

POTENTIAL FOR PROFITABLE COTTON ROTATIONS

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Abstract

Long-term studies of rotations of agronomic crops have identified certain combinations that show yield increases for both, when they are grown in rotation, compared with the yields of each when they are grown separately as monocultures. Such combinations include cotton (*Gossypium hirsutum*) with corn (*Zea mays*) or peanuts (*Arachis hypogaea*), and corn with soybean (*Glycine max.*) or peanuts. Winter cover crops and rotation of broadleaf crops with small grains often are also beneficial. Moreover, when monoculture is practiced, yields tend to decrease over time and pest populations and management costs tend to increase. Fertilizing two or more crops that are grown in rotation for optimum yields may require prescription management on certain soil types. However, plant nutrition does not limit the yields of crops grown in rotation. While the root systems of different crops exploit different soil volumes, plant nutrition factors do not appear to explain the yield increases that are frequently observed when rotation is practiced. Where crop rotation studies have been done with the participation of plant pathologists, nematologists, and other crop protection scientists, pest population data often exhibit dynamics that correspond with crop damage and yield trends. Thus, rotations of certain compatible agronomic crops, often alternations of grain and broadleaf crops, show positive yield increases compared with those produced by the same crops when grown in monocultures, and the yield responses are often consistent with known principles of crop protection. Considering the benefits, crop rotations seems under-utilized in large-scale U.S. agriculture. Limitations on the use of crop rotations include crop and cultivar adaptation, overlapping susceptibilities of crop to pests, costs of specialized planting or harvesting equipment, and the relatively lower returns that may be achieved from some of the possible rotation crops. In many cases, the net income from the higher income producing, and therefore the more frequently planted crop, exceeds the income that may be expected from the increased yields of the two or more crops when they are grown in rotation. However, the potential economic returns from crop rotation may be underestimated. Differences in pest control costs, between mono-cultured crops and those grown in rotation are often neglected in the calculation of the overall economic effect. There is lack of data on pest populations and effects in long-term rotation studies, and many growers and consultants lack experience with predicting the pest populations that may occur in rotations, compared with those found in mono-culture. Progress has been made when pest management scientists and agricultural economists actively participate from the beginning in the design and implementation of cooperative research with agronomists to identify crop rotations with potential for profitability above that achieved by crop monoculture.

What is a Rotation ?

Summer	Winter	Summer	Cropping System
Cotton	Fallow or Cover Crop	Cotton	Continuous Cotton
Cotton	Cool-Season Crop	Cotton	Double Crop
Cotton	Fallow or Cover Crop	Alternative Crop	Rotation

Agricultural Research:



Effects of Cropping Systems

Agronomic

- Measured in Lbs./Acre
- Soils, Properties or Crop Yields

Economic

- Measured in \$\$\$
- Costs, Returns, Income

Agricultural Research:



Rotations Affect Pest Populations, Management Costs, and Yield Losses

- **Weed Shifts**
- **Insect Populations**
- **Disease Incidence**
- **Nematodes (Increasing)**

Agricultural Research:



Developing Data on Rotations

Team Approach

- “We research by Discipline, but we don’t farm by Discipline” Hal Lewis

Long Term:

- **Six Years = 2 crops by 3 cycles
or 3 crops by 2 cycles**
- **Bring in the Economists at the Beginning**

Agricultural Research:



The Bottom Line

- **Either the Crops must be close in gross returns, and not violate other limiting factors**
- **Or there must be Major Additions to Yields,**
- **Or Major Reductions in Pest Management Costs and/or Effects.**

