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HOW DOES THE SUN'S RADIATION AFFECT PLANT GROWTH

The global sun radiation spectrum has a wide array of specific uses. Not only is there the well-known photosynthetic active radiation-PAR (growing light that plants feed on) in the 400-700nm range, but there are different parts of the sun's radiation that have specific influences on plant development.

Each part of the sun's radiation triggers different responses. Some types of radiation are used more than others, and some ranges are not used at all. As a matter of fact, certain parts of the solar spectrum are detrimental to plant development.

- **200-280 Nanometers**

The first band of spectral utilization is the 200-280nm ultraviolet (UVC) range, which is extremely harmful to plants because it is highly toxic.

- **280-315 Nanometers**

The next band of spectral utilization is the 280-315nm (UVB) range, which has a crop specific response on growth and physiologic processes. This range includes harmful ultraviolet light (UVB) which effects plant color. With "green" plants, growers often observe that their plants "bleach-out" under the UV light of the sun. Plant colors are "faded" or "washed-out".

- **315-400 Nanometers**

The 315-400 nm range of the sun's radiation includes the ultraviolet (UVA) range as well as visible light. This range starts out with ultraviolet rays (315-380nm) and ends with visible light (380-400nm) that begins the process of chlorophyll absorption, influences photoperiodic and inhibits cell elongation. To inhibit sporulation and control the blackening of rose petals, greenhouse film should block to 380nm, while guaranteeing that the beneficial 380-400nm range on visible light enters. In the 380-400nm range, plant stretch is reduced, the thickness of the leaves is increased and fungal sporulation is reduced.

- **400-610 Nanometers**

Visible light ranges from less than 400 to almost 700nm. This range includes violet, blue, green, yellow, orange and red bands of light, which includes the PAR range. In the 400-520nm range where we have violet, blue and green bands, there is peak absorption by chlorophyll and carotenoids as well as a strong influence on photosynthesis.

- **610-720 Nanometers**

In the 610-720 nm band there is little absorption by chlorophyll, a stimulation of cell elongation and an influence on flowering and germination. This band includes infrared (IR) at its high end, which is heat. Note the final band of 1000+ nm is totally infrared and all energy absorbed at this point is converted into heat.

- **780-2500 Nanometers**

Infrared ranges from 780-2500nm. Excess infrared results in the need to shade, which reduces the amount of PAR light available to increase growth. Many growers will use the whitewash to shade, which can reduce the quantity of PAR light, but many also have the detrimental effect of reducing the quality of light. Recent developments in technology have made it possible to now selectively reflect the short wave infrared (700-2500nm—Heat) to reduce the extreme solar loads and lower temperatures, while maintaining high PAR.

Spectral influence

It is important for growers to understand the spectral influence the sun's rays have on their crops to take advantage of the one **"free"** energy source available – the SUN. Growers may need to adjust fertilizers or plant cycles to adapt to the changes resulting from the altered rays. While the choice of greenhouse covering may be one of the least expensive investments a grower makes, its impact on crops (the money that is being grown) is critical.