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IN COOPERATION WITH COLORADO STATE UNIVERSITY
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Refinishing FRP Greenhouse Panels

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Research in 1967 indicated that FRP panels could be refinished and the spectral transmission characteristics restored within 98.5 percent of a new panel (1). After the first commercial coverings were refinished, it was apparent that the longevity of the refinishing materials was limited.

In 1971 a series of 3-10-year-old greenhouse panels was evaluated for physical characteristics of the surface as related to the need to be refinished (2). Some panels fewer than three years old had fiber "bloom," and a few new panels had imperfections that contributed to early weathering (Fig. 1, 2). All of the weathered panels had developed a surface characteristic called "polygonal" cracking (3). It was concluded that the inability of refinishers to adhere to weathered FRP panels is due to the different degrees of elasticity of the panel surface and that of the refinishing material. The panel surface continues to "crack" and the refinisher cracks and flakes off like dandruff.

Although unsubstantiated by experimental evidence, many growers and greenhouse contractors felt the method of cleaning panels and materials used had a direct bearing on the ability of the refinisher to adhere.

Panel Preparation Studies

In October 1972 an experiment was designed to evaluate the application of two new "lacquers" and two commercially available refinishers to three-year-old weathered greenhouse panels. On October 3, 1972, three different cleaning materials and water were used to clean the panels before the refinishers were applied (Table 1). As the cleaning treatments were applied, the panels were scrubbed with a coarse scrub brush. Each panel was rinsed thoroughly with clear water and allowed to dry 48 hours before the refinishers were applied October 5, 1972. Each refinisher was mixed and applied by brush according to the manufacturers' recommendations on each of the specially prepared panels (Table 1).

Figure 1. Irregular cracking observed in new non surface treated panel (2).

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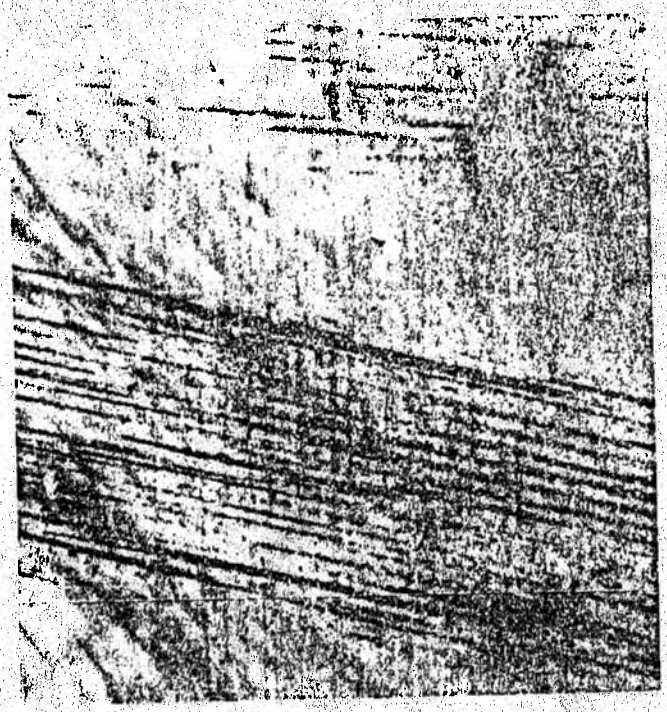

Figure 2. Exposed glass fibers in factory run non surface treated FRP panel (2).

Results

There were no apparent pre-panel treatments that contributed more to the bonding of one refinisher than another. Several growers in the Denver area have tried additional cleaning agents and feel that the treatment prior to applying the refinisher has little or no bearing on the retention of the coating.

Refinishing Evaluation

Refinisher treatments 1 and 2 were silicone resins. Both materials began peeling in approximately 12 months after application. When the panels were removed July 7, 1974, approximately 1/8 of the coatings had peeled off the individual panels and the remaining refinisher had turned almost milk white (Fig. 4).

Table 2. Coating materials used in the 1972-74 refinisher evaluation.

Refinisher Treatment	Name	Source
1	Dow No. 1	Dow Corning Corp.
2	Dow No. 2	Dow Corning Corp.
3	Nuglas	Silmar Chemical Corp.
4	Continental Clear	Continental Products Co.

Refinisher treatment 4 showed the least flaking and wear of any coating. There was little flaking on all pre-treatment panels and, where the resin was extra thick, no glass fibers were exposed. Even though treatment 4 adhered relatively well to the panels, it did turn yellow as the evaluation progressed. The material lacked complete light and temperature stability. The thinner areas of application were beginning to weather away on all pre-treatment panels at the time of replacement, July 7, 1974.

Refinisher treatment 4 adhered to all pre-treatment panels somewhat better than treatments 1, 2 and 3

Table 1. Materials used to clean and refinish three-year-old weathered FRP Panels.

Panel	Pre-Panel Treatment	Refinisher Treatment
1	Sodium triphosphate (NA_3PO_4), 1#/gal. water	Dow No. 1
2	Colgate-Palmolive car cleaner (CPC), 1/2oz/gal.	Dow No. 2
3	Water	Continental Clear (CC)
4	Spic & Span (S&S), 1/2cup/gal.	Filon
5	No Treatment	
6	NA_3PO_4	Dow No. 2
7	CPC	Dow No. 1
8	Water	Filon
9	S&S	CC
10	No Treatment	
11	NA_3PO_4	CC
12	CPC	Filon
13	Water	Dow No. 1
14	S&S	Dow No. 2
15	No Treatment	
16	NA_3PO_4	Filon
17	CPC	CC
18	Water	Dow No. 2
19	S&S	Dow No. 1
20	No Treatment	

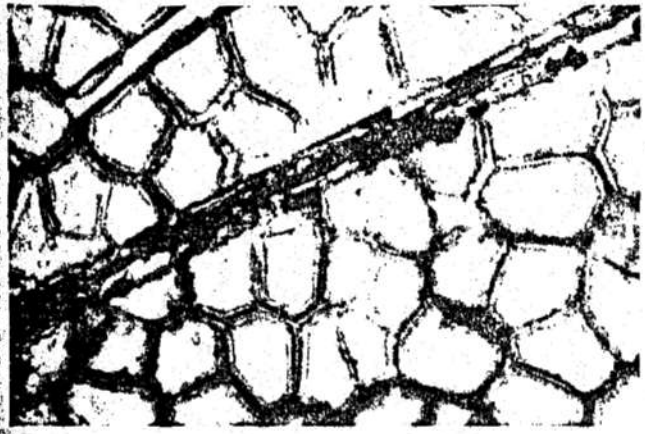

Figure 3. Polygonal cracking found in some weathered greenhouse FRP panels (2).

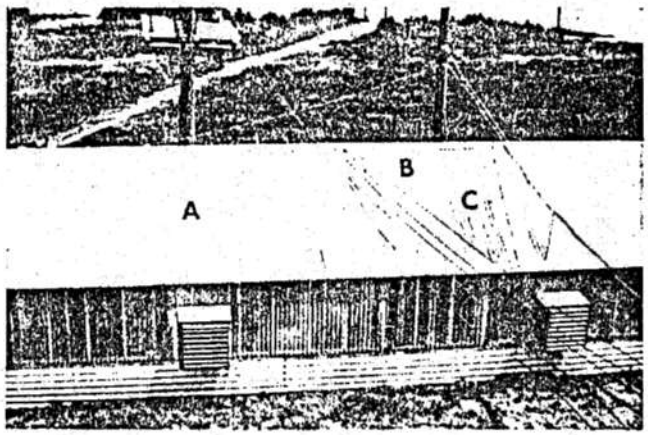

Figure 4. Greenhouse, with panels pretreated and coated with refinishers, 21 months after application. (A) Coating that turned white but still transparent. (B) an untreated panel and blooming. (C) continental coating starting to flake.

but did not turn milky white; however, it did start "flaking off" approximately 14 months after application. It is assumed that a hard rain or even a hail storm could have removed most of the remaining coating at the time of panel removal. The refinisher on the panel was beginning to develop a yellow hue.

Discussion

None of the refinishers evaluated during the past eight years at CSU has met the needs of the FRP greenhouse industry. Some refinishers have flaked off in 6-8 months while others have adhered but gradually weathered and turned yellow within 18 months.

Until there is evidence to the contrary, it is recommended that FRP panels not be refinished because it has not been proven economical. It costs more than 10¢ per sq. ft. to have a roof refinished, and it is only beneficial for the first 6-12 months after application.

If the panel manufacturers' recommendations are heeded — namely "washing down the roof periodically" — the grower will retain an adequate light transmission capability through most acrylic modified "standard" greenhouse panels for 8-10 years.

Literature Cited

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