2002 BELTWIDE COTTON CONFERENCES, ATLANTA, GA – JANUARY 8-12

A STUDY OF THE DIVERSITY OF GEOGRAPHIC POPULATIONS OF *ROTYLENCHULUS RENIFORMIS*, AND OBSERVATIONS ON COMPATIBLE AND INCOMPATIBLE INTERACTIONS WITH COTTON

P. Agudelo and R.T. Robbins
Department of Plant Pathology
J. McD. Stewart
Department of Crop, Soil, and Environmental Sciences
University of Arkansas
Fayetteville, AR

Abstract

Reniform nematode (*Rotylenchulus reniformis* Linford & Oliveira 1940) is considered the most damaging nematode in many cotton-producing areas of the mid-southern United States (1,3,4). In Arkansas, it has increased in incidence and importance during the last ten years, and appears to be displacing root-knot nematode in some areas (3). Reniform nematode causes loss of cotton lint, delays maturity, and reduces boll size, seed index, and plant growth (1,3,4). Currently, management practices include the use of nematicides and rotation with nonhost crops. The most effective and profitable means of control would be the use of host plant resistance, but no upland cotton cultivars with resistance to reniform nematode are available. Information about resistance, such as genetic variability among populations of reniform nematode, and the biochemical and genetic basis of host resistance, does not exist. Ecological adaptations that have resulted in significant variation among *R. reniformis* populations in the world have been reported (2), but no comparisons using biochemical or molecular approaches have been made. Detailed information on cotton-reniform nematode interactions also is limited. The first objective of this research is to determine the diversity of geographic populations of reniform nematode in the United States. Populations will be characterized as to morphometrics, reproduction on different hosts, and the sequence of the ribosomal DNA-internal transcribed spacer (rDNA-ITS) region. Preliminary results indicate there are morphometric differences between geographic populations from Hawaii and populations from the cotton-growing regions of the U.S. Reproduction tests on a *Gossypium longicalyx* x *G. hirsutum* hybrid showed final populations were lower than those found in fallow soil. Partial resistance of a *G. hirsutum* material (40% reproduction of susceptible Deltapine 50) was also confirmed. The second objective is to make observations on the events occurring in compatible and incompatible interactions between reniform nematode and cotton. Histological and ultrastructural modifications induced by *R. reniformis* in resistant and susceptible cotton have been compared. Both susceptible and resistant plants form syncytia with cell wall perforations, dense cytoplasm, and increased size of nucleus. Changes that appear to be induced in plants with a higher level of resistance include a layer of necrotic cells surrounding the syncytia, and prominent cell wall appositions in syncytium component cells near the necrotic layer.

References

1. Choi-Pheng, Y. and Birchfield, W. 1984. Resistant germplasm in *Gossypium* species and related plants to *Rotylenchulus reniformis*. Journal of Nematology 16: 146-153.

2. Gaur, H.S. and Perry, R.N. 1991. The biology and control of the plant parasitic nematode *Rotylenchulus reniformis*. Agricultural Zoology Reviews 4:177-212.

3. Kirkpatrick, T. 2001. Nematodes, hidden enemy of cotton. Delta Farm Press 58(16): 28-29.

4. Robinson, A.F., Cook, A.G., and Percival, E. 1999. Resistance to *Rotylenchulus reniformis* and *Meloidogyne incognita* Race 3 in the major cotton cultivars planted since 1950. Crop Science 39: 850-858.