



Floriculture

# Photoselective Films For Height Control

**Photoselective plastics may offer a chemical-free alternative for growth regulation.**

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Plant production facilities often depend on the use of chemical growth regulators to unify plant growth, reduce plant height for optimal shipping and handling, and improve establishment in the field. However, due to increasing environmental and human health concerns, the use of some of these chemical regulators has been restricted in agricultural production by regulating agencies. This has inspired several research teams around the world to



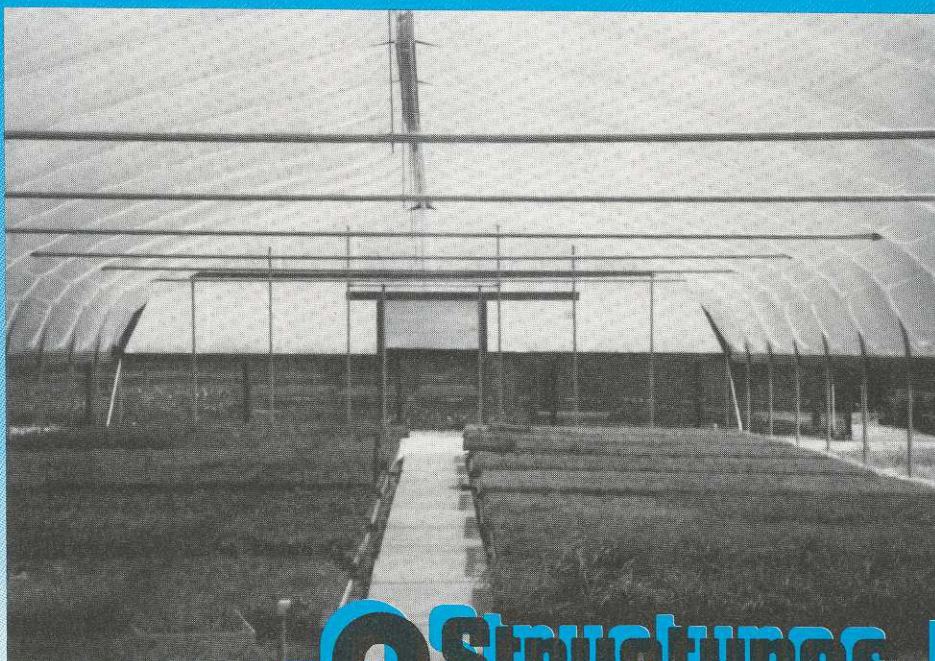
Effect of  $A_R$  and  $A_{FR}$  photoselective filters (Mitsui Chemicals Inc.) on plant growth of *lisianthus* 'Florida Sky Blue'

Table 1. Influence of red- and far-red-light-absorbing plastic films ( $A_R$  and  $A_{FR}$ , respectively) on plant height and flower development (days to anthesis, DA) of selected ornamentals. Control is a clear polyethylene film. Numbers with same letter within a row are not significantly different.

Plant Species	Control film		$A_R$ film		$A_{FR}$ film	
	Height (cm)	DA (days)	Height (cm)	DA (days)	Height (cm)	DA (days)
Cat Whiskers ( <i>Orthosiphon stamineus</i> )	58.7 a	37 a	58.9 a	31 b	46.8 b	34 ab
Golden Shrimp Plant ( <i>Pachystachys lutea</i> )	30.1 b	38 a	32.8 a	38 a	27.0 c	38 a
Persian Shield ( <i>Strobilanthes</i> )	34.2 ab	—	38.9 a	—	30.2 b	—
Salvia						
Indigo Spires Salvia ( <i>Salvia</i> x 'Indigo Spires')	72.7 a	—	68.8 a	—	46.7 b	—
Wine Sage ( <i>Salvia</i> Van Houttei)	52.0 a	34 a	56.1 a	32 a	43.0 b	36 a

Table 1 continued on page 13

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investigate alternative growth-control measures. Recent developments in greenhouse light manipulation offer a commercially acceptable option for plant-growth regulation. Several years ago, Clemson University (CU) researchers began a collaboration with Mitsui Chemicals Inc., Tokyo, Japan, to develop and test photosensitive greenhouse plastic films that can remove far-red light and that are effective in height control. Mitsui has identified red- and far-red-light-absorbing pigments that can be incorporated into polyethylene films. In general, exposure to far-red light promotes stem elongation of seedlings. Therefore, environments high in red light relative to far-red light are favorable for production of short and compact plants. University of Florida (UF) researchers are currently collaborating with CU researchers to test the photosensitive films in Florida (Zone 9b) using subtropical perennials and bedding annuals.

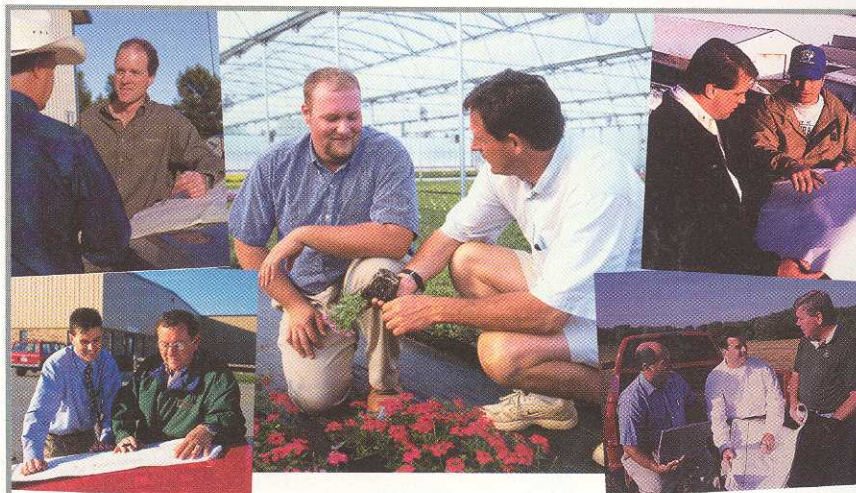
At UF, growth of eleven ornamental species was evaluated inside chambers covered with photosensitive films. Plants produced under the far-red-light-absorbing film ( $A_{FR}$ ) were generally shorter (5–36%) than the control plants. Plants produced under a red-light-absorbing film ( $A_R$ ) had similar or increased height (0–13%) as compared to the control plants. As with chemical growth regulators, the response varied with species and cultivar. Flowering time was not significantly delayed for species tested, except for cat whiskers. It appears that the effect of photosensitive films on flowering can be dependent on whether the plants are photoperiodic.

Although photosensitive films effectively alter plant growth, concerns exist relating to their spectral stability, reduction of light transmission, and variable effects across many species. Current research is addressing these issues while considering the commercial applications of the photosensitive films to maximize the use of sunlight during the day-time and achieve reasonable height reduction without using chemicals. ■

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Table 1. continued

Plant Species	Control film		$A_R$ film		$A_{FR}$ film	
	Height (cm)	DA (days)	Height (cm)	DA (days)	Height (cm)	DA (days)
Zinnia ( <i>Zinnia elegans</i> )						
'Profusion Cherry'	19.6 a	36 a	18.7 a	34 a	15.2 a	35 a
'Old Mexico'	59.5 a	42 a	58.8 a	39 a	56.7 a	39 a
'Isabellina'	80.8 a	43 a	69.4 b	43 a	64.8 b	43 a
Lisianthus ( <i>Eustoma grandiflora</i> )						
'Florida Blue'	31.2 a	30 a	30.4 a	28 a	27.9 b	31 a
'Florida Pink'	23.6 b	26 a	27.2 a	27 a	22.5 b	25 a
'Florida Sky Blue'	26.7 ab	30 a	28.1 a	30 a	23.4 b	32 a



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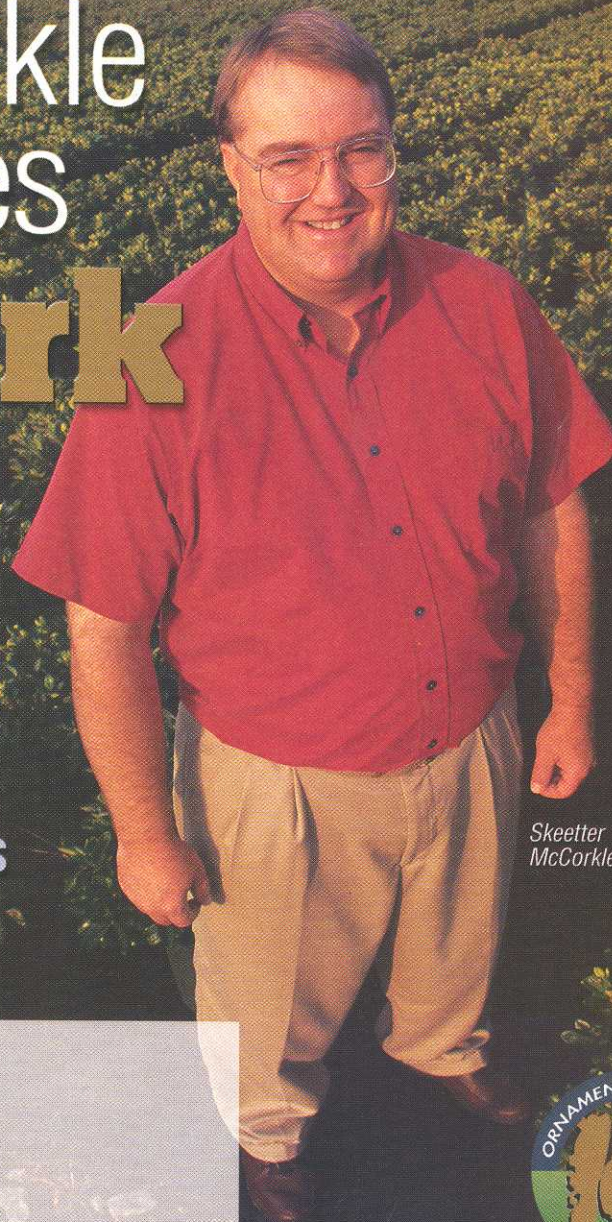
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