

Growing Salvia for Profit

A Commercial Grower's Guide

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I. INTRODUCTION

- A. Salvia, often called Scarlet Sage, belong to the mint family (Labiatae) and are native to Brazil.
- B. They are grown as annuals in the North and perennials in the South.
- C. With their long blooming season, they are good for both cutting and bedding plants. Their brilliant red flower spikes contribute to their long-lasting popularity.
- D. Varieties range in height from 9" to 30"; therefore, short varieties work well as border plants with taller ones used as background.
- E. The shortest cultivars begin blooming in the garden in mid to late June while the taller cultivars bloom in August.
- F. They prefer sun or partial shade; however, the flower spikes of white cultivars tend to burn if grown in full sun during hot weather.

II. CULTIVARS

- A. Most of the popular cultivars belong to *Salvia splendens*. However, *Salvia farinacea* is becoming more popular with the introduction of new dwarf varieties.
- B. Cultivars are grouped by height; the shorter cultivars generally flower earlier than taller cultivars. Therefore, taller cultivars are sold "green", without flowers.
- C. Plants will bloom at 1/2 to 2/3 their garden size when grown in containers or flats.
- D. The most popular color is red; however, salvia are available as orange, white, purple, pink, rose, salmon or bicolor flower spikes.
- E. F₁ hybrids have the advantage of flowering all summer with no mid-season stall.
- F. Current cultivars are listed in Table 1.

Table 1. List of Current Cultivars.

	RED	WHITE	PURPLE	PINK	ROSE	ORANGE	CHERRY	PINK/WHITE
1. Dwarf Varieties (Garden height varies up to 12")								
Baby Salvia	x							
Blow Up	x							
Fireball	x							
Firebird	x							
Flamenco	x							
Hotline	x							
Jetco	x							
North Star	x							
Pixie (F ₁)	x							
Red Baron	x							
Regal Purple				x				
Rodeo	x							
St. John's Fire	x							
Scarlet Pygmy	x							
Scarea Turkestanica	x							
Snow Tip			x					
Vanguard	x							
2. Short Varieties (Garden height 12-18")								
Blaze of Fire	x							
Carabiniere Series	x	x	x				x	x
Caramba	x							
Early Bird	x							
Hot Jazz (Red Pillar)	x							
Hot Pants (F ₁)	x							
Lavender Love				x				
Monarch Bouquet Mixed (<i>S. horminum</i>)					x			
Mood Indigo					x			
Orange Pillar							x	
Purple Blaze				x				
Purple Royal				x				
Red Devil	x							
Red Head	x							
Red Hot Sally	x							

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Table 1. List of Current Cultivars, "continued."

	RED	WHITE	PURPLE	PINK	ROSE	ORANGE	CHERRY	PINK/WHITE
Red Hussar (Bravissimo)	x							
Red Pillar (Hot Jazz)	x							
Red Pompeii	x							
Red Sentinel	x							
Royal Mountie	x							
Sight Delight	x	x	x	x	x			x
Tally Ho	x							
Trail Blazer (F ₁)	x							
White Fire		x						
3. Medium Varieties (Garden height 18-24")								
America (Globe of Fire)	x							
Evening Glow	x							
Firebrand	x							
Fusilier	x							
Grenadier	x							
Regal Spires	x							
Rose Flame					x			
Torch (F ₁)	x							
Violet Flame			x					
4. Tall Varieties (Garden height 25" and taller)								
Bonfire (Early)	x							
Bonfire (Clara Bedman)	x							
Bonfire Elite	x							
Royal Blue				x				
Splendens Tall	x							
5. Salvia Farinaceae								
Blue Bedder 36"				x				
Catina 24"				x				
Regal Purple 24"				x				
Regal White 24"			x					
Royal Blue 36"				x				
Victoria 18"				x				

III. PROPAGATION

A. Seed

1. Salvia are grown primarily from seed. *Salvia splendens* and *Salvia farinaceae* contain approximately 7,500 and 23,500 seeds per ounce, respectively.
2. For best results, use seed from reliable sources and order new seed each year.
3. Store seed in a cool, dry place that is safe from moisture, rodents and insects.

B. Germination media

1. Prepare a fine, porous medium such as peat-lite mix or fine sphagnum with a pH around 6.5. Be sure that it is low in soluble salts, since salvias are particu-

larly sensitive to salts during germination.

2. Do not use soil that has been treated with methyl bromide.

C. Sowing seed

1. Moisten the medium thoroughly before sowing and use a fungicide drench treatment to prevent damping off due to *Rhizoctonia*, *Pythium* and/or *Sclerotinia*.
2. Sow the seed in rows about 2" apart and 1/4 - 3/8" deep.
3. A standard size flat (11½ x 22¼") will require 1/16 to 1/8 ounce (1.75 to 3.5 grams) of seed.
4. Cover seed with 1/4" of fine vermiculite which will allow light to penetrate and keep the seeds moist.

D. Watering

1. Keep the surface of the medium uniformly moist; any moisture fluctuation may result in seedling death.
2. Water carefully, so that seed is not washed away or buried by splashing soil. Use a fine water fog nozzle, an automatic mist system or sub-irrigation.
3. Water should be warm (70°F); cool water (below 60°F) will delay germination.

E. Temperature and humidity

1. Warm temperatures are essential for successful salvia germination. The seed will not germinate well at temperatures below 70°F. Keep the soil temperature above 70°F by applying bottom heat and monitoring it with a soil thermometer.
2. To keep the humidity high, cover the flats with clear polyethylene or glass.
 - a. Since the temperature will be higher under the covering than it is in the greenhouse, remove the polyethylene or glass on very warm or sunny days to prevent excessively high temperatures.
 - b. Covering the flats retains moisture, keeps the humidity high and often eliminates the need for additional watering.
 - c. Remove the covering after germination when seedlings are first visible.

F. Germination

1. Seeds germinate in approximately 12-15 days.

IV. TRANSPLANTING

- #### A. Seedlings can be transplanted about 3 weeks after sowing.

1. "Harden off" seedlings for 3-4 days at

55°F night temperature before transplanting.

2. Transplant when the first true leaves are present or when the seedlings can be handled easily.
 - a. Delayed transplanting results in greater transplant shock; seedlings may stall or remain stunted.
 - b. Crowded seedlings are poorer in quality and do not grow as uniformly after transplanting.
3. Transplant into thoroughly moistened media; do not allow the media to dry out. Water with warm water (70°F).
4. A fungicide drench applied now will help control damping off.
5. Salvia are frequently grown in flats of 36 plants or in 3-4" pots.

B. Growing media

1. A typical bedding plant peat-lite mix (for Michigan; other regions should adjust accordingly) contains the following ingredients:

- 50% peat/50% perlite or 50% peat/50% vermiculite by volume
- 11 bushels peat, 11 bushels vermiculite or perlite per cubic yard*
- 5 pounds fine dolomitic lime
- 2 pounds superphosphate 0-20-0
- 1 pound potassium nitrate
- 2 pounds slow release fertilizer (14-14-14)
- 3 ounces wetting agent
- 4 tablespoons fritted trace elements or equivalent amount of any microelement mix

(* one cubic yard equals 27 cubic feet or 22 bushels. However, since shrinkage occurs in mixing, add 4 bushels for one full yard of mix. Therefore, 26 bushels before mixing will give one yard or 22 bushels after mixing.)

2. A soil-based mix contains the following ingredients:

- 1/3 cubic yard loam soil
- 1/3 cubic yard sphagnum peat
- 1/3 cubic yard perlite
- 2 pounds 0-20-0 superphosphate

(adjust soil pH to 5.8 - 6.0 by adding dolomitic limestone to increase pH or FeSO₄ to lower pH)

3. Whatever type of mix you choose, it must provide good aeration, drainage, and moisture-holding capacity. A peat-lite mix gives the most consistent results.

V. GROWING ON

A. Temperature

1. After transplanting, grow plants at 65°F night temperature for 1 week, then reduce to 55-60°F.
 - a. Salvia grown at 65°F night temperature will be ready for sale one week earlier than those grown at 55°F.
 - b. On cloudy days, the recommended day temperature should be 5° higher than night temperatures and 10-15° higher on sunny days.
2. Reduce temperatures to 55°F night temperature for the final two weeks to improve quality and harden plants. However, salvia will not grow well at temperatures below 55°F.

B. Water

1. Keep salvia on the dry side to get short plants with dark green foliage.
2. Water thoroughly each time to prevent soluble salts buildup.

C. Fertilization

1. Salvia are very sensitive to high soluble salts.
2. Before fertilization, know the pH and soluble salt content of the media. Use a pH meter and solubridge to spot check weekly.
3. Send a sample of initial media mix to a soil testing lab for complete analysis and make necessary adjustments prior to planting.
4. A general recommendation is to fertilize lightly using 200 ppm of 15-16-17 every second watering if using the peat-lite mix described above.

D. Photoperiod and flower initiation

1. Salvia cultivars differ in their response to photoperiod (see Table 2 for cultivar recommendations).
 - a. Cultivars differ in their response to daylength by flowering earlier under short days (SD), long days (LD) or being day neutral.
 - b. The critical photoperiod of 'Bonfire', 'Red Pillar' and 'America', for example, has been shown to be 14-16 hours of dark. 'Red Pillar' flowers approximately 18 days earlier when the daylength is restricted to 9 hours (SD).
 - c. 'Fireball' and 'Carabiniere' are not responsive to daylength, so shading and night lighting are not necessary and will not affect flower time.
 - d. 'St. John's Fire', 'Catima' and 'Firebrand' may flower sooner under 13 hour days (LD).

VII. COMMON PROBLEMS

A. Diseases

1. Damping off

- a. Damping off is caused by *Rhizoctonia*, *Pythium* or *Sclerotinia* organisms and results in the death of seedlings.
- b. It often spreads in a circular pattern through the seed flat; planting the seeds in rows may prevent excessive spreading.
- c. Control by using a steam treatment prior to sowing seed and a fungicide drench just after transplanting seedlings. Do not use methyl bromide.
- d. Be careful not to transplant the seedlings too deeply.

2. Powdery mildew

- a. Appears as a white dusty growth on foliage surface and occurs primarily under humid conditions.
- b. It is spread by wind-borne spores, splashing water, or leaf contact. Therefore, prevent by keeping air circulation high and humidity low.
- c. Powdery mildew can be controlled by using the proper fungicides, such as Benomyl and Benlate.

B. Insects and Mites

1. Red spider mites

- a. Found primarily on the underside of leaves and can cause plants to be chlorotic or necrotic depending on the severity of the infestation.
- b. They weave small webs and reproduce faster in warm weather. Stick to a regular

miticide spray schedule.

2. Aphids

- a. Aphids are light-colored, crawling insects that suck plant juices and cause stunted growth or a general decline in plant vigor.
- b. They often appear on growing tips, flower buds, or under leaves and secrete a sticky honeydew which supports a black sooty mold.

3. White fly

- a. These flying insects have powdery white wings and are primarily found on the underside of leaves.
- b. They suck plant juices and cause a general decline in plant vigor as well as secrete a sticky honeydew which supports a black sooty mold.

C. Nutrient deficiency symptoms

1. Nitrogen deficiency results in yellow lower leaves with necrotic speckling over the top surface and premature defoliation.
2. A deficiency in phosphorous is characterized by foliage which is initially dark green but later develops leaf tip yellowing and burn.
3. Low levels of potassium cause orangeish-yellow colored patches which develop along the leaf margins of lower leaves.
4. Iron deficiency results in interveinal chlorosis of the top growth, especially the new leaves.

Production Schedule (by Week) for Sale of Salvia May 1.

January				February				March				April				May	
WEEK: 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
							<i>Sow</i>			<i>Transplant</i>					<i>Reduce temperature</i>		<i>Sales</i>

Table 2. Effect of Daylength on Flowering of Certain Varieties.

Variety	Days to Flower		Suggested Production Daylength
	SD	LD	
America (Globe of Fire)	59	77	SD
Baby Salvia	56	90+	SD
Blaze of Fire	57	52	LD
Blue Bedder	86	82	LD
Bonfire (Clara Bedman)	64	67	E
Bonfire (Early)	63	72	SD
Bonfire Elite	63	78	SD
Carabiniere Series	62	62	E
Catima	90	75	LD
Evening Glow	52	69	SD
Fireball	59	59	E
Firebrand	77	60	LD
Fuselier	68	62	LD
Grenadier	51	70	SD
Hot Jazz (Red Pillar)	65	83	SD
Hot Pants	58	66	SD
Lavender Love	54	90+	SD
Park's Special Bedding	60	77	SD
Patens	64	58	LD
Purple Blaze	64	68	LD
Red Baron	60	57	E
Red Devil	60	78	SD
Red Head	65	61	E
Red Hussar (Bravissimo)	66	77	LD
Red Pillar (Dwarf)	68	82	SD
Red Pillar (Hot Jazz)	65	83	SD
Red Pompeii	66	82	SD
Rose Flame	57	90+	SD
Royal Blue	86	87	E
Royal Mountie	54	70	SD
St. John's Fire	67	58	LD
Scarlet Pygmy	58	57	E
Scarlet Sage	57	63	E
Sclarea Turkestanica	90+	90+	E
Sight Delight	54	64	SD
Splendens Tall	55	69	SD
Tally Ho	59	49	LD
Titania	56	52	LD
Torch	52	61	SD
Trail Blazer	58	60	E
Vanguard	62	60	E
Violet Flame	62	57	LD
White Fire	64	52	LD

SD = short days LD = long days E = either

2. Regulating daylength

- a. For short day plants, if the natural daylength is longer than 9 hours, pull black cloth or black polyethylene over plants from 5 pm until 8 am. Restrict the light period to 9-hour days from transplant until bud.
- b. For long days, more than 13 hours of light are necessary. If natural daylength is less than 13 hours, light with incandescent bulbs (7 watts/square foot) from 11 pm until 3 am each night.

E. Growth regulators

- 1. Salvia respond to Cycocel (chlormequat), A-Rest (ancymidol) and B-Nine (SADH).

- 2. Spray when the leaf spread is 1½ - 2" or 6-8 weeks after sowing.
- 3. B-Nine (85% active ingredient)
 - a. Use a 0.5% concentration (5,000 ppm) which is 10 teaspoons of the powder formulation to one gallon of water (or 8 ounces per 10 gallons of water).
 - b. Do not water over leaves for 24 hours after applying B-Nine.
 - c. More than one application can cause a delay in flowering.
- 4. Cycocel (11.8% active ingredient)
 - a. Use 1,500 ppm in 2 applications.
 - b. Test treat a few plants of each cultivar first, as foliage burn may occur.
- 5. A-Rest
 - a. Not all cultivars have been tested, so treat a few plants of each cultivar first.
 - b. A rate of 200 ppm has been tried successfully with some cultivars.

F. Carbon dioxide

- 1. CO₂ improves plant quality when applied at 1,000 to 1,500 ppm during the day.

G. Spacing

- 1. Place flat to flat in greenhouse, leaving a 2' wide center aisle. This will utilize 90% of the greenhouse.
- 2. Raise flats off the ground to prevent rooting into the greenhouse floor and to increase air circulation around the plants.

VI. SCHEDULING

A. Total crop time

- 1. Dwarf salvia in packs require approximately 10 weeks at 55°F night temperatures (NT) or 9 weeks when grown at 65°F NT. Check Table 2 for specific cultivars.
- 2. Dwarf salvia in 3-4" pots require 11 weeks at 55°F NT and 10 weeks at 65°F NT.
- 3. Tall cultivars require an extra 10 days and are usually sold "green", without flowers.
- 4. The earliest cultivars will begin flowering 7-8 weeks after sowing.
- 5. 'St. John's Fire' and 'Red Pillar' require 9-10 weeks at 55-60°F.

B. Schedule for pack sales at 55°F NT ready for May 1 sales is as follows:

- Week 8: Sow Seed (70°F)**
- Week 9-10: Germination (70°F)**
- Week 11: Transplant (55°F) (Begin short days, if necessary)**
- Week 16: Harden off (45°NT/50°DT)**
- Week 18: Sales**

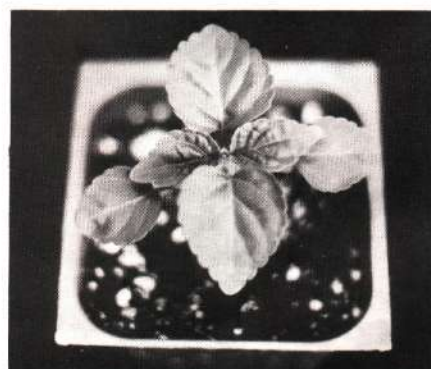
Fig. 1. Weekly stages in development of salvia



WEEK 11 transplant
(seed sown week 8)



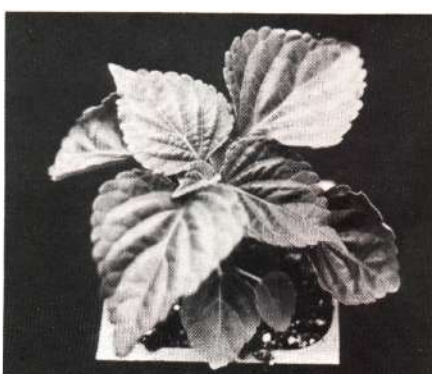
WEEK 12



WEEK 13



WEEK 14



WEEK 15



WEEK 16



WEEK 17



WEEK 18 sale
(total crop time 10 weeks)

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