

VERBENA *Verbena x hybrida*

seed count: 11,900/oz. 420/g.	Sow to transplant 512 plug				Transplant to flower 4" pot or 36 tray		
	STAGE 1	STAGE 2	STAGE 3	STAGE 4	FALL	SPRING	SUMMER
CROP TIME	4-7 days	10-14 days	14 days	7 days		7-8 weeks	6-7 weeks
TEMP:							
SOIL	75-80° F 24-27° C	72-75° F 22-24° C	68-72° F 20-22° C	65-68° F 18-20° C			
NIGHT					62-65° F 17-18° C		
DAY					68-75° F 20-24° C		
MOISTURE	Dry	Dry	Dry	Dry	Dry		
LIGHT (FC)	100-400	1000-2500	2000-2500	3000-4500	4000-5000		
COVER (Y/N)	Yes						
FERTILIZER:							
RATE		50-75 ppm	100-150 ppm	100-150 ppm	150-200 ppm		
FORM		14-0-14	20-10-20 14-0-14	14-0-14	20-10-20 15-0-15		
FREQUENCY		1X/week	alternate 1X/week	1X/week	alternate every other irrigation		
SOIL pH	5.5-5.8	5.5-5.8	5.5-5.8	5.5-5.8	6.2-6.5		
SOIL EC (mmhos/cm)	< 0.75	< 0.75	< 1.0	< 0.75	< 1.0		
PLANT GROWTH REGULATORS			A-Rest B-Nine Bonzi Cycocel	A-Rest B-Nine Bonzi Cycocel	A-Rest B-Nine Bonzi Cycocel		

VERBENA: *PLUG CULTURE*

STAGE 1 - Time of radicle emergence (4-7 days)

- ◆ Soil temperature 75-80° F (24-27° C).
- ◆ Keep media dry, moisture should be about 1/2 the amount normally used for other corps.
- ◆ Do not saturate the media at any time during germination.
- ◆ Cover the seed lightly with coarse vermiculite.
- ◆ Light at 100-400 foot-candles may be beneficial for germination.
- ◆ Light is not necessary for germination until radicle emergence.
- ◆ Soil pH 5.5-5.8 and soluble salts (EC) less than 0.75 mmhos/cm (2:1 extraction).
- ◆ Verbena is very sensitive to high salts, particularly high ammonium, during germination.
- ◆ Keep ammonium levels less than 10 ppm.

STAGE 2 - Stem and cotyledon emergence (10-14 days)

- ◆ Soil temperature 72-75° F (22-24° C).
- ◆ Continue to deep media on the dry side. Allow the soil to dry out slightly before watering for best germination and rooting.
- ◆ Keep soil pH 5.5-5.8 and EC less than 0.75 mmhos/cm.
- ◆ Keep ammonium levels less than 10 ppm.
- ◆ Begin fertilizing with 50 - 75 ppm N from 14-0-14 or a calcium/potassium nitrate feed once cotyledons are fully expanded.
- ◆ Alternate feed with clear water.
- ◆ Irrigate early in the day so foliage is dry by nightfall to prevent diseases.

STAGE 3 Growth and development of true leaves (14 days)

- ◆ Soil temperature 68-72° F (20-22° C).
- ◆ Allow the soil to dry thoroughly between irrigations but avoid permanent wilting to promote root growth and control shoot growth.
- ◆ Maintain soil pH 5.5-5.8 and EC less than 1.0 mmhos/cm.
- ◆ Increase feed to 100 - 150 ppm N from 20-10-20 alternating with 14-0-14 or other calcium/potassium nitrate fertilizer.
- ◆ Fertilize every 2 - 3 irrigations.
- ◆ If using 15-0-15 supplement with magnesium 1 - 2x during this stage, using magnesium sulfate (16 oz/100 gal) or magnesium nitrate. Do not mix magnesium sulfate with calcium nitrate as precipitate will form!
- ◆ Use DIF whenever possible, especially the first 2 hours after sunrise, to control plant height.
- ◆ A-Rest, B-Nine, Bonzi, and Cycocel are effective at controlling height of verbena.
- ◆ Use growth regulators at first true leaf expansion.

STAGE 4 - Plants ready for transplanting or shipping (7 days)

- ◆ Soil temperature 65-68° F (18-20° C).

- ◆ Allow soil to dry thoroughly between irrigations.
- ◆ Maintain soil pH 5.5-5.8 and EC less than 0.75 mmhos/cm.
- ◆ Fertilize with 14-0-14 or calcium/potassium nitrate feed at 100 - 150 ppm N as needed.

VERBENA: *GROWING ON TO FINISH*

TEMPERATURE

- ◆ Night -- 62-65° F (17-18° C)
- ◆ Day -- 68-75° F (20-24° C)

LIGHT

- ◆ Maintain light levels as high as possible, 4000-5000 foot-candles, while maintaining moderate temperatures.
- ◆ Plants will stretch if grown under low light conditions.
- ◆ Plants grow best in full sun under cool temperatures.
- ◆ Excessive light during high temperature periods promotes leaf necrosis.

MEDIA

- ◆ Use a well-drained, disease-free soil-less medium with a medium initial nutrient charge and a pH 6.2-6.5.

WATER

- ◆ Avoid over watering or water stress as this will cause leaf edge damage.
- ◆ The root system is easily damaged due to incorrect moisture management.

FERTILIZATION

- ◆ Fertilize every other irrigation with 15-0-15 alternating with 20-10-20 at 150-200 ppm nitrogen.
- ◆ Verbena benefits from higher potassium levels.
- ◆ Verbena has a heavy fertilizer requirement to keep the plant growing vigorously.
- ◆ Reducing the feed will cause the plants to become woody.
- ◆ Maintain medium electrical conductivity around 1.0 mmhos/cm (using 1:2 extraction).

PINCHING

- ◆ Pinch plants once they are rooted to the edge of the container.
- ◆ Pinch above the 4th or 5th set of leaves about 2-2.5-inches above the soil.
- ◆ Plants can be sheared 2-3 times to increase branching and improve plant shape.

CONTROLLING HEIGHT

- ◆ Once plants are rooted to the sides of the containers they can be allowed to wilt prior to irrigation to provide some height control.
- ◆ Height can also be controlled by withholding fertilizer, especially phosphorous and ammonium-form nitrogen.
- ◆ Verbena are responsive to day/night temperature differential (**DIF**), and are shorter with a negative DIF.
- ◆ A-Rest, B-Nine, Bonzi, and Cycocel are all effective at controlling height of verbena.

VERBENA: *POST PRODUCTION CARE*

TEMPERATURE

Optimum temperatures for verbena:

- ◆ Night -- 62-65° F (17-18° C)
- ◆ Day -- 68-75° F (20-24° C)
- ◆ Optimum conditions may be difficult to maintain, especially if plants are displayed outside.
- ◆ Using a negative **DIF** will help keep the plants short and of high quality.

LIGHT

- ◆ Verbena do best in full sun, however partial shading may be beneficial during retail display.

VERBENA: COMMON PROBLEMS

INSECTS:	DISEASES	MISCELLANEOUS
Aphids Fungus gnats Spider mites Thrips Whitefly	<i>Botrytis</i> (gray mold) Powdery mildew <i>Pythium</i> <i>Rhizoctonia</i>	No flowers, vegetative growth Foliage necrosis Foliage chlorosis Poor branching