

MURAKAMI SEED

Culture Guideline

<< POT AND BEDDING PLANTS >>

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All information given is intended for general guideline only and may have to be adjusted to meet individual needs. Cultural details are based on the research stations in Japan and Murakami Seed shall not take responsibilities along with crop damage or loss related to the information shown herein. Application of recommended growth regulators and chemicals are subject to appropriate regulations under the governmental or municipal rule. Always follow manufacturer's label instructions. Testing a few plants prior to treating the entire crop is best.

Culture Guideline

Brassica(Flowering Kale) *Brassica oleracea*

Dwarf Series and varieties for Pot/Bedding Plants

Young Plant Operation

Stage 1(sowing stage) - Approximately 5 days

Temperature: 20 - 22 °C

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

pH and EC: pH 5.7 - 6.2, EC 0.5 - 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: 13 - 18 °C (optimum 15 °C)

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

Fertilizer: 50 ppm (N)

Soil Moisture: Slightly dry

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

Temperature: 13 - 18 °C (optimum 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 4 - 7 to 10 days <Hardening stage>

Temperature: 13 - 15 °C

Light: Up to 3,000 f.c. (33,000 lux) as far as temperature is in proper range

Fertilizer: 100 ppm (N)

Soil Moisture: Normal to slightly dry

Young plants must be transplanted without delay before they are stretching.

<< Plant Growth Regulator >>

In stage 3 or 4, plant growth regulator effectively works to reduce stem elongation under high temperature. Occasionally apply B-Nine at 1,500-2,000 ppm or Bonzi at 2-3 ppm. Do not apply growth regulator if the plants are served for food consumption. *Brassica oleracea* sensitively responds to DIF. Recommend to prevent the stems from stretching with environmental conditions before taking the chemical measures.

NOTE:

- Recommend 288 to 406 size tray.
- Miantain a soil pH of 5.7 to 6.2 and EC in lower than 1.0 the overall period for young plant production.
- As soon as cotyledon emerges move the trays to a cool and bright location with good air flow.
- Apply a nitrate form fertilizer with low phosphorus - do not use ammonium form.

Growing Management

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with pH range 5.7 to 6.2. Young plants do not like dry stress especially in start-up time.

Container and Spacing

10 to 15 cm containers are the most fitting range. When planted in the garden, allow enough space (25 cm or more) between plants to grow in maximum and then reduce stretching.

Irrigation

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

Fertilizer

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 6.2. 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).

Light Level

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

Temperatures

Day temperature: 15 - 18 °C

Night temperature: 10 - 13 °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.

Plant Growth Regulator

Under high temperature(especially production in early autumn), plant growth regulator works to keep the plants compact. Spray Bonzi at 5 ppm one week after transplant and spray one week later if necessary. B-Nine may work also but Bonzi may be more effectively under warm condition.

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.

Culture Guideline

Cineraria *Pericallis x hybrida*

Resort Series

Young Plant Operation (plug production)

Stage 1(sowing stage). 4 to 5 days <until cotylecon emergence>

Germination Temperature: 21 - 24 °C

Sowing and Soil: Single sowing with 288-cell tray recommended and use a well drained and disease free medium

Cover: Do not cover. Light is necessary for germination

pH and EC: pH 5.5 - 6.0, EC 0.5 - 0.75 mmho/cm

Humidity and Soil Moisture: RH 100%

If in germination chamber, requires 50 – 100 f.c. (540 - 1,100 lux) at minimum

Soil Moisture: Wet

Stage 2. 7 to 10 days <cotyledon emergence to true-leaf development>

Temperature: Same as Stage 1

Light: 500 - 1,000 f.c. (5,400 - 11,000 lux)

Fertilizer: 50 - 75 ppm (N); low phosphorus fertilizer recommended

Soil Moisture: Down to Slightly dry

Stage 3. 21 to 28 days <More true-leaf development>

Temperature: 18 - 21 °C

Light: 1,000 - 1,500 f.c. (11,000 - 16,000 lux)

Fertilizer: 100 - 150 ppm (N)); low phosphorus fertilizer recommended. Keep pH at 5.5 - 5.8(carefully, high pH may cause leaf chlorosis)

Soil Moisture: Dry to Normal

Stage 4. approx. 7 days <Hardening stage>

Temperature: 16 - 17 °C (carefully, do not drop air temperature below 10 °C below, as initiation will be delayed)

Light: 1,000 - 1,500 f.c. (11,000 - 16,000 lux)

Fertilizer: 100 – 150 ppm (N); low phosphorus fertilizer recommended

Soil Moisture: Dry to Normal

<<< Total time for young plant operation: 6 to 7 weeks under Japanese climate >>>

NOTE:

- Plants will stretch under low light condition.
- Fertilizer frequencies will be at second or third irrigation in stage 2 and 3, then as needed in stage 4.
- Days for stage 2 and 3 are in 288-cell tray. If larger, it takes longer.
- If concerned about stretching in plug production stage B-9 is effective can be used once true leaves have expanded.
- Do not use ammonium nitrate fertilizers.
- Transplanting plugs must be on time. Never allow plants to become overgrow or root-bound.

Growing Management

Soil

Prepare a well drained and disease free medium. A moderate initial nutrient suggested with a range of pH 5.8 to 6.2 and EC 0.75 - 1.0 mmho/cm. Do not use coarse soil material as dry out too quickly.

Fertilizer

Apply 100 - 150 ppm with 20-10-20 and switch to 150 - 200 ppm with 15-0-15 when initiated. Do not use ammonium nitrate fertilizers.

Light Level

Grow under 3,000 - 3,500 f.c. (32,000 - 38,000 lux). Excessive light levels will result in leaf burn or wilting. Keeping the light levels is benefit to produce better color with contrast on the flower and prevent stems from stretching.

Temperatures

Temperature must be managed by growth stage of the plants

- | | | |
|--|----------------|------------------|
| - Early establishment stage <approximately 2 weeks>: | Day 18 - 20 °C | Night 16 - 17 °C |
| - Cool treatment stage <approximately 3 - 4 weeks>: | Day 10 - 14 °C | Night 7 - 13 °C |
| - Forcing stage <approximately 6 -10 weeks>: | Day 17 - 18 °C | Night 16 - 17 °C |

Cineraria is a cool season crop and tolerant down to 5 °C at lowest.

Plant Growth Regulator

Varieties with genetically well branched and compact habit are picked up, so PGR doesn't need as long as controlled in proper temperature and light level. If necessary, B-9 effectively works with spray at 2,500 ppm or lighter approximately 2 weeks after transplant. It is important to control the stem elongation in earlier stage.

Common Diseases and Insects

Diseases: Botrytis, Powdery Mildew, Pythium, Verticillium

Pests: Aphids, Thrips

Scheduling

Cineraria is a typical cool season crop sowing in summer to early fall (Jul - Sep) and flowering in winter to early spring (Dec - Mar). Appropriate temperature control each stage will be a Key factor to induce the flower initiation –

- 1) When is the best selling season/time?
- 2) Possible or not to control temperature in the sages mentioned above?
- 3) Is your facility or location available to achieve #2?
- 4) What you need in your facility, or what is the barrier to carry out production?

<<< Total time transplant to finishing: 11 to 16 weeks under Japanese climate >>>

Culture Guideline

Pansy *viola x wittrockiana* Waraku Series

Young Plant Operation

Stage 1(sowing stage) - 3 to 5 days

Temperature: 18 - 21 °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 mmho/cm

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

Light: No needed for germination stage

Stage 2 - 1 to 2 weeks <cotyledon emergence>

Temperature: Day = 18 - 21 °C Night = Lower than 18 °C (optimaly 16 °C)

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

Fertilizer: 100 - 150 ppm (N)

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

Stage 3 - 1 to 2 weeks <True-leaf development>

Temperature: Day = 18 - 21 °C Night = Lower than 18 °C (optimaly 16 °C)

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

Fertilizer: 100 - 150 ppm (N)

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

Stage 4 - 1 to 2 weeks <Hardening stage>

Temperature: Day = 16 - 20 °C Night = Lower than 18 °C (optimaly 14 °C)

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

Fertilizer: 100 - 150 ppm (N)

Soil Moisture: Slightly dry

NOTE:

- 288 to 405-cell trays are available but larger cells can be easy to manage the soil moisture.
- Organize best combination between slightly and enough daylight not to stretch the young plants.
- Apply fertilizer with low phosphorus a few times weekly. Miantain a soil pH of 5.5 to 5.8 and EC at 0.7 to 1.0 mS/cm. Higher pH(6.2 or more) can induce boron deficiency, so care fully and periodically check soil conditions.
- Growth regulator is not needed in young plant stage but A-Rest or B-Nine in very light application with foliar spray may work effectively. Use of growth regulator must be judged by growers' responsibility.
- Do not use ammonium-form fertilizers

Growing Management

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 be allow plugs to dry out immediately after transplant.

Timing to Transplant

Transplant into 9 to 15 cm-pot before root bound. Carefully do not damage the roots at transplanting.

Fertilizer

One week after transplant, apply 150 - 250 ppm using predominantly nitrate-form fertilizer with low phosphorus. Maintain the soil pH at 5.6 to 5.8 and EC at 1.5 to 2.0 mS/cm. To avoid boron deficiency, when the soil pH is over 6.2 then take corrective treatment.

Light Level

Keep the light level as high as possible while the temperature is appropriately maintained.

Temperatures

Day temperature: 16 - 23 °C

Night temperature: 10 - 14 °C

Carefully manage the plants under 15 °C night temperature to prevent the stems from stretching.

Growth Regulator

Plant growth regulator may not be needed as long as managed under appropriate conditions. In some tests, common growth regulators like; Bonzi, B-Nine, A-Rest, are effective for height control. Application must be organized by grower's responsibility and judgement.

Common Disease and Insects

Protections with fungicide and pesticide required. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Culture Guideline

Primula *Primula malacoides* New Fuji Series

Young Plant Operation

Stage 1(sowing stage) - approx. 10 days

Temperature: 15 - 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 0.7 - 1.0 mmho/cm

Humidity and Soil Moisture: RH 95%+, Uniformly moist but not saturated

Light: 100 - 400 f.c. (1,100 - 4,300 lux)

Stage 2 - approx. 14 days <cotyledon emergence>

Temperature: 17 - 18 °C

Light: 1,000 - 1,500 f.c. (11,000 - 16,000 lux)

Fertilizer: 50 – 75 ppm (N)

Soil Moisture: Normal

Stage 3 - approx. 35 days <True-leaf development>

Temperature: 16 - 17 °C

Light: 1,000 - 1,500 f.c. (11,000 - 16,000 lux)

Fertilizer: 100 – 150 ppm (N)

Soil Moisture: Dry to Normal

Stage 4 - approx. 7 days <Hardening stage>

Temperature: 16 - 17 °C

Light: 1,000 - 1,500 f.c. (11,000 - 16,000 lux)

Fertilizer: 100 – 150 ppm (N)

Soil Moisture: Dry to Normal

NOTE:

- Store seed in a refrigerator at 7 °C
- Plants will stretch under the dark condition
- Fertiliser must be applied as soon as cotyledon expands in stage 2
- Days for stage 3 are in 288-cell tray. If larger, it takes longer.
- Do not use ammonium nitrate fertilizers

Growing Management

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 be allow plugs to dry out immediately after transplant.

Timing to Transplant

When 3 to 4 true leaves open transplant into 10 to 15 cm-pot. Carefully transplant not damage the roots. Transplants must be done before root bound.

Fertilizer

Apply 150 - 200 ppm from 20-10-20 at every other irrigation, then switch to 15-0-15 after cold treatment Do not use ammonium nitrate fertilizers.

Light Level

Grow under 2,000 - 3,500 f.c. (22,000 - 38,000 lux). Plants can take higher levels at lower temperature. When grown in warm summer or locational conditions shading will need.

Temperatures

<Plant Establishment> 10 - 20 °C

Suggest relatively lower night temperature in the range

<Cool Treatment> Lower than 15 °C

Plants require cool treatment approx. 10 days under 5 °C but takes a few more weeks under 15 °C .

Cool Treatment

Cool treatment can be ready when plants have 6 to 10 leaves and a well-established root system. After cool treatment, plants can be back to the recommended conditions above. From bud visibility to first opening of flower is approximately 4 weeks, depending on temperatures light levels.

Common Disease and Insects

Susceptible to botrytis. Take off dead leaves or flowers, then keep the soil slightly dry and clean on the bench

Scheduling

Premula malacoides is a plant requires cool treatment to initiate flowering buds, so growers must describe and check the practical operation plan in the following factors –

- 1) When is the best selling season/time.
- 2) Possible or not to organize cool treatment with locational availability.

Culture Guideline

Viola *viola x wittrockiana*

Millionflora Series

Young Plant Operation

Stage 1(sowing stage) - 3 to 5 days

Temperature: Approximately 20 °C (optimally keep 23 °C to prevent seedlings stretched)

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 mmho/cm

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

Light: No needed for germination stage

Stage 2 - 10 to 14 days <cotyledon emergence>

Temperature: Day = 18 - 21 °C Night = Lower than 18 °C (optimally 15 °C)

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

Fertilizer: No needed

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

Stage 3 - approximately 14 days <True-leaf development>

Temperature: Day = 18 °C Night = Lower than 18 °C (optimally 15 °C)

Light: 3,000 f.c. (32,000 lux)

Fertilizer: 50 - 100 ppm (N)

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

Stage 4 - 7 to 10 days <Hardening stage>

Temperature: Day = 15 °C Night = Approximately 13 °C

Light: 3,000 f.c. (32,000 lux)

Fertilizer: Up to 100 ppm (N)

Soil Moisture: Slightly dry

NOTE:

- 288 to 405-cell trays are available but larger cells can be easy to manage the soil moisture.
- Organize best combination between slightly and enough daylight not to stretch the young plants.
- Apply fertilizer with low phosphorus a few times weekly. Miantain a soil pH of 5.5 to 5.8 and EC at 0.7 to 1.0 mS/cm. Higher pH(6.2 or more) can induce boron deficiency, so care fully and periodically check soil conditions.
- Growth regulator is not needed in young plant stage but A-Rest or B-Nine in very light application with foliar spray may work effectively. Use of growth regulator must be judged by growers' responsibility.
- Do not use ammonium-form fertilizers

Growing Management

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 be allow plugs to dry out immediately after transplant.

Timing to Transplant

Transplant into 9 to 12 cm-pot before root bound. Carefully do not damage the roots at transplanting.

Fertilizer

One week after transplant, apply 150 - 200 ppm using predominantly nitrate-form fertilizer with low phosphorus. Maintain the soil pH at 5.6 to 5.8 and EC at 1.5 mS/cm. To avoid boron deficiency, when the soil pH is over 6.0 then take corrective treatment.

Light Level

Keep the light level as high as possible while the temperature is appropriately maintained.

Temperatures

Day temperature: 15 - 22 °C

Night temperature: 10 - 14 °C

Carefully manage the plants under 15 °C night temperature to prevent the stems from stretching.

Growth Regulator

Plant growth regulator may not be needed as long as managed under appropriate conditions. In some tests, common growth regulators like; Bonzi, B-Nine, A-Rest, work effective for height control. Application must be organized by grower's responsibility and judgement. The first application must be after one week at least after transplant.

Common Disease and Insects

Protections with fungicide and pesticide required. Each grower must check with best advisor to control diseases and insects with appropriate measures.

Culture Guideline

Vinca *Catharanthus roseus*

Jaio Series

Young Plant Operation

Stage 1(sowing stage) - approx. 7 days

Temperature: 22 - 25 °C (optimally over 24 °C)

Sowing and Soil: Single sowing recommended and use a well drained and disease free medium. Cover the seed with vermiculite or coarse cover material.

pH and EC: pH approx. 6, EC 0.75 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

NOTE:

- Plants will stretch under the dark condition
- Vinca plants do not like wet condition. Soil must be slightly drier late of stage 2 up to stage 4
- Tray size recommended 288 to 405 cells
- Do not use ammonium-form fertilizers

Growing Management

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 2,000 - 3,500 f.c. (22,000 - 38,000 lux). Plants can take higher levels at lower temperature. When grown in warm summer or locational conditions shading will need.

Temperatures

Day temperature: 23 °C or above

Night temperature: 19 - 21 °C

Growth Regulator

Plant growth regulator may not be needed as long as managed under appropriate conditions. In some tests, common growth regulators like; Bonzi, B-Nine, A-Rest, are effective for height control. Application must be organized by grower's responsibility and judgement.

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