USING THE SUN'S ENERGY FOR GROWTH

by Klerk's Plastics

The Sun's Radiation

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 are detrimental to plant development.

The UV portion of the spectrum

The UV (ultra violet) portion of the light spectrum causes color bleaching. Although UV light has no heat in it, it does penetrate the skin of plants and humans causing bleaching, cell damage and burning. It is referred to as a "high energy" wavelength because it oscillates at such a small frequency and can penetrate the outer layer of plants and animals. *When it comes to UV preference, there are 2 basic groups of plants.* Most bedding plants produce brighter colors and darker green foliage when UV is blocked to 380nm. *Some plants like Bougainvillea, grow faster and larger without UV but have less intense color.* When *these* plants are subjected to direct sun through 55% shade *cloth (100% UV but only 45% quantity)*, the flowers will become brilliant within 2 days. This proves that *even* plants *that need UV for color* can grow without UV *for growth reasons* and be finished with UV to get color. *As a general rule,* plants that produce purple *color*, like eggplant *Tie basil* and purple lettuce, *need* UV to achieve intense color. Some people say plants 'fight' or push up against the UV to color up and some say they color up because of it. Either way you want to look at it, it is an often overlooked and misunderstood piece of the puzzle. When any white paint or white poly is placed over a plant it blocks all the UV and takes the visible *and* infrared down to whatever percentage it is shaded. White pigment blocks UV non-proportional to the rest of the spectrum.

With today's additives films can simulate *a* "low UV *or* shade ***condition***" and at the same time deliver high amounts *PAR* of energy. When this is combined with high diffusion, it is amazing how much energy film *one* can inject into a plant.

Light Diffusion

Imagine that you could bring the sun down and roll it around individual plants. Suddenly you could get more light to more leaves with less stress to any one leaf. By rolling (diffusing) the sun around, each leaf would receive a correct spoon feeding of solar energy. By giving the optimal amount of light to each leaf, the leaf's capacity to manufacture food would be maximized.

Controlling Heat Buildup

Up until now, to control heat buildup (even with diffusion) growers were forced to reduce the sun's energy with shade cloth which also limited the total quantity of PAR light. Another option, white wash, reduces not only the quantity, but also the quality of PAR light. Either of the above options could contribute to plant "stretch" (where plant internodes elongate), and result in a need for use of a growth retardant.

Research

According to research at the University of Oregon, diffused light has the advantage of getting more light down into plant foliage canopies. This is an advantage to plants, which grow upright; where the newly emerging leaves end up shading the older leaves below them. Since the older leaves originally emerged and developed for maximum food production under highlight conditions, the shading caused by the newly emerging leaves reduces their food production. The benefit of diffused light is that it provides more light to the lower (older) leaves and thus increases their food production.

Since 1972 when IR films were first developed, there has been significant research of the effects of light diffusion on plant productivity, concluding that diffusion averages leaf temperatures by evenly distributed energy resulting in more photosynthesis, causing earlier and fuller development of healthier, disease resistant crops.

Stop the spread of fungal infestations.

If the UV is blocked ***to*** **380nm** and a minimum of 62° F is maintained, fungus do not get the signal that they are "in the light" or in an unfavorable temperature condition and will not spore (multiply). This method of avoiding major infestation by actually keeping an unwanted organism alive was discovered in 1961 in Japan. They use vinyl coverings, which normally blocks UV to 380 nm. If sidewalls or open vents let UV in or the temperature drops below 62°f. the fungus will sporulate. This is not a magic bullet, but it is a valuable piece of the puzzle.

High UV blockage greatly reduces a plants need for water. UV is also nature's natural growth regulator causing plants to have short internode spacing. When the UV is blocked to 380nm the water should be cut back to avoid stretch. If plants are watered as normal, plant stretch will result.

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We have all heard that "this plant can only handle X amount of Foot Candles of Light." The "books" say that if you exceed X amount, your plants will suffer from Bleaching, Stress from Intensity, or stress and death from Heat. The tools available to growers have changed and so have the roles.

The following growers have crops under polyethylene covered greenhouses and have changed the way they use the sun's energy. They have all discovered more efficient ways to use the sun's 'free' energy.

The Plug Connection in San Diego Calif. Grows bedding plant plugs and uses no shade. (Other than a few days in August). Dorights Nursery in Oxnard California grows bedding Plant plugs and uses no shade.

Rick Outing grows bedding plants and plugs in Kalamazoo Michigan and no longer uses Shade paint.

Tony Godfrey of Olive Hill Nursery in San Diego grows bromeliads and tropical and rarely uses shade.

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Many successful growers have utilized the sun's energy to create the total picture of growing success. With today's film technology the growing possibilities are unlimited. And the color is spectacular.