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## THE 1996 POINSETTIA CULTIVAR TRIAL: A DIFFERENT APPROACH

Roy A. Larson and Ingram F. McCall

Department of Horticultural Science, NC State University

**T**he 1996 poinsettia cultivar evaluation trial was quite different from the ones we have had in former years. Previously we would request poinsettia breeders to send all the cultivars they wanted to send, and the number of cultivars could be close to 70. Breeders paid no entry fees for any of their cultivars. In 1996 the policy changed when five companies said they would pay entry fees, on a sliding scale, with the newest cultivars having the highest fee, followed by those which had been in the trade for a couple of years, and the lowest fee for the cultivars they wished to use as comparisons with the new selections. Three universities had been selected for this program, and these universities were Purdue University (Allen Hammer), University of Florida in Gainesville (Jim Barrett) and NC State University.

Outside funding has become essential for floriculture research at Land Grant Universities and Experiment Stations as tax support has decreased, so the financial support by poinsettia

breeders was appreciated. Some of our independence was lost, however, as we had agreed to evaluate only those cultivars which had entry fees and some prominent cultivars in the industry weren't included if a company excluded them from their list. 'Supjibi' and 'Monet' would be two examples of cultivars which were excluded in 1996, and some growers at the open houses wondered where they were.

In previous years we also grew stock plants and propagated the cuttings ourselves with a few exceptions. In 1996 we didn't grow any stock plants and received rooted cuttings from the breeders instead. The breeders also decided they would send us the cuttings at different times, rather than all at once. Previously we had planted everything in early September and pinched September 15, but in 1996 the breeders sent us what they considered to be their less vigorous cultivars in early August, the medium ones in mid-August and the tall growing ones in late August. That meant our plant and pinch dates

varied, based on cultivar growth habits. The poinsettia breeders and the dates when we potted the rooted cuttings of the cultivars are shown in Table 1.

Plants that were potted on August 15 were pinched on August 29, those planted August 23 were pinched September 6, and those potted August 29 were pinched September 12. We thought that the plants that were pinched August 29 would have more long days than those pinched on September 6 or September 12 so should be taller, even though the breeders had labeled them as compact cultivars. The 15 cultivars that were pinched August 29 had an average height of 10"; those pinched September 6 were 11"; and those pinched August 12 were 10". Unfortunately we didn't have the same cultivar on all three dates to see the effects of pinch dates on final heights within cultivars but the data do indicate that the breeders had their cultivar growth habits labeled correctly. (Plant heights were measured from the pot rim to the top of the plant canopy).

**Cultural Procedures**

The plants were potted in 6.5" plastic azalea pots in Fafard 4P. They were grown under natural daylengths in a double-layered polyethylene house, at a night temperature of 65 °F. A tube watering system was used. Osmocote 14-14-14

was applied one week after potting, at a rate of one teaspoon/pot. The primary fertilizer used was a combination of calcium nitrate (33 oz/100 gallons of water) and potassium nitrate (18 oz/100 gal), at weekly intervals, but 20-10-20 at 2 lbs/100 gallons was applied every third week. Sodium molybdate was applied as a drench at 2.5 oz/100 gallons on October 7, and Epsom salts at 2 lbs/100 gallons was applied on October 10. None of the cultivars showed any signs of nutrient

**Table 1. Suppliers, cultivars, and potting dates for poinsettias evaluated in the NC State 1996 trials.**

Breeder	Potting Date		
	August 15	August 23	August 29
Ball Flora Plant	Jolly Red		
	Red Splendor		
Dümmen		Spotlight Dark Red	
Fischer	Marblestar	Bonita	
	Picacho	Cortez	
	Silverstar	Cortez Pink	
		Cortez White	
		Dark Puebla	
		Flirt	
		Maren	
		Nobelstar	
		Puebla	
		Sonora	
Oglevee	Dynasty Red		Festival Red
			Nutcracker Red
			Nutcracker White
Paul Ecke Ranch	Freedom		Angelika Marble
	Freedom Jingle Bells		Angelika White
	Pepride		Celebrate 2
	Peterstar Jingle Bells		Darlyne
	Peterstar Pink		Lilo
	Peterstar Red		Pearl
	Peterstar White		Petoy
	Success		
	V-14 Glory		

deficiency or excess. No growth regulators were used. Marathon was applied in late September for whitefly control but by late November some whiteflies were evident and we used Dithio twice. No diseases were encountered.

Once again our trials proved that growers have many options when it comes to choosing cultivars. Several of the cultivars are very similar. The PLA Poinsettia International ApS, (headquarters in Hillerod, Denmark) has Plant Variety Protection guidelines for the conduct of tests for distinctness, homogeneity and stability. There are 53 characteristics listed and described in these guidelines, and if a selection differs from others in only one characteristic, often very minor, it can be named. The senior author of this article was invited to attend a meeting of the PLA in Germany in November, 1996 and was appalled to learn that a characteristic such as color of the leaf petiole was considered to be as important as the color of the bracts. So if two plants with different names look exactly alike they might differ in some trivial characteristic a grower would be too busy to even notice.

New "breeding" techniques also have hastened the development of new "sports" of many cultivars. Previously it might take several years to get a white, pink or marble selection from a red cultivar, but innovative procedures have greatly decreased the time required. This proliferation of cultivars increases the value of trials which are readily accessible to growers. In 1996 we

**Table 2. Final height, number of flowering shoots per plant, and flowering date data for poinsettias in the NC State 1996 trials.**

Cultivar	Final height (")*	No. flowering shoots*	Average date for:		
			Bract color	Cyathia	Anthesis
Angelika Marble	13.0	5.5	10/29	10/30	11/19
Angelika White	11.5	6.0	10/28	10/28	11/18
Bonita	9.5	4.5	10/13	10/28	11/19
Celebrate 2	8.5	4.5	10/19	10/29	11/17
Cortez	10.0	7.0	10/23	10/28	11/22
Cortez Pink	9.5	6.0	11/1	10/28	11/21
Cortez White	9.0	6.5	10/26	10/28	11/20
Dark Puebla	12.0	**	11/14	11/4	**
Darlyne	10.0	4.5	10/25	10/27	11/18
Dynasty Red	12.5	7.0	10/14	10/25	11/17
Festival Red	9.5	5.0	10/18	10/23	11/13
Flirt	11.0	6.5	10/25	10/28	11/17
Freedom	10.0	5.0	10/12	10/19	11/9
Freedom Jingle Bells	10.5	5.0	10/20	10/22	11/12
Jolly Red	11.0	5.0	10/26	10/30	11/24
Lilo	11.5	4.0	10/29	10/16	11/9
Marblestar	10.0	6.0	10/22	10/28	11/20
Maren	12.0	6.5	10/20	10/27	11/16
Nobelstar	12.0	7.0	10/16	10/27	11/15
Nutcracker Red	10.0	4.5	10/17	10/27	11/17
Nutcracker White	10.5	6.0	10/27	10/28	11/19
Pearl	8.5	5.0	10/23	10/28	11/18
Pepride	6.0	3.5	10/10	10/14	11/4
Peterstar Jingle Bells	10.5	5.5	10/16	10/28	11/18
Peterstar Pink	11.0	6.0	10/21	10/27	11/16
Peterstar Red	10.5	5.0	10/16	10/27	11/18
Peterstar White	10.0	6.0	10/27	10/29	11/20
Petoy	10.0	4.5	10/22	10/28	11/19
Pichacho	9.5	6.0	10/14	10/21	11/16
Puebla	11.0	6.0	10/23	10/27	11/14
Red Splendor	12.5	**	11/7	10/24	**
Silverstar	10.0	5.5	10/15	10/27	11/19
Sonora	10.5	6.0	10/20	10/28	11/19
Sonora Marble	12.0	6.0	10/29	10/27	11/20
Sonora Pink	11.0	5.5	10/27	10/27	11/18
Sonora White	9.5	6.5	10/24	10/27	11/18
Spotlight Dark Red	15.0	6.5	10/17	10/28	11/21
Success	9.0	5.0	10/18	10/29	11/24
V-14 Glory	8.5	5.0	10/20	10/29	11/19

\* Final height and number of flowering shoot data taken on 19 November 1996.

\*\*Missing data.

had approximately 100 visitors at our Open House and several representatives from poinsettia breeding companies were in attendance throughout the day.

Important data about the cultivars we evaluated in 1996 are shown in Table 2, and some cultivars we have never shown in previous issues of the Bulletin when we gave our annual reports are pictured in this issue.

*The authors wish to acknowledge the following companies for their contributions to our poinsettia trials: Poinsettia cultivars: Ball Flora Plant, Dümmer Young Plants, Fischer, USA, Inc., Oglevee, Ltd., Paul Ecke Ranch. Substrate: Fafard Fertilizer: Scotts Refreshments for the Open House: Financed by the N.C. Commercial Flower Growers' Association and made or purchased by Darlyne Larson and Ingram McCall.*



*Figure 1. 'Cortez Pink' on 16 December 1996.*



*Figure 2. 'Sonora Pink' on 16 December 1996.*



*Figure 3. 'Peterstar Pink' on 16 December 1996.*



*Figure 4. 'Marblestar' on 16 December 1996.*



*Figure 5. 'Peterstar Red' on 16 December 1996.*



*Figure 6. 'Festival Red' on 16 December 1996.*



*Figure 7. 'Spotlight' on 16 December 1996.*



*Figure 8. 'Nutmacker Red' on 16 December 1996.*



*Figure 9. 'Pepride' on 16 December 1996.*



*Figure 10. 'Petoy' on 16 December 1996.*



*Figure 11. 'Sonora Marble' on 16 December 1996.*



*Figure 12. 'Cortez White' on 16 December 1996.*



*Figure 13. 'Nutcracker White' on 16 December 1996.*



*Figure 14. 'Peterstar White' on 16 December 1996.*

# CHOOSE A GREENHOUSE SCREEN BASED ON ITS PEST EXCLUSION EFFICIENCY

**Michelle L. Bell, Departments of Entomology and Horticultural Science  
and James R. Baker, Department of Entomology, NC State University**

*(Dr. Michelle Bell recently completed her Ph.D. with a dual major in Entomology and Horticultural Science under the direction of Dr. Jim Baker and Dr. Doug Bailey. This article is taken from a portion of her thesis research. Michelle has taken a floriculture extension and research position with the University of Florida at Bradenton. We at NC State are very proud of her accomplishments and wish her the very best of luck in her continuing career in floriculture.)*

**A**cquired resistance to pesticides by aphids, thrips and whiteflies has made management practices that rely on pesticides less effective and more costly in terms of economics and the environment. In an integrated pest management system, exclusion of pests should be one of the first tactics considered in order to reduce the need for pesticides and other control measures. An important part of exclusion involves screening the greenhouse.

Excluding pests using greenhouse screens is now more feasible than in the past due to the rising costs of registered pesticides and increased worker protection regulations. Reductions in pest population, lower incidence of insect-transmitted disease, and fewer needed pesticide applications have been documented when screening is used. Exclusion screens are proving a valuable addition to current management practices and may be especially important where greenhouse pests overwinter outside.

As use of exclusion screens has risen, some materials, such as Vispore products and Pak WP87, have become unavailable while many more have entered the market. Selection of the screen most beneficial to a particular greenhouse situation requires some basic information. A foremost consideration when designing or retrofitting a greenhouse for screen installation is the effect screening materials will have on the flow of air.

Airflow resistance, primarily a function of hole or mesh size, varies widely among available screening products. In our laboratory, we have investigated airflow resistance of screens and have developed "resistance curves" for each product. This airflow resistance data, along with greenhouse airflow recommendations, has been incorporated into a step-by-step guide for calculating the total screening area required for different materials. The guide walks the user through a short series of inputs, such as greenhouse and fan specifications and the measured pressure drop. For ease of use, the information has been developed as a computer program by Mr. Edwin Shearin and can be obtained from Dr. James Baker, Dept. of Entomology, North Carolina State University, Raleigh, NC 27695; (919) 515-8880.

Once a grower determines which screens can be used on his or her greenhouse, the cost of screening is often the next consideration (see Table 2). Costs vary depending not only on the price of the screening material, but also on the type and size of the frame required and screen longevity or replacement considerations. However, even though costs may differ, the next consideration after airflow should really be one of efficacy, that is, how well a screening material excludes pests.

The unfortunate fact is that many screens on the market do not effectively exclude common

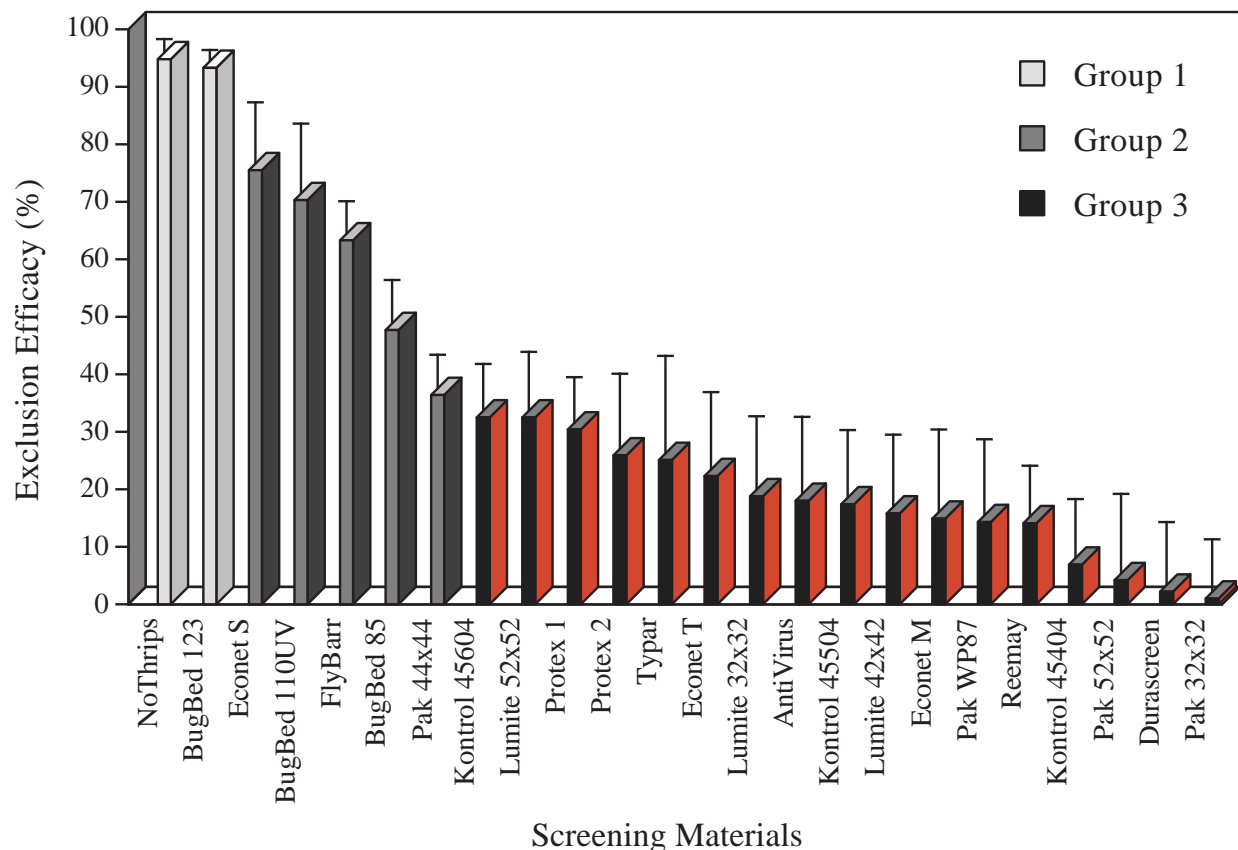
greenhouse pests at air approach velocities required for adequate summer ventilation of a well-designed greenhouse. Furthermore, choosing a screen with small holes and high resistance to airflow (if your greenhouse situation so allows) may not ensure adequate exclusion. This is a report of a three-year study to determine and compare efficacy of screens for excluding whiteflies and thrips under summer ventilation conditions resembling those of a commercial greenhouse.

Small (0.5 × 0.5 × 1 meter), wood-framed and polyethylene plastic-covered cages were used in these exclusion studies. Each cage was constructed with the front open to allow covering with the screening material to be tested. A squirrel cage blower was installed at the rear of

each cage to pull air through the screening materials and into the cage. Resistance curves were used to equalize the velocity of air entering the cages through the screening materials being tested. The approach velocity used for each material was 300 ft/minute, an airflow velocity recommended for well-designed production greenhouses.

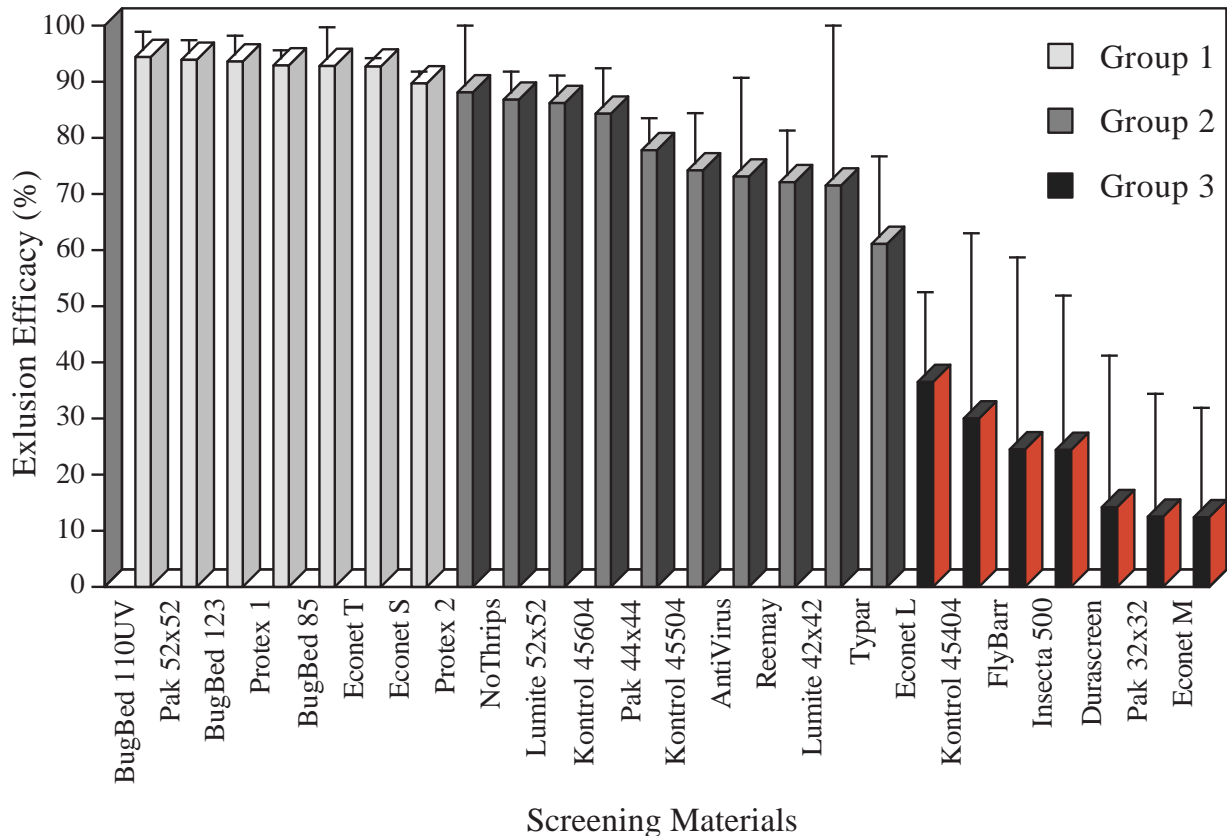
Yellow sticky cards were placed inside the cages before each installation of the screening materials and were used to sample the whiteflies and thrips entering the cages through the screens. Each commercial screening material was compared with ordinary fiberglass window screen to determine its degree of exclusion.

Screens exhibiting thrips exclusion equal to or greater than the window screen control are



**Figure 1.** Thrips exclusion efficacy of commercial greenhouse screens as a percentage of the fiberglass window screen control (n = 8, commercial screens; n = 60, control screen). Screens shown gave exclusion equal to or greater than the control. Group 1 screens exclude more than the control and similar to No-Thrips, the screen with the highest percent efficacy, in pairwise comparisons. Group 2 screens exclude more than the control and less than No-Thrips. Group 3 screens exclude similar to the control.





**Figure 2.** Silverleaf whitefly exclusion efficacy of commercial greenhouse screens as a percentage of the fiberglass window screen control (n = 8, commercial screens; n = 56, control screen). Screens shown gave exclusion equal to or greater than the control. Group 1 screens exclude more than the control and similar to BugBed 110UV, the screen with the highest percent efficacy, in pairwise comparisons. Group 2 screens exclude more than the control and less than BugBed 110UV. Group 3 screens exclude similar to the control.

shown in Figure 1. Seven screens gave greater exclusion than the control screen, and of these, the two Group 1 screens both can be considered the best screens for thrips exclusion.

Screens exhibiting whitefly exclusion equal to or greater than the window screen control are shown in Figure 2. Seventeen screens gave greater exclusion than the control screen, and of these, the seven Group 1 screens all can be considered the best screens for whitefly exclusion.

Screens with a lower percent exclusion than the window screen control do not appear in Figures 1 and 2. However, these screens were statistically similar to window screen in their exclusion capabilities and are included in Table 1 as Group 3 screens.

Only BugBed 123 was rated as a Group 1 screen in both studies, providing exclusion of

both thrips and whiteflies at more than 93% compared with window screen. Being the only screen to be rated Group 1 for exclusion of both pests, BugBed 123 can be considered the best overall screen for thrips and whitefly exclusion.

No-Thrips was rated as a Group 1 screen for thrips exclusion and as a Group 2 screen for whitefly exclusion. Though only a Group 2 screen, No-Thrips gave whitefly exclusion at 87%, which was still very good.

Whenever exclusion of thrips and / or thrips-transmitted diseases is of paramount importance but where whiteflies may also be pests, BugBed 123 and No-Thrips should be strongly considered. An advantage of BugBed 123 over No-Thrips is that BugBed 123 is only moderately resistant to airflow whereas No-Thrips is very highly resistant to airflow (Table 1). The

**Table 1. Grouping of screening materials for relative exclusion of whiteflies and thrips, characterization of relative air flow resistance and manufacturer or distributor.**

Screening material	Exclusion rating <sup>1</sup>		Static pressure <sup>2</sup> (inches of water)	Airflow resistance category	Source
	vs. Silverleaf whitefly	vs. Thrips			
BugBed 123	Group 1	Group 1	0.054	Moderate	Green Thumb Group, Inc.
No-Thrips	Group 2	Group 1	0.263	Very High	Green-Tek, Inc.
Econet S	Group 1	Group 2	0.095	High	LS Americas
BugBed	Group 1	Group 2	0.028	Low	Green Thumb Group, Inc.
BugBed 85	Group 1	Group 2	0.039	Moderate	Green Thumb Group, Inc.
Econet T	Group 1	Group 3	0.074	High	LS Americas
Pak 52x52	Group 1	Group 3	0.049	Moderate	Pak Unlimited, Inc.
Protex 1	Group 1	Group 3	0.023	Low	Rotogro Systems International Ltd.
Pak 44x44	Group 2	Group 2	0.051	Moderate	Pak Unlimited, Inc.
Protex 2	Group 2	Group 3	0.057	Moderate	Rotogro Systems International Ltd.
Kontrol 45604	Group 2	Group 3	0.044	Moderate	Baycor Products Group
Lumite 52x52	Group 2	Group 3	0.040	Moderate	Synthetic Industries
Lumite 42x42	Group 2	Group 3	0.042	Moderate	Synthetic Industries
Kontrol 45504	Group 2	Group 3	0.056	Moderate	Baycor Products Group
Antivirus	Group 2	Group 3	0.042	Moderate	Green-Tek, Inc.
Typar	Group 2	Group 3	0.271	Very High	Reemay, Inc.
Reemay	Group 2	Group 3	0.058	Moderate	Reemay, Inc.
FlyBarr	Group 3	Group 2	0.064	Moderate	Hydro-Gardens, Inc.
Pak WP87	Group 3	Group 3	0.152	High	(no longer available)
Kontrol 45404	Group 3	Group 3	0.022	Low	Baycor Products Group
Durascreen	Group 3	Group 3	0.024	Low	DuraGreen Marketing, Inc.
Insecta 500	Group 3	Group 3	0.024	Low	Green-Tek, Inc.
Econet L	Group 3	Group 3	0.020	Low	LS Americas
Econet M	Group 3	Group 3	0.022	Low	LS Americas
Lumite 32x32	Group 3	Group 3	0.022	Low	Synthetic Industries
Pak 32x32	Group 3	Group 3	0.022	Low	Pak Unlimited, Inc.
Kontrol 45304	Group 3	Group 3	0.010	Very Low	Baycor Products Group
Kontrol 45204	Group 3	Group 3	0.008	Very Low	Baycor Products Group

<sup>1</sup> Group 1 - screens that excluded more insects than the fiberglass window screen and about the same number of insets as the top-performing screen for that pest.

Group 2 - screens that excluded more insects than the fiberglass window screen but not as many insects as the top-performing screen for that pest.

Group 3 - screens that excluded no more insects than the fiberglass window screen.

<sup>2</sup>static pressures at an approach velocity of 300 ft./min. on which the designated relative airflow resistance category is based (Bell, Baker and Shearin, unpublished data).

two screens may also differ in longevity (expected life span). On a demonstration and research greenhouse at NCSU on which BugBed 123 was installed, the screen barely lasted one season before tearing occurred from weathering. No-Thrips lasts longer under similar conditions. Longevity studies of screening materials are currently underway in our lab.

BugBed 110UV, BugBed 85 and Econet S were rated as Group 1 screens for whitefly exclusion and as Group 2 screens for thrips exclusion. If whiteflies are the major pest problem in the greenhouse, these three screens will likely give excellent whitefly exclusion as well as provide the added benefit of good thrips exclusion.

BugBed 110UV, also called BugShield and the newest addition to the BugBed product line, exhibited the highest percent exclusion for whiteflies at 94%. Unique among greenhouse screens, BugBed 110UV is dark and, therefore, may be less attractive to pest insects that may happen upon the screen while in flight than would be lighter screens. Also, BugBed 110UV has enhanced protection from ultraviolet light degradation and thus may be longer-lived than BugBed 123 and other screens that lack UV protection. Another distinct advantage of BugBed 110UV is that its resistance to airflow is lower than BugBed 123; we characterize BugBed 110UV as a low resistance screen (Table 1).

Another new product, Econet S, provides excellent whitefly exclusion (90%) and, together with the other Econet products, is estimated by the manufacturer as offering the greatest longevity of available materials (5 to 8 years). Econet S has a smaller hole size--about one-half that of Econet T, formerly the most effective screen of the Econet line. Econet T very effectively excludes whiteflies but is rather ineffective in excluding thrips. Econet S excludes insects better than Econet T presumably due to the smaller hole size as well as a different hole geometry (holes of Econet S are square whereas those of Econet T are rectangular easily allowing thrips to pass through). Both Econet S and Econet T rank as

high resistance screens based on our wind tunnel studies (Table 1).

Several screens that did not exclude thrips did exclude whiteflies. According to Bethke and Paine, investigators at the University of California at Riverside, greenhouse pests are likely to be excluded by screens with hole sizes smaller than the width of the insects' thorax, or midsection. They also noted that projecting body parts such as the wings of whiteflies further limit their ability to penetrate many screens. In general, species of thrips attacking greenhouse crops are narrower than species of whitefly pests, including the silverleaf whitefly. Our studies suggest that the holes of several screens allow differential passage of thrips over the silverleaf whitefly.

Though thrips are more difficult to exclude than the silverleaf whitefly, this whitefly is smaller in size than other whitefly pests such as the greenhouse whitefly. A screen which excludes the silverleaf whitefly should exclude other whitefly species equally well or better.

In general, the higher the airflow resistance of a screen, the smaller the mesh or hole size through which insects must pass. However, exclusion capability varied widely for the five screens exhibiting high or very high resistance (Table 1). As mentioned, No-Thrips and Econet S were rated as Group 1 screens for thrips and whitefly exclusion, respectively. The other three high resistance screens, Econet T, Typar and Pak WP87, failed to exclude thrips better than ordinary window screen. Moreover, Pak WP87 did not exclude whiteflies appreciably. In addition to hole size, Bethke and Paine found that hole geometry may play a role in insect penetration through screens. The holes of No-Thrips and Econet S are small and square. In contrast, Typar is a polyspun material and Pak WP87 is a woven material covered in acrylic lending high variability in hole size and shape to both screens. The rectangular holes of Econet T, as mentioned above, allow thrips to pass.

Four of the seven screens that exclude thrips are moderately resistant to airflow. In fact, a

**Table 2. Percent shade as determined by manufacturer, size information and cost of greenhouse screening materials<sup>1</sup>.**

Material	Shade factor	Standard widths	Maximum lengths	Cost/ft <sup>2</sup>
Kontrol 45204	20%	6 ft	300 ft	\$0.34
Kontrol 45304	20%	6 ft	300 ft	\$0.39
Kontrol 45404	27%	6 ft	300 ft	\$0.63
Kontrol 45504	40%	6 ft	300 ft	\$0.71
Kontrol 45604	40%	6 ft	300 ft	\$0.89
Lumite 32x32	33%	6 ft (up to 24 ft with sewn seams)	min./max. 100 ft. Add \$0.12/ft <sup>2</sup> for cutting roll	\$0.64
Lumite 42x42	30%	6 ft (up to 24 ft with sewn seams)	min./max. 100 ft. Add \$0.12/ft <sup>2</sup> for cutting roll	\$0.58
Lumite 52x52	32%	6 ft (up to 24 ft with sewn seams)	min./max. 100 ft. Add \$0.12/ft <sup>2</sup> for cutting roll	\$0.80
Pak 32x32	–	6 ft	300 ft	\$0.70
Pak 44x44	–	6 ft	300 ft	\$0.95
Pak 52x52	–	6 ft	300 ft	\$0.87
Econet L	15%	5.3 and 10.6 ft	no maximum	\$0.46
Econet M	15%	5.3 and 10.6 ft	no maximum	\$0.52
Econet T	15%	5.3 and 10.6 ft	no maximum	\$0.74
Econet S	15%	5.5 and 11.1 ft	no maximum	\$0.78
BugBed 85	32%	3.4 and 6.7 ft	102 ft	\$0.95
BugBed 110UV	32%	5 and 6.7 ft	165 ft	\$1.00
BugBed 123	32%	3.4, 5, 6.7 and 10 ft	165 ft	\$1.00
No-Thrips	33%	3.3 and 6.5 ft	328 ft	\$0.91
Antivirus	20%	3.6, 6.5, 9.8 and 11.8 ft	656 ft	\$0.67
Insecta 500	35%	9.8 ft	1000 ft	\$0.33
Durascreen	40%	9.8 and 16.4 ft	1,650 ft	\$0.84
FlyBarr	60%	6 and 7 ft	62 and 100 ft rolls	\$0.24
Reemay	25%	15.7 ft (up to 60 ft with sewn seams)	min. 300 ft, 500 ft and max. 10,500 ft rolls	\$0.03-0.04
Typar	25%	15.7 ft (up to 60 ft with sewn seams)	min. 300 ft, 500 ft and max. 10,500 ft rolls	\$0.03-0.04

<sup>1</sup>Where possible, reported cost reflects distributor pricing and is for minimum order; both may vary with distributor. Bulk discounts may apply. Special fabrication (addition of Velcro, zippers or fasteners; sewn caging, etc.) and custom sizing costs extra when available.

moderately resistant screen, BugBed 123, accounts for one of the two screens that were rated the best for thrips exclusion. Several moderately resistant screens exclude whiteflies.

One low resistance screen, BugBed 110UV, excludes thrips; along with BugBed 110UV, the low resistance screen, Protex 1, excludes whiteflies.

Comparisons were made to window screen even though, certainly, any type of screening is better than none at all. Results of these studies may seem somewhat conservative since screening materials were compared with what is essentially another screen. However, one should consider that window screen has a mesh, or hole size, considerably larger than most greenhouse screening materials, and most greenhouse pests are very small and easily pass through window screen.

Reemay and Typar are marketed primarily as crop or turf blankets and not as greenhouse screens, though they are available as such. Pak WP87 is no longer available. Other than these three products, the screens reported from our studies are presently being sold for use as insect screens on commercial greenhouses. The fact that several performed poorly in our exclusion tests run at 300 ft/min air velocity points to the pressing need for continued, independent evaluation of screens for their pest exclusion properties.

In summary, of the 25 greenhouse screening products tested and presently available to growers, fewer than  $\frac{2}{3}$  exclude whiteflies and fewer than  $\frac{1}{3}$  exclude thrips better than ordinary window screen. Your selection of a screen can be narrowed considerably if you keep exclusion efficiency in mind. Also, though airflow is an important consideration, there are no strict rules when it comes to its effect on exclusion. High airflow resistance, often costly in terms of requiring greater screening area to maintain adequate airflow in a greenhouse, neither ensures nor is necessary for significant exclusion of whiteflies and thrips.

Most of the sources listed in Table 1 are product manufacturers. Contact these manufacturers for a list of distributors:

**Baycor Products Group.** 3500 Parkway Ln., Suite 500, Norcross, GA 30092; (404) 448-1518; fax 404-446-0696.

**DuraGreen Marketing, Inc.** P.O. Box 1486, 2600 Britt Rd., Mount Dora, FL 32757-1486; (904) 383-8811; fax 904-735-2688.

**Green Thumb Group, Inc.** 3380 Vernard Rd., Suite 2, Downer's Grove, IL 60515-1178; (1-800) 240-3371; fax 708-964-1963.

**Green-Tek, Inc.** 407 N. Main St., Edgerton, WI 53534; (1-800) 747-6440; fax 608-884-9459.

**Hydro-Gardens.** P.O. Box 9707, Colorado Springs, CO 80932; (1-800) 634-6362; fax 719-531-0506.

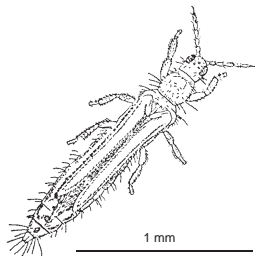
**LS Americas.** 1813-E Associates Ln., P.O. Box 19548, Charlotte, NC 28219; (704) 357-0457; fax 704-357-0460.

**Pak Unlimited, Inc.** 3300 Holcomb Bridge Rd., Suite 215, Norcross, GA 30092; (404) 448-1917 and (206) 845-9453.

**Reemay, Inc.** 70 Old Hickory Blvd., Old Hickory, TN 37138; (1-800) 284-2780; fax 615-847-7068.

**Rotogro Systems International Limited.** Churchfield, Station Rd., East Preston, West Sussex BN 16 3AJ, U.K.; phone: 9011 44 (1903) 785955. Note: At press-time, Protex products were not yet available to U.S. growers.

**Synthetic Industries.** 6525 The Corners Pkwy., Suite 115, Norcross, GA 30092; (404) 449-4960; fax 404-449-0054.





*Greenville, South Carolina  
June 12-14, 1997*

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## 1997 NCCFGA MEMBERSHIP DIRECTORY DUE DATE NEARS

**The 1997 NCCFGA Directory will include all members who join prior to May 1, 1997. If you are interested in supporting NCCFGA through an advertisement in the directory, please contact Bonnie Holloman at 919-779-4618 as soon as possible. Advertisement costs are:**

**\$350 for outside back cover, inside back cover, or inside front cover**  
**\$250 for a full page ad**  
**\$150 for a half page ad**  
**\$100 for a quarter page ad**

**Anyone interested in being a directory sponsor needs to contact Bonnie as soon as possible. We intend to distribute membership directories at the 1997 Southeast Greenhouse Conference and Trade Show.**

## CALENDAR OF EVENTS

Event	Date	Time	Location and contacts
Southeast Greenhouse Conference and Trade Show	Thursday–Saturday 12–14 June		Palmetto Expo Center, Greenville, S.C. Contact Charles Hall at 800-453-3070 for further information.
NCCFGA Board Meeting	Friday June 13	TBA	At the SGCTS in Greenville, S.C. Contact Bonnie Holloman for further details at 919-779-4618.
NCSU Bedding Plant Field Day	Wednesday 30 July	9:00 am to 3:30 pm	Horticulture Field Laboratory, Raleigh, N.C. Contact Bonnie Holloman for further details.
NCCFGA General Membership Meeting	Wednesday 30 July	3:30 pm	McKimmon Center, Raleigh, N.C. Bonnie Holloman for further details.
NCCFGA Board Meeting	Wednesday 30 July	4:00 pm	McKimmon Center, Raleigh, N.C. Contact Bonnie Holloman for further details.



**NORTH CAROLINA  
COMMERCIAL FLOWER GROWERS' ASSOC.**

**DOUGLAS A. BAILEY, EDITOR  
DEPARTMENT OF HORTICULTURAL SCIENCE  
NORTH CAROLINA STATE UNIVERSITY  
BOX 7609  
RALEIGH, NC 27695-7609  
(919) 515-1195 FAX (919) 515-7747  
INTERNET: doug\_bailey@ncsu.edu**

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