

**COTTON SEEDLING SHOOT AND ROOT
GROWTH RESPONSES TO LIGHT REFLECTED
FROM STRAW-COVERED VERSUS BARE SOIL**

M. J. Kasperbauer

USDA, ARS

Coastal Plains Research Center

Florence, SC

Abstract

Double-cropping of cotton following wheat is being evaluated in conservation-tillage systems. Poor cotton seedling establishment may occur if the wheat straw remains on the soil surface. This has been attributed to a number of factors including poor seed to soil contact, low soil temperature, and effects on light environment. Our objective was to evaluate effects of straw residue on the light environment while removing effects on soil temperature and seed to soil contact. The study utilized 3-liter pots of loamy sand in a greenhouse in 1991, 1994, and 1995. The soil was taken from fertilized field plots and screened through a 2-mm screen to remove old roots and stems. Pots were arranged in groups of five on greenhouse benches. Each group of five pots was covered with a 122 x 122 x 2 cm styrofoam insulation panel. Five 7.5 cm holes were cut in each panel so that a hole was centered over each pot. The panels were covered with fresh wheat straw, weathered straw, or bare soil. Soil temperatures did not differ in the pots below the various surface materials. However, the different colored straw and soil reflected different far-red (FR) to red (R) light ratios and different quantities of photosynthetic and blue light. Five cotton seeds were sown in each pot. At emergence, seedlings were thinned to one per pot so that all of the evaluated seedlings emerged on the same day. In 1994 and 1995, seedlings were cut at the soil surface seven days after emergence and they were evaluated for shoot and root size. Leaf areas and stem lengths were measured, and roots were washed free of soil. The roots from each plant were spread on a 21.5- x 28-cm sheet of white paper, covered with a transparent plastic page protector, and photocopied. Lateral root lengths were measured on the photocopies. Stem, leaves, and roots were freeze-dried and weighed on a per plant basis. The fresh wheat straw reflected the highest FR/R ratio and seedlings developed the longest stems, heaviest shoots, lowest root weight, least root length, and lowest root/shoot weight ratio. The seedling growth response to light reflected from fresh wheat straw could be relevant in management of cotton seedling establishment when soil moisture availability is marginal.