

LIGHT TRANSMISSION

Every material placed between the sun and plants can impact plant growth. How do you know if the material you are considering allows the right amount and kind of light to pass through to your crops?

What kind of light do plants need?

PAR (Photosynthetically Active Radiation): The range of light wavelengths that are used for photosynthesis by plants

UV light (UVA 315 – 400nm %) (UVB 280-315nm %): most crops need some amount to develop flavor and nutritional content.

What happens if the product I use blocks too much PAR or UV?

Results can be longer stem lengths; fewer leaves; early flowering, yellowing or wilting of leaves; harvested crops that can lack flavor or the expected nutrition levels.

How do I know if the product (poly film, curtain, polycarbonate or netting) I'm considering delivers the light my crops need? The specification should answer some of the questions, while the crop and its location will dictate the true requirements.

- **Total Light Transmission (400-700nm %):** % of light that passes through panels or textile to the crop.
- **% of Light Diffused:** % that is scattered or bent when it passes through fabric or sheeting, some of light is reflected away while some breaks.
- **While not listed on specifications, they may help indicate what to look for:**
- **Clarity:** % of light that is diffused at an angle (<2.5 °) when it passes through the material. Plastic will therefore look clear.
- **Haze:** % of light that is bent at an angle >2.5 ° when it passes through the material. Indicates if plastic will look cloudy. Plastic film or curtain can look yellow when there is too much haze.

Absorption Spectra of Pigments

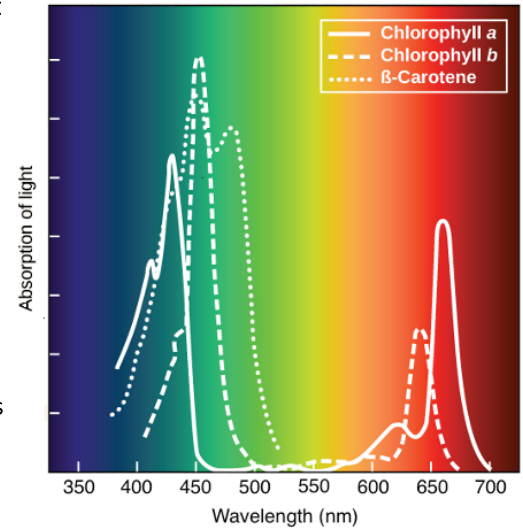


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Will all glass, polycarbonate, polyfilm or netting pass PAR or UV light to crops? No.

- Transmission of light through fabric is reduced if material absorbs or reflects too much light.
- Diffusion is when light is either reflected off the surface or light passing through disperses. Light dispersing can be helpful depending on the situation.
 - Greenhouses with multiple canopy levels benefit from limited diffusion because light reaches leaves at various levels.
 - Too much diffusion causes unequal amounts of light to be available in the interior of a high tunnel, caterpillar tunnel or greenhouse. Plants may grow unevenly, some can grow elongated stems or have differences in skin color.
 - Possible cause: the proper mix of PE types are not added to each film layer (many polyfilms are made in 3 or 5 layers)
- Excessive UV additives may be added to prolong the life of the fabric. These can block the light components that give crops full color, nutritional value and flavor, and prevent bees from “seeing” well enough to pollinate

What parts of a technical specification help in product evaluations?

- **ASTM D 1003:** Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics
- **ASTM D 1494:** Standard Test Method for Diffuse Light Transmission Factor of Reinforced Plastics
- **ASTM D 1746-15:** Standard Method or Transparency of Plastic Sheeting
- **AATCC TM 148-2014e4 (2021):** Test Method for Light Blocking Effect of Textiles and Related Materials

SPECS BY PRODUCT

ASTM D 1494	ASTM D 1003	*ASTM D 1746*	AATCC TM 148
Poly Carbonate Sheeting	Poly Carbonate Sheeting	Polyfilm	Shade Fabric
Insect Netting	Glass		
	Greenhouse Curtain		
	Polyfilm		

*Applies only to translucent material / colorless thin sheeting
Not needed when ASTM D1003 used*