



ADT* - THE AVERAGE DAILY TEMPERATURE AND CULTURE OF CYCLAMEN

I - THE IMPACT OF TEMPERATURE ON THE CULTURE OF CYCLAMEN

Temperature has a strong impact on the production of cyclamen.

It is a **brake** or **accelerator of growth** in terms of culture time and plant volume. High temperatures allow rapid and significant plant development, while low temperatures slow down growth and lead to smaller plants volumes for the same variety.

It is a decisive factor for the **flowering quality** (number of flowers, central bouquet, straight stems, lifespan of flowers, detachment of flowers in relation to foliage, intensity of colour). The bigger the foliage volume, the more freshness the plant needs to reduce its transpiration and put its energy into the flowering stage. Compact plants adapt more easily to different temperature conditions.



II - EQUIPMENT AND THERMAL INERTIA OF GREENHOUSES

According to their equipment (shading system, heating system, ventilation, height of the greenhouses...) greenhouses react more or less rapidly to changes in external temperature.

Reaction time = inertia of the greenhouse. The longer the duration, the more significant the inertia of the greenhouse will be.

It is important to know the temperatures in the greenhouse in order to increase their inertia when climatic conditions require it.

High inertia ensures the maintenance of climatic conditions chosen by the grower in the greenhouse for a longer duration.

Low inertia may affect almost immediately outside weather conditions on crops and increase stress conditions for plants.

In times of heat, it is recommendable to increase shading (whitewash, screen) and ventilation. In fact, in the growth stage, high water demand can result in either excessive foliage, or irreversible damage to the roots.

In the flowering stage, in particular, varieties with large flowers may experience burns, early loss of petals or pale colours. During cold weather, a high inertia in greenhouses will reduce heating costs, thanks to better insulation.

III - KNOWLEDGE METHODS OF TEMPERATURE

Whichever method is chosen, it is essential to take night temperatures into account. In fact, for example, in a warm period, the freshness of the night allows the cyclamen to cool off and to decrease their need to transpire. Thus, they can withstand high temperatures during the day. The temperature reading will therefore always be based on a 24-hour period.



Moreover, in the case of high peaks during flowering it will be complicated to plan certain varieties for certain pot sizes. In this case, you should adjust the growing schedule to varieties most suited to the existing climatic conditions.

1 - Weather station

As a general rule, weather stations can provide the maximum or minimum temperature over 24 hours for a specific geographical area. This offers an initial overall approach and provides a trend.

This information requires more precision in order to know the temperature actually tolerated by the cyclamens in greenhouses.

Examples of monthly averages measured in different types of climate

MONTHLY AVERAGES		Sanremo, IT	Rotterdam, NL	Salinas, California, US	Karuizawa, JP	Berlin, DE
2012	Aug.	25	19	17	22	22
2012	Sep.	21	14	17	20	16
2012	Okt.	18	11	18	14	10
2012	Nov.	13	7	16	8	6
2012	Dec.	10	5	10	0	1
2013	Jan.	9	1	10	-2	0
2013	Feb.	8	2	10	0	0
CLIMATE ZONES		Mediterranean (Warm Summer)	Oceanic (Mild Summer)	Oceanic Mediterranean (Mild Summer)	Continental humid Mountain (Mild Summer)	Continental (Warm Summer)

2 - Temperatures in the greenhouses

Each greenhouse has its own characteristics (materials, orientation, shading, ventilation...). The thermal conditions sometimes vary greatly from one greenhouse to another. So it is very useful to measure the temperatures directly in each greenhouse.

There are several ways to measure the temperature over 24 hours. Whichever technique is used, the objective is to determine an average temperature:

- The average between the maximum and minimum temperature

This technique allows for taking the thermal amplitude between day and night into account. In some cases it is not accurate enough. For example, in climate type « continental humid mountain », the number of cool hours in the night has the effect of reducing the average daily temperature in a more important way than if we only take into account the calculation: (Minimum temperature + maximum temperature)/2

- ADT*, the average daily temperature

This is the most accurate technique.

A calculation example: take an hourly temperature reading over 24 hours.

Add them together and divide the total by 24.

ADT* not only highlights the day/night thermal amplitude, but also the incidence of the number of hours at a high and/or low temperature. It therefore allows you to take account of the **inertia of the greenhouses**, i.e. the time required for the temperature to rise, fall or be maintained.

- The lower the inertia of the greenhouse, the most important is the difference between the 2 averages.

IV - SIMPLE AND INEXPENSIVE MEASURING TOOLS

Simple and inexpensive tools are available that allow you to measure and store the temperatures in the greenhouses.

Please contact your suppliers for more information.

Some websites where you can find out more:

<http://www.specmeters.com/brands/watchdog/>

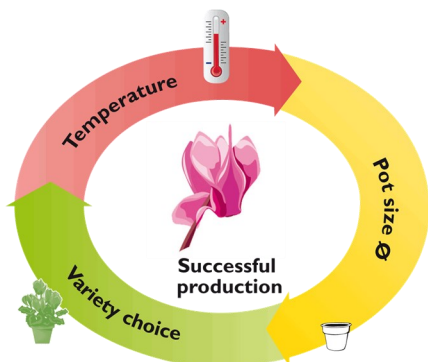
<http://www.logtagrecorders.com/>

<http://www.metostep.com/es/stepsystems/data-logger>



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V – HOW TO MAKE THE BEST VARIETY / POT SIZE CHOICE ACCORDING TO TEMPERATURE



Knowing the thermal conditions in which varieties will flourish is essential for successful growth.

3 factors interact: temperature, pot size and varietal choice.

On a technical level, the selection of the variety should be based on thermal conditions that would offer plants the optimum conditions to:

- adapt to the desired pot size, while presenting a round, compact, well-structured shape.
- provide a quality flowering on the scheduled date.



Latinia® SUCCESS® 12 cm pots
In the Netherlands, in October



Latinia® SUCCESS® 15 cm pots
in Italy, in September

Choosing the variety that is suited to the thermal conditions of **your greenhouses** allows you to:

- Grow successfully
- **Save energy** by selecting varieties suited to low temperatures which do not require much heating.
- **Plan** your growths carefully by knowing which period offers favourable thermal conditions for quality flowering. The indication of the culture time then allows you to determine the potting date. See the technical leaflet for the average culture time per series.
- **Limit treatments**, when the plants are in the right conditions they will, on the one hand, be more resistant, and on the other hand, be of better quality.
- Improve the behaviour of the plants.

VI – ADT IN THE GREENHOUSE AND 22 MOREL SOLUTIONS

22 SOLUTIONS	POT Ø	IDEAL ADT RECOMMENDED**
		Flowering
Smartiz®	6	12-15°C
	9	15-20°C
Smartiz® VICTORIA	10.5	20-≥25°C
Metis® FANTASIA®	6	12-15°C
	9	15-20°C
	10.5	20-≥25°C
Metis®	9	12-15°C
	10.5	15-20°C
	12	20-≥25°C
Metis® Silverleaf	9	12-15°C
	10.5	15-20°C
	12	20-≥25°C
Metis® VICTORIA	9	12-15°C
	10.5	15-20°C
	12	20-≥25°C
Metis® PomPom®	9	12-15°C
	10.5	15-20°C
	12	20-≥25°C
Tianis® FANTASIA®	9	12-15°C
	10.5	15-20°C
	12	20-≥25°C
Tianis®	10.5	12-20°C
	12	20-≥25°C
Premium	10.5	12-15°C
	12	15-20°C
	14	20-≥25°C
Latinia® FUNFLAME®	10.5	12-15°C
Latinia® FANTASIA®	12	15-20°C
	14	20-≥25°C
Latinia® SUCCESS®	10.5	12-15°C
	12	15-20°C
	14	20-≥25°C
Latinia® VICTORIA	10.5	12-15°C
	12	15-20°C
	14	20-≥25°C
Latinia®	10.5	12-15°C
	12	15-20°C
	14	20-≥25°C
Halios® FANTASIA®	12	12-15°C
	14	12-20°C
	17	12-20°C
Halios® VICTORIA	12	12-15°C
	14	12-20°C
	17	12-20°C
Halios® HD	12	12-15°C
	14	12-20°C
	17	12-20°C
Halios® Silverleaf	14	12-20°C
Halios® BLUSH	17	12-20°C
	22	12-15°C
Halios®	14	12-20°C
	17	12-20°C
	22	12-15°C
Halios® CURLY®	14	12-20°C
	17	12-20°C
	22	12-15°C

(**) for an easy culture control