North Carolina Flower Growers' Bulletin

Volume 41, Number 5
October, 1996

NORTH CAROLINA COMMERCIAL FLOWER GROWERS' ASSOCIATION
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Official Publication of the North Carolina Commercial Flower Growers' Association

Perennials: Basics of Profitable Production (Part I)

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(This is Part I of a series on perennial production basics. The remaining portion of this article will appear in future issues of the Bulletin.)

There is an old saying that "those who can, do; those that can't do, teach; those that can't teach, coach; and those that can't coach, cheer." With respect to perennials, I fall somewhere between the teaching and coaching categories, yet Holly has had much more experience with perennials. We have tried to pull together information from those who are more experienced in the art and science of perennial production, and this handout is a compilation of that research.

Before we plunge into production technology, it may be useful to try and gain some appreciation for the perennial industry and to examine how a grower may approach entering the perennial market. As with any crop, gaining a perspective and planning are as important as actual production.

Perennials: A Perspective

Producing perennials as a greenhouse crop is easily justified, given the popularity of the plants with the public. Perennials offer more variety in product lines, extend sales windows later into summer (than many annuals), and in most cases they can be "plugged into" existing production facilities and systems designed for production of annual bedding plants. However, just as a grower would carefully plan the annual mix prior to spring sales, a perennial plan is also required. Where do you begin? Three basic questions need to be addressed before you decide what (if anything) you can produce profitably: ❶ What market(s) is / are available; ❷ What products are needed; and ❸ When are products needed?

Marketing Channels: You may already have established which markets are best for you to supply and if so you shouldn't change just for a portion of your product line. There are drastic differences between growing for mass market outlets and growing for retail garden centers with respect to perennials, and your product line will vary with each market. Growing for landscaper clientele will also affect both species and product sizes offered.

Table 1. Top-selling perennial genera in 1993.*

Rank	Genera
1	*Hosta*
2	*Hemerocallis*
3	*Coreopsis*
4	*Astilbe*
5	Grasses
6	*Phlox*
7	*Rudbeckia*
8	*Chrysanthemum*
9	Herbs
10.5	*Sedum*
10.5	*Delphinium*
12	*Geum*
13.5	*Echinacea*
13.5	Ferns
16	*Veronica*
16	*Dianthus*
16	*Dicentra*
19	*Salvia*
19	*Iris*
19	*Heuchera*

*From Rhodus, 1995.

We conducted an informal survey by talking to producers supplying mass market outlets and by visiting mass market outlets in the area. Product size ranged from 4 inch material up to 3 gallon containers; the majority being 1 gallon material. Most mass merchandisers (and their suppliers) offered only the most popular genera and a fairly narrow selection of perennials. The most species we counted in the mass marketplace was 42; the average was 23.

A study conducted by Charles Safley (Department of Agriculture and Resource Economics, NCSU) in 1991 examined the purchases customers made during the spring season at 18 garden centers located in five geographical regions across North Carolina. Plant purchases were categorized as indoor plants, herbs, trees & shrubs, perennials, annuals, hanging baskets, and vegetables. Results of the survey indicated that a significant number of customers (16%) did indeed purchase perennials (Figure 1). The total value of perennial purchases only accounted for 10.6% of plants sales (Figure 2), but there were more species of perennials (76) sold than any other plant category; even more than trees & shrubs (Figure 3). Retail garden centers sell a much larger selection of perennials than mass merchandisers and if you intend to address this market, your product mix should be much greater than for mass merchandisers.

Another expanding part of the wholesale market is the use of perennials in public and municipal plantings. Characteristics that have won over landscapers and state DOT's include salt tolerance; erosion control potential; no mowing requirements; and early- mid-, and late-season bloom periods. Day lilies, hostas, *Rudbeckia*, and perennial *Helianthus* are among the favorites for large-scale displays and roadside plantings. Established 1 and 3 gallon sizes are preferred for these high impact (and often high stress) situations.

Product Line: Various surveys conducted over the past few years have yielded valuable information as to the most popular perennial genera, species, and cultivars (Tables 1, 2, and 3). These lists should give you a good starting point in deciding which perennials may be worth producing.

Growers should keep abreast of the "fashion trends" in perennials. A single article in a magazine such as Southern Living highlighting a particular genus, species, or cultivar nearly always results in instantaneous sellouts and increased demand for the featured perennial. Perennial buyers are becoming increasingly more sophisticated and knowledgeable; requesting new and unusual offerings from their local garden center.

But hand in hand with popularity goes current availability and competition. There's no need to produce it if the market is already saturated. Be aware your competition now includes a significant number of container nurseries. Traditional bastions of woody plant production are now delving into herbaceous perennials with gusto.

The product mix of woodies, ornamental grasses, and perennials offers one-stop shopping for retail outlets and landscapers looking for material.

With respect to product sizes, it appears that 4 to 5 inch material is more popular during the spring sales period and larger (1 and 3 gallon) containers fare better during summer sales. However, most retailers offer gallons during the spring season as well as smaller material.

Dale Groff of Greenleaf Enterprises asks the following questions to help decide whether or not to produce a new item:

❶ Is there presently a demand for the item, or can we create a sufficient demand easily?
❷ Can we produce the item in sufficient quantity to meet the marketing window?
❸ Will this item be a true perennial for most of the markets we address?
❹ Is this item susceptible to diseases and / or insects?
❺ If vegetatively propagated, will this item require a great amount of stock plants in proportion to cuttings produced?
❻ If seed propagated, is there seed available, and at a reasonable cost?
❼ Does this item need to be held for a long period of time?
❽ Can this item be sold at a profit?

Product Availability: The traditional picture of perennial production included crops in large

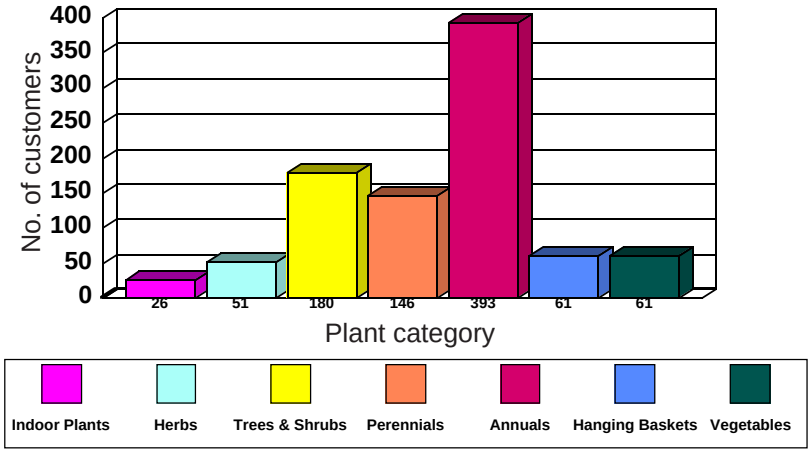

Figure 1. Number of customers purchasing plants in each plant

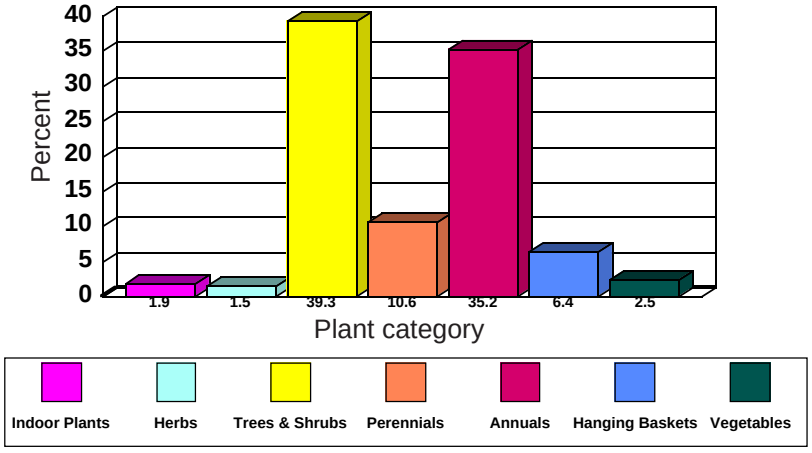

Figure 2. Percent (of $) of total plant sales.

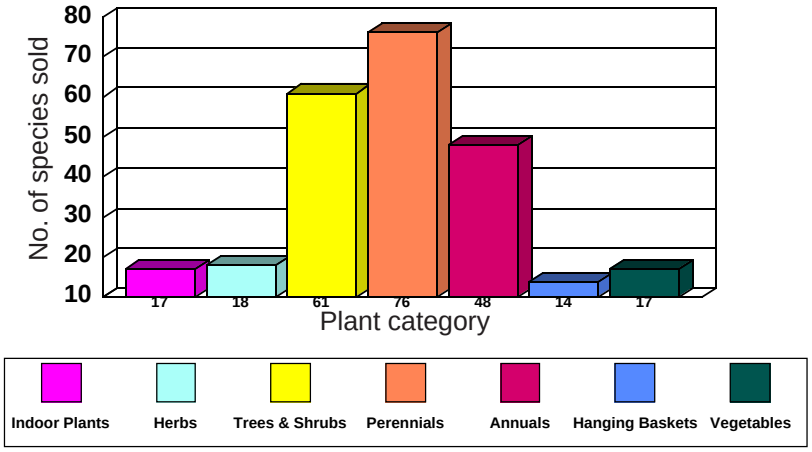

Figure 3. Number of species sold in each plant category.

Table 2. Top-selling seed perennials at C. Raker and Sons, 1994–1995.*

Rank	Cultivar
1	*Iberis sempervirens* 'Snowflake'
2	*Leucanthemum* x *superbum*** 'Snow Lady'
3	*Rudbeckia fulgida* 'Goldsturm'
4	*Coreopsis grandiflora* 'Early Sunrise'
5	*Echinacea pupurea* 'Bravado'
6	*Heuchera micrantha* 'Palace Purple'
7	*Gaillardia* x *grandiflora* 'Goblin'
8	*Lavandula angustifolia* 'Munstead Dwarf'
9	*Dianthus deltoides* 'Zing Rose'
10	*Primula* x *polyantha* 'Pacific Giants Mixed'
11	*Platycodon grandiflorus* 'Sentimental Blue'
12	*Delphinium* x *elatum* 'Magic Fountains Mix'
13	*Heuchera sanguinea* 'Bressingham Hybrids'
14	*Campanula carpatica* 'Blue Clips'
15	*Leucanthemum* x *superbum*** 'Alaska'

*From Karlovich, 1995.

**Shasta daisy was formerly *Chrysanthemum* x *superbum.*

containers outdoors which were overwintered for spring sales. Plants would often be sold green. The market has now expanded to include sales of non-cooled plants in the fall, non-cooled plants in the spring (green; no flowers at sales), and cooled plants in the spring in smaller containers for gardeners and landscapers. Your product availability should be based on sales potential for a given period.

It is possible to force many species of perennials into bloom for spring sales. It may also be beneficial to force some summer-flowering perennials into bloom during the spring sales period to help customers see what the final product will look like later in the season.

(To be Continued)

Table 3. Top 25 perennials sold at Greenleaf Enterprises, Leola, Pennsylvania.

Rank	Sorted by variety	Source	Sorted by genus
1	*Artemisia schmidtiana* 'Silver Mound'	Cuttings	*Phlox*
2	*Phlox subulata* 'Emerald Blue'	Cuttings	*Coreopsis*
3	*Coreopsis verticillata* 'Moonbeam'	Cuttings	*Artemisia*
4	*Phlox subulata* 'Emerald Pink'	Cuttings	*Sedum*
5	*Rudbeckia fulgida* 'Goldsturm'	Cuttings	*Dianthus*
6	*Phlox subulata* 'White Delight'	Cuttings	*Iberis*
7	*Coreopsis rosea* 'Nana'	Cuttings	*Aster*
8	*Ceratostigma plumbaginoides*	Cuttings	*Achillea*
9	*Iberis sempervirens* 'Alexander White'	Cuttings	*Rudbeckia*
10	*Sedum* x 'Autumn Joy'	Cuttings	*Veronica*
11	*Phlox subulata* 'Scarlet Flame'	Cuttings	Shasta Daisy
12	*Veronica longifolia* 'Sunny Border Blue'	Cuttings	*Ceratostigma plumbaginoides*
13	*Primula* x *polyantha* 'Pacific Giants'	Seed	*Anemone*
14	*Coreopsis verticillata* 'Zagreb'	Cuttings	*Gypsophila*
15	*Phlox subulata* 'Red Wings'	Cuttings	*Monarda*
16	*Aster* x *frikartii* 'Monch'	Cuttings	Poppy
17	*Hypericum calycinum*	Both	*Lythrum*
18	*Dianthus gratianopolitanus* 'Tiny Rubies'	Cuttings	*Echinacea*
19	*Dianthus gratianopolitanus* 'Spotty'	Cuttings	*Salvia*
20	*Lythrum virgatum* 'Morden Pink'	Cuttings	*Campanula*
21	*Artemisia ludoviciana* 'Silver King'	Cuttings	*Gaillardia*
22	*Leucanthemum* x *superbum*** 'Snow Lady'	Seed	*Hypericum*
23	*Hypericum patulum* 'Hidcote'	Cuttings	*Delphinium*
24	*Perovskia atriplicifolia*	Cuttings	*Aquilegia*
25	*Veronica spicata* 'Red Fox'	Cuttings	*Oenothera*

*From Groff, 1991.

**Shasta daisy was formerly *Chrysanthemum* x *superbum.*

PESTICIDES LABELED FOR GREENHOUSE ORNAMENTAL INSECT AND RELATED PEST CONTROL

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This table lists pesticides currently labeled for use in commercial floriculture greenhouses for use on ornamental plants. Unless noted in the precautions and remarks column, the pesticide listed is labeled for any greenhouse flower or foliage plant. Read individual labels for any restrictions on use prior to application; labels do change. The abbreviation "NA" stands for not applicable; used when a column is not applicable for a product. Do not confuse volume rates (given in fluid ounces [fl oz]; 8 fl oz = 1 cup) with weight rates (given in avoirdupois ounces [oz]; 16 oz = 1 pound [lb]). Do not equate 1 fl oz with 1 oz; many dry products such as wettable powders should be weighed out for precise concentrations. Other volume and weight abbreviations used include: Tablespoon (Tbsp), teaspoon (tsp), pint (pt), gallon (gal), and pound (lb). Aerosol product and vaporized product application rates are based on either greenhouse area (ft^2) or greenhouse volume (ft^3).

†Pesticide classifications: BO - botanical; CA - carbamate; CH - chlorinated hydrocarbon; DI - Diphenyl; IGR - insect growth regulator; MI - microbial; OP - organophosphate; PY - pyrethroid

Pesticide formulations: A - aerosol (includes compressed total release products and smoke generator products); AS - aqueous suspension; D - dust; DF - dry flowable; EC - emulsifiable concentrate; F - flowable; G - granular; L - water-soluble liquid; ME - microencapsulated; P - pelleted; SP - soluble powder; WG - water-dispersible granules; WP - wettable powder; WSP - water-soluble packets.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Aphids	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	1 to 2 tsp NA -- Aerosols	1/3 to 2/3 lb NA -- Aerosols	See product label See product label	Orthene 75 soluble powder is also available for use on tobacco. When spraying ornamental plants, be sure to use Orthene Tree, Turf and Ornamentals product. Apply total release aerosols using a rate of 1 lb per 1,500 to 3,000 ft^2. Treat as late in the day as possible. Apply directed spray aerosol using a release rate of 5 to 10 seconds per 100 ft^2.
	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC) 4.5 EC (Neemazad)	 2 1/2 to 5 tsp 1/2 tsp 1/8 to 1/4 tsp	 40 to 80 fl oz 8 fl oz 2 1/4 to 4 1/2 fl oz	 4 hours 4 hours 4 hours	
	Beauveria bassiana -- MI 7.16 EC (Naturalis-O)	2 tsp to 2 Tbsp	30 to 100 fl oz	4 hours	Three to 5 sprays needed for adequate control.
	bendiocarb -- CA 76 WP (Dycarb, Ficam, Turcam)	1 Tbsp	12 to 20 oz	See product label	Avoid excessive runoff. Labeled for chrysanthemums only.
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	 1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	 6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	 See product label See product label See product label	Apply aerosol using a rate of 1 lb per 1,500 to 3,000 ft^2. Treat as late in the day as possible. Building should be vented before reentry.
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	1/2 to 1 Tbsp	1 1/2 to 3 pt	12 hours	

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Aphids, continued	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	diazinon -- OP 23 EC (Knox-Out)	1 to 2 Tbsp	3 to 6 pt	See product label	Diazinon should not be applied directly to open blooms; it is not labeled for use on poinsettias.
	dichlorvos -- OP 5 A (Vapona)	NA -- Smoke Generator	NA -- Smoke Generator	See product label	Dichlorvos may damage chrysanthemum varieties Shasta, Pink Champagne, and Nightingale.
	endosulfan -- CH 24.2 EC (Thiodan) 50 WP (Thiodan) 5 A (Thiodan)	2 tsp 1 Tbsp NA -- Smoke Generator	2 pt 1 lb NA -- Smoke Generator	24 hours 24 hours See product label	Apply as needed. Repeat applications may be necessary. Thiodan is phytotoxic to some varieties of geraniums and chrysanthemums.
	fenoxycarb -- IGR 0.6 A (PT 2100 Preclude)	NA -- Aerosol	NA -- Aerosol	See product label	Apply aerosol using a rate of 1 lb per 1,500 to 3,000 ft^2. Treat as late in the day as possible. Building should be vented before reentry.
	fenpropathrin -- PY 30 EC (Tame)	2/3 tsp	10 2/3 fl oz	See product label	Can be used with 1/3 lb per 100 gallons acephate (Orthene Turf, Tree and Ornamental 75 SP).
	fluvalinate -- PY 22.3 F (Mavrik)	1/8 to 5/8 tsp	2 to 10 fl oz	See product label	Also labeled as a plant dip.
	horticultural oil -- Other 98.8 EC (Ultra Fine, Sun Spray)	2 1/2 to 5 Tbsp	1 to 2 gallons	4 hours	Oil is a contact killer of pests; thorough coverage is required. May cause foliar injury if sprayed during extremely humid conditions.
	imidacloprid -- Other 1 G (Marathon)	NA -- Granular	NA -- Granular	12 hours	Can be incorporated into substrate at 3 lb per yd^3; broadcast over flats at 9 to 15 oz per 1,000 ft^2; or surface applied to pots (rate varies with pot size -- use 1/3 tsp (1.3 grams) per 6" pot).
	kinoprene -- IGR 65.1 EC (Enstar II)	1/2 to 2/3 tsp	5 to 10 fl oz	4 hours	
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	—	1 to 4 packets	24 hours	
	lindane -- CH 25 WP (Lindane)	1 Tbsp	1 lb	See product label	
	malathion -- OP 25 WP (Malathion) 57 EC (Malathion)	2 tsp 2 tsp	40 oz 2 pt	See product label See product label	Malathion may injure begonia, crassula, ferns, petunia, orchids, pansy, African violet, gloxinia, some red carnations, and some rose varieties.
	methiocarb -- CA 75 WP (Mesurol)	2 to 4 tsp	1 to 2 lb	24 hours	Up to 4 applications per season. Not for use in the landscape.
	naled -- OP 58 EC (Dibrom)	NA --Vaporized	NA -- Vaporized	24 hours	Apply on steam pipes at rate of 1 fl oz per 10,000 ft^3 of greenhouse volume. Then heat pipes to 160 °F. Naled will corrode pipes with continued use. Naled vapor treatment may injure 'White Butterfly' and 'Golden Rapture' rose, 'Pink Champagne' chrysanthemums, wandering jew, poinsettias, and Dutchman's pipe.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Aphids, continued	nicotine sulfate -- Other 40 EC (Nicotine Sulfate)	1 1/2 tsp	1 1/2 pt	See product label	Nicotine sulfate will damage young chrysanthemums and lilies.
	oxamyl -- CA 24 L (Vydate L) 10 G (Oxamyl)	2 to 4 tsp NA -- Granules	2 to 4 pt NA -- Granules	See product label See product label	Ornamental uses of Vydate L are being phased out. Apply 22 to 30 oz of Oxamyl granules per 1,000 ft^2. Equates into 1/8 tsp per 6" to 10" azalea-depth pot.
	permethrin -- PY 36.8 EC (Astro)	1/4 to 1/2 tsp	4 to 8 fl oz	24 hours	
	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	1/8 to 1 1/2 tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	Pyrethrins are not recommended for use directly on open blooms or on bracts showing color. Apply PT 1100 using a rate of 1 lb per 3,000 ft^2. Treat as late in the day as possible. Ventilate prior to reentry.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	1 tsp NA -- Aerosols	1 pt NA -- Aerosols	See product label See product label See product label	Apply PT 1200 TR using a rate of 1 lb per 1,500 to 3,000 ft^2. Treat as late in the day as possible. Ventilate prior to reentry. Apply PT 1200 DS using a release rate of 5 to 10 seconds per 100 ft^2.
	soap -- Other 25 EC (Olympic Insecticidal) 49 EC (M-Pede) 49.5 EC (Olympic Insecticidal)	2 1/2 to 5 fl oz 1 1/4 to 2 1/2 fl oz 2 1/2 fl oz	--- 1 to 2 gal 2 gal	See product label 12 hours 12 hours	Do not apply more than two times consecutively; too frequent of applications can cause foliar discoloration.
	sulfotepp -- OP 15 A (Dithio, Plantfume 103)	NA -- Smoke Generator	NA -- Smoke Generator	See product label	Consult product label for recommended rates.
Armyworms	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	1 to 2 tsp NA -- Aerosols	1/3 to 2/3 lb NA -- Aerosols	See product label See product label	See aphids section for comments.
	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC) 4.5 EC (Neemazad)	2 1/2 to 5 tsp 1/2 tsp 1/8 to 1/4 tsp	40 to 80 fl oz 8 fl oz 2 1/4 to 4 1/2 fl oz	4 hours 4 hours 4 hours	
	Bacillus thuringiensis -- MI 3.2 AS (Dipel) 15 AS (Victory)	1 to 2 tsp 2 1/2 to 5 tsp	1 to 2 pt 40 to 80 fl oz	4 hours 4 hours	
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	See product label See product label See product label	See aphids section for comments.
	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	diflubenzuron -- IGR 25 WSP (Adept)	---	4 to 8 packets	12 hours	Apply at a volume of 1 gallon of final solution per 200 ft^2.
	fluvalinate -- PY 22.3 F (Mavrik)	1/8 to 5/8 tsp	2 to 10 fl oz	See product label	See aphids section for comments.
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	---	1 to 4 packets	24 hours	

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Armyworms continued	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	1/8 to 1 1/2 tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	See aphids section for comments.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	1 tsp NA -- Aerosols	1 pt NA -- Aerosols	See product label See product label See product label	See aphids section for comments.
Beet Armyworm	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	1/2 to 1 Tbsp	1 1/2 to 3 pt	12 hours	
	fenpropathrin -- PY 30 EC (Tame)	2/3 tsp	10 2/3 fl oz	See product label	See aphids section for comments.
	permethrin -- PY 36.8 EC (Astro)	1/4 to 1/2 tsp	4 to 8 fl oz	24 hours	
Broad Mite	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	See product label See product label See product label	See aphids section for comments.
	dienochlor -- CH 50 WP (Pentac) 38 F (Pentac)	1 tsp 1/2 tsp	8 oz 8 fl oz	See product label See product label	Repeat pentac applications in 5 to 14 days for effective control.
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	—	2 to 4 packets	24 hours	
	pyridaben -- DI 75 WP (Sanmite)	—	2 to 4 oz	12 hours	Do not exceed 10.5 oz of product per acre per application.
Brown Soft Scale	bendiocarb -- CA 76 WP (Dycarb, Ficam, Turcam)	3/4 Tbsp	5 1/2 oz	See product label	Avoid excessive runoff.
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	See product label See product label See product label	See aphids section for comments.
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	—	2 to 4 packets	24 hours	
	sulfotepp -- OP 15 A (Dithio, Plantfume 103)	NA -- Smoke Generator	NA -- Smoke Generator	See product label	See aphids section for comments.
Cabbage Looper	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	1 to 2 tsp NA -- Aerosols	1/3 to 2/3 lb NA -- Aerosols	See product label See product label	See aphids section for comments.
	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC) 4.5 EC (Neemazad)	2 1/2 to 5 tsp 1/2 tsp 1/8 to 1/4 tsp	40 to 80 fl oz 8 fl oz 2 1/4 to 4 1/2 fl oz	4 hours 4 hours 4 hours	
	Bacillus thuringiensis -- MI 3.2 AS (Dipel) 15 AS (Victory)	1 to 2 tsp 2 1/2 to 5 tsp	1 to 2 pt 40 to 80 fl oz	4 hours 4 hours	
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	1/2 to 1 Tbsp	1 1/2 to 3 pt	12 hours	
	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Cabbage Looper, continued	diazinon -- OP 23 EC (Knox-Out)	1 to 2 Tbsp	3 to 6 pt	See product label	See aphids section for comments.
	dichlorvos -- OP 5 A (Vapona)	NA -- Smoke Generator	NA -- Smoke Generator	See product label	See aphids section for comments.
	fluvalinate -- PY 22.3 F (Mavrik)	1/8 to 5/8 tsp	2 to 10 fl oz	See product label	See aphids section for comments.
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	---	1 to 4 packets	24 hours	
	naled -- OP 58 EC (Dibrom)	NA --Vaporized	NA -- Vaporized	24 hours	See aphids section for comments.
	permethrin -- PY 36.8 EC (Astro)	1/4 to 1/2 tsp	4 to 8 fl oz	24 hours	
	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	1/8 to 1 1/2 tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	See aphids section for comments.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	1 tsp NA -- Aerosols	1 pt NA -- Aerosols	See product label See product label See product label	See aphids section for comments.
Caterpillars	*Beauveria bassiana* -- MI 7.16 EC (Naturalis-O)	2 tsp to 2 Tbsp	30 to 100 fl oz	4 hours	See aphids section for comments.
	azadirachtin -- BO 4.5 EC (Neemazad)	1/8 to 1/4 tsp	2 1/4 to 4 1/2 fl oz	4 hours	
	soap -- Other 25 EC (Olympic Insecticidal)	2 1/2 to 5 fl oz	---	See product label	See aphids section for comments.
Chrysanthemum Gall Midge	lindane -- CH 25 WP (Lindane)	1 Tbsp	1 lb	See product label	For use on chrysanthemums only. Weekly applications may be needed.
Crickets	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	1/2 to 1 Tbsp	1 1/2 to 3 pt	12 hours	
	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	---	1 to 4 packets	24 hours	
	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	1/8 to 1 1/2 tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal) 49 EC (M-Pede) 49.5 EC (Olympic Insecticidal)	2 1/2 to 5 fl oz 1 1/4 to 2 1/2 fl oz 2 1/2 fl oz	--- 1 to 2 gal 2 gal	See product label 12 hours 12 hours	See aphids section for comments.
Cucumber Beetle	*Beauveria bassiana* -- MI 7.16 EC (Naturalis-O)	2 tsp to 2 Tbsp	30 to 100 fl oz	4 hours	See aphids section for comments.
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	See product label See product label See product label	See aphids section for comments.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Cucumber Beetle, continued	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	1/2 to 1 Tbsp	1 1/2 to 3 pt	12 hours	
	fluvalinate -- PY 22.3 F (Mavrik)	1/8 to 5/8 tsp	2 to 10 fl oz	See product label	See aphids section for comments.
	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	1/8 to 1 1/2 tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	See aphids section for comments.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	1 tsp NA -- Aerosols	1 pt NA -- Aerosols	See product label See product label See product label	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal)	2 1/2 to 5 fl oz	---	See product label	See aphids section for comments.
Cutworms	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	1 to 2 tsp NA -- Aerosols	1/3 to 2/3 lb NA -- Aerosols	See product label See product label	See aphids section for comments.
	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC)	2 1/2 to 5 tsp 1/2 tsp	40 to 80 fl oz 8 fl oz	4 hours 4 hours	
	Bacillus thuringiensis -- MI 3.2 AS (Dipel) 15 AS (Victory)	1 to 2 tsp 2 1/2 to 5 tsp	1 to 2 pt 40 to 80 fl oz	4 hours 4 hours	
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	See product label See product label See product label	See aphids section for comments.
	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	fluvalinate -- PY 22.3 F (Mavrik)	1/8 to 5/8 tsp	2 to 10 fl oz	See product label	See aphids section for comments.
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	---	1 to 4 packets	24 hours	
	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	1/8 to 1 1/2 tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	See aphids section for comments.
Cyclamen Mite	endosulfan -- CH 24.2 EC (Thiodan) 50 WP (Thiodan) 5 A (Thiodan)	2 tsp 1 Tbsp NA -- Smoke Generator	2 pt 1 lb NA -- Smoke Generator	24 hours 24 hours See product label	See aphids section for comments.
Earwigs	soap -- Other 49 EC (M-Pede) 49.5 EC (Olympic Insecticidal)	1 1/4 to 2 1/2 fl oz 2 1/2 fl oz	1 to 2 gal 2 gal	12 hours 12 hours	See aphids section for comments.
Fungus Gnats	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC)	2 1/2 to 5 tsp 1/2 tsp	40 to 80 fl oz 8 fl oz	4 hours 4 hours	
	Bacillus thuringiensis -- MI 3.2 AS (Dipel) 15 AS (Victory)	1 to 2 tsp 2 1/2 to 5 tsp	1 to 2 pt 40 to 80 fl oz	4 hours 4 hours	

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Fungus Gnats, continued	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	 1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	 6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	 See product label See product label See product label	See aphids section for comments.
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	1/2 to 1 Tbsp	1 1/2 to 3 pt	12 hours	
	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	diazinon -- OP 23 EC (Knox-Out)	1 to 2 Tbsp	3 to 6 pt	See product label	See aphids section for comments.
	diflubenzuron -- IGR 25 WSP (Adept)	---	2 packets	12 hours	Apply at a volume of 1 to 3 gallons of final solution per 100 ft^2.
	fenoxycarb -- IGR 25 WP (Precision)	1/2 tsp	4 oz	See product label	
	kinoprene -- IGR 65.1 EC (Enstar II)	1/2 to 2/3 tsp	5 to 10 fl oz	4 hours	Enstar II is for larvae control only.
	nematodes (*steinernema carpocapsae*) -- Other 17 AS (Exhibit)	---	---	See product label	Apply 1 gallon per 10,000 ft^2 for larvae control. Make three applications, each 7 days apart for best results.
	oxamyl -- CA 24 L (Vydate L) 10 G (Oxamyl)	 2 to 4 tsp NA -- Granules	 2 to 4 pt NA -- Granules	 See product label See product label	See aphids section for comments.
	permethrin -- PY 36.8 EC (Astro)	1/4 to 1/2 tsp	4 to 8 fl oz	24 hours	See beet armyworm for comments.
	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	1/8 to 1 1/2 tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	See aphids section for comments.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	1 tsp NA -- Aerosols	1 pt NA -- Aerosols	See product label See product label See product label	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal)	2 1/2 to 5 fl oz	---	See product label	See aphids section for comments.
Hemispherical Scale	bendiocarb -- CA 76 WP (Dycarb, Ficam, Turcam)	3/4 Tbsp	5 1/2 oz	See product label	Avoid excessive runoff.
Leafhoppers	*Beauveria bassiana* -- MI 7.16 EC (Naturalis-O)	2 tsp to 2 Tbsp	30 to 100 fl oz	4 hours	See aphids section for comments.
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	 1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	 6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	 See product label See product label See product label	See aphids section for comments.
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	1/2 to 1 Tbsp	1 1/2 to 3 pt	12 hours	
	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	fenpropathrin -- PY 30 EC (Tame)	1/3 to 2/3 tsp	5 1/3 to 10 2/3 fl oz	See product label	See aphids section for comments.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Leafhoppers, continued	lambda-cyhalothrin -- PY 10 WSP (Topcide)	—	1 to 4 packets	24 hours	
	malathion -- OP 25 WP (Malathion) 57 EC (Malathion)	 2 tsp 2 tsp	 40 oz 2 pt	 See product label See product label	See aphids section for comments.
	permethrin -- PY 36.8 EC (Astro)	 1/4 to 1/2 tsp	 4 to 8 fl oz	 24 hours	See beet armyworm for comments.
	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	 1/8 to 1 1/2 tsp NA -- Aerosol	 2 to 12 fl oz NA -- Aerosol	 See product label See product label	See aphids section for comments.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	 1 tsp NA -- Aerosols	 1 pt NA -- Aerosols	 See product label See product label See product label	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal) 49.5 EC (Olympic Insecticidal)	 2 1/2 to 5 fl oz 2 1/2 fl oz	 — 2 gal	 See product label 12 hours	See aphids section for comments.
Leafminers	abamectin B_1 -- Other 2 EC (Avid)	 1/2 tsp	 8 fl oz	 See product label	Do not use on ferns or conifers.
	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	 1 to 2 tsp NA -- Aerosols	 1/3 to 2/3 lb NA -- Aerosols	 See product label See product label	See aphids section for comments.
	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC) 4.5 EC (Neemazad)	 2 1/2 to 5 tsp 1/2 tsp 1/8 to 1/4 tsp	 40 to 80 fl oz 8 fl oz 2 1/4 to 4 1/2 fl oz	 4 hours 4 hours 4 hours	
	bendiocarb -- CA 76 WP (Dycarb, Ficam, Turcam)	 3/4 Tbsp	 5 1/2 oz	 See product label	Avoid excessive runoff.
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	 1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	 6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	 See product label See product label See product label	See aphids section for comments.
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	 1/2 to 1 Tbsp	 1 1/2 to 3 pt	 12 hours	
	cyromazine -- IGR 75 WP (Citation)	 —	 2 2/3 oz	 See product label	Must wear protective clothing when harvesting. Labeled for chrysanthemum only.
	diazinon -- OP 23 EC (Knox-Out)	 1 to 2 Tbsp	 3 to 6 pt	 See product label	See aphids section for comments.
	dichlorvos -- OP 5 A (Vapona)	 NA -- Smoke Generator	 NA -- Smoke Generator	 See product label	See aphids section for comments.
	malathion -- OP 25 WP (Malathion) 57 EC (Malathion)	 2 tsp 2 tsp	 40 oz 2 pt	 See product label See product label	See aphids section for comments.
	oxamyl -- CA 24 L (Vydate L) 10 G (Oxamyl)	 2 to 4 tsp NA -- Granules	 2 to 4 pt NA -- Granules	 See product label See product label	See aphids section for comments.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Leafminers, continued	permethrin -- PY 36.8 EC (Astro)	1/4 to 1/2 tsp	4 to 8 fl oz	24 hours	See beet armyworm for comments.
Leaf Rollers	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	1 to 2 tsp NA -- Aerosols	1/3 to 2/3 lb NA -- Aerosols	See product label See product label	See aphids section for comments.
	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC)	2 1/2 to 5 tsp 1/2 tsp	40 to 80 fl oz 8 fl oz	4 hours 4 hours	
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	See product label See product label See product label	See aphids section for comments.
	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	diazinon -- OP 23 EC (Knox-Out)	1 to 2 Tbsp	3 to 6 pt	See product label	See aphids section for comments.
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	—	1 to 4 packets	24 hours	
	naled -- OP 58 EC (Dibrom)	NA --Vaporized	NA -- Vaporized	24 hours	See aphids section for comments.
	pyrethrins -- BO 6 EC (Pyrenone)	1/8 to 1 1/2 tsp	2 to 12 fl oz	See product label	See aphids section for comments.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	1 tsp NA -- Aerosols	1 pt NA -- Aerosols	See product label See product label See product label	See aphids section for comments.
Mealybugs	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	1 to 2 tsp NA -- Aerosols	1/3 to 2/3 lb NA -- Aerosols	See product label See product label	See aphids section for comments.
	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC) 4.5 EC (Neemazad)	2 1/2 to 5 tsp 1/2 tsp 1/8 to 1/4 tsp	40 to 80 fl oz 8 fl oz 2 1/4 to 4 1/2 fl oz	4 hours 4 hours 4 hours	
	bendiocarb -- CA 76 WP (Dycarb, Ficam, Turcam)	3/4 Tbsp	5 1/2 oz	See product label	Avoid excessive runoff.
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	See product label See product label See product label	See aphids section for comments.
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	1/2 to 1 Tbsp	1 1/2 to 3 pt	12 hours	
	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	diazinon -- OP 23 EC (Knox-Out)	1 to 2 Tbsp	3 to 6 pt	See product label	See aphids section for comments.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Mealybugs, continued	dichlorvos -- OP 81 EC (Vapona) 5 A (Vapona)	— NA -- Smoke Generator	— NA -- Smoke Generator	See product label See product label	The 81 EC product is for use on African violets and begonias only. Vaporize 1 fl oz per 10,000 ft^3. Ventilate thoroughly after two hours post application. See aphids section for comments on the 5 A product.
	fenpropathrin -- PY 30 EC (Tame)	$^2/_3$ tsp	10 $^2/_3$ fl oz	See product label	See aphids section for comments.
	fluvalinate -- PY 22.3 F (Mavrik)	$^1/_8$ to $^5/_8$ tsp	2 to 10 fl oz	See product label	See aphids section for comments.
	horticultural oil -- Other 98.8 EC (Ultra Fine, Sun Spray)	2 $^1/_2$ to 5 Tbsp	1 to 2 gallons	4 hours	See aphids section for comments.
	imidacloprid -- Other 1 G (Marathon)	NA -- Granular	NA -- Granular	12 hours	See aphids section for comments.
	kinoprene -- IGR 65.1 EC (Enstar II)	$^1/_2$ to $^2/_3$ tsp	5 to 10 fl oz	4 hours	
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	—	2 to 4 packets	24 hours	
	malathion -- OP 25 WP (Malathion) 57 EC (Malathion)	2 tsp 2 tsp	40 oz 2 pt	See product label See product label	See aphids section for comments.
	naled -- OP 58 EC (Dibrom)	NA --Vaporized	NA -- Vaporized	24 hours	See aphids section for comments.
	oxamyl -- CA 24 L (Vydate L) 10 G (Oxamyl)	2 to 4 tsp NA -- Granules	2 to 4 pt NA -- Granules	See product label See product label	See aphids section for comments.
	permethrin -- PY 36.8 EC (Astro)	$^1/_4$ to $^1/_2$ tsp	4 to 8 fl oz	24 hours	See beet armyworm for comments.
	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	$^1/_8$ to 1 $^1/_2$ tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	See aphids section for comments.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	1 tsp NA -- Aerosols	1 pt NA -- Aerosols	See product label See product label See product label	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal) 49 EC (M-Pede) 49.5 EC (Olympic Insecticidal)	2 $^1/_2$ to 5 fl oz 1 $^1/_4$ to 2 $^1/_2$ fl oz 2 $^1/_2$ fl oz	— 1 to 2 gal 2 gal	See product label 12 hours 12 hours	See aphids section for comments.
	sulfotepp -- OP 15 A (Dithio, Plantfume 103)	NA -- Smoke Generator	NA -- Smoke Generator	See product label	See aphids section for comments.
Millipedes	malathion -- OP 25 WP (Malathion) 57 EC (Malathion)	2 tsp 2 tsp	40 oz 2 pt	See product label See product label	See aphids section for comments.
Mites	*Beauveria bassiana* -- MI 7.16 EC (Naturalis-O)	2 tsp to 2 Tbsp	30 to 100 fl oz	4 hours	See aphids section for comments.
	diazinon -- OP 23 EC (Knox-Out)	1 to 2 Tbsp	3 to 6 pt	See product label	See aphids section for comments.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Mites, continued	dicofol -- CH 35 WP (Kelthane 35) 50 WP (Kelthane T/O)	 1 1/2 Tbsp 1 Tbsp	 1 to 1 1/3 lb 1/2 to 1 lb	 12 hours 12 hours	
	fenpropathrin -- PY 30 EC (Tame)	 1/2 to 1 tsp	 10 2/3 fl oz	 See product label	See aphids section for comments.
	fluvalinate -- PY 22.3 F (Mavrik)	 1/8 to 5/8 tsp	 2 to 10 fl oz	 See product label	See aphids section for comments.
	methiocarb -- CA 75 WP (Mesurol)	 2 to 4 tsp	 1 to 2 lb	 24 hours	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal) 49.5 EC (Olympic Insecticidal)	 2 1/2 to 5 fl oz 2 1/2 fl oz	 --- 2 gal	 See product label 12 hours	See aphids section for comments.
Moths	chlorpyrifos -- OP 22.5 EC (Dursban Pro)	 1/2 to 1 Tbsp	 1 1/2 to 3 pt	 12 hours	
Plant Bugs	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	 1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	 6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	 See product label See product label See product label	See aphids section for comments.
	cyfluthrin -- PY 20 WP (Decathlon)	 1/4 tsp	 1.9 oz	 See product label	
	fluvalinate -- PY 22.3 F (Mavrik)	 1/8 to 5/8 tsp	 2 to 10 fl oz	 See product label	See aphids section for comments.
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	 ---	 1 to 4 packets	 24 hours	
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	 1 tsp NA -- Aerosols	 1 pt NA -- Aerosols	 See product label See product label See product label	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal) 49.5 EC (Olympic Insecticidal)	 2 1/2 to 5 fl oz 2 1/2 fl oz	 --- 2 gal	 See product label 12 hours	See aphids section for comments.
Scale Insects	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	 1 to 2 tsp NA -- Aerosols	 1/3 to 2/3 lb NA -- Aerosols	 See product label See product label	See aphids section for comments.
	azadirachtin -- BO 3 EC (Azatin EC)	 1/2 tsp	 8 fl oz	 4 hours	
	bifenthrin -- PY 0.5 A (PT 1800 Attain)	 NA -- Aerosol	 NA -- Aerosol	 See product label	See aphids section for comments.
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	 1/2 to 1 Tbsp	 1 1/2 to 3 pt	 12 hours	
	cyfluthrin -- PY 20 WP (Decathlon)	 1/4 tsp	 1.9 oz	 See product label	
	diazinon -- OP 23 EC (Knox-Out)	 1 to 2 Tbsp	 3 to 6 pt	 See product label	Diazinon should not be applied directly to open blooms; it is not labeled for use on poinsettias.
	fenoxycarb -- IGR 25 WP (Precision) 0.6 A (PT 2100 Preclude)	 1/2 tsp NA -- Aerosol	 4 oz NA -- Aerosol	 See product label See product label	See aphids section for comments.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Scale Insects, continued	horticultural oil -- Other 98.8 EC (Ultra Fine, Sun Spray)	2 1/2 to 5 Tbsp	1 to 2 gallons	4 hours	See aphids section for comments.
	kinoprene -- IGR 65.1 EC (Enstar II)	1/2 to 2/3 tsp	5 to 10 fl oz	4 hours	
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	—	1 to 4 packets	24 hours	
	oxamyl -- CA 24 L (Vydate L) 10 G (Oxamyl)	2 to 4 tsp NA -- Granules	2 to 4 pt NA -- Granules	See product label See product label	See aphids section for comments.
	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	1/8 to 1 1/2 tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal) 49 EC (M-Pede) 49.5 EC (Olympic Insecticidal)	2 1/2 to 5 fl oz 1 1/4 to 2 1/2 fl oz 2 1/2 fl oz	— 1 to 2 gal 2 gal	See product label 12 hours 12 hours	See aphids section for comments.
Shore Flies	diflubenzuron -- IGR 25 WSP (Adept)	—	2 packets	12 hours	Apply at a volume of 1 to 3 gallons of final solution per 100 ft^2.
	fenoxycarb -- IGR 25 WP (Precision)	1/2 tsp	4 oz	See product label	
Slugs and Snails	metaldehyde -- Other 4 P (Deadline Bullets and Granules) 5 P (Snarol)	NA -- Pelleted bait NA -- Pelleted bait	NA -- Pelleted bait NA -- Pelleted bait	See product label See product label	More than one application usually necessary. Follow label directions for application rates.
	methiocarb -- CA 75 WP (Mesurol)	8 tsp	4 lb	24 hours	See aphids section for comments.
Sowbugs	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	lindane -- CH 25 WP (Lindane)	1 Tbsp	1 lb	See product label	Apply 1 gallon of spray per 150 ft^2. Repeat applications every 7 to 10 days may be required for effective control.
	malathion -- OP 25 WP (Malathion) 57 EC (Malathion)	2 tsp 2 tsp	40 oz 2 pt	See product label See product label	See aphids section for comments.
	resmethrin -- PY 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	NA -- Aerosols	NA -- Aerosols	See product label See product label	See aphids section for comments.
Spider Mites	abamectin B_1 -- Other 2 EC (Avid)	1/4 tsp	4 fl oz	See product label	Do not use on ferns or conifers.
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	See product label See product label See product label	See aphids section for comments.
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	1/2 to 1 Tbsp	1 1/2 to 3 pt	12 hours	
	dichlorvos -- OP 5 A (Vapona)	NA -- Smoke Generator	NA -- Smoke Generator	See product label	See aphids section for comments.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Spider Mites, continued	dicofol -- CH 35 WP (Kelthane 35) 50 WP (Kelthane T/O)	 1 1/2 Tbsp 1 Tbsp	 1 to 1 1/3 lb 1/2 to 1 lb	 See product label See product label	
	dienochlor -- CH 50 WP (Pentac) 38 F (Pentac)	 1 tsp 1/2 tsp	 8 oz 8 fl oz	 See product label See product label	Repeat pentac applications in 5 to 14 days for effective control.
	fluvalinate -- PY 22.3 F (Mavrik)	 1/8 to 5/8 tsp	 2 to 10 fl oz	 See product label	See aphids section for comments.
	horticultural oil -- Other 98.8 EC (Ultra Fine, Sun Spray)	 2 1/2 to 5 Tbsp	 1 to 2 gallons	 4 hours	See aphids section for comments.
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	 —	 2 to 4 packets	 24 hours	
	naled -- OP 58 EC (Dibrom)	 NA --Vaporized	 NA -- Vaporized	 24 hours	See aphids section for comments.
	oxamyl -- CA 24 L (Vydate L) 10 G (Oxamyl)	 2 to 4 tsp NA -- Granules	 2 to 4 pt NA -- Granules	 See product label See product label	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal) 49 EC (M-Pede) 49.5 EC (Olympic Insecticidal)	 2 1/2 to 5 fl oz 1 1/4 to 2 1/2 fl oz 2 1/2 fl oz	 — 1 to 2 gal 2 gal	 See product label 12 hours 12 hours	See aphids section for comments.
Spittlebugs	cyfluthrin -- PY 20 WP (Decathlon)	 1/4 tsp	 1.9 oz	 See product label	
Spittlebugs, continued	resmethrin -- PY 24.3 EC (Resmethrin)	 1 tsp	 1 pt	 See product label	See aphids section for comments.
	soap -- Other 49 EC (Insecticidal, M-Pede)	 2 1/2 fl oz	 7 1/2 qt	 12 hours	See aphids section for comments.
Silverleaf (Sweetpotato) Whitefly	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC)	 5 tsp 2/3 to 1 tsp	 80 fl oz 10 to 16 fl oz	 4 hours 4 hours	
	fenpropathrin -- PY 30 EC (Tame)	 1/2 to 1 tsp	 10 2/3 fl oz	 See product label	See aphids section for comments.
Thrips	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	 1 to 2 tsp NA -- Aerosols	 1/3 to 2/3 lb NA -- Aerosols	 See product label See product label	See aphids section for comments.
	azadirachtin -- BO 0.3 F (Margosan-O 4.5 EC (Neemazad)	 2 1/2 to 5 tsp 1/8 to 1/4 tsp	 40 to 80 fl oz 2 1/4 to 4 1/2 fl oz	 4 hours 4 hours	
	Beauveria bassiana -- MI 7.16 EC (Naturalis-O)	 2 tsp to 2 Tbsp	 30 to 100 fl oz	 4 hours	See aphids section for comments.
	bendiocarb -- CA 76 WP (Dycarb, Ficam, Turcam)	 1 1/2 tsp	 12 to 20 oz	 See product label	Avoid excessive runoff.
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	 1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	 6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	 See product label See product label See product label	Apply aerosol using a rate of 1 lb per 1,500 to 3,000 ft^2. Treat as late in the day as possible. Building should be vented before reentry.
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	 1/2 to 1 Tbsp	 1 1/2 to 3 pt	 12 hours	

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Thrips, continued	cyfluthrin -- PY 20 WP (Decathlon)	1/4 tsp	1.9 oz	See product label	
	diazinon -- OP 23 EC (Knox-Out)	1 to 2 Tbsp	3 to 6 pt	See product label	Diazinon should not be applied directly to open blooms; it is not labeled for use on poinsettias.
	fluvalinate -- PY 22.3 F (Mavrik)	1/8 to 5/8 tsp	2 to 10 fl oz	See product label	See aphids section for comments.
	horticultural oil -- Other 98.8 EC (Ultra Fine, Sun Spray)	2 1/2 to 5 Tbsp	1 to 2 gallons	4 hours	See aphids section for comments.
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	---	1 to 4 packets	24 hours	
	lindane -- CH 25 WP (Lindane)	1 Tbsp	1 lb	See product label	Apply 1 gallon of spray per 150 ft^2. Repeat applications every 7 to 10 days may be required for effective control.
	malathion -- OP 25 WP (Malathion) 57 EC (Malathion)	2 tsp 2 tsp	40 oz 2 pt	See product label See product label	See aphids section for comments.
	oxamyl -- CA 24 L (Vydate L) 10 G (Oxamyl)	2 to 4 tsp NA -- Granules	2 to 4 pt NA -- Granules	See product label See product label	See aphids section for comments.
	pyrethrins -- BO 6 EC (Pyrenone)	1/8 to 1 1/2 tsp	2 to 12 fl oz	See product label	See aphids section for comments.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	1 tsp NA -- Aerosols	1 pt NA -- Aerosols	See product label See product label	See aphids section for comments.
	sulfotepp -- OP 15 A (Dithio, Plantfume 103)	NA -- Smoke Generator	NA -- Smoke Generator	See product label	See aphids section for comments.
Twospotted Spider Mite	fenpropathrin -- PY 30 EC (Tame)	1/2 to 1 tsp	10 2/3 fl oz	See product label	See aphids section for comments.
	fluvalinate -- PY 22.3 F (Mavrik)	1/8 to 5/8 tsp	2 to 10 fl oz	See product label	See aphids section for comments.
	pyridaben -- DI 75 WP (Sanmite)	---	2 to 4 oz	12 hours	See broad mite section for comments.
Western Flower Thrips	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental)	1 to 2 tsp	1/3 to 2/3 lb	See product label	See aphids section for comments.
	azadirachtin -- BO 3 EC (Azatin EC)	3/4 to 1 tsp	12 to 16 fl oz	4 hours	
	fomentate hydrochloride -- CA 92 SP (Carzol)	1 tsp	8 oz	24 hours	Local use registration in North Carolina.
Whiteflies	acephate -- OP 75 SP (Orthene Turf, Tree and Ornamental) 3 A (PT 300 TR Orthene & PT 1300 DS Orthene)	1 to 2 tsp NA -- Aerosols	1/3 to 2/3 lb NA -- Aerosols	See product label See product label	See aphids section for comments.

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Whiteflies, continued	azadirachtin -- BO 0.3 F (Margosan-O) 3 EC (Azatin EC) 4.5 EC (Neemazad)	 2 1/2 to 5 tsp 1/2 tsp 1/8 to 1/4 tsp	 40 to 80 fl oz 8 fl oz 2 1/4 to 4 1/2 fl oz	 4 hours 4 hours 4 hours	
	Beauveria bassiana -- MI 7.16 EC (Naturalis-O)	 2 tsp to 2 Tbsp	 30 to 100 fl oz	 4 hours	See aphids section for comments.
	bendiocarb -- CA 76 WP (Dycarb, Ficam, Turcam)	 3/4 tsp	 5 1/2 oz	 See product label	See aphids section for comments.
	bifenthrin -- PY 10 WP (Talstar) 7.9 F (Talstar) 0.5 A (PT 1800 Attain)	 1 to 5 tsp 1/2 to 2 1/2 tsp NA -- Aerosol	 6.4 to 32 oz 2 to 10 fl oz NA -- Aerosol	 See product label See product label See product label	See aphids section for comments.
	chlorpyrifos -- OP 20 ME (PT 1325 DuraGuard)	 1/2 to 1 Tbsp	 1 1/2 to 3 pt	 12 hours	
	cyfluthrin -- PY 20 WP (Decathlon)	 1/4 tsp	 1.9 oz	 See product label	
	diazinon -- OP 23 EC (Knox-Out)	 1 to 2 Tbsp	 3 to 6 pt	 See product label	See aphids section for comments.
	dichlorvos -- OP 5 A (Vapona)	 NA -- Smoke Generator	 NA -- Smoke Generator	 See product label See product label	See aphids section for comments.
	diflubenzuron -- IGR 25 WSP (Adept)	 —	 2 packets	 12 hours	Apply at a volume of 1 gallon of final solution per 200 ft^2.
	endosulfan -- CH 24.2 EC (Thiodan) 50 WP (Thiodan) 5 A (Thiodan)	 2 tsp 1 Tbsp NA -- Smoke Generator	 2 pt 1 lb NA -- Smoke Generator	 24 hours 24 hours See product label	See aphids section for comments.
	fenoxycarb -- IGR 0.6 A (PT 2100 Preclude)	 NA -- Aerosol	 NA -- Aerosol	 See product label	See aphids section for comments.
	fenpropathrin -- PY 30 EC (Tame)	 2/3 tsp	 10 2/3 fl oz	 See product label	See aphids section for comments.
	fluvalinate -- PY 22.3 F (Mavrik)	 1/8 to 5/8 tsp	 2 to 10 fl oz	 See product label	See aphids section for comments.
	horticultural oil -- Other 98.8 EC (Ultra Fine, Sun Spray)	 2 1/2 to 5 Tbsp	 1 to 2 gallons	 4 hours	See aphids section for comments.
	imidacloprid -- Other 1 G (Marathon)	 NA -- Granular	 NA -- Granular	 12 hours	See aphids section for comments.
	kinoprene -- IGR 65.1 EC (Enstar II)	 1/2 to 2/3 tsp	 5 to 10 fl oz	 4 hours	
	lambda-cyhalothrin -- PY 10 WSP (Topcide)	 —	 2 to 4 packets	 24 hours	
	naled -- OP 58 EC (Dibrom)	 NA --Vaporized	 NA -- Vaporized	 24 hours	See aphids section for comments.
	oxamyl -- CA 24 L (Vydate L) 10 G (Oxamyl)	 2 to 4 tsp NA -- Granules	 2 to 4 pt NA -- Granules	 See product label See product label	See aphids section for comments.
	permethrin -- PY 36.8 EC (Astro)	 1/4 to 1/2 tsp	 4 to 8 fl oz	 24 hours	

Insect or Related Pest	Pesticide, Classification, and Formulation†	Amount of Formulation per Gallon of Spray	Amount per 100 Gallons of Water	Minimum Interval Between Application	Precautions and Remarks
Whiteflies, continued	pyrethrins -- BO 6 EC (Pyrenone) 0.5 A (PT 1100 Pyrethrum)	1/8 to 1 1/2 tsp NA -- Aerosol	2 to 12 fl oz NA -- Aerosol	See product label See product label	See aphids section for comments.
	pyridaben -- DI 75 WP (Sanmite)	---	4 to 6 oz	12 hours	See broad mite section for comments.
	resmethrin -- PY 24.3 EC (Resmethrin) 1 A (PT 1200 TR Resmethrin & PT 1200 DS Resmethrin)	1 tsp NA -- Aerosols	1 pt NA -- Aerosols	See product label See product label See product label	See aphids section for comments.
	soap -- Other 25 EC (Olympic Insecticidal) 49 EC (M-Pede) 49.5 EC (Olympic Insecticidal)	2 1/2 to 5 fl oz 1 1/4 to 2 1/2 fl oz 2 1/2 fl oz	--- 1 to 2 gal 2 gal	See product label 12 hours 12 hours	See aphids section for comments.
	sulfotepp -- OP 15 A (Dithio, Plantfume 103)	NA -- Smoke Generator	NA -- Smoke Generator	See product label	See aphids section for comments.

Please note that this table only lists PESTICIDES and does not include non-pesticide control measures, such as biological control organisms. We intend to publish a comprehensive non-pesticide control table for control of insects and related pests in a future issue of the NCCFGA Bulletin.

CALENDAR OF EVENTS

Event	Date	Time	Location and contacts
Association of Specialty Cut Flower Growers National Conference	Wednesday–Sunday 6–10 November		Denver Marriott Tech Center, Denver, Colorado. Contact Judy Laushman at 216-774-2887 for more information.
Innovative Plant Management: Focus on Biological Control	Thursday–Friday 7–9 November		University of Maryland, College Park, Maryland. Contact Stanton Gill at 301-596-9413 for more information.
NCSU Poinsettia Open House	Thursday 5 December	10:00 am to 3:00 pm	Horticulture Field Laboratory, Raleigh, N.C. Contact Doug Bailey at 919-515-1195 for more information.
Green & Growin' Show and Floral Expo	Thursday–Sunday 9–12 January 1997		Benton Convention Center, Winston-Salem, N.C. Contact Bonnie Holloman at 919-779-4618 for further details.
NCCFGA Board Meeting	Saturday 11 January 1997		Benton Convention Center, Winston-Salem, N.C. Contact Bonnie Holloman for further details.
GrowerExpo '97	Thursday–Sunday 9–12 January 1997		Pheasant Run Resort, St. Charles, Illinois. Call 1-800-456-5380 for more information.

NCCFGA News

Autumn is here and supposedly so is our dry season. Of course, many of us are still waiting for our socks to dry out before we go back outside to see if the rains have indeed stopped! Weather used to be the common topic when there was nothing else to talk about. Recently, its become more important than many of us would like to remember. I know some of you encountered much damage from our recent storms, but I hope you are on the road to recovery. There's always a new "pest" during poinsettia season. A few years ago whiteflies were the issue. This year it seems to be hurricanes and wet, cloudy weather.

Be on the lookout for your 1996-97 NCCFGA membership directory; it should be mailed to you very soon. This is our first attempt at a more formal directory, complete with vendor support. We thank those suppliers that bought ads in this directory and hope many more will be willing to help us out next year.

We are also in the midst of our membership drive. Bonnie Holloman will be sending out complimentary copies of this issue of the Bulletin to nonmember flower growers across the state. We welcome those of you who are not members of NCCFGA and hope you like what you see. Please consider joining our organization. We work towards goals common to all floriculture businesses in North Carolina, regardless of membership status.

Why should you consider joining NCCFGA? What benefits does our organization offer to you? We asked membership for feedback in the last issue of the Bulletin, and I thank those who responded with suggestions and comments about what the Association is doing and could be doing for its membership. Enclosed is our Association flyer that outlines who we are and what we do. If you are in floriculture, hopefully you will find value in the workshops, field days, trade shows, and other educational events we help sponsor. This Bulletin is another means of helping North Carolina growers stay in the forefront of floriculture.

It is difficult to address all members' needs, but we do try. For example, over 25% of our N.C. membership indicated they were in Retail Garden Center businesses. For the past four years, we have offered Retail Marketing and Garden Center Programs at the Southeast Greenhouse Conference and Trade Show. Last year, we had two days of retailing seminars ranging from "Perfecting Labor Relations" to "Extending Spring Sales." We plan on continuing our support of the retail segment of our membership and will offer retailing seminars in 1997 during the conference. Our new membership directory should also be an asset to retailers, who may be looking for a list of suppliers (and if you are a grower nonmember, you may want to join for the advertising benefits of being in our directory).

Our Legislature Educational Efforts benefit all growers in the State, regardless of membership status. The Roy A. Larson Scholarship Endowment is well under way, and we look forward to awarding the first scholarships from that fund during 1997.

The NCCFGA Research Fund was a topic of our recent October 17 Board Meeting. Membership and program revenues now allow us to formalize our efforts in supporting floriculture research at N.C. State. After reviewing our financial situation, the Association's annual budget will now include a $5,000 allotment dedicated to our Research Fund. How will this funding effort benefit you? It will support research priorities listed by NCCFGA and projects that NCCFGA elects to sponsor. Each year, faculty working on floriculture-related research will have the opportunity to submit a research proposal to NCCFGA for possible funding. The faculty member does not have to be in Horticultural Science, but does have to address

a topic of interest to NCCFGA. Proposals could also come from Agr. and Resource Economics (e.g. marketing research topics), Biol. and Agr. Engineering (e.g. greenhouse heating and cooling systems), Entomology (e.g. insect and pest control research), or Plant Pathology (e.g. plant disease research). Let us know your research needs to help us develop our priority list. Contact Bonnie Holloman at 919-779-4618 if you have a suggested priority item; we want your input.

We want you to join us, so we can do even more! Check out our home page at http://www2.ncsu.edu/unity/lockers/project/floriculture/www/NCCFGA/index.html and see what we're about. You can also download back issues of the NCCFGA Bulletin from this web site.

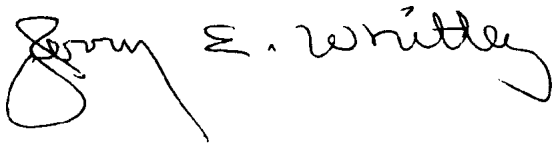
Mark your calendars for Thursday, 5 December 1996. This is the date for the NCSU poinsettia open house to be held in Raleigh. We help support this trial to give growers the opportunity to see how more than 40 cultivars of poinsettias perform under our conditions. Contact Doug Bailey if you need directions to the greenhouse at the Horticulture Field Laboratory.

We plan to finalize our plans for the Green and Growing Show during our October Board meeting. You'll want to mark your 1997 calendar (9–11 January) for that event. The Green and Growing Show is the largest green industry program in our state, and we are happy to be a cosponsor of this event. Not only will you have the opportunity to exhibit your product line to garden centers and landscapers from the area, but you can also attend the educational session we have planned for that Friday afternoon.

The 1997 Southeast Greenhouse Conference planning committee will be meeting soon. If you have any topics and / or speakers that you are interested in seeing on the program, tell Doug Bailey (919-515-1195). This is another educational opportunity for our membership, cosponsored by YOUR association.

Please let us know what's on your mind. We do listen and do appreciate your input.

Until next time,



Jerry E. Whitley, NCCFGA President

Aart Van Wingerden: Flower Grower / Missionary

Perhaps only those closest to Aart Van Wingerden could say which title he most preferred, as he was a world leader in both areas. His financial success as a very innovative and extremely competent flower grower enabled him to support so generously the work he did for the hungry in the Third World countries, but it was what he did with much of that money that gave him the motivation to succeed as a grower. A failed bedding plant crop in North Carolina might send children to bed hungry in Zaire, and Aart couldn't stand that thought.

Several years ago Aart was told he had cancer, and he was given a relatively short period to live if he didn't do something about it. He firmly

believed that his faith was as strong and healing as any surgery or other treatments could be, and he didn't want to waste any time in recovery. He decided to just keep on doing what he had been doing for so long, and it is hard for us to say he made the wrong choice. He outlived the doctors' predictions as to the longevity of his life, and he kept on working almost to the very end of his very productive life.

Death finally claimed Aart on August 21, 1996, when he was 75 years old. That 75 years was filled with work and creativity, with joys and sadness, with success and with an occasional failure. He had good luck and bad luck. I was in a greenhouse range in Santa Barbara County in California. The greenhouse had about three feet of silt and logs and other debris that had washed into the greenhouse when a culvert up the road became jammed from record-breaking rain, and a flood resulted. The greenhouse belonged to Jim Perry, a highly successful bedding plant grower in California, but he had only bought the greenhouse from Aart about three weeks before. It was one of those "bad news/good news" episodes… the bad news was that the greenhouse was flooded but the good news was that someone else owned it. On the other hand, in 1993 a March storm inflicted millions of dollars of damage to Aart's greenhouse range in Fletcher. The thought of not rebuilding wasn't an option to the positively minded Dutch immigrant, and no one went unemployed during the rebuilding process.

Aart was a major personality in making the bedding plant industry what it is today, and he had a similar impact on flowering potted plants. A tour through his greenhouse range would show the visitor the cleanliness of the range, the high quality of the crops, and the innovations that made crop production and shipping so efficient. The first person the visitor might meet in the greenhouse range would be a fellow in a nondescript suit and a cap which didn't advertise anything or anyplace. The visitor might ask the man with the smile on his face where he might find Aart Van Wingerden, and find out that a world leader in floriculture was standing right there, completely indifferent to external appearances because it was what was inside that mattered.

Years ago Aart asked me for some ideas about what trees could be planted in Haiti that would be fast growing to protect the mountain sides that had been laid bare by the removal of the forests. I could only think of Eucalyptus, about which I knew little, and then Aart asked if there was some procedure he could follow that would make it grow even faster. He was deeply involved in mission work in a country which most Americans still thought was arrayed in tropical splendor.

A few days after Aart's death someone asked me how Aart and I got along. I said, with complete honesty, that we got along fine. He was always very cooperative, at times asked for suggestions about a growth regulator or crop culture, and he always was glad to see the students on our field trips. I asked why the person would even ask such a question, and she said she thought two strong personalities might have clashed at times. My personality is in the minor leagues compared to Aart's. We had a common bond. He was an immigrant from the Netherlands, I was a first generation American, so I had a special appreciation for all he had accomplished. I could truly respect a man who came to this country 48 years ago, with six dollars in his pocket, who learned to read English by reading the weather reports, and virtually built an empire through hard work, keen intelligence, honesty, dedication, a loving family, and an extremely strong faith.

We extend our sympathies to Cora, and all the other family members.

Roy Larson

NORTH CAROLINA
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In This Issue:

Perennials: Basics of Profitable Production (Part I) 1

Pesticides Labeled for Greenhouse Ornamental Insect and Related Pest Control 5

Calendar of Events 20

NCCFGA News 21

Aart Van Wingerden: Flower Grower / Missionary 22