RISK MAP OF PESTS AND DISEASES IN THE PROTEAS IN LA PALMA ISLAND (CANARY ISLANDS)

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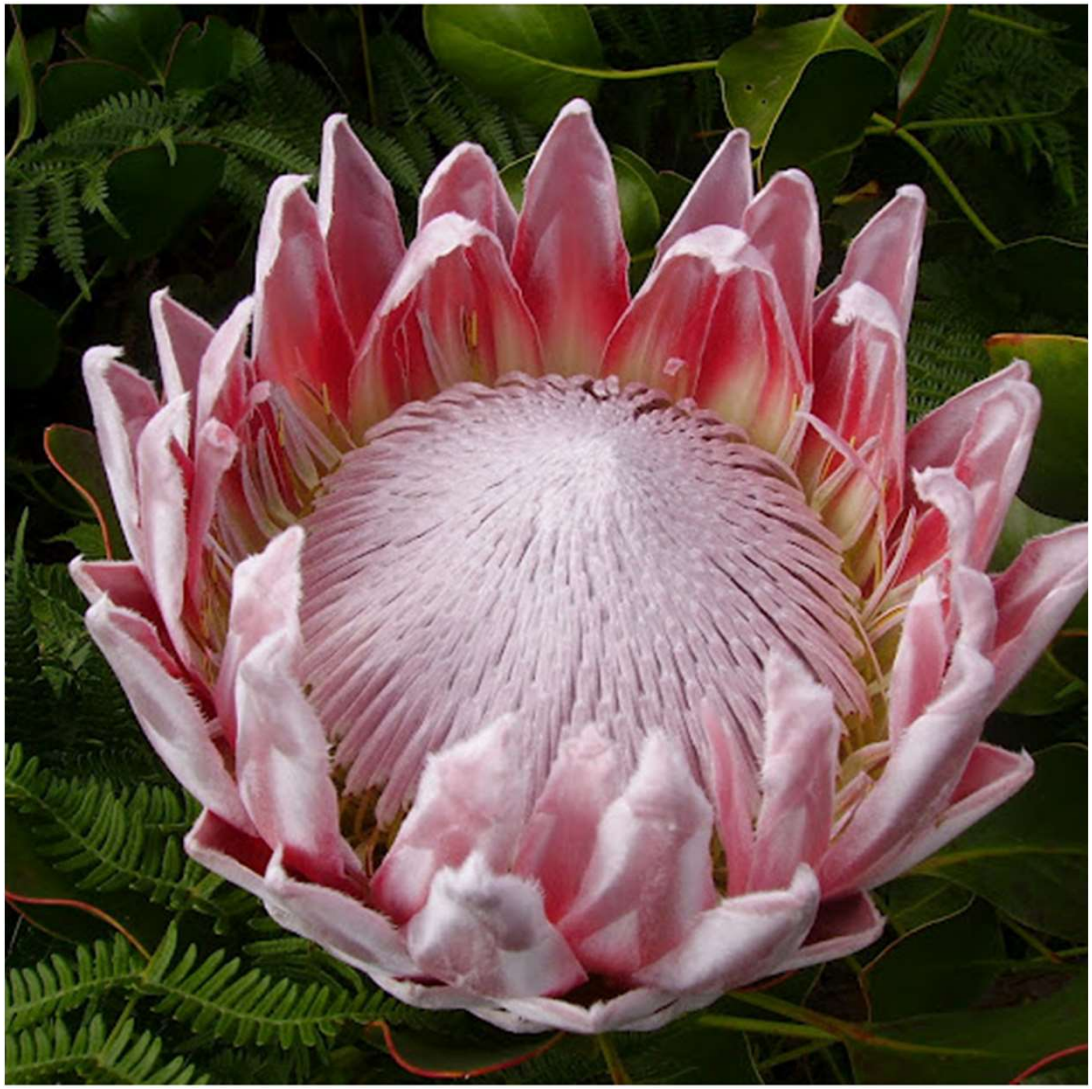
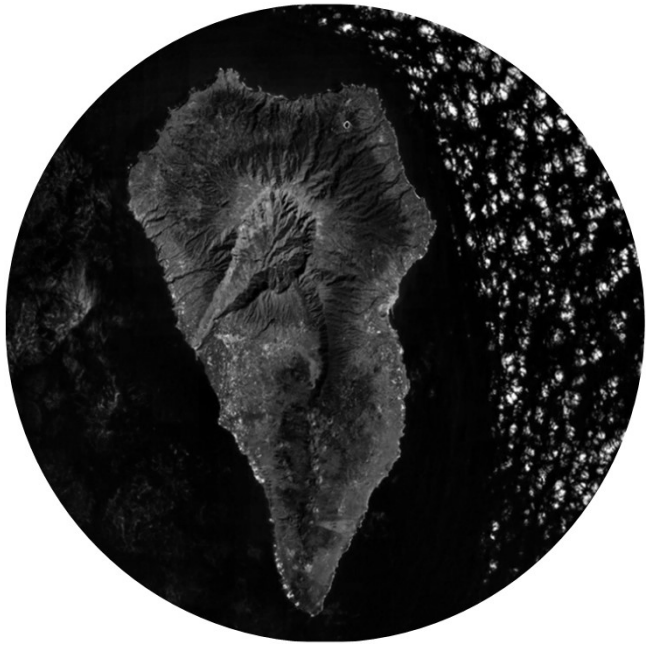
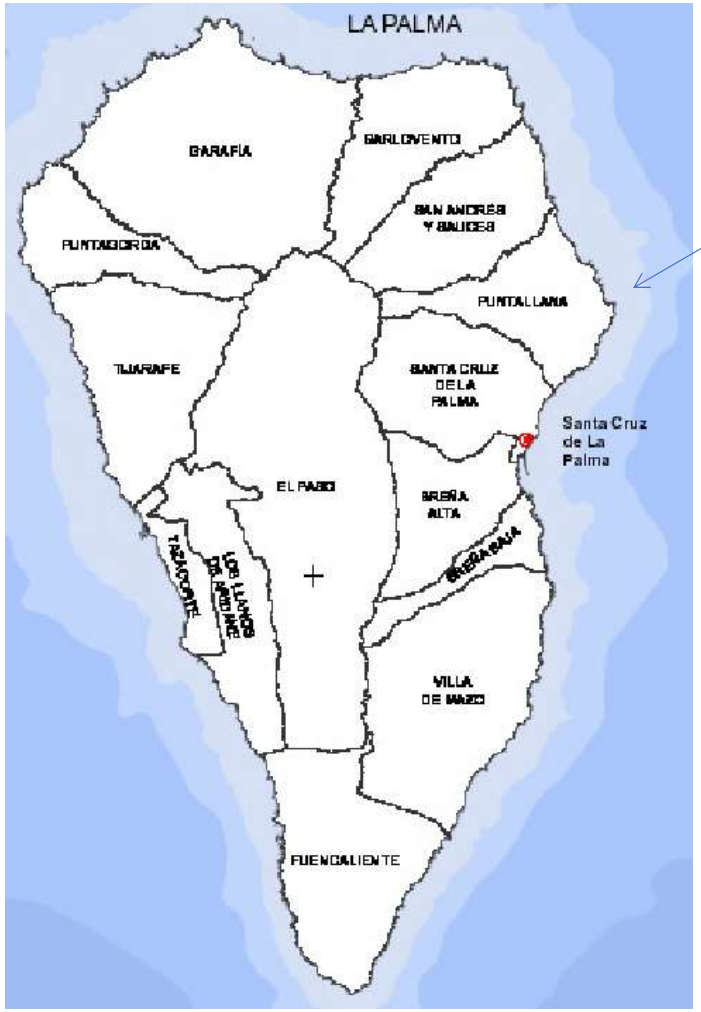


INTRODUCTION

- Proteas were introduced in the Canary Islands in **1975** by the Tenerife researcher Juan Alberto Rodríguez through the Orotava Acclimatization Garden (Tenerife).
- In **1998** they were introduced in La Palma, currently cultivating about 30 hectares belonging to a group of 45 farmers, all belonging to the Proteas Cooperative of La Palma.
- In general, these are small farms with an average area of 0,7 Ha located in the NE, E and W of the island, at an altitude between 300 and 900 m above sea level.
- The most important genus is Leucospermum, followed by Proteas. Leucadendrons have no commercial interest. Production has been growing in recent years, estimating 1.500.000 stems for this harvest (actually 500.000 due to the volcano influence) and more than 2.000.000 stems in the next harvests (depending on the reaction of the plants to the damage caused by the volcano).
- In general we can say that the attack of pests and diseases on the island is not too serious, being able to say that there are no pathogens specific to proteas but rather those from other typical crops on the island that have been adapted to attack proteas .

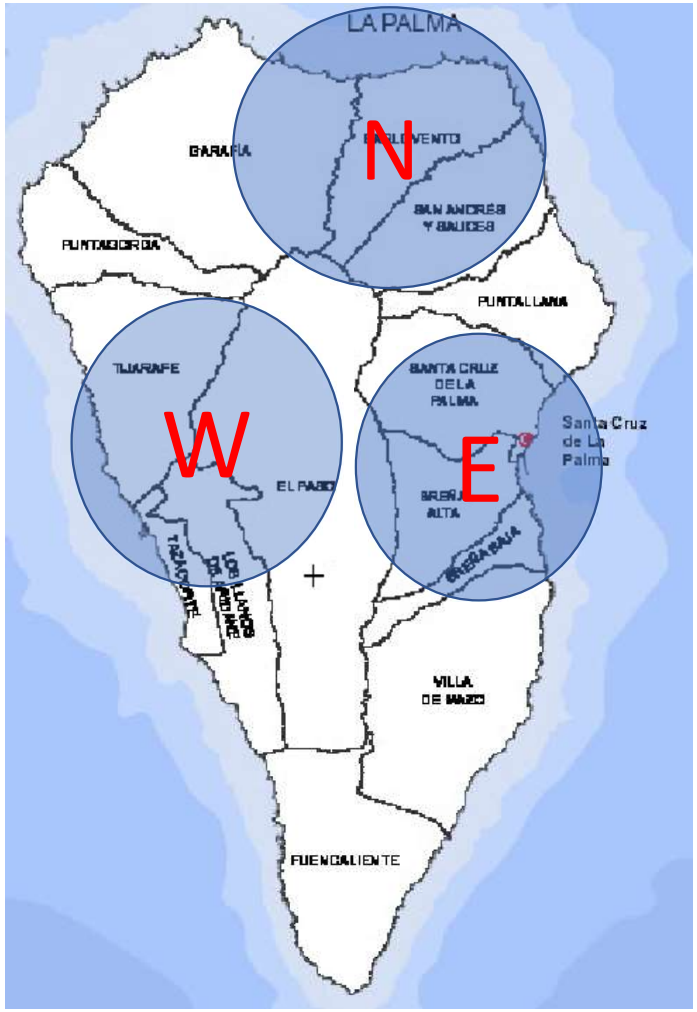


LOCALIZATION OF STUDY



The archipelago is located in the Atlantic Ocean, northwest of Africa, near the coasts of southern Morocco and northern Western Sahara, between the coordinates 27º 37' and 29º 25' north latitude and 13º 20' and 18º 10' west longitude.

La Palma is the most oxidental island and has a total area of 708 Km2, reaching an altitude of 2426 meters in Roque de Los Muchachos.



	N	E	W	TOTAL
Ha	8,20	10,82	11,19	**30,21**
Growers	16	11	15	**42**
ALTITUDE (AVERAGE)	760	450	830	**681**
Average/grower	5.125	9.834	7.462	**7.193**

VARIETY	NORTH	EAST	WEST	TOTAL
Succession II	2.870	2.443	11.889	**17.202**
Ayoba Peach	4.200	8.407	3.940	**16.547**
Madiba	10.150	4.419	1.000	**15.569**
Ayoba Sun	4.650	1.615	4.253	**10.518**
Tango	4.480	3.588		**8.068**
Brenda		1.020	6.458	**7.478**
Niobe		1.588	3.844	**5.432**
Artic Ice	3.660	1.065	700	**5.425**
Serruria	700	635	1.743	**3.078**
White Night		820	1.431	**2.251**
High Gold		2.250		**2.250**
Clare		1.960		**1.960**
Magnífica			1.700	**1.700**
Soleil		1.400		**1.400**
Grandicolor		650	500	**1.150**
Red Rex	200	800		**1.000**
Succesion I			1.000	**1.000**
Telopea	350	141		**491**
Goldie	400			**400**
	31.660	**32.801**	**38.458**	**102.919**

GENUS	Nº PLANTS
Leucospermun	57.385
Protea	41.965
Serruria	3.078
Telopea	491

OBJETIVES

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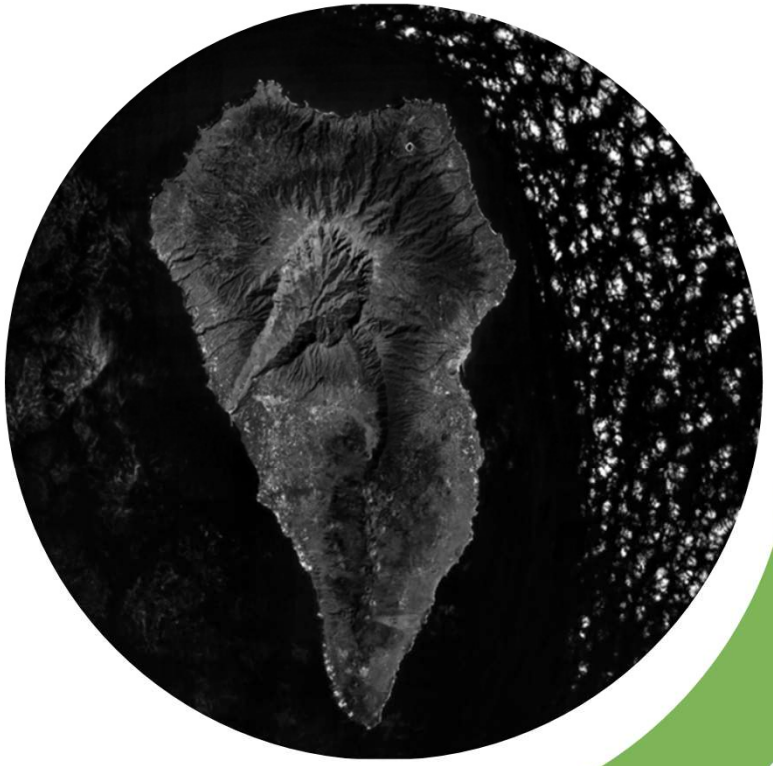
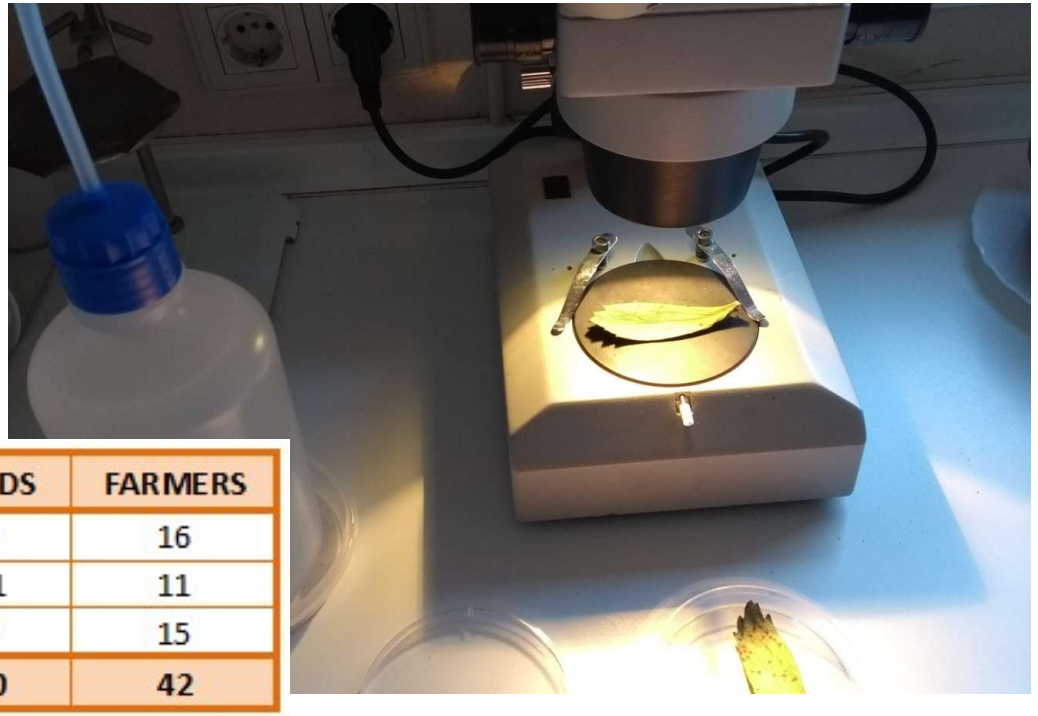
- To identify the main pests and diseases presents in the **different varieties** of Proteas grown in La Palma (Canary Islands).
- Carry out the climatic study (temperature, humidity and rainfall) of the three protea cultivation areas: N, W and E.
- To determine the degree of influence of these pests and diseases taking into account the climatic conditions present in the **three different Proteas growing areas** on the island of La Palma: N, W, E.



MATERIALS AND METHODS

ZONE	RECORDS	FARMERS
NORTH	762	16
EAST	1.031	11
WEST	627	15
	2.420	42



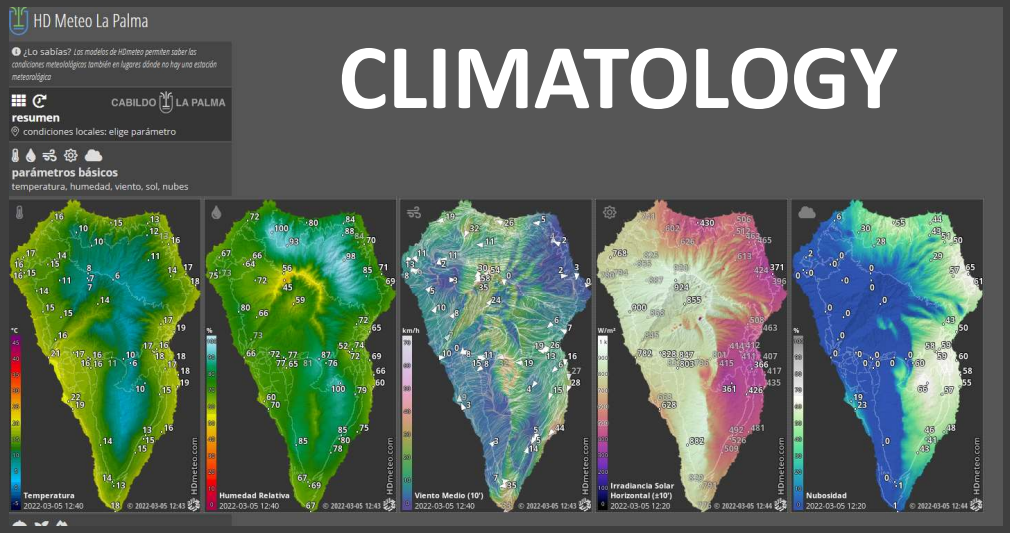
IDENTIFICATION OF PEST AND DISEASES

Qualitative and quantitative determination of pest and diseases.

516 technical visits between 2015 and 2019

A total of 2.420 records in 42 farms.

CLIMATOLOGY



CLIMATE DATA 2015 - 2019

Minimum Average Temperatures.

Maximum Average Temperatures.

Average Rainfall.

Average relative humidity.

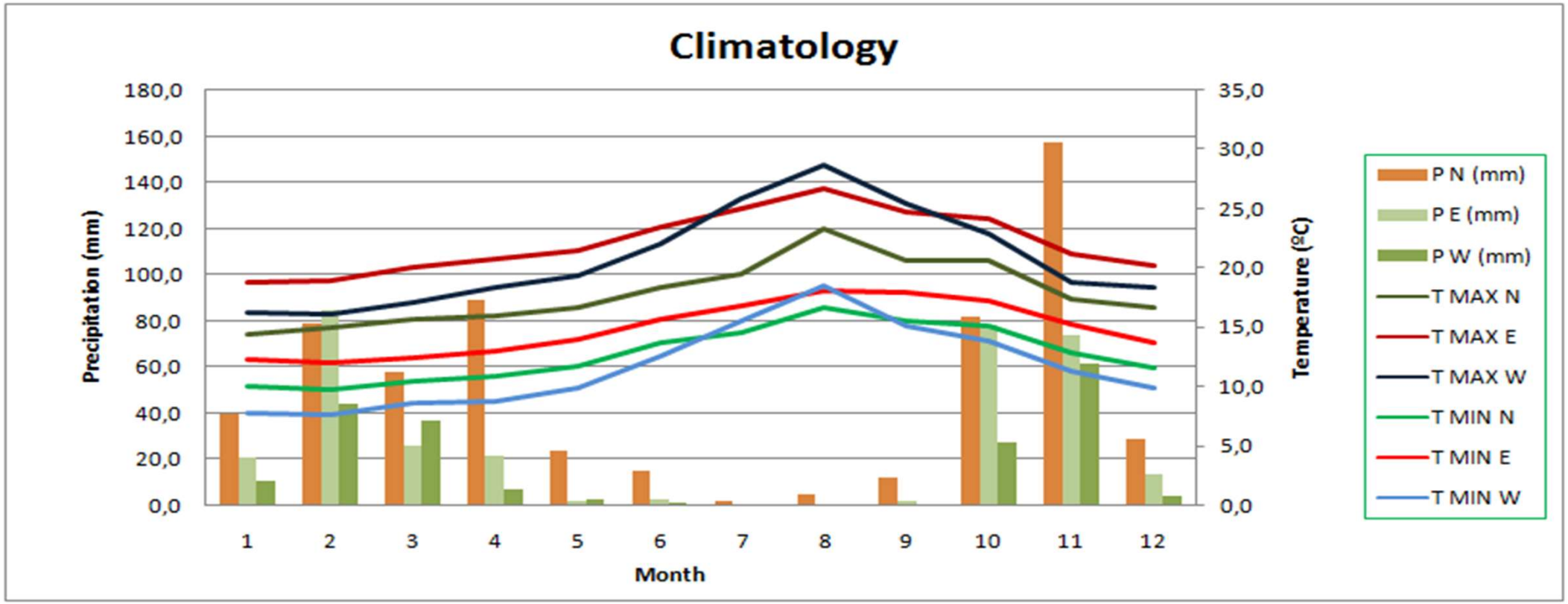
BARLOVENTO: 730 msnm (NE)

MIRAFLORES: 380 msnm (E)

EL PASO: 845 msnm (W)

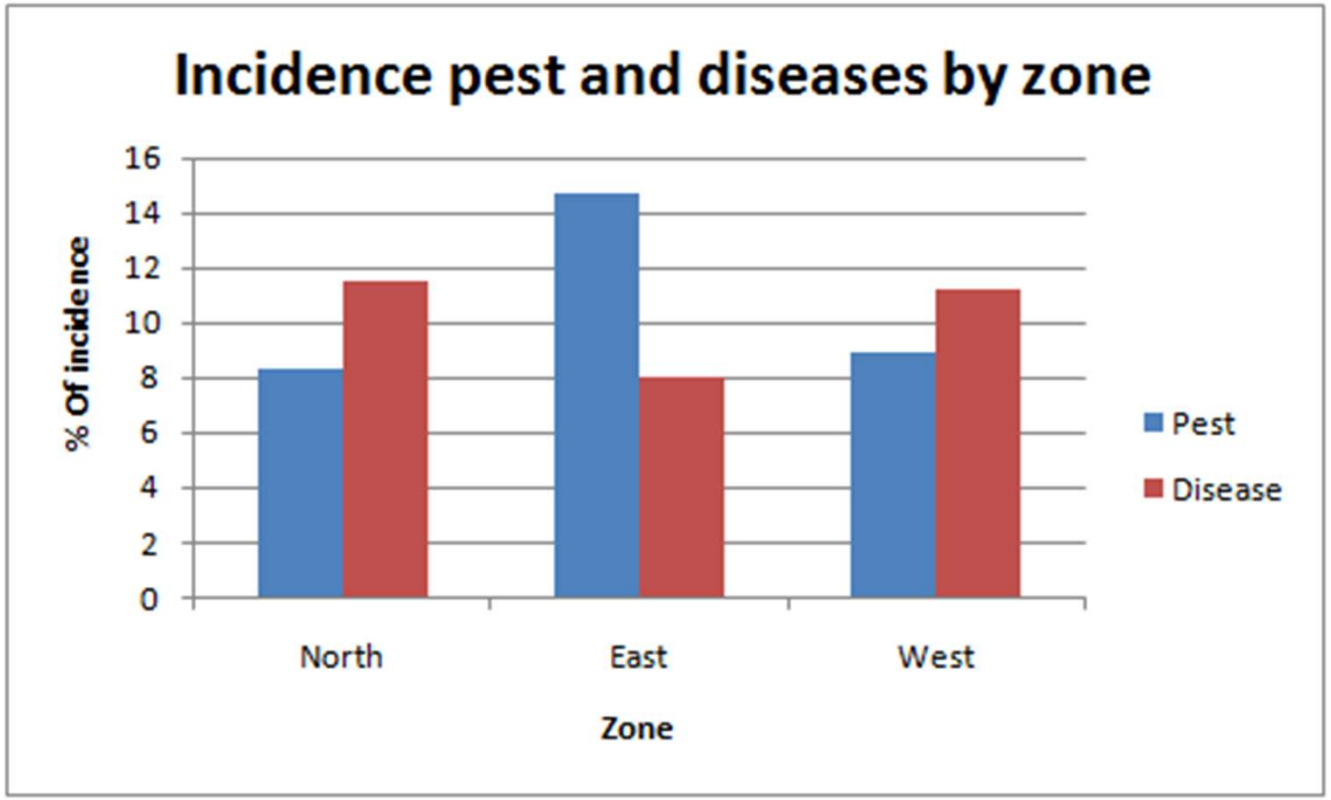
ZONE	ALTITUDE (AVERAGE)	
	FARMS	WHEATHER STATION
NORTH	760	730
EAST	450	380
WEST	830	845

RESULTS



ZONE	Total Raifall	Relative Humidity	Min. Average (ºC)	Máx. Average (ºC)	Máx - Min
NORTH	588	79,6-89,4	10	24	14
EAST	323	75,5	12	26	14
WEST	189	68	7	28	21

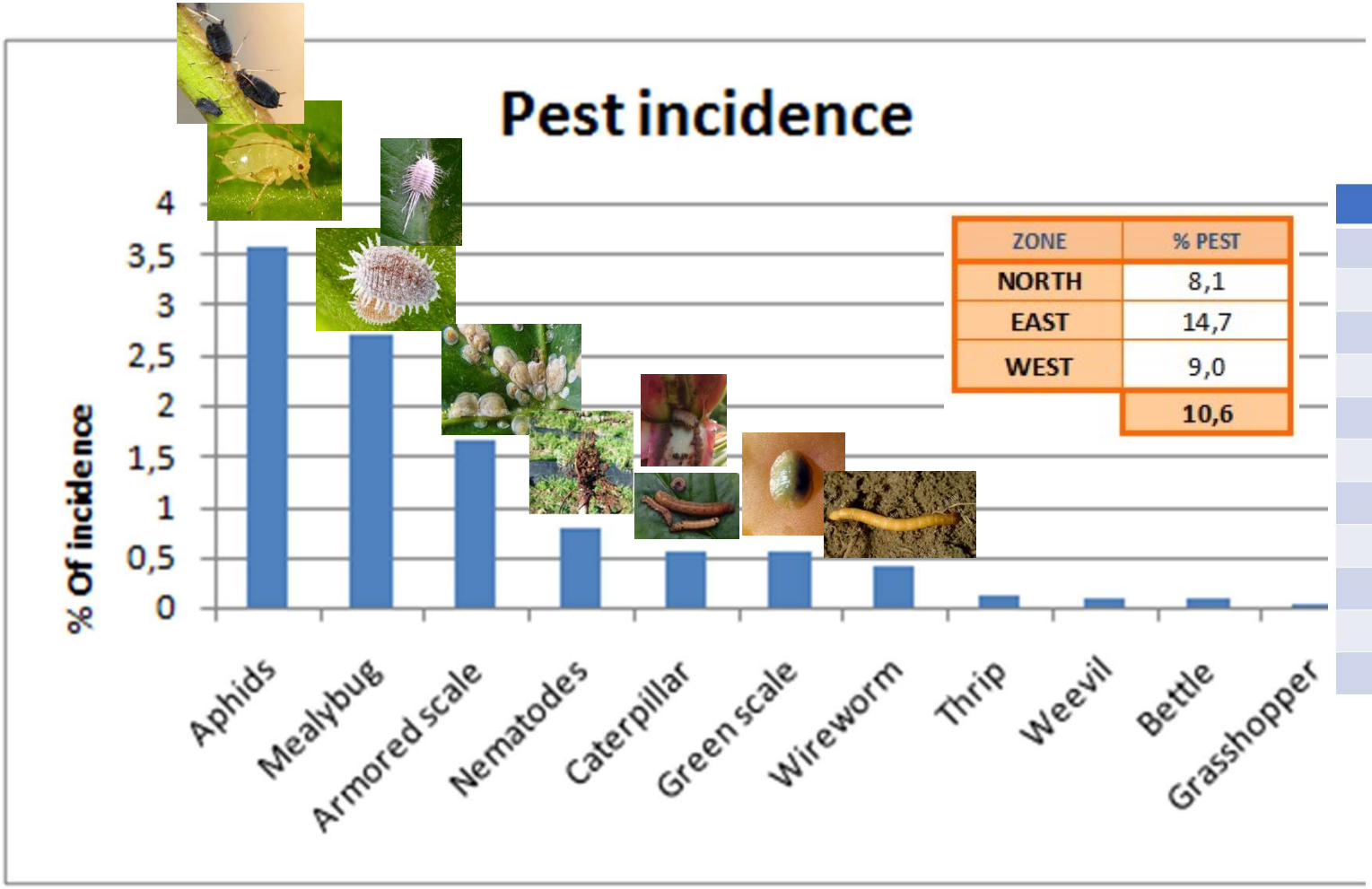
INCIDENCE OF PEST AND DISEASES BY ZONE



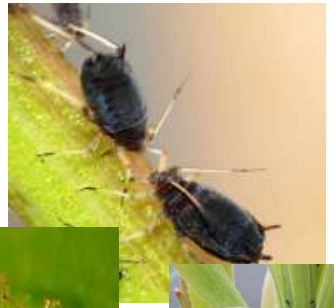
ZONE	RECORDS	POSITIVES	% PEST	% DESEASES	% TOTAL
NORTH	1.031	204	8,1	11,7	19,8
EAST	762	173	14,7	8,0	22,7
WEST	627	126	9,0	11,1	20,1
	2.420	**503**	**10,6**	**10,3**	**20,8**

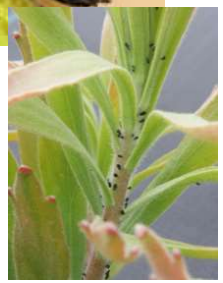
Identification of pests

- *Aphis gossyppy / A. fabae*
- *Planococcus citri*
- *Meloydogine incognita*
- *Pulvinaria spp.*

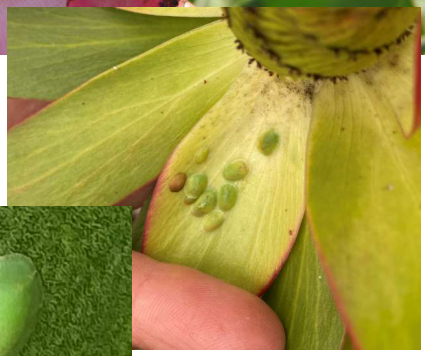


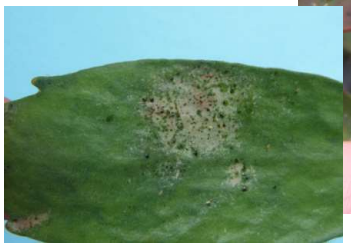
Pest	% Incidence
Aphids	3,55
Mealybug	2,69
Armored scale	1,65
Nematodes	0,79
Caterpillar	0,54
Green scale	0,54
Wireworm	0,41
Thrip	0,12
Weevil	0,08
Bettle	0,08
Grasshopper	0,04



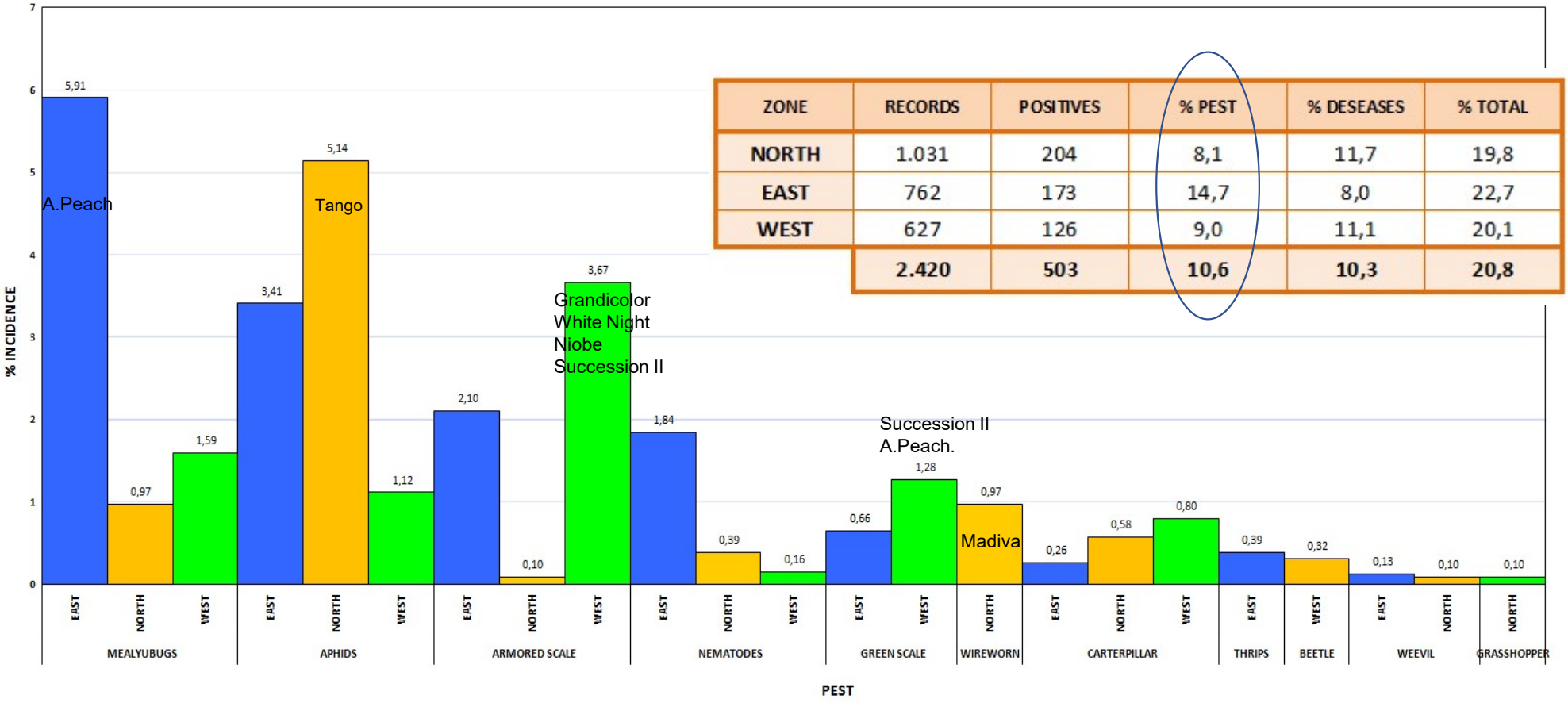


Aphids	*Aphis gossypii*
	Aphis Fabae
Mealybug	*Planococcus Citri*
	Pseudococcus Longispinus
Armored Scale	*Aspidiotus Nerii*
Nematodes	*Meloydogine spp.*
Caterpillar	*Spodoptera Littoralis*
	Autographa Gamma
	Opogonia Sacchari
Green Scale	??
Wireworn	*Agriotes spp.*
Thrips	*Heliothrips Aemorroidalis*
	Hercinothris Spp.
	Frankiniella Occidentalis
Weevil	?
Bette	?
Grasshopper	?





PEST INCIDENCE BY ZONE



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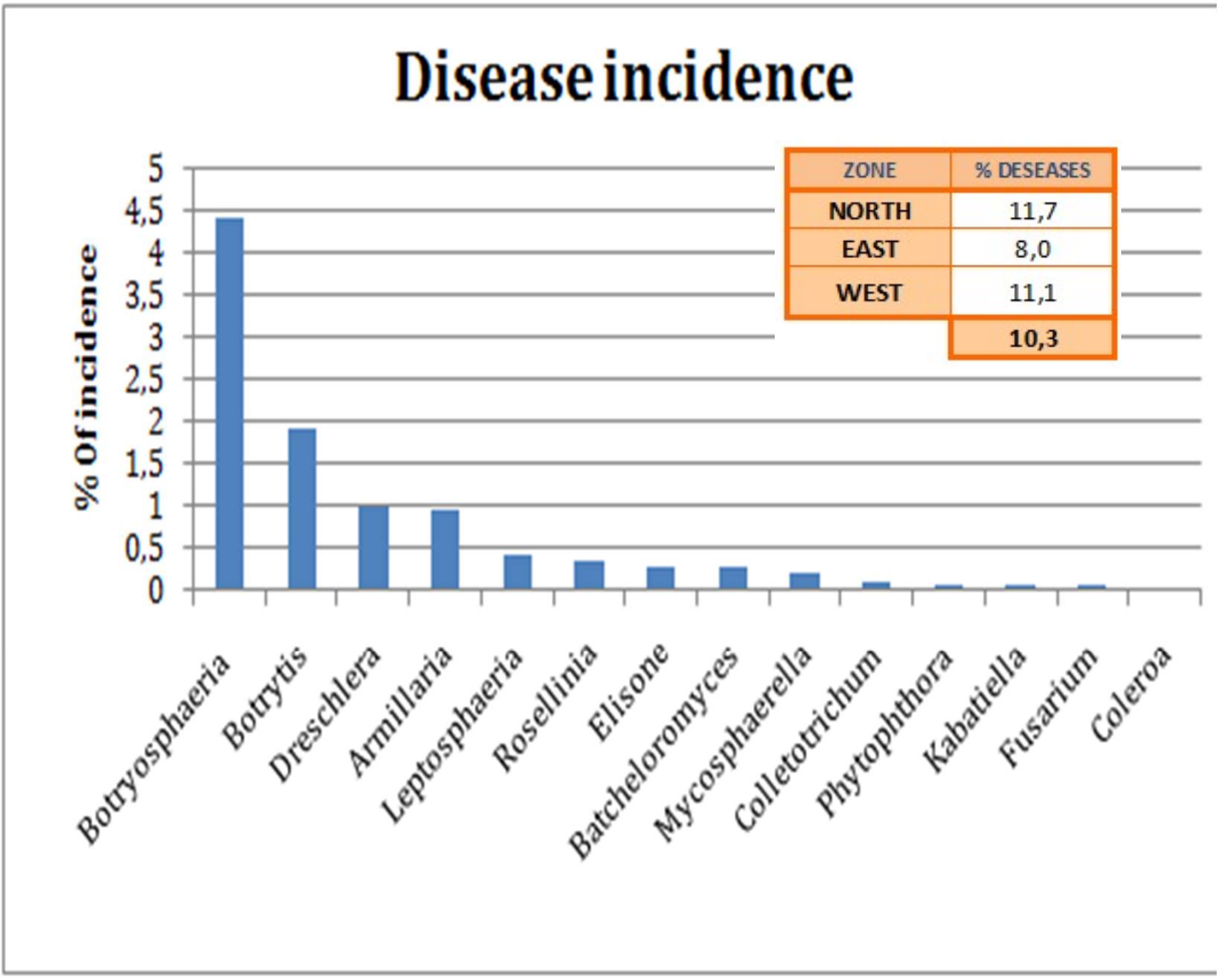
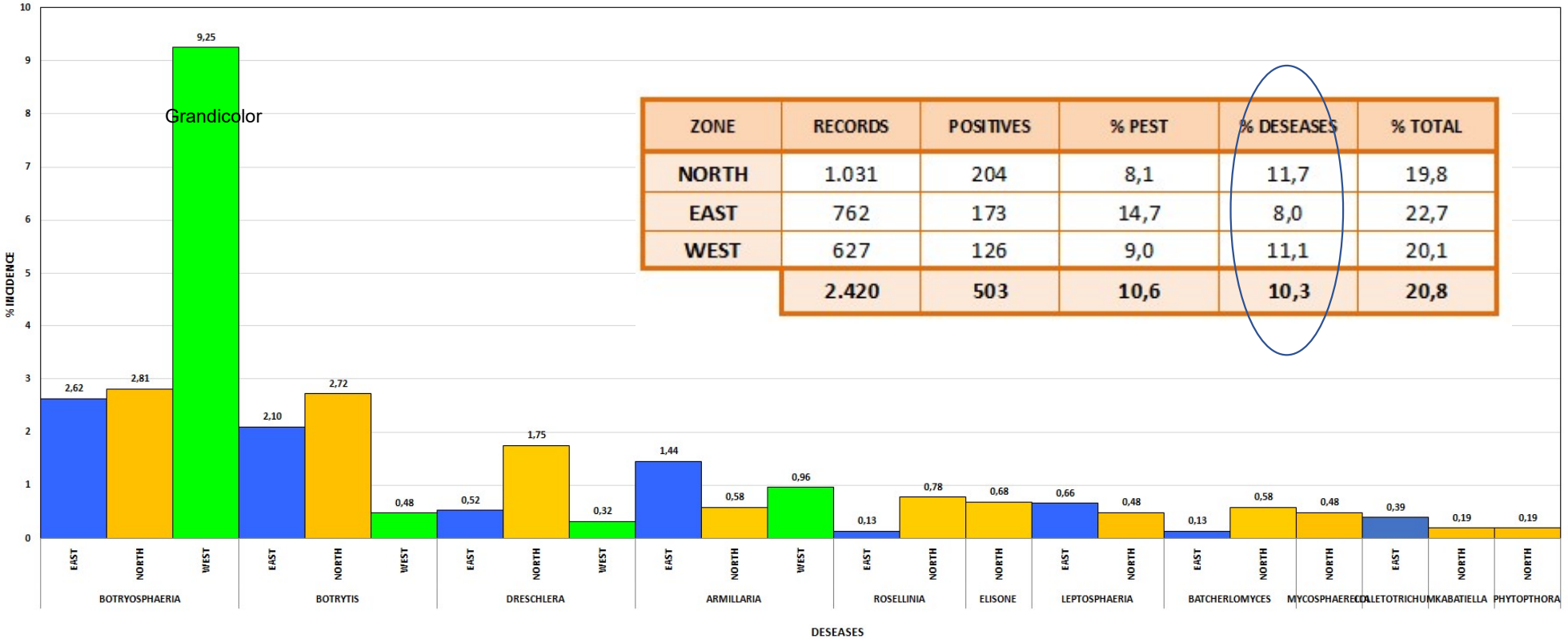
IDENTIFICATION OF DISEASES

- *Botryosphaeria*
- *Botrytis cinerea*
- *Dreschlera spp.*
- *Armillaria mellea*



Disease	% Incidence
Botryosphaeria	4,42
Botrytis	1,94
Dreschlera	0,99
Armillaria	0,95
Leptosphaeria	0,41
Rosellinia	0,37
Elisone	0,29
Batcheloromyces	0,29
Mycosphaerella	0,21
Colletotrichum	0,12
Phytophthora	0,08
Kabatiella	0,08
Fusarium	0,08
Coleroa	0,04

DISEASE INCIDENCE BY ZONE



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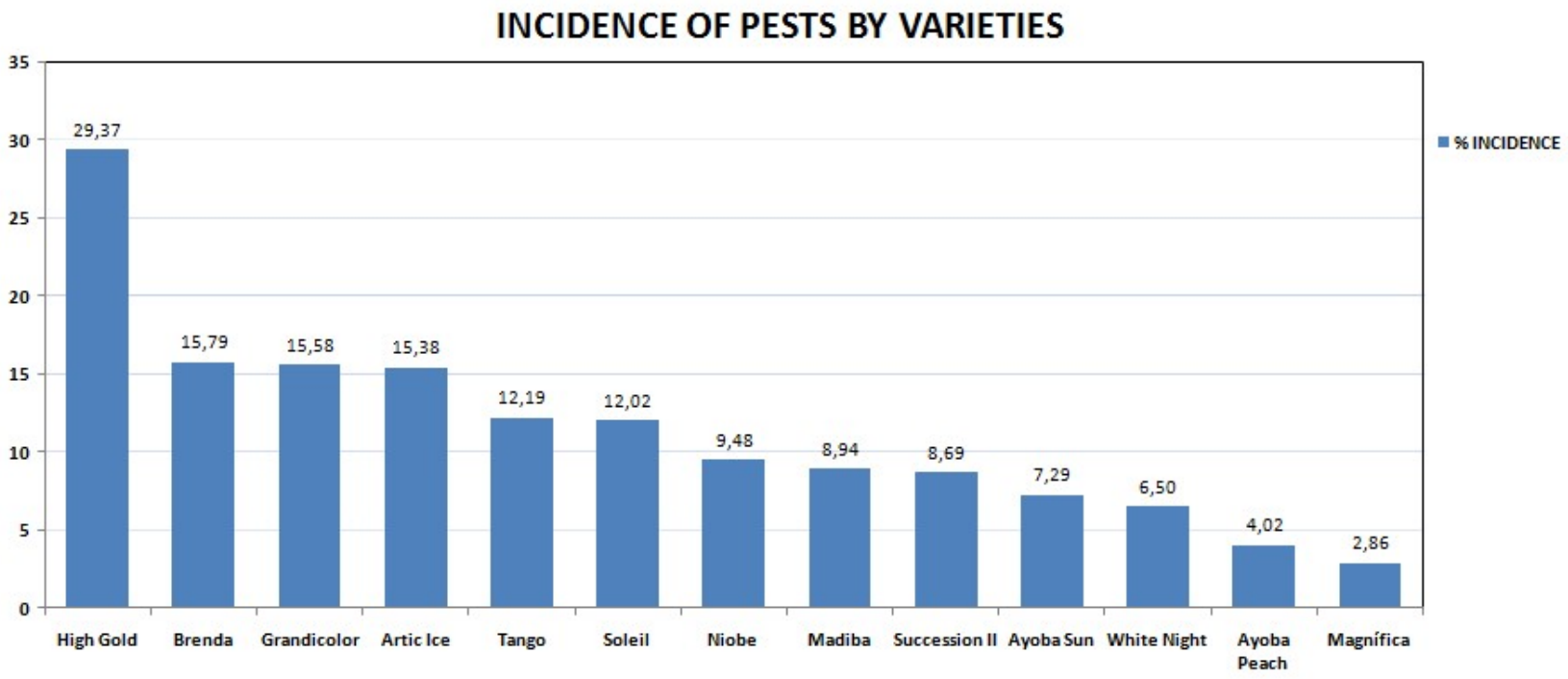
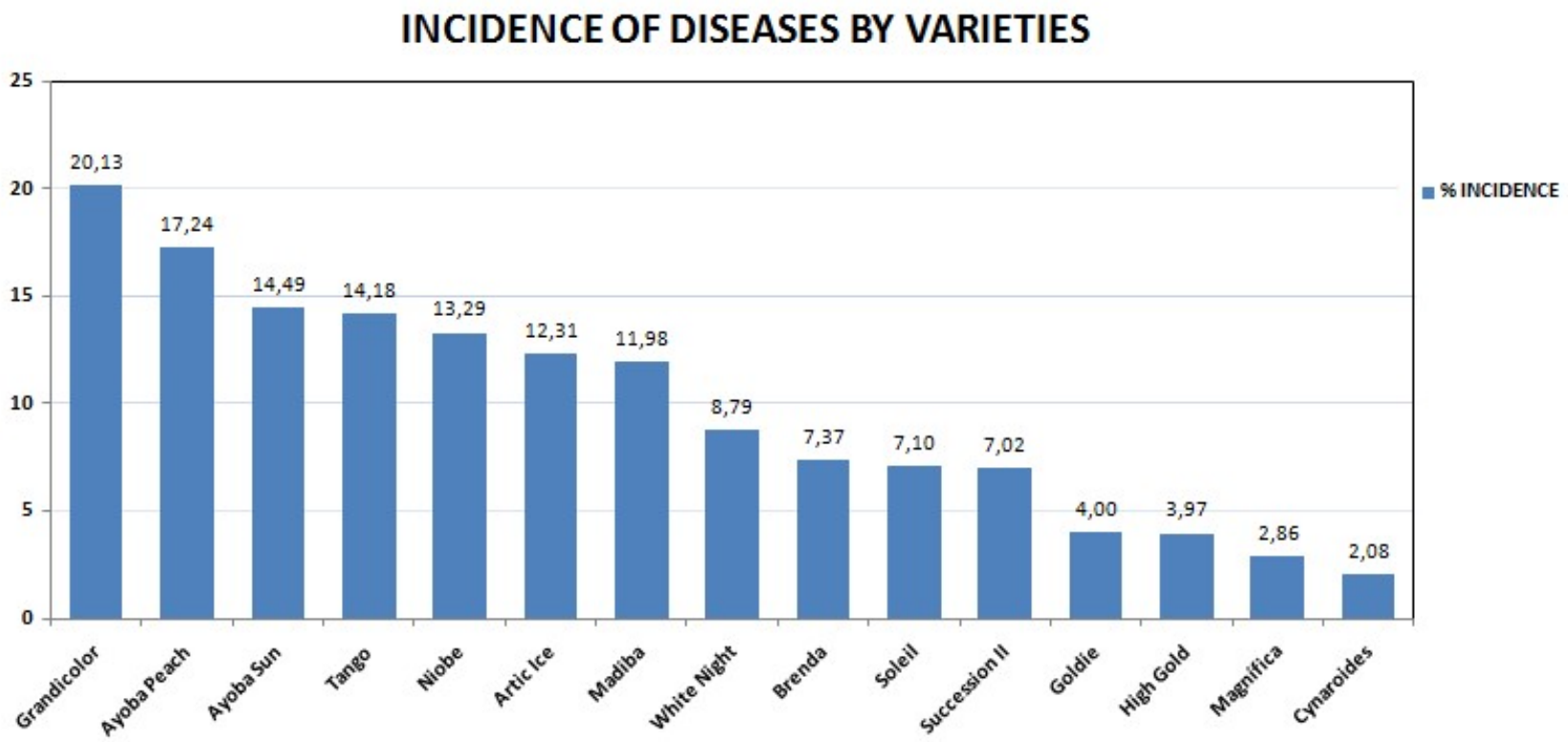
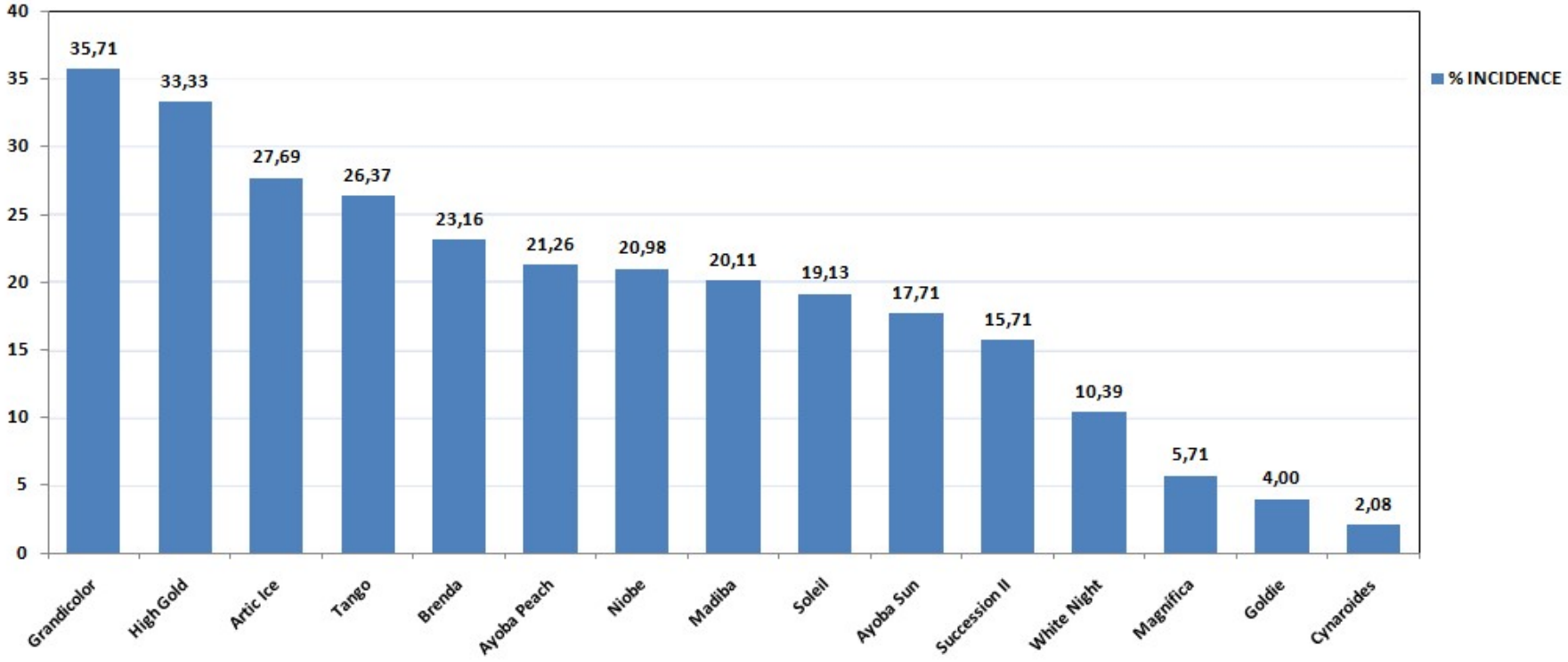

INCIDENCE OF PESTS BY VARIETIES
35
30
25
20
15
10
5
0
29,37
15,79
15,58
15,38
12,19
12,02
9,48
8,94
8,69
7,29
6,50
4,02
2,86
High Gold
Brenda
Grandicolor
Artic Ice
Tango
Soleil
Niobe
Madiba
Succession II
Ayoba Sun
White Night
Ayoba Peach
Magnífica
% INCIDENCE


INCIDENCE OF DISEASES BY VARIETIES
25
20
15
10
5
0
20,13
17,24
14,49
14,18
13,29
12,31
11,98
8,79
7,37
7,10
7,02
4,00
3,97
2,86
2,08
Grandicolor
Ayoba Peach
Ayoba Sun
Tango
Niobe
Artic Ice
Madiba
White Night
Brenda
Soleil
Succession II
Goldie
High Gold
Magnifica
Cynaroides
% INCIDENCE

INCIDENCE OF DESEASES AND PESTS BY VARIETIES



CONCLUSIONS

From the climatological study it is deduced that all the zones adjust to the thermal band for the optimal development of the protea culture (7 - 27 ºC)

In general, we can consider that the incidence of pests and diseases in the cultivation of proteas in La Palma is not high, although we do not have other similar studies to compare results.

In general, there is a greater influence of pests in the East zone, which can be attributed to a more benign climate compared to the North and West zones, although there are some exceptions due to the great sensitivity of a variety to a specific pest.

We can deduce that the area least affected by the incidence of diseases is the West, although, as in the case of pests, there is a high influence of the sensitivity of each variety to a given disease, regardless of the area where this is found. This is the case of *P. Grandicolor*, which is very sensitive to Botryosphaerea in the western zone.

If we ignore the influence of the incidence of the *P. Grandicolor* variety in the West, the premise is fulfilled that the area with the greatest influence on disease attack is the North, followed by the East.

The pests with the highest incidence on the island of La Palma are: cotton mealybug (*Planococcus Citri* and *Pseudococcus Longispinus*), Aphids (*A.gossypii* and *A.fabae*) and armored Scales (*Aspidiotus nerii*).

In the case of diseases, the most frequent is Botryosfaeria, followed by Botrytis, Dreshlera and Armillaria. Other diseases with a certain incidence are Leptosphaeria, Rosellinia, Batcheloromyces and Elsinoe.