MURAKAMI SEED Culture Guideline CUTFLOWERS

✿ MURAKAMI SEED

CONTENTS

Blue Lace Flower (Trachymane didiscus) 1
Brassica (Flowering Kale) 3
Bupleurum 5
Celosia argentea 7
Delphinium chinensis
Delphinium consolida11
Dianthus 13
Echinops ritro
Eustoma (Lisianthus) 17
Lilium 19
Monarda punctata 22
Snapdragon (Antirrhium) 24
Stock (Matthiola) Standard 26
Stock (Matthiola) Spray 28
Solanum nigrum

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All information given is intended for general guideline only and will have to be adjusted to meet individual needs. Cultural details are based on the research station in Japan and Murami Seed shall not take responsibilities along with crop damage or loss related to the information shown herein. Application of recommended growth regulators and chemicals must be used under appropriate regulations under the governmental or municipal rule. Always follow manufacturer's label instructions. A small-scale testing is recommended prior to using them for entire crop.

Blue Lace Flower Trachymene coerulea Blue Murex/Sandpiper

Young Plant Operation

Stage 1(sowing stage) - 10 to 14 days (depending on moisture and temperature)

Temperature: 18 - 21 °C

Sowing and Soil: Single sowing recommended. Use a well drained and disease-free medium. pH and EC: 6.0 to 6.8 and 0.75 mmhos

Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate.

Cover seeds with the same soil/material used for seed bed.

Stage 2/3 - approximately 2 weeks <cotyledon emergence>

Temperature: 15 - 20 °C

Light: 1,000 - 1,500 f.c. (11,000 - 17,000 lux)

Fertilizer: 50 - 100 ppm (N)

Soil Moisture: Wet slightly to dry (repeat a wet slightly and dry cycle)

Stage 4 - approximately 2 to 3 week <True-leaf development>

Temperature: 15 - 22 °C

Light: 2,500 - 3,000 f.c. (27,000 - 33,000 lux)

Fertilizer: 100 - 150 ppm (N)

Soil Moisture: Wet slightly to dry (repeat a wet slightly and dry cycle)

- 288 to 406-cell trays are available. Recommend such a large size as 288-cell tray. Carefully handle the roots (in soil) while transplanting, as they are friable.
- Blue Lace Flower is a taproot crop and does not like being transplaned, so growers must minimize the time to transplant.
- Miantain a soil pH of less than 6.8. When soil pH turns to 7.0 or above, it must be controlled in the proper range by adding dilution of calcium hydroxide (follow usage and cnocnetration of the instruction label) to the soil.
- Do NOT apply ammonium-form fertilizers particularly in early stage.

Soil

Prepare a well drained and disease free medium. A moderate or adequate initial-nutrient suggested with pH range 6.0 to 6.8. Careful not to allow plugs to dry out immidiately after transplant.

Density

Plants at space of 20 to 30 cm.

Plant Net

Plant net works well. Stems on Blue Lace Flower are generally thin, so the plant net protects its breakdown from strong wind.

Fertilizer

After rooted, apply 100 to 150 ppm once a week. Maintain EC less than 1.2 mmhos/cm and pH between 5.8 and 6.8.

Temperatures

Day temperature: 18 - 22 °C Night temperature: 10 - 19 °C Shades need during summer season.

Light Level/Photoperiod

Can be up to 5,000 f.c. (54,000 lux) as far as tepmerature is maintained in the proper range. When the plants are gown under short-day conditions, day length extension to 16 to 18 hours are helpful.

Common Disease and Insects

Protections with fungicide and pesticide required. Particularly aphids must be carefully eliminated in advance, as they like young flowering buds.

NOTE:

• Operation in greenhouse is desirable, because the plants will be stressed under the environment of extreme warm or cold and may be damaged by strong wind.

Brassica(Flowering Kale) Brassica oleracea Cutflower Series and varieties

Young Plant Operation

Stage 1(sowing stage) - Approximately 3 to 4 days

Temperature: 20 - 23 °C

Sowing and Soil: Single sowing recommended and use a well drained and disease free medium.

pH and EC: pH 5.5 - 6.2, EC 0.75 mmhos/cm

Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate.

Light: No needed for germination stage - cover seeds lightly

Stage 2 - 1 to 2 weeks <cotyledon emergence>

Temperature: Day = 15 - 21 °C Night = 13 - 15 °C

Light: Up to 2,500 f.c. (27,000 lux) as far as temperature is in proper range

Fertilizer: 100 ppm (N)

Soil Moisture: Slightly dry

Stage 3 - Approximately 2 weeks <True-leaf development>

Temperature: Day = 15 - 21 °C Night = 13 - 15 °C

Light: Up to 2,500 f.c. (27,000 lux) as far as temperature is in proper range

Fertilizer: 100 - 150 ppm (N)

Soil Moisture: Slightly dry

Stage 4 - 7 to 10 days <Hardening stage>

Temperature: Day = 15 - 21 °C Night = 10 - 13 °C Light: Up to 5,000 f.c. (54,000 lux) as far as temperature is in proper range

Fertilizer: 100 - 150 ppm (N)

Soil Moisture: Normal to slightly dry

- 288 to 405 size tray recommended.
- Miantain a soil pH of 5.8 to 6.2 and EC in lower than 1.2 the overall period for young plant production.
- Avoid temperatures below 10 °C and above 24 °C in young plant production time; especially earlier stages.
- Apply a nitrate form fertilizer with low phosphorus do not use ammonium form.

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with pH range 5.8 to 6.5. Young plants do not like dry stress especially in start-up time. Careful not to allow plugs to dry out immidiately after transplant.

Planting Density

Recommended to plant 10 x 10 cm. apart to clean lower leaves and promote stems thinner. Carefully do not damage the roots at transplanting. A humid deficit (G/M3) must be within moderate range as actual temperature.

Irrigation

Recommend overhead irrigation after transplant, then switch to basal supply 2 to 3 weeks later. Keep the media moist. Allow the media to dry slightly between watering strokes.

Fertilizer

After rooted, apply 150 ppm of nitrate form fertilizer with low phosphorus every other irrigation. Maintain EC at about 1.0 to 1.5 mS/cm (1:2 extraction) and pH at 5.8 to 6.5. Continue fertilizing until harvest. Avoid excessive moisture and fertilization and maintain less(50 to 100 ppm(N)/ EC 0.75 mmhos/cm) several days before lowering the temperature(refer to "Temperature" below). NOTE: Too much moisture and fertilizer promotes delaying leaves coloring and leads to out of the balance in top and bottom.

Light Level

Plants must be grown under 3,000 - 5,000 f.c. (33,000 - 54,000 lux).

Temperatures

Day temperature: 15 - 22 °C

Night temperature: 10 - 15 °C

Control temperature in proper range until the desired height, then keep night temperature below 13 °C to tone up color on the leaves. The color becomes more intense under the temperature comes below 9 °C.

Supporting Net

Support nets will be helpful - enough with one layer.

Pinch

No pinching needed.

Common Disease and Insects

Protections with fungicide and pesticide; particularly Aphids, Thrips, Caterpillars, Downy Mildew, Botrytis, are required. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Bupleurum Bupleurum rotundifolium Green Fairy Lights

Young Plant Operation 5 to 7 weeks (whole of process) **Preparation before sowing** Cool treatment required at 10° C for 7 to 10 days before sowing Early stage – until cotyledon emergence (2 to 3 weeks) Temperature: 14 - 16 °C Recommend multi-seed sowing Soil: Use a well drained and disease-free medium. Cover the seed lightly. pH and EC: pH 5.8 to 6.2, EC 0.7 to 1.0 mmho/cm Humidity and Soil Moisture: RH 99%+ Light: No needed Later stage - until transplant (3 to 4 weeks) Temperature: 15 - 18 °C Light: Take care of leaf burns with top shades, if sunlight is strong. Fertilizer: 50 - 100 ppm (N) Soil Moisture: Normal

- Tray size recommended 288 or larger to avoid root-bound.
- As option to expose young plants outdoor and harden them off unless raining often expected.
- Thin as necessary once true leaves appear.
- Do not sow deep in soil but just cover seed not for drying.
- Cool treatment needs to get best results and avoid rosetting.

Soil

Prepare a well drained and disease-free medium. A moderate initial nutrient suggested with pH range of 6.0 to 6.5. Young plants do not like dry stress especially in start-up timing. Be careful not to dry out after transplant.

Transplant and Space to Plant

Bupleurum is a typical crop with taproot, so tranplant must be in young stage. Carefully transplant not damage the roots. Transplants must be done before root bound. Recommend 20 to 25 cm space.

Fertilizer

Bupleurum does not need fertilizer so much. Apply 100 - 150 ppm of common fertilizer (low phosphorus) in low frequency when fertilizer looks short seeing leaf color. Maintain soil pH of 6.0 and EC between 1.0 and 1.5 (mS/cm).

Light Level

Grow under 3,500 f.c. (38,000 lux) or higher. When grown in warm summer, shading will need depending on environmental conditions. Caution leaf condition not to avoid leaf-burns, as botrytis can happen from them.

Supplemental Lighting

Supplemental lighting works for longer stem and to help cutflower value higher. Start night interruption for four hours (10PM to 2AM) two weeks after transplant.

Temperatures

Day temperature: 18 - 23 °C (Bupleurum does not like high temperature – must be controlled below 25 °C) Night temperature: 15 - 18 °C (heating needs under 8 °C)

Common Disease and Insects

Spider mites, Aphids, Botrytis

Crop Schedule

In northern hemisphere climate, cutflower will be harvested December to February in scheduling to sow August to October.

Celosia Celosia argentea Brick Arch

Young Plant Operation Stage 1(sowing stage) - 3 to 5 days Temperature: 22 - 25 °C (Soil temperature must be above 22 °C) Sowing and Soil: Multiple sowing(5 or more) recommended and use a well drained and disease free medium. Cover the seed lightly. pH and EC: pH 5.8 to 6.2, EC 0.7 to 1.0 mmho/cm Humidity and Soil Moisture: RH 99%+, Uniformly moist but not saturated Light: No needed Stage 2 - until cotyledon emergence Temperature: 20 - 22 °C Light: 2,500 f.c. (approx. 27,000 lux) Fertilizer: 50 - 100 ppm (N) Soil Moisture: Normal Stage 3 - until true-leaf development Temperature: 20 - 22 °C Light: 2,500 f.c. (approx. 27,000 lux) Fertilizer: 100 - 175 ppm (N). Maintain soil pH of 5.8 and EC between 1.0 and 1.5 (mS/cm) Soil Moisture: Slightly dry Stage 4 - hardening stage Temperature: 20 - 22 °C Light: 5,000 f.c. (approx. 54,000 lux) Fertilizer: Same as stage 3 Soil Moisture: Same as stage 3

- Plants will stretch under the dark condition
- Celosia plants do not like wet condition. Soil must be slightly deyer late of stage 2 up to stage 4
- Tray size recommended 288 to 406 cells
- Do not use ammonium-form fertilizers

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with pH range 5.5 to 6.0. Young plants do not like dry stress especially in start-up time. Be careful not to be allow them to dry out after transplant.

Timing to Transplant

Carefully transplant not damage the roots. Transplants must be done before root bound.

Fertilizer

Apply 150 - 250 ppm once a week using mainly a nitrate-form with low phosphorus(P) and high potassium(K). Maintain soil pH of 5.8 and EC between 1.5 and 2.0 (mS/cm).

Light Level

Grow under 3,500 f.c. (38,000 lux) or higher. When grown in warm summer shading will need depending on locational conditions. Plants may have flowering buds before plants are matured under low light, then supplemental light works effectively.

Temperatures

Day temperature: 23 °C or above Night temperature: 19 - 21 °C

Common Disease and Insects

Susceptible to Phytophthora, Rhizoctonia, Botrytis, Pythium. particularly in wet and cool conditions. Take off dead leaves or flowers, then keep the soil slightly dry and clean on the bench

Delphinium Delphinium chinensis

Energy Series, Fashion Series and Totty Tall Sky

Young Plant Operation Stage 1(sowing stage) - Approximately 10 days Temperature: 19 - 22 °C Sowing and Soil: Single sowing recommended and use a well drained and disease free medium. pH and EC: pH 5.8 - 6.3, EC 0.75 mmhos/cm Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate. Light: No needed for germination stage - cover seeds Stage 2 - Approximately 2 weeks <cotyledon emergence> Temperature: 18 - 20 °C Light: 2,000 - 2,500 f.c. (22,000 - 27,000 lux) Fertilizer: 100 ppm (N) Soil Moisture: Normal - do not saturate young plants Stage 3 - Approximately 2 weeks <True-leaf development> Temperature: 18 - 20 °C Light: 2,000 - 2,500 f.c. (22,000 - 27,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Slightly dry Stage 4 - 1 to 2 weeks <Hardening stage> Temperature: 15 - 18 °C Light: 4,000 - 5,000 f.c. (43,000 - 27,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Slightly dry

- 200 to 288-cell trays are available but recommend 200 or similar size.
- Maintain pH of lower than 6.5 and EC between 0.7 and 1.2 from stage 2 thru 4..
- Do not use ammonium-form fertilizers

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with pH range 5.8 to 6.5. Young plants do not like dry stress especially in start-up time. Careful not to allow plugs to dry out immidiately after transplant.

Planting Density

40 to 64 plants per sq. meters. – keep spacing 12 to 15 cm. Carefully do not damage the roots at transplanting.

Fertilizer

After rooted, apply 100 - 200 ppm of low ammonium fertilizer every other irrigation. Maintain the soil pH at 5.8 to 6.5 and EC lower than 1.0 mS/cm. Do not allow nutrient shortage to young plants, as it can seriously affect behavior of growth and then bud initiation.

Irrigation

Water plants consistently. Do not direct overhead watering as susceptible to aerial disease.

Light Level

In greenhouse operation, supplemental light works well for delphinium. When shorter than 12 hours (later than mid September around 35 °N of northernhemispare), 4 hours of light extension(starting from 4:30 PM) will be effective to promote flowering earlier with uniformity. This is just an example, so grower must research the timing on the location.

Temperatures

Day temperature: 17 - 20 °C(autumn transplant) Night temperature: 12 - 15 °C(autumn transplant)

Supporting Net

Support nets help the growing operation. Grower can choose single or multi-layer depending on traits of varieties.

Common Disease and Insects

Protections with fungicide and pesticide required. Disease issues on the whole happens along with stresses in growing management or surroundings, so keeping appropriate growing conditions leads to diminishing chance to be infected. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Delphinium Delphinium consolida Folk Art Series

Young Plant Operation [Stage 1(sowing stage)] - Approximately 7 to 10 days Temperature: 18 - 20 °C Sowing and Soil: Single sowing recommended and use a well drained and disease-free medium. pH and EC: pH 5.8 - 6.3, EC 0.75 mmhos/cm Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate. Light: No needed for germination stage - cover seeds [Stage 2] - Approximately 2 weeks <cotyledon emergence> Temperature: 18 - 20 °C Light: 2,000 - 2,500 f.c. (22,000 - 27,000 lux) Fertilizer: 100 ppm (N) Soil Moisture: Normal - do not saturate young plants [Stage 3] - Approximately 2 weeks <True-leaf development> Temperature: 18 - 20 °C Light: 2,000 - 2,500 f.c. (22,000 - 27,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Slightly dry [Stage 4] - 1 week <Hardening stage> Temperature: 16 - 19 °C Light: 4,000 - 5,000 f.c. (43,000 - 27,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Slightly dry

- Recommend 288-cell or larger sized tray.
- Maintain pH of lower than 6.5 and EC between 0.7 and 1.2 from stage 2 thru 4..
- Do not use ammonium-form fertilizers

Soil

Prepare a well drained and disease-free medium. A moderate initial nutrient suggested with pH range 5.8 to 6.5. Young plants do not like dry stress especially in start-up time. Careful not to allow plugs to dry out immidiately after transplant.

Planting Density

keep spacing 15 x 15 or 20 x 20 cm (6 x 6 or 8 x 8 in.) – approximately 25 to 40 plants per sq. meters. Carefully do not damage the roots at transplanting.

Fertilizer

After rooted, apply 100 - 200 ppm of low ammonium fertilizer every other irrigation. Maintain the soil pH at 5.8 to 6.5 and EC lower than 1.0 mS/cm. Do not allow nutrient shortage to young plants, as it can seriously affect behavior of growth and then bud initiation.

Irrigation

Water plants consistently. Do not direct overhead watering as susceptible to aerial disease.

Light Level

In greenhouse operation, supplemental light works well for delphinium. When shorter than 12 hours (later than mid September around 35 °N of northernhemispare), 4 hours of light extension(starting from 4:30 PM) will be effective to promote flowering earlier with uniformity. This is just an example, so grower must research the timing on the location.

Temperatures

Day temperature: 18 - 24 °C Night temperature: 12 - 18 °C

Supporting Net

Support nets help the growing operation. Grower can choose single or multi-layer depending on traits of varieties.

Common Disease and Insects

Protections with fungicide and pesticide required. Disease issues on the whole happens along with stresses in growing management or surroundings, so keeping appropriate growing conditions leads to diminishing chance to be infected. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Cropping Schedule

It takes for 13 to 15 weeks from transplant until the first harvest in greenhouse production.

Dianthus Dianthus japonicus Summer Lavender

Young Plant Operation

Stage 1(germination stage) - 5 to 7 days

Temperature: 18 - 20 °C

Sowing and Soil: Single sowing recommended and use a well drained and disease free medium. pH and EC: pH 5.8 - 6.2, EC: below 1.0 mmhos/cm

Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate.

Light: No needed but benefitical for uniformity - cover seeds lightly to keep moisture

Stage 2 - approximately 2 weeks <cotyledon emergence>

Temperature: 18 °C

Light: Up to 2,500 f.c. (27,000 lux)

Fertilizer: 50 ppm (N)

Soil Moisture: Normal to slightly wet

Stage 3 - approximately 2 weeks <True-leaf development>

Temperature: 14 - 16 °C

Light: Up to 2,500 f.c. (27,000 lux)

Fertilizer: 50 - 100 ppm (N)

Soil Moisture: Normal to slightly wet

Stage 4 - 1 to 2 weeks <Hardening stage>

Temperature: 14 - 16 °C

Light: Up to 5,000 f.c. (54,000 lux)

Fertilizer: 100 - 150 ppm (N)

Soil Moisture: Normal to slightly wet

- 288 to 406-cell tray recommended.
- It is a typical cropping schedule to sow October to December, and transplant November to January. On this schedule, harvest time is planned late July to early August.
- As another schedule, it is possible to plan sowing in January and transplanting/pinching in February, then growing the plants under natural environment.
- Avoid high temperature during the young plant production and just after transplant stage, as it can induce rosetting, which will cause stunting after transplanted.

Soil

Prepare a well drained and disease-free medium. A moderate initial nutrient suggested with pH range 5.8 to 6.5. Careful not to allow seedlongs to dry out immidiately after transplant.

Transplant and Schedule

It is important to decide the appropriate cropping schedule. Best plan to recommend will be sowing in October to December and transplanting November to January in weather of northern hemisphere. This schedule has benefit of that plants have less stress with high temperature and then naturally grow under proper low temperature condition. The plants grow up well in appropriate temperature spring to early summer and initiate flowering buds under long day condition after late May

Planting Density

Recommend to transplant 15 x 15cm apart. With pinching, over 150 stems per sq. meter are expected to harvest at max when grown in the optimum conditions.

Irrigation

Plants must be adequately watered until rooted. Maintain moderate soil moisture after rooted. Do not too wet or too dry.

Fertilizer

After rooted confirmed, apply 150 to 200 ppm once a week. Maintain EC less than 1.2 mS/cm and pH between 5.8 and 6.5. Plants do not need fertilizer during winter season, so the application must be kept to a minimum. And, the plants desire fertilizer in spring with the cool season gone. Then carefully apply fertilizer enough, as nutrient deficiency may allow the plant height to be shorter.

Light Level

Keep light levels as high as possible while mainining appropriate temperatures.

Photoperiod

Smmer Lavender requires a 15-hour or longer daylength to flower in more uniform. Extension with supplemental light needs according to environmental conditions, so day-length is the restricting factor for bud initiation. But even if longer extension set it does not effectively work earlier to initiate buds.

Temperatures

Day temperature: 18 - 22 °C Night temperature: 12 - 18 °C Shades works effectively when sunlight is too strong during summer season.

Pinching

Summer Lavender can flower without pinch but produces more branching and numbers of stem per bed by pinching. Keep more potential stems with buds and then pinch another stem at every second node.

Supporting Net

Supporting nets will be helpful to manage harvesting. Two rows are better as 100 to 120 cm is expected in height.

Common Disease and Insects

Protections with fungicide and pesticide - particularly protection needs against Thrips, Aphids, Mites. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Echinops ritro

Young Plant Operation Stage 1(sowing stage) - Approximately 5 days Temperature: 19 - 21 °C Sowing and Soil: Single sowing recommended and use a well drained and disease free medium. pH and EC: EC 0.75 mmhos/cm Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate. Do not cover seeds Stage 2 - approximately 1 week <cotyledon emergence> Temperature: 15 - 18 °C Light: 1,000 - 2,500 f.c. (11,000 - 27,000 lux) Fertilizer: 50 - 100 ppm (N) Soil Moisture: Slightly wet (repeat a wet and dry cycle) Stage 3 - approximately 1 week <True-leaf development> Temperature: 15 - 18 °C Light: 1,000 - 2,500 f.c. (11,000 - 27,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Slightly wet (repeat a wet and dry cycle) Stage 4 - approximately 1 week <Hardening stage> Temperature: 14 - 18 °C Light: 2,500 - 5,000 f.c. (27,000 - 54,000 lux) Fertilizer: 100 - 150 ppm (N) - When slow to grow apply more frequently Soil Moisture: Normal

- 288 to 512-cell trays are available recommend 405 or similar size.
- Miantain a soil pH of 6.2 to 6.8. Higher pH(6.0 or more) can induce iron and boron deficiency, so care fully and periodically check soil conditions.
- High EC ratio, excessive moisture or root-bound, accumulates stress on plants, and it results in physical issues like abortion.
- Do not use ammonium-form fertilizers

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with pH range 6.2 to 6.5. Young plants do not like dry stress especially in start-up time. Careful not to allow plugs to dry out immidiately after transplant.

Planting Density

Keep space 35 to 40 cms each, as side stems grow up very wildely.

Fertilizer

After rooted, apply 150 - 200 ppm of low ammonium fertilizer every other irrigation. If low phosphorus and calcium in the soil(test needed) then they would be added before planting. Carefully control low fertilizer and irrigation to avoid excessive side shoots. Maintain the soil pH at 5.8 to 6.2 and EC at 1.5 to 2.0 mS/cm.

Temperatures

Day/Night temperature: 13 - 16 °C Recommend soil temperature at 20 °C more or less to get better uniformity

Light Level

Higher is better as far as tepmerature is maintained in the proper range.

Supporting Net

Not required.

Common Disease and Insects

Protections with fungicide and pesticide required. Disease issues on the whole happens along with stresses in growing management or surroundings, so keeping appropriate growing conditions leads to diminishing chance to be infected. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Eustoma(Lisianthus) *Eustoma grandiflorum* F1 Double Flowering Series and Varieties

Young Plant Operation

Stage 1(sowing stage) - Approximately 2 weeks Temperature: 20 - 22 °C (lower than 24 °C) Sowing and Soil: Single pellet sowing recommended and use a well drained and disease free medium. pH and EC: pH 6.5 - 6.0, EC 0.7 mmhos/cm Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate. Light: No seed cover - germination requires light of 100 - 300 f.c. (1,000 - 3,000 lux) Stage 2 - 1 to 2 weeks <cotyledon emergence> Once cotyledon emerges, seedlings must be moved to a location in appropriate air-circulation. Temperature: 20 - 22 °C Light: 1,000 - 2,500 f.c. (10,000 - 27,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Slightly wet - do not saturate young plants Stage 3 - 4 to 5 weeks <True-leaf development> Temperature: 15 - 20 °C Light: 1,000 - 2,500 f.c. (10,000 - 27,000 lux) Fertilizer: 150 ppm (N) Soil Moisture: Slightly wet - do not saturate young plants Stage 4 - Approximately 1 week <Hardening stage> Temperature: 15 - 18 °C Light: 2,500 - 5,000 f.c. (27,000 - 54,000 lux) Fertilizer: 200 ppm (N)

Soil Moisture: Normal – keep drier than former stages

- 406-cell tray or similar size recommended.
- Maintain soil pH between 6.5 and 7.0 and EC at lower than 0.7 mmhos/cm.
- Adequate moisture needed to dissolve pelleted material in germination stage.
- Relative humidity must be reduced down to 70% in stage 2 and then maintained in the following stages.
- Do not allow high night temperature, exceeding 22°C (72°F), in the stage 2 to avoid induction of resetting.
- Eustoma young plants must be produced under optimal light levels. Low light conditions with high humid raise up chance for disease infection.
- Do not use ammonium-form fertilizers.
- Transplant needs to be done without delay at timing of 6 to 8 true leaves. Any plants with rootbound can not recover to normal growth.

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with pH range 6.5 to 7.2. Careful not to allow plugs to dry out immidiately after transplant.

Planting Density

64 to 72 plants per sq. meters. - keep 12 to 15 cm. apart. Carefully do not damage the roots at transplanting. Plants must be within a moderate humid deficit(G/M3) range in the facility operation.

Fertilizer

Apply every other irrigation with calcium nitrate-based fertilizer at 100-200 ppm. Maintain EC between 1.0 and 1.5 mmhos/cm. Quit fertilizer applications as buds become visible. Note: high salt levels will delay flowering and can induce to rosetting.

Irrigation

Begin with overhead irrigation, then switch to drip irrigation 2 to 3 weeks gone after transplanted. Keep the media moist but not too wet; allow drying slightly between strokes of watering. Eustoma grows slowly at first, so requires little water. Do not allow the soil to completelydry when plants are in flower.

Light Level

4,000 - 6,000 fc (40,000 - 60,000 lux) is optimal. Higher light promotes high bud count and good flower development. During winter operation, when daylength is shorter than 12 hrs. supplemental light can availably work.

Temperatures

Day temperature: 20 - 24 °C Night temperature: 16 - 18 °C Cooler temperature in growing will enhance stem length and caliper but require longer production time, while higher temparture during the first four weeks after transplant can induce rosetting.

Supporting Net

Support wires of one or two layers 10 x 15 cm. are recommended.

Common Disease and Insects

Protections with fungicide and pesticide; Carefully sprayed - aphids, thrips, leaf miners, whitefly, and then Botrytis, Fusarium, Rhizoctonia, Tospo Viruses required. Disease issues on the whole happens along with stresses in growing management or surroundings, so keeping appropriate growing conditions leads to diminishing chance to be infected. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Post Harvest

After harvested, place cutflowers in fresh water . Using the preservative is recommended. Do not ship flowers until their field heat removed.

- In summer production plants should be appropriately shaded.
- General habit for each variety can be referred to page 15 16, or see the international catalog about the details.

Lilium Lilium formolongo

1. Scheduling

1) Northern Hemisphere – Sow mid December to late January, and expect to flower in summer depending on variety.

2) Southern Hemisphere – Sow June to late July, and expect to flower in summer depending on variety.

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2. Recommended Preparation in Advance

Trimming:	Recommend "deburring" on seed edge as referring right. \bigcirc	
	Remove the serrated edge with small scissors or fine sadpaper.	
Seed Cooling:	Immerse seed in a cold water (10 °C) for 15 days in advance of actually sowing.	

3. Young Plant Production

Tray Size:	200-cell or 288-cell tray works good.			
Media:	Use a drained, disease free media, with a pH 5.5 to 5.8 and a medium initial			
	nutrient charge (EC 0.7 to 1.0).	Тор		
Cover:	Lightly with vermiculite (refer right).	Good	Not Good	
	Seed must no be placed deeply.	In Soil		
Temperature:	Keep the range of 15 to 20 °C (soil temperature) for optimum germination.			
Fertilizer:	Not needed in early stage, but it is effective to apply a well-balanced fertilizer in low rate after cotyledons emerge .			

Soil Moisture: Keep as high as possible, as the seed lilium varieties do not like dry in young plant stage.

	Germination Stage	Germination to Transplant
Duration	3 to 5 days	10 to 13 weeks (depending on environmental condition)
Temperature	Keep 15 to 20°C	Day - 18 to 21°C Night - 15 to 19°C (Plants do not like extreme up/down)
Cover/Light	Lightly with vermiculite	Place the young plant tray under natural light. When sunlight is strong, shades will help.
Moisture/ Watering	Wet media (like medium wet) preferred	Initially keep wet and gradually reduce moisture level in soil. With expansion of root system, keep the soil condition slightly dry.
Fertilizer	Not needed	Apply a fertilizer in proportion of 30-40-30 (%) - initially start at low rate (less than 100ppm) and increase up to 200ppm at max. As frequency, one or two times per week will be enough.

4. Tips in Young Plant Production

- Note covering seed is to protect dry but germination is not enhanced by light.
- Optimum timing to transplant is at 3 to 4 true leaves developed in 200-cell tray or 3 true leaves developed in 288-cell tray.
- Keep attention to the transplant timing with "No Delay, No Dry and No Injury". If failed, plants make bud initiation very early before plants grow enough.

- If the production schedule comes near warm season, as an option, it is effective to cool the seedlings at 10° C for 30 days before transplant. By cooling seedlings, the treatment allows plants to flowers earlier approximately 10 weeks but plant height may be shorter than grown in regular schedule.
- In event of sowing in summer, it is helpful to cool seed at 10° C for 15 days before sowing as well. The treatment enhances germination with more uniform.

5. Growing-On

1) Transplant

Water the soil of bed well before transplant. Optimum timing to transplant is at 3 to 4 true leaves developed in 200-cell tray or 3 true leaves developed in 288-cell tray. Plant density is recommended as plant 15 x 15 cm (or 20×20 cm) apart depending on stem caliper or branching form.

2) Soil Condition

Plant bed must be wet well before transplant but carefully controlled moisture level lower in soil under rainy or winter season. In that schedule, do not excess water, as it causes root rot or prevents root system from growing actively.

3) Irrigation

Water the soil enough before transplant and manage well in appropriate level. Carefully avoid plant drying to wilting. Water required enough for plant growth and bud initiation. Also, carefully monitor drainage in soil not for excessive pooling, especially in season of cold or much raining. Refer to the right figure.



4) Temperature and Photoperiod

Day temperature: 25 - 30 °C (Under the condition ventirated well)

Night temperature: 15 °C (Minimum)

* Night interruption is recommended from 10PM thru 2AM.

Bud initiation is induced in combination of average temperature of 17 °C and a long day-length (interruption between 10PM and 2AM). The more temperature and day-length it happens, the earlier plants flower.

	Minimum Temp	Supplement light
Transplant to 20 true leaves	15 °C	No
After 20 true leaves	20 °C	4-hour* night interruption for 25 days
Until flowering	15 °C	4-hour* night interruption until budding

5) Light Level

10,000 f.c. (108,000 lux) or more will be optimum. When sunburn occurs on leaves or flowers, simple shades may be helpful during the mid summer.

6) Light Level

Recommend the basic proportion as N : P : K = 15 : 20 : 15 to 30 : 40 : 30, plus some mineral elements are optionally needed. After rooted, apply in low level and gradually increase according to growth. Particularly nitrogen physically affects plant as below. The soil pH must be in range of 5.5 to 5.8.

Nitrogen Factor	Leaf	Plant Height	Plant quality
Deficiency	Smaller and pale	Short	Poor development
Normal	Well-balanced	Average or tall	Good/Best
Excess	Too large	Average or tall	Poor (weak/infective)

7) Common problems – insects and diseases

The following problems and methods to solve are reported.

Disease/Insect Name	Methods	
Botrytis	Quick removal/Better irrigation management/Cover with plastic	
Phytophthora	Quick removal/Better irrigation and ventilation management/Cover with plastic/Lowering temperature	
Colletotrichum (Anthrax)	Quick removal/Better irrigation management	
Damping-Off	Better irrigation and ventilation management/Review of greenhouse management	
Aphids*	Quickly remove the infected plants/Planned pesticide management/Cleaning hands and tools well	
Thrips	Better ventilation management/Lowering temperature	

* Aphids, as vector, carry the mosaic virus and it can be spreading the diseases over a lot of plants; therefore, grower will be required the planned fungicide management.



< Frequency of Fungicide/Pesticide >

Spring – every other week Summer – every week

Spray entirely, particularly towards the back of leaf blade enough, with low concentration.



Protection with plastic tunnel, like a figure left, is effective in early stage just after transplant and helps to prevents plants from insects, especially aphids, or rain, strong wind.

6. Tips in Growing-On

- Do not plant deeply. This crop hates planted deeply and it hinders plants from developing roots enough in early stage.
- Never dried once planted. Keep water level not so much as to be saturated.

Monarda Monarda punctata Bicolor Melba

Young Plant Operation

[Stage 1(sowing stage)] - Approximately 10 days Temperature: 18 - 20 °C Sowing and Soil: Single sowing recommended and use a well drained and disease-free medium. pH and EC: 5.5 to 5.8 and 0.75 mmhos Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate. Cover lightly. [Stage 2] - approximately 3 weeks Temperature: 18 - 20 °C Light: 1,000 - 1,500 f.c. (11,000 - 17,000 lux) Fertilizer: 50 - 100 ppm (N) Soil Moisture: Normal to dry (repeat a wet slightly and dry cycle) [Stage 3] - approximately 2 weeks Temperature: 16 - 19 °C Light: 2,500 - 3,000 f.c. (27,000 - 33,000 lux) Fertilizer: 100 - 150 ppm (N)

Soil Moisture: Slightly dry (repeat a wet and dry cycle)

- Monarda has a sensitive root system. Do NOT delay the timing to transplant. Root bound develops flowering in dwarf.
- 288 to 406-cell trays are available. Larger size is recommended to avoid root bound.
- Miantain a soil pH of 5.5 to 5.8. Higher pH and EC of EC: EC 0.75 mmhos/cm during stage 3 and 4.
- Do NOT apply ammonium-form fertilizers particularly in germination and early stage, as salvia farinacea is very sensitive to high salts. Carefully control fertilization even in latter stages. When applied too much rinsing appropriately needs to wash leaves and plants.

Soil

Prepare a well drained and disease-free medium. A moderate initial nutrient suggested with pH range 5.5 to 5.8. Young plants do not like dry stress especially in start-up time. Careful not to allow plugs to dry out immidiately after transplant.

Planting Density

keep spacing 12 x 12 or 15 x 15 cm – approximately 40 to 64 plants per sq. meters. Carefully do not damage the roots at transplanting.

Fertilizer

After rooted, apply 150 ppm of low ammonium fertilizer one time (two times depending on the growing speed). If plants look required more fertilizer, then keep 150 ppm and manage them well in more frequently applying. Maintain the soil pH at 5.8 to 6.2 and EC at 1.0 to 2.0 mmhos.

Temperatures

Day temperature: 16 - 19 °C Night temperature: 12 - 16 °C

Light Level/Photoperiod

Can be up to 5,000 f.c. (54,000 lux) as far as tepmerature is maintained in the proper range. Top shades will help to avoid leaf burns from late spring thru summer.

Common Disease and Insects

Recommend protections with proper fungicide and pesticide as required.

Cropping Schedule

It takes for 12 to 14 weeks from transplant until the first harvest in greenhouse production.

Snapdragon Antirrhinum majus Smile Series, Memorial Series

Young Plant Operation

Stage 1(sowing stage) - Approximately 5 days Temperature: 18 - 20 °C Sowing and Soil: Single sowing recommended and use a well drained and disease free medium. pH and EC: pH 5.5 - 5.8, EC 0.75 mmhos/cm Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate. Light: No needed for germination stage - cover seeds lightly Stage 2 - 1 to 2 weeks <cotyledon emergence> Temperature: 15 - 20 °C Light: 1,000 - 2,500 f.c. (11,000 - 27,000 lux) Fertilizer: 50 - 100 ppm (N) Soil Moisture: Slightly wet (repeat a wet and dry cycle) Stage 3 - 1 to 2 weeks <True-leaf development> Temperature: 15 - 20 °C Light: 1,000 - 2,500 f.c. (11,000 - 27,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Slightly wet (repeat a wet and dry cycle) Stage 4 - 1 to 2 weeks <Hardening stage> Temperature: 14 - 18 °C Light: 2,500 - 5,000 f.c. (27,000 - 54,000 lux) Fertilizer: 100 - 150 ppm (N) - When slow to grow apply more frequently

Soil Moisture: Normal

- 288 to 512-cell trays are available but recommend 405 or similar size.
- Miantain a soil pH of 5.5 to 6.0. Higher pH(6.0 or more) can induce iron and boron deficiency, so care fully and periodically check soil conditions.
- High EC ratio, excessive moisture or root-bound, accumulates stress on plants, and it results in physical issues like abortion.
- Do not use ammonium-form fertilizers

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with pH range 5.5 to 6.0. Young plants do not like dry stress especially in start-up time. Careful not to allow plugs to dry out immidiately after transplant.

Planting Density

64 to 96 plants per sq. meters. Carefully do not damage the roots at transplanting. Smile Series and Memorial Series are open to flower in low temperature and short daylength conditions. Growers must organize cropping schedule per the trait.

Fertilizer

After rooted, apply 150 - 200 ppm of low ammonium fertilizer every other irrigation. If low phosphorus and calcium in the soil(test needed) then they would be added before planting. Carefully control low fertilizer and irrigation to avoid excessive side shoots. Maintain the soil pH at 5.8 to 6.2 and EC at 1.5 to 2.0 mS/cm.

Light Level

Plants must be under 3,000 f.c. (33,000 lux) as optimum.

Temperatures

Day temperature: 13 - 22 °C Night temperature: 10 - 13 °C

Supporting Net

Support nets are necessary. Those mesh sizes like 10 x 10 (cm) or 15 x 15 (cm) are commonly used. Snapdragon plants grows up to 1 meter above in height, so recommend multi-layers of net depends on occasion.

Common Disease and Insects

Protections with fungicide and pesticide required. Disease issues on the whole happens along with stresses in growing management or surroundings, so keeping appropriate growing conditions leads to diminishing chance to be infected. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Stock/Matthiola Matthiola incaca Standard Type Series and Varieties

Young Plant Operation

Stage 1(sowing stage) - 3 to 4 days

Temperature: 20 - 22 °C

Sowing and Soil: Multiple sowing(3 to 4 seeds) recommended and use a well drained and disease free medium.

pH and EC: pH 5.5 - 6.5, EC 0.75 mmhos/cm

Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate.

Light: No needed for germination stage - cover seeds lightly

Stage 2 - cotyledon emergence

Temperature: 15 - 21 °C

Light: 2,500 f.c. (27,000 lux)

Fertilizer: 100 ppm (N)

Soil Moisture: Slightly wet

Stage 3 - True-leaf development

Temperature: 15 - 21 °C

Light: 2,500 f.c. (27,000 lux)

Fertilizer: 100 - 150 ppm (N)

Soil Moisture: Slightly wet

Stage 4 - 1 to 2 weeks <Hardening stage>

Temperature: 15 - 21 °C

Light: 5,400 f.c. (54,000 lux)

Fertilizer: 100 - 150 ppm (N)

Soil Moisture: Normal - must be drier and milder moist than earlier stages

<< Tips to Select Double-Flowering Plants >>

Generally recommend the two processes to select double-flowering plants in cotyledon stage. 1st Action - throw away relatively slower germination plants by 30%.

2nd Action - remove the plants suspected as single-flowering with the following signs in the 70% plants.

	Size	To Grow	Leaf Form	Color
Double	Larger	Faster	Oval-like	Light Green
Single	Smaller	Slower	Round	Dark Green

- 405-cell or larger sized trays are recommended.
- Miantain a soil pH in lower than 6.5 and EC between 0.7 1.2 mmhos/cm.
- Approximately scheduled 4 weeks for young plant production but it will be depending on environmental conditions.
- Do not use ammonium-form fertilizers



Typical comparison between single(L) and double(R)

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with pH range 5.8 to 6.5. Young plants do not like dry stress especially in start-up time. Careful not to allow plugs to dry out immidiately after transplant.

Planting Density

30 to 50 plants per sq. meters. Carefully do not damage the roots at transplanting.

Fertilizer

After rooted, apply 150 - 200 ppm of nitrate-form fertilizer with low phosphorus every other irrigation. If low phosphorus and calcium in the soil(test needed) then they would be added before planting. Carefully control low fertilizer and irrigation to avoid excessive side shoots. Maintain the soil pH at 5.8 to 6.5 and EC at 1.5 to 2.0 mS/cm.

Irrigation

Recommend overhead-irrigation after transplant, then switch to drip-irrigation 2 to 3 weeks later. Keep the soil moist. Allow the soil to dry slightly between watering strokes.

Light Level

No suplemental light needed but must be scheduled in the best daylight season when gorwn in greenhouse. Matthiola initiates buds and flowers under the condition of shoter than 12 hours in daylangth but longer hours will help quicker to harvest.

Temperatures

Day temperature: 15 - 22 °C Night temperature: 8 - 15 °C A humid deficit (G/M3) must be within moderate range in proportion as actual temperature.

Supporting Net

Support nets may be necessary. Size and layer will can be in view of bedding width, efficiency to pinch and other physical parameters.

Common Disease and Insects

Crown Rot, Botrytis, Downy Mildew, Thrips, Aphids... must be controlled in the first level attention. Protections with fungicide and pesticide required. Disease issues on the whole happens along with stresses in growing management or surroundings, so keeping appropriate growing conditions leads to diminishing chance to be infected. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Stock/Matthiola Matthiola incaca Chanter Series and Spray Antique Pink

Young Plant Operation Stage 1(sowing stage) - 3 to 4 days Temperature: 20 - 22 °C Sowing and Soil: Multiple sowing(3 to 4 seeds) recommended and use a well drained and disease-free medium. pH and EC: pH 5.5 - 6.2, EC 0.75 mmhos/cm Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate. Light: No needed for germination stage - cover seeds lightly Stage 2 - cotyledon emergence Temperature: 15 - 21 °C Light: 2,500 f.c. (27,000 lux) Fertilizer: 100 ppm (N) Soil Moisture: Slightly wet Stage 3 - True-leaf development Temperature: 15 - 21 °C Light: 2,500 f.c. (27,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Slightly wet Stage 4 - 1 to 2 weeks <Hardening stage> Temperature: 15 - 21 °C Light: 5,400 f.c. (54,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Normal - must be drier and milder moist than earlier stages

<< Tips to Select Double-Flowering Plants >>

Recommend the two phases to select double-flowering plants in cotyledon stage. 1st Action - throw away relatively slower germination plants by 30%.

2nd Action - remove the plants suspected as single-flowering with the following signs in the remaining 70% plants.

	Size	To Grow	Leaf Form	Color
Double	Larger	Faster	Oval-like	Light Green
Single	Smaller	Slower	Round	Dark Green



NOTE:

- 406-cell or larger sized trays are recommended.
- Miantain a soil pH in lower than 6.2 and EC between 0.7 1.2 mmhos/cm.
- Approximately scheduled 4 weeks for young plant production but it will be depending on environmental conditions.
- Do not use ammonium-form fertilizers

single(L) and double(R)

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with pH range 5.8 to 6.5. Young plants do not like dry stress especially in start-up time. Careful not to allow plugs to dry out immidiately after transplant.

Planting Density

30 to 50 plants per sq. meters. Carefully, do not damage the roots at transplanting.

Fertilizer

After rooted, apply 150 - 200 ppm of nitrate-form fertilizer with low phosphorus every other irrigation. If low phosphorus and calcium in the soil(test needed) then they would be added before planting. Carefully control low fertilizer and irrigation to avoid excessive side shoots. Maintain the soil pH at 5.8 to 6.5 and EC at 1.5 to 2.0 mS/cm.

Irrigation

Recommend overhead-irrigation after transplant, then switch to drip-irrigation 2 to 3 weeks later. Keep the soil moist. Allow the soil to dry slightly between watering strokes.

Light Level

No suplemental light needed but must be scheduled in the best daylight season when gorwn in greenhouse. Matthiola can initiate buds and flowers under the condition of shoter than 12 hours in daylangth but longer hours will help quicker to harvest.

Temperatures

Day temperature: 15 - 22 °C

Night temperature: 8 - 15 °C

A humid deficit (G/M3) must be within moderate range in proportion as actual temperature. Matthiola must be in cool temperature to trigger the initiation for buds.

Supporting Net

Support nets may be necessary. Size and layer will can be in view of bedding width, efficiency to pinch and other physical parameters.

Pinching

Pinch the top flower when starting to tone up it color, while a few buds are opening on basal stems. When pinching, one flower in the lowest must be remained to keep further yield.

Common Disease and Insects

Crown Rot, Botrytis, Downy Mildew, Thrips, Aphids... must be controlled in the first level attention. Protections with fungicide and pesticide required. Disease issues on the whole happens along with stresses in growing management or surroundings, so keeping appropriate growing conditions leads to diminishing chance to be infected. Each grower must check with best advisor to control diseases and insects with appropriate measures.

- In summer production plants should be appropriately shaded.
- General habit for each variety can be referred to page 15 16, or see the international catalog about the details.

Solanum solanum nigrum Colenas Black Drops

Young Plant Operation

[Stage 1(sowing stage)] - 5 to 7 days

Temperature: Higher than 18 °C pH and EC: 6.0 and 0.75 mmhos Humidity and Soil Moisture: RH 95%+. Adequately moist soil but do not saturate. Cover lightly with vermiculite. Solanum seed needs light for germination. Do not cover deep or too much. [Stage 2 – approximately] - 1 week <cotyledon emergence> Temperature: 15 - 20 °C Light: 1,000 - 1,500 f.c. (11,000 - 17,000 lux) Fertilizer: 50 - 100 ppm (N)

Soil Moisture: Wet slightly to dry (repeat a wet slightly and dry cycle)

[Stage 3 – approximately] - 1 week <true-leaf development>

Temperature: 15 - 22 °C Light: 2,500 - 3,000 f.c. (27,000 - 33,000 lux) Fertilizer: 100 - 150 ppm (N) Soil Moisture: Wet slightly to dry (repeat a wet slightly and dry cycle)

- 288-cell tray is recommended. Carefully handle the roots (in soil) in transplanting.
- Solanum is enhanced to germinate in a condition of increasing temperature gradually (for example; 20 the first and 23 degrees three days later ... like that)..
- Miantain a soil pH of less than 6.0 entirely in young plant stage.
- Do NOT apply ammonium-form fertilizers too much in early stage.

Soil

Plant a well drained and disease-free in soil. Prepare a moderate to adequate initial-nutrient with low pH. Keep pH of 6.0 until flowering stage, then switch up to 7.0 more or less for more fruits.

Planting Density

keep spacing 20 x 20 cm – approximately 25 to 30 plants per sq. meters. Carefully do not damage the roots at transplanting.

Plant Net

Plant net does not need. As for this crop tends to grow wide, pay more attention to plant dansity or space than upright forming.

Fertilizer

After rooted, apply 100 to 150 ppm once a week. Maintain EC less than 1.2 mmhos/cm and pH of below 6.0 until flowering.

Temperatures

Day temperature: 23 - 26 °C Night temperature: 16 - 20 °C

Light Level/Photoperiod

Can be up to 5,000 f.c. (54,000 lux) as far as temperature is maintained. If leaf burns are seen, top shades will help between 10AM and 2PM in summer. Day-length does not affect bud initiation.

Common Disease and Insects

Protections with fungicide and pesticide required. Particularly aphids must be carefully eliminated in advance, as they like young flowering buds.

NOTE:

• Operation in greenhouse is desirable, because the plants will be stressed under the environment of extreme warm or cold and may be damaged by strong wind.