

Covering Material for Greenhouses

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Greenhouses are essential structures for cultivating plants in controlled environments, providing protection from adverse weather conditions and allowing for year-round cultivation. One crucial component of a greenhouse is its covering material, which directly affects the efficiency, durability, and overall performance of the structure. In this comprehensive guide, we will explore various types of greenhouse. Covering materials, their characteristics, advantages, and considerations for choosing the most suitable option for your specific needs.



Nowadays, many farmers are shifting farming to other professions due to insufficient financial protection. Climatic change is a significant challenge for the farmer. More than 95% of farmer uses the traditional farming technique in India. To earn more profit from agriculture, we must adopt modern techniques such as Greenhouse farming

Greenhouse Covering

Greenhouse covering is the material that covers the greenhouse frame and plays a key role in heat retention. The covering material used on a greenhouse influences the productivity and performance of a structure. Covering materials impact on the level and quality of light available to the crop. Diffused light is better than direct light. Fluorescent and pigmented films can increase the proportion of good red light. Dust, attracted to plastic films, will reduce the transmission of radiation. Water droplets on the inside of coverings have been shown to reduce light transmission by 8% and will also block thermal radiation. Greenhouse coverings all reduce light to some extent. As coverings become dirty and as they get older, less light enters the greenhouse. Condensation (water drops) on the covering material also reduce light. Light coloured materials in the greenhouse, such as white weed matting, increase the light available to the crop.

Different types of covering material

- 1) **Glass:** Traditional and time-tested, glass is a popular choice for greenhouse coverings. It provides excellent light transmission, allowing for maximum photosynthesis, and creates a visually appealing environment. Glass is durable and can last for decades with proper maintenance. However, it is relatively expensive, heavy, and more susceptible to breakage than other materials. Special coatings can be applied to enhance insulation and reduce heat loss.
- 2) **Polycarbonate:** Polycarbonate is a lightweight and durable material that has gained significant popularity in greenhouse construction. It offers excellent light transmission,

comparable to glass, while providing superior insulation properties. Polycarbonate also has good impact resistance, making it less prone to damage during transportation and installation. It is available in single, double, or multi-wall panels, with varying levels of insulation and light diffusion properties.

- 3) **Polyethylene film:** According to a 1993 study by researchers Gene A. Giacomelli and William J. Roberts of Rutgers University, plastic (polyethylene) film, is the most popular glazing material, mainly due to its low initial cost. Polyethylene film is a cost-effective and versatile covering material widely used in commercial and small-scale greenhouses. It is available in various thicknesses, and its light transmission can be adjusted by selecting different grades. Polyethylene film is lightweight, easy to install, and allows for good light diffusion. However, it has a shorter lifespan compared to glass or polycarbonate and requires regular replacement due to degradation caused by UV radiation and weathering.



- 4) **Acrylic:** Acrylic, also known as polymethyl methacrylate (PMMA), is another transparent material used in greenhouse coverings. It offers high light transmission, similar to glass, and has good impact resistance. Acrylic is lighter than glass and has better insulation properties, reducing heat loss. However, it can be more expensive than other options and is prone to scratching, requiring proper maintenance to preserve its clarity.
- 5) **Fiberglass:** Fiberglass is a reinforced plastic material that provides a balance between light transmission, insulation, and durability. It is a cost-effective option and has good impact resistance. Fiberglass panels can be corrugated or flat, and they offer diffused light, reducing the likelihood of shadowing and promoting even plant growth. However, fiberglass panels may yellow or become brittle over time due to UV exposure, requiring periodic replacement.
- 6) **ETFE (Ethylene Tetrafluoroethylene):** ETFE is a lightweight, translucent, and highly durable material gaining popularity in modern greenhouse design. It offers excellent light transmission, comparable to glass, while being significantly lighter. ETFE has outstanding resistance to UV radiation, chemicals, and weathering. It also has self-cleaning properties, reducing the need for regular maintenance. However, ETFE is relatively expensive compared to other materials and may require professional installation.



Considerations for Choosing Greenhouse Covering Materials

- **Climate:** Consider the prevailing weather conditions in your region, including temperature extremes, sunlight intensity, wind, and snow loads. Select a covering material that provides suitable insulation and protection against these factors.
- **Light Transmission:** Different plants have specific light requirements. Choose a covering material that allows adequate light transmission for optimal plant growth.

- **Energy Efficiency:** Look for covering materials with good insulation properties to reduce heat loss during colder months and minimize energy costs.
- **Longevity and Maintenance:** Consider the lifespan of the material and the maintenance required to keep it in good condition. Factor in replacement costs if necessary.
- **Budget:** Determine your budget for greenhouse construction and choose a Covering