

Miniature roses (*Rosa ×hybrida*) continue to gain in popularity as greenhouse flowering pot plants. The traditional beauty of roses, their versatility as a gift item and their winter hardiness in most areas are key reasons for their popularity.

We strive to have the best starter plants available in the industry and we are continually evaluating new varieties.

### Product Forms

Oasis and Pinch 'n' Go starter plants are available for year-round production. Added advantages of Pinch 'n' Go starter plants are labor saving, faster take-off and more reliable scheduling.

### Handling Upon Receipt

For best results always unpack and pot liners upon receipt. If necessary, boxed liners can be stored at 35° to 40°F but for no longer than 1 to 2 days. Check plants for moisture prior to storage. If dry, water plants but be sure to allow leaves and stems to dry before storage. Prolonged storage increases the potential for Botrytis, drying and root loss.

For **Oasis liners**, cover the top of the Oasis with 1/8" to 1/4" root medium to prevent water stress that is caused by wicking of water from the Oasis. Irrigate thoroughly after planting with fertilizer solution. Keep Oasis liners moist by misting or syringing for 3 to 4 days to establish new roots into the root medium.

**Pinch 'n' Go** starter pots should be unpacked upon receipt and placed at final spacing for best results. This minimizes the potential for disease and maximizes potential flower development.

### Root Medium and Irrigation

Miniature roses can be produced in most of today's commercial pot mixes. A well-drained root medium is essential. The pH range for good nutrient availability in soilless mixes is 5.8 to 6.3. As with all potted plants, water quality (e.g., alkalinity, nutrient content, etc.) should be known to evaluate the potential effects on plant nutrient availability. Plants should be kept moist at all times, but not soggy. Drying results in leaf loss and poor flower development. Don't let plants dry out.

### Fertilization and CO<sub>2</sub>

Liquid fertilizer at each irrigation should contain 200 to 250 ppm nitrogen from a complete N-P-K fertilizer that contains the majority of nitrogen as the nitrate form and contains extra micronutrients as in the "Peat-Lite Specials" (e.g., 20-10-20, 20-5-19, 21-5-20, etc.). Avoid high ammonia and urea fertilizers, which can inhibit root development and cause foliar chlorosis. If nonleaching systems are used, such as pulse watering, ebb and flow or other subirrigation methods, lower fertilization rate to 100 to 125 ppm nitrogen to reduce soluble salt accumulation.

All roses need **supplemental iron** as they are relatively inefficient in iron uptake compared to other plants. Iron deficiency can result in interveinal chlorosis of upper leaves. Apply 5 to 10 ppm iron from iron chelate with each irrigation or drench every 7 to 10 days at 30 to 50 ppm.

Use lower fertilization rates (125 to 150 ppm nitrogen) during the last 2 to 3 weeks of production or use periodic leaching with clear water.

Miniature rose growth can be increased with supplemental **carbon dioxide (CO<sub>2</sub>)**. Better stem strength, leaf color and flowering results with 800 to 1,000 ppm CO<sub>2</sub>. All other cultural factors (e.g., light, temperature, nutrition) must be optimum for CO<sub>2</sub> benefits to occur.

### Flower Response

Miniature rose flowering is mainly determined by the amount of light and temperature during production. **When lowering night temperatures, lower no more than 3°F every 3 to 4 days to minimize any possible greening of flower centers.** This is partly a genetic effect, but it is also influenced by sudden, drastic changes in light or temperature and excessive nitrogen levels.

### Light and Temperature

Miniature roses should be grown with full sunlight for fastest flowering and highest quality. Supplemental HID lighting is recommended for early spring crops at 350 to 500 footcandles for 13 hours daily. Low light can result in weak stems and flower bud abortion (typically called "blind" shoots).

Temperature greatly affects the rate of plant growth and flowering. Optimum night temperatures are 62° to 65° F with day temperatures of 68° to 70° F. Night temperatures can be as low as 50° F if desired to reduce the rate of development, **however, relative humidity must also be lowered.** Higher temperatures will speed growth and flowering but may cause softer stems and less flower petals.

## Relative Humidity

Relative humidity control is extremely important for this crop since it affects disease development. In general, 60 to 70 percent relative humidity should be maintained to suppress diseases. Higher relative humidity (up to 85 percent) may be used **temporarily** to encourage new shoot development after pinching. Use fog, mist or syringing to raise relative humidity. Use good air circulation and the heating and ventilating of moist air at sundown to lower relative humidity. Avoid leaving foliage wet into the night to reduce the incidence of disease.

## Pinching

Rose liners and Pinch 'n' Go starter pots have been pinched prior to your receipt. Plants can be flowered without further pinching or given as many pinches as desired to create fuller, flowering plants (see options in Crop Planning section). For best branching after transplanting, allow 2 to 3 weeks before your first pinch to establish new root and shoot growth. Oasis liners sometimes need a week longer to establish.

Plants should be pinched or cut back ½" to 1" above the previous pinch. Use shears or other pruners to pinch plants. Subsequent pinches can be made in 3-week intervals in the same manner.

**Special Note:** Occasionally vigorous, succulent growth will occur from the bottom of plants. Such growth is often called "suckers," "bottom breaks" or "water shoots." This growth is good for building up plants for the garden; however, it strongly competes with the rest of the plant for nutrients, water and carbohydrates. Therefore its presence often results in unbalanced, asymmetrical pots. For more symmetrical pot growth, pinch this growth as soon as possible. Remove enough of the tip so that

the remaining shoot is only ¼ to ½ the height of the surrounding plant. If the resulting symmetry is still unacceptable for your market, then you will have to remove the entire shoot in future crops.

## Spacing

Plants may be spaced pot tight until pinching. Then space 4" to 4½" pots at 6" x 8", 6" to 6½" pots at 10" x 12", 8" pots at 14" x 16" and 10" pots at 18" x 20".

## Height Control

Miniature roses are responsive to DIF; however, don't use greater than 5°F negative DIF to avoid weak stems and flowers. Miniature rose breeders are developing varieties with little need for growth regulators. If chemical height control is needed, Bonzi sprays of 30 to 60 ppm have been effective. Better height control is achieved prior to the visible bud stage. First apply when new shoots after pinching are 1" to 1½" long. Reapply every 7 to 10 days until first visible bud. The amount and timing of Bonzi will depend on the variety, temperature, light intensity and other cultural conditions.

**Insect and Mite Control:** Key pests include aphids, spider mites, thrips and whiteflies. Occasionally worms or leafrollers may become pests.

### **Pesticides for Aphids and Whiteflies:**

Decathlon, Distance (whiteflies only), Duraplex, Endosulfan, Flagship, Marathon, Mavrik, Orthene, Talstar and TriStar.

### **Pesticides for Thrips:**

Conserve, Decathlon, Duraplex, Endosulfan, Marathon, Mavrik, Orthene, and Talstar.

### **Pesticides for spider mites:**

Avid, Floramite, M-Pede/Insecticidal soap, Sanmite and Tetrasan.

### **Pesticides for worms or leafrollers:**

Conserve, Crymax, Decathlon, Talstar and Tame (avoid use of Tame on younger plants since phytotoxicity may occur).

**Disease Control:** Disease problems should be anticipated and a **preventative program of sanitation, temperature/relative humidity control and protective fungicides should be implemented.** Severely infected plants should be removed from the growing area. Leaf, stem, flower and soil debris should be cleaned up after each crop. Control temperature and relative humidity as directed. Useful pesticides for disease control are as follows.

**Root rots** can result from the presence of Pythium or Rhizoctonia fungi. Use a protective fungicide combination drench of Subdue MAXX and Cleary's 3336, Subdue MAXX and OHP 6672 or Subdue MAXX and Medallion after potting.

**Powdery Mildew** is characterized by white powdery fungal growth on both upper and lower leaf surfaces. Young leaves and shoot tips become distorted, rendering plants unmarketable. Use a variety of products in rotation to discourage powdery mildew resistance. Useful chemicals include Compass, Systhane, Rubigan, Pipron and Phytan 27. Spray every 10 to 14 days as needed, making sure to cover both upper and lower leaf surfaces. **Temperature and relative humidity control must also be used for best results!**

**Downy Mildew** differs from powdery mildew. It has no white powdery growth and spores of this fungus only form on the lower leaf surface. Cool, moist conditions are necessary for spore development. Major symptoms of downy mildew are sections of yellow and green leaf tissue, giving a variegated

appearance, or all green leaf tissue with a dull, grayish cast. Infected leaves soon drop. Use Aliette, Dithane T/O, Heritage or Protect T/O fungicide sprays if needed. Be sure to cover the lower leaf surface when spraying. **Temperature and relative humidity control must also be used for best results!**

**Botrytis** can be a problem after pinching or during humid storage or shipping conditions. Plants can be destroyed rapidly if Botrytis is not controlled. High humidity and free moisture favor disease development. Use protective fungicides after pinching and prior to shipping or storage. Useful pesticides include Chipco 26GT, Daconil Ultrex, Decree, Medallion and Sextant.

*Before using any pesticides be sure that they are registered for use in your state. Check with your local county extension or state university extension service. See label for use rates and application methods. Always follow label directions.*

### Care and Handling

Harvest miniature roses with a minimum of two open flowers and several buds showing color on small pots. Larger pots should have more open flowers.

Leaf and flower drop can occur during dark shipping conditions. Ship or store at 35° to 40° F for a maximum of 6 days. Higher temperatures can cause bud drop, leaf yellowing and drop and poor flower opening indoors.

Avoid exposure to ethylene sources (vehicle exhaust, fruits, etc.).

### Indoor Care

Provide 100 to 300 footcandles of light (bright reading illumination) and 60° to 65° F night temperatures for best indoor plant maintenance. Lower light levels can result in bud drop.

Keep plants moist, but not soggy, and don't let plants dry out as leaf yellowing and drop can occur. Fertilization is generally not needed while indoors.

Remove old flowers as they fade.

### Garden Care

Plant where plants will receive full sun for at least 6 hours daily. Morning sun is best to allow quicker drying of leaf moisture, which reduces foliar disease. The garden soil should be well drained. Add organic matter if necessary to improve drainage. Good air circulation around plants will also reduce foliage diseases.

Gently loosen the root ball prior to planting. Plant at the same level as in the growing container. Space plants 9 to 12" apart. General garden height of mature plants is 18 to 24".

Keep plants moist; drying causes leaf yellowing and drop. Provide at least 1" of water per week while plants are actively growing. During the growing season, fertilize monthly with a complete N-P-K fertilizer at label rates. Only fertilize actively growing plants. Stop fertilization in August to help condition plants for winter. Spider mites and aphids are common pest problems. They can be forcibly removed from plants with a strong water spray. For spider mites, you will have to direct the

spray to the underside of the leaves. Check your local garden center for recommended pesticides if necessary.

Black spot and powdery mildew are common diseases. Actively growing plants and proper site location (good air circulation and morning sun to help the dew dry quickly from the foliage) will help prevent these diseases. Check your local garden center for recommended pesticides if necessary.

Remove spent blooms to encourage more flower production. Cut back spent flower stems to just above a five-leaflet leaf. In early spring, remove dead or spindly branches and cut back other stems down to about 1/2 to 1".

# Crop Planning

Use the following guidelines for planning your rose crop. Option A will produce fuller pots. Also, for a given pot size, the bigger the liner the fuller the finished pot. Roses flower fastest with higher light and temperature. Florida and Texas production may be 1 week faster than shown.

Liner Form	Planned Activity	4" to 4 ½" Pots		6" to 6½" Pots		8" Patio Pots 8" H. Baskets		10" Patio Pots 10" H. Baskets	
		Option	Option	Option	Option	Option	Option	Option	Option
		A	B	A	B	A	B	A	B
<b>Oasis 12 Strip</b>	# Liners	1	1	1	1	3	2	4	3
3 to 4 Cuttings per liner	# Pinches	1	0	3	2	2	3	2	3
1 Pinch	Wks Plant to 1st Pinch	2-3	-	2-3	2-3	2-3	2-3	2-3	2-3
Shipped 2 to 3 wks after pinch	Wks 1st Pinch to 2nd Pinch	-	-	3	3	3	3	3	3
	Wks 2nd Pinch to 3rd Pinch	-	-	3	-	-	3	-	3
	Wks Last Pinch to Flower	5-8	-	5-8	5-8	5-8	5-8	5-8	5-8
	Wks Total Crop Time	7-11	3-5	13-17	10-14	10-14	13-17	10-14	13-17

Liner Form	Planned Activity	4" to 4 ½" Pots		6" to 6½" Pots		8" Patio Pots 8" H. Baskets		10" Patio Pots 10" H. Baskets	
		Option	Option	Option	Option	Option	Option	Option	Option
		A	B	A	B	A	B	A	B
<b>Pinch 'n' Go</b>	# Liners	1	1	1	1	1	1	2	2
4 to 5 Cuttings per 4½" Pot	# Pinches	1	0	2	1	3	2	3	2
1 Pinch	Wks Plant to 1st Pinch	3	-	3	3	3	3	3	3
Shipped right after pinch	Wks 1st Pinch to 2nd Pinch	-	-	3	-	3	3	3	3
	Wks 2nd Pinch to 3rd Pinch	-	-	-	-	3	-	3	-
	Wks Last Pinch to Flower	5-8	5-8	5-8	5-8	5-8	5-8	5-8	5-8
	Wks Total Crop Time	8-11	5-8	11-14	8-11	14-17	11-14	14-17	11-14



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