
Gerbera
Practice & Theory
Selected chapters:
Botrytis -
Is the disease
preventable?
Seminar
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Botrytis
Is it preventable?
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Botrytis cinerea in gerbera - Is the disease preventable?

Seminar with the agronomists of Selecta cut flowers S.A.U.

Medellin area, Colombia.

Organized by Selecta and Ball Colombia. Feb 16th 2005, Medellin.

Revised January 2021.

In most cases Botrytis cinerea is a 'discipline disease', and it is possible to reduce significantly its damage by 'Agro-technique actions'.

Botrytis cinerea (gray mold disease) in controlled greenhouses -

The faster the Botrytis spores are able to germinate, the higher is the chance that the disease will spread widely and will cause severe damage.

By reducing the humidity in the greenhouse, and by decreasing the duration of condense-water presence on the plants' tissues, it is possible to slow down the germinate phase of the Botrytis spores.

By 'Agro-technique actions'; as operating Heating-systems and forming air movement by spinning fans, it is possible to mix the internal humid warm air with external cold air during the cold hours, such actions preserves the 'Relative-Humidity' in the greenhouse around 80% - 85%. It keeps the leave's temperatures above the air temperatures and avoid the developing of water-film on the leaves.

The disease symptoms - Watery spots on: leaves, stems, flowers and fruits, covered by mycelium and gray spores. It creates also black Sclerotiums.

The spores are easily spread in the air and in water. The disease can present also in the plants' tissue as a latent-phase (invisible) and develop later during shipping.

Even though B. cinerea characterized as a weak Saprophyte-fungi,* it causes severe damage to the gerbera petals.

*Saprophytic fungi feed also on dead plants tissues.

Dried gerbera leaf petiole covered by Botrytis (gray mold) spores.

Note - The gerbera petals are developed and exposed to the greenhouse environments, quite long period before the flower-stems are harvested.

Thus; here in the greenhouse starts the Botrytis' contamination-phase

The fungus penetrates into the plants'- cells walls through: stomata, wounds, damaged tissues, and also through the cuticle.

It is an enzymatic process that melt the plant's tissue.

In weak and damaged plants, the penetrating process is easier.

Factors affecting the disease development:

Temperatures -

The Botrytis fungi is active between 9 - 30C. The optimal boundaries for its development are 18 - 22C …… 25 - 30C will delay it.

The spores will germinate at night temperatures' range of 9 to 22C and high humidity conditions for at least 8 hours.

2 - 3 additional hours needed for the penetration process.

All together it takes about 10 hours.

However; suboptimal temperatures conditions can encourage the disease -

For example: common environment combination that allow the fungi to act: occasions of low air temperatures and low leaves temperatures that exist for many hours and combined with high humidity.
In such situation; 'Water film' develop and covers the plants tissue, and when it long enough, it allows the spores to germinate.

Relative-Humidity -

The Botrytis develops under high Relative-humidity conditions 85% - 95%.
It is not only the high relative humidity that affect the spore germination, it is the long duration of the water film that remains on the plant tissue.
And as long it remains, the greater possibility of the disease to develop.

The accumulation of condense-water on the leaves at night, occurs only if the temperature of the leaves is lower than the air temperature in the greenhouse.

Water film existing is essential state for the ‘Spores germinating-phase’.

On the contrary, the ‘Spores-Generating phase’ is encouraged by low relative-humidity, as occur occasionally in sunny days, that follow some previous rainy days.

Humidity sources in the greenhouse -

The local environment humidity.

The plants’ transpiration.

Evaporation from irrigated soil and media surface.

Accumulation of condense-water on the underside of the roof material, on the greenhouse’s structure, and on the plants.

Why Botrytis is an economic problem?

Botrytis cinerea is a multi diversely genetic fungus.

It easily produces countless spores.

It has numerous fast development cycles.

It quickly develops resistance to fungicides.

Therefore it looks as there are difficulties to control it.

Is it so? Is the disease preventable?

How to reduce Botrytis damage -

Under Mediterranean winter conditions it is quite difficult to avoid the Botrytis without ventilating and heating the gerbera greenhouses. However agro-techniques managements help partly to change the microclimate-conditions even in unheated greenhouses.

Above all, are the actions taken for avoiding the presence of water film on the plant tissue, or at least, taking actions for shorten the time of saturated humidity in the greenhouse.

A new way to deal with the Botrytis is selecting resistant varieties. Résistance to Botrytis is an important Selecting-Parameter in my work as a gerbera breeder.*

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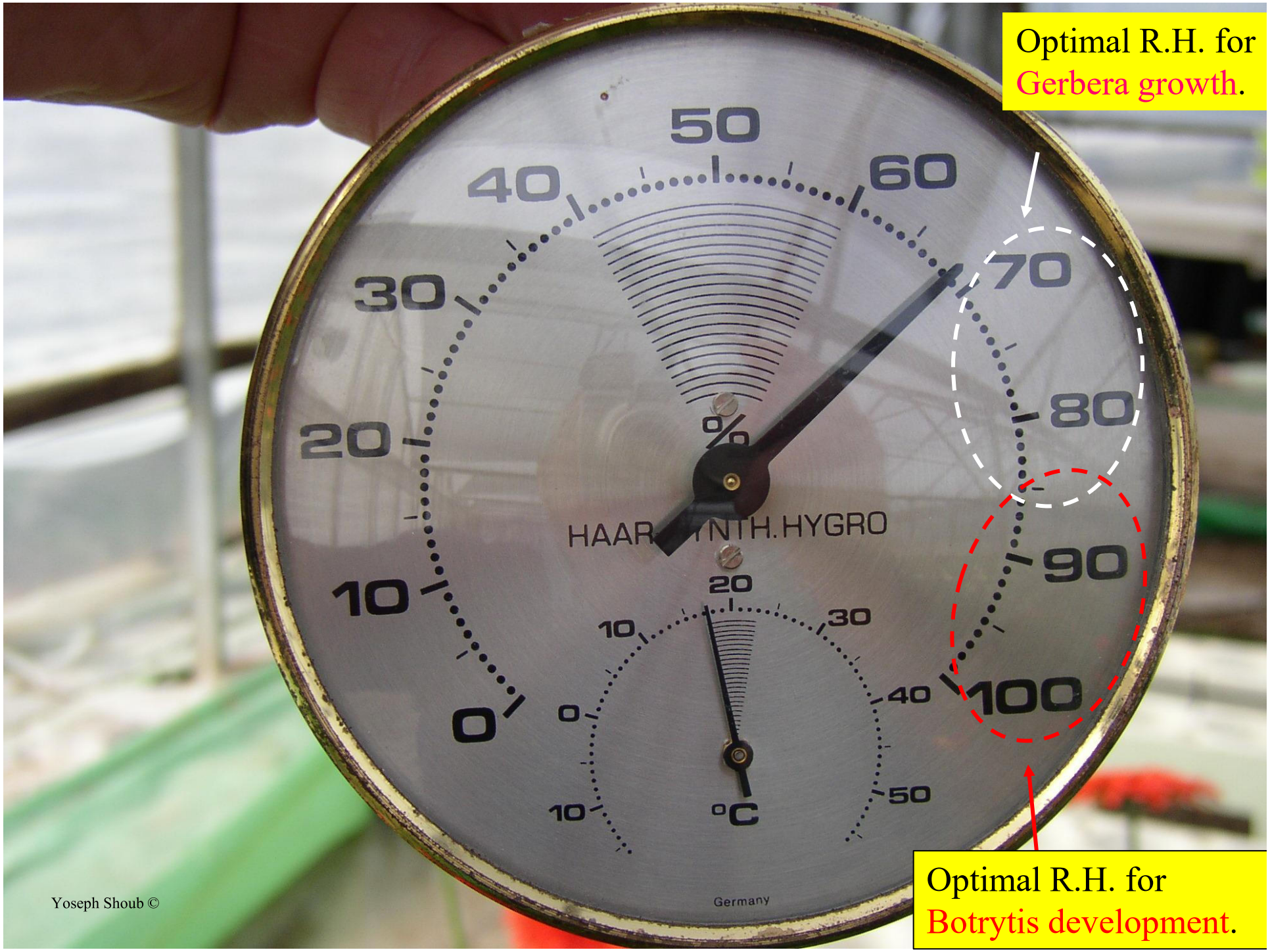
* Gerbera Breeding Ltd.


Optimal R.H. for
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Yoseph Shoub ©
Optimal R.H. for
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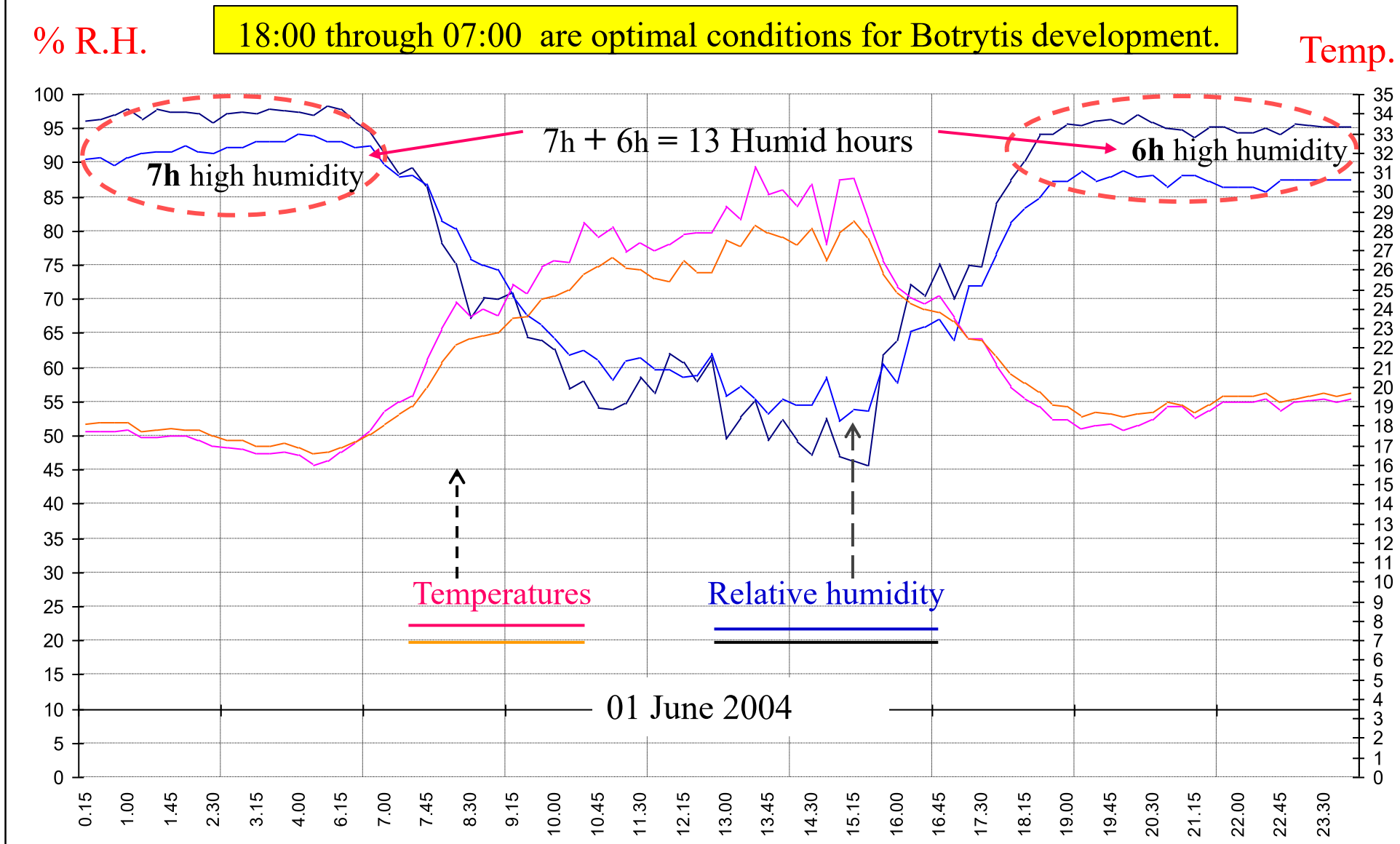


Yoseph Shoub

24h Temperatures and Relative *Humi*dity in 2 Colombian gerbera greenhouses.

Optimal conditions for Botrytis are: continuous low night temperatures for 7 to 10 hours, and 85% - 100% relative-humidity, in condition that water film covers the plant tissue.

Preferable agro techniques actions -1

General technical growing conditions.

Choose the right elevated topographic location.

Choose an automatically controlled high greenhouse type, with automatically open / close walls.

Close at once the side walls in the morning when sun radiation rise the temperatures.

Open gradually the greenhouse walls when the temperatures inside the greenhouse reached temperatures around 25 – 27C.
Try to keep these temperatures as long as possible..

Use clear saran nets, or thin plastic sheets hanged below the greenhouse roof, for avoiding fallen of condense drops from the roof cover on the plants.

Create conditions for natural air movement between the plants.

Agro techniques - 2

Irrigation and drainage.

Improve drainage speed & rates – high raised soil beds
high containers / bags
well drained media.

Clear out the drainage from the greenhouse.

Irrigate to promote roots growth and water uptake.

Avoid salinity.

Fertigate with formulas including Ca (and Mg if needed).

Agro techniques - 3

Sanitation.

Keep sanitation conditions in the packing area and in the cooling rooms.

Keep fresh water in clean buckets and at the water tanks at the cooling rooms.

Change often the air of the cooling rooms.

Never leave flower stems longer than 24 hours in the same water.

Pack dry flowers only.

Agro technique - 4

Avoiding Ethylene damage.

Gerbera flowers are sensitive to Ethylene (gas) released by old injured plant-organs.

Avoid the Ethylene damage to flowers and their longevity.

Keep the sanitation in the greenhouse and around it and avoid ethylene damage.

Clean and remove old damaged leaves and old flowers from the greenhouse.

Agro-techniques - 5

Feeding - general remarks

Feeding formulas -
Balanced feeding formulas strengthens the plant structure, thickening the plants' cells walls and the cuticle.

Feeding with Calcium -
The role of Ca in plants tissues, is to strengthen the ties between the cells.
The presence of Ca makes it difficult for the fungi to deteriorates the cells walls.

Calcium and internal ethylene -
Ethylene secretion from old plant tissues, encourage plants' sensitivity to Botrytis.
Absorption of Ca by the plant, decreases internal ethylene secretion.

Agro-techniques - 6

Helpful remarks

Avoiding wounds of any kind will reduces the ability of the Botrytis-spores to germinate into the plant tissues

Injuries caused by: Insecticides or Fungicides, winds, mechanical rub, sun radiation, cold, frost, pests, etc. increase the sensitivity of the tissue to Botrytis.

Physical damage is increasing also ethylene secretion.

Plant ingredients flow - Flow of carbohydrates and some other ingredients out of the plant, encouraging the disease development.

Botrytis germs grow easily into the reproductive organs, such as, stigmas, stamens and pollens, and then into the whole flower.

Helpful information:

Gibberellins - delay the aging of the flowers. In some roses varieties, post harvest treatments with gibberellin decreases Botrytis damage.

Coating materials - as wax, increases the thickness of the cuticle, and as a result the sensitivity to the disease is decreased.

Calcium sulfate - sprayed on cut roses as pre-harvest treatment, increased the longevity of roses vase life *(2004 new publication).*
*C*oating the flower surface, is probably the key effect of this chemical.

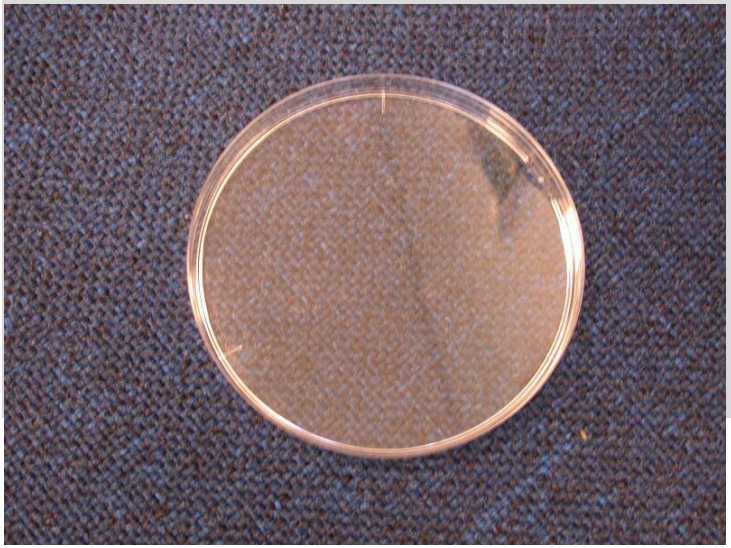
Seasonal Botrytis cycle -

In four-seasons countries the Botrytis is identifies as winter disease. Therefore heating is commonly used from early autumn to spring time.

In hot countries - the ability of the spores to survive in summer is quite low.

The fungi body survives the summer season, in diseased plant remainders.

In Colombian greenhouses, the fungi survives probably the year-round, as to the eternal spring climate conditions..



Petri-dishes with fungi agar-feeding solution, located in the greenhouse, helps to identify Botrytis presence.

Chemical control (Valid to 2004)

Benzimidazoles /Benlate, Delsan, Boistone
(resistant mutations already appeared early in the 70th of the 20th century)

Dicarboximides / Rovral, Ronilan (spraying or dusting)
(resistance already appeared in the early 80th of the 20th century)

Other chemicals:
Triazoles / Silbacor, Indar.

Polioxines / Polar, Milpan (also for cut flowers)

Avoiding chemicals:
Manebgan, Manzidan, (used also for dusting)
Bravo / Daconil (for vaporizing in the greenhouse)

New chemicals:
Mithos, Propica, Switch (still efficient compounds)
And the Teldor