

For example, deoxyribonucleic acid (DNA) encoding the D4 domain has been used to create a DNA construct that encodes for a collagenlike protein that consists of multiples of the D4 domain. From previous research, it was known that the D4 domain is critical for interaction of collagen II with chondrocytes. Hence, this multiple-D4 protein is supe-

rior to natural collagen for use as a scaffold material for repair of cartilage or for growth of cartilage *in vitro*.

*This work was done by Andrzej Fertala of Thomas Jefferson University for Johnson Space Center. Further information is contained in a TSP (see page 1).*

*In accordance with Public Law 96-517, the contractor has elected to retain title to this*

*invention. Inquiries concerning rights for its commercial use should be addressed to:*

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*Refer to MSC-24151-1, volume and number of this NASA Tech Briefs issue, and the page number.*

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## Remote Sensing of Parasitic Nematodes in Plants

*Stennis Space Center, Mississippi*

A method and apparatus for remote sensing of parasitic nematodes in plants, now undergoing development, is based on measurement of visible and infrared spectral reflectances of fields where the plants are growing. Initial development efforts have been concentrated on detecting reniform nematodes (*Rotylenchulus reniformis*) in cotton plants, because of the economic importance of cotton crops.

The apparatus includes a hand-held spectroradiometer. The readings taken by

the radiometer are processed to extract spectral reflectances at sixteen wavelengths between 451 and 949 nm that, taken together, have been found to be indicative of the presence of *Rotylenchulus reniformis*. The intensities of the spectral reflectances are used to estimate the population density of the nematodes in an area from which readings were taken.

*This work was done by Gary W. Lawrence, Roger King, Amber T. Kelley, and John Vickery of Mississippi State University for Stennis Space Center.*

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