

# Cultivation Manual

Limonium

Wings Series



**Botanical family :** Plumbaginaceae.

**genus:** limonium

**species:** sinuatum

**common name :** 'statice'

The great success of limonium and the increasing interest for limonium made HilverdaKooij decide to develop their own limonium varieties. In the past few years HilverdaKooij's Breeding Section developed various new limonium sinuatum species called the 'WINGS'-series.

The HilverdaKooij 'Wings-series' is available in a wide range of new bright/intensive colours and suitable for glasshouse as well as outdoor cultivation.

All over the world limonium species can be found. At present some 200 species have been identified. Nowadays several of these are used for both fresh cut flower and dried flower production.

limonium sinuatum or 'annual statice' originates from the mediterranean coastal areas. Therefore all varieties have been adjusted to grow in a dry environment. The tiny flowers are narrow funnel shaped, consisting of loose terminal panicles appearing in loose bows. The leaves of the sinuatum plants form a rosette pattern at the base of the plant, the leaves grow close to the ground. Prior to flowering the stem elongates and terminal leaves become upright. Stems are winged and grow approx. 70-80 cm tall when flowering.

### **TISSUE CULTURE**

Until 1989 almost all limonium sinuatum or 'notch leaf statice' was reproduced by seed, and only available in blue-purple and white colours. Seed propagated statice is usually planted with 12 plants/net m<sup>2</sup> or 8.5 plants/gross m<sup>2</sup>. Unfortunately the plants are not very uniform and production per plant is relatively low.

From the first research it appeared that the 'in vitro propagation' of limonium sinuatum is difficult. Recently the experience with tissue culture is at such a level that the propagation of limonium sinuatum can be done successfully: producing uniform plants which are 100% free of fungal diseases.

The newly developed Tissue Culture method enabled the rapid introduction of a wide range of new varieties. The reproduction by Tissue Culture guarantees that all characteristics of the variety remain in the young plants. The new varieties are selected for their 'special' colours and uniform growth. Especially growing characteristics as a uniform stem length, a higher production and a better quality of the flowers are used for selection: resulting and a higher production from less plants per square meter.

### **PLANTING**

For the cultivation of statice any type of soil is suitable. The soil should be well drained; sandy or sandy-clay soils are recommended. The soil must be free of pests and diseases. When necessary we advise to fumigate or to steam sterilise. This will also control possible weed problems.

It is important that the growing points (eyes) of the plants can be reached by light. The plants should not be planted too deep and the eyes should not be covered by soil.

### **FERTILIZATION**

Generally statice needs a limit amount of fertilizer especially when grown in the greenhouse. For greenhouse cultivation the soil is normally fertile enough. This also depends on the soil type where the crop is being grown on. If the soil contains too many nutrients the crop may become very flaccid with a decrease in flower production.

Basic fertilization before planting the crop:

3-5 kg sulphate of potash magnesium	( K <sub>2</sub> SO <sub>4</sub> + Mg SO <sub>4</sub> H <sub>2</sub> O )	
3-5 kg magnesium sulphate	( K <sub>2</sub> SO <sub>4</sub> MgO + K <sub>2</sub> O )	> per 100 m <sup>2</sup>
3-5 kg triple super phosphate	( Ca (H <sub>2</sub> PO <sub>4</sub> ) )	

Use as fertilizers organic materials or late effect (slow working) chemicals.

After the first flush is harvested liquid fertilizers can be given as follows:

N:P:K 15-15-15

10 days later	15-15-10	1,5 gram per litre, or EC 1,0-1,3
another 10 days later	15-15-10	

After the above fertilization, give clean water to optimise the uptake of the solution given. Watering is necessary until flower bud initiation. Listed below is a guideline of nutrient elements needed for annual statice in mill mole ( m/mol ) per litre water.

Ammonium	(NH <sub>4</sub> <sup>+</sup> )	0.1	Nitrate	(NO <sub>3</sub> <sup>-</sup> )	2.5
Potassium	(K <sup>+</sup> )	1.3	Chlorine	(Cl <sup>-</sup> )	< 0.4
Sodium	(Na <sup>+</sup> )	< 0.4	Sulphate	(SO <sub>4</sub> <sup>-</sup> )	1.5
Calcium	(Ca <sup>++</sup> )	1.5	Bicarbonate	(HCO <sub>3</sub> <sup>-</sup> )	0.5
Magnesium	(Mg <sup>++</sup> )	1.0	Phosphate	(H <sub>2</sub> PO <sub>4</sub> )	

A soil pH of 6.5 and an EC of 1,0 is ideal for the cultivation of statice.

### **PLANTING DISTANCE**

The advised planting distance between each plant is 30 x 30 cm.

It is recommended to plant two rows per bed, each bed should be 1 meter wide with paths of at least 40 cm wide in between the beds. Use one layer of 17x20 cm mesh/ support wire. Do not plant too deep; it is important that the growing points (eyes) of the plants are not covered by soil.

$$\underline{6 \text{ plants per net m}^2 = 3 - 3.5 \text{ plants per gross m}^2}$$

Planting more plants per square meter will result in more stems per sq meter but a lower quality.

### **PLANTING IN NORTHERN AND SOUTHERN EUROPE**

Due to the difference of the climates in Northern and Southern Europe a different planting strategy can be followed.

Northern Europe: Planting can take place from the end of December (in heated glasshouse) until mid June. Outdoor planting can take place as from April till the end of May. From the 'early' planting, flower production can be expected at the end of April to beginning of May. A spring planting usually flowers 10-11 weeks after planting. If the grower wishes to plant early e.g. December/February it is necessary for the temperature in the greenhouse to be apx. 12-14°C at night. If sunny the temperature may rise to 20-25°C, the greenhouse must be ventilated at a temperature higher than 15-16°C.

Southern Europe: Planting can take place from August to February; however keep plants frost-free at all times. When planting in August/September, flower production can be expected from October onwards.

### **CULTIVATION**

The growth of statice is very much light depending. A day length of 14 hours or more promotes earlier flowering and better quality flowers. For planting under extreme sharp light conditions a maximum 40% shade cloth can be applied. As soon as the plants are well established the shade net should be removed. In Summer the plants will start generative growth soon after planting. These first flower stems should be pinched until the plant has a rosette with a diameter of at least 25-30 cm, as well as a sufficient vegetatively developed plant.

The plants are sensitive to a high moisture content. A high humidity in the greenhouse must be avoided, especially during the flowering period. Ventilation of the greenhouse is necessary 24 hours a day during flowering. A high humidity may cause an outbreak of Botrytis in the flowers.

### **TEMPERATURE**

Temperature is an important cultivation aspect for limonium sinuatum. The Vernalization and Devernalization of plants are regulated by temperature.

## **CULTIVATION TEMPERATURE**

In case of Winter planting the greenhouse must be kept frost free. From January onwards the greenhouse must be kept at minimum 10 °C.

Ideal greenhouse temperature for statice :            optimum= 15-20 °C  
    minimum= 8-10 °C  
    maximum= 25 °C

The most suitable night temperature is 12-14 °C.

### First flowering can be expected:

- in heated glasshouse  
    planted in winter (December - January)    : 14-16 weeks after planting
- outdoor grown or  
    planted in springtime in greenhouse        : ± 10 weeks after planting

### Second flush

It may be necessary to pinch the first new flower stems which appear soon after the end of the first flush. This so-called 'flush-in-between' is often too short and of inferior quality and should be completely pruned in mid summer.

Depending on the local climatological conditions you may chose to proceed for the second flush in following manner:

mild climate	warm climate
warm days + cool nights	hot days + warm nights
<p>After the peak of first flush has decreased continue to water and fertilise:</p> <p>Within a few weeks the first new stems of second flush will appears. The quality of the stems is dependent on sufficient difference between day and night temperatures. This second flush will continue well into autumn as long light and temperature are sufficient</p>	<p>After the first flush has been harvested prune all remaining stems and leaves at the base of the plant (leave apx. 6-8 cm.)</p> <p>Keep the plants dry for the first 14 days; than continue to water and fertilise. Allow the plant to grow sufficient leaves - plant diameter apx 30/40 cm - and pinch again the first flower stems.</p> <p>When the plant is well developed allow the flower stems to grow.</p>

## **WATERING**

Careful watering is the most important aspect for a successful *Statice sinuatum* crop. The grower should determine whether or not the crop needs water by the condition/quality of the crop. We advise to water the plants until a rosette is formed with the use of a sprinkler or overhead watering system. Hereafter the plants should be watered by drip irrigation tubes which run down the bed. Two drip tubes should be used for every bed.

From flower bud initiation till harvesting time water as required. If possible add fertilizer. Continue watering throughout the crop. Although just before flowering starts a decrease in water application does stimulate flowering.

It is very important that special care is taken from flower induction until harvesting. The flowers should not come into contact with water at all as they are most susceptible to Botrytis at this stage.

Water tends to remain in the funnel shaped flowers creating an ideal situation for an outbreak of Botrytis. Botrytis is the most harmful disease which can occur in a flowering *limonium sinuatum* crop.

## **HARVESTING**

The flowers can be harvested when the outer, coloured, petals are open as well as the inner white flower. Harvesting should be done in the early morning or in the late afternoon. In the harvesting period good ventilation is necessary to prevent condensation and to maintain a low moisture content in the glasshouse.

The first stems can be harvested approx. 3 months after planting; between April - May. Within the varieties there can be a difference of 7 - 14 days. The daily temperature is mainly responsible for the flower bud initiation. Whereas long days promote a rapid growth of the flowers. Stems should be cut using small scissors or a sharp knife.

Flowers do not open any further once placed in water which is why it is advised to pick flowers only when they are as ripe as possible.

## **DISEASES**

**Never use DDVP, this will cause burning of the crop !**

### **Botrytis**

The most occurring disease in *limonium* is Botrytis.

Botrytis cinerea or grey mould is a fungus that forms on leaves or the flowers causing irreversible damage. Conditions encouraging Botrytis are a high humidity and a high moisture content of the soil. When the humidity level is over saturation point (100% relative humidity) the air cannot hold any more moisture and condensation will occur. It is only in the presence of free standing water that Botrytis spores germinate if the temperature is above 5-6°C.

Early symptoms of Botrytis are yellow leaves, loss of foliage, small white or brown spots on the petals and leaves (in dark coloured petals the spots are brown and soft; in light coloured petals they are white and circular). Once these spots develop into fuzzy grey mould, the spores are released into the air infecting the surrounding flowers.

**Preventive:**

- Refrigerated units should not be above 5°C.
- Wet flowers should never be placed in the cold room.
- Bunches should be bunched loose enough so that the moisture released by transpiration from the foliage can evaporate.
- Any damaged, diseased or decaying flower or foliage should be removed as they are very vulnerable to an outbreak of Botrytis.
- Whatever the flowers come into contact with e.g. containers, buckets etc. should be clean.

**Spraying:**

1. Beginning of the crop: - spray 1 gr. Fongarid per m<sup>2</sup> after planting
2. In course of time:
  - spray 200 gr. Rovral per 100 liters water + 30 cc Agral wetting agent
  - or, spray 100 gr. Rizolex /100 l water
  - or, spray 150 gr. Eupareen /100 l water
  - or, spray 200 gr. Benlate /100 l water
  - or, spray 200 gr. Mancozeb /100 l water
  - or, spray 200 gr. Ronilan /100 l water
3. During flowering:
  - Smoke with Termil H. smoke tablets
  - Dust with TMTD

spray using a low volume high pressure spray !!

**Sclerotinia**

- Spray(per 100 litres water):
- 50 gr./ml Sumisclex
  - or, 200 gr. Rovral

**Rhizoctonia**

- Drench/spray(per 100 litres water):
- 100 gr. Rizolex, after spraying, rinse/wash off with clean water
  - or, 200 gr. Rovral

**Red spider mite**

- Spray once every 7-10 days(per 100 liters water):
- Pentac 100 gr./ml + 30 ml Agral
  - or, Nissorun 50 gr./20 ml
  - or, Apollo 30 ml
  - or, Vertimec 25 ml
  - or, Talstar 40 ml (only in glasshouse)

**Aphids**

- Spray(per 100 litres water):
- 50 gr. Pirimor
  - or, 75 gr. Undeen
  - or, 60 gr/ml Parathion
  - or, 40 ml Talstar

### **Cutworm, Caterpillars etc**

Spray(per 100 litres water):

- 50-100 gr. Bactospeine
- or, 50-100 gr. Ambush
- or, 100 gr. Nomolt
- or, 100 gr. of 100ml Lannate
- or, 100 -150 gr. Dipterex
- or, 25 ml Agrichem Permethrin

### **Scutigerella**

Treat soil with Curater.

Prepare the soil mix in the Curater. After adding Curater to the soil drench by watering using lots of water to break down the Curater.

### **Beatles, Taxusbeetle**

Spray once per week and repeat this for some weeks, hereafter 1x per 14 days, repeat this 1x 14 days 2-3 times.

Spray(per 100 litres water):

- Actellic 50-100 ml
- or, Orthene 50 gr.
- or, Parathion 100 ml, before adding, the soil should be moist, thereafter rinse, wash off the Parathion by watering.

Soil treatment with Curater, rinse and drench soil hereafter

- Drench with 150 ml Parathion

### **Rust**

spray:

per 100 liters water:

- Baycor liquid 150 ml
- or, Mancozeb 300 gr.
- or, Zineb 300 gr.
- or, 100 ml Triforine (Funginex)