

PROTEACEA PLANT PROTECTION – AN OVERVIEW FROM PORTUGAL



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1st exports of Proteas to Europe were dried flowers from mission station in South Africa in 1886

In 1919 *Protea cynaroides* was cultivated commercially for the 1st time on a farm in the Stellenbosch area

Since then a lot has change and the industry has grown highly.

Proteas are now cultivated in more than 20 countries in both the southern and northern hemispheres

With the growth of the industry and all the plant material movement around the world both as cut flowers and for propagation purposes new challenges emerged

Market quality standards and phytosanitary regulations became more strict

PLANT HEALTH

NUTRITIONAL BALANCE

WEEDS

PESTS

DISEASES

INSECTS

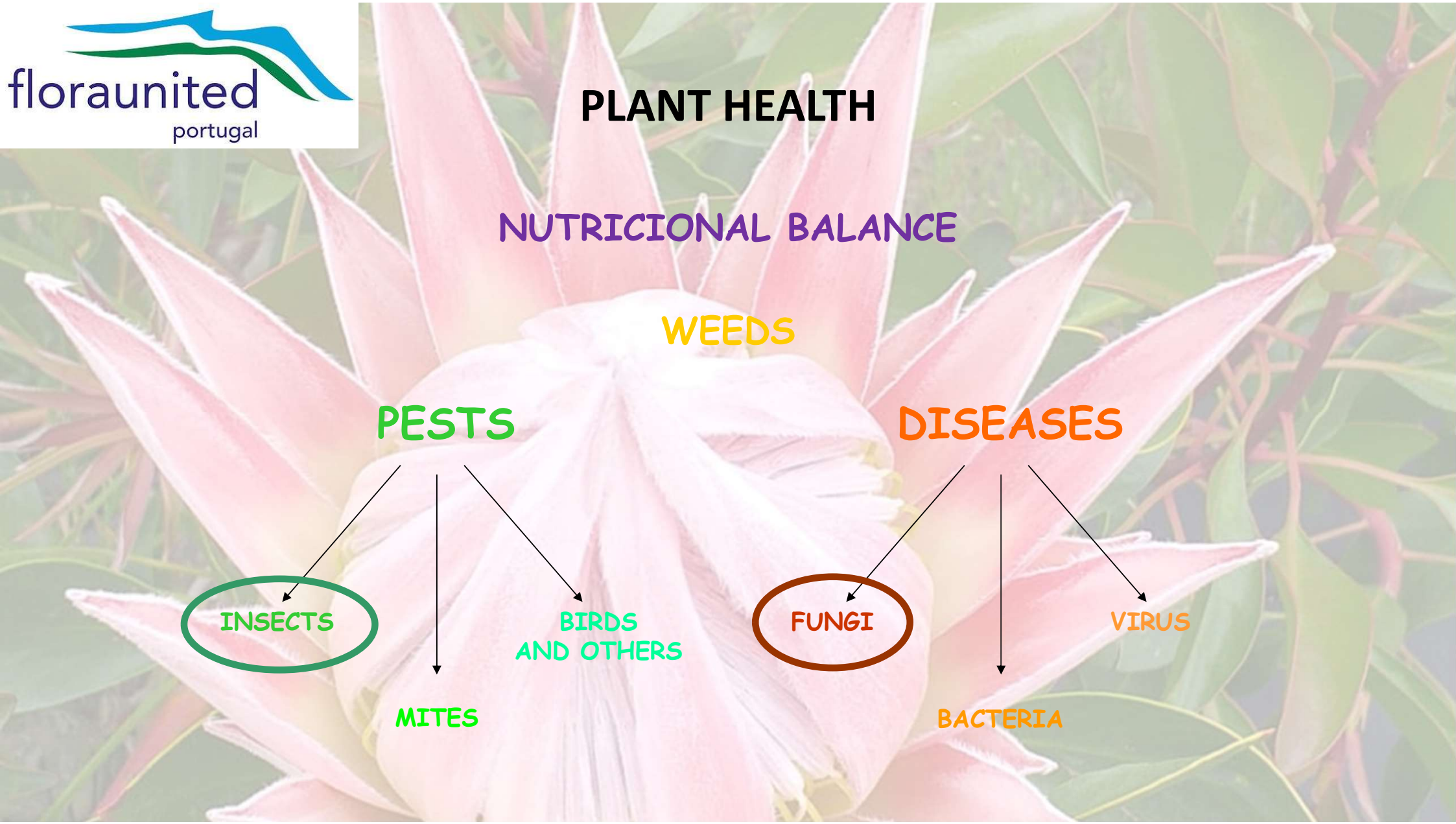
BIRDS
AND OTHERS

FUNGI

VIRUS

MITES

BACTERIA



MAIN PESTS AND DISEASES

Lack of information/research

Distinct situation for pests and disease

In **diseases** widespread common pathogens in wide variety of hosts

Shorten when economic relevance considered

Relevance differs from region to region

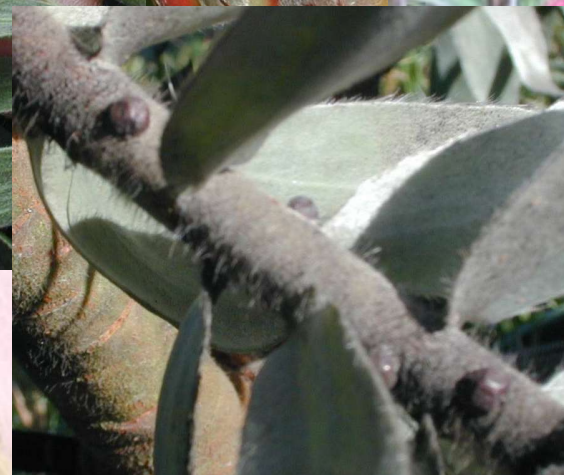
Fungus	Australia	California	Hawai	Israel	N. Zeland	Portugal	S. Africa	Spain
<i>Alternaria alternata</i>	usP		P	is	P	P		usP
<i>Armillaria sp.</i>	P					P		
<i>Botryosphaeria dothidea</i>	P	P	usP			P	P	
<i>Botryosphaeria proteae</i>	P	P	usP			P	P	
<i>Botrytis cinerea</i>	P	P	usP		is	usP	usP	usP
<i>Cercostigmia protearum</i>	usP						is	
<i>Chondrostereum purpureum</i>					is			
<i>Cladosporium sp.</i>	usP	usP	P			usP		usP
<i>Coleroa senniana</i>	usP	usP	P			usP	usP	
<i>Colletotrichum gloeosporioides</i>	usP	usP	usP			usP	usP	
<i>Coniothyrium leucospermi</i>		usP					usP	
<i>Cylindrocarpum destructans</i>						usP		
<i>Cylindrocadium sp.</i>	-		-		-			
<i>Didymosphaeria futilis</i>		P					P	
<i>Drechslera dematoides</i>	usP	usP	usP		usP	usP	usP	usP
<i>Elsenoë sp.</i>	usP	usP	usP		-		usP	

Root disease			
	<i>Phytophthora cinnamomi</i>	<i>Fusarium oxysporum</i>	
Leaf and stem disease			
	<i>Coleroa senniana</i>	<i>Botryosphaeria dothidea</i> and <i>Botryosphaeria proteae</i>	<i>Drechslera dematoides</i>
	<i>Botrytis cinerea</i>	<i>Elsenoë sp.</i>	<i>Leptosphaeria sp.</i>

In pests the most relevant are local insects that adapted to the Proteacea

However the insect types are similar across the different production areas

1. Borers
2. Leafminers
3. Moths and other butterflies
4. Scales and mealybugs
5. Snout beetles
6. Aphids
7. Tip wilters and stingbugs
8. Thrips



ROOT DISEASES

Phytophthora cinnanomi - Most relevant disease on Proteaceae across all the production areas

Once established the disease is impossible to eradicate so all preventive measures available should be put on practice to avoid the introduction

SW Portugal main root problem is ***Fusarium oxysporum*** - Main cause of mortality on plantations following any type of stress (frost, long wet periods, bad drainage, ...)

Once again very difficult to control and once again preventive measures should be the key to do it

In our farm the application of ***Trichoderma harzianum*** has had some positive effect on reducing the pressure of the disease but not proven able to control it

The use of chemical control has not proven to be effective and has a very limited use for the control of root problems



LEAF and STEM DISEASES

Leaf and stem diseases vary in importance from region to region depending on the environmental conditions prevailing

SW Portugal

Coleroa
on *Protea* sp.



Dreschelera and ***Botrytis***
on *Leucospermum* sp.



Strigmina
on *Leucadendron* sp.



LEAF and STEM DISEASES

Elsenoë

Considered to cause great losses in several regions

No relevance in SW Portugal

In Terceira Island (Azores) is a huge problem in Lsp Sucession II

Chemical control not effective

1st and key step – use of clean propagation material

Sanitation measures implement as 1st symptoms detected



Most fungus affecting the areal part of Proteas easy to control with fungicides available

Fair amount of options used to be available in the market

❖ Preventive

- ~~Mandazeb~~
- Captan
- ~~Chlorothalonil~~

❖ Curative

- ~~Iprodione~~
- Tebuconazol
- Azoxystrobin
- Metyldinocap
- ~~Thiophanate-methyl~~

Situation changing with a huge number of products taken out of the market in EU for safety and environmental reasons

Similar for insecticides several products currently out of the market or with very limited use

- Imidacloprid
- Chlorpyrifos
- Methomyl
- Thiamethoxam

Importance of keeping the environmental balance to enhance the role of the beneficial agents



Use of predators and parasitoids

Example:

Exclusion of Imidaclopride and Thiomethoxam

Both products used on the control of the leafminer through irrigations applications

Presently very limited solutions for the effective control of this pest

New solutions need to be found and tests must be done with new products available in the market

This is one of the big challenges farmers are facing today

Study done on the 5 key agricultural sectors in Portugal
(wine, olive oil, pear 'pera-rocha', tomato for industry, corn)

Estimates a loss of 12% in the total agricultural income of the country



AT OUR FARM

Zero Residue Products

Nutritional Biostimulants

Biopesticides

Testing several product

Most results still preliminary

Bacillus subtilis (Serenade Max from Bayer Crop Sciences) effective in the control of *Dreschelera* and *Botrytis* on Lsp Soleil

Same level of control achieved with the product Trichobot from Trichodex^R

In both cases level of control similar to the previous established program

From Trichodex[®] - Also testing Sultop on the control of Coleroa in Protea White Night

This product is registered as a nutritional deficiency corrector

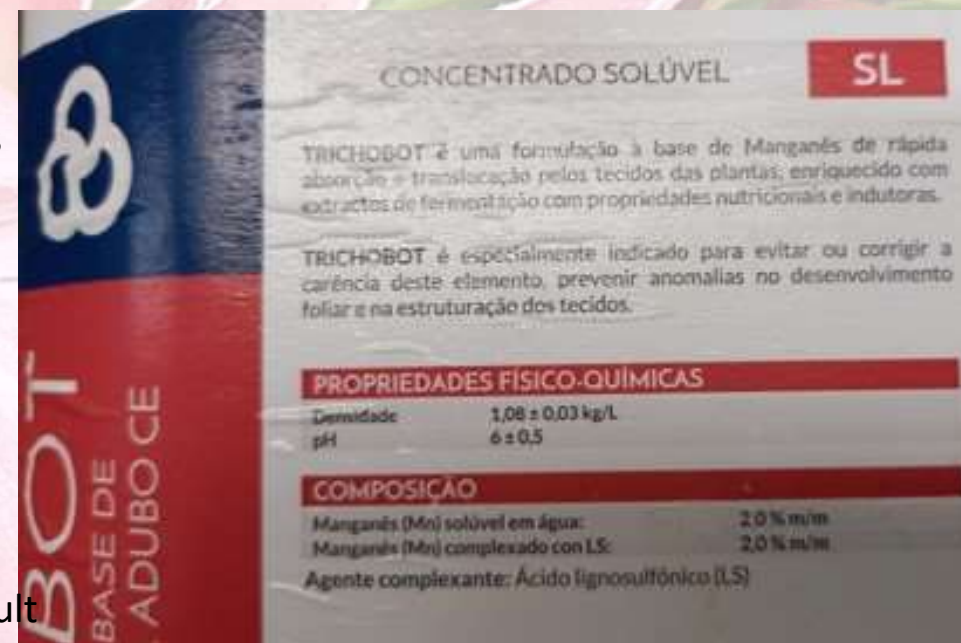
Described as a liquid formulation of sulphur with systemic action suitable for the control of powdery mildew and acari in several crops

Main difficult is the lack of information on these products

Finding solutions is essential at this point

All testing is done with s very practical farmer's approach

Generalization of its use to other different conditions might be difficult





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THANK YOU