



Danziger Gypsophila Cultivation Guide.....

Imagine more



Botanical Background

Origin: Asia & Europe

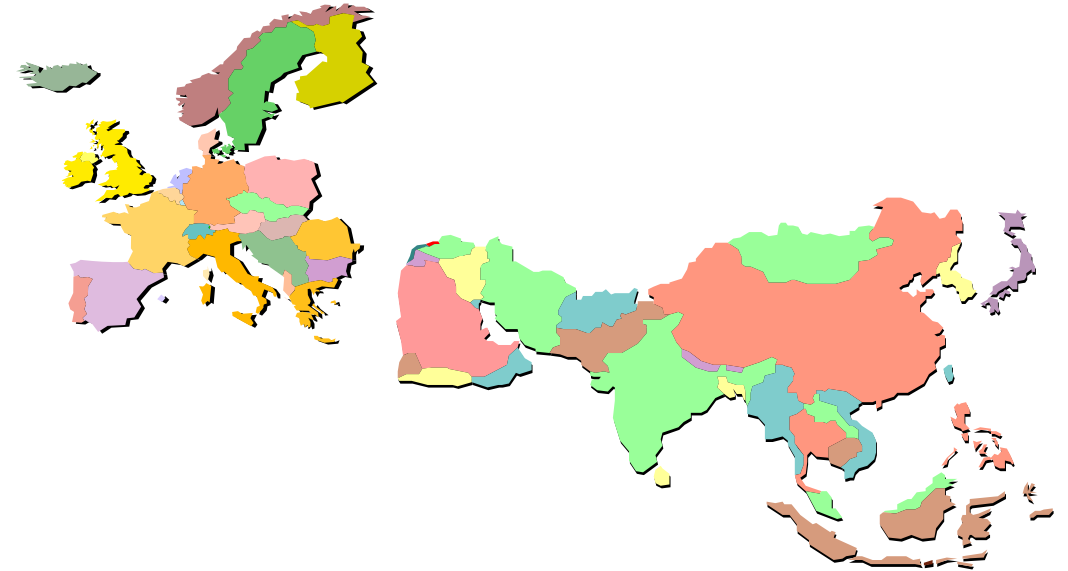
Family: Cariophyllaceae

Genus: Gypsophila

(comprised of 125 species)

Species: Gypsophila Paniculata

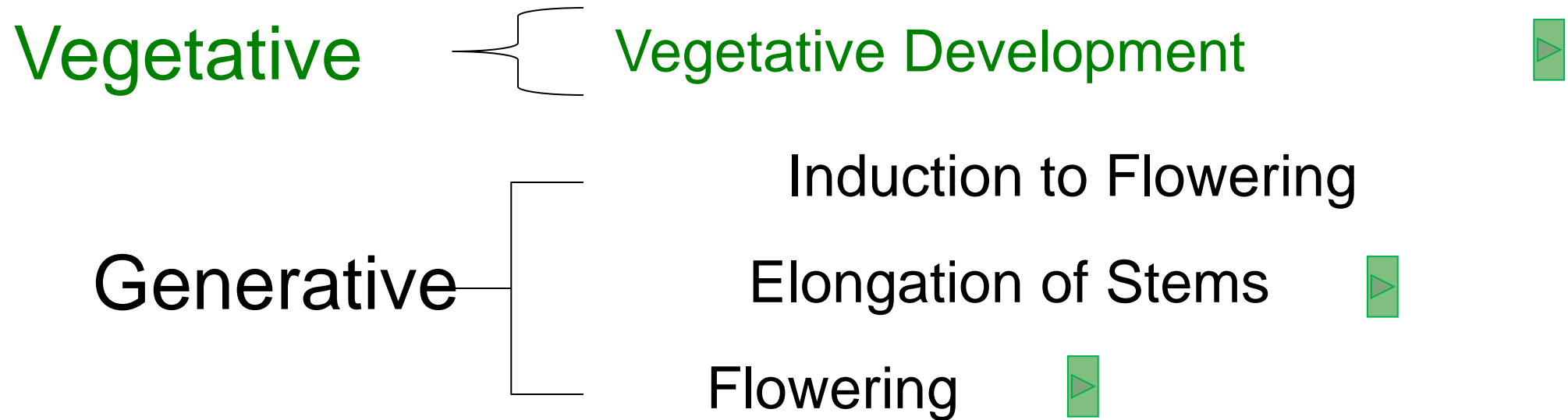
(being the only Gypsophila species suited for the cut-flower market).



Physiological Background

1. Gypsophila is a perennial: it can produce several flowering flushes in a span of 1 to 2 years
2. Gypsophila is a quantitative long day plant: it requires a minimum of 12-13 hours day light in order to elongate and flower

Physiological Background



Physiological Background

What affects the change from vegetative to generative

Day Length

Exposure to a minimum of 13 hours daylight

Temperature

Under cold conditions, plant finds it difficult to react to day length. High temperatures quicken the process from induction until flowering

Light Intensities

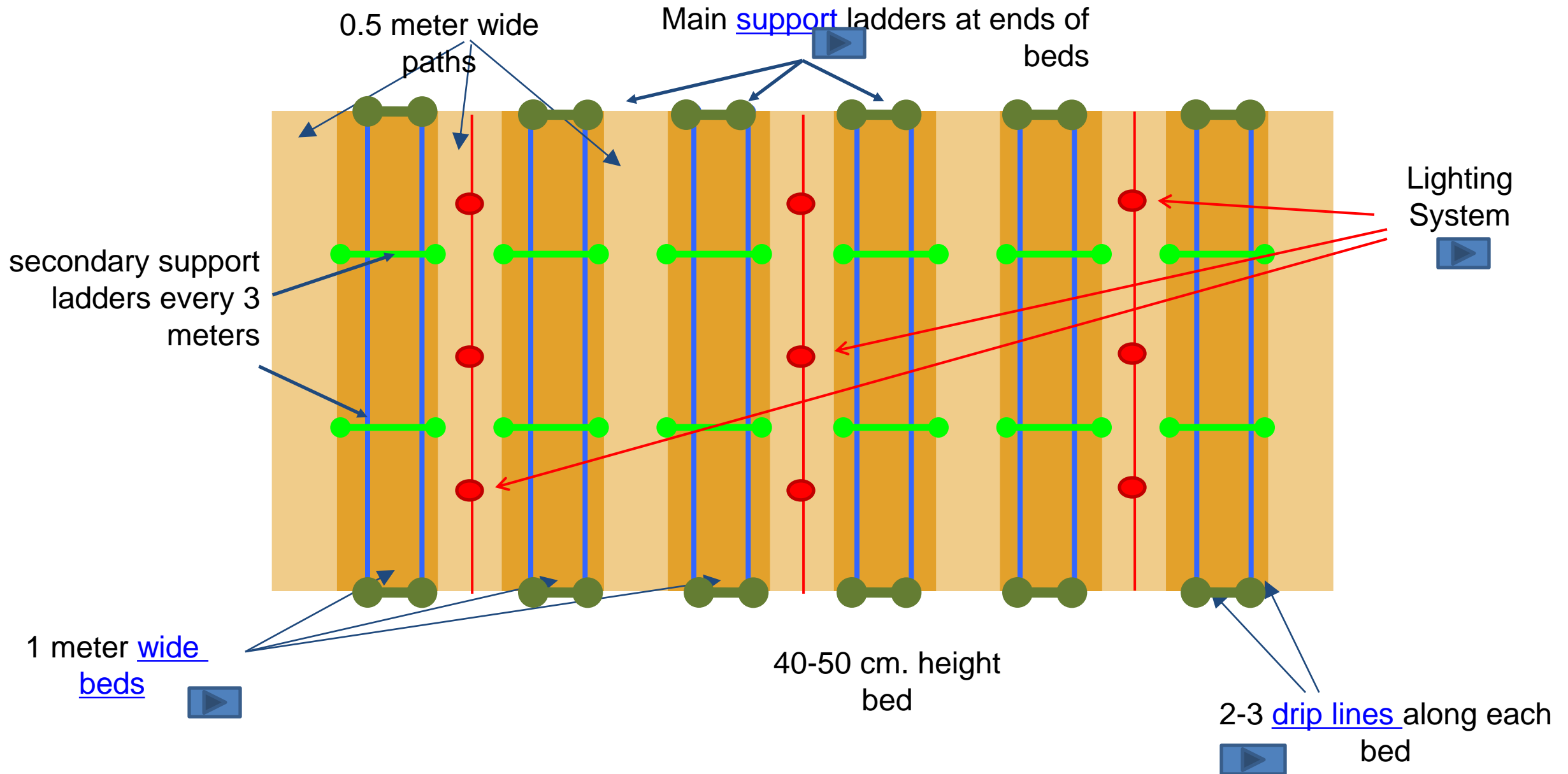
The stronger the intensity the better the reaction

The Growth Cycle

- ❖ Preparation of the field
- ❖ Planting
- ❖ Pinching
- ❖ Long day treatment
(Lighting, Gibberellin treatment)
- ❖ Harvest
- ❖ Post Harvest Treatment
- ❖ Cut Back



Plot Preparation



Planting Density

Key point - Potential of stems per m² of bed •

Density – more plants / m² – less stems /plant •

Less stems /plant – more quality – heavier stems •

Uniformity - thinning and harvest time are shorter - less •
rejects on harvest .

Planting Density



Planting Density



8 plants per net square meter in open field in Kenya

Planting Density



10 plants per net square meter in open field in Kenya

Planting Density



Planting should be done in humid soil
when outdoor temp. are cool

Do not plant too deep to
avoid risk of *Rhizoctonia*



Irrigation & Fertilization

- Irrigation:

Establishment- Amount of 80-70 cubic meters/Hectare/day through overhead and extra 20 cubic meter/Hectare with fertilizations.

Elongation-

During the hot period 50-60 cubic/Hectare/day.

During the cold period 20-30 cubic/Hectare/day.

- Fertilization:

NPK rates according to the stage of the plant.

Stage	Period (days)	K (ppm)	P (ppm)	N (ppm)
Establishment and Development	20-30	100	20-30	100-150
Elongation of stems	20-50	120-170	20-30	120-170
Flowering	20-50	150	20-30	100

Irrigation & Fertilization

Adjust the amount of water given
to the growth stage of the plant



Irrigation & Fertilization




DANZIGER

Irrigation & Fertilization

- Formula - N: P:K:Mg:Ca – 5:3:8:6:8.
- ΔEC - should be 1 higher than the source of water.
- System to control the feeding : EC , PH



Pinching

5-7 weeks from planting to pinching- root system ready for pinch



Pinching

Focus on the quality stems



Long Day Treatment

- As a rule, *Gypsophila* is a quantitative long day plant, requiring a minimum of 12-13 hours daylight in order to elongate and flower.
- Artificial light induces the change from vegetative to generative plant growth, and improves the uniformity of the flowering flush.
- Lighting is applied so as to complete that natural day-length to 16 hours
- It is possible to light in a cyclic manner, at a proportion of 1 light to 2 dark, maximum dark period of 30 minutes
- The natural day length in equatorial countries is sufficient to induce flowering in most *Gypsophila* varieties



GA Treatments



- Correct time for application - after pinching /pruning.
- Correct concentration - depending on climate conditions and the variety, key number is 100 - 400 ppm.
- Too high a concentration may have a negative effect on the quality: low weight and hollow stems.
- Number of applications - depending on plant's reaction.
- Correct application:
 - Apply 25-30 cc per plant (of above concentrations)
 - Consider weather conditions - rain, wind, temperatures.
 - Consider method of application.
 - Solution pH should be ~ 6.0.

Thinning (de-sprouting)

- A process in which we remove side shoots at the lower part of the inflorescence.
- Advantages:
 - Heavier stems with weight concentrated at top.
 - Easier to harvest. Reduces labor cost in harvest and in sorting.
 - Reduces the number of rejects.
 - Prevents scaring during the sorting.
- The correct timing - when leading stems are 50-60cm long, and side stems are 20-30 cm.
- Should be done once or twice in a cycle.



Characteristics of the Gypsophila inflorescence

- The flowers of a Gypsophila inflorescence open gradually over a period of several weeks. 
- Research has shown flowers to senescence starting 10 days after the onset of opening
- The market requires Gypsophila at an opening stage of 60% to 80% and with flowers of a pure white color
- Allowing the flowers to open under natural conditions in the field or Greenhouse may cause browning of flowers 
- Two possible harvest stages are recommended, each demanding a different method of opening the flowers (see next slide):

Harvest

System 1: Harvest when 25%-30% of the flowers on each stem are open



“Regular” Opening method, over a 2-3 day period



Harvest

System 2: Harvest when 3%-5% of the flowers on each stem are open

“Slow” or “Ecuadorian” Opening method, over a 5-8 day period



Post Harvest - “Regular” Opening



A few important points:

- Harvest should be performed at the base of the stem.
- Harvested stems should be placed immediately in buckets containing the post harvest solution:
 - Each bucket should be filled with 3-5 Liters of solution.
 - The water used in the solution should be of the best quality.
 - The Buckets themselves should be cleaned and sterilized after each use.
- The buckets with the harvested stems should be placed under shade, and removed from the field/greenhouse to the pack-house as soon as possible. Do not leave harvested stems in the sun or without solution!



Post Harvest - The “Opening”

The Solution contains three major components:

- An **Ethylene inhibitor** (most recommended is **STS** - Silver Thiosulfate 75mM - at a concentration of 0.15%, 4.5ml in 3 Liters)
- A **Bactericide/Fungicide/Hydrator** (possible commercial chemicals include **TOG₃** by Gadot Group Israel, or **Chrysal OVB** by Chrysal International Netherlands)
- **Sugar** (5% to 10%, 150 to 300 grams in 3 Liters)

Post Harvest



Filling buckets with the post harvest solution

Post Harvest



Sorting in the green house

Post Harvest

Sorting in the
field



Post Harvest - Sorting

The sorting process is most important for the quality of the end product:

- Sort by length, bunches should be uniform.
- Clean foliage from bottom third of stem.
- Arrange the top of the inflorescences in each bunch in a straight line.
- After the process place immediately back in the solution.



Flowers are opened in a special room under controlled conditions. The main concept is to allow the flowers the best conditions for absorbing the post harvest solution:

- Temperatures of $\sim 25^{\circ}\text{C}$.
- Relative humidity of $\sim 70\%$.
- Lighting through the night.

Post Harvest - the “Opening Room”





Elaborate Opening Room



Simple Opening Room

The results:









“Regular” process



“Ecuadorian” process

Post Harvest - “Slow” or “Ecuadorian” process

- Harvest at 3%-5% open flowers only (!). 
- Sorting, bunching, sleeving. 
- Dipping the bottom of stems in a 0.05% solution of Polar .
- Placing flowers in **first solution (pulse solution)**: STS 75 at 0.2% + Gibberellic Acid at 4ppm. This solution is brought to pH=4.5 using Citric acid. Stems remain in first solution for 24 hours. 
- Placing flowers in **second solution**: 0.1% Liquid ‘Long Life’ + 5% Sugar for three days in “Opening Space” with controlled conditions. 
- Placing flowers in **third solution**: 0.15% TOG₃ + 5% Sugar for three additional days in same “Opening Space”. 
- Placing in cooling room at 2⁰C to 4⁰C for minimum 24 hours.
- Packing and shipping. 

Pests and diseases

Common Pests:

- Leaf Miner
- Thrips
- Caterpillar
- Spider Mites



Pests & Diseases

- Focus on the leaf-miner:

Egg laying and feeding punctures on leaves disqualify the product for market. Although usually the direct damage caused to plant from these actions is small, its effect on product quality is large.

- How to control:



1. **Cultural Control** - be sure to clean the surface from weeds within the structure and the external environment (sanitation).
2. **Chemical control** - This pest control must be carried out in accordance with the recommendations and the preparations will be chosen among the authorized pesticides for use in flowers.
3. **Biological control** - *Diglyphus isaea* is marketed in Israel by the "Bio - B" industry in Sade-Eliyahu, it is very efficient and can greatly reduce the fly population.
4. **Calnit**- Recently, we have been experimenting treatment with spraying Calnit, $\text{Ca}(\text{NO}_3)_2$. We received results indicating the effectiveness of spraying against the leaf miner.





Thrips



Caterpillar

Pests and diseases

Common diseases:

- Powdery Mildew
- Downy Mildew





Vegetative Development



Elongation of Stems





Flowering





Two to three drip lines per
bed



1.2-2 Liter/hour drips, 25-30 cm
intervals

Drip irrigation system



Secondary support
ladders

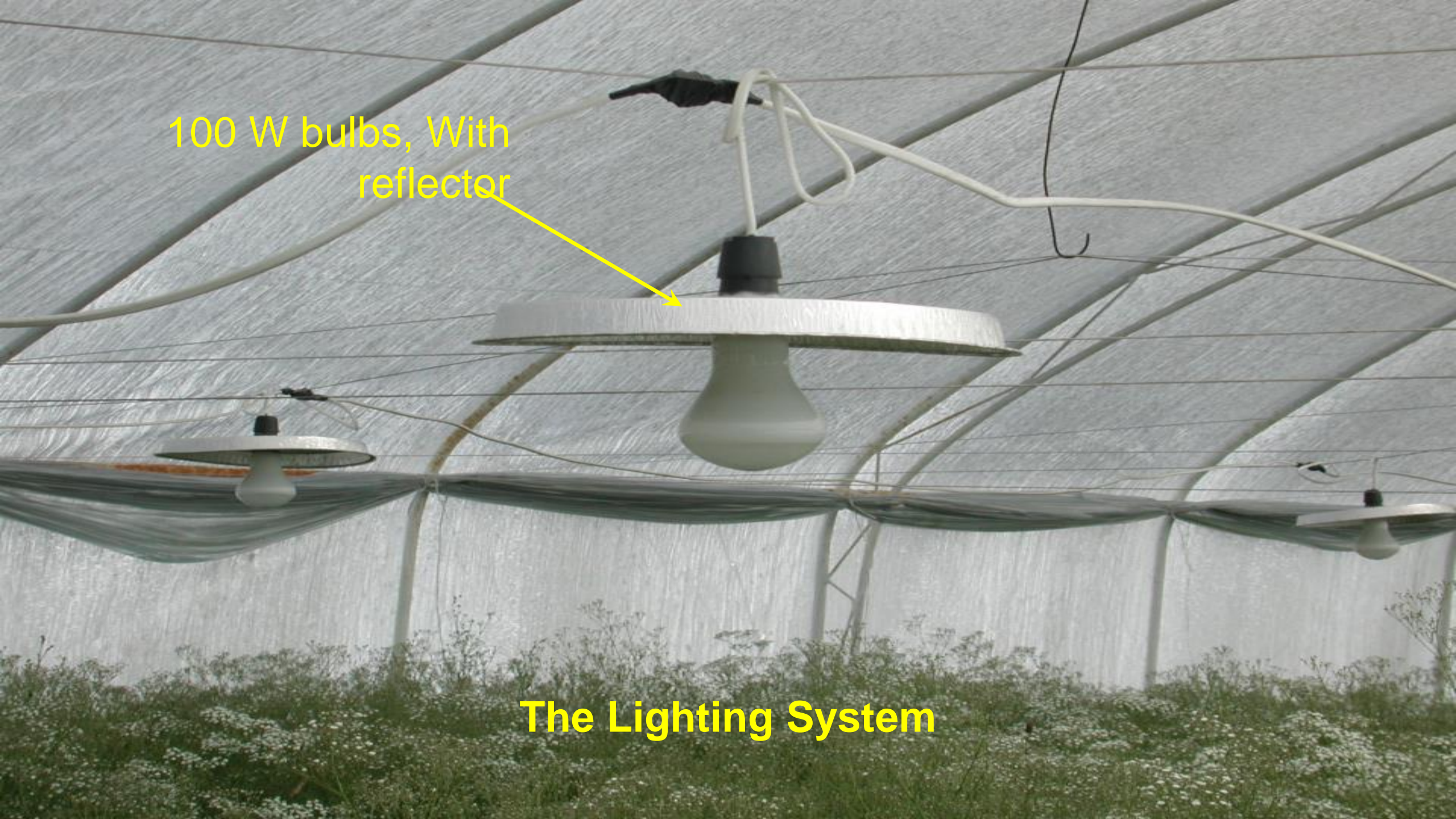
Support Net 20 by
20 cm/ 30 by 30 cm

Support System in Israel

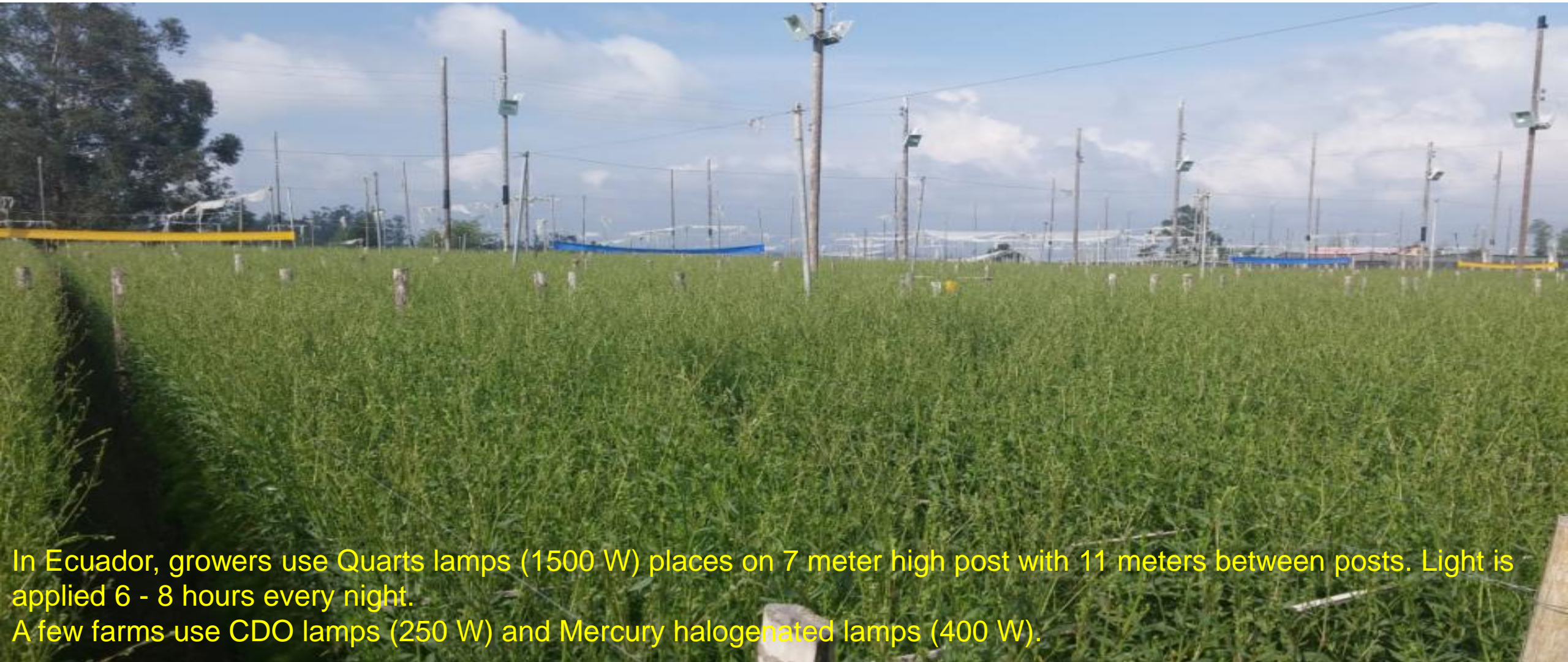


100 W bulbs, With
reflector

The Lighting System

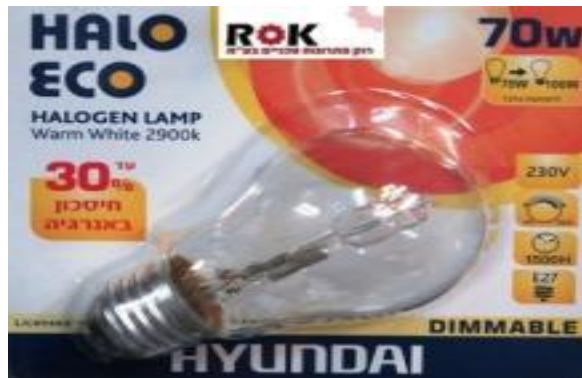


Lighting system



In Ecuador, growers use Quarts lamps (1500 W) places on 7 meter high post with 11 meters between posts. Light is applied 6 - 8 hours every night.
A few farms use CDO lamps (250 W) and Mercury halogenated lamps (400 W).

1. In Israel, it was found that 7W LED lamps with a spectrum including red and far red light were effective on Gyps
2. The Ministry of Agriculture recommends 70W Halogen bulbs



Halogen 70W bulb



Outdoor Lighting System



Low Pinch, for heavier stems
(though less yield will be achieved)



High pinching, for higher production



Before



After

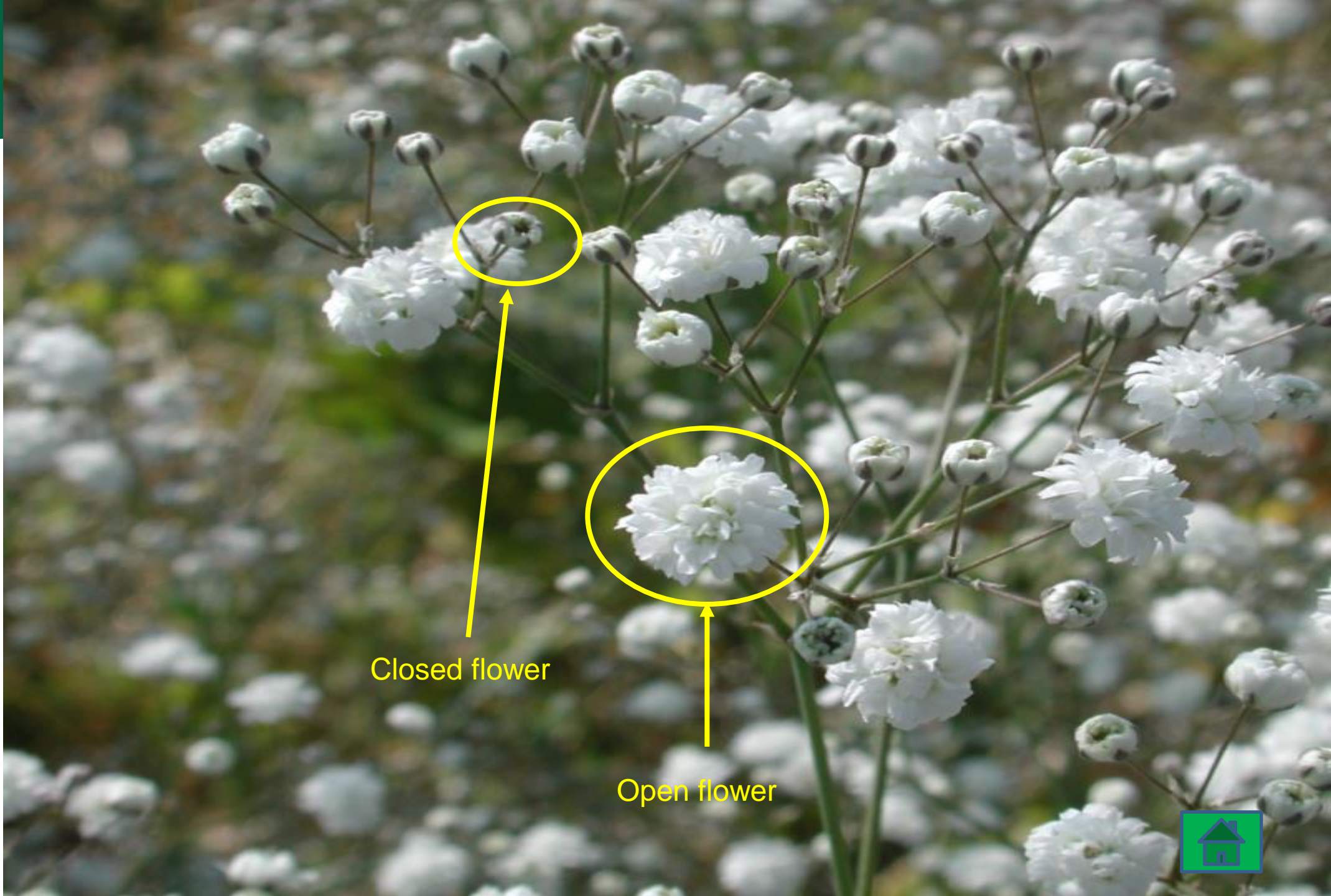


Outdoor Lighting System



Gypsophila left to open in the field

Close-up:
Opening
Of the
Flowers



Closed flower

Open flower





Browning of flowers



Post Harvest - Cleaning the buckets



Opening Stage for harvest





Sorted and cleaned bunch



Using colors to follow STS absorption



The buckets

**Aeration
holes**

**Reducing
solution
volume**



‘Long Life’

- **Long Life** is a ‘Cut flower food’ produced by **Gadot Agro** of Israel (see [Link](#))
- This product is designed to improve the quality and extend vase life of cut flowers and contains bacterial growth inhibitors and sugar
- Alternative products would be **Chrysal Clear** by **Chrysal international** of Holland ([Link](#)), or **Floralife Crystal Clear** by **Floralife** of the USA ([Link](#))





Opening in greenhouse in Ecuador



Opening space in Greenhouse in Ethiopia

Efficient use of space



TOG₃

- **TOG₃** is a cut flower pre treatment chemical produced by **Gadot Agro** of Israel (see [Link](#))
- This product is designed to enhance the uptake of water, assist in bud opening and prevent fungal and bacterial growth
- Alternative products would be **Chrysal OVB** by **Chrysal international** of Holland ([Link](#)), or **HydraFlor® 100** by **Floralife** of the USA ([Link](#))





Opening space in Israel





End Product in Ecuador



End Product in Israel





Leafminer - laying of eggs



Leafminer - Tunnels



Chemical control

Commercial name & application	Concentration	Generic name
		Spray
Evisect®-s	50%	THIOCYCLAM HYDROGEN OXALATE
Vydate®	100g/liter	OXAMYL (exterminates Liriomyza huidobrensis only)
Trigard®	75%	CYROMAZINE (Weekly drenching spray against adult flies)
Karate E.C	50g/liter	LAMBDA CYHALOTHRIN*
	18g/liter	ABAMECTIN
TRACER ULTRA S.C	129g/liter	SPINOSAD



Biological control



**Using vacuum-cleaner against
Leafminer**





**Diglyphus can get out.
Leafminer cannot**

Using fan and “sticking sheet”





Thank you
:)

Imagine more

