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Real-time Measurements of Carbon Partitioning in Plants Using $^{11}CO_2$ M.R. KISER, C.R. HOWELL, A.S. CROWELL, Duke University Physics Department and TUNL, C.D. REID, Duke University Biology Department — Understanding the effects that increased levels of atmospheric carbon dioxide (CO_2) can have on plants is of global importance. Of particular concern is the effect on crop yield and plant growth, as well as the potential of long-term carbon sequestration via natural processes. To better understand plant response to increased CO_2 levels, we use a short half-life radioisotope labelling process to trace the dynamics of carbon allocation and translocation within the plant. Using the positron-emitter carbon-11, which is produced at Triangle Universities Nuclear Laboratory via the reaction ^{14}N(p, α)^{11}C, we are able to introduce $^{11}CO_2$ to plants grown at current and projected CO_2 concentrations at the Duke University Phytotron. Positron emission imaging techniques are then used to trace the transport and distribution of carbon throughout the plant. Results from collimated, single-detector measurements and a low spatial resolution (∼1cm) planar positron emission imager will be presented, as well as plans for ^{13}N studies and the construction of a high spatial resolution (∼3mm) planar imager.

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