REINFORCED PLASTICS*

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Fiberglass plastic panels have many advantages over glass.

Of primary importance is the resistance to breakage by hail. Other advantages include its weight of only 6 ounces per square foot, ease of installation, long-lasting qualities and reduced heat loss by transmission during the winter. A 15 percent acrylic resin base plastic is currently selling for approximately 40 to 42 cents per square foot. Its use has increased despite this cost being considerably higher than for either film plastics or glass.

During the fall of 1958, a 15 x 65-foot wooden framework greenhouse was constructed at Kansas State University, Manhattan, and covered with clear, jonquil-yellow, ivy-green and pearl-white 2½-inch corrugated panels of reinforced fiberglass plastic. After a year, the white was replaced with tropical coral. The greenhouse was oriented east-west and divided into four compartments, each compartment covered with a different colored plastic.

Results of physical measurements are shown in Table 1. Several important findings concerning quality of the plastics for greenhouse use were as follows:

(1) Only the clear plastic permitted the penetration of a high percentage of sunlight.

(2) Corrugated sheet plastic panels permitted a higher percentage of penetration of sunlight in the morning and afternoon than at noon, except in midsummer.

(3) Corrugated fiberglass reinforced plastic panels permitted a higher percentage of light penetration in the fall, winter and spring than during the summer. Maximum percentages of light penetration occurred during the winter.

(4) All colored fiberglass plastic panels tested had more coloring then is desirable for many florists' crops.

(5) The percentages of heat and light from the sun's penetrating any given color of plastic panels were about equal.

*Condensed from the Kansas State Florists Association Bulletin 90:1-3. June, 1961.

Table 1. Percentages of light and heat penetration of 2½-inch corrugated samples of different colored fiberglass reinforced plastic panels. Figures were obtained in tests at Manhattan, Kan., in 1960. Percentage readings in excess of 100 resulted from refraction of light rays by the plastic. To calculate the foot-candles of light penetrating each plastic, multiply the light percentage by the average foot-candles found at the bottom of the table.

	June 16				September 18				December 30			
	8:30 a.m.		noon		8:30 a.m.		noon		8:30 a.m.		noon	
Plastics	heat	light	heat	light	heat	light	heat	light	heat	light	heat	light
Clear	61	64	75	79	73	78	68	71	79	101	76	86
Pearl White	14	11	16	12	13	19	12	14	53	55	30	23
Jonquil Yellow	29	30	40	35	50	63	48	47	94	139	58	59
Pacific Blue	26	21	38	29	44	49	46	48	87	88	47	54
Tropical Coral	34	34	45	46	42	42	52	46	74	80	57	55
Ivy Green	48	56	66	75	48	47	49	53	66	100	68	71
Skylite Green					57	63	70	67	98	102	86	88
Full sunlight (Foot-candles)	6,200 to 6,900		10,950 to 11,165		2,300 to 3,050		7,300 to 7,700		550 to 700		5,000 to 5,050	

Light transmissions through the clear and colored plastic panels are shown in Table 2. The following are some important considerations about the light transmission through these plastics:

(1) The colored light penetrating the plastic is not the same as the light reflected from its surface.

(2) Light penetrating a colored plastic panel can be easily misjudged by observation with the human eye. For example, the percentages of colored light penetrating the sample of jonquil yellow is highest in red and orange, equal in green and yellow and only slightly less in blue and blue-green than in yellow. Yet this light appears very yellow in a greenhouse covered by this color of plastic.

(3) None of the samples tested displayed any great potential for selective light transmission.

(4) The pigments added to plastic panels today are selected primarily for an attractive appearance and not light-penetrating qualities for plant growth. Before pigments and dyes can be added to plastics specifically for their light transmission qualities, considerable research and testing will be required.

Table 2. Percentages of each color of light penetrating reinforced plastic panels of 2½-inch corrugation. Plastics listed are trade names of Stylux plastics made by the Butler Mfg. Co., Kansas City, Missouri.

Plastic	Light Colors						
	Violet	Blue	Blue-Green	Green	Yellow	Orange	Red
Clear	40	67	71	72	73	73	75
Pearl White	2	3	4	4	4	5	5
Jonquil Yellow	7	11	13	16	16	17	19
Pacific Blue	3	7	10	8	7	6	12
Tropical Coral	14	28	30	30	29	32	33
Ivy Green	7	18	25	30	25	18	23
Skylite Green	22	50	60	65	58	47	52

Plants of many species have been grown at the Kansas Experiment Station beneath the clear, jonquil-yellow, tropical-coral, pearl-white and ivy-green plastics during the past three years.

These results have not been fully summarized but certain general statements can be drawn from them. Only the clear plastic can be recommended for midwinter production of crops requiring a high light intensity, such as snapdragons, potted and benched chrysanthemums, carnations, etc. Midwinter qualities of snapdragons and chrysanthemums grown in the clear plastic panel greenhouse section have been consistently superior to those grown in an adjoining glass greenhouse. The higher percentage of sunlight coming through the clear plastic (Table 1), especially between 8 to 9:30 a.m. and 3 to 4 p.m., and sunlight diffusion which increases the light intensity on otherwise shaded leaves are possible explanations.

Sunscalding of flower petals of standard chrysanthemums during the late spring and early summer developed under the clear plastic.

Plants requiring a high light intensity made satisfactory growth beneath the jonquil-yellow, tropical-coral and ivy-green plastics during the late spring, summer and early fall. Plants grown beneath the ivy green were weaker stemmed, flowered 7 to 10 days later and had poorer flower color than plants grown beneath the clear, jonquil-yellow or tropical-coral plastics.

As shown in Table 1, the more coloring added to a plastic panel, the more direct sunlight penetration is reduced; this has been found to increase the amount of diffused light. It has been observed that plants requiring lower light intensity grew well at light intensities considerably higher than these plants will normally tolerate beneath the colored plastics. This was especially pronounced in the section covered with the jonquil-yellow panels.

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Try praising your wife even though it might frighten her at first.

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