

Periods of risk for the occurrence of the most common diseases and pests in *Proteaceae* in the Azores islands

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The Azores are one of the regions in Europe where the cultivation of protea flowers has grown and developed most in the last two decades;
The genus *Leucospermum*, *Protea* and *Telopea* being the most representative and the cultivars *L.* 'Succession', *L.* 'Tango', *L.* 'High Gold', *P.* 'Grandicolor' and *P.* 'King' are responsible for more than 80% of the regional production.



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Influence of the climate to the pests and diseases development in Azores

- Climate conditions with mild temperatures, high relative humidity, long periods of abundant rain, strong winds, which are sometimes cyclonic, and long periods with low light, create a favorable conditions for the development of diseases and pests;
- The risk of development is more high for fungus diseases and insects when we compare with the Mediterranean zones;
- The high humidity (above 80% a long period of the year) and the mild temperatures (average around 14°C in winter to 23°C in summer periods) give conditions for the pests develop more life cycles than usually in other places with Mediterranean climate;
- Pests such *Aphis*, *Diaspididae*, *Planococcus* or *Heliothrips* develop very fast, mainly in the summer period but shows a relatively risk during the winter period as well.

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Influence of the climate to the pests and diseases development in Azores

Attack of *Aphis fabae* in *L. 'Tango'* during the winter period.



Attack of *Thrips* in *P. 'Lime light'* during the harvest season.



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Influence of the climate to the pests and diseases development in Azores

Strong attack of *P. citri* in *P.* 'Grandicolor' during the summer period.



Strong attack of *Diaspididae* in *P.* 'Grandicolor' at the end of the winter.



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- Other pests such *Pantomorus cervinus* or *Popillia japonica* we found them in the normal period of occurrence.

Pantomorus cervinus on L. 'Succession'.



Popillia japonica on *Telopea* plant.



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Influence of the climate to the pests and diseases development in Azores

- Climate is changing and we do not have well-defined climate seasons as in the past and it is necessary to be careful for the occurrence of the pests and diseases out of the normal period;
- In Azores the diseases that are more concerned are the fungus diseases and its development is related to the high humidity periods, because the temperature is favorable for the development of almost every fungus that appears in the proteas crop;
- The periods of high risk for the fungus diseases are between autumn and spring. Normally, during this period the humidity is up to 90% and 75% of the total rainfall of the year.
- Fungus such as *Botrytis cinerea*, *Drechslera*, *Elsinoe* and *Mycosphaerella* develop quickly between autumn and spring. But it is in the spring period that those fungi are more dangerous because, normally, the development stage of the cultivars of proteas are more susceptible due to the tender shoots.

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Strong attack of *Elsinoe* on *L. 'Succession'* plant during the spring period.



Strong attack of *Elsinoe* on *L. 'Succession'* in the base of the flower bud. Flowers aborted.



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Botrytis on young shoot of *P. 'Grandicolor'* in the spring growth.



Botrytis symptoms on flower bud of *L. 'High Gold'* during the winter period.



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Botrytis on *L.* 'High Gold' in the harvest moment.



Botrytis symptoms on flower head of *L.* 'Tango' developed inside the coldroom (2°C).



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- There are another fungus such *Alternaria* and *Drechslera* that shows more development during periods of mild temperature e high humidity. The autumn and the spring periods are the most dangerous for this fungus and some times in the winter with mild temperatures.

Alternaria on *L. 'High Gold'* during the autumn season.



Drechslera on *L. 'High Gold'* during the autumn season.



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Influence of the climate to the pests and diseases development in Azores

- *Botryosphaeria* is a big problem in Azores at the moment. It is a fungus that is difficult to control because most cuts in the plants are made during harvest periods that occur between autumn and spring in adult plants and in young plants in new field planted with infected plant material.

Botryosphaeria on *P. 'Grandicolor'* during the autumn season.



Botryosphaeria on *P. 'Grandicolor'* during the autumn season. Infection by pruning.



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- *Rosellinea necatrix* and *Armillaria mellea* are both fungus that develop in the soil with roots attacks. Normally we found this attacks in fields near to the forest trees or in some fields replanted with proteas. It is a problem each time more frequent in Azores, because there is more farms with old plants replanted and both fungus are promoted by wet winters during long periods of rainfall. It is usual the plants die during the end of spring when the plant shows more activity and growth.

Armillaria on L. 'Succession'.



Armillaria



Rosellinea



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In view of what we have presented above, we have created a risk calendar based on information collected:

- Some specific research done in Azores about identification of diseases and pests with Azores University and La Laguna University;
- Samples of infected plants sent to a laboratory (Regional Laboratory of Plant Sanitary of the Agriculture Azores Department) for analysis and identification (reports from the laboratory);
- Observations and notes registered during the technical support for the farmers (local, cultivar, date, etc...), sometimes technical support by colleagues in visits to protea farms in Azores;
- Pictures collected;
- Correlation between the environment conditions of the climate in the Azores and the conditions favorable to the development of the diseases and pests.

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Risk calendar for the main diseases and pests of the *Proteaceae* in the Azores.

Disease or Pest	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
<i>Botrytis cinerea</i>												
<i>Colletotrichum</i>												
<i>Mycosphaerella</i>												
<i>Drechslera</i>												
<i>Botryosphaeria</i>												
<i>Alternaria</i>												
<i>Elsinoe</i>												
<i>R. necatrix</i> and <i>A. mellea</i>												
<i>P. citri</i> and <i>P. longispinus</i>												
<i>Saissetia oleae</i>												
<i>Diaspididae</i>												
<i>A. spiraecola</i> and <i>A. fabae</i>												
<i>Mythimna unipuncta</i>												
<i>Popillia japonica</i>												
<i>H. haemorrhoidalis</i>												
<i>Pantomorus cervinus</i>												
		Period of low risk, conditions are not favourable to its development										
		The conditions are favourable to the appearance of the disease or pest										
		Period of risk, conditions are very favourable to the propagation of the disease or pest										
		Period of high risk, the disease or pest may reach its maximum potential for spread and cause serious damage										

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Thank you for your attention!



SAT Proteas Tenerife



**For the protea
farmers**

