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Effects of Glass and Fiberglass coverings on Carnation Growth -- Second Report

by
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Yield under clear fiberglass was 10% higher than under glass to December 10, and equal under the two coverings to April 15, the end of the second crop. While subsequent yields to June 16, were also approximately equal, height of cutting the second crop probably influenced yield during this period more than type of covering. Grade of flowers was significantly improved under clear fiberglass.

Briggs (1) compared the growth of carnations under clear and coral fiberglass structures with that under glass. While his records were taken from January 3, 1960 to April 1, 1961, gas injury from unit-fired heaters after November made his winter production records subject to question. He obtained 12% higher yield and a highly significant increase in average grade of flowers when compared to glass. The transmission of energy by coral fiberglass was found too low for carnations, although flower color was improved by either coral or clear. Briggs also found that heat transmission by either color of fiberglass was reduced thereby reducing the operating time of the cooling-ventilating system.

In order to check on Briggs' results and to obtain more reliable data on winter plant growth, the 15' x 18' houses were replanted with rooted cuttings of the varieties Red Gayety and Coquette on June 5, 1961. They were timed for a first crop peak in late September, a low point at mid-November, and a heavy second crop in January and February, following the lowest light of the winter. Steam heating coils were installed to avoid the gas injury experienced the previous year.

Yield and grade records for the first two complete crops are shown in Table 1 and cumulative yields for these two crops are illustrated in the chart. There were no differences in design grade flowers produced in the three houses. Those graded design were predominantly malformed flowers, with few weak-stemmed flowers in spite of the adverse winter timing. Even though coral fiberglass reduces light to the point of reducing growth, stem strength was adequate throughout the winter crop. The most short grade flowers were produced in the glass house primarily from Coquette on the first crop and Red Gayety on both crops. The production of standard grade flowers was virtually the same in

1/Bryce D. Bennett assisted with this while a senior student in Horticulture at Colorado State University.

Table 1. Yield and grade of carnations (2 varieties) by crops under 3 coverings.

First crop Aug 13 to Nov. 25	Design	Short	Stand.	Fancy	Total	Mean grade
Glass	72	396	987	81	1536	3.70
Clear fiberglas	117	239	1097	259	1693	3.92
Coral fiberglas	104	126	924	321	1475	3.99
Second Crop Nov. 26 to May 5						
Glass	168	195	769	1531	2663	4.37
Clear fiberglas	172	113	674	1739	2717	4.44
Coral fiberglas	174	91	605	1505	2375	4.45
Total for 2 crops						
Glass	240	591	1756	1612	4199	4.13
% in each grade	5.7	14.1	41.8	38.3		
Clear fiberglas	289	352	1771	1998	4410	4.24
% in each grade	6.6	8.0	40.1	45.3		
Coral fiberglas	278	217	1529	1826	3850	4.27
% in each grade	7.2	5.6	39.7	47.4		

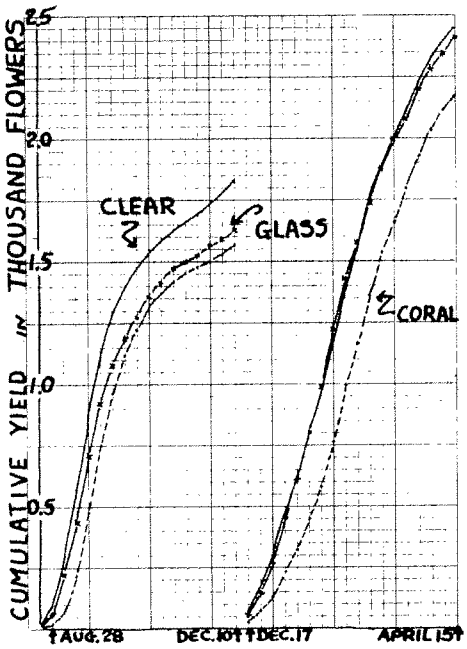
the three houses, with the most fancy flowers in the clear house and the fewest in the glass house. The difference in average grade is highly significant statistically.

The houses were ventilated automatically at 65°F throughout the experiment. Fan capacity and wet pad or air intake capacity were set as near equal as possible and fan operation time recorded daily. Table 2 gives this ventilation time by months. Compared to the glass house, fan operation time was 19% less in the clear and 14% less in the coral fiberglass house for the 54-week period. The reduction in cooling-ventilating time varied with solar energy and outside temperature. The reduced fan time was only 12% for clear and 4% for coral during July,

Table 2. Fan operation time in hours to cool glass and fiberglass houses at Fort Collins, Colorado.

	Glass	Clear fiberglass	Coral fiberglass
June 1961 a/	230	223	247
July	332	293	318
August	291	265	293
September	132	104	116
October	156	98	123
November	70	68	48
December	25	16	10
Jan. 1962	43	27	27
February	81	57	54
March	153	100	102
April	209	156	168
May	231	174	179
June b/	113	87	992
Total	2066	1668	1777

a/ Last 28 days b/ First 14 days



whereas the reduction from September to May averaged 27% for clear fiberglass and 24% for coral. This is a very important characteristic of fiberglass coverings which should allow more time in winter for the addition of carbon dioxide to houses of this material.

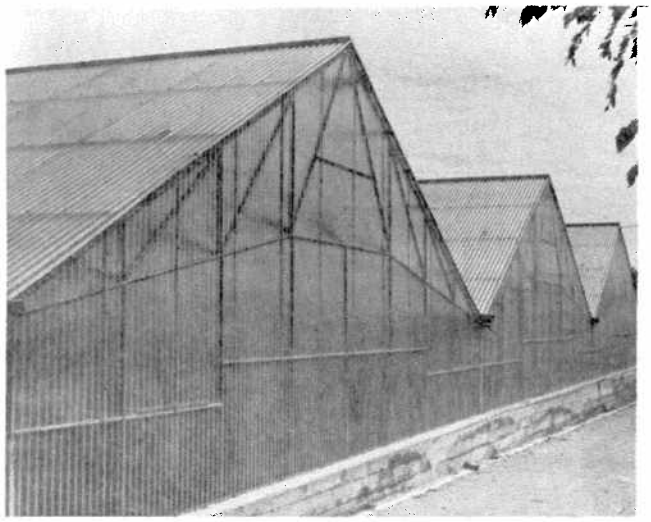
The partial reflection of infra red energy is a desirable feature in greenhouse coverings and will be investigated further as the plastics industry develops. Investigation into the reasons for daily differences obtained in fan operation time under these coverings and the weather effects on these differences are being expanded.

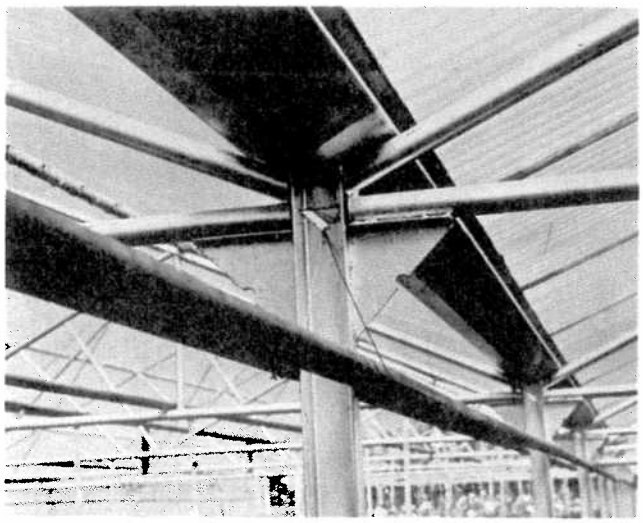
Finally, it is postulated that growth of carnations is significantly improved under clear fiberglass from March to August, or during the six months of highest solar energy. This period has an average daily solar energy of 400 g cal/cm^2, or higher, in Colorado. The lag in increased yield of carnations due to this increased earlier growth extends for 3 or 4 months after August, with a corresponding lag after March before flowering increases.

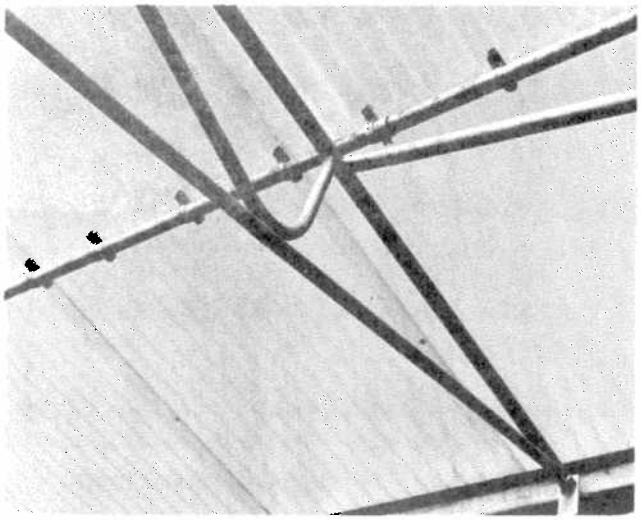
Filon Plastics Corporation, Hawthorne, Calif., supplied the fiberglass panels and defrayed a part of the cost for this investigation.

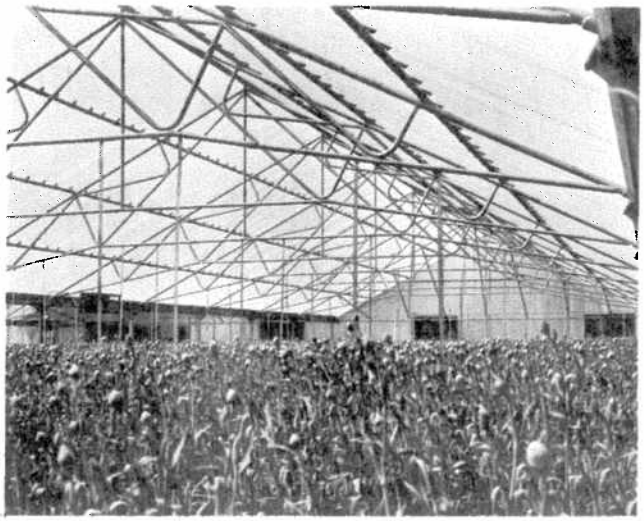
Literature cited

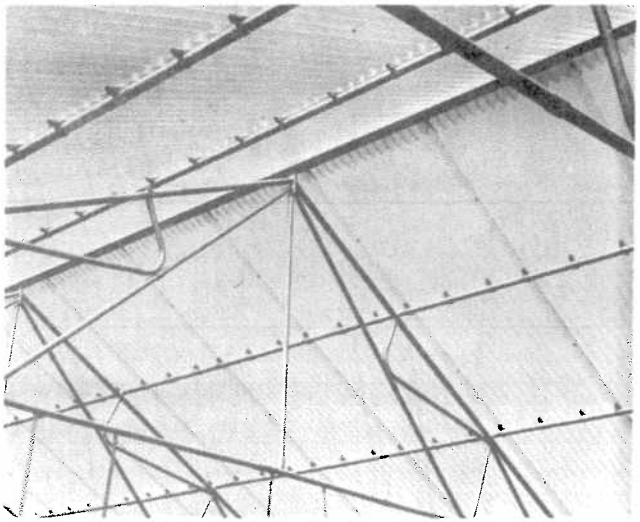
1. Briggs, Robert A. 1961. Effects of glass and fiberglass on carnation growth. Master of Science thesis. Colorado State University, Fort Collins, Colorado.

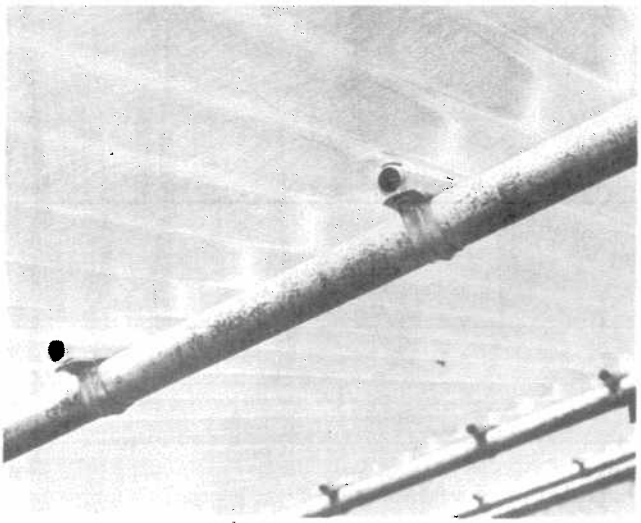




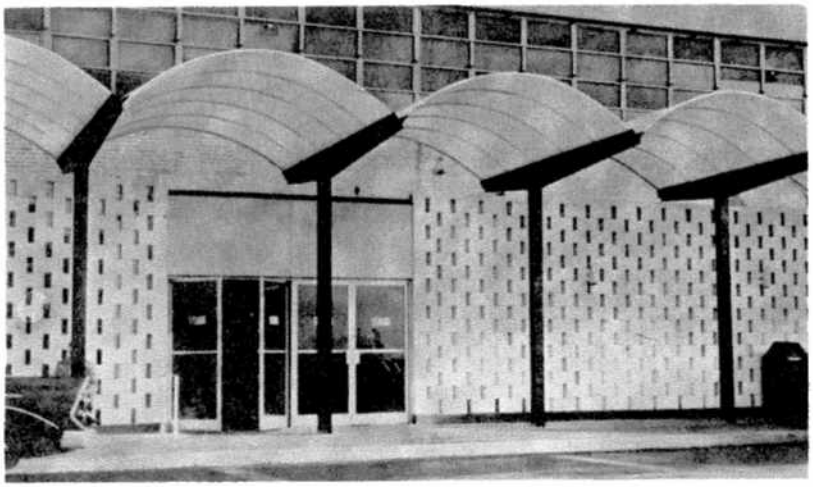


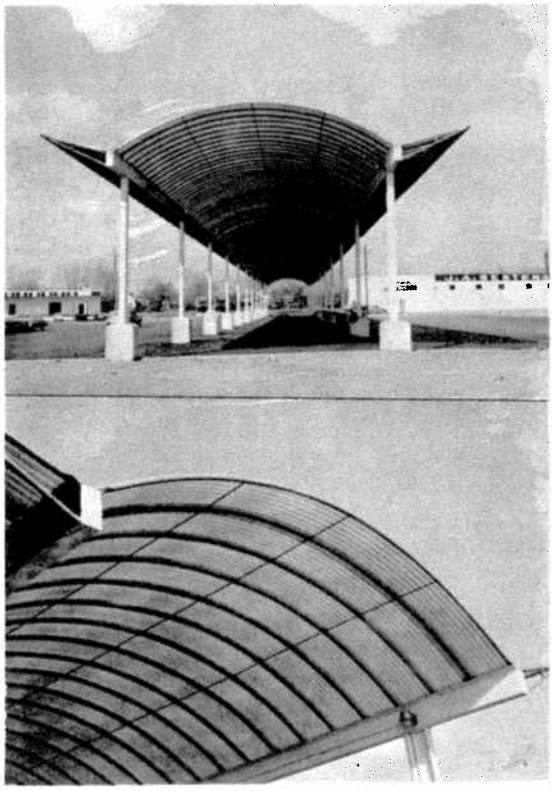






Fiberglass construction in the Denver area showing details of trusses, gutter, and attachment of fiberglass to pipe purlins by means of small bolts and conduit spacers to raise fiberglass off the purlin.





Architects for this vaulted fiberglass construction at the Willow Run Air Terminal were Yamasaki, Leinweber & Associates of Royal Oak, Michigan. Why not this construction for greenhouses? Pictures courtesy Structoglas, Cleveland, Ohio.

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