

## Production procedures

### Substrate

The substrate must consist of free-draining organic mixtures such as bark with 20% sphagnum, coir or rockwool.

### Vegetative phase

#### ■ Vegetative phase plantlets delivered in flasks

Deflasking is seldom done at production facilities due to the high degree of difficulty associated with this procedure.

#### ■ Vegetative phase plantlets delivered in plugs

Plantlets are delivered in plugs (plug trays) with a leaf length of 10-15 cm and are transplanted to 12 cm pots immediately on delivery. Various organic mixtures with good drainage and air retentive capacity can be used. The basis is usually finely textured bark supplemented with sphagnum, coir, peat fibre or chunks. Oncidium requires a rapid-draining mixture. Each substrate has its own character with regard to providing water and fertilisers. The plants should immediately receive water and nutrients by means of overhead watering. Hand watering is sometimes necessary and is also a good way to monitor the crop. The plants are placed against each other in close proximity. That way there are approx. 60-65 plants per net m<sup>2</sup> during 6 months.

After this period, the plants are moved to the spike initiation and flowering section where both night and daytime temperatures are somewhat lower. In this cooler section, spikes can then be initiated in the young shoots previously developed under warmer conditions. Then there are approx. 32 plants/net m<sup>2</sup> for another period of 6 months. During this second period, more and more plants will flower until 65-70% have produced flowers. Depending on production differences, approx. 10-20% of the plants will not flower within a year. The plants that have not flowered yet, will be spaced out again to 25 plants per net m<sup>2</sup> after which they will flower in the course of the next 6 months.

### Temperature

As a rule, the target temperatures depend on the two phases:

#### 1. Vegetative phase.

During the vegetative phase, target temperatures are 20°C at night and 25°C during the day. Temperatures lower than 16°C will result in growth problems.

#### 2. The spike initiation and flowering phase.

The spike initiation and flowering phase requires temperatures of 16°C at night and around 24°C during the day. In autumn and winter, maintaining a temperature of 16°C at night and 18°C during the day promotes spike development.

Higher temperatures (particularly in summer) can be prevented by heavy whitewashing, using an outdoor screen or roof sprayers and by ensuring sufficient air movement in greenhouse. The light intensity is less important during that period than striving for the right temperature.

### Light

Oncidium cultivation requires fairly high light intensities. The best growth and flowering results are obtained by exposing the plants to light intensities from 15,000 to 20,000 lux at the plant level.

The greenhouse must be equipped with a shading system. In addition, the greenhouse cover must be whitewashed in summer. Providing supplementary growth lighting of at least 6,000 lux will be necessary during autumn and winter. This improves shoot development in the vegetative phase and in the flowering phase it promotes easy development of the flower spike. During formation and development of the flower spike, Oncidium needs as much space and light as possible.

### Water

Water is one of the most important factors in production. Only rainwater or reverse osmosis water is suitable. Any other kind of water will inevitably result in cultivation problems.

Provide enough water storage capacity. Water consumption should be calculated as a minimum of 15 litres of water/m<sup>2</sup>/week. Water used for irrigation must be between 12 and 15°C. Cooler irrigation water lowers the pot temperature and this can inhibit growth.

A heated indoor intermediate tank or a counter-flow system is recommended.

Water is provided by overhead watering to which fertiliser is added.

For the following elements the maximum concentration in the water is as follows. Cl 50 mg/litre, Fe 2 mg/litre and bicarbonate 3°dH hardness.

## RH

Providing the proper humidity level ranging from 65 to 80% is important for good growth and flowering. Humidification or the use of roof sprayers will greatly improve the greenhouse climate. When considering cost-effectiveness, roof sprayers are a better investment. Maintaining the recommended levels 24 hours a day is not necessary. The biggest problems usually occur when the humidity drops too suddenly.

Higher values than 80% are acceptable without any problems, yet in that case it is necessary to ensure sufficient moisture discharge by moderate heating and simultaneous ventilation (air movement in the greenhouse). The biggest problems usually occur during prolonged periods of high humidity. A low RH on sunny days and in spring inhibits growth and makes whitewashing and shading necessary.

## Fertilisation

Fertilising and irrigating are done simultaneously. The composition of fertilisers depends on the season and the growth stage of the plants. Although either simple and/or compound fertilisers can be applied, working with compound fertilisers is usually much more practical.

For the vegetative phase, a combination of calcium nitrate, Plantprod or Peters 20-20-20 and magnesium sulphate in a ratio of 3:6:1 would be a fine combination that could be supplied by a 2-tank system.

If the foliage becomes too lush, the 20-20-20 can be replaced by 17-5-34 by Pokon or 18-5-35 by Plantprod. During the winter period and during flowering, plant sturdiness can be promoted by replacing the compound fertiliser by a high-potassium fertiliser 7-11-27. The latter will not be necessary when growth lighting is used. Vegetatively mature plants must receive a 7-11-27 fertiliser (EC of 0.3-0.5) and calcium nitrate (ratio of 3:1) starting in the spring and on into the summer.

The best EC values are 0.5-0.7 EC. During freezing weather, reducing the EC somewhat would be advisable due to the effect of heating.

The pH may become too low, watch out for that. The solution is to apply less ammonium nitrogen and/or urea.

You do have to add Dolokal to the substrate in advance. Depending on the materials used, Dolokal should be applied at the rate of 3 kg/m<sup>3</sup>.

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### To sum up, the optimum fertilisation is:

|                          |                |   |
|--------------------------|----------------|---|
| Vegetative phase:        | 0.7 EC         | 20-20-20 + CaNO <sub>3</sub> + MgSO <sub>4</sub> = 6 : 3 : 1. |
| Bulb and spike formation | winter: 0.3 EC | 7-11-27 + CaNO <sub>3</sub> = 3 : 1.                          |
|                          | summer: 0.5 EC | 7-11-27 + CaNO <sub>3</sub> = 3 : 1.                          |

## Diseases and pests

With sound cultivation and sufficient control of the most significant attackers, use of chemical control agents will rather be exception than rule. Red spider mites and California Thrips are actually the most important pests, and ones that can spread rapidly.

- Red spider mite.  
Red spider mites infection gives the plant dull and grey leaves and inhibits growth.
- Thrips.  
Thrips infection in flowering causes flower damage and Thrips transmit Tomato Spotted Wilt Virus (TSWA) that results in heavy leaf spotting.
- Bulb and shoot rot.  
Bulb and shoot rot is caused by bacterial infection at too high a temperature and too little evaporation or a too-wet production environment.
- Root rot.  
Root rot is caused by a soggy or poorly-draining substrate and/or an excessively high EC. Too-cold irrigation water also causes root problems.
- Dead leaf tips.  
Dead leaf tips are caused by moisture shortage in hot and dry periods.
- Caterpillars.  
Caterpillars may cause damage on flowers and leaves.

*It would be best to consult an expert with regard to which chemical control agents to use and what the application dosages are and we recommend to carefully read the labels.*

## Greenhouse systems

A nursery needs at least two sections to produce *Oncidium* as pot plants:

- The vegetative phase.  
From leaf size 10-15 cm the plants growing the vegetative phase for another six months in a considerably warmer climate.
- The spike initiation and flowering phase.  
The spike initiation and flowering phase lasts 8-12 months. Because the plants occupy about twice as much space during the flowering phase, the warmer section used for the vegetative phase will have to accommodate about 35% of the entire production.

### Benches/mobile containers

Production takes place on benches or mobile containers with an open bottom. Various materials are possible. We advise against ebb-and-flow systems.

### Heating

The heating system has to provide the following temperatures regardless of outdoor temperatures:

- During the vegetative phase, at least 25°C during the day and 20°C at night. Temperatures lower than 16°C will result in growth problems.
- After spacing out the pots in the spike initiation and flowering section, at least 24°C during the day and at least 16°C at night.

### Shading system

A shading system is required, not so much for saving energy but more to limit excess light. A double screen is not necessary. An external shading system offers a good way to cultivate at a cooler temperature without whitewashing.

### CO<sub>2</sub> system

A CO<sub>2</sub> system will provide an effective supplement for optimum growth. Although no studies have been conducted into *Oncidium*, the crop will undoubtedly benefit from this.

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### Growth lighting

Growth lighting will be necessary during both the vegetative and spike initiation phase in order to achieve the required light intensities during the winter months.

It provides advantages during the vegetative phase, particularly for better shoot growth so that plants are quicker to reach flowering size. In the flowering phase it promotes the development of flower spikes.

The lighting system should have a capacity of at least around 6,000 lux.

### Sprinkler system

Water is provided by mainly by overhead watering to which fertiliser is added. The system must supply an even distribution.

## Production

Yields in a modern facility with approx. 84% space utilisation (as realised by mobile containers or mobile benches) depend on various factors. Using growth lighting increases the rate of growth, reduces the loss percentage, improves flowering results, and makes a yield of approx. 30-35 plants/m<sup>2</sup>/year feasible. Yields resulting from unlighted production will be around 25 plants/m<sup>2</sup>/year.

As a rule, the loss percentage is between 5 and 10% per year.

The labour requirement is around 1,500 m<sup>2</sup>/worker/year.