SHORT REPORT

LEAF ABSORBANCE AND PHOTOSYNTHESIS

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The absorption spectrum of a leaf is often thought to contain some clues to the photosynthetic action spectrum of chlorophyll. Of course, absorption of photons is needed for photosynthesis, but the reverse, photosynthesis when there is absorption, is not necessarily true. As a check on the existence of absorption limits we measured spectra for a few different leaves.

Two techniques for measuring absorption have been used, *viz.* the separate determination of the diffuse reflectance and the diffuse transmittance with the leaf at a port of an integrating sphere and the direct determination of the non-absorbed fraction with the leaf in the sphere. In a cross-check both methods yielded the same results for the absorption spectrum.

The spectrum of a Fuchsia leaf (fig. 1), covering the short-wave region from 350 to 2500 nm, shows a high absorption in UV, blue and red, the well known dip in the green and a steep fall-off at 700 nm. Absorption drops to virtually zero in the near infrared, with subsequent absorptions, corresponding to the water absorption bands. In more detailed spectra, taken at 5 nm intervals with a 5 nm bandwidth, differences in chlorophyll content show in the different depths of the dip around 550 nm and in a small shift of the absorption edge at 700 nm. From figure 2, showing spectra for Geranium (*Pelargonium zonale*) and Hibiscus (with a higher chlorophyll content) it is clear, that the upper limit for photosynthesis can not be much above 700 nm. No evidence, however is to be seen of a lower limit for photosynthesis and in fact, some experiments down to 300 nm still did not show a decrease of the absorption although it is well recognized that no photosynthesis results with 300 nm wavelengths.

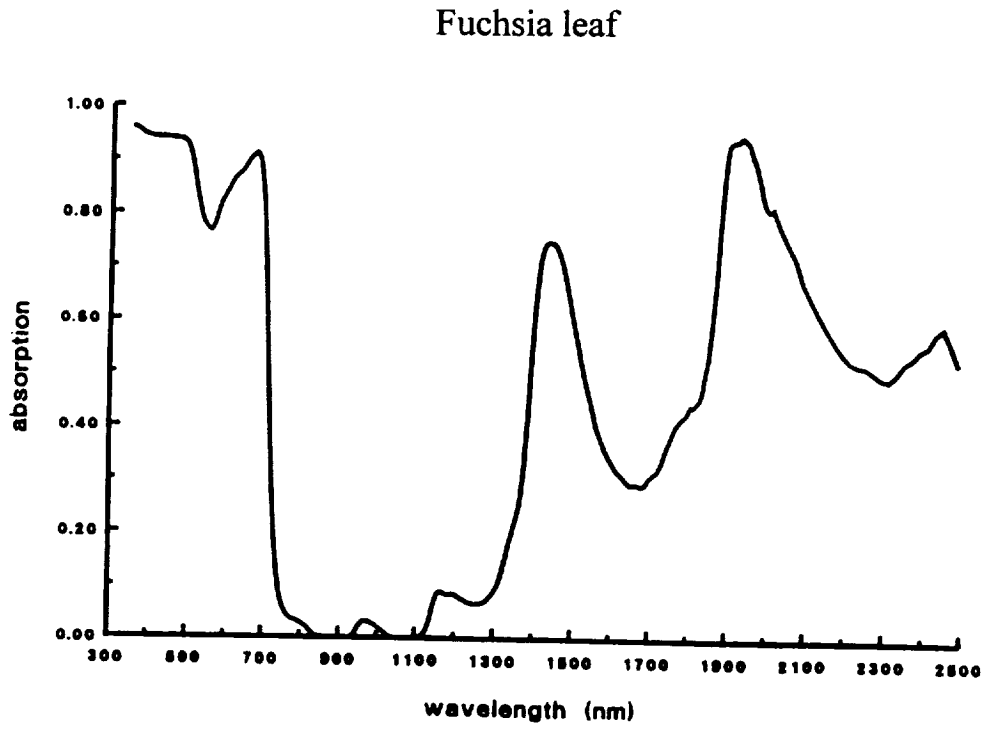

Fig. 1. Shortwave abosrption spectrum of a Fuchsia leaf

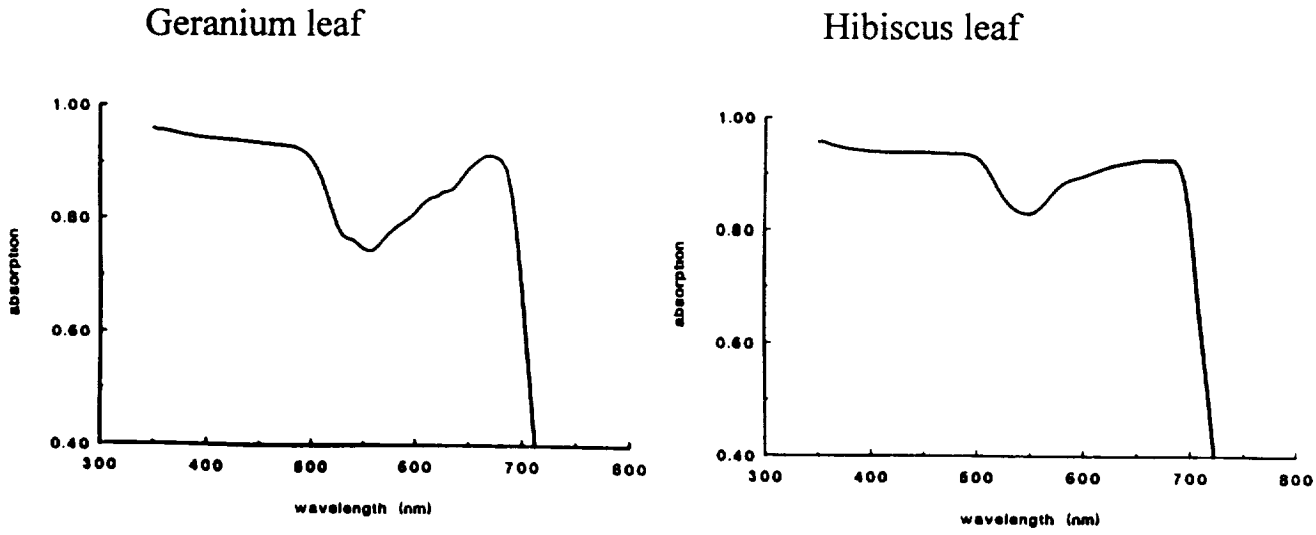

Fig. 2. Detailed absorption spectra of leaves of Geranium and Hibiscus

PLANT REQUIREMENTS

NON-PHOTOSYNTHETIC (PHYTOCHROME)