



## Constellation™

### HELIANTHUS ANNUUS

**Minimum Germination Rate:** 80%

**Seed Product Form:** Raw

### FLOWERING

**Flowering Mechanism:** Short days; plants initiate on approximately days 21 – 28, 4 – 6 leaves present and the daylength is less than 12 hours.

**Flowering Type:** Facultative short-day plant.

**Specific Flowering Mechanism:** Flower buds will initiate when the daylength is less than 12 hours. Plants will grow approximately 24" tall at this daylength. If the daylength is greater than 14 hours, plants will grow up to 36" tall.

### PLUG CULTURE

The timing approximations are based on optimal culture recommendations below:

**Germination 1** (approximately day 1 – 6): From the time a seed is sown until radicle emergence takes place, usually with the root penetrating the media and some cotyledon development. If desired, Helianthus Constellation seeds can be sown into the final container. Humidity in the air is 95 – 98% (humidification); media moisture 4+ – 5. Expect radicle emergence in 5 – 6 days.

**Cover:** Cover seeds with a thin layer of medium-sized vermiculite to maintain moisture levels.

**Media:** pH: 5.5 – 5.8. EC: 0.75 – 1. High EC discourages rooting into the media and could decrease final count of usable seedlings.

**Light:** Light is not necessary for germination. If utilizing a chamber, providing a light source of 10 – 100 foot candles (100 – 1,000 lux) will improve germination and reduce stretch.

**Moisture:** Saturated (5) for day 1 – 5, on day 5 reduce to wet (4). Beginning day 9, reduce moisture further to moist (3).

**Humidity:** 100% until radicle emergence then reduce to 40%.

**Dehumidify:** Provide horizontal airflow to aid in drying down the media through evapotranspiration, allowing better penetration of oxygen to the roots.

**Temperature:** 68° – 72°F (20° – 22°C).

**Germination 2** (approximately Day 6 – 10): From the time cotyledon is observed until it is fully expanded. The roots have expanded throughout the media. Dehumidify from 100% to 50% moisture in the air. Media moisture during the wet cycle is usually 4 – 5, and 2 – 3 during the dry cycle; this wet-dry cycle should take place within 12 – 24 hours for most plants.

**Media:** pH: 5.5 – 5.8. EC: 1 – 1.5

**Light:** Supplemental lighting at 350 – 450 foot candles (3,500 – 4,500 lux) during a 10 – 12 hour day will enhance plant growth.

**Temperature:** 68° – 72°F (20° – 22°C).

**Moisture:** Alternate between moisture levels wet (4) and moist (3). Allow media to approach level (3) before re-saturating to level (4). Do not allow seedlings to wilt.

**Humidity:** 40 – 70%

**Dehumidify:** Lower relative humidity to 40% (approximately day 6 – 8). Provide horizontal airflow to aid in drying down the media through evapotranspiration, allowing better penetration of oxygen to the roots.

**Fertilizers:** Alternate between calcium-based fertilizers (13-2-13 or 14-4-14) and potassium nitrate (15-5-15) at 50 – 75 ppm nitrogen. Phosphorus should not exceed 10 ppm.

**Growth Regulators:** Helianthus Constellation is naturally a compact plant and should not require PGR applications. If needed in the plug stages, a 1,500 – 2,500 B-Nine application may be supplied as a spray.

**Fungicides:** Preventative fungicide may be applied for Pythium, Rhizoctonia and Thielaviopsis, and/or Rust.

**Plug Bulking/Flower Initiation** (approximately day 21 – 28): The time it takes for the shoots to proportionately fill the plug cell and for roots to develop throughout the media. Induction and initiation may occur if daylength is less than 12 hours.

**Media:** pH: 5.5 – 5.8. EC: 1 – 1.5

**Light:** Supplemental lighting under low light conditions at 350 – 450 foot candles (35,000 – 45,000 lux) will enhance shoot and root growth.

**Temperature:** 65° – 68°F (18° – 20°C). If needed, the temperature may be gradually reduced to 62° – 65°F (16° – 18°C) to hold plugs.

**Moisture:** Alternate between moisture levels wet (4) and moist (3). Allow media to approach level (3) before re-saturating to level (4). Do not allow plants to wilt.

**Humidity:** 40 – 70%

**Fertilizers:** Alternate between calcium-based fertilizers (13-2-13 or 14-4-14) and potassium nitrate (15-5-15) at 75 – 100 ppm nitrogen.

**Growth Regulators:** If needed, spray B-Nine at 1,500 – 2,500 ppm.

**Fungicides:** Preventative fungicide may be applied for Pythium, Rhizoctonia and Thielaviopsis, Rust and/or Botrytis.

**Initiated Bulking** (approximately day 28 – 35): Seedlings develop from juvenile to mature, usually determined by the number of leaves present or daylength. Seedlings are receptive to initiation and flower bud development.

**Light:** Provide 3,500 – 4,500 foot candles (35,000 - 45,000 lux) or 12 – 16 mols of light.

**Temperature:** 62° – 68°F (17° – 20°C)

**Fertilizer:** Alternate between calcium-based fertilizers (13-2-13 or 14-4-14) and potassium nitrate (15-5-15) at 100 – 150 ppm nitrogen. Under high light conditions a 20-10-20 fertilizer can be used; leach with fresh water every third watering.

**Fungicides:** Preventative fungicide may be applied for Pythium, Rhizoctonia and Thielaviopsis, Rust and/or Botrytis.

### GROWING ON

The timing approximations are based on optimal culture recommendations below:

**Transplant to Finish** (approximately day 35 - 98): Optimize plant shoot and root growth, which is usually a 1:1 ratio. Flower buds are usually present and developing.

**Media:** pH: 5.5 – 5.8. EC: 1.2 – 1.5; high salts may result in root loss.

**Light:** Provide 3,500 – 4,500 foot candles (15 – 20 total mols or 35,000 – 45,000 lux) to enhance shoot and root growth. Less than 12 hours daylength will result in shorter plants. Greater than 14 hours daylength will delay flowering and result in taller plants.

**Temperature:** 70° – 75°F (21° – 24°C) days; 65° – 68°F (18° - 20°C) nights.

**Moisture:** Alternate between moisture levels wet (4) and moist (3). Allow media to approach level (3) before re-saturating to level (4). Excessive drying of the media moisture level will concentrate salts around the root system and burn the root hairs. Symptoms of excessive drying include lower leaves turning yellow, and dropping.

**Dehumidify:** Provide horizontal airflow to aid in drying down the media through evapotranspiration under cool, low light conditions.

**Humidity:** 40%

**Fertilizers:** Constant liquid feed at 150 – 200 ppm nitrogen with a calcium-based fertilizer (13-2-13 or 14-4-14). Under high light conditions, a 17-5-17 fertilizer can be used. Leach with fresh water every third watering.

**Growth Regulators:** If needed, spray B-Nine at 1,500 – 3,500 ppm, or drench Bonzi at 1 – 2 ppm.

**Fungicides:** Preventative fungicide may be applied for Pythium, Rhizoctonia and Thielaviopsis, Rust and/or Botrytis.

### TECHNIQUES TO ENHANCE POST HARVEST QUALITY

**When to treat:** 1 – 2 weeks prior to finish or shipping.

**Fertilizer:** Potassium nitrate drench at 150 ppm nitrogen.

**Common Diseases:** Pythium, Rhizoctonia, Thielaviopsis, Rust, Botrytis. Monitor moisture and humidity levels and use preventative fungicide drenches.

**Common Pests:** Fungus Gnats, Shore Flies, White Fly, Spider Mites, Beetles, and Thrips. Use pesticides according to label directions.

*continued on next page*



## Constellation™ (continued)

PRODUCT USE	GARDEN SPECIFICATIONS
Pots, containers, mass plantings	<b>Light:</b> Part sun to full sun <b>USDA Hardiness Zone:</b> 10 <b>AHS Heat Zone:</b> 12 – 1

	Garden Height	Garden Width
<b>Constellation</b>	24 – 36" (60 – 90 cm)	12 – 14" (30 – 35 cm)

### SUNFLOWER SCHEDULING IN WEEKS

	Constellation
<b>Total crop time</b>	8 – 13
<b>'128' plug crop time</b>	3 – 4
<b>'200' plug crop time</b>	3
<b>'288' plug crop time</b>	3
<b>Transplant to finish crop time from a '200' plug</b>	
<b>4" crop</b>	5 – 6
<b>6" crop</b>	8 – 9
<b>8" crop</b>	9 – 10, depending on number of plugs transplanted

The shortest crop times may be achieved when following recommended optimal culture. Deviation in environmental conditions will result in longer crop times.

*Note: These suggestions are only guidelines and may have to be altered to meet individual grower's needs. Check all chemical labels to verify registration for use in your region.*