GrowerFacts

Echinacea PowWow®

(*Echinacea purpurea*)

Germination

Approximate seed count (raw): 7,400-7,600 S./oz. (260-270 S./g)

Key flowering facts:

- First year-flowering perennial.
- Juvenile phase: before 2-mature true leaf stage.
- Photoperiod response: a short-day / long-day plant. For more details, see Growing On to Finish – Photoperiod below.
- Vernalization: not required but beneficial. Flowering will be two weeks earlier following a minimum of ten weeks cold treatment.

Media
Use a well-drained, disease-free, soilless media with a pH of 5.8 to 6.2 and a medium initial nutrient charge (EC 0.75 mmhos/cm).

Sowing
Sow 1 seed per cell in 288 or larger plug tray. In Europe, 264-cell trays can be used. Covering seed with vermiculite is recommended.

Stage 1 – Germination begins at day 4-5 continuing through day 14

Soil temperature: 71 to 76°F (21 to 24°C)

Light: Optional.

Moisture: Keep soil wet (level 4).

Humidity: Maintain 95%+ relative humidity (RH) until radicles emerge.

Plug Production

Stage 2

Soil temperature: 71 to 73°F (21 to 22°C)

Light: Up to 2,500 f.c. (26,900 Lux), DLI 5 to 8 moles•m-2•d-1.

Moisture: Reduce soil moisture slightly (level 3 to 4) to allow the roots to penetrate into the media.

Fertilizer: Apply fertilizer at rate 1 (less than 100 ppm N/less than 0.7 mS/cm EC).

Stage 3

Soil temperature: 68 to 70°F (20 to 21°C)

Light: Up to 2,500 f.c. (26,900 Lux), DLI about 10 moles•m-2•d-1.

Moisture: Allow media to dry further until the surface becomes light brown (level 2) before watering. Keep the moisture level to wet-dry cycle (moisture level 4 to 2).

Fertilizer: Increase fertilizer to rate 2 (100 to 175 ppm N/0.7 to 1.2 mS/cm EC). If growth is slow, apply a balanced ammonium and nitrate-form fertilizer with every other fertilization. Maintain medium pH of 5.8 to 6.2 and EC between 1.0 and 1.5 mS/cm (1:2 extraction).

Growth Regulators: Generally not needed

Stage 4

Soil temperature: 65 to 67°F (18 to 19°C)
Light: Up to 5,000 f.c. (53,800 Lux), DLI =10 moles•m-2•d-1, if temperature can be controlled.

Moisture: Same as Stage 3.

Fertilizer: Same as Stage 3.

Growing On to Finish

Container Size

4.5-in. (11-cm) square/quart pots: 1 plug per pot

6-in. (15-cm) or gallon (18-cm) pots: 1 plug per pot

Media
Use a well-drained, disease-free, soilless media with a pH of 5.5 to 6.2 and a medium initial nutrient charge (EC 0.75 mmhos/cm). For overwinter production, bark media is recommended for better drainage purpose to

protect plants from root rot due to conditions that are too wet.

Optimum temperature: ADT 68 to 72°F (20 to 22°C)

Temperature

Nights: 60 to 65°F (15 to 18°C)

Days: 65 to 75°F (18 to 24°C)

Note: Keep average daily temperature (ADT) above 55°F (13°C). Otherwise, plants will stop growing.

Light
Maintain light levels as high as possible (DLI = 20 moles·m-2·d-1) while maintaining moderate temperature.

Photoperiod
PowWow and 'Cheyenne Spirit' are short-day / long-day plants. The best flowering occurs when plants are grown under short-day conditions (12 hours or shorter) until 7-mature leaf stage, followed by long-day conditions.

Note: Echinacea plants won't perceive day length induction until 2 mature true leaf stage. Plants are in juvenile stage until 2 mature leaves.

Irrigation
Maintain media moisture. Avoid both excessive watering and drought.

For overwinter production, keep plants on the dry side during cold period as overwatering could result in plant loss from root rots.

Fertilizer
Apply balanced fertilizer at rate 3 (175 to 225 ppm N/1.2 to 1.5 mS/cm). Maintain the media EC at 1.5 to 2.0 mS/cm and pH at 6.0 to 6.5.

For constant fertilizer program, can apply fertilizer at rate 2 (100 to 175 ppm N or 0.7 to 1.2 mS/cm) while maintaining the above recommended EC and pH ranges.

Key to dark foliage and the prevention of purple foliage:
Phosphorous is the key to maintaining dark green foliage and to preventing leaves from turning purple and becoming hard and brittle, particularly for PowWow Wild Berry. Pale foliage is primarily due to low phosphorus. This is not strictly temperature related. Lack or loss of phosphorous may be related to low/poor nutrition resulting from poor uptake, depletion of phosphorus due to excessive watering (predominately overhead watering), or being tied up in the soil. Target 30-35 ppm phosphorus via constant liquid feed. Soil additives, such as finely ground rock phosphates, are not recommended as uptake and availability to the plant can be erratic or delayed when soil is too wet, too cold or when the additive is not well mixed into the soil.

Growth Regulators

For height control: Echinacea is responsive to tank mix of B-Nine/Alar (daminozide) 2,500 ppm (3.0 g/l 85% formulation or 4.0 g/l of 64% formulation) mixed with Cycocel (chlormequat) 500-750 ppm (4.2-6.4 ml/l 11.8% formulation or 0.67-1.0 g/l of 75% formulation). PGR application can be applied at the point when stem starts elongation, about 4 weeks after transplant. If necessary, repeat the application two weeks later.

Optional PGR treatments: 1-2 applications of B-Nine at 3,500 to 5,000 ppm (4.1-5.9 g/l 85% formulation or 5.8-7.8 g/l of 64% formulation) or Sumagic (uniconazole) at 20 ppm (36.4 ml/l 0.055% formulation) spray also work well.

Note: Higher PGR rates may cause plant height to be less uniform. It is recommended using lower rate with multiple applications.

For branching: PowWow and 'Cheyenne Spirit' are naturally well branched. To augment or increase branching, use Configure (active ingredient N-phenylmethyl-1H-purine-t-amine, commonly called benzyladenine or 6-BA). Configure can be applied at 300 ppm two weeks after transplanting and repeated two weeks later.

In northern Europe conditions: 3,200 ppm B-Nine/Alar (3.8 g/l 85% formulation or 5.0 g/l of 64% formulation) works well.

Pinching
Pinching is not needed.

Spacing
Space plants when foliage is touching.

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Crop Scheduling

For the following production scenarios:
Sow to transplant (288 cell plug): 5 to 6 weeks crop time.

1. Spring production for late Spring flowering, target market weeks 23 or later, under natural day-length condition
Sow in January, weeks 1-3, for natural flowering in middle to later June.

Transplant to flower: 13 to 17 weeks
Under temperature range from 60°F (15°C) to 68°F (20°C)

Total crop time approximately 18 to 23 weeks
Under temperature range from 60°F (15°C) to 68°F (20°C)

2. Overwinter production for late Spring flowering, target market weeks 21 or later, under natural day-length conditions:
Sow in July to early September for natural flowering late May to early June of the following year.

Note: Plants from overwinter production will flower slightly earlier than those from Spring production with better branching and shorter flower stems.

Forcing:
Below are three key elements necessary for best production results. These elements can be manipulated to achieve your market target ship weeks:

- Understanding when juvenility stage ends so plants can perceive light.
- Applying the appropriate duration of short or long day conditions.
  - Short day = 12 or less hours
  - Long day = 14 or more hours
- Providing optimum temperatures.

3. Forcing for Summer and Fall Sales target market weeks 35 or later:

- Sow week 14-16, using 288, 72, or 50 trays.
- Grow plugs to the 2 mature true leaf stage. It takes about 4 to 5 weeks during summer production.
- If using a 288 tray, transplant to larger liner or final container.
- At the 2-mature true leaf stage, start short day such as with black cloth. Continue short day until plant reaches 7 mature leaves, which takes about 6 weeks at ADT of approx. 72-75° F (22 to 24°C).
- The **fundamental guidelines** for successful uniform flowering:
  - **Give 6 weeks short day after 2 mature leaves.**
  - **Or give short day from 2 mature leaves to 7 mature leaves. This means 5 leaves added.**
- After short day treatment, transplant to final container and grow under natural long days. Outdoor production is recommended.
- Total crop time is approximately 20-21 weeks.
  - Sow to 2 mature leaf stage: 4-5 weeks.
  - SD treatment from 2 to 7 mature leaves: 6 weeks.
  - End of SD to flowering: 10-11 weeks.

4. Forcing for Spring sales target market weeks 18-19, such as Mother's Day sales:

- Sow week 45-46, using 288, 72, or 50 trays.
- If using a 288 tray, transplant to larger liner or finish container at the 2 mature true leaf stage.
- Bulking options:
  - Bulk in the larger liner
  - Bulk in finish container
- • Bulk under natural short-day at temperature about 68 to 70°F (20 to 21°C) until minimum 7-mature leaf stage.
- It takes about 13-15 weeks from sowing to 7-leaf stage.
- Transplant liners to final container, if bulking in liner.
- Provide 14-hour long-day until knot is visible on stem, about 3 to 4 weeks.
- After visible knot, turn light off and grow the plants under natural daylength.
- Plants ready approximately week 18.
- Total crop time approximately 23-25 weeks.
  - Sow to 2 mature leaf stage: 5-6 weeks
  - Short-day bulking from 2 to 7 mature leaves: 8-9 weeks
  - 14-hour long-day treatment: 3 to 4 weeks until visible knot
- End of long-day to flowering: 7 to 8 weeks.
- The **fundamental guidelines** for successfully delivering uniform flowering plants on time:
  - **Bulked plants under natural short-day conditions until minimum 7 mature leaves.**
  - **Provide 14-hour long-day until visible knot stage.**
  - **14-hour long-day should be started 10 to 11 weeks before target market date.**

Common Problems

Insect: Aphids, fungus gnat, etc.

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Disease: Powdery Mildew

Garden and Landscape Information

- PowWow and ‘Cheyenne Spirit’ are first year-flowering perennials in USDA Hardiness Zones 4 to 10.
- Plant in full sun after all danger of frost has passed.
- Space plants 10-14 in. (25-36 cm) apart in well-drained soil.
- After plants are established, PowWow and ‘Cheyenne Spirit’ are quite drought tolerant.
- Garden height and spread in the first year:
  - PowWow: 16-20 in. (40-50 cm) tall and a spread of 20-22 in. (50-55 cm)
  - ‘Cheyenne Spirit’: 18-24 in. (46-61 cm) tall and a spread of 10-16 in. (25-41 cm).

Note: Growers should use the information presented here as a starting point. Crop times will vary depending on the climate, location, time of year, and greenhouse environmental conditions. Chemical and PGR recommendations are only guidelines. It is the responsibility of the applicator to read and follow all the current label directions for the specific chemical being used in accordance with all regulations.

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