

BACOPA *Bacopa monnieri, Sutera, Jamesbrittennia*

	Rooting environment Oasis wedge or media				Transplant to sale		
	STAGE 1	STAGE 2	STAGE 3	STAGE 4	4"	6"	10" bskt.
CROP TIME:		3-4 days	7-9 days	5-7 days			
Winter					7-9 wks	9-10 wks	12-14 wks
Spring					5-6 wks	7-9 wks	8-10 wks
LINERS/POT					1	1-2	3-4
# OF PINCHES					1	1-2	1-2
TEMP:							
SOIL		68-70° F 20-21° C	65-68° F 18-20° C	65-68° F 18-20° C			
NIGHT		65-70° F 18-21° C	65-70° F 18-21° C	55-65° F 13-18° C		55-60° F 13-16° C	
DAY	40-45° F 4-8° C	68-72° F 20-22° C	68-72° F 20-22° C	65-72° F 18-22° C		65-72° F 18-22° C	
MOISTURE		Medium	Medium	Dry		Dry	
LIGHT (FTC)		500-1000	1500-200	3000-5000		3500-5000 day neutral	
FERTILIZER:							
RATE		50-75 ppm	100-200 ppm	150-200 ppm		200-250 ppm	
FORM		20-10-20	20-10-20 15-0-15	20-10-20 15-0-15		20-10-20 15-0-15	
FREQUENCY		1X/week	alternate 1X/week	alternate 1X/week		Constant feed	
SOIL pH		5.5-6.5	5.5-6.5	5.5-6.5		5.5-6.5	
SOIL EC (mmhos/cm)		<0.5	<0.5	<1.0		<1.0	
PLANT GROWTH REGULATORS						Not necessary	

BACOPA: *ROOTING CULTURE*

STAGE 1 - Harvesting of cuttings to sticking

- ◆ Harvest uniform diameter cuttings within a bunch to ensure uniform rooting.
- ◆ Make multiple passes over the stock to collect uniform diameter cuttings.
- ◆ Harvest cuttings at the correct stage of maturity.
- ◆ Harvest cuttings in the early morning or late afternoon when ambient temperatures are below 90° F (32° C).
- ◆ Place cuttings in carriers either base up or base down.
- ◆ Avoid crushing the cuttings when harvesting to decrease botrytis problems.
- ◆ Cover the carrier with a damp towel to prevent desiccation of the cuttings.
- ◆ Store the cuttings for at least 2 hours at 48° F (9° C) to reduce cutting temperature.
- ◆ Maintain 75-90% RH in the cooler to prevent desiccation of the cuttings.
- ◆ If cuttings cannot be stuck immediately, store at 40-45° F (4-8° C) for up to 48 hours.

STAGE 2 - Callus formation (3-4 days)

- ◆ Callus formation occurs in 4 steps:
 - ◆ 1. Swelling of the tissue, no color change
 - ◆ 2. Swollen area begins to turn white
 - ◆ 3. White area begin to crack open (epidermis ruptures).
 - ◆ 4. Rough callus area begins differentiating root initials
- ◆ Soil temperature 65-68° F (18-20° C).
- ◆ Air temperature 65-70° F (18-21° C) nights, 68-72° F (20-22° C) days.
- ◆ To guarantee uniform rooting, the media should be sufficiently moist so that water is easily squeezed out of rooting media.
- ◆ Keep RH 75-90% at the base of the cutting.
- ◆ Use tempered water, 70° F (21°C), in the mist lines since cold water will lower the soil temperature during the day.
- ◆ Maintain high relative humidity in the air surrounding the cutting, 75-90%, to minimize evapotranspiration.
- ◆ Prevent leaf wilting by applying overhead mist or fog.
- ◆ The mist frequency should increase and decrease as the light and ambient temperatures change during the course of the day.
- ◆ During the first 3-5 days frequent night misting may be required.
- ◆ Each wilting episode during stage 2 adds at least one day to the rooting program.
- ◆ Light intensity should be 500-1000 foot-candles.
- ◆ Light intensity above 1000 will increase plant stress due to plant warming.
- ◆ Use retractable shade so that the light intensity can be increased as the cuttings mature.
- ◆ Begin foliar feeding with 50-75 ppm of 20-10-20 as soon as there is any loss in foliage color.
- ◆ Soil pH should be 5.5-6.5 with an EC < 0.5

- ◆ Maintain pH of media leachate at 6.0-6.2.
- ◆ Once 50% of the cuttings begin differentiating root initials, the cuttings are ready to transfer to stage 3.

STAGE 3 Root development (7-9 days)

- ◆ Soil temperature 65-68° F (18-20° C)
- ◆ Air temperature 65-70° F (18-21°C) nights, 68-72° F (20-22°C) days.
- ◆ Once the cuttings begin to form root initials, keep soil relatively moist.
- ◆ Avoid drying out the air since this will increase evapotranspiration which will reduce root zone temperature.
- ◆ To reduce soil moisture:
 - ◆ Reduce the mist application during the dark period.
 - ◆ Reduce the duration and frequency of the mist.
 - ◆ Reduce the amount of water applied per day by delaying the start of the mist period until 9:30 to 11:00 AM and end the mist period earlier than 4:00-5:00 PM.
 - ◆ Begin increasing light intensity to 1500-2000 ftc as the cuttings begin to root out.
- ◆ Foliar feed at 100 ppm nitrogen from 15-0-15 alternating with 20-10-20 then increase rapidly to 200 ppm. Increase the frequency and rate at each application to prevent salt problems.
- ◆ The soil pH should be 5.5-6.5.
- ◆ Soil EC should be around 0.5 mmhos/cm.

STAGE 4 - Plants ready for transplanting or shipping (5-7 days)

- ◆ Air temperatures 65-70° F (18-21° C)
- ◆ Move the liners from the mist area into an area of lower RH, lower temperatures, and higher light intensity.
- ◆ Attempt to duplicate the RH levels found in the production area.
- ◆ A zero DIF is desired.
- ◆ Increase the light intensity to 3000-5000 ftc.
- ◆ Provide shade during the mid point of the day to reduce temperature stress on the crop.
- ◆ Maintain **soil pH** 5.5-6.5 and EC less than 1.0 mmhos/cm.
- ◆ Fertilize at 150-200 ppm nitrogen from 15-10-15 alternating with 20-10-20 twice per week.

BACOPA: *GROWING ON TO FINISH*

TEMPERATURE

- ◆ Night -- 55-60⁰ F (13-16 C)
- ◆ Day -- 65-72⁰ F (18-22⁰ C)
- ◆ Plants will tolerate a wide range of temperatures from 40-80⁰ F (4-26⁰ C).
Temperature determines the growth rate with temperatures above 65⁰ (18⁰C) promoting the most rapid growth while the best quality occurs at temperatures <60⁰ F.
- ◆ Flowering is promoted by temperatures <65°F (18°C).

LIGHT

- ◆ Bacopa grows best in bright shade to full sun.
- ◆ Optimum light is 3,500-5,000 ftc.
- ◆ Low light levels promote stem stretch.
- ◆ Bacopa are day neutral, but flower profusely as the light intensity improves.
During winter when the sunlight is reduced, crops take longer to finish.

MEDIA

- ◆ The media should have good aeration, drainage and water holding capacity.
- ◆ Combinations of peat, bark or perlite are best.
- ◆ A pH of 5.5-6.5 with a high starting charge is desired.

WATER

- ◆ Avoid over watering which results in chlorosis of the growing point. If this condition develops, incorporate additional iron into the mix.

FERTILIZATION

- ◆ Bacopa have a moderate to heavy fertilizer requirement.
- ◆ Constant liquid feed fertilizers like 20-10-20 or 15-0-15 at 200-250 ppm.
- ◆ Incorporation of slow release fertilizer is recommended for continued flowering.
- ◆ If plants become chlorotic, application of iron is recommended.

PINCHING

- ◆ Plants are pinched by hedging the plants back once they are established in the final container.

GROWTH REGULATORS

- ◆ Because of free flowering habit, growth regulators are not necessary.

BACOPA: *POST PRODUCTION CARE*

TEMPERATURE

- ◆ Nights 55-60°F (13-15°C).
- ◆ Day 65-72°F (18-22°C).
- ◆ Flowering is enhanced by night temps below 65°F (18°C).

LIGHT

- ◆ 3500-5000 ftc is the optimal light level. Bacopa grows best in full light to part shade

WATER

- ◆ Keep media medium to dry in moisture. Over watering leads to chlorosis, or *Botrytis*.

BACOPA: COMMON INSECTS AND DISEASES

INSECTS:	DISEASES:
Whiteflies Aphids Fungus gnats Leafminers Thrips	<i>Botrytis</i> <i>Pythium</i> root rot <i>Rhizoctonia</i> stem rot Powdery Mildew

BACOPA: COMMON PROBLEMS AND CAUSES

PROBLEM:	CAUSE:
Plants collapse	-Wet media for extended time period - <i>Pythium</i> or <i>Rhizoctonia</i> due to too deep planting
Excessive vegetative growth	-High nitrogen balance in fertilizer -Over fertilization under low light
Stretched plants	-Low light conditions
Poor branching	-Low fertilization, lack of nitrogen