LIGHT AND THE COTTON PLANT

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Abstract

To humans, light is that portion of the electromagnetic radiation spectrum (ERS) that our eyes can detect. It is in fact only a small portion of the ERS that includes radiation wavelengths ranging from gamma rays to TV and radio. This small sliver of the ERS closely corresponds to the wavelengths that are utilized to drive plant photosynthesis, namely 400 to 700 nm or photosynthetically active radiation. However, this small range is not the only part of the radiation spectrum that affects plant growth and development. The presence of neighboring plants will alter the light environment through reflection from and transmission through plant tissues. Reflected and transmitted light will be enriched in far-red light in relation to red light. Both far-red and red light can be detected through phytochrome, a photoreceptor pigment in plants that changes form in response to red or far-red light and their ratio. Phytochrome plus the blue light receptors, cryptochromes and phototropins, cause alterations in plant growth and development called photomorphogenesis. In addition, UV light can affect cotton photosynthesis and growth in a negative manner when present at a sufficient intensity. Both too little light and too much light can have negative effects on cotton growth through effects on photosynthesis. Too little light fails to produce photosynthate in sufficient quantity to maximize growth thus leading to fruiting form shedding. Too much light, especially in the presence of low temperatures, causes reduced photosynthesis through photoinhibition. In either case, crop productivity is reduced. One thing is for sure, changing light environments will bring about change either through direct effects on photosynthetic capacity or through photomorphogenesis.