

## Butterfly F<sub>1</sub> Series Pentas

*P. lanceolata*

Approximate pelleted seed count: 31,900/oz.  
(1,125/g)

### Plug Production

#### Media

Use a well-drained disease-free seeding medium with a pH of 6.5 to 6.8 and EC of about 0.75 mmhos/cm (1:2 extraction). Below pH 6.5 plants will stop growing and exhibit iron toxicity as foliar necrosis and calcium/magnesium deficiency as foliar puckering.

#### Sowing

Recommended plug tray is 288-cell or larger. Do not cover the seed. Light improves germination and uniformity. Non-acidified water is recommended to maintain high media pH.

**Stage 1** – Germination takes about 6 to 9 days.

**Soil temperature:** 75°F (24°C)

**Light:** Light during germination (10 f.c./110 Lux) will improve germination uniformity and seedling quality.

**Moisture:** Maintain moisture level at 4 to 5 during stage 1. Non-acidified water is beneficial throughout plug production.

**Humidity:** Maintain 100%.

#### Stage 2 (About day 9)

**Temperature:** At full cotyledon emergence, maintain 75°F (24°C).

**Light:** Pentas have high light requirements. Seedlings must receive higher light levels immediately after germination to avoid elongation and promote rapid growth. After germination, maintain light levels between 1,500 and 2,000 f.c. (4 to 6 moles/m<sup>2</sup>/day or 16,150 to 21,530 Lux).

**Moisture:** Level 3 to 4, avoid extreme shifts in moisture. Non-acidified water recommended.

**Humidity:** Reduce to 70%.

**Fertilizer:** 14-4-14 or 13-2-13 at 50 ppm N once radicles fully emerge and adjust upward to 75 ppm through end of Stage 2. Maintain EC <1.0 mmhos/cm.

#### Stage 3

**Temperature:** Gradually reduce to 65 to 68°F (18 to 20°C)

**Light:** Up to 2,500 f.c. (6 to 8 moles/m<sup>2</sup>/day or 26,900 Lux)

**Moisture:** Level 2 to 4, avoid extreme shifts in moisture. Non-acidified water recommended.

**Fertilizer:** Increase fertilizer to 75-100 ppm with 14-4-14 or 13-2-13. Use 20-10-20 if needed to promote leaf expansion.

#### Growth Regulators

Controls plug growth first by environment, nutrition and irrigation management (keep plants on the dry side). Minimize phosphorus fertilizer to avoid elongation of seedlings. Temperature differential (DIF) can also be used to minimize height. If necessary, Cycocel (chlormequat) spray can be applied at 500 ppm (4.2 ml/l 11.8% formulation or 0.7 ml/l 75% formulation) or B-Nine/Alar (daminozide) spray at 2,500 to 3,500 ppm (3.0 to 4.1 g/l 85% formulation or 4.0 to 5.5 g/l of 64% formulation).

#### Stage 4

**Temperature:** Can be reduced to 60 to 65°F (15 to 18°C) from maturity until transplant

**Light:** Up to 3,500 f.c. (10 moles/m<sup>2</sup>/day or 37,800 Lux)

**Moisture:** Same as stage 3

**Fertilizer:** Same as stage 3

### Growing On to Finish

#### Container Size

Butterfly Pentas are well suited to 4-in. (10-cm) pots up to 1 to 2-gallon containers. Containers smaller than 4 inches (10 cm) will necessitate heavy PGR applications.

**4-in. (10-cm) pot:** 1 plug per pot

**6-in. (15-cm) pot:** 1 to 2 plugs per pot

**1 to 2 gallon pot:** 2 to 3 plugs per pot

#### Media

Use a well-drained, disease-free soilless medium with a medium initial nutrient charge and a pH of 6.5 to 6.8. When pH below 6.5, growth will be slowed and plants will exhibit iron toxicity as foliar necrosis and calcium/magnesium deficiency as foliar puckering.

## Temperature

Butterfly Pentas benefit from warm temperatures and high light conditions. Maintain minimum day temperatures of 72 to 80°F (22 to 27°C) and minimum night temperatures of 62 to 65°F (17 to 18°C). Low temperatures will prevent uniform flower development, delay flowering and extend crop time.

## Light

Provide 12 to 15 moles/m<sup>2</sup>/day. Keep light levels as high as possible to promote compact growth. Extend daylength if grown under short days to achieve 12 to 15 moles/m<sup>2</sup>/day.

## Humidity

Maintain low relative humidity during production to reduce foliar diseases.

## Water

Pentas benefit from non-acidified water during production, which can decrease crop times by as much as two weeks versus using acidified water. Avoid both excess watering and drought, which will stress the plants and cause severe yellowing and necrosis.

## Fertilization

Constant liquid fertilizer at 75 to 125 ppm N, depending on frequency, with 14-4-14 or 17-5-17. Use 20-10-20 if needed to promote leaf expansion. Maintain medium EC around 1.2 to 1.5 mmhos/cm (using 1:2 extraction).

## Growth Regulators

Effective height control of Butterfly Pentas can be accomplished with environmental manipulation. Height can be controlled by withholding fertilizer, especially phosphorous and ammonium-form nitrogen. Pentas are responsive to day/night temperature differential (DIF), and are shorter with a negative DIF. A tank mix of B-Nine (daminozide) 2,500 ppm (3.0 g/l 85% formulation or 4.0 g/l of 64% formulation) and Cycocel (chlormequat) 1,000 to 1,500 ppm (8.5 to 12.7 ml/l 11.8% formulation or 1.3 to 2.0 ml/l 75% formulation) dependent on temperature at visible bud can be used. Higher rates of Cycocel (chlormequat) may cause phytotoxicity. Cycocel (chlormequat) alone at 1,000 to 1,500 ppm (8.5 to 12.7 ml/l 11.8% formulation or 1.3 to 2.0 ml/l 75% formulation) spray or Bonzi (paclobutrazol) 5 ppm (1.3 ml/l 0.4% formulation) drench at visible bud stage are also effective. (Refer to photo). Always follow current manufacturer label instructions. In-house trials are recommended to determine the best rate for your location.



## Crop Scheduling

**Sow to transplant:** 6 to 9 weeks in a 288-cell plug tray.

**Transplant to finish (flower first umbel):** 10 to 12 weeks in the North, 8 to 10 weeks in the South.

Under high light, long days and warm temperatures (Summer production), Butterfly Pentas can be produced in as little as 12 to 13 weeks from seed.

## Common Problems

**Insects:** Aphids, thrips, whitefly.

## Diseases:

*Pythium* root rot: Soft, brown, mushy roots. Drench with Subdue, Banrot, Truban or similar compound.

*Rhizoctonia:* Tan, brown or black lesions on the stem at the soil line in conjunction with good root development. Drench the soil with Chipco 26019, Cleary's 3336, Banrot or Terraclor.

*Botrytis* blight: Will appear at wound sites on the plant, especially where the air is stagnant. If undetected, this blight will form a canker that will girdle the stem, thus wilting and killing that part of the plant. Treatments include increased air circulation and Daconil fungicide spray applications. Refer to the Daconil label for the specifics.

## Nutritional Problems:

**Iron toxicity:** Excessive iron levels or pH below 6.2 for extended time will cause marginal burn on leaves in upper foliage. Raise pH by adding limestone.

**Iron/Manganese toxicity:** Extremely low pH can induce iron and manganese toxicity, indicated by brown or tan lesions on the foliage. Switch to a base-forming fertilizer, such as 15-0-15. If symptoms do not improve, or if the pH is below 6.0, irrigate the crop with a hydrated lime

solution. Be sure to rinse foliage after application to avoid phytotoxicity.

Calcium and magnesium deficiency: If pH falls below recommended target values, lower leaf interveinal chlorosis and foliar puckering can develop, especially during flowering when pH can fall as much one unit in 24 hours due to plant roots actively acidifying the media. Use fertilizers that contain magnesium during early crop development. Supplement with calcium nitrate as directed above to adjust pH. Avoid wide fluctuations in media moisture levels.

**Note:** To increase soil pH, apply 12 oz. hydrated lime per 100 gal. water (90 g. per 100 l) as a soil drench. Follow up with 1 tablespoon of limestone (dolomite or calcium carbonate) per pot. Do not apply hydrated lime if the medium ammonium level is above 10 ppm (1:2 extraction).

**Note:** Chemical recommendations are only guidelines. Follow national and state regulations.

## In the Garden

Butterfly Pentas will flourish when planted in full-sun garden beds and patio containers. In northern gardens, use a spacing of 10 to 12 in. (25 to 30 cm); southern gardeners can space Butterfly plants a little farther apart – 13 to 15 in. (33 to 38 cm) is ideal. Keep plants well watered and feed regularly with an all-purpose fertilizer following package directions.

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