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CCFG LIGHT MEASUREMENT WORKSHOP 29th September 2009

During the afternoon of the workshop, the delegates were split into three groups to take measurements of light levels at three different points in the ground of Westonbirt. The groups rotated so each had a chance to take measurements at each point.

Light was measured in the PAR (Photosynthetically Active Radiation 400-700 nm) region of the solar spectrum. The total open sky area (direct plus diffuse light) was measured using a Skye Instruments cosine corrected PAR Quantum sensor and also an approximate value of just the diffuse light was taken, using a matt black disc to shade the sensor from direct sunlight.

Sunlight levels were very variable throughout the afternoon ranging from bright sunlight to overcast, due to constantly changing cloud conditions. This made it difficult to draw positive conclusions from the actual measurements, but we were able to point out the principles of differing light levels within a forest.

POINT 1 - A SINGLE TREE IN A OPEN FIELD

Light measurements were taken at 5m intervals, starting at 1m from the trunk outwards the canopy edge at 16m. Light levels at the trunk were seen to be around 2% of the light measured outside the influence of the canopy. Beneath the canopy 95-98% of light was diffuse light. Open area measurements showed a large variation in the contribution of diffuse light of 25-75% depending on the cloud cover.

POINT 2 - A TRANSECT ALONG A WOODLAND PATH

Light measurements were taken amongst different levels of shading along the transect. The differences in the amounts of direct and diffuse sunlight were clearly demonstrated.

POINT 3 – COMPARISON OF AN OPEN AREA AND DENSE UNDERSTOREY

Simultaneous light measurements were taken in an open sky area and under dense canopy. Again the light levels under the canopy were around 2% of the open sky measurements, and diffuse light consisted of 96-97% of the light available in the understorey.

Red / Far-red (RFR) light ratio measurements were also taken at Point 3.

In general, PAR light measurements give the quantity of light available to plants, the RFR ratio measurements indicate the quality of that light.

The Red wavelength is around 660 nm (within the 400-700 nm PAR region).

The Far-Red wavelength is around 730 nm (just beyond the 400-700 nm PAR region).

A typical RFR reading around midday on a sunny day is 1.00, meaning there are equal amounts of both the Red and Far-red light wavelengths. Sun loving plants show optimum growth under these conditions.

At Westonbirt we measured a RFR ratio of 0.98 in the open area, and 0.31 under the dense canopy. This demonstrated that the canopy was absorbing 67% of the available Red wavelengths, and this understorey area was only suitable for growing shade tolerant plants.