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COTTON/CORN ROTATIONS IN THE MID-SOUTH - HISTORICAL REVIEW

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Abstract

Crop rotations have been practiced for hundreds of years around the world with modern rotations established as early as 1730 in England. This early rotation, termed the Norfolk Four-Course Rotation, included turnips, barley, clover, and wheat. Crop rotations continue, in some form, into the 21st century and will continue into the future. Several factors control the use of rotations with the producer's desire to get the highest returns from the inputs for the effort he puts into it as the leading factor. Fertility of the soil, tilth, drainage, reaction (pH), slope, temperature, rainfall, weeds, diseases, and insect pests determine certain limitations to the kinds and proportions of crops to be grown. Within these limits, the relative prices for the products produced, labor distribution through the season, and the prices of materials and labor used in production, determine more definitely the acreage to be grown in a certain crop.

Rotation in Relation to Soil Productivity

English colonists found a well-developed system of agriculture practiced by native tribes of Indians when they arrived in North America. These tribes were inter-cropping corn and beans with the beans providing some nitrogen (N) for the corn. In the early stages of settlement, individual fields were used for a number of years. After a few years, productivity fell and another field was cleared where farming operations were started anew. In 1832, Edmund Ruffin stated that agriculture at the time had reached an unsatisfactory state. Corn followed by corn and then wheat without any type of manure crop depleted the soil. Fallowing or providing a time for the soil to rest was not sufficient to restore it back to acceptable productivity. In the southern areas of United States, a one-crop system prevailed in cotton districts. Continuous cotton was the desired cropping sequence and it was difficult to introduce a systematic crop rotation. Hugh N. Starnes of Georgia stated that by using a systematic rotation, the yields of cotton could be "materially increased". Starnes proposed a rotation which had corn with cowpeas sown at the last working. Cowpeas were worked into the ground and oats sown in late fall. The oats were harvested in the spring and cowpeas sown. The cowpeas were worked into the land and cotton planted in the spring. This rotation system was reported to increase cotton yields by 100%.

Essentials of a Good Crop Rotation

One of the important factors in determining what crops should be grown in a rotation system is the crop's adaptation to particular soil types. A good crop rotation utilizes crops that are adapted to the environment and that fit into a farming system that is planned and integrated as an efficient business undertaking. Methods should be used that maintain or improve yields by 1) maintaining soil fertility, 2) plant disease and insect pest control, and 3) weed control. It is generally accepted that the per acre yield of a given crop largely determines the unit cost of production of that crop. Large yields per acre, economically obtained, make it possible for some farmers to secure profit on their operations even in times of relatively low prices for their crops. Low yields preclude the possibility of profits when prices are low and afford only small profits when prices are relatively high. Suitable crop rotation and the application of adequate amounts of the right kind of fertilizer are the most important factors in obtaining high crop yields economically.

Benefits of Crop Rotation

The major benefits of crop rotation include 1) the maintenance of crop yields, 2) control of weeds, insects, and diseases, 3) prevention of soil erosion, and may also include 4) distribution of labor, and 5) provides some diversification of income. With respect to the maintenance of crop yields, before the extensive use of chemical fertilizers, maintenance or improvement of crop yields was best achieved by improving the base fertility of the soil. This could be accomplished by growing a legume crop to promote nitrogen fixation or by applying manure to provide additional organic nutrients. In many cases, crop rotation gave little visible benefit, while the use of fertilizer and lime produced an appreciable increase in crop production and growth. Less thought went into the crop rotation than to other factors which help to maintain soil productivity such as drainage, soil reaction, irrigation, organic matter content, or tillage. The control of weeds, insects and diseases with rotations are benefits which are frequently mentioned although there is little direct evidence available to support some of these supposed benefits. With rotation, better weed control may be possible by changing chemistries of herbicides. Adding organic matter has long been discussed along with improvements in soil tilth. Erosion is very heavy throughout a large part of the South where cultivated land is left bare during the winter. Rainfall is usually heaviest during the winter months also. Since conditions are very favorable for soil erosion in most of the southern states, it would seem that crop rotation involving non-cultivated crops would be highly beneficial in reducing erosion losses.

Crop Rotation and Cotton Production

For the purposes of maintaining soil fertility, preventing erosion, and controlling weeds, insect pests, and plant diseases, the need for effective crop rotations probably is greater in the Cotton Belt than in any other region of the country. However, definite crop rotations or crop sequences are much less common on cotton farms than on any other farms. Cotton occupies a larger percentage of the crop land. There are few livestock and little need for feed crops. Sharecroppers and tenants have always wanted to grow cotton and the soils are less suited for alternative crops. Field research across the cotton producing states supported the use of crop rotations but many producers have been reluctant to rotate cotton. Some of the reasons given include 1) rotations complicate production practices; 2) rotations present an extra challenge to management, and 3) variable yield responses. Small yield differences can accumulate with time as the effects of erosion and herbicide buildup continue. Why rotate in cotton production systems? Cotton, as a clean cultivated crop, offers little protection against soil erosion, especially in the sloping areas of the Cotton Belt. With the introduction of chemical weed control, crop rotations to control weeds is not as important as it once was, however, rotating the families of herbicides may become more important. Control of plant pests and diseases may be a valid reason for crop rotation in cotton based on the assumption that continuous cropping affords pathogenic organisms the means to continue their life cycles without interruption. The best example is root diseases. Rarely can the use of rotations eliminate a pathogen but it can reduce the population drastically if the rotated crop does not serve as an alternative host for the disease pathogen. Crop rotations have significant effects on the physical and chemical properties of soils including increased organic matter content which will affect soil tilth and internal water movement. The ultimate answer as to where crop rotation fits lives within whole-farm economics. This will include the effects on general farm overhead, fixed cost of machinery, and many other factors as well as the variable costs of producing crops. The final question remains....Can you afford not to rotate?