

S441  
.S8557

SARE Project ~~L94-57~~  
LS94-57

Special Publication No. 88  
August 1997

# PROCEEDINGS



---

The University of Georgia

---

College of Agricultural and Environmental Sciences

# PEST MANAGEMENT IN SUSTAINABLE ROW-CROP SYSTEMS FOR THE SOUTHEAST

Barry Cunfer

Wheat and soybeans contribute about 10% of the farm gate value of agricultural crops in Georgia. The doublecropping system of fall-planted wheat followed by soybeans planted with minimum-tillage has been important in the Southeast for more than 20 years. Continuous use of these crops results in outbreaks of take-all root rot on wheat and stem canker on soybeans. If susceptible wheat cultivars are planted, Hessian fly damage also increases. Canola is a new oilseed crop in the region. Grain pearl millet is a new feed grain with potential for the expanding poultry industry in Georgia. An interdisciplinary study of pest management incorporating canola as a fall-planted crop and pearl millet in the summer into the wheat:soybean system was conducted. Twelve crop rotation sequences were planted over a three-year period at the Southwest Georgia Branch Station at Plains. Six scientists located at the Griffin and Tifton Stations participated in the study. Results after three years are as follows.

A one-year rotation with canola controlled take-all root rot on wheat. In the rotations with continuous wheat, yield was reduced 39% by the disease. This represented a loss of about \$63 per acre in the value of the wheat crop. Pearl millet substituted for soybeans in the summer did not reduce take-all in the following wheat crop.

**Pearl millet** was compatible with the wheat:soybean rotation. It had no adverse effects on wheat or canola diseases and pests.

**Hessian fly** increased each year in continuous wheat but was reduced in rotations with canola.

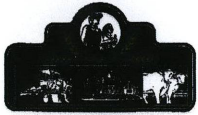
**False chinch bugs** reduced the stand of millet following canola. Other populations of insect pests were not affected by the various rotations.

The plant population of soybeans and millet was reduced following canola, compared with wheat. This may be due to chemicals released by canola vegetation as it decomposes in the soil.

Stem canker on soybeans did not increase with canola or pearl millet in the rotation.

Results after three years are quite encouraging. All crops were compatible with each other. Incorporation of canola and grain pearl millet into row crop production in the Southeast can be profitable but also can contribute to reduced use of pesticides for disease and insect management and contribute to the sustainability of the agricultural system.





# The University of Georgia CAES and SARE/ACE Pest Management in Sustainable Row-crop Systems for the Southeast

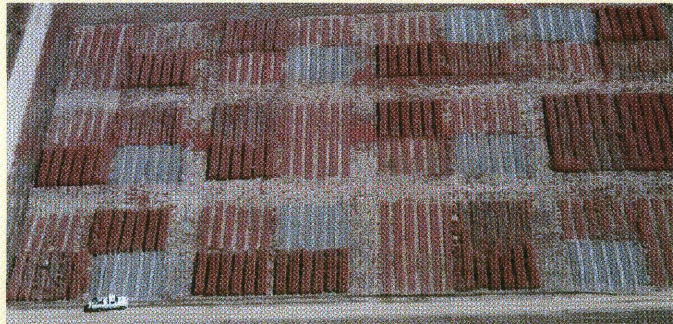


An interdisciplinary project to study management of disease and insect pests by incorporating new crops into the wheat:soybean doublecropping system was initiated in 1994 at the Southwest Branch Station at Plains. Twelve rotation systems were established (Table 1). The new oilseed crop canola was planted in the fall and pearl millet for grain was planted in the summer. A rye cover crop was included in some rotations. Results of the project after three years are presented and illustrated. Canola and pearl millet can be incorporated into the wheat:soybean system with beneficial effects for management of diseases and insect pests.

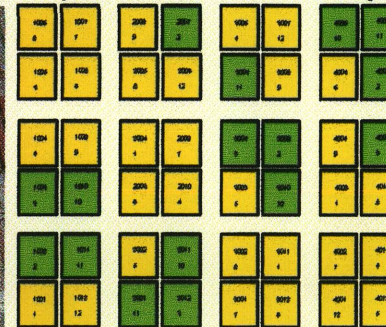
### Project Cooperators

Barry M. Confer - Plant Pathology, Griffin  
 Daniel V. Phillips - Plant Pathology, Griffin  
 John R. Allison - Agricultural and Applied Economics, Griffin  
 Q. David Burton - Entomology, Griffin  
 R. Dewey Lee - Crop and Soil Sciences, Tifton  
 Jeffrey F. Minson - USDA, Tifton  
 Stanley R. Jones - Southwest Branch Station, Plains

This project was supported by a grant from the USDA Sustainable Agriculture Research and Education program.



Aerial infrared photo of the plots in 1996. Deep red areas are healthy wheat. Dark areas in plots are due to take-all root rot. Light red plots are canola. Gray plots are rye.

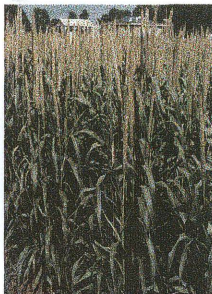


Layout of plots for the fall 1996 planting. Green plots are canola and yellow plots are wheat.

Table 1. Doublecropping rotation sequences

Rotation	1994-95	1995-96	1996-97
1	WS	WS	WS
2	CS	CM	CS
3	CS	WM	CM
4	CM	CS	WM
5	WS	CS	WM
6	RS	CM	WS
7	WS	CM	WS
8	CM	WM	WS
9	WM	WM	WM
10	WM	RS	CS
11	CS	WM	CS
12	RM	RS	WM

W=Wheat S=Soybean C=Canola  
 R=Rye M=Pearl Millet



Pearl millet ripening in late summer. Grain pearl millet is a potential new source of feed for the poultry industry in south Georgia. Pearl millet substituted for soybean had no effect on take-all root rot in a following wheat crop. It was compatible with the wheat:soybean system. It had no adverse effects on wheat or canola diseases or insect pests. False chinch bugs reduced the stand of millet following canola. Other insects were not affected by the rotations.



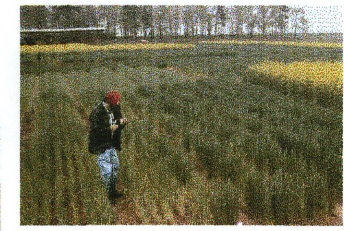
Canola is an oilseed crop which produces a cooking oil low in saturated fat. Soybean and millet stand was reduced following canola.



Plot of rotation 1 (continuous wheat:soybean) showing healthy wheat on right and damage from take-all root rot. A one year rotation with canola controlled take-all root rot of wheat. Wheat grain yield was reduced 39% when wheat was planted all three years. This was a loss of about \$63 per acre in 1997.



Soybean plants dying from stem canker disease. Stem canker of soybeans did not increase with canola or pearl millet in the rotation.



Wheat plots at heading stage showing stunting due to take-all root rot. Canola is flowering. Hessian fly damage increased each year in continuous wheat but was reduced in rotations with canola.