

The Greenhouse Environment

Greenhouse Environment: The Effect of Chemicals on Polyethylene Film in the Greenhouse Environment

AT Films, Inc. greenhouse film provides long life and dependability. You can further ensure good results by avoiding snags and tears during installation and using a white plastic (non-PVC) batten or adhesive tape to separate the film from the heat of the structural members. Shading or painting the film at the polylock will also reduce failures caused by heat.

Makeup of Flexible Greenhouse Films

Flexible greenhouse films are made from low density polyethylene (LDPE), linear low density polyethylene (LLDPE), ethylene-vinyl acetate copolymers (EVA), and similar polymers. In their natural state these polymers deteriorate rapidly when exposed to sunlight. The sun's ultraviolet (UV) light transfers its energy to the polyethylene molecules, causing them to become so energized that they break apart. Several successful stabilizer additives have been used by film manufacturers to arrest this natural degradation. Although effective, these additives caused discoloration of the film and reduced light transmission.

In 1982 AT Films began to produce tough, clear, high PAR light transmission greenhouse films using hindered amine light stabilizers (HALS). Since that time HALS stabilizers have become the standard for the industry. HALS stabilizers protect our Super Dura-Film® products by interfering with the propagation of free radicals. Free radicals are high energy particles released when UV energy "breaks" a polymer molecule. This produces a chain reaction with each free radical potentially striking and breaking other molecules, thus releasing more and more radicals, until the film has degraded to the point of failure. The HALS additive effectively restricts the multiplication of these free radicals.

Protecting Your Film from Chemicals

Using advanced materials and strict quality controls, AT Films can assure you that our products offer the exceptional ability to withstand the effects of natural UV radiation and weathering—even in the most severe climates. What is more difficult is protecting our films from the effects of exposure to

the man-made elements found in the greenhouse environment. Even the best quality greenhouse films may be weakened or destroyed by contamination from certain chemicals. To protect your investment in crop and covering you should know what chemicals and cultural practices to avoid or modify.

- Certain chemicals attack the polymer itself. These are usually oil-based solvents in paints and petroleum distillates used as solvents for wood preservatives. **Avoid direct contact of any polyethylene film with oil-based paint products or wood preservatives.**
- Other products, such as copper bactericide sprays, may catalyze the breakdown of polymers. **Minimize direct contact with the greenhouse film when using copper sprays.**
- High concentrations of chlorine, commonly used in greenhouses as a disinfectant, will also adversely affect the polymer. **Avoid the use of chlorinating solutions or household bleach products.** Instead, use one of the commercially available disinfectants such as Greenshield® or Demoss®.
- Chemicals in the greenhouse environment can also affect the HALS stabilizers. Sulfur, halogens (fluorine, bromine, chlorine, etc.) and chemicals containing them, especially pesticides, are very aggressive in deactivating the HALS stabilizers.
- Rose growers using large amounts of sulfur and chlorinated-hydrocarbons (Pentac® is one example) have learned to expect reduced film life compared to growers who have less need for regimented pest controls.
- Using foggers and smoke generators also leads to direct contact of the pesticide with the plastic and can shorten film life. Overspray can lead to large volumes of pesticide coming in direct contact with the plastic and should be reduced or avoided. **Many pesticides not containing halogens or sulfur are available and should not be harmful to greenhouse films when used as directed.**
- Drawing inside air to inflate a double poly house concentrates airborne pesticides between the film layers, especially at the point where the inflation air is constantly blowing against the film. **Avoid the problem of film failing at the inflation fan by drawing outside air, or by providing a baffle to prevent the fan from discharging pesticide residue directly on to the film.**



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- Direct contact with PVC pipe, PVC tapes, or lagging made with plasticized PVC can also provide a source of damaging chlorine that can act upon the HALS stabilizer and the polymer itself.
- **Whitewashing should be done with products designed for greenhouse film.** Other products such as latex house paints may contain fungicide additives. Some of these fungicides contain chlorine or other halogens that reduce the effectiveness of the HALS stabilizer and may shorten film life.
- Sulfur and other chemical contaminants can come from external sources, such as aerial spraying of adjacent vineyards, orchards, or field crops. This is sometimes characterized by degradation of the outside layer of film while the inside layer maintains good physical integrity. **It is a good idea to know what your neighbors are spraying with and to plan accordingly.**

Get the Most out of Your Film

- Reduce or eliminate overspray with pesticides containing chlorine, bromine, fluorine, or sulfur.
- Do not use foggers or smoke generators with any chemical containing chlorine, bromine, fluorine or sulfur.
- Avoid direct contact with PVC products in general, and especially PVC pipe or plasticized PVC tape.
- Avoid direct contact with oil-based paints or products containing petroleum distillate, e.g. wood preservatives.
- Do not substitute white paint for shade compounds designed for greenhouse film. Latex house paint may contain fungicides containing sulfur, halogens, etc.

If repeated or prolonged contact with any of the above is unavoidable due to required cultural practices, reduced film life may be inevitable. The greater the contact, the more affect it will have on the film. If you have any questions concerning the correct application of AT Films Dura-Film® products, please contact your distributor salesperson or AT Films, Inc.

