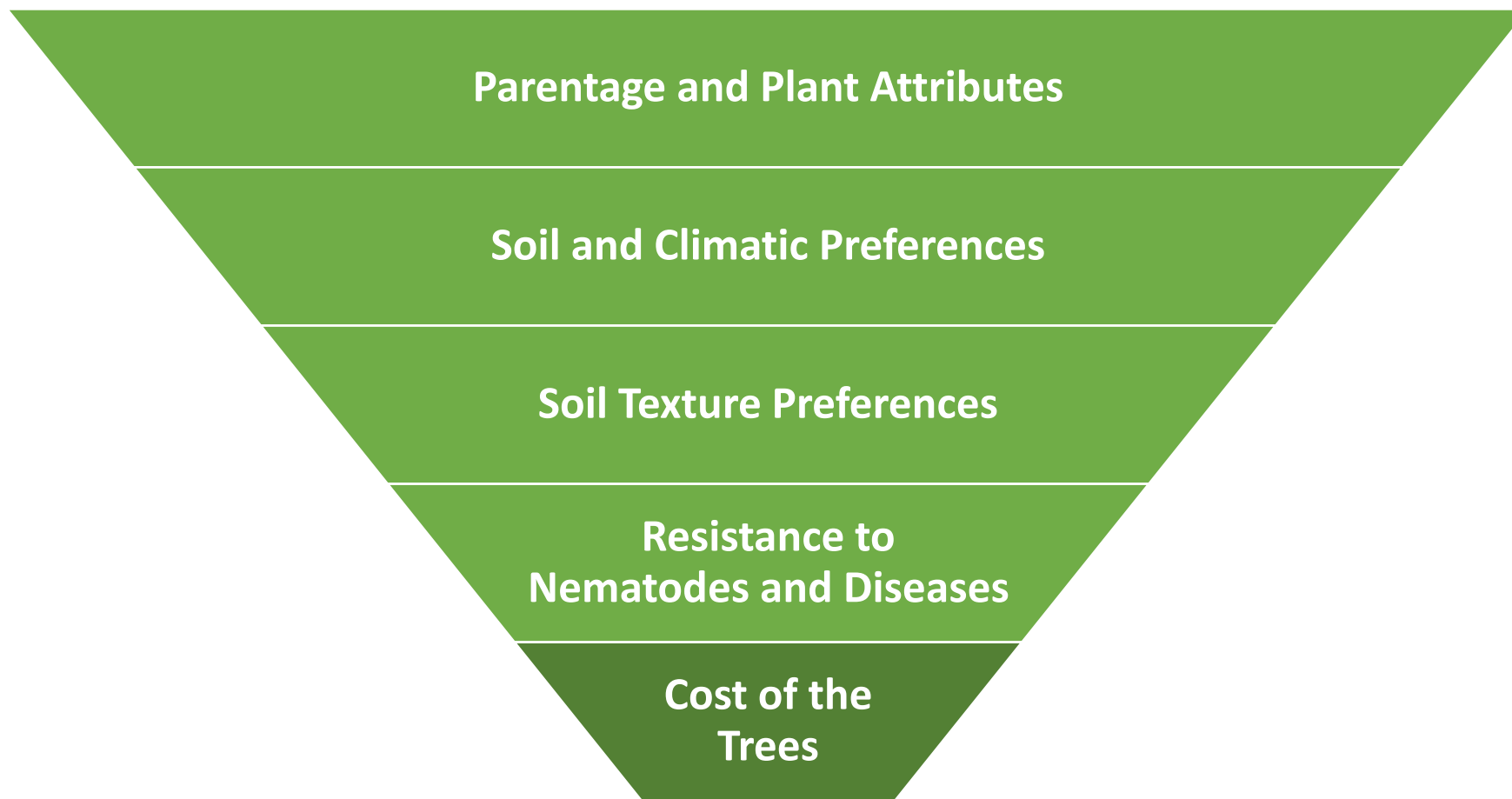
Soil Texture Preferences

ROOTSTOCK	90 – 95% SAND	80 – 90% SAND	20 – 35% SILT + CLAY. CLAY LESS THAN 20%	20 – 30% CLAY	COMMENTS
Atlas	Yes	Yes	Yes	Moderately tolerant	A good overall rootstock for a wide range of soils
Cadaman	Yes	Yes	Yes	No.	Good for sandy soils
Flordaguard	Yes	Yes	No	No	Excellent for deep, well-drained, sandy soils. Not for wet or calcareous or alkaline soils.
Garnem	Not known.	Yes	Yes	No	Vigorous especially in less than 80% sand
GF 677	No	No	Yes	No	Very sensitive to over-irrigation and poor drainage
Guardian	Not known.	Yes	Yes	Moderately tolerant	Not for calcareous soils
Kakamas seedling	No	No	Yes	No	Easily stressed in sandy and stony soils
Marianna	No	Yes	Yes	Moderately tolerant	Shallow horizontal root system that can grow in soil depth of 450 mm if well-managed
Maridon	No	Yes	Yes	Moderately tolerant	Shallow horizontal root system that can grow in soil depth of 450 mm if well-managed
Royal seedling	No	Yes	Yes	No	Excellent for well-drained shales
SAP0 778	No	Yes	Yes	Moderately tolerant	Can have synchronisation problems with early cultivars. Very sensitive in sandy soils with fluctuating water tables.
Viking	No	Yes	Yes	Yes	Not recommended for sandy or stony soils

Resistance to Nematodes and Diseases

ROOTSTOCK	INFECTIONS BY FUNGI AND BACTERIA	ROOT-KNOT NEMATODE ¹	RING NEMATODE ¹	ROOT-LESION NEMATODE ¹	NEMATODE COMMENTS
Atlas	Tolerant	Resistant	Moderately tolerant	Moderately tolerant	High ring nematode numbers do not affect yield and fruit weight
Cadaman	Sensitive	Resistant	Moderately tolerant	Sensitive	High ring nematode numbers do not affect yield and fruit weight
Flordaguard	Sensitive	Immune	Sensitive – tolerant	Sensitive	Sensitive to high numbers of ring nematodes. Reduce fruit weight.
Garnem	Very sensitive	Resistant	Moderately tolerant	Tolerant	Good host but still performs well when ring nematodes occur
GF 677	Very sensitive	Very sensitive	Sensitive	Very sensitive	High ring nematode numbers reduce fruit weight. More sensitive in sandy soils.
Guardian	Tolerant	Resistant	Tolerant	Moderately tolerant	Need more information on sandy soils
Kakamas seedling	Tolerant	Very sensitive	Sensitive	Sensitive	Very sensitive to high numbers of ring nematodes. Reduce fruit weight.
Marianna	Very sensitive	Immune	Very sensitive	Sensitive	Very sensitive to high numbers of ring nematodes. Reduce fruit weight.
Maridon	Very sensitive	Immune	Very sensitive	Sensitive	Very sensitive to high numbers of ring nematodes. Reduce fruit weight.
Royal seedling	Very sensitive	Tolerant	Very sensitive	Sensitive	Very sensitive to high numbers of ring nematodes. Reduce fruit weight.
SAPO 778	Sensitive	Tolerant	Resistant – tolerant	Sensitive	More sensitive in sandy soil and when scion and rootstock not synchronised
Viking	Tolerant	Resistant	Tolerant – Sensitive	Sensitive	Sensitive to ring nematodes in stony and sandy soils during summer months

WHY | PROJECT PROFITS FOR ORCHARDS PLANTED TO DIFFERENT ROOTSTOCKS



**Optimum
Rootstock**

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Soil Texture Preferences

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Nematodes and Diseases

Cost of the
Trees



**2nd or 3rd
best option**

HORTGRO
Growing Fruit IQ



OBJECTIVE

Long Term Benefits



OBJECTIVE

Build a **theoretical financial model**

THAT

(Project) the potential **long term profit** of a plum orchard planted to the **most optimum rootstock**

TO

Indicate the **importance** of selecting the **correct rootstock** for a **specific site**

4 Completed Industry Plum Rootstock Trials



African Delight plums | 10 different rootstocks



African Delight plums | 11 different rootstocks



Laetitia plums | 14 different rootstocks



Sunbreeze plums | 12 different rootstocks

THE DATA

Establishment Costs

- Actual tree and royalty costs and industry averages for all other relevant expenses

Yield Data

- Year 1-4/5: Extracted from the completed industry rootstock trials
- Year 6 – 20: A 2 year-average was used for long term yield projections

Fruit Size Distributions

- Average fruit size data from the completed industry rootstock trials was fitted to the 4 year industry average fruit size distribution of each cultivar

Fruit Quality

- Uniform fruit quality was assumed.
- Packout% was based on 4-year industry average per cultivar

Fruit Pricing

- Weighted average prices per equivalent carton were sourced from the FRUDATA study group



THE FINANCIAL ASSUMPTIONS

- An **inflation** of **5%** was applied to both Income and Expenses
- **Loan** amounts were amortized **at prime (7.75%** at the time) with a 2-year grace period (with interest charged over that period)
- A **15-year** loan **term** was assumed
- **Tax** payment of **28%** was assumed in the model

RESULTS | PROJECT PROFITS FOR ORCHARDS PLANTED TO DIFFERENT ROOTSTOCKS



1 | African Delight orchard in Simondium



- Low-lying **sandy soils** with fluctuating water tables (93.4 % sand, 1.5% silt and 5.1% clay, pH KCl 6.5)
- High numbers of **ring nematodes**



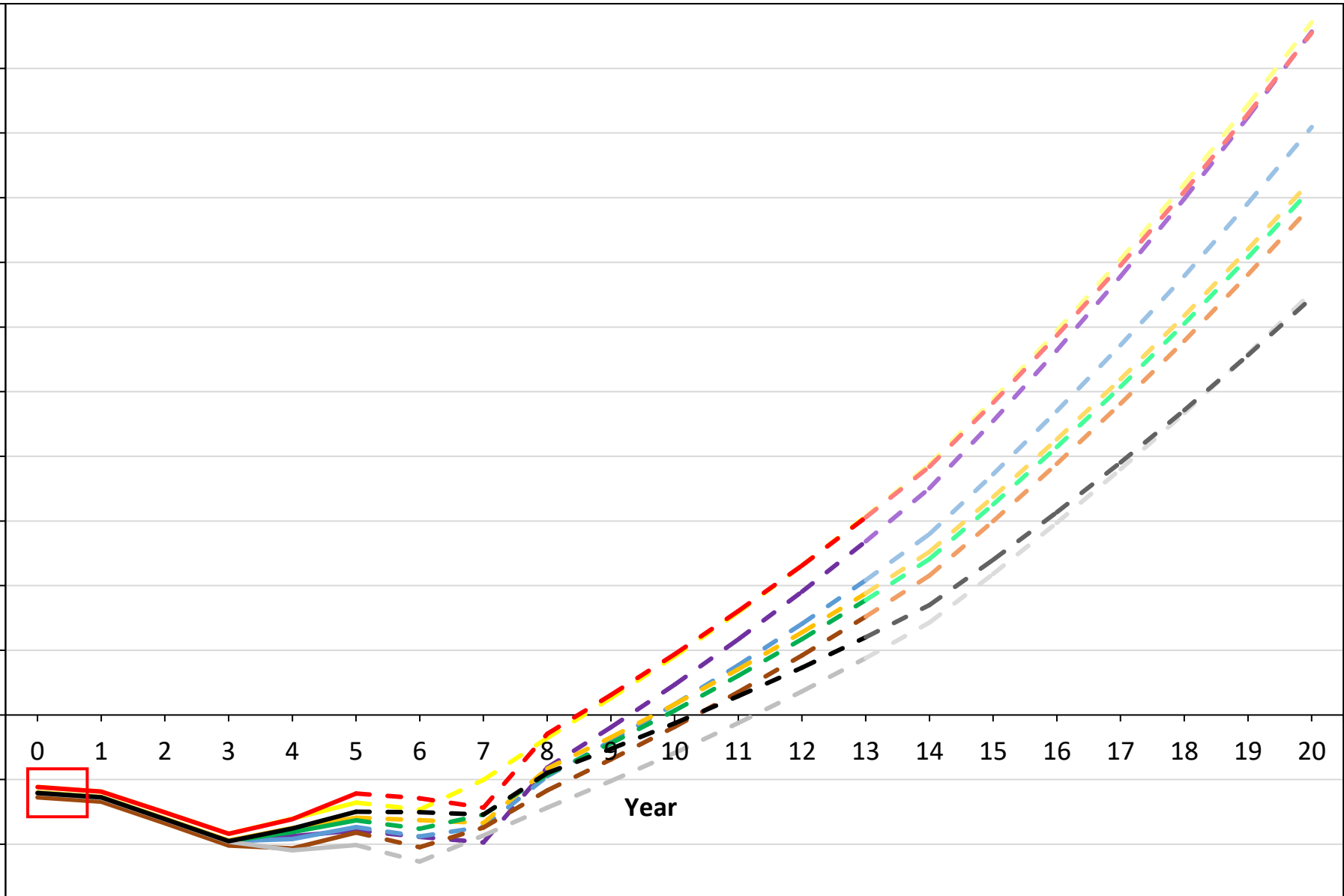
Orchard Details:

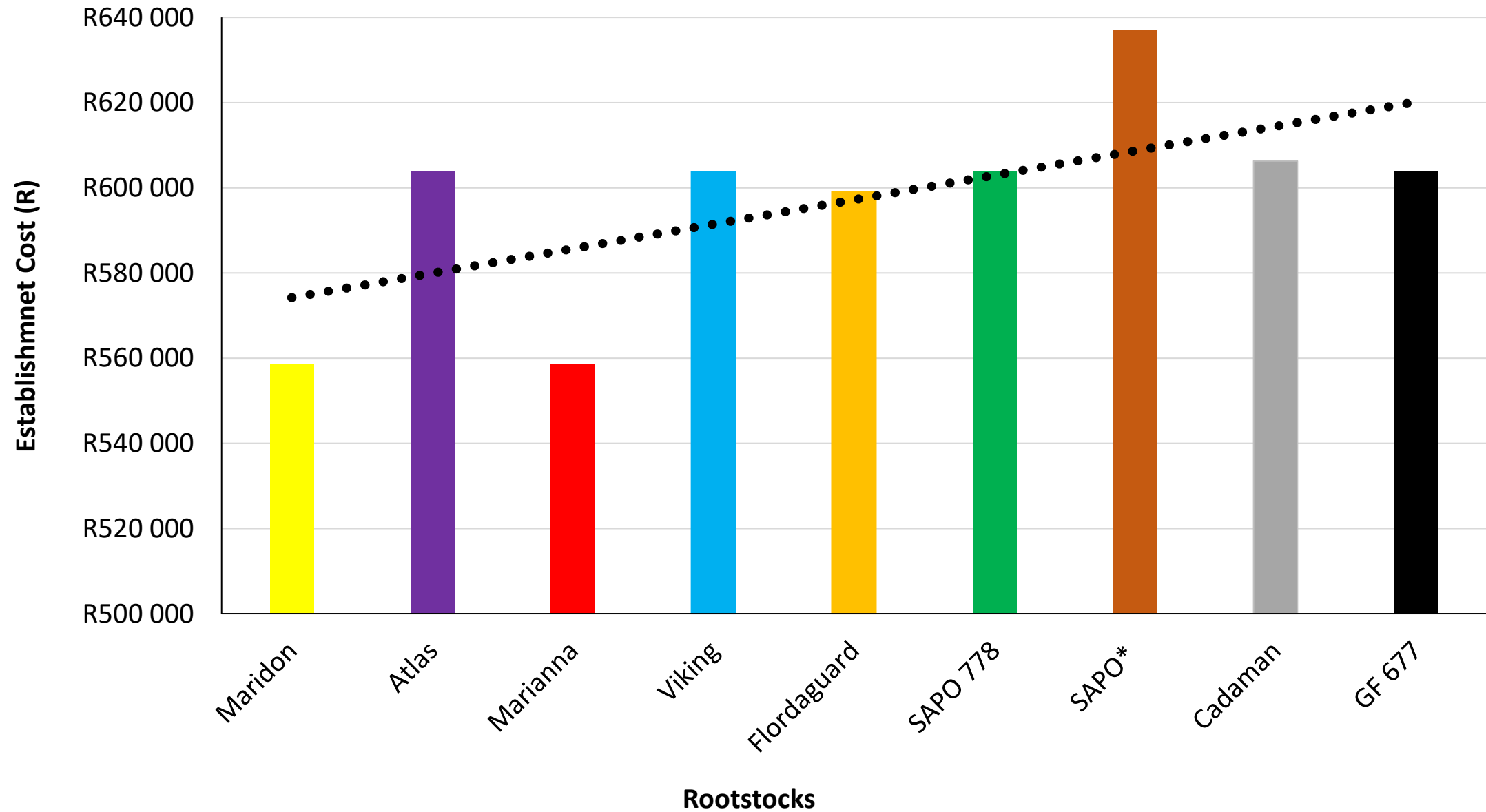
- Planting Distance: 4.5m x 0.75m
- Training System: V-system with individual trees each side of the V

Orchard Preparations:

- **Drainage system** to keep the water table well below the root zone
- Trees were planted on **Ridges** of 0.5m x 1.5m
- **Cut off furrows** was dug to prevent lateral flow of water

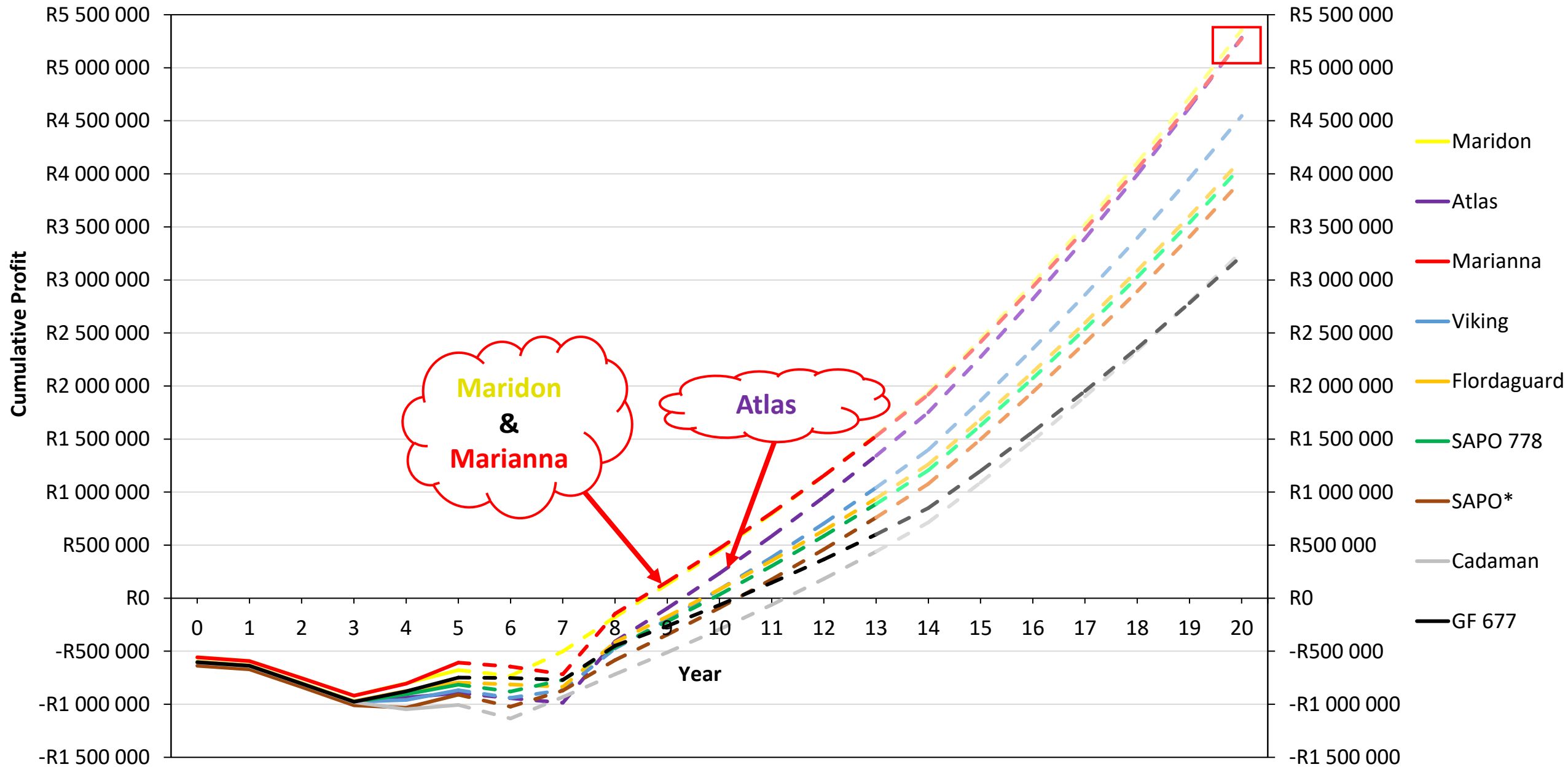
(SANDY SOILS + RING NEMATODES)



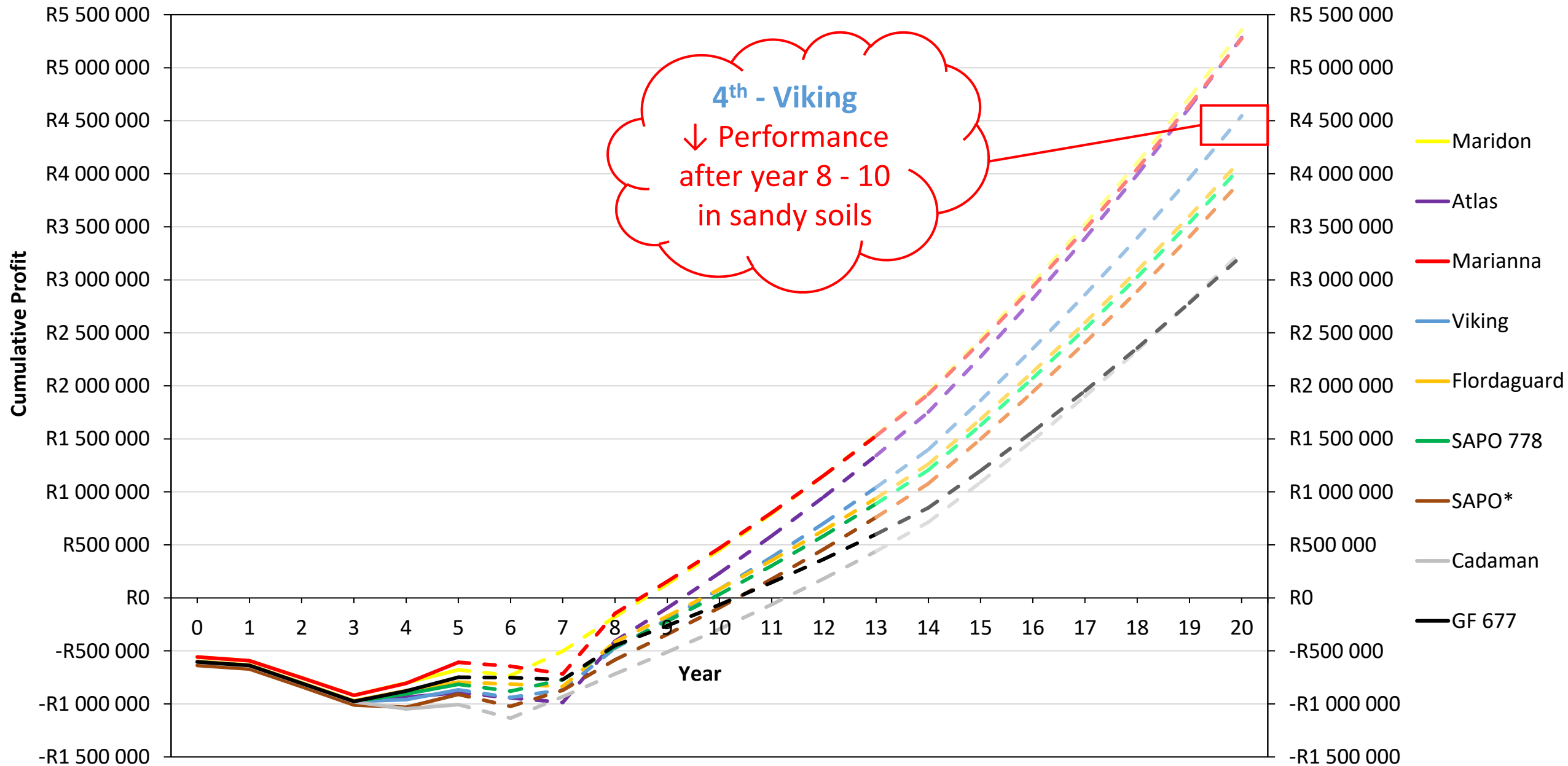


Establishment cost of African Delight orchards planted to different rootstocks

PROJECTED CUMULATIVE PROFIT OF AN AFRICAN DELIGHT PLUM ORCHARD (SANDY SOILS + RING NEMATODES)



PROJECTED CUMULATIVE PROFIT OF AN AFRICAN DELIGHT PLUM ORCHARD (SANDY SOILS + RING NEMATODES)



PROJECTED CUMULATIVE PROFIT OF AN AFRICAN DELICIOUS ORCHARD

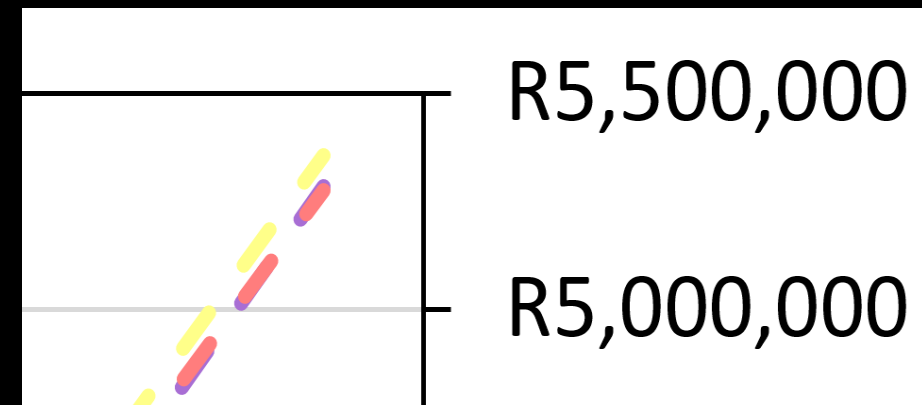
SANDY SOILS WITH RING NEMATODE

Maridon and Marianna:

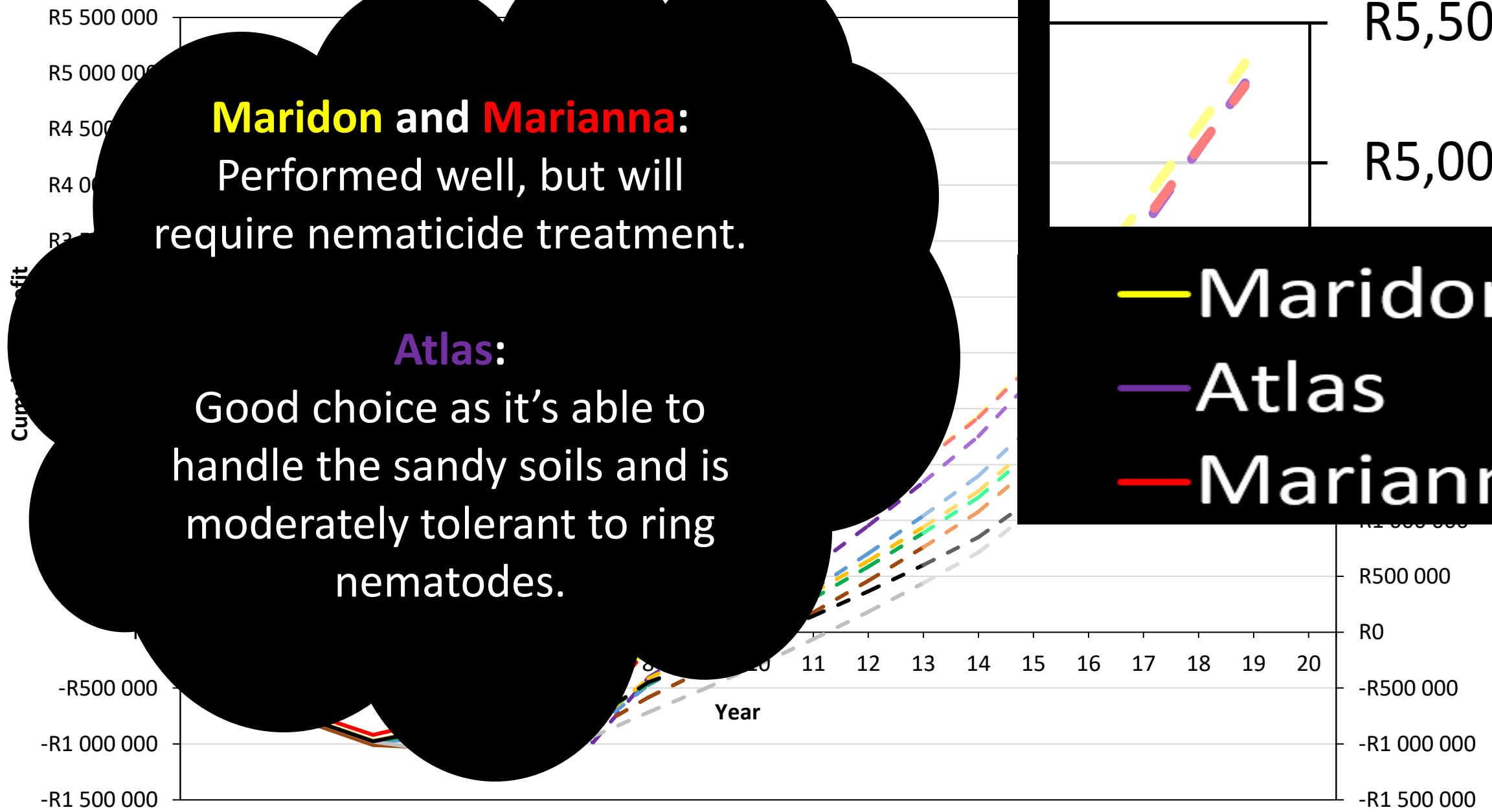
Performed well, but will require nematicide treatment.

Atlas:

Good choice as it's able to handle the sandy soils and is moderately tolerant to ring nematodes.



— Maridon
— Atlas
— Marianna



2 | African Delight orchard in Robertson



- **Calcareous, sandy soil** (89.4 % fine sand, 7.1% silt and 3.5% clay, **pH KCl 7.6**)
- High numbers of **ring nematodes**

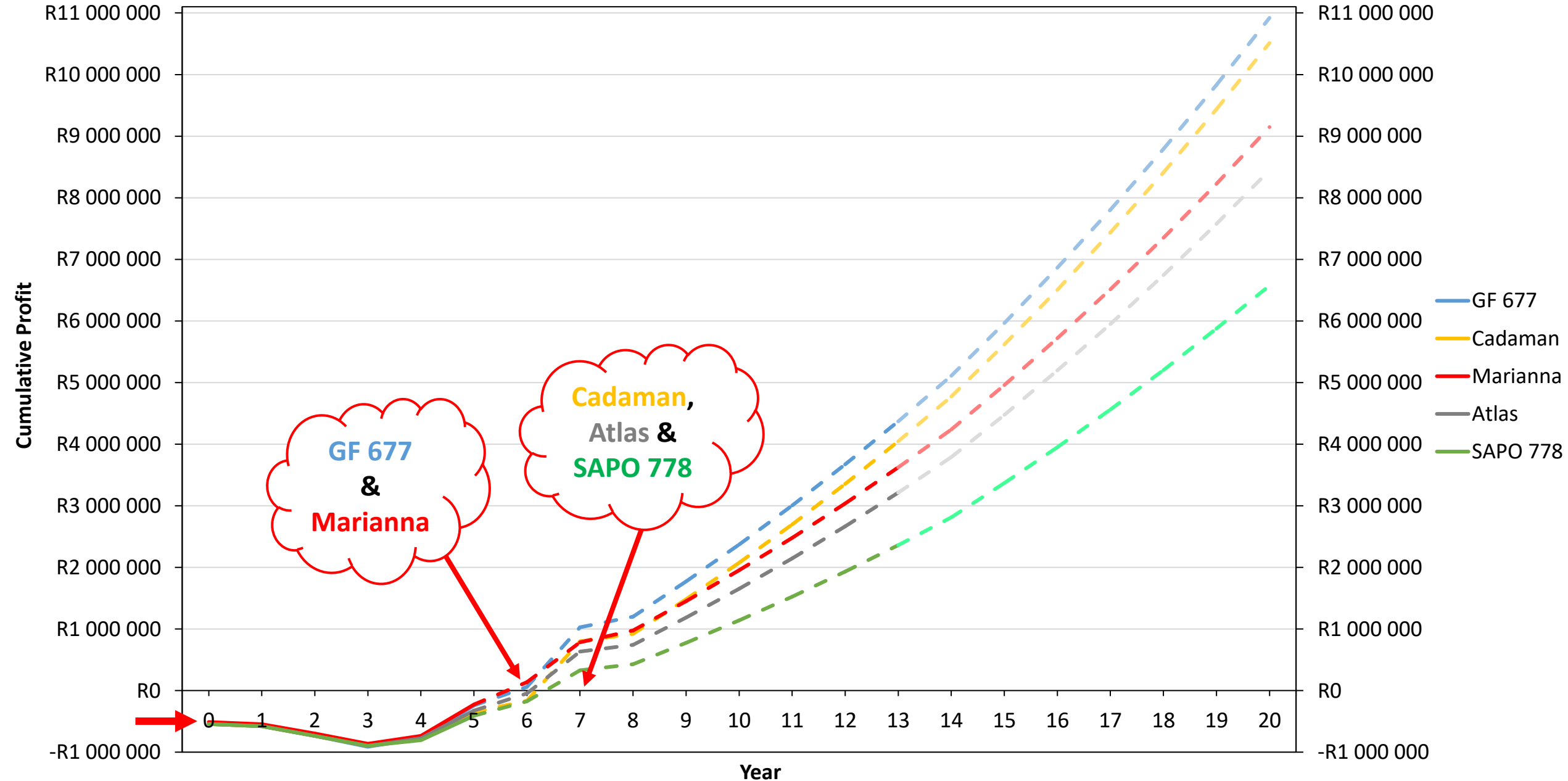


Orchard Details:

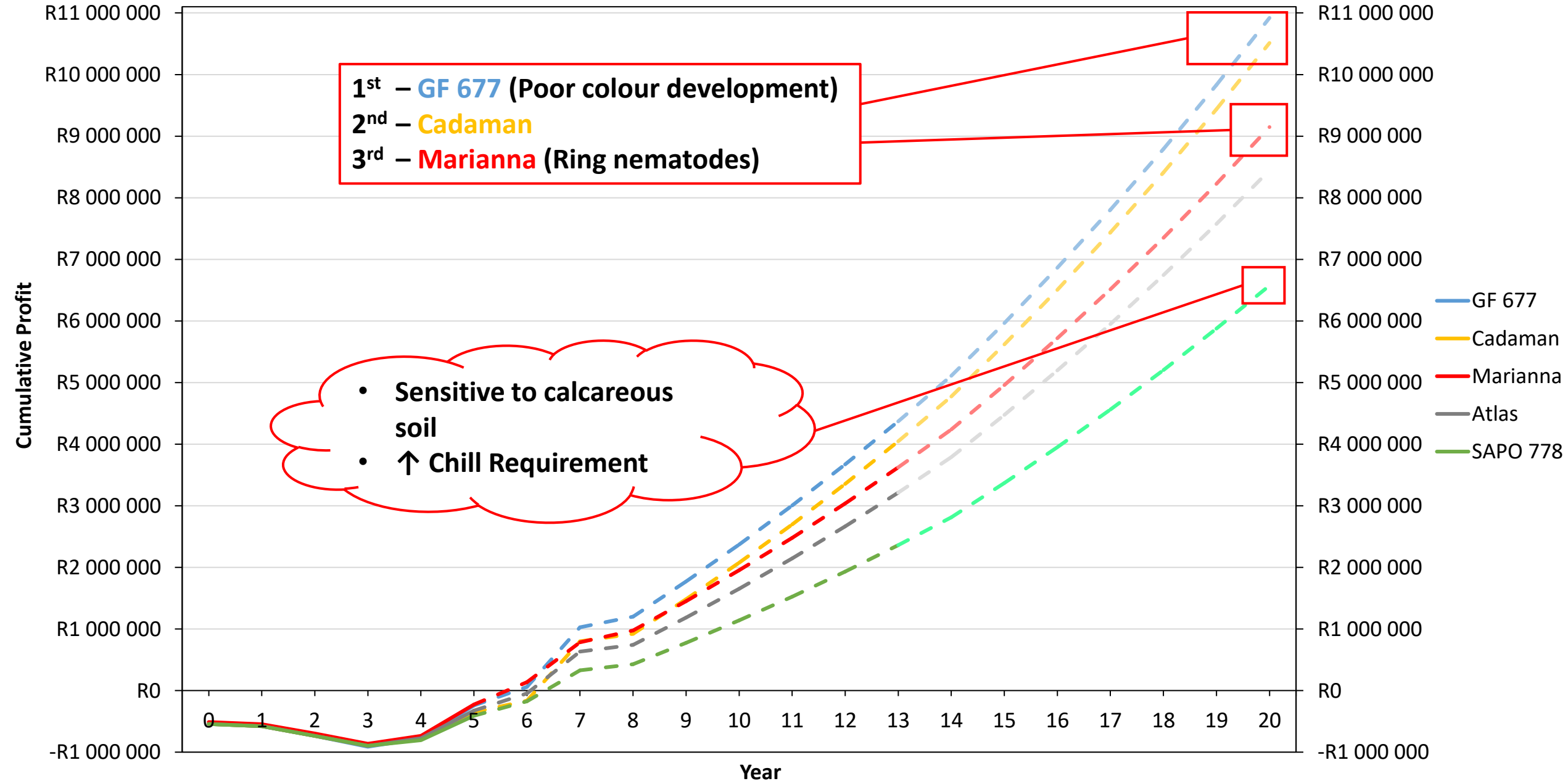
- Planting Distance: 5.5m x 0.75m
- Training System: V-system with individual trees each side of the V



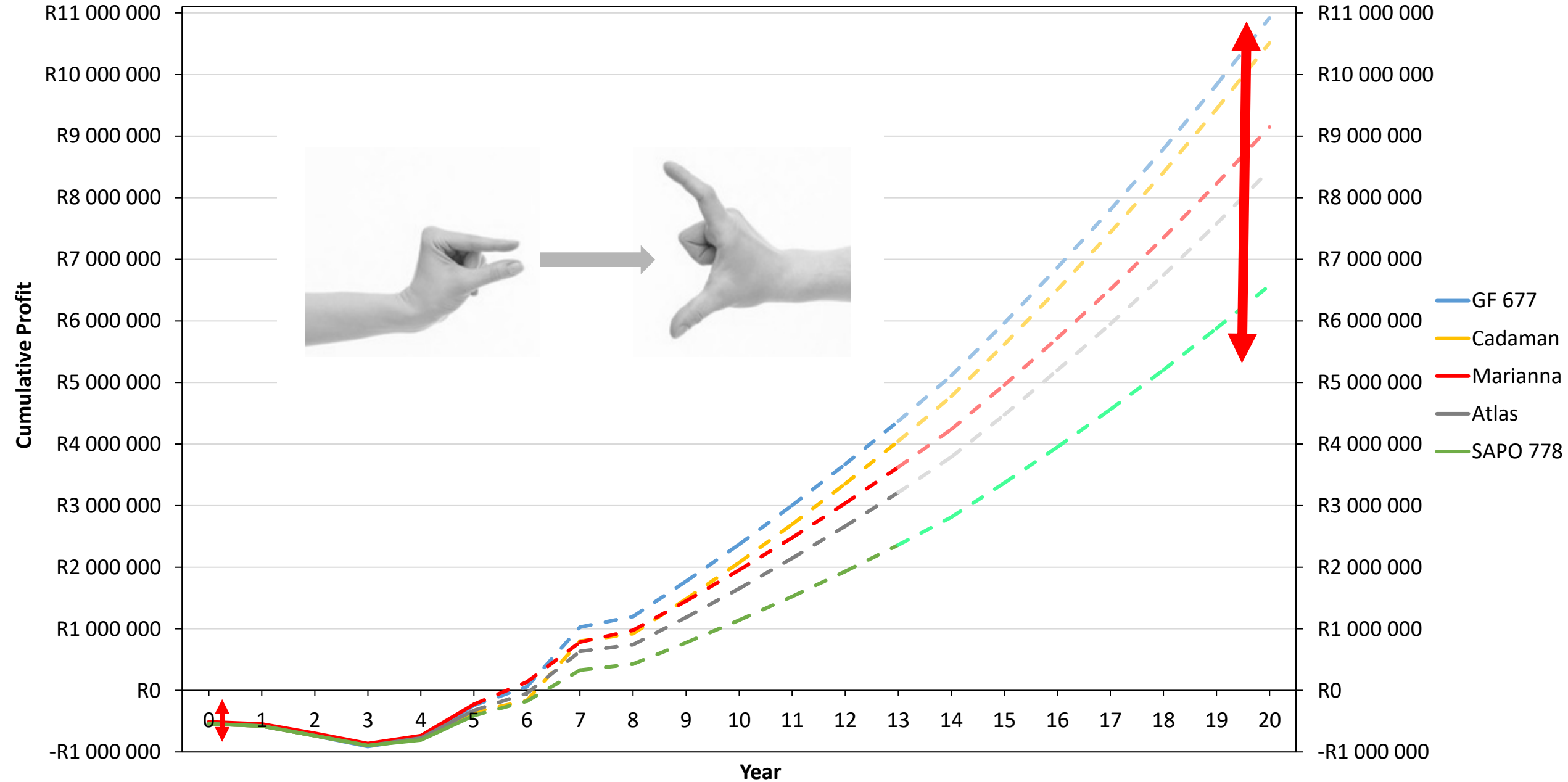
PROJECTED CUMULATIVE PROFIT OF AN AFRICAN DELIGHT PLUM ORCHARD (CALCAREOUS, SANDY SOIL + RING NEMATODES)



PROJECTED CUMULATIVE PROFIT OF AN AFRICAN DELIGHT PLUM ORCHARD (CALCAREOUS, SANDY SOIL + RING NEMATODES)



PROJECTED CUMULATIVE PROFIT OF AN AFRICAN DELIGHT PLUM ORCHARD (CALCAREOUS, SANDY SOIL + RING NEMATODES)



3 | Laetitia orchard in Stellenbosch



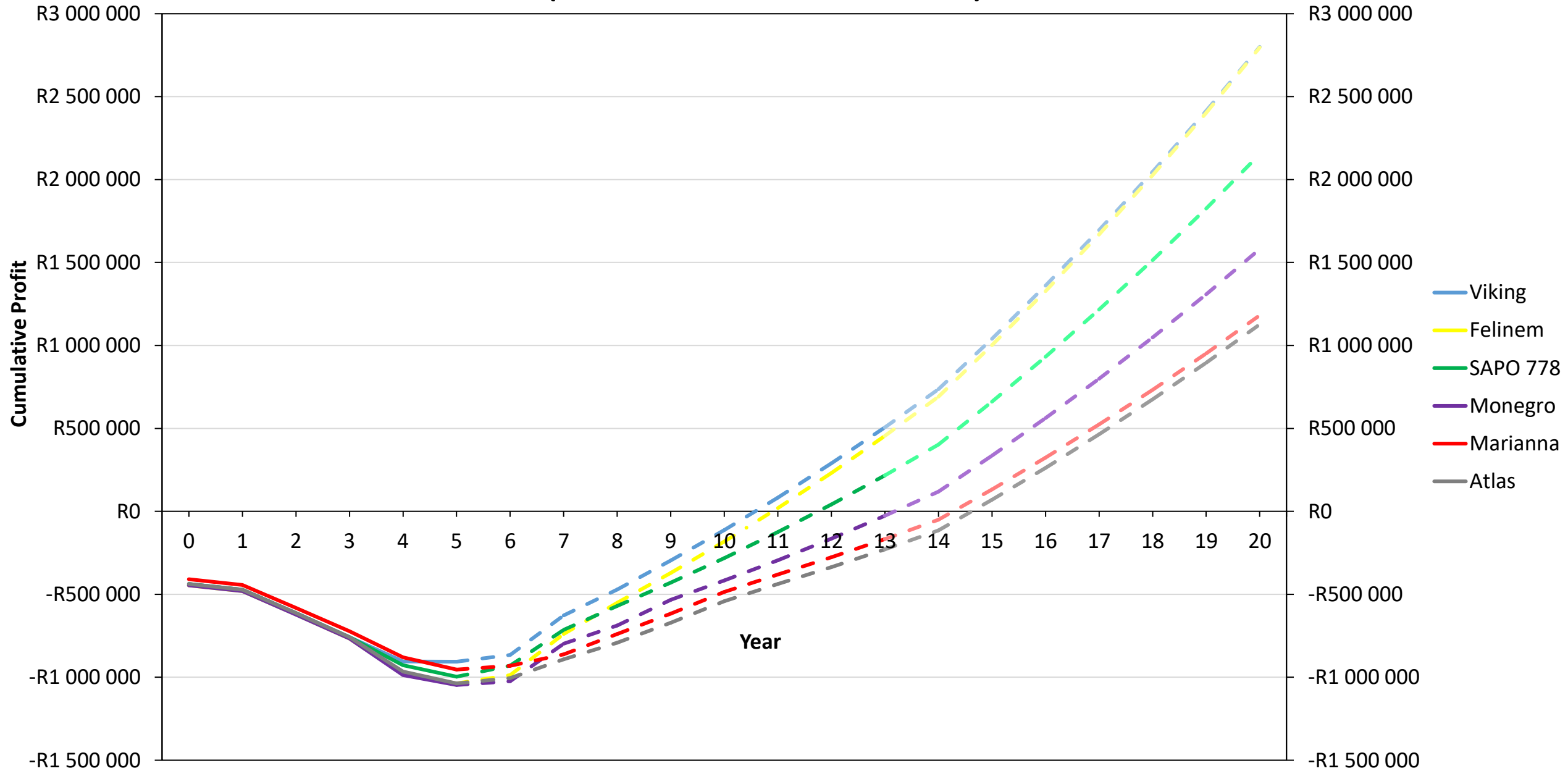
- **Clay soil** (58 % sand, 11% silt and **31% clay**, pH KCl 6.4)
- High numbers of **ring nematodes**



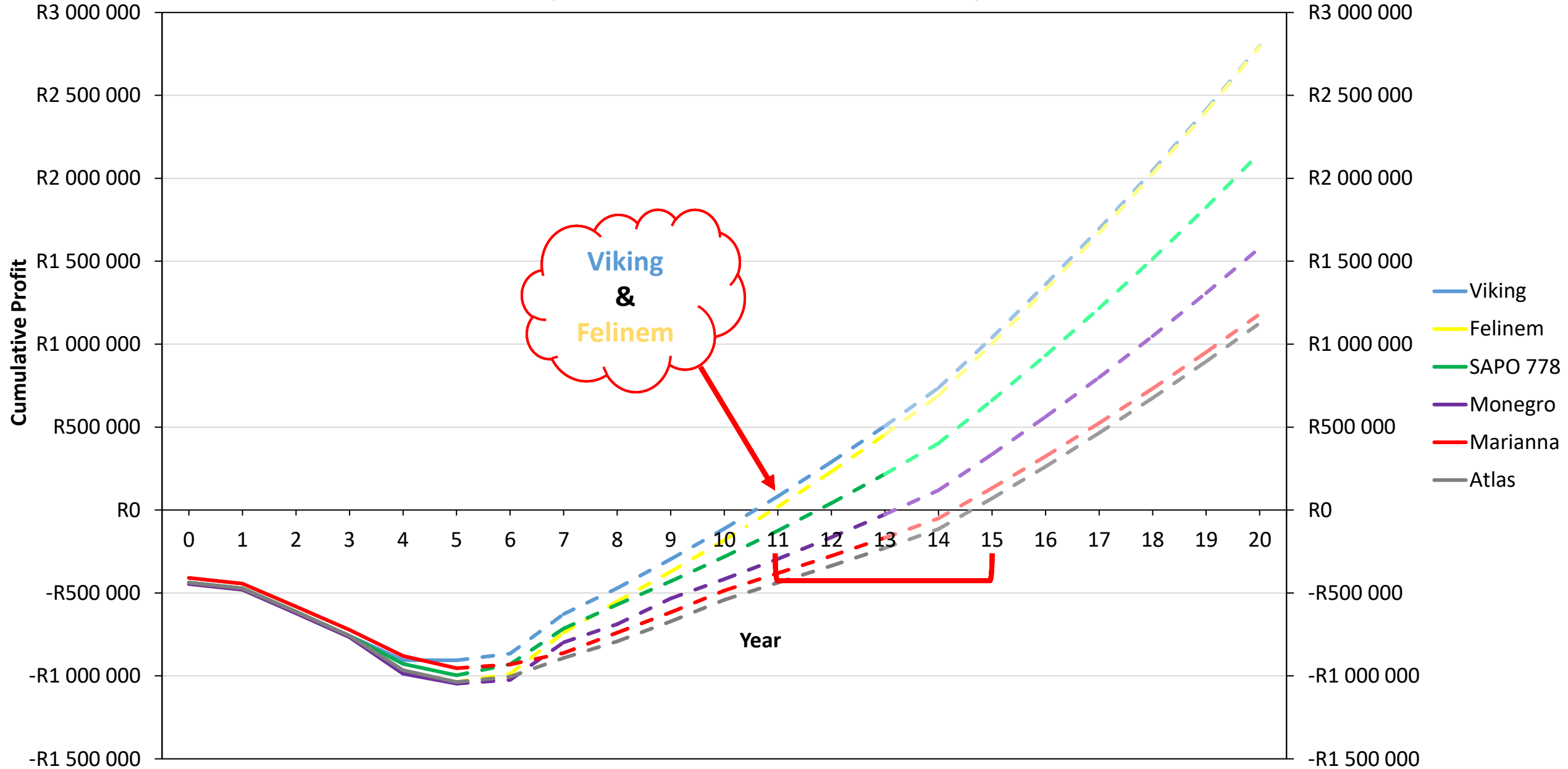
Orchard Details:

- Planting Distance: 3.25m x 1.5m
- Training System: Palmette system

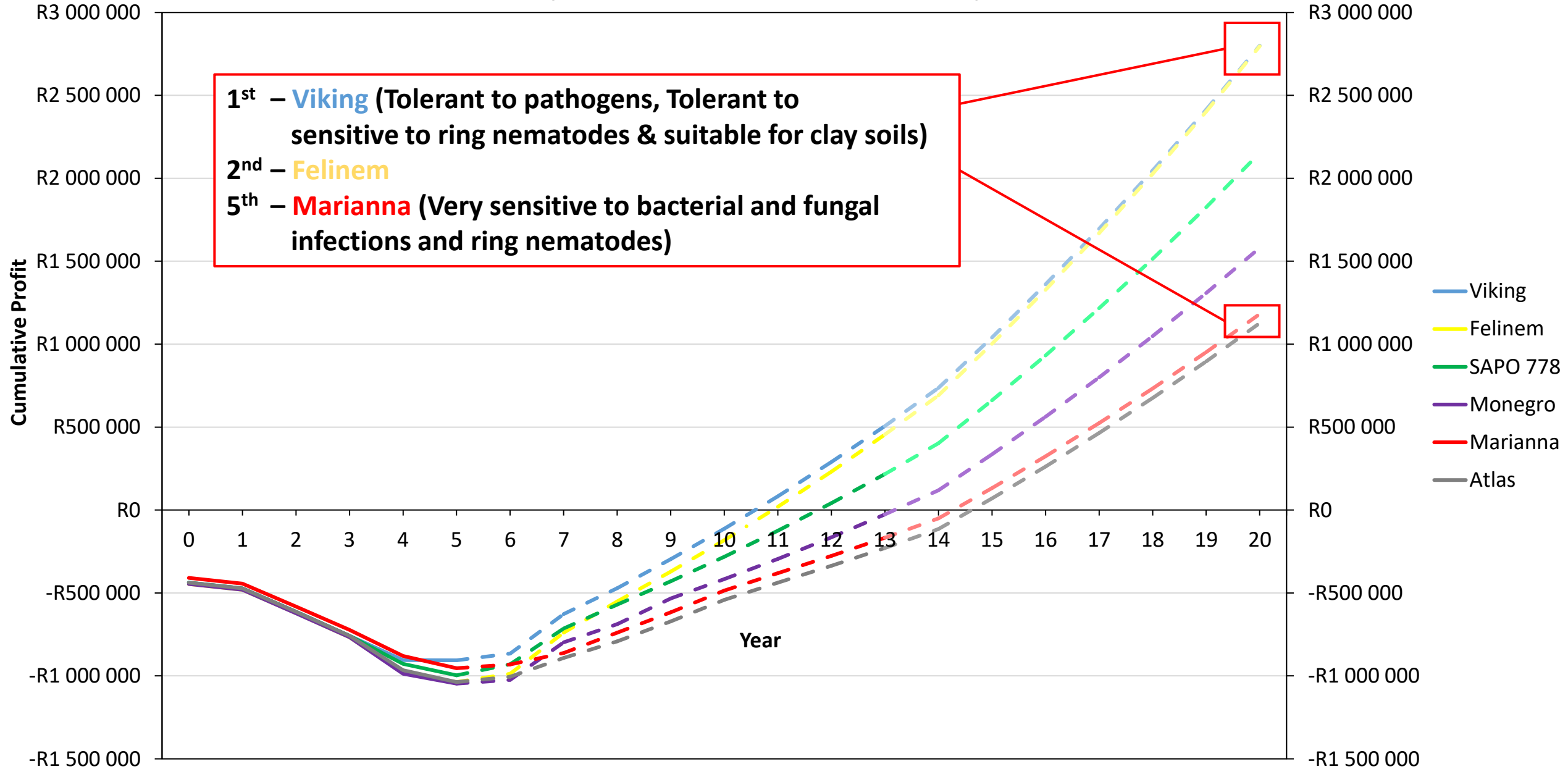
PROJECTED CUMULATIVE PROFIT OF A LAETITIA PLUM ORCHARD (CLAY SOIL + RING NEMATODES)



PROJECTED CUMULATIVE PROFIT OF A LAETITIA PLUM ORCHARD (CLAY SOIL + RING NEMATODES)



PROJECTED CUMULATIVE PROFIT OF A LAETITIA PLUM ORCHARD (CLAY SOIL + RING NEMATODES)



4 | Sunbreeze orchard in Stellenbosch



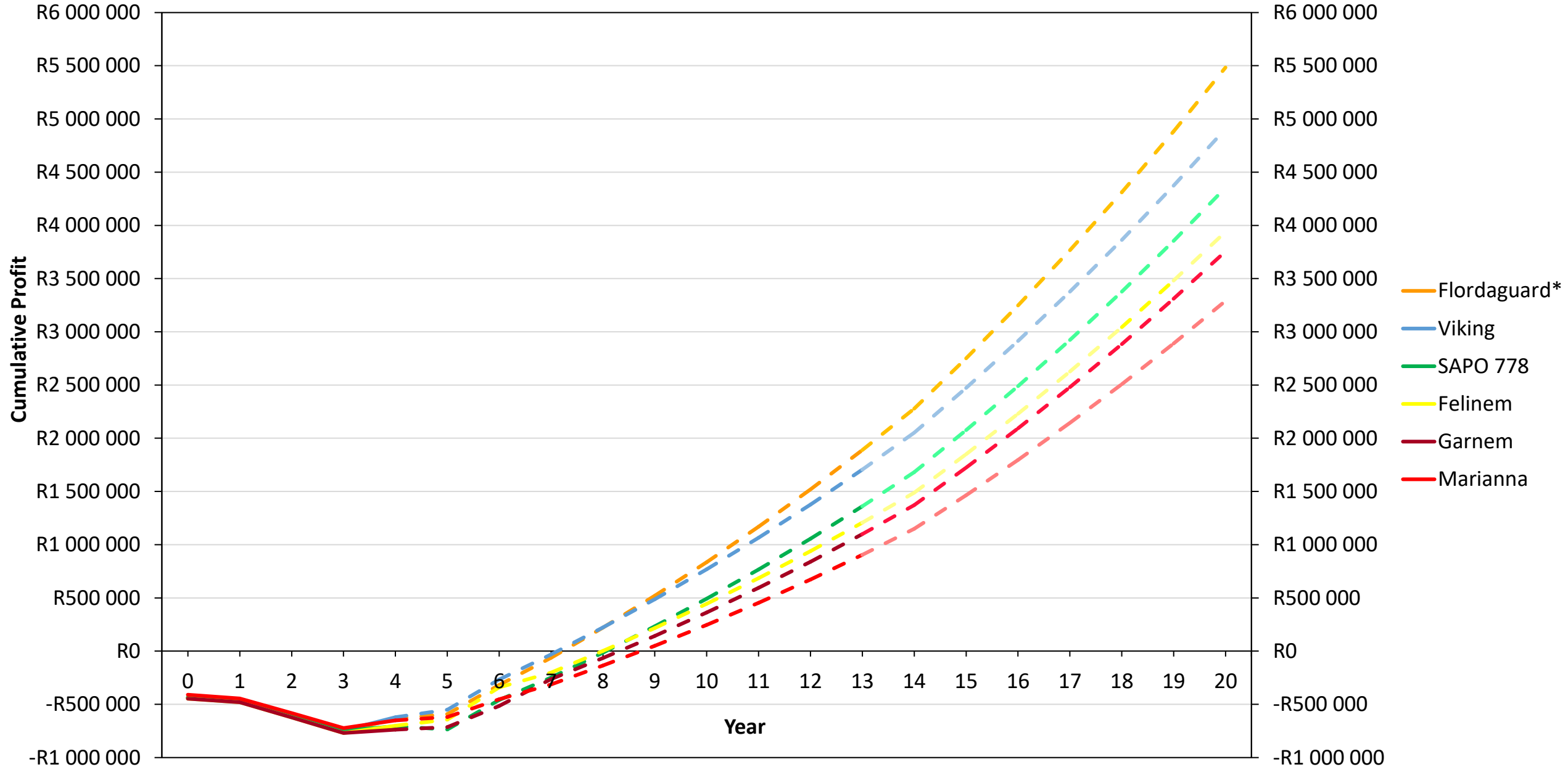
- **Clay soil** (58 % sand, 11% silt and **31% clay**, pH KCl 6.4)
- High numbers of **ring nematodes**



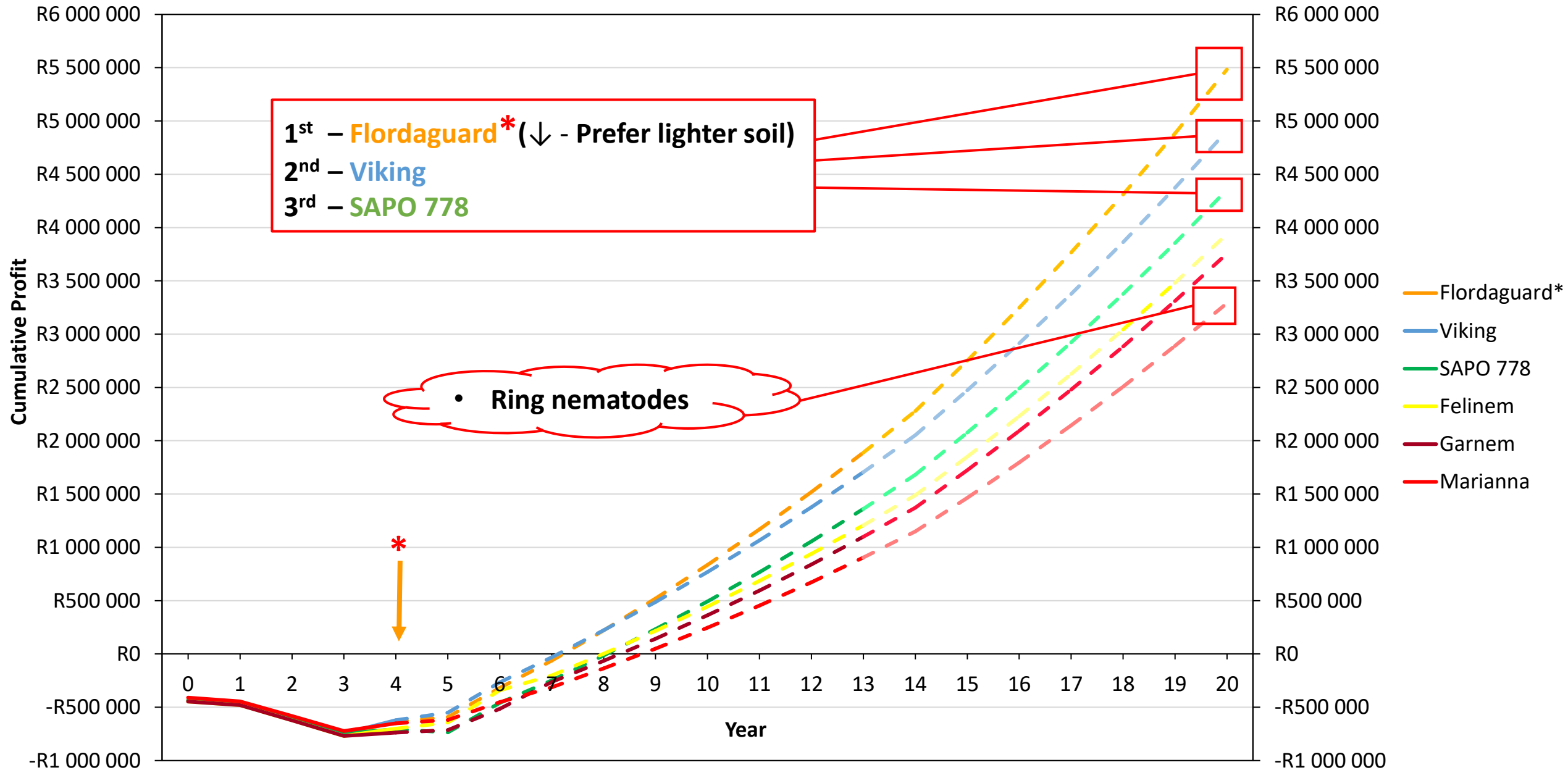
Orchard Details:

- Planting Distance: 3.25m x 1.5m
- Training System: Palmette system

PROJECTED CUMULATIVE PROFIT OF A SUNBREEZE PLUM ORCHARD (CLAY SOIL + RING NEMATODES)



PROJECTED CUMULATIVE PROFIT OF A SUNBREEZE PLUM ORCHARD (CLAY SOIL + RING NEMATODES)

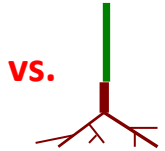


TAKE HOME MESSAGE

PROJECT PROFITS FOR ORCHARDS PLANTED TO DIFFERENT ROOTSTOCKS



Rootstock selection is **site specific**.



Rootstock selection is nearly as vital as **cultivar selection**.



Do not let the **choice** of what you plant be determined solely by the **cost of planting** it.



Consider the **long term effect/benefit** a rootstock will hold.

Work with your technical advisor when deciding on which rootstock to use for a specific site and its edaphic and climatic profile.

ACKNOWLEDGEMENTS

PROJECT PROFITS FOR ORCHARDS PLANTED TO DIFFERENT ROOTSTOCKS



Xolela Dlikilili



Wiehann Steyn



Mariëtte Kotzé



Rudolph Cronje



Charl Stander

Thank You