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ESTIMATED COSTS, RETURNS, AND ENVIRONMENTAL IMPACTS OF SUSTAINABLE AGRICULTURE SYSTEMS FOR THE MID SOUTH REGION

A Thesis

Presented for the

Master of Science

Degree

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Nancy Lynne Graham

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DEDICATION

I would like to dedicate this thesis to my family, especially my parents, Mr. and Mrs. James R. Graham. Without their unconditional love, support, and encouragement, achieving this goal would never have been possible.

ACKNOWLEDGEMENT

With this opportunity, I would like to express my deepest appreciation to individuals who were instrumental in the completion of this study. I want to especially thank Dr. Larry Johnson not only for the opportunity to participate in this study and his continued guidance throughout its completion, but more importantly his understanding and perspective for life in general. Dr. Greg Pompelli and Dr. Kim Jensen also deserve a sincere thanks for their encouragement and teaching me the value of the agricultural economics discipline. Many individuals were involved behind the scenes that without them, this thesis would never have been completed. Behind any good document, you will always find the hard work of a secretary. Much thanks to Cathy, Kathy, Lisa, and Felicia for their expert assistance and listening to my crazy stories. Believing strongly in friendships, I know I could never have completed graduate school without them. Special thanks to Phyllis Bohannon, Lucy Dunn, and Virginia Holt for showing me the ropes for the entire graduate school process. Also, a special thanks to Davin Welter, Helen Dampf, and Larry Ottinger for their listening ears and constant words of encouragement. Finally, I want to especially acknowledge my undergraduate friends who were always there reminding me why the agricultural community is so special. Thanks to Tara Hobbs and Ginger Wilson for all the good times, to Edward Snodgrass for not letting me quit, to Jeff Hunt for his contagious optimism for yourself and others, and to David Wheeler not only for being my bodyguard all those late nights studying in Morgan Hall, but most importantly for being the best friend anyone could hope to have.

ABSTRACT

This study focuses on sustainable agricultural systems. Much debate in the agricultural arena has centered on the definition of sustainable agriculture, but a general consensus, as well as the legal definition, concludes that a sustainable agricultural system is both environmentally and economically sound. The purpose of this study was to determine whether such systems can meet these goals.

Conventional cropping systems were converted to sustainable systems using crop rotations and different tillage systems. A comparative statics approach was used to evaluate these systems. A representative farm, the static condition, was developed for Haywood County Tennessee. The farm was assumed to have 460 acres cropland and grew cotton, corn, wheat, soybeans. The variables for the study were the different cropping systems. The representative farm had five different scenarios: 1) conventional farming systems, 2) sustainable farming systems, 3) conventional farming systems enrolled in government programs, 4) sustainable farming systems enrolled in government programs, and 5) integrated farm management options incorporated into conventional systems.

A microcomputer-based farm decision support system--Sustaining and Managing Agriculture Resources for Tomorrow (SMART) was used for the analysis. The center for SMART is Planetor, which provides an economic and environmental assessment for farm situations. Planetor indicates soil erosion rates, pesticide leaching and surface run-off potential while also providing economic indications such as overall net returns and resource allocation.

For these farms, the farm utilizing sustainable farming systems enrolled in government programs was found to be the most profitable with a average projected annual net income of $30,070, while also having the smallest levels of predicted erosion. However, this farm also had indications of potential water quality problems due to increased chemical use. The farm utilizing integrated farm management options had the least total expense ($114,589) and also managed to receive an average annual net income of $10,940. Therefore, the results indicate that sustainable systems can be both environmentally and economically sound.

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CHAPTER 1

INTRODUCTION

Sustainable agriculture is defined in Section 1603, paragraph (17) of the 1990 Food, Agriculture, Conservation and Trade Act as the following:

> "(17) the term 'sustainable agriculture' means an integrated system of plant and animal production practices having a site-specific application that will, over the long-term,
>
> '(A) satisfy human food and fiber needs;
>
> '(B) enhance environmental quality and the natural resource base upon which the agricultural economy depends;
>
> '(C) make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls;
>
> '(D) sustain the economic viability of farm operations; and
>
> '(E) enhance the quality of life for farmers and society as a whole."

Sustainable agriculture is one of the newest concepts to be evaluated as an alternative approach to modern agricultural production systems. Heightened awareness of environmental issues and concerns about farmer profitability have encouraged further study of sustainable agriculture. Agriculture is a process by which humans use natural, biological systems to produce greater amounts of food and fiber than could be obtained

from a simple gathering from the ecosystem. However, as agriculture began to industrialize, greater amounts of synthetic inputs were used to offset a depleting resource base or to control pests. Externalities created by these inputs threaten human society, endanger wildlife and deplete resources needed by future generations. Consequently, agricultural production practices has been under investigation by environmentalists, the government, agribusinessmen, and producers concerning environmental and food safety issues. During this investigation, sustainable agriculture has been a key issue. Before now, discussion has mostly centered on simply defining the phrase "sustainable agriculture" rather than an intense investigation of sustainable systems and their economic impacts. The recent legal definition, found in the 1990 Food, Agriculture, Conservation, and Trade Act, actually defines a concept that has been around since the earliest days of modern agriculture and before modern-day synthetic inputs. Until then, farmers were forced to rely on biological systems to increase production.

Early agriculture developed in at least three separate locations: Southeast Asia, China, and Mesoamerica or Mesopotamia. These first settled societies were characterized by farmers growing food for non-food producers. Even in its earliest forms, agriculture involved a massive disruption of the natural ecosystem such as clearing fields for growing crops and the grazing by domesticated animals. As a result, natural nutrient recycling was disrupted and extra inputs of one form or another were required to sustain the system. Mesopotamia, between the Tigris and Euphrates Rivers, become known as the "cradle of civilization" and grew large amounts of wheat and barley. However, due to increased salt levels in the soil, crop yields declined 42 percent

over time. The same type of decline also occurred in the Mediterranean. Even in these early times, farmers began to recognize the damage caused by their use of natural resources and they learned how to use natural systems, such as crop rotations, to lessen the environmental damage from continuous cropping systems. (Pointing, 1990)

In the modern sense of sustainable agriculture, J.I. Rodale, in the publications The Organic Front and Organic Method on the Farm, gave the first insight into sustainability. Rodale developed an organiculturalist's creed, whereby:
1) organiculturalists were opposed to artificial or chemical fertilizers and use only compost and other natural substances, 2) the compost was to be made of a ratio on one part animal manure to three parts of plant residue, 3) soil was treated as a living, breathing entity by rotating crops and fallowing land at regular intervals, 4) observing the "Law of Return", restoring to the soil all plant residues that came from it, and 5) the use of poison sprays was taboo. Rodale's concept of sustainability can be further supported by his statement:

> The organiculturalists farmer must realize that in him is placed a sacred trust, the task of producing food that will impart health to the people who consume it. As a patriotic duty he assumes an obligation to presume the fertility of the soil, a precious heritage that he must pass on, undefined an even enriched, to subsequent generations. (Rodale, 1950)

Although Rodale was successful in creating a new mindset in some farmers, he failed to include a viable part of today's agriculture--economic sustainability. Many of

the forerunners of sustainable agriculture have failed to incorporate economics into their definitions. Internationally, the World Commission on Environment and Development in 1987 defined sustainable agriculture as "development that meets the needs of the present without jeopardizing the ability of future generations to meet their needs." (WCED, 1987) Again, sustaining the environment is the key theme. And during the 1980's, professionals have tried to further develop the environmental emphasis of sustainable agriculture.

Several definitions of sustainable agriculture take a more theoretical framework. For example:

> Sustainable agriculture is a philosophy and system of farming. It has its roots in a set of values that reflects a state of empowerment, of awareness of ecological and social realities, and of one's ability to take effective action. It involves design and management procedures that work with natural processes to conserve all resources, promote agroecosystems resilience and self-regulation, and minimized waste and environmental impact, while maintaining or improving farm profitability. (MacRae)

While Secretary of Agriculture, Richard Lyng stated, "Alternative farming systems are defined as alternatives to current farming systems that tend to have a high degree of specialization." Lyng also commented on the shift from the high use of major inputs for higher yields to alternative farming systems. They not only reduce inputs but use practices such as integrated pest management and crop rotation.

Definitions have often followed a more biological framework. The Kerr Center for Sustainable focuses on the reduced reliance of external inputs and has noted that the basic principle of sustainable agriculture involves the development of systems that are modeled after ecosystems that have survived the test of time. They suggest that a midwestern ecosystem, for example, would produce sustainable yields without the introduction of purchased inputs. (Horne)

Some authors try to utilize the "sustain" part of "sustainable agriculture." Following Webster's definition of "sustain" as 1) the act of keeping in existence, 2) keeping up and maintaining or prolonging. Luna suggests that sustainable agriculture could be interpreted as sustaining the present level of agricultural effectiveness. Therefore, he also suggests that clearly a "sustainable agriculture" must sustain the soil from which our civilization derives its sustenance and must be economically viable, ecologically sound, socially just and humane.

Edwards defines lower-input/sustainable agriculture as: "Integrated systems of agricultural production that are less dependent on high inputs of energy and synthetic chemicals, and more dependent on intensive management than conventional monocultural systems. These lower-input sustainable systems maintain or only slightly decrease productivity, maintain or increase net income for the farmer, and are ecologically desirable and protective of the environment." (Edwards, 1987). The integrated systems approach is important because, while it maintains the basic tenets of sustainable agricultural systems such as lower inputs of fertilizers and pesticides, less cultivation, and

specialized cultural techniques, it recognizes the need to attain these goals without decreasing productivity or net farm income.

The National Research Council, (NRC) through its controversial book Alternative Agriculture, presented its definition of sustainable agriculture. Basically, their definition encompassed all aspects of previous definitions. According to the NRC:

> Alternative agriculture is any system of food or fiber production that systematically pursues the following goals:
>
> 1. More thorough incorporation of natural process such as nutrient cycles, nitrogen fixation, and pest-predator relationships into the agricultural production process;
>
> 2. Reduction in the use of off-farm inputs with the greatest potential to harm the environment or the health of farmers and consumers;
>
> 3. Greater productive use of the biological and genetic potential of plant and animal species;
>
> 4. Improvement of the match between cropping patterns and the productive potential and physical limitations of agricultural lands to ensure long-term sustainability of current production levels; and
>
> 5. Profitable and efficient production with emphasis on improved farm management and conservation of soil, water, energy, and biological resources.

The NRC also suggested that alternative agriculture incorporates many farming systems while being diversified. An "alternative farm" can have organic farming systems, utilize integrated pest management (IPM), rotate crops, or reduce chemical use. (NRC, 1989)

Ikerd provided additional new insights and concluded that the difference between conventional and sustainable agriculture is "more a matter of difference in farming philosophy than of farming practices or methods." This philosophy is provided by agroecology--a synthesis of agriculture and ecology (Altieri). Ikerd then suggests a holistic approach for sustainability implying a systems approach using multidisciplinary technology. The implications intuitively suggest that while some sustainable systems will be inherently different than others; what is sustainable for one farming system may or may not be for another farming system.

With the notion of reduced chemical use, alternative agriculture soon became known as low-input sustainable agriculture (LISA), becoming the newest acronym in agriculture. Controversy arose with the first two words of that phrase because everybody focused on reduced chemical use and lower amounts of fertilizer. More recently, especially with the 1990 Farm Bill, the "low-input" has been left off the phrase, and the current phrase--sustainable agriculture, as previously stated is now accepted.

With the definition of sustainable agriculture in legislation and more research being completed on this relatively new concept, the agricultural community is reaching to a common understanding of what the term implies. It is vital that there is some agreement on the definition of sustainable agriculture due to the amount of funding ($40 million) Congress has authorized in spending for research into reducing the use of

agricultural chemicals, training extension agents, preparing new technical guides, and setting up a federal-state matching grant programs. (FACT) Although $40 million as been authorized, Congress only appropriated $6,725,000 in July 1991 for the LISA program. (IAA)

These numerous definitions of sustainable agriculture and their importance are presented since it is essential to understand the concept of sustainable agriculture before research can be completed. Also, consistency among its definitions has to occur before significant research can provide useful information.

The legal definition presented in 1990 FACT has tried to incorporate many of the ideas presented during the evolution of sustainable agriculture. And although there are many definitions including the 1990 FACT definition, it is also important to know what sustainable agriculture is not. Sustainable agriculture is neither a specific tillage practice, nor a specific pesticide regulation. It is neither organic farming, nor subsistence farming, nor totally family farms. Sustainable agriculture does not pertain to any certain crop in any certain geographical location. Yet, sustainable is a concept that utilizes information from all these agricultural entities to reach the two goals of being environmentally sound and economically viable. Many tradeoffs occur in sustainable agriculture. For example, for farmers to increase yield and therefore increase income, they apply synthetic fertilizers and chemicals to the crop. Although the nutrients increase production, they also act as a contaminant to the soil and water.

Balancing these tradeoffs is the key issue of sustainable agriculture. Many weights cause the scales to tip to the environmental side or the economic side. In order

to reach this "balance", many research areas in multiple disciplines need to be investigated. This study addresses the area of developing sustainable crop budgets and rotations to be utilized in the whole farm system. By using the software package Planetor (University of Minnesota), both economic and environmental assessments can be made.

Agriculture's Environmental Concerns

Groundwater and surface water contamination has been a major concern with agriculturalists, environmentalists and the general public for more than a decade. Rising concern has resulted from several studies. The Environmental Protection Agency (EPA) began to emphasize the problem of groundwater contamination by pesticides in 1979 after DBCP and aldicarb were found in groundwater in various states (Cohen, 1984). Groundwater contamination is a critical issue since over 97% of rural America's drinking water taps underground sources and over 50% of the population drinks water from groundwater sources. Five percent of this nation's freshwater supplies are in our surface water--rivers, lakes, and streams. The extent of groundwater usage in agriculture is also evident. Underground supplies provide 55% of the country's livestock water and 40% of all water used to irrigate crops. Even outside rural America, the scope of groundwater usage remains vast. In 1980, 40% of the population served by public water supplies used groundwater. (Journal of Freshwater, 1985)

Therefore, contamination of the nation's water supply is a major concern and one of the primary reasons for the increased interest in sustainable agriculture. Given the

1990 FACT definition of sustainable agriculture, one of the primary goals set forth of a sustainable agriculture systems is to "enhance environmental quality and the natural resource base upon which the agricultural economy depends." Therefore, these sustainable agriculture systems investigate alternatives which not only attempt to maintain production, but also consider environmental implications, such as groundwater contamination.

A lack of consistent and comprehensive data concerning groundwater contamination has delayed complete understanding of the degree of contamination. In a 1986 review, Cohen and others noted that at least 17 pesticides have been found in groundwater in 23 states as a result of routine agricultural practices, such as the use of insecticides and herbicides, with the understanding that more than 17 may be increased with the completion of many new studies initiated by agencies such as the United States Geological Survey.

Contamination of groundwater is not strictlt a result of agriculture. The best known source of contamination is waste disposal and septic systems from an estimated 22 million sites. However, in terms of areal extent and a nonpoint source of pollution, agriculture is one of the most widespread human activities affecting groundwater quality. In 1987, about 330 million acres were used for growing agricultural crops in the United States. Primary inputs used on these crops include nitrogen, phosphorous, and potassium fertilizers, that peaked at 23 million nutrient tons per year in 1981. Due to participation in the Conservation Reserve Program, fertilizer use had dropped to 19.2 million tons in

1987. Pesticide use increased 170% between 1964 and 1982, but has declined somewhat in the last part of the 1980s. (Moody)

Recently, the five-year National Pesticide Survey was computed by the EPA Office of Drinking Water and Office of Pesticide Programs. This survey was the first national study of pesticides, pesticides degradates, and nitrate in drinking water wells. Initial EPA results and estimates indicate:

1. About 9,850 (10.4%) of the nation's community water systems (CWS) wells and about 446,000 (4.2%) of the nation's rural domestic wells contain at least one pesticide above Survey minimum reporting limits. The most commonly found chemicals, other than nitrate, are the acid metabolites of the pesticide DCPA and atrazine.
2. The levels of pesticides and pesticide degradates found in wells were usually lower than levels of drinking water health concern.
3. Over half of all CWS wells and rural domestic wells nationally contain nitrate above the NPS minimum reporting limit (0.15 mg/L). About 1,130 (1.2%) CWS wells and 254,000 (2.4%) rural domestic wells contain nitrate exceeding EPA's Maximum Contaminant Level (MCL) and lifetime Health Advisory Level (HAL) of 10 milligrams per liter(mg/L).
4. The maximum concentrations of nitrate detected were approximately 13 mg/L for CWS wells and 120 mg/L for rural domestic wells.

5. The median concentrations of nitrate detected, above the Survey's minimum reporting limit, were approximately 1.6 mg/L for both CWS wells and rural domestic wells.

The EPA results are helpful in determining the environmental impact of agricultural input use. The contaminant and advisory levels (Maximum Contaminant Level and Health Advisory Level) will play a great role in the constraints for environmental effects of sustainable agricultural practices. Not only is sustainable agriculture concerned about groundwater contamination, but the whole concept of sustainable agriculture is leading farmers to look at other practices such as tillage systems. Farmers are learning to maximize return on investment with reduced tillage. Low tillage systems allow the farmer to be efficient in both time and equipment, but uses a higher level of herbicides. If a farmer is going to reduce the use of herbicides, he/she also must find other means to control weeds such as mechanical cultivation or increased hand labor. Although the discussion of sustainable agriculture, groundwater contamination, and tillage practices has been widespread over the past 10 years, little research has been conducted in relating the three concepts. The research concerns now are to provide insight into the adoption of sustainable agricultural practices and determine the implications both economically and environmentally.

Purpose

The purpose of this study is to evaluate the economics and environmental impacts of sustainable agricultural systems. The study provides workable practical results on

sustainable agriculture systems that are beneficial for agricultural producers, environmentalists, legislators, extension personnel, and general consumers. The study should provide farmers with pertinent information to assist them in their decision making. Hopefully, these decisions will include alternative cropping systems that maintain or increase farmers' profits while enhancing conservation and environmental quality.

Objectives

The objectives of this study are (1) to develop sustainable cropping systems and then (2) utilize these systems to compare environmental and economic results with conventional cropping systems. These primary objectives are consistent with those of the project "Reference Manual of LISA Resource Management Strategy Crop Budgets for the Mid-South Region" funded by the Sustainable Agriculture Research and Education (SARE)(Section 1619 of 1990 FACT). The SARE project provided the financial support for this thesis with the results used to partially fulfill the requirements of that grant. The objective of the SARE project is to develop Resource Management Strategy (RMS) crop budgets for selected agricultural enterprises and systems located in the mid-south region using standard budgetary analysis procedures for selected rotation schemes and tillage systems. The following methods are used to meet the project objectives:

1. Determine applicable crop systems/rotations for the region;
2. Select appropriate tillage systems;

3. Determine an appropriate input level (It should be noted here that although sustaiful to illustrate the differences in costs and returns per acre for comparison purposes); and

4. Provide an indication of environmental effects, specifically groundwater and surface water contamination.

After sustainable cropping systems are developed, they are compared to conventional systems. Budgetary analysis procedures including partial-farm and whole-farm analysis were also used. Whole farm planning procedures capture multi-field, multi-rotational effects while considering the economic vitality of the farmer. Partial-farm budgetary analysis evaluates specific enterprise data, particularly when adjusting information to fit within the system. For example, budgets for continuous soybeans would differ from budgets in a corn-soybean rotation for such as elements as yield information and fertilizer requirements.

CHAPTER 2

THEORY AND METHODOLOGY

When evaluating farm planning, the question most often asked by producers is "what combination of enterprises should be produced with a given group of resources?' Theoretically, the product-product model in economics provides a conceptual framework to allocate land, labor, and capital resources to alternative uses in a way that maximizes net returns to the farmer's owned resources. Two economic concepts, the equal marginal return principle and the product-product frontier enable the farmer to make decisions that maximize his net return. Using the equal marginal return principle, the returns from scarce or limited resources are maximized when the input is allocated to its most profitable uses and the value added by the last unit of the resource is the same in each of its alternative uses.

The product-product frontier, a way of summarizing the maximum possible production levels of two outputs for a given set of resources, can be derived from the production functions for the outputs. If, in fact, a farmer, was maximizing profit, the general rule to use in finding the profit-maximizing amount of each product (enterprise) to produce is to continue substituting one product (enterprise) for another along the product-product frontier as long as the revenue added by the product being increased is greater than the revenue lost from the product being decreased.

The product-product frontier for given budgetary data is discontinous and, therefore, cannot be optimized. It can be approximated by linear programming techniques, but the use of this tool is beyond the scope of this project. Essentially, the

alternative relationship for this budget analysis is a competitive relationship where crop and livestock enterprises using pasture on cropable land compete for the use of that land during a specified year or production period. This farm is assumed to be strictly a row-crop operation with no livestock production; therefore, the crops will compete for capital, machinery, labor input, and tillable land. An individual planning a farm business typically has neither the data available to estimate continuous production functions for the alternative enterprises nor the time required to obtain the data. Instead of estimating such functions and the corresponding product-product frontiers, data on the quantity of limited resources are obtained and used with enterprise budget data to evaluate alternative combinations of enterprises.

When the combination of inputs devoted to an enterprise is adjusted in fixed proportions, the marginal physical product per unit of the scarce or limited resources is constant. The limits imposed on the maximum production of two enterprises by several scarce or limited resources result in a product-product frontier composed of one or more straight-line segments. These segments form constraints which, when graphically illustrated, formulate a feasible region where all feasible combinations of inputs are replaced in a profit maximizing equation to decide the optimal amount of corn and soybeans. This basic production function and linear programming theory only allows the optimization of one goal, which in most cases, is income. Sustainable agriculture may have at least two main goals, to maintain economic profitability and to preserve the environment. Therefore, utilizing basic linear programming may not be suitable for this type of analysis. Furthermore, not only does linear programming optimize one goal, at

this point in the research collection, not enough information has been gathered to formulate environmental objectives. For example, although nitrates found in a few rural water wells exceeds the EPA's maximum contaminant level, the amount of danger to the environment is not known. An even greater challenge to economists is that environmental constraints may not be constraints after all. Preserving environmental conditions may, in fact, provide producers with utility that, at this point, in sustainable agriculture research is inconceivable to quantify.

This study uses a comparative static approach to compare conventional versus sustainable systems. With comparative static theory, one examines the changes in results when one variable is changed holding all other conditions constant. Whether the changes are similarities or differences, they still pertain to one variable changes within the system. In this case, similarities and differences of sustainable and conventional cropping systems (a cropping system is considered a variable) are analyzed environmentally and economically given that these cropping systems occur under fixed conditions.

The cropping system is considered the variable because, based upon the one selected, the environmental and economic conditions will change. Furthermore, the cropping system is an entire resource management budget including price and yield information, input costs, and environmental indicators such as pesticides. The whole farm is the static situation because all overhead costs, field size, soil types, and other farm data is fixed. Therefore, the methodology is not one of optimization, but a comparison utilizing results from representative static situations. This comparative static

approach allows implications of government provisions to determine farm impact of selection of farming systems. By incorporating government costs within the enterprise budgets, the comparison is made again between sustainable and conventional cropping systems that are enrolled in government programs.

Farm management situations and budget analysis are performed today with many software packages such as Quicken and Finpack. However, these programs do not incorporate the environmental assessment that the SMART system provides. Funded jointly by the Extension Service and Cooperative State Research Service-United States Department of Agriculture, a microcomputer-based farm decision support system called Sustaining and Managing Agricultural Resources for Tomorrow (SMART) was developed by a multi-state task force and maintained by the Center for Farm Financial Management at the University of Minnesota. This program is designed to help farmers and ranchers evaluate both environmental and economic aspects of their farming practices. SMART utilizes a program called Budgetor, a tool for summarizing budget and other data that drives the entire SMART system. The focus of this study will be to gather the information needed for Budgetor, and then to use Planetor to evaluate the environmental and economic aspects. Typically, the information for Budgetor comes from budgets generated by Farm Management Extension Specialists. Conventional cropping budgets are adapted within Budgetor for "sustainable" cropping systems.

When developing these sustainable systems, good management, whether it be pest, weed, or conservation management is assumed. An example is the integrated pest management (IPM) system defined as "a strategy of pest containment that seeks to

maximize the effectiveness of biological and cultural control factors, utilize chemical controls only as needed with a minimum of environmental disturbance." (SAS) This widely adopted practice is important because one of its integral components is the use of crop rotations since crop rotation systems offer numerous advantages in soil structure, fertility and erosion management, as well as aiding in pest control. Therefore, by simply developing crop rotation systems, sustainable cropping systems are also developed.

As stated earlier, Planetor provides both an economic analysis and environmental assessment of a particular farm or representative farm. The system includes three databases to be developed: soils, chemicals, and enterprise budgets. The soils database is prepared by the Center for Farm Financial Management. In addition, the Agricultural Research Service and Soil Conservation Service have developed the pesticide database. Budgetor comprises the third database, enterprise budgets, utilized by Planetor. Once these three databases are completed, Planetor can be executed.

Planetor evaluates each field for erosion control, water quality, and pesticide toxicity with each receiving a low, medium, or high rating. Each rating can be periscoped to show the exact amount of environmental influence, such as the tons of erosion produced to receive a high indicator rating. Planetor calculates water erosion using the Universal Soil Loss Equation (USLE):

A = R K LS C P, where

A = Estimated Average Annual Soil Loss (tons per acre),

R = Rainfall Factor from predicted rainfall erosion losses,

K = Soil-Erodibility Factor (stored in the soils data base),

LS = Combined Effect of Slope Length and Steepness ,

C = Cover and Management Factor (.001 to 1.0), and

P = Practice (contouring, contour strip, ridge till, or terracing).

The following constitutes the tolerable soil loss levels:

Low: less than .9 tons per acre,

Medium: between .9 tons per acre and 2 tons per acre, and

High: greater than 2 tons per acre.

The water quality indicator combines nitrogen use, pesticide leaching and pesticide runoff effects. The Planetor excess nitrogen potential is estimated by calculating the average difference between the amount of N available and the amount removed by crop production over the entire length of the plan. The following are the excess nitrogen levels:

Low:	less than 25 pounds at expected yields,
Medium:	between 25 pounds at expected yields and 50 pounds at optimistic yields, and
High:	greater than 50 pounds at optimistic yields.

Soil leaching potential for a particular soil types is also calculated using the following soil characteristics:

Hydrological Group: The hydrological group of the soil is mainly the inherent capacity of the soil, bare of vegetation, to permit infiltration.

The slope and type of plant cover are not considered in this characteristic. The hydrological group ranges from A through where group A soils have a very high infiltration rate when thoroughly wet. If a soil is very sandy, it will be in the hydrological group A. This means that very little of the surface water will run-off, rather it will filter through the soil very rapidly.

Organic Matter: The organic matter is the amount (percentage) of plant and animal residue in the soil, in various stages of decomposition.

Soil Depth of Horizon #1: The soil depth of horizon number 1, is measure Horizon #1of the thickness of the first layer (horizon) of the soil in inches. Soil Leaching Potential levels are shown in table 2.1.

Table 2.1 Soil Leaching Potential Levels

Hydrological Group	Organic Matter x Depth of Horizon #1	Soil Leaching Potential
A	Less than 30	High
	Between 30 and 65	Medium
	Greater than 65	Low
B	Less than 5	High
	Between 5 and 45	Medium
	Greater than 45	Low
C	(not applicable)	Low
D	(not applicable)	Low

The soil surface loss potential for a particular soil type is calculated using the soil characteristics, hydrological group (same as for soil leaching potential) and soil erodibility factor (K). The soil erodibility factor (K), quantifies the susceptibility of soil

particles to detachment and movement by water. This factor is also used in the Universal Soil Loss Equation. The following equation is used to compute a potential surface loss value:

$$\text{result} = \text{LOG}((\text{K factor}) * (\text{hydrological group})^{5.7})$$

The result from the above calculation is used for the potential surface loss is shown in Table 2.2.

Table 2.2 Soil Surface loss Potential Levels

Soil Surface Loss Potential	Result of Equation
High	Greater than 2.8
Medium	Between 1.0 and 2.8
Low	Less than 1.0

Pesticide leaching potential for a particular pesticide is calculated using the following pesticide characteristics: 1) soil adsorption, 2) water solubility, and 3) persistence, half-life. Soil adsorption (K_{oc}) is a measure of the tendency of a pesticide to be attached to soil particle surfaces. The higher the value, the stronger the bond between the soil surface and the pesticide. Water solubility of a pesticide in water at room temperature is given in parts per million (ppm or mg/L). Solubility of a pesticide will affect how easily it washes off crop residue and leaches through the soil. Persistence (half-life), expressed in days, is the time required for pesticides in the soil to degrade to one-half of their previous concentration.

The following equation is used to compute a potential leaching value:

result = LOG (half-life) * (4 - LOG (K_{oc})).

The result fr om the above calculation determines the potential leaching levels are shown in table 2.3.

Table 2.3 Pesticide Leaching Potential Levels

Pesticide Leaching Potential	Result of Equation
High	Greater than 2.8
Medium	Between 1.0 and 2.8
Low	Less than 1.8

The pesticide surface loss (run off) potential for a particular pesticide is calculated using the soil adsorption and persistence characteristics described above. The following equation is used to compute a potential leaching value:

result - LOG (half-life) * (1.23 - LOG (K_{oc}))

The result from the above calculation determines the potential surface loss levels are shown in Table 2.4.

Table 2.4 Pesticide Surface Loss Potential Levels

Pesticide Surfface Loss Potential	Result of Equation
High	Less than -2.4
Medium	Between -0.4 and -2.4
Low	Greater than -0.4

Besides providing an environmental assessment, Planetor also provides an economic analysis for the farmer that is comprised of two major sections, income and resources. Within the income section, several financial or economic measures are calculated. Return over direct costs, probability of negative return, net farm income, probability of loss, net worth change, probability of negative net worth change, and diversification effect. The per acre return is the expected yield multiplied by the expected price for both the first and second crop plus any other income minus all direct cash costs listed in the budget. For livestock, the gross return is the expected sales quantity times the expected price plus any cull or other income minus all direct cash expenses including death loss and feeder livestock purchases. The per acre return plus the livestock return gives the total return over direct costs, which must be large enough to cover all overhead costs, family living expenses, and taxes (unless nonfarm income is available). The resource section includes corn equivalent balance, hay equivalent balance, silage equivalent balance, labor balance, energy equivalents, and water availability. The subsection for labor provides the total hours required, and the number of months there is a labor shortage.

Planetor has several advantages over other farm management tools when addressing the issue of sustainable crop research. One of the biggest advantages is the ability to build systems over an extended period (up to twelve years). This time span is important when discussing sustainable systems since it takes several years to develop sustainable cropping systems. Secondly, Planetor allows a researcher, farmer, or extension personnel to instantly create hypothetical situations. For example, research

will provide sustainable crop rotations. With Planetor, these rotations can be changed instantaneously to show how either erosion or net farm income might be effected. Finally, Planetor allows the comparison of current conventional systems (operations farmers typically perform) to these sustainable systems. These comparisons enable the main objective of this study, both environmentally sound and economically viable systems, to be met.

CHAPTER 3

DATA SUMMARY

Data Sources

Three data bases were used for this study: a soils data base, a pesticide data base, and an enterprise budget data base. All three data bases are utilized by Planetor, as well as whole farm data. The source of information for the pesticide data base is the "USDA-ARS Interim Pesticide Properties Database, Version 1.0." The soils data base was prepared by the Center for Farm Financial Management at the University of Minnesota with additional information from the Soil Conservation Service. The enterprise budget data came from the Guide to Farm Planning developed by the Tennessee Agriculture Extension Service. Financial information and other farm data for the whole farm systems were obtained from the 1987 Census of Agriculture and University of Tennessee Staff Paper 90-03, Developing Two Representatives Farms for Major Land Resource Area 134: The Southern Mississippi Valley Silty Uplands."

Pesticide Data Summary

The pesticide data used for the selected crops provides estimates of pesticide properties to determine relative risk to water resources. The pesticide data comes from the database "USDA-ARS Interim Pesticide Properties Database, Version 1.0" by R.D. Wachope, 1988. The Agricultural Research Service and the Soil Conservation Service adapted this data base to fit in the Planetor system.

The Environmental Protection Agency includes two limitations with this database. First, field office staffs are encouraged not to make pesticide use recommendations based on the pesticide database; therefore, recommended use varies from farm to farm. The data base only provides data for evaluation of relative risks to water resources. Second, estimates of risk to water resources such as high or low, should not be considered precise because there are too many variables involved. The estimates of risk should be considered a first approximation and a guide for better management.

Two terms, runoff and leaching potential, were discussed in Chapter 2 with equations showing how these results are calculated. Runoff potential indicates the tendency of the pesticide to move with sediment in runoff. A large rating means the pesticide has a high tendency to move with sediment while a small rating means the pesticide has a low potential to move with sediment. The leaching potential indicates the tendency of a pesticide to move in solution with water and leach below the root zone into deep percolation.

The chemical database had to be modified for cotton. Originally prepared for regions that mainly grew corn, wheat, and soybeans, the pesticide data base did not include such chemicals as Cotoran, a cotton herbicide. Therefore, any new chemicals necessary were added to the pesticide data base with label warnings provided by EPA.

Soil Data Summary

The soils database is prepared by the Center for Farm Financial Management. As a user of the software, all data information for the soil is collected and in disk format

Enterprise Budget Data Summary

The Guide to Farm Planning, developed by the Tennessee Agriculture Extension Service, was used to provide estimated cost and return data for Planetor economic analysis. Budget information used included gross receipts, total operating costs, machinery cost and labor requirements. The enterprise budget data is summarized in table A.1 located in the Appendix.

Cover management effects on erosion are complex and diverse. The type of crop, stage of growth, and crop and soil management are important. Some crops and crop sequences maintain good soil cover while others leave the land bare for extended periods. Canopy density depends on planting method and on soil productivity. Tillage also affects soil permeability and residue disposition. The C-Factor is defined as the ratio between the amount of soil lost under these specific crop-cover management conditions and the loss when soil is fallow and cultivated regularly up and down the slope. Soil loss from a cropped field is usually much smaller than from a continuously fallowed field. Furthermore, soil loss from a cropped field with a reduced or no-tillage system is much smaller than a continuously conventional cropped field. The C-Factors were obtained through SCS and are prepared for western Tennessee for conventional and no-tillage crop practices. Listed in Table 3.2 are the C-Factors for crops and various rotation used in this study.

By collecting data on nitrogen use, Figure 3 - Screen 4, Planetor can make an environmental nitrate assessment. In most cases, applied nitrogen is generally used. However, with sustainable systems and the use of a legume crop such as soybeans, certain assumptions can be made concerning nitrogen replacement. If soybeans yield 30 bushels per acre, it assumed they will return 30 units (lbs.) of nitrogen to the soil. Thus, nitrogen application is reduced, thereby reducing nitrogen costs. The nitrogen fixation assumption is an important when analyzing the results since it contributes to the ability of sustainable crop rotations to be profitable.

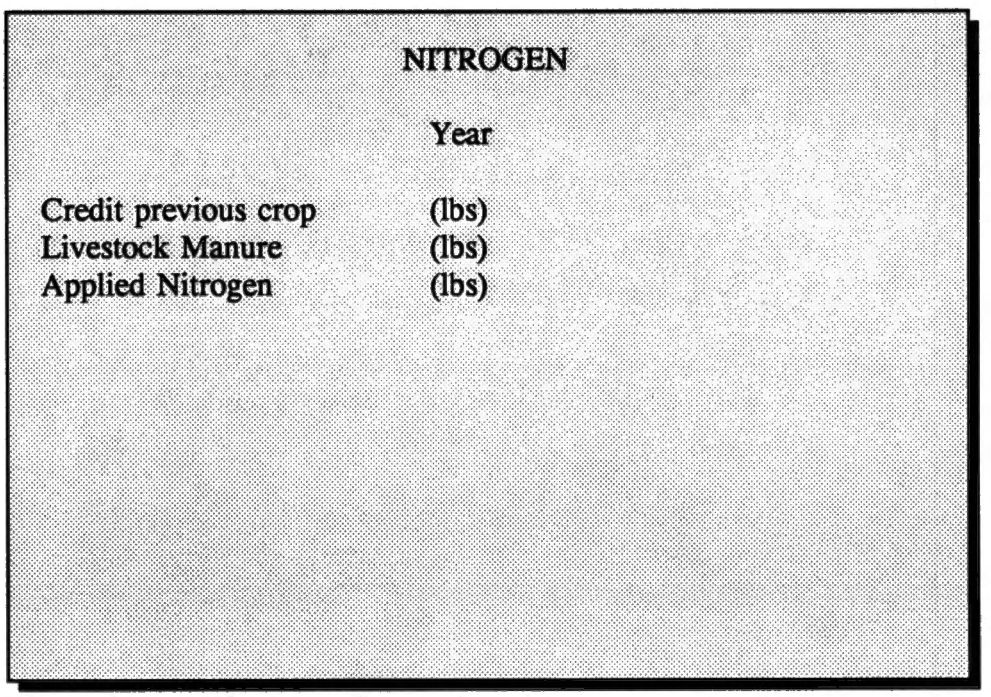


Figure 3 Nitrogen - Screen 4

Not only does the Soil Conservation Service provide C-factors, but they also are the source for chemical information used by this system, Figure 4 and Screen 5. Again, the data base had to be modified. The chemical data base was originally for the Midwestern region with the main crops of corn, soybeans, and wheat. However, the geographic location for this study grows cotton. Cotoran, a cotton herbicide, was added in the database with the environmental information coming from the Environmental Protection Agency.

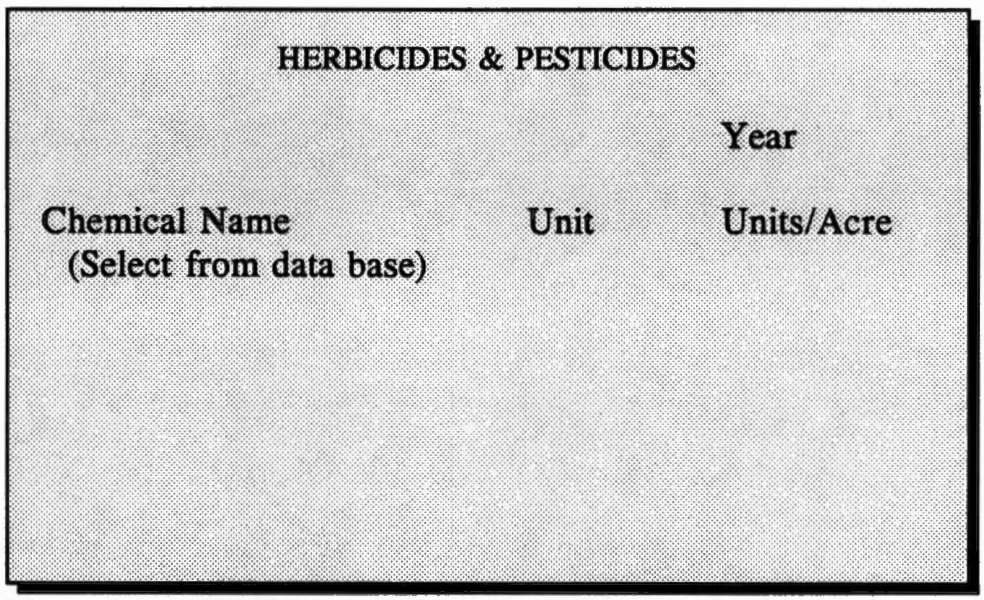


Figure 4 Herbicides and Pesticides - Screen 5

Water, fuel, and energy information was included in the budget data illustrated in Figure 5 - Screen 7. The cropping systems used no irrigation and assumed no diesel or electricity for grain drying. Diesel equivalents for machinery was calculated by totaling the sum of machinery hours per acre times the fuel cost. For example, in conventional corn, the machinery required with diesel are a 100 HP tractor, a combine,

and a 2-Ton truck. The machine hours respectively are 1.56 hours per acre, .41 hours per acre, and .41 hours per acre with the fuel costs being $3.45, $3.58, and $4.05 respectively. The diesel equivalent for this cropping system would then be 8.51 gallons [(1.56 * $3.35) + (.41 * $3.58) + (.41 * $4.05)]. The enterprise budgets list a set of field operations which may be used in the production of a given crop along with the machine time and man hours required, including indirect labor.

The second part of the budgets lists the hours required, the interest charge, and fixed and variable cost per hour and per acre for each piece of machinery utilized in the production of the specific crop. These data are used to derive the variable and fixed expenses, the fixed interest charges and the labor costs in the crop budgets. Located in the appendix are tables which provide this machinery information for each enterprise budget. (See Appendix Tables)

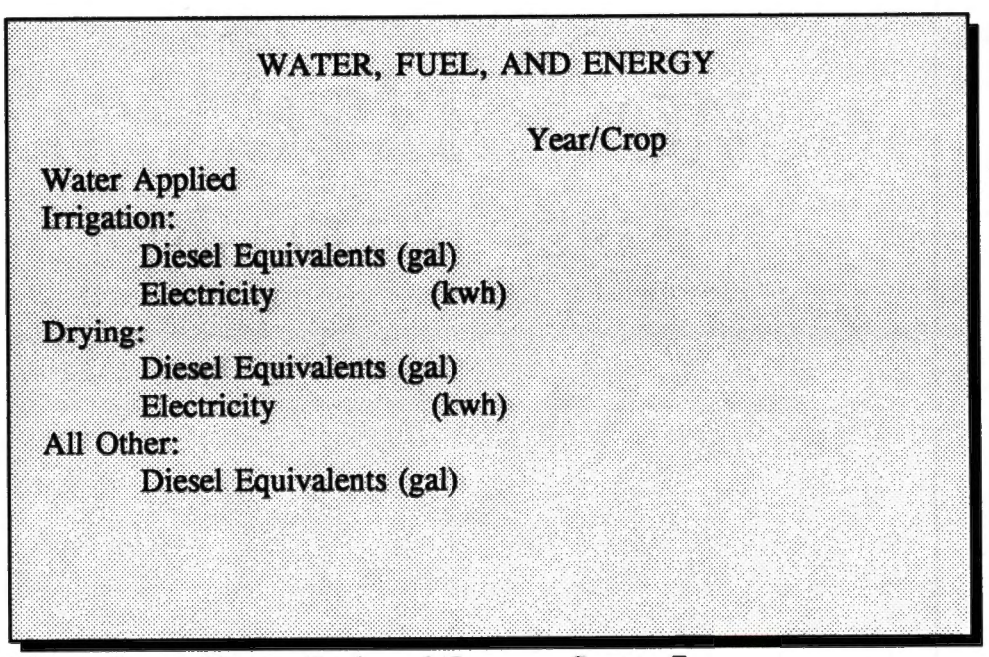


Figure 5 Water, Fuel, and Energy - Screen 7

Labor requirements, Figure 6 - Screen 8, were incorporated into the system on a monthly basis. Modifications were made from the Tennessee Extension Service's budgets since the labor requirements are bi-monthly. However, adjustments were made to change the bi-monthly labor estimates into monthly labor requirements.

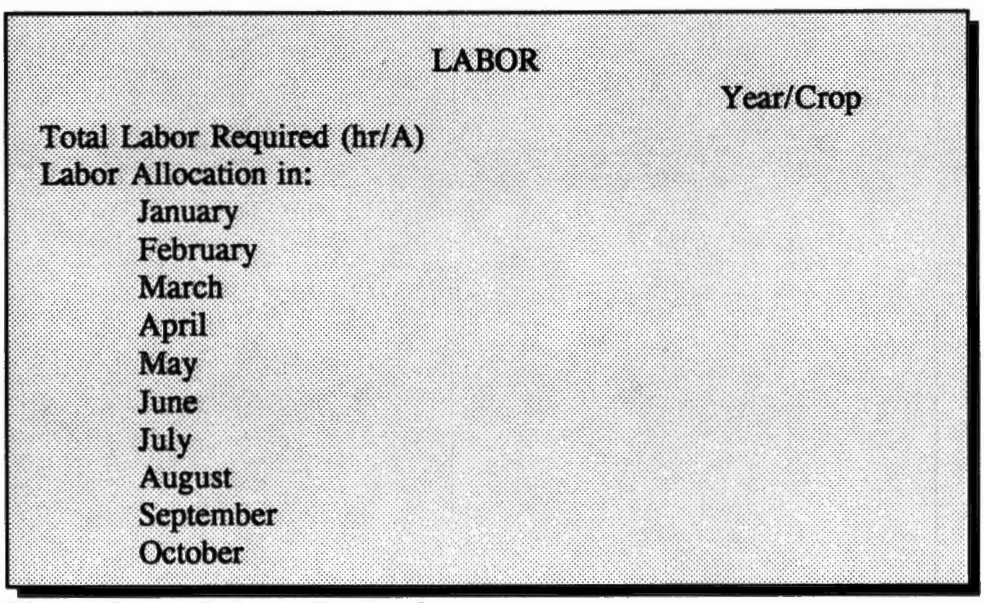


Figure 6 Labor - Screen 8

The final component of the budget data are total operating costs, Figure 7 - Screen 8. Total cash operating expense has three separate components: variable expenses, fixed expenses, and labor and interest expense. Variable expenses include costs which vary with the level of output. These costs are normally for production items which are used within a given production period such as feed, seed, fertilizer and variable machinery costs. Adjustments were made in these costs when making assumptions about sustainable systems such as fertilizer use. Fixed expenses consist of costs that occur regardless of the level of output once the operation is established.

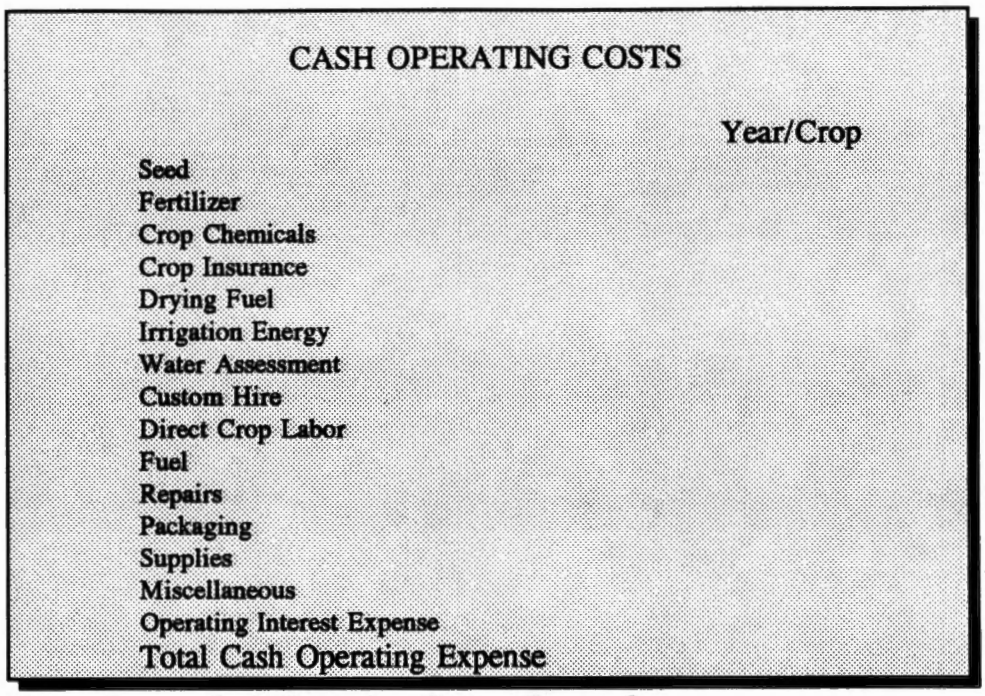


Figure 7 Cash Operating Costs - Screen 9

Labor and interest charges fall into both variable and fixed expense categories. Hired labor and interest on operating capital are variable expenses, while the value of family labor and interest on investment capital are assumed to be fixed expenses.

Entering most variable expenses such as seed, fertilizer, crop chemicals, and operating interest expense into Budgetor are straightforward. However, other costs were adapted to fit the Budgetor program. Fuel costs are the products of the amount of diesel used per acre from Screen 7 and the cost of diesel fuel.

The repair cost per hour is calculated as a percent of the initial purchase price divided by the total hours of use. The miscellaneous cost represents the sum of the fixed expense of machinery plus the fixed capital expense. For definition purposes, fixed expenses consist of those costs that occur regardless of the level of output once the

operation is established. Therefore, all other costs illustrated represent variable expenses which include costs that vary with the level of output. These costs are normally for production items which are used within a given production period.

Additional Farm Data

Representative Farm Characteristics

In addition to the enterprise budget data explained in Chapter 3, Planetor requires other farm data to provide the environmental and economic assessment. A whole farm plan is simulated, including all financial data such as loans, interest, other farm income, and available labor. Due to the large number of row-crops in Western Tennessee, Haywood County was selected as the representative site as it is typical of agriculture in West Tennessee and the Delta region. For example, the average farm in Haywood county averages over 400 acres with primary cash crops of cotton, corn, soybeans, and wheat. (Census of Agriculture, 1987).

Descriptive statistics were used to determine the farm's resource base. Size was set at 460 acres of harvested cropland with approximately 240 acres of cotton, 60 acres of corn for grain, 100 acres of soybeans, and 50 acres of wheat and soybeans in double crop (Census of Agriculture and Tennessee Agriculture Statistics). Also, 255 acres of the farm is owned by the producer, and three fields of 55, 92, and 58 acres, are assumed to be rented. Each from a different landlord and operate under different ASCS farm numbers.

Cropland in the region is dominated by Collins, Falaya, Grenada, Loring, and Memphis silt loam series and accounts for approximately 75% of the row crop acreage. While Collins and Falaya soils are generally non erosive, Grenada, Loring, and Memphis soils may exhibit high erosion rates when unprotected. Since Planetor only allows one particular soil type per field, five fields were selected with each field representing one of the five soil series listed.

Table 3.3 illustrates the particular soil type and number of acres for each field for the conventional farming system.

Table 3.3 Representative Fields and Soil Types

FIELD	SOIL SERIES	% OF FARM ACRES	FARM ACRES
1	COLLINS SILT LOAM	11.9	55
	FALAYA SILT LOAM	20.0	92
3	GRENADA SILT LOAM	21.8	100
4	LORING SILT LOAM	12.6	58
5	MEMPHIS SILT LOAM	33.7	155
	TOTAL	100.0	460

Financial Information

The 1987 Census of Agriculture information for Haywood County and Agricultural Income and Finance Situation and Outlook Report were used to determine a balance sheet for the representative farm. Balance sheet information is as shown in Table 3.4.

Table 3.4 Selected Initial Balance Sheet Data for the Haywood County Representative Farm[1]

Financial Variable	Value	Debt/Asset	Interest[2]
Assets:			
Cropland & Farmstead	155,400		
Farm Machinery	104,201		
Off-Farm Investments	2,000		
Cash Reserves	3,000		
Total	264,601		
Liabilities:			
Real Esate Debt	13,520	0.087	1,487.20
Intermediate Debt	23,341	0.224	6,228.75
Total	36,861	0.139	7,715.95
Overhead Expenses:			
Farm Taxes	529		
Farm Insurance	1,663		
Land Rent	9,900		
Hired Labor	940		
Utilities	1,200		
Miscellaneous	2,000		
Total	16,232		

[1] Family living expenses is assumed to be 18,000 annually for one-family with three full-time equivalent workers and total amount of available labor is 2,400 hours.

[2] Interest Rate is assumed to be 11%.

to better meet environmental and economic needs facing the agricultural society today. The many definitions of sustainable agriculture contribute to the difficulty in defining a sustainable system. In this study, sustainable systems center on reduced tillage methods, crop rotations, cover crops, and the use of legumes. The adaptations of conventional systems are theoretically simple and this study focuses on one such alternative, crop rotations.

Crop rotation is not a new concept in farming. It received considerable interest during the first half of this century. After World War II though, the introduction of relatively inexpensive nitrogen fertilizers provided an economically attractive alternative to farmers. During the late 1970s and early 1980s, strong governmental support was available. Farmers who might prefer rotations due to other advantages including pest control are locked into participating into government program payments that preclude broader farming options because of short-term economic necessity.

The dominant types of rotations, including the ones in this study contain a legume. Two types of legumes can be used to improve soil fertility, primarily through nitrogen contributions: annual seed legumes and perennial forages used as green manure crops. The research in seed legumes such as soybeans have concluded that corn and cotton production increases when rotated with soybeans due primarily to increased nitrogen availability after the soybeans. Corn yields were increased 16 to 17 percent when grown after soybeans compared to continuous corn (Robinson, 1966; Heggs et al., 1976; Randall, 1981; Hesterman et al.,1986). Therefore, the sustainable rotations in this system include soybeans. Table 3.5 outlines the assumed sustainable systems.

Table 3.5 Cropping Systems for Representative Farm

FIELD	CROPPING SYSTEMS		
	CONVENTIONAL	SUSTAINABLE	
	(All Years)	(Year 1)	(Year 2)
1	Wheat/Soybeans No-till	Wheat/Soybeans No-till	No-till Corn
2	Conventional Cotton	No-till Soybeans	No-till Cotton
3	Conventional Soybeans	No-till Cotton	No-till Soybeans
4	Conventional Corn	No-till Corn	Wheat/Soybeans No-till
5	Conventional Cotton	No-till Cotton	No-till Cotton

Using crop rotations requires changes within the enterprise budgets. The changes consist of tillage systems, input costs, nitrogen application, and expected yield. As seen in Table 3.5, all systems were converted to no-tillage systems. No-tillage is a practice that reduces soil erosion since the ground is not broken as compared to conventional tillage methods. However, mechanical tillage is often used for weed control, and with this operation taken out of the system, weed control is now primarily through chemical application, thereby increasing environmental concerns. Consultation with Paul Denton, Associate Professor in Plant and Soil Science with the University of Tennessee Agricultural Extension Service, indicates environmental hazards are questionable. Only limited chemical information is available to determine if, in fact, these chemicals are environmentally hazardaous. Over time, chemical applications costs will be lower than disking (mechanical methods) due to increased competition in the chemical market which reduces chemical prices. Machinery costs, however, are increasing due to increases in equipment and fuel costs.

In a rotation, if a nitrogen-replacing legume crop is grown, nitrogen is assumed to be replaced in the soil. Input costs and nitrogen application is consequently affected. The amount of nitrogen replaced depends upon the yield of the seed legume. For these rotations, soybeans is the legume crop utilized to replace nitrogen. Agronomists generally agree that soybeans replace one unit (or one pound) of nitrogen for every bushel produced. If soybeans yields 30 bu/acre, then 30 units of nitrogen are assumed to be replaced and available for the following crop. The Tennessee Agricultural Extension's Service recommends nitrogen application of 120 units on the original continuous system. Due to the soybean rotation, nitrogen application is reduced by 30 units. Therefore, since corn production requires only 90 units of nitrogen in this particular rotation, the rotation with soybeans reduces input costs for corn $7.80/acre due to lower nitrogen fertilizer cost. A similar reduction occurs for the cotton-soybean rotation. Nitrogen applications were adjusted accordingly for every field except for Field 5 since continuous cotton was grown.

Finally, yield adjustments in the budgets are made. As previously indicated, research has shown corn yields to increase. The assumption for this study is that within the two-year rotation corn yields increased 10 percent. This budget data is summarized in the Appendix.

CHAPTER 4

ANALYSIS

The farm data information was entered into Planetor to establish a representative farm. As stated earlier, corn, cotton, and soybeans (including various rotations) are the cropping systems used to illustrate economic and environmental impacts. For this study, five farm cases were simulated to capture various elements of government program participation. All five farms have the same amount of acreage and the same financial information creating a static situation. The first farm utilizes the conventional cropping systems without participation in government programs. The second farm utilizes sustainable crop rotations without government program participation. The third and fourth farms are the same, conventional and sustainable scenarios, except that it is assumed that the crop acreage is enrolled in government programs. The fifth case utilizes government program options implemented in the 1991 farm bill which enhances conservation practices and allows more flexibility for the farmers. The following section outlines major provisions of the government programs available for these particular farms and their role in these five representative case farms.

Role of Government Programs

Government program participation was considered to address the impact of direct government payments on farm decision making. In 1991, $18,730,000 for feed grain payments and $40,826,000 for cotton payments were paid to Tennessee farmers.

(Tennessee Agriculture Statistics, 1991). Therefore, the Food, Agriculture, Conservation and Trade Act of 1990 (FACT) guides American farm policy for the 1991-95 crops and influences a farmer's decision.

Again, the representative farm for Haywood County will be used to illustrate farmer involvement. The role of government programs will be evaluated for both conventional and sustainable systems. Furthermore, with 1990 FACT, several options for farmers are available that address the sustainable issue. However, in order for farmers to participate, they must comply with the following provisions of each of the three government programs.

Farm Eligibility

This representative farm is eligible for the cotton, feed grains, and wheat program. For this farm, it is assumed that a fifty-five acre wheat base, a fifty-eight acre corn base, and a one-hundred and fifty-five acre cotton base exists. The program payment yields are as follows: thirty-seven bushels for wheat, eighty bushel for corn, and five hundred and fifty pounds for cotton. (Agriculture Economics and Resource Development Info. No. 27,28, and 29) Decision-aid worksheets prepared by the University of Tennessee Agricultural Extension Service were used to determine the amount of money received by participation in government programs. In the Appendix, the completed worksheets for each of the program crops showing the assumed deficiency payment received by the farmer are located.

Acreage Reduction Requirements

Farmers have to comply with an acreage reduction requirement in order to receive government payments. The requirement for wheat and corn is five percent of crop acreage and the amount for cotton is ten percent. This program provision is designed to reduce erosion since it allows farmers to take highly erodible soils out of production.

In the Planetor system, a set-aside field was established for each crop enrolled in a government program. The size of the field is determined by the set-aside required. For example, field one has a fifty-five acre wheat base. Five percent is 2.8 acres; therefore, the field size for the set-aside field is 2.8 while field one is reduced to 52.2 acres. On the set-aside fields, typically a cover crop, either annual pasture or winter wheat, is grown.

Planting Flexibility

The 1990 Farm Bill provides an additional planting flexibility options allowing farmers to preserve part of their base acreage. With this provision, growers may plant crops other than corn, grain sorghum, barley or oats on up to twenty-five percent of the crop acreage base and still preserve base acreage history. The first fifteen percent of the "flex" acreage will be known as the normal flex acreage and the other ten percent will be known as the optional flex acreage. If a grower chooses to plant another crop on this flex acres, no deficiency will be paid; although, other program crops or oilseed are eligible for price support.

Zero Certification

The farm bill also has an option available to producers known as zero certification. Producers can certify that no acreage was planted to one or more program crops in a particular year, and this option allows growers to retain their crop acreage base and plant any other crop other than expanded acreage of fruits and vegetables. The major disadvantage with this option is that absolutely no acres of the program crop can be grown. However for the farm in this study, Field 1 (55 acre-wheat base), Field 2 (92 acre-no base), and Field 4 (58 acre-corn base) are rented. Each farm is rented under a different name; therefore, this farmer can utilize zero certification on those rented acreages.

This option is used on Fields 1 and 4. The farm has a 55 acre wheat base on Field 1. The second year, no-till corn is grown. Zero certification the second year preserves the 55 acre wheat base and corn is planted forming a two-year rotation. The same procedure is used for Field 4 where, in the second year, the farm again zero certifies that no corn will be grown, and grows a double-crop of soybeans and wheat forming a two-year rotation.

Integrated Farm Management Option

A voluntary commodity program flexibility option called the Integrated Farm Management Program Option (IFMPO) is incorporated into the 1990 Farm Bill. This program is specifically designed to assist producers in adopting more sustainable farming systems by addressing the issues that surrounded the sustainable agriculture implications,

primarily the environment. The IFMPO will help farmers utilize improved stewardship practices by providing farm program payments on resource-conserving crops planted on paid acres and by allowing some harvesting on set-aside acres. This sustainable agriculture initiative is most useful for farmers converting base acres from program crops to nonprogram crops to achieve a more diversified rotation.

The benefits of participating in the IFMPO are as follows:

1. farmers do not lose any base acreage for planting resource-conserving crops (forage legumes, small grain mixtures, grass mixtures),
2. program payment yields are not reduced,
3. farmers receive deficiency payments on resource-conserving crops, and
4. if set-aside acres are planted to resource-conserving crops, up to one-half of the set-aside acres may be hayed or grazed at any time without restriction.

This IFMPO option is utilized on the fifth farm example on Fields 3 and 4. Field 5 is a continuous cotton field. By using the IFMPO, the farmer places 1) ten percent (15.5 acres) into the mandatory set-aside acres, 2) fifteen percent (23.25 acres) into Resource Conserving Crops (RCC), which in this farm is an annual pasture, 3) twenty-five percent (38.75 acres) in the mandatory nonpayment acres, triple base, which are planted to soybeans and are eligible for soybean marketing loans, 4) fifty percent paid cotton acres. (77.5 acres) This conversion is illustrated in Table 4.1.

The same procedure is used for Field 4, a continuous corn field. Using IFMPO, 14.5 flex acres is planted into soybeans, 29 acres are paid corn acres, 11.6 acres are in paid resource conserving crops, and 2.9 acres in the mandatory set-aside acres. Table 4.1 illustrates the different field size and crop acreages.

Table 4.1 Conversion of Continous Corn to IFMPO

CONTINUOUS CORN			
5% ARP 2.9 acres	55.1 Paid Corn Acres		
INTEGRATED FARM MANAGEMENT OPTIONS			
5% ARP 2.9 acres	50% Paid 29 Corn Acres	25% Flex 14.5 acres	20% RCC Paid 11.6 acres

Table 4.2 Conversion of Continous Cotton to IFMPO

CONTINUOUS COTTON			
10% ARP 15.5 acres	139.5 Paid Cotton Acres		
INTEGRATED FARM MANAGEMENT OPTIONS			
10% ARP 15.5	15% RCC Paid 23.25 acres	50% Paid 77.5 Cotton acres	25% Flex 38.75 acres

Program Payments

Each government program has a target price and a basic loan rate established to assist farmers with their income while providing price stability to consumers. The

difference between these two figures is the maximum basic deficiency payment rate (MBDPR) for a crop. Listed in Table 4.3 are the MBDPR for each program crop:.

Table 4.3 Deficiency Payments for Program Crops

CROPS	TARGET PRICE	LOAN RATE	MBDPR
Corn	$2.75	$2.01	$0.74
Cotton	$0.73	$0.52	$0.21
Wheat	$4.00	$2.21	$1.79

In order for Planetor to pick up this additional income, government program payments are captured in the data by calculating a payment rate per bushel. For example, the deficiency payment for corn was $54.40 per acre. In order for Planetor to reflect government payments in net revenue, the payment was included in the price. Therefore, with a payment of $54.40 and a yield of 100 bu/acre, the payment added to the expected price is $0.54. the deficiency payment per acre was converted to price payment per bushel and added to the expected price per unit received by the farmer. For example, by participating in the government program, corn program participants received an additional $0.54 per bushel on permitted acreage.

The maximum payment acreage will be seventy-five percent of the cotton acreage base (acreage base minus fifteen percent flex acreage minus ten percent set aside). The maximum payment acreage for the corn and wheat base is eighty percent (acreage base minus fifteen percent flex acreage minus five percent set aside).

CHAPTER 5

RESULTS

Economic Results

Conventional Farm

The conventional farm not enrolled in government programs has a gross farm income of $141,836. Of the total gross income, $93,119 (66.6 percent) is from cotton sales. Soybeans contribute $27,249 (19 percent) and corn equivalents add $21,468 (15 percent). Total expenses for the farm are $141,610. Therefore, net profit for this farm is only $226. Although a net profit occurs, family living expenses ($18,000) are not met and the farmer would have to resort to obtaining a loan, or a member of the family would have to work off the farm to maintain family living expenses. Table 5.1 summarizes the income and expenses for this conventional farm.

Table 5.1 Income Summary for Conventional Farm Without Government Program Participation

Crop	Acres	Total Production	Price	Gross Revenue
Wheat	55	2,750/bu	$3.04	$8,360
Soybeans	100	4,650/bu	$5.86	$27,249
Corn	58	5,800/bu	$2.26	$13,108
Cotton	247	160,550/lbs	$0.58	$93,119
Total Gross Income				$141,836
		Total Gross Expense		$141,610
		Total Net Profit		$226

Note: Totals may not equal due to rounding.

Sustainable Farm

The sustainable farm not enrolled in government programs has a gross income average of $150,371, which is slightly higher than the conventional farm scenario. Cotton comprises the largest percentage of this gross revenue with $49,123 (33 percent). Soybeans contribute a yearly average of $29,485 (20 percent) and corn equivalents add $22,634 (15 percent). Overall gross revenue increased by $8,535 as compared to the conventional farm. This increase in income is a result of the assumed increased yields when crop rotations occur. Corn production increased over 400 bushels, wheat production increased over 250 bushels, and more importantly cotton production increased by approximately 11,000 pounds. These increases in overall gross revenue and total production are seen in Table 5.2.

Table 5.2 Income Summary for Sustainable Farm Without Government Program Participation

Crop	Acres		Total Production		Price		Gross Revenue	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Corn[1]	58	55	6,380	6,050	$2.26	$2.26	$14,419	$13,673
Cotton Rot[2]	100	92	71,500	65,780	$0.58	$0.58	$41,470	$38,152
Cotton Cont.	155	155	100,750	100,750	$0.58	$0.58	$58,435	$58,435
Soybeans[3]	147	158	4,851	5,214	$5.86	$5.86	$28,427	$30,554
Wheat[4]	55	58	2,750	2,900	$3.04	$3.04	$8,360	$8,816
Total Gross Income							$151,111	$149,630
					Gross Income Average			$150,371
					Gross Expense Average			$131,799
					Total Profit Average			$18,572

Note: Totals may not equal due to rounding.

[1] Corn Yield 110/bu (10% assumed increase)

[2] Cotton Yield 715/bu (10% assumed increase)

[3] Soybean Yield 33/bu (10% assumed increase)

[4] Wheat Yield 50/bu (10% assumed increase)

Total gross expenses average $131,799. This amount is approximately $10,000 less than the conventional farm. The reduction is a result of the conversion cost reducing to no-tillage systems. When converting to a reduced tillage system, the machinery required takes fewer trips across the field reducing overall machinery costs. However, because chemicals are now replacing the previous mechanical weed control, an increase is seen in the amount of chemical cost, but this increase is not as large as the decrease in machinery costs. Therefore, overall expense is smaller for the sustainable farm. Table 5.3 illustrates the reduction in total expense for these two farms.

Table 5.3 Conventional and Sustainable Farm Expenses

INPUT	CONVENTIONAL		SUSTAINABLE	
	AMOUNT	%	AMOUNT	%
Misc. crop expense	$39,051	27.6	$38,905	29.5
Repair cost	$18,264	12.9	$13,954	10.6
Crop Chemicals	$13,277	9.3	$20,150	15.3
Other Expense	$71.018	50.1	$58,790	44.65
TOTAL	$141,610		$131,799	

Conventional Farm Enrolled in Government Programs

When the conventional farming systems were enrolled in government programs, overall gross revenue increased from $141,836 to $148,249. This difference of $6,143 is explained simply by the increase in price due to the deficiency payment received by the farmer. Corn received $0.34 more per bushel, wheat $0.52 more per bushel, and cotton $0.11 more per pound for each unit produced. Although this increase is

substantial, gross income is still larger for the sustainable farm not enrolled in government programs.

Total expenses are $137,327, a reduction of $4,283 from the conventional farm that did not participate in government programs. Converting cropland to set-aside acres in a wheat and small grain cover crop accounts for this difference. The government payments did increase total income and therefore increased the net profit, which now is $10,922. Again however, with family living expenses assumed to be $18,000, the farm family will have to seek other income to meet family living expenses. Table 5.4 summarizes the income information for the conventional farm with government program participation.

Table 5.4 Income Summary for Conventional Farm With Government Program Participation

Crop	Acres	Total Production	Price	Gross Revenue
Corn	55	5,510/bu	$2.60	$14,326
Cotton	100	65,000/lbs	$0.58	$37,700
Cotton w/govt	139.5	90,675/lbs	$0.69	$62,566
Soybeans	144	4,327/bu	$5.86	$25,357
Wheat/DC	52.25	2,351/bu	$3.53	$8,300
Wheat/ARP	21.15			
Total Gross Income				$148,249
		Total Gross Expense		$137,327
		Total Net Profit		$10,922

Note: Totals may not equal due to rounding.

Sustainable Farm Enrolled in Government Programs

As expected when the sustainable farming systems were enrolled in government programs, the highest gross income occurs. Overall average gross revenues is projected at $156,064. Overall gross income increased from $150,371 from the sustainable systems not participating to an average over the two years of $156,064. This difference of $5,693 is not the same as the increase found when conventional cropping systems enrolled in government programs because the crop program acres are different. One field of cotton is not enrolled in the government program and therefore, does not receive the deficiency payment of $0.11.

Total farm expenses decreased even further to $125,994. Again, this reduction occurs because previous mechanical weed cultivation is now completed by chemical control and fewer acres are planted due to the set aside restrictions. Obviously, chemical costs increase for the sustainable system, but not enough to offset the reduction in machinery costs.

Table 5.5 summarizes the income information for the sustainable farm that participated in government programs.

Table 5.5 Income Summary for Sustainable Farm With Government Program Participation

Crop	Acres		Total Production		Price		Gross Revenue	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Corn[1]	55	52	6,061	5,720	$2.60	$2.60	$15,759	$14,872
Cotton [2]	100	92	71,500	65,780	$0.58	$0.58	$41,470	$38,152
Cotton w/govt	139.5	139.5	90,675	90,675	$0.69	$0.69	$62,566	$62,566
Soybeans[3]	144	155	4,752	5,118	$5.86	$5.86	$27,847	$29,992
Wheat/DC[4]	52	55	2,600	2,755	$3.53	$3.53	$9,178	$9,725
Wheat/ARP	21	21						
Total Gross Income							$156,820	$155,307
				Gross Income Average				$156,064
				Gross Expense Average				$125,994
				Total Profit Average				$30,070

Note: Totals may not equal due to rounding.
[1] Corn Yield 110/bu (10% assumed increase)
[2] Cotton Yield 715/bu (10% assumed increase)
[3] Soybean Yield 33/bu (10% assumed increase)
[4] Wheat Yield 50/bu (10% assumed increase)

Integrated Farm Management Option

The fifth farm, also a sustainable farm, incorporated conservation provisions from the 1990 FACT explained in Chapter 4. The farm that utilized the integrated farm management options had a total gross revenue less than any of the other four farms. Its projected gross income average is $125,333. This amount is $16,503 less than the conventional farm that did not participate in government programs. This large reduction in revenue is the result of fewer planted cotton and corn acres. The largest cotton field (155 acres) was reduced 50 percent and only 77.5 acres were planted. A similar

reduction is exhibited in the amount of corn acres planted that dropped from 58 planted corn acres to 29. Parts of both the corn and cotton acreage were used to meet the set aside requirement for the government program. However, 25 percent of both corn and cotton acres were "flexed" and planted in soybeans. Although the gross income of this farm does not include revenue from the hay and pasture situations created, the potential returns of selling hay or grazing livestock on the pasture would also be a consideration for this particular scenario. This production and income summary is illustrated in Table 5.6.

Table 5.6 Income Summary for Integrated Farm Management System

Crop	Acres		Total Production		Price		Gross Revenue	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Corn	29	29	2,900	2,900	$2.60	$2.60	$7,540	$7,540
Cotton	100	100	65,000	65,000	$0.58	$0.58	$37,700	$37,700
Cotton w/govt	77.5	77.5	50,375	50,375	$0.69	$0.69	$34,759	$34,759
Pasture Est/Corn	11.6	11.6	(80/bu x .5 = 40 x 11.6 = 464)				$464	$464
Pasture Est/Cotton	23.3	23.3	(550 x .16 = 88 x 23.3 = 2,050.4)				$2,050	$2,050
Soybeans	144.25	144.25	4,327.5	4,327.5	$5.86	$5.86	$25,359	$25,359
Soybean Flex	53.25	53.25	1,597.5	1,597.5	$5.86	$5.86	$9,361	$9,3615
Wheat/DC	52.25	52.25	2,351.25	2,351.25	$3.53	$3.53	$8,300	$8,300
Wheat/ARP	21	21						
Total Gross Income							$125,533	$125,533
				Gross Income Average				$125,533
				Gross Expense Average				$114,589
				Total Profit Average				$10,940

Note: Totals may not equal due to rounding.

Although total gross income is the lowest for each of the five farms, the average gross expense is the lowest for all five farms. The average total farm expense is $114,589, approximately $10,000 less than the sustainable farm also enrolled in government programs. However, the average profit is only $10,940; therefore, this farm

is faced with the same problem that the conventional farms has to deal with by searching for other sources of income. However, sustainable agriculture also focuses on the importance of environmental outcomes, addressed in the next section, and it is apparent that the sustainable farms and this farm utilizing the integrated farm management options better meet the environmental goals set forth by sustainable agriculture. Table 5.7 summarizes the expense information for all three farms that were enrolled in government programs. Total expenses are generally lower than those not participating in government programs since government program provisions require some conservation with the set aside. The IFMPO farm with the least amount of total expenses is a result of more crop acres being converted to resource conserving crops requiring fewer chemicals costs than the sustainable farm because less crop acreage is planted that requires chemical application. Machinery costs are less than either the sustainable or the conventional farm, again because crop acreage requiring large machinery use for mechanical cultivation or general production practices is reduced significantly.

Table 5.7 Government Participant Farm Expenses

INPUT	CONVENTIONAL		SUSTAINABLE		IFMPO	
	AMOUNT	%	AMOUNT	%	AMOUNT	%
Misc. crop expense	$47,225	34.4	$37,023	29.2	$32,537	28
Repair Cost	$17,616	12.8	$13,320	10.6	$11,654	10
Crop Chemicals	$12,701	9.2	$19,192	15.1	$15,858	14
Other Expenses	$59,785	43.5	$56,459	45.1	$54,720	48
TOTAL	$137,327		$125,994		$114,589	

Environmental Results

Planetor provides environmental assessment in the area of soil erosion, water quality, and pesticide contamination. Environmental information is the same regardless of farmer participation in government program participation. Therefore, for the environmental analysis, the five farms will be reduced to the original comparison of conventional systems versus sustainable systems.

Erosion

The greatest impact on environmental quality can be seen in the area involving soil erosion. When switching from a continuous, conventional corn system to a no-till cropping system with the wheat/soybean double crop, soil erosion dropped as much as 10.4 tons per year. The cotton fields were planted on the Grenada and Memphis soils, which exhibit high soil erosion rates. Therefore, converting to these no-till systems with one field also having a rotation is a very practical application of sustainable farming, reducing erosion by as much as 9.6 tons per year. By using a weighted average, predicted soil erosion for each field is calculated. As expected, the sustainable farm enrolled in government program has the lowest amount for the entire farm due to no-tillage practices and set-aside acres enrolled in cover crops. The predicted average soil losses are shown in Table 5.8.

Table 5.8 Predicted Average Soil Loss

	CROPPING SYSTEM Predicted Average Soil Loss/Year (tons)				
Field	Conventional	Conventional-Government	Sustainable	Sustainable-Government	IFMPO
1	2.1	2.06	1.0	1.0	2.06
2	7.6	2.8	2.9	2.9	2.8
3	16.1	7.26	6.5	6.03	7.26
4	13.0	3.22	2.6	2.6	3.22
5	16.8	5.88	7.9	7.43	5.88
AVERAGE	11.12	10.77	4.18	4.00	4.24

Water Quality

Water quality is determined by the amount of pesticide leaching and surface runoff. It is easy to see why environmental conditions become a trade-off. While reducing tillage systems, which in fact reduces erosion, it may cause a greater impact on water quality due to increased chemical leaching. Since no mechanical control of the weed population was assumed, the applications of more chemicals create a greater risk for water contamination. Again, through Tables 5.9 and 5.10, the sustainable systems suggest more problems with additional chemical use. However, does this in fact make the system "not" sustainable. Planetor does not take into consideration the amount of the pesticide used, only whether the EPA has labeled the chemical with a caution, danger, or warning label. While the amount of chemical applied can still be determined, further information on the environmental impacts on pesticide use is needed before environmental danger can be assessed.

Table 5.9 Pesticide Leaching Potential

FIELD	CONVENTIONAL	SUSTAINABLE	
		Year 1	Year 2
1	Medium Sencor	Medium Sencor	Medium Atrazine Medium Furadan
2	--	Medium Sencor	--
3	Medium Sencor	--	Medium Sencor
4	Medium Atrazine	Medium Atrazine Medium Furadan	Medium Sencor
5	Medium Treflan	High Cotoran	High Cotoran

Table 5.10 Pesticide Runoff Potential

Field	Conventional	Sustainable System	
		Year 1	Year 2
1	High Blazer High Prowl High Sencor High Gramoxone	High Blazer High Prowl High Sencor High Gramoxone	High Atrazine Medium Furadan High Gramoxone High Lasso EC
2	High Cotoran High Treflan	Same as above	High Cotoran High Gramoxone High Prowl
3	High Blazer High Sencor High Treflan	Same as Year 2-Field 2	Same as Year 1-Field 1
4	High Atrazine High Lasso EC	Same as Year 1-Field 2	Same as Year 1-Field 1
5	High Treflan	Same as Year 2-Field 2	Same as Year 2-Field 2

CHAPTER 6

SUMMARY

This study compares the environmental and economic tradeoffs of sustainable versus conventional farming systems on a representative west Tennessee row-crop farm. The analysis uses whole-farm and partial budgetary techniques to determine estimated costs and returns to each production system, as well as the whole-farm under various case scenarios. Case scenarios included a comparison of the farm using conventional farming system versus sustainable assuming no government program participation, both conventional and sustainable system given government price support program provision, and then a comparison of each incorporating special conservation provisions.

Descriptive statistics from Haywood County, Tennessee were used to develop the representative farm for the West Tennessee region. Budgetary analysis using the University of Minnesota Farm and Financial Management Center's Smart computer program was performed to identify the environmental and economic impacts of conventional farming versus sustainable cropping systems on the representative farm. Field data to include a soil and pesticide database and financial data from Extension budgets were entered into the Budgetor and Planetor sections of the SMART system and budgetary analysis performed. The result of the study concludes that farmer's incomes increase with sustainable practices, while enhancing the environment.

Sustainable agriculture will continue to play an increasing role in American agriculture, particularly in the Mid-South region. As just stated, the farm cases in this

study have revealed that farmer's income can be maintained if not increased when moving to a sustainable farming system. And when the transition to sustainable systems has occurred, environmental conditions are expected to improve. However, the results of this study would conclude that all producers in the Midsouth region would naturally switch to sustainable systems as developed for their farm. However, conclusions have to be cautious because several areas need to be more fully addressed before these results are assumed correct. The role of agriculturalists for sustainable agriculture lies in the realm of the land grant university with the roles of research and education.

The role of research is forefront. Only in the last decade has environmental concerns risen to such heights, but little research has been completed on exact implications of chemical use. Its exact harm is unknown, and only preliminary studies are providing indications of pesticides. Due to the long nature of this chemical research, research findings will not occur overnight. Crop rotations have been proven to increase yields and reduce soil erosion. Furthermore, converting to lower tillage systems has had a great impact on soil erosion, and this conversion is occurring rapidly. Table 6.1 adapted from Tennessee Agriculture Statistics-1991 shows clearly the percentage increase in conservation and no-tillage since 1983.

Table 6.1 Tillage Practices for Tennessee Since 1983

Crop*	Year	Total Acres Planted	No-Till		Conventional Till	
			Acres	% of Total	Acres	% of Total
Soybeans	1983	2,020,000	330,000	16.3	1,330,000	65.8
	1984	1,900,000	370,000	19.5	1,320,000	69.5
	1985	1,500,000	240,000	16.0	1,120,000	74.7
	1986	1,470,000	180,000	12.2	1,150,000	78.2
	1987	1,300,000	140,000	10.8	1,040,000	80.0
	1988	1,300,000	200,000	15.4	980,000	75.4
	1989	1,300,000	260,000	20.0	840,000	64.6
	1990	1,300,000	300,000	23.1	710,000	54.6
	1991	1,100,000	280,000	25.5	550,000	50.0
Corn	1983	650,000	90,000	13.8	430,000	66.2
	1984	850,000	191,000	22.5	533,000	62.7
	1985	950,000	120,000	12.6	670,000	70.5
	1986	910,000	100,000	11.0	710,000	78.0
	1987	730,000	75,000	10.3	575,000	78.8
	1988	680,000	70,000	10.3	540,000	79.4
	1989	650,000	60,000	9.2	495,000	76.2
	1990	620,000	85,000	13.7	385,000	62.1
	1991	620,000	135,000	21.8	350,000	56.5

*Cotton Tillage Information was unavailable

Economically, researchers face a great challenge to incorporate environmental costs with the traditional cost and returns analysis. Multiple goal programming is a tool that will certainly be useful to economists because farmers will no longer have a single objective function to maximize or minimize. Rather, the producer of tomorrow will have

to juggle environmental restrictions with other resource constraints to maximize environmental conditions, as well as economic returns. The challenges facing the researcher today directly correlate with the role of education.

The producers in today's agriculture are to be well and accurately informed of the results of research. It is the role of educators to inform the farmer of good alternatives to his traditional cropping systems. Although the farmer reads in farm publications that the new farm bill includes some "flex" options, does he necessarily know how to effectively plan his crop acres for the benefit of his own farm? Or is the farmer aware of such options as the integrated farm management options or how zero certification will enable him to effectively use his resources in a way that is profitable and environmentally acceptable?

Regarding this particular study, several remarks are in order. First, this study is only a guide to give farmers and researchers things to consider. Because all the data is simulated, it is impractical to say that the results would actually occur. Although, given that the study did use representative characteristics, we are to assume that there is some validity in the projected outcomes. However, as a producer myself, it is important to keep conditions in perspective. It is easy to say that you can easily convert a fifty-five acre field into four separate fields to utilize the set-aside requirement, RCC acres, flex acres, and the program acres. However, is this even conceivable in some instances? Can a farmer divide his field feasibly to practice these options? Furthermore, it is easy to say fields will automatically be converted to a crop rotation. Consider the farmer who

only wants to grow soybeans because corn has not been found as profitable. How readily will he convert to a rotation, especially if he does not have a corn base?

Finally, the limitations of Planetor itself are enough to use the results only as a mind stimulator. Environmentally, no accurate or significant information is given concerning pesticide use because the amount of the chemical applied is not considered. By simply using a having a "dangerous rating" from EPA, the Planetor analysis will strictly project high risks in water quality and surface runoff. The sustainable cases were found to be the most suitable both economically and environmentally. However, the assumptions of increased yields due to crop rotations without a decrease in cost cannot be overlooked. Although the producer will receive increase yields, does he in fact want to grow another crop. He may not have a market for a different crop due to market restrictions. Also, nitrogen replacement has found to in fact work; however, so many variables make this assumption hard to justify. Research experts have found that the weather (the most significant variable in any farm analysis) and time of harvest greatly influence whether one unit of nitrogen is indeed replaced for one unit of yield. Machinery and equipment is another variable that needs consideration. True, conversion to reduced or no-tillage systems does reduce erosion and maintains yields. But, initially does the farmer have the proper equipment to convert to no-tillage practices?

These questions and issues are to be dealt with in order to fully realize the true impact of sustainable agriculture. Until all research is complete though, research findings like the one in this study indicate that sustainable agriculture will play a positive and important role with tomorrow's farmers.

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APPENDIX

Table A.1 Enterprise Budget Data Per Acre Summary

	Conv. Corn	No-till Corn	Conv. Cotton	No-till Cotton	Conv. Soybeans	No-till Soybeans	No-till Soy/Wheat	Soy/Wheat Corn	(NT)Corn Soy/Wheat	Soybeans Cotton	(NT) Soy Cotton
BUDGET DATA											
Exp. Yield	100 bu.	100 bu.	650 lb.	650 lb.	30 bu.	30 bu.	30/45 bu.	33/50/110	33/50/110	33/715	33/715
Exp. Price	$2.26	$2.26	$0.58	$0.58	$5.86	$5.86	$5.86 /$3.04	$5.86 /$2.26	$5.86 /$3.04 /$2.26	$5.86 /$0.58	$5.86 /$0.58
TOTAL REVENUE	$226.00	$226.00	$377.00	$377.00	$175.80	$175.80	$345.38	$571.58	$571.38	$552.80	$552.80
Seed	$21.00	$21.00	$9.75	$9.75	$6.80	$10.20	$20.30	$41.30	$41.30	$16.55	$19.95
Fertilizer	$62.80	$62.80	$48.39	$48.39	$21.90	$21.90	$50.70	$113.50	$105.70	$70.29	$70.29
Chemicals	$13.97	$36.95	$34.15	$49.61	$26.01	$31.82	$26.01	$39.98	$62.96	$60.16	$92.74
Fuel[1]	$9.85	$5.81	$21.08	$13.07	$9.79	$5.39	$10.96	$20.81	$16.77	$30.87	$18.46
Repairs[2]	$23.85	$19.71	$50.66	$36.87	$25.14	$17.52	$33.70	$57.55	$53.41	$75.80	$54.39
Misc.[3]	$65.68	$54.97	$134.74	$101.94	$68.04	$50.44	$95.04	$160.72	$150.01	$202.78	$152.38
Operating Interest	$7.23	$8.16	$9.54	$8.67	$4.40	$4.37	$7.79	$15.02	$15.95	$13.94	$13.67
TOTAL COSTS	$204.38	$209.40	$308.31	$268.30	$162.08	$141.64	$244.50	$448.88	$446.10	$470.39	$421.88
TOTAL NET RETURNS	$21.62	$16.60	$68.69	$108.70	$13.72	$34.16	$100.88	$122.70	$125.28	$82.41	$130.92

[1]Fuel Cost Calculated by Diesel Equivalents*Cost of Diesel ($1.10)
[2]Repair Cost Calculated by Variable Machinery Costs - Fuel Cost
[3]Miscellaneous Cost Includes the Total of Machinery Fixed Cost + Fixed Capital Expense

Table A.2 Crop Deficiency Payments Calculations

CROP	A Total Acres	B % Acreage Planted to Program	C Estimated Deficiency Payment per unit	D Farm Program Yield	E % for Set Aside Acreage	F Total Acres Planted A-(A*E)	H Maximum # of Acres Paid (A*B)	I Estimated Deficiency Payment per acre (C*D)	J Total Gov't Payments (H*I)	K Total Payment per acre (H/F)	L Payment per Unit (K/yield)
Cotton	155	75	$0.16	550 lbs.	10	139.50	116.25	$88.00	$10,230	$73.33	$0.11
Corn	58	80	$0.50	80 bu.	5	55.10	46.40	$40.00	$1,856	$33.68	$0.34
Wheat	55	80	$0.75	37 bu.	5	52.25	44.40	$27.75	$1,221	$23.37	$0.52

Table A.3 Cotton- Picker Owned Machinery Data

Machine	Hours Per Acre	Interest Cost Per Hour	Interest Cost Per Acre	Cost Per Hour		Cost Per Acre		
				F.C.	V.C.	F.C.	V.C.	Fuel
Tractor, 125 HP	3.66	4.13	15.10	6.42	9.52	23.50	34.86	4.31
Picker, 2-Row	0.93	22.00	20.46	42.19	4.41	39.24	22.70	3.65
Plow	0.20	2.20	0.20	3.51	2.40	0.70	0.48	0.00
Disk	0.20	7.86	1.57	12.70	5.71	2.54	1.14	0.00
Sprayer	1.24	2.06	2.56	4.17	2.81	5.17	3.49	0.00
Planter	0.42	6.68	2.81	10.77	4.86	4.52	2.04	0.00
Cultivator	1.08	3.21	3.47	5.45	3.50	5.88	3.78	0.00
Cultimulcher	0.11	10.61	1.17	17.34	7.71	1.91	0.85	0.00
Mower	0.36	3.67	1.32	7.32	6.67	2.63	2.40	0.00
Total			$48.64			$86.10	$71.74	

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Table A.4 Corn-Conventional Tillage Machinery Data

Machine	Hours Per Acre	Interest Cost Per Hour	Interest Cost Per Acre	Cost Per Hour		Cost Per Acre		
				F.C.	V.C.	F.C.	V.C.	Fuel
Tractor, 100 HP	1.56	3.21	5.01	5.00	7.52	7.80	11.73	3.45
Combine	0.41	19.25	7.89	36.98	21.83	15.16	8.95	3.58
Corn Head	0.41	7.15	2.93	14.16	9.75	5.81	4.00	0.00
Truck	0.41	4.22	1.73	6.71	9.10	2.75	3.73	4.05
Chisel Plow	0.24	1.72	0.41	2.73	1.88	0.65	0.45	0.00
Disk	0.36	3.54	1.27	5.93	2.57	2.13	0.93	0.00
Cultimulcher	0.18	1.18	0.21	1.90	0.64	0.34	0.12	0.00
Planter	0.42	6.68	2.81	10.77	4.86	4.52	2.04	0.00
Cultivator	0.36	3.21	1.16	5.45	3.50	1.96	1.26	0.00
Sprayer	0.18	2.06	0.37	4.17	2.81	0.75	0.51	0.00
Total			$23.79			$41.89	$33.70	

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Table A.5 Soybeans-Conventional Tillage-36" Rows Machinery Data

Machine	Hours Per Acre	Interest Cost Per Hour	Interest Cost Per Acre	Cost Per Hour		Cost Per Acre		
				F.C.	V.C.	F.C.	V.C.	Fuel
Tractor, 100 HP	1.74	3.21	5.58	5.00	7.52	8.70	13.08	3.45
Combine SP	0.38	19.25	7.32	36.98	21.83	14.05	8.29	3.58
Grainheader 13'	0.38	5.23	1.99	10.30	7.13	3.91	2.71	0.00
Truck, 2 Ton	0.38	4.22	1.60	6.71	9.10	2.55	3.46	4.05
Plow	0.24	1.72	0.41	2.73	1.88	0.65	0.45	0.00
Disk	0.36	3.54	1.27	5.93	2.57	2.13	0.93	0.00
Planter	0.42	7.70	3.23	12.32	5.60	5.17	2.35	0.00
Sprayer	0.18	3.93	0.71	7.75	5.36	1.39	0.96	0.00
Cultivator	0.36	5.04	1.82	8.07	5.50	2.91	1.98	0.00
Cultimulcher	0.18	5.50	0.99	9.07	4.00	1.63	0.72	0.00
Total			$24.92			$43.12	$34.93	

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Table A.6 Soybeans-No Tillage-20" Rows Machinery Data

Machine	Hours Per Acre	Interest Cost Per Hour	Interest Cost Per Acre	Cost Per Hour		Cost Per Acre		
				F.C.	V.C.	F.C.	V.C.	Fuel
Tractor, 100 HP	0.58	3.21	1.86	5.00	7.52	2.90	4.36	3.45
Sod Planter	0.40	10.21	4.09	16.39	7.43	6.55	2.97	0.00
Sprayer	0.58	2.06	1.20	4.17	2.81	2.42	1.63	0.00
Combine, 13' SP	0.38	19.25	7.32	36.98	21.83	14.05	8.29	3.58
Grain Header	0.38	5.23	1.99	10.30	7.13	3.91	2.71	0.00
Truck, 2 Ton	0.38	4.22	1.60	6.71	9.10	2.55	3.46	4.05
Total			$18.05			$32.39	$23.42	

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Table A.7 Wheat Machinery Data

Machine	Hours Per Acre	Interest Cost Per Hour	Interest Cost Per Acre	Cost Per Hour		Cost Per Acre		
				F.C.	V.C.	F.C.	V.C.	Fuel
Tractor, 80 HP	1.67	2.29	3.83	3.58	5.71	5.98	9.54	2.76
Combine, 13'	0.70	19.28	13.48	36.98	21.83	25.89	15.28	3.58
Truck, 2 Ton	0.70	4.22	2.95	6.71	9.10	4.69	6.37	4.05
Grain Header	0.70	5.23	3.66	10.30	7.13	7.21	4.99	0.00
Chisel Plow	0.24	1.72	0.41	2.73	1.88	0.65	0.45	0.00
Disk, 14'	0.18	3.54	0.64	5.93	2.57	1.07	0.46	0.00
Cultimulcher	0.18	5.50	0.99	9.07	4.00	1.63	0.72	0.00
Planter, 4 Row	0.60	7.86	4.71	12.61	5.71	7.57	3.43	0.00
Sprayer	0.78	2.06	1.61	4.17	2.81	3.25	2.19	0.00
Grain Drill	0.18	8.25	1.49	13.51	6.00	2.43	1.08	0.00
Spreader, 900#	0.11	2.29	0.25	5.90	1.39	0.65	0.15	0.00
Total			$34.01			$61.03	$44.66	

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Table A.8 Cotton-No Tillage-Picker Owned Machinery Data

Machine	Hours Per Acre	Interest Cost Per Acre	Interest Cost Per Acre	Cost Per Hour		Cost Per Acre		
				F.C.	V.C.	F.C.	V.C.	Fuel
Tractor, 125 HP	1.97	4.13	8.11	6.42	9.52	12.62	18.72	4.31
Picker, 2 Row	0.93	22.00	20.46	42.19	24.41	39.24	22.70	3.65
Sprayer	1.14	2.06	2.35	4.17	2.81	4.75	3.21	0.00
Planter	0.60	6.68	4.01	10.77	4.86	6.46	2.91	0.00
Mower	0.36	3.67	1.32	7.32	6.67	2.63	2.40	0.00
Total			$36.24			$65.70	$49.94	

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Table A.9 Corn-No Tillage Machinery Data

Machine	Hours Per Acre	Interest Cost Per Hour	Interest Cost Per Acre	Cost Per Hour		Cost Per Acre		
				F.C.	V.C.	F.C.	W.C.	Fuel
Tractor, 80 HP	0.78	2.29	1.79	3.58	5.71	2.79	4.46	2.76
Combine	0.41	19.25	7.89	36.98	21.83	15.16	8.95	3.58
Corn Head	0.41	7.15	2.93	14.16	9.75	5.81	4.00	0.00
Truck	0.41	4.22	1.73	6.71	9.10	2.75	3.73	4.05
No-Till Planter	0.60	7.22	4.71	12.61	5.71	7.57	3.43	
Sprayer	0.18	2.06	0.37	4.17	2.81	0.75	0.51	0.00
Granule App.	0.60	0.29	0.18	0.89	0.75	0.54	0.45	0.00
Total			$19.60			$35.37	$25.52	

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Table A.10 Wheat and Soybeans, Double-Cropped, No Tillage Machinery Data

Machine	Hours Per Acre	Interest Cost Per Hour	Interest Cost Per Acre	Cost Per Hour		Cost Per Acre		
				F.C.	V.C.	F.C.	V.C.	Fuel
Tractor, 80 HP	1.67	2.29	3.83	3.58	5.71	5.98	9.54	2.76
Combine 13'	0.70	19.25	13.48	36.98	21.83	25.89	15.28	3.58
Truck, 2 Ton	0.70	4.22	2.95	6.71	9.10	4.69	6.37	4.05
Grain Header	0.70	5.23	3.66	10.30	7.13	7.21	4.99	0.00
Chisel Plow	0.24	1.72	0.41	2.73	1.88	0.65	0.45	0.00
Disk, 14'	0.18	3.54	0.64	5.93	2.57	1.07	0.46	0.00
Cultimulcher	0.18	5.50	0.99	9.07	4.00	1.63	0.72	0.00
Planter, 4 Row	0.60	7.86	4.71	12.61	5.71	7.57	3.43	0.00
Sprayer	0.78	2.06	1.61	4.17	2.81	3.25	2.19	0.00
Grain Drill	0.18	8.25	1.49	13.51	6.00	2.43	1.08	0.00
Spreader, 900#	0.11	2.29	0.25	5.91	1.39	0.65	0.15	0.00
Total			$34.01			$61.03	$44.66	

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CROP BUDGETS

COTTON, PICKER OWNED

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.389
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	1

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Cotton	

**** SUMMARY DATA ****

		Year 1
Excess nitrogen	(lbs)	
With expected yield		18
With optimistic yield		13
Highest chemical rating		
Toxicity		Medium
Leaching potential		Medium
Run-off potential		High
Diesel equivalents	(gallons)	29.21
BTU equivalents	(millions)	4.09
Value of exp. yield - Crop 1	($)	377
Value of exp. yield - Crop 2	($)	-
Total return/benefit	($)	377.00
Total cash operating costs	($)	308.31
Return over direct costs	($)	68.69
Total return risk factor	(+/-)	85
Labor requirement	(hours)	6
Corn equivalents produced	(bu)	-
Hay equivalents produced	(ton)	-
Silage equiv. produced	(ton)	-
Animal Unit Month prod.	(AUM)	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

		Year 1
**** YIELD AND PRICE ****		Cotton
Unit of yield		Lbs.
Expected yield		650.0
Optimistic yield		730.0
Pessimistic yield		570.0
Expected price		0.58
Optimistic price		0.69
Pessimistic price		0.47
Price/yield correlation		Negligible
Value other product/acre		-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield	
Expected yield	
Optimistic yield	
Pessimistic yield	
Expected price	
Optimistic price	
Pessimistic price	
Price/yield correlation	
Rev. corr. between crop 1 & 2	
Value other product/acre	

**** NITROGEN ****		Cotton
Credit green manure (lbs)		-
Credit other sources (lbs)		-
Applied nitrogen (lbs)		60

**** HERBICIDES ****

Treflan	pt	1.50
Cotoran	PT	3.50

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-
Irrigation energy:		
Diesel equivalents	(gal)	-
Electricity	(KWH)	-
Drying:		
LP Gas	(gal)	-
Electricity	(KWH)	-
All Other:		
Diesel equivalents	(gal)	19.2

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** LABOR ****	Year 1 Cotton
Total labor required (hrs/A)	5.7
Labor allocation in:	
January	0.5
February	0.2
March	0.3
April	0.7
May	0.4
June	0.4
July	0.4
August	0.4
September	0.9
October	0.9
November	0.2
December	0.2
**** CASH OPERATING COSTS $ ****	
Seed	9.75
Fertilizer	48.39
Crop chemicals	34.15
Crop insurance	-
Drying fuel	-
Irrigation energy	-
Water assessment	-
Custom hire	-
Direct crop labor	-
Fuel	21.08
Repairs	50.66
Packaging	-
Supplies	-
Miscellaneous	134.74
Operating interest expense	9.54
Total cash operating expense	308.31

COTTON, NO-TILLAGE

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.183
Irrigation system used	Not Irrigated
Tillage system	Low
Input level	Unrestricted
Length of the rotation (yrs)	1

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Cotton	

**** SUMMARY DATA ****

		Year 1
Excess nitrogen	(lbs)	
With expected yield		18
With optimistic yield		13
Highest chemical rating		
Toxicity		High
Leaching potential		Medium
Run-off potential		High
Diesel equivalents	(gallons)	21.93
BTU equivalents	(millions)	3.07
Value of exp. yield - Crop 1	($)	377
Value of exp. yield - Crop 2	($)	-
Total return/benefit	($)	377.00
Total cash operating costs	($)	268.30
Return over direct costs	($)	108.70
Total return risk factor	(+/-)	61
Labor requirement	(hours)	4
Corn equivalents produced	(bu)	-
Hay equivalents produced	(ton)	-
Silage equiv. produced	(ton)	-
Animal Unit Month prod.	(AUM)	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** YIELD AND PRICE ****		Year 1 Cotton
Unit of yield		Lbs.
Expected yield		650.0
Optimistic yield		730.0
Pessimistic yield		570.0
Expected price		0.58
Optimistic price		0.64
Pessimistic price		0.52
Price/yield correlation		Negligible
Value other product/acre		-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield	
Expected yield	
Optimistic yield	
Pessimistic yield	
Expected price	
Optimistic price	
Pessimistic price	
Price/yield correlation	
Rev. corr. between crop 1 & 2	
Value other product/acre	

**** NITROGEN ****		Cotton
Credit green manure (lbs)		-
Credit other sources (lbs)		-
Applied nitrogen (lbs)		60

**** HERBICIDES ****

Gramoxone Extra	PT	1.50
Prowl	PT	1.50
Cotoran	PT	6.00

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-
Irrigation energy:		
Diesel equivalents	(gal)	-
Electricity	(KWH)	-
Drying:		
LP Gas	(gal)	-
Electricity	(KWH)	-
All Other:		
Diesel equivalents	(gal)	11.9

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** LABOR ****	Year 1 Cotton
Total labor required (hrs/A)	4.2
Labor allocation in:	
January	-
February	-
March	-
April	0.2
May	1.2
June	-
July	-
August	-
September	0.9
October	0.9
November	0.4
December	0.5
**** CASH OPERATING COSTS $ ****	
Seed	9.75
Fertilizer	48.39
Crop chemicals	49.61
Crop insurance	-
Drying fuel	-
Irrigation energy	-
Water assessment	-
Custom hire	-
Direct crop labor	-
Fuel	13.07
Repairs	36.87
Packaging	-
Supplies	-
Miscellaneous	101.94
Operating interest expense	8.67
Total cash operating expense	268.30

CORN, CONVENTIONAL TILLAGE

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.301
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	2

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Corn	
2	Corn	

**** SUMMARY DATA ****

	Year 1	Year 2
Excess nitrogen (lbs)		
With expected yield	30	30
With optimistic yield	19	19
Highest chemical rating		
Toxicity	High	High
Leaching potential	High	High
Run-off potential	Medium	Medium
Diesel equivalents (gallons)	29.95	29.95
BTU equivalents (millions)	4.19	4.19
Value of exp. yield - Crop 1 ($)	260	260
Value of exp. yield - Crop 2 ($)	-	-
Total return/benefit ($)	260.00	260.00
Total cash operating costs ($)	204.38	204.38
Return over direct costs ($)	55.62	55.62
Total return risk factor (+/-)	48	48
Labor requirement (hours)	3	3
Corn equivalents produced (bu)	100	100
Hay equivalents produced (ton)	-	-
Silage equiv. produced (ton)	-	-
Animal Unit Month prod. (AUM)	-	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** YIELD AND PRICE ****	Year 1 Corn	Year 2 Corn
Unit of yield	Bu.	Bu.
Expected yield	100.0	100.0
Optimistic yield	112.0	112.0
Pessimistic yield	88.0	88.0
Expected price	2.60	2.60
Optimistic price	2.96	2.96
Pessimistic price	2.24	2.24
Price/yield correlation	Negligible	Negligible
Value other product/acre	-	-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield	
Expected yield	
Optimistic yield	
Pessimistic yield	
Expected price	
Optimistic price	
Pessimistic price	
Price/yield correlation	
Rev. corr. between crop 1 & 2	
Value other product/acre	

**** NITROGEN ****		Corn	Corn
Credit green manure (lbs)		-	-
Credit other sources (lbs)		-	-
Applied nitrogen (lbs)		120	120

**** HERBICIDES ****

Atrazine	QT	1.25	1.25
Lasso EC	QT	2.00	2.00

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-
Irrigation energy:			
Diesel equivalents	(gal)	-	-
Electricity	(KWH)	-	-
Drying:			
LP Gas	(gal)	-	-
Electricity	(KWH)	-	-
All Other:			
Diesel equivalents	(gal)	9.9	9.9

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** LABOR ****	Year 1 Corn	Year 2 Corn
Total labor required (hrs/A)	3.0	3.0
Labor allocation in:		
January	-	-
February	-	-
March	0.3	0.3
April	0.2	0.2
May	1.0	1.0
June	0.5	0.5
July	-	-
August	-	-
September	0.4	0.4
October	0.4	0.4
November	0.1	0.1
December	0.1	0.1
**** CASH OPERATING COSTS $ ****		
Seed	21.00	21.00
Fertilizer	62.80	62.80
Crop chemicals	13.97	13.97
Crop insurance	-	-
Drying fuel	-	-
Irrigation energy	-	-
Water assessment	-	-
Custom hire	-	-
Direct crop labor	-	-
Fuel	9.85	9.85
Repairs	23.85	23.85
Packaging	-	-
Supplies	-	-
Miscellaneous	65.68	65.68
Operating interest expense	7.23	7.23
Total cash operating expense	204.38	204.38

CORN, NO-TILLAGE

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.068
Irrigation system used	Not Irrigated
Tillage system	Low
Input level	Unrestricted
Length of the rotation (yrs)	1

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Corn	

**** SUMMARY DATA ****

	Year 1
Excess nitrogen (lbs)	
With expected yield	30
With optimistic yield	17
Highest chemical rating	
Toxicity	High
Leaching potential	High
Run-off potential	High
Diesel equivalents (gallons)	25.38
BTU equivalents (millions)	3.55
Value of exp. yield - Crop 1 ($)	260
Value of exp. yield - Crop 2 ($)	-
Total return/benefit ($)	260.00
Total cash operating costs ($)	209.40
Return over direct costs ($)	50.60
Total return risk factor (+/-)	51
Labor requirement (hours)	2
Corn equivalents produced (bu)	100
Hay equivalents produced (ton)	-
Silage equiv. produced (ton)	-
Animal Unit Month prod. (AUM)	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

		Year 1
**** YIELD AND PRICE ****		Corn
Unit of yield		Bu.
Expected yield		100.0
Optimistic yield		114.0
Pessimistic yield		86.0
Expected price		2.60
Optimistic price		2.96
Pessimistic price		2.24
Price/yield correlation		Negligible
Value other product/acre		-
*** 2nd CROP YIELD AND PRICE ***		
Unit of yield		
Expected yield		
Optimistic yield		
Pessimistic yield		
Expected price		
Optimistic price		
Pessimistic price		
Price/yield correlation		
Rev. corr. between crop 1 & 2		
Value other product/acre		
**** NITROGEN ****		Corn
Credit green manure (lbs)		-
Credit other sources (lbs)		-
Applied nitrogen (lbs)		120
**** HERBICIDES ****		
Gramoxone Extra	PT	1.50
Atrazine	QT	1.75
Lasso EC	QT	2.50
**** PESTICIDES ****		
Furadan	LB	7.00
**** WATER, FUEL & ENERGY ****		
Water applied (inchs/year)		-
Irrigation energy:		
Diesel equivalents	(gal)	-
Electricity	(KWH)	-
Drying:		
LP Gas	(gal)	-
Electricity	(KWH)	-
All Other:		
Diesel equivalents	(gal)	5.3

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

	Year 1
**** LABOR ****	Corn
Total labor required (hrs/A)	2.0
Labor allocation in:	
January	-
February	-
March	0.8
April	0.2
May	-
June	-
July	-
August	-
September	0.4
October	0.4
November	0.1
December	0.1
**** CASH OPERATING COSTS $ ****	
Seed	21.00
Fertilizer	62.80
Crop chemicals	36.95
Crop insurance	-
Drying fuel	-
Irrigation energy	-
Water assessment	-
Custom hire	-
Direct crop labor	-
Fuel	5.81
Repairs	19.71
Packaging	-
Supplies	-
Miscellaneous	54.97
Operating interest expense	8.16
Total cash operating expense	209.40

SOYBEANS CONVENTIONAL TILLAGE

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.372
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	1

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Soybeans	

**** SUMMARY DATA ****

		Year 1
Excess nitrogen	(lbs)	
With expected yield		-
With optimistic yield		-
Highest chemical rating		
Toxicity		High
Leaching potential		High
Run-off potential		High
Diesel equivalents	(gallons)	8.90
BTU equivalents	(millions)	1.25
Value of exp. yield - Crop 1	($)	176
Value of exp. yield - Crop 2	($)	-
Total return/benefit	($)	175.80
Total cash operating costs	($)	162.08
Return over direct costs	($)	13.72
Total return risk factor	(+/-)	32
Labor requirement	(hours)	3
Corn equivalents produced	(bu)	-
Hay equivalents produced	(ton)	-
Silage equiv. produced	(ton)	-
Animal Unit Month prod.	(AUM)	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** YIELD AND PRICE ****	Year 1 Soybeans
Unit of yield	Bu.
Expected yield	30.0
Optimistic yield	33.0
Pessimistic yield	27.0
Expected price	5.86
Optimistic price	6.76
Pessimistic price	4.96
Price/yield correlation	Negligible
Value other product/acre	-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield	
Expected yield	
Optimistic yield	
Pessimistic yield	
Expected price	
Optimistic price	
Pessimistic price	
Price/yield correlation	
Rev. corr. between crop 1 & 2	
Value other product/acre	

**** NITROGEN ****	Soybeans
Credit green manure (lbs)	-
Credit other sources (lbs)	-
Applied nitrogen (lbs)	-

**** HERBICIDES ****

Treflan	pt	1.50
Blazer	pt	1.50
Sencor	lbs	0.38

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-
Irrigation energy:		
Diesel equivalents	(gal)	-
Electricity	(KWH)	-
Drying:		
LP Gas	(gal)	-
Electricity	(KWH)	-
All Other:		
Diesel equivalents	(gal)	8.9

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** LABOR ****	Year 1 Soybeans
Total labor required (hrs/A)	3.1
Labor allocation in:	
January	-
February	-
March	0.5
April	0.5
May	0.5
June	0.7
July	-
August	-
September	-
October	0.5
November	0.2
December	0.2
**** CASH OPERATING COSTS $ ****	
Seed	6.80
Fertilizer	21.90
Crop chemicals	26.01
Crop insurance	-
Drying fuel	-
Irrigation energy	-
Water assessment	-
Custom hire	-
Direct crop labor	-
Fuel	9.79
Repairs	25.14
Packaging	-
Supplies	-
Miscellaneous	68.04
Operating interest expense	4.40
Total cash operating expense	162.08

SOYBEANS, NO-TILLAGE

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.146
Irrigation system used	Not Irrigated
Tillage system	Low
Input level	Unrestricted
Length of the rotation (yrs)	1

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Soybeans	

**** SUMMARY DATA ****

		Year 1
Excess nitrogen	(lbs)	
With expected yield		-
With optimistic yield		-
Highest chemical rating		
Toxicity		High
Leaching potential		High
Run-off potential		High
Diesel equivalents	(gallons)	4.90
BTU equivalents	(millions)	0.69
Value of exp. yield - Crop 1	($)	176
Value of exp. yield - Crop 2	($)	-
Total return/benefit	($)	175.80
Total cash operating costs	($)	141.64
Return over direct costs	($)	34.16
Total return risk factor	(+/-)	32
Labor requirement	(hours)	2
Corn equivalents produced	(bu)	-
Hay equivalents produced	(ton)	-
Silage equiv. produced	(ton)	-
Animal Unit Month prod.	(AUM)	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

		Year 1
**** YIELD AND PRICE ****		Soybeans
Unit of yield		Bu.
Expected yield		30.0
Optimistic yield		33.0
Pessimistic yield		27.0
Expected price		5.86
Optimistic price		6.76
Pessimistic price		4.96
Price/yield correlation		Negligible
Value other product/acre		-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield	
Expected yield	
Optimistic yield	
Pessimistic yield	
Expected price	
Optimistic price	
Pessimistic price	
Price/yield correlation	
Rev. corr. between crop 1 & 2	
Value other product/acre	

		Soybeans
**** NITROGEN ****		
Credit green manure (lbs)		-
Credit other sources (lbs)		-
Applied nitrogen (lbs)		-

**** HERBICIDES ****

Gramoxone Extra	pt	1.50
Blazer	pt	1.50
Sencor	lbs	0.38
Prowl	pt	1.50

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-
Irrigation energy:		
Diesel equivalents	(gal)	-
Electricity	(KWH)	-
Drying:		
LP Gas	(gal)	-
Electricity	(KWH)	-
All Other:		
Diesel equivalents	(gal)	4.9

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** LABOR ****	Year 1 Soybeans
Total labor required (hrs/A)	1.7
Labor allocation in:	
January	-
February	-
March	-
April	-
May	0.5
June	0.2
July	-
August	-
September	-
October	0.5
November	0.2
December	0.2

**** CASH OPERATING COSTS $ ****

Seed	10.20
Fertilizer	21.90
Crop chemicals	31.82
Crop insurance	-
Drying fuel	-
Irrigation energy	-
Water assessment	-
Custom hire	-
Direct crop labor	-
Fuel	5.39
Repairs	17.52
Packaging	-
Supplies	-
Miscellaneous	50.44
Operating interest expense	4.37
Total cash operating expense	141.64

WHEAT-SOYBEAN, NO-TILLAGE

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.125
Irrigation system used	Not Irrigated
Tillage system	Low
Input level	Unrestricted
Length of the rotation (yrs)	1

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Soybeans	Wheat Winter

**** SUMMARY DATA ****

	Year 1
Excess nitrogen (lbs)	
With expected yield	3
With optimistic yield	-4
Highest chemical rating	
Toxicity	High
Leaching potential	High
Run-off potential	High
Diesel equivalents (gallons)	20.01
BTU equivalents (millions)	2.80
Value of exp. yield - Crop 1 ($)	176
Value of exp. yield - Crop 2 ($)	159
Total return/benefit ($)	334.65
Total cash operating costs ($)	244.50
Return over direct costs ($)	90.15
Total return risk factor (+/-)	32
Labor requirement (hours)	4
Corn equivalents produced (bu)	49
Hay equivalents produced (ton)	-
Silage equiv. produced (ton)	-
Animal Unit Month prod. (AUM)	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** YIELD AND PRICE ****	Year 1 Soybeans
Unit of yield	Bu.
Expected yield	30.0
Optimistic yield	33.0
Pessimistic yield	27.0
Expected price	5.86
Optimistic price	6.76
Pessimistic price	4.96
Price/yield correlation	Negligible
Value other product/acre	-

*** 2nd CROP YIELD AND PRICE *** Wheat Winter

Unit of yield	Bu.
Expected yield	45.0
Optimistic yield	51.0
Pessimistic yield	39.0
Expected price	3.53
Optimistic price	3.54
Pessimistic price	2.63
Price/yield correlation	-
Rev. corr. between crop 1 & 2	-
Value other product/acre	-

**** NITROGEN ****	Soybeans
Credit green manure (lbs)	-
Credit other sources (lbs)	-
Applied nitrogen (lbs)	60

**** HERBICIDES ****

Gramoxone Extra	pt	1.50
Blazer	pt	1.50
Sencor	lbs	0.38
Prowl	qt	1.00

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-
Irrigation energy:		
Diesel equivalents	(gal)	-
Electricity	(KWH)	-
Drying:		
LP Gas	(gal)	-
Electricity	(KWH)	-
All Other:		
Diesel equivalents	(gal)	10.0

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** LABOR ****	Year 1 Soybeans
Total labor required (hrs/A)	3.8
Labor allocation in:	
January	0.1
February	0.1
March	-
April	-
May	0.8
June	0.7
July	0.1
August	0.1
September	0.5
October	0.8
November	0.5
December	0.2
**** CASH OPERATING COSTS $ ****	
Seed	20.30
Fertilizer	50.70
Crop chemicals	26.01
Crop insurance	-
Drying fuel	-
Irrigation energy	-
Water assessment	-
Custom hire	-
Direct crop labor	-
Fuel	10.96
Repairs	33.70
Packaging	-
Supplies	-
Miscellaneous	95.04
Operating interest expense	7.79
Total cash operating expense	244.50

NT CORN - NT SOY/WHEAT TWO YEAR ROTATION

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.060
Irrigation system used	Not Irrigated
Tillage system	Low
Input level	Unrestricted
Length of the rotation (yrs)	2

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Soybeans	Wheat Winter
2	Corn	

**** SUMMARY DATA ****

	Year 1	Year 2
Excess nitrogen (lbs)		
With expected yield	-63	21
With optimistic yield	-71	8
Highest chemical rating		
Toxicity	High	High
Leaching potential	High	High
Run-off potential	High	High
Diesel equivalents (gallons)	10.00	20.37
BTU equivalents (millions)	1.40	2.85
Value of exp. yield - Crop 1 ($)	193	286
Value of exp. yield - Crop 2 ($)	176	-
Total return/benefit ($)	369.88	286.00
Total cash operating costs ($)	244.50	201.60
Return over direct costs ($)	125.38	84.40
Total return risk factor (+/-)	45	54
Labor requirement (hours)	4	2
Corn equivalents produced (bu)	55	110
Hay equivalents produced (ton)	-	-
Silage equiv. produced (ton)	-	-
Animal Unit Month prod. (AUM)	-	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County gprog2

**** YIELD AND PRICE ****		Year 1 Soybeans	Year 2 Corn
Unit of yield		Bu.	Bu.
Expected yield		33.0	110.0
Optimistic yield		36.0	124.0
Pessimistic yield		30.0	96.0
Expected price		5.86	2.60
Optimistic price		6.76	2.96
Pessimistic price		4.96	2.24
Price/yield correlation		Negligible	Negligible
Value other product/acre		-	-

*** 2nd CROP YIELD AND PRICE *** Wheat Winter

Unit of yield	Bu.	
Expected yield	50.0	
Optimistic yield	56.0	
Pessimistic yield	44.0	
Expected price	3.53	
Optimistic price	3.94	
Pessimistic price	3.12	
Price/yield correlation	Negligible	
Rev. corr. between crop 1 & 2	Negligible	
Value other product/acre	-	

**** NITROGEN ****		Soybeans	Corn
Credit green manure (lbs)		-	30
Credit other sources (lbs)		-	-
Applied nitrogen (lbs)		-	90
**** HERBICIDES ****			
Gramoxone Extra	PT	1.50	1.50
Atrazine	QT	-	1.75
Lasso EC	QT	-	2.50
Blazer	PT	1.50	-
Sencor	LBS	0.38	-
Prowl	QT	1.00	-
**** PESTICIDES ****			
Furadan	LB	-	7.00
**** WATER, FUEL & ENERGY ****			
Water applied (inchs/year)		-	-
Irrigation energy:			
Diesel equivalents	(gal)	-	-
Electricity	(KWH)	-	-
Drying:			
LP Gas	(gal)	-	-
Electricity	(KWH)	-	-
All Other:			
Diesel equivalents	(gal)	10.0	5.3

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County gprog2

**** LABOR ****	Year 1 Soybeans	Year 2 Corn
Total labor required (hrs/A)	3.8	2.0
Labor allocation in:		
January	0.1	-
February	0.1	-
March	-	0.8
April	-	0.2
May	0.8	-
June	0.7	-
July	0.1	-
August	0.1	-
September	0.5	0.4
October	0.8	0.4
November	0.5	0.1
December	0.2	0.1
**** CASH OPERATING COSTS $ ****		
Seed	20.30	21.00
Fertilizer	50.70	55.00
Crop chemicals	26.01	36.95
Crop insurance	-	-
Drying fuel	-	-
Irrigation energy	-	-
Water assessment	-	-
Custom hire	-	-
Direct crop labor	-	-
Fuel	10.96	5.81
Repairs	33.70	19.71
Packaging	-	-
Supplies	-	-
Miscellaneous	95.04	54.97
Operating interest expense	7.79	8.16
Total cash operating expense	244.50	201.60

NT COTTON - NT SOYBEANS TWO YEAR ROTATION

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.150
Irrigation system used	Not Irrigated
Tillage system	Low
Input level	Unrestricted
Length of the rotation (yrs)	2

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Soybeans	
2	Cotton	

**** SUMMARY DATA ****

	Year 1	Year 2
Excess nitrogen (lbs)		
With expected yield	-	14
With optimistic yield	-	8
Highest chemical rating		
Toxicity	High	High
Leaching potential	High	Medium
Run-off potential	High	High
Diesel equivalents (gallons)	4.90	16.92
BTU equivalents (millions)	0.69	2.37
Value of exp. yield - Crop 1 ($)	193	415
Value of exp. yield - Crop 2 ($)	-	-
Total return/benefit ($)	193.38	414.70
Total cash operating costs ($)	141.64	280.24
Return over direct costs ($)	51.74	134.46
Total return risk factor (+/-)	35	70
Labor requirement (hours)	2	4
Corn equivalents produced (bu)	-	-
Hay equivalents produced (ton)	-	-
Silage equiv. produced (ton)	-	-
Animal Unit Month prod. (AUM)	-	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County gprog2

**** YIELD AND PRICE ****		Year 1 Soybeans	Year 2 Cotton
Unit of yield		Bu.	Lbs.
Expected yield		33.0	715.0
Optimistic yield		36.0	806.0
Pessimistic yield		30.0	614.0
Expected price		5.86	0.58
Optimistic price		6.76	0.64
Pessimistic price		4.96	0.52
Price/yield correlation		Negligible	Negligible
Value other product/acre		-	-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield	
Expected yield	
Optimistic yield	
Pessimistic yield	
Expected price	
Optimistic price	
Pessimistic price	
Price/yield correlation	
Rev. corr. between crop 1 & 2	
Value other product/acre	

**** NITROGEN ****	Soybeans	Cotton
Credit green manure (lbs)	-	30
Credit other sources (lbs)	-	-
Applied nitrogen (lbs)	-	30

**** HERBICIDES ****

Gramoxone Extra	PT	1.50	1.50
Prowl	PT	1.50	1.50
Blazer	PT	1.50	-
Sencor	LBS	0.38	-
Cotoran	PT	-	6.00

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-	-
Irrigation energy:			
Diesel equivalents	(gal)	-	-
Electricity	(KWH)	-	-
Drying:			
LP Gas	(gal)	-	-
Electricity	(KWH)	-	-
All Other:			
Diesel equivalents	(gal)	4.9	11.9

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County gprog2

**** LABOR ****	Year 1 Soybeans	Year 2 Cotton
Total labor required (hrs/A)	1.7	4.2
Labor allocation in:		
January	-	-
February	-	-
March	-	-
April	-	0.2
May	0.5	1.2
June	0.2	-
July	-	-
August	-	-
September	-	0.9
October	0.5	0.9
November	0.2	0.4
December	0.2	0.5
**** CASH OPERATING COSTS $ ****		
Seed	10.20	9.75
Fertilizer	21.90	48.39
Crop chemicals	31.82	60.92
Crop insurance	-	-
Drying fuel	-	-
Irrigation energy	-	-
Water assessment	-	-
Custom hire	-	-
Direct crop labor	-	-
Fuel	5.39	13.07
Repairs	17.52	36.87
Packaging	-	-
Supplies	-	-
Miscellaneous	50.44	101.94
Operating interest expense	4.37	9.30
Total cash operating expense	141.64	280.24

ANNUAL FALL AND WINTER PASTURE

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.005
Irrigation system used	Not Irrigated
Tillage system	Unrestricted
Input level	Unrestricted
Length of the rotation (yrs)	1

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Pasture Est	

**** SUMMARY DATA ****

	Year 1
Excess nitrogen (lbs)	
With expected yield	-800
With optimistic yield	-
Highest chemical rating	
Toxicity	-
Leaching potential	-
Run-off potential	-
Diesel equivalents (gallons)	2.04
BTU equivalents (millions)	0.29
Value of exp. yield - Crop 1 ($)	40
Value of exp. yield - Crop 2 ($)	-
Total return/benefit ($)	40.00
Total cash operating costs ($)	72.03
Return over direct costs ($)	-32.03
Total return risk factor (+/-)	-
Labor requirement (hours)	1
Corn equivalents produced (bu)	-
Hay equivalents produced (ton)	-
Silage equiv. produced (ton)	-
Animal Unit Month prod. (AUM)	80

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** YIELD AND PRICE ****		Year 1 Pasture Est
Unit of yield		AUM
Expected yield		80.0
Optimistic yield		-
Pessimistic yield		-
Expected price		0.50
Optimistic price		-
Pessimistic price		-
Price/yield correlation		-
Value other product/acre		-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield	
Expected yield	
Optimistic yield	
Pessimistic yield	
Expected price	
Optimistic price	
Pessimistic price	
Price/yield correlation	
Rev. corr. between crop 1 & 2	
Value other product/acre	

**** NITROGEN ****		Pasture Est
Credit green manure	(lbs)	-
Credit other sources	(lbs)	-
Applied nitrogen	(lbs)	-

**** HERBICIDES ****

No Herbicides were selected for use in this rotation.

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-
Irrigation energy:		
Diesel equivalents	(gal)	-
Electricity	(KWH)	-
Drying:		
LP Gas	(gal)	-
Electricity	(KWH)	-
All Other:		
Diesel equivalents	(gal)	2.0

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County GPROGRAM

**** LABOR ****	Year 1 Pasture Est
Total labor required (hrs/A)	1.0
Labor allocation in:	
January	-
February	-
March	-
April	-
May	-
June	-
July	-
August	-
September	0.7
October	0.3
November	-
December	-

**** CASH OPERATING COSTS $ ****

Seed	43.10
Fertilizer	5.60
Crop chemicals	-
Crop insurance	-
Drying fuel	-
Irrigation energy	-
Water assessment	-
Custom hire	-
Direct crop labor	-
Fuel	2.24
Repairs	3.96
Packaging	-
Supplies	-
Miscellaneous	11.92
Operating interest expense	5.21
Total cash operating expense	72.03

WHEAT/SMALL GRAIN COVER CROP

**** RESOURCE MANAGEMENT STRATEGIES ****

C-Factor for this rotation	0.075
Irrigation system used	Not Irrigated
Tillage system	Reduced
Input level	Unrestricted
Length of the rotation (yrs)	1

**** CROP PLAN ****

Year	Primary Crop	Second Crop
1	Wheat Winter	

**** SUMMARY DATA ****

		Year 1
Excess nitrogen	(lbs)	
With expected yield		-
With optimistic yield		-
Highest chemical rating		
Toxicity		-
Leaching potential		-
Run-off potential		-
Diesel equivalents	(gallons)	1.63
BTU equivalents	(millions)	0.23
Value of exp. yield - Crop 1	($)	-
Value of exp. yield - Crop 2	($)	-
Total return/benefit	($)	-
Total cash operating costs	($)	30.49
Return over direct costs	($)	-30.49
Total return risk factor	(+/-)	-
Labor requirement	(hours)	1
Corn equivalents produced	(bu)	-
Hay equivalents produced	(ton)	-
Silage equiv. produced	(ton)	-
Animal Unit Month prod.	(AUM)	-

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County gprog2

		Year 1
**** YIELD AND PRICE ****		Wheat Winter
Unit of yield		Bu.
Expected yield		-
Optimistic yield		-
Pessimistic yield		-
Expected price		-
Optimistic price		-
Pessimistic price		-
Price/yield correlation		-
Value other product/acre		-

*** 2nd CROP YIELD AND PRICE ***

Unit of yield	
Expected yield	
Optimistic yield	
Pessimistic yield	
Expected price	
Optimistic price	
Pessimistic price	
Price/yield correlation	
Rev. corr. between crop 1 & 2	
Value other product/acre	

**** NITROGEN ****		Wheat Winter
Credit green manure	(lbs)	-
Credit other sources	(lbs)	-
Applied nitrogen	(lbs)	-

**** HERBICIDES ****

No Herbicides were selected for use in this rotation.

**** PESTICIDES ****

No Pesticides were selected for use in this rotation.

**** WATER, FUEL & ENERGY ****

Water applied (inchs/year)		-
Irrigation energy:		
Diesel equivalents	(gal)	-
Electricity	(KWH)	-
Drying:		
LP Gas	(gal)	-
Electricity	(KWH)	-
All Other:		
Diesel equivalents	(gal)	1.6

PLANETOR CROP ROTATION BUDGET
Farm: Haywood County gprog2

**** LABOR ****	Year 1 Wheat Winter
Total labor required (hrs/A)	0.7
Labor allocation in:	
January	-
February	-
March	-
April	-
May	-
June	-
July	-
August	-
September	-
October	0.7
November	-
December	-

**** CASH OPERATING COSTS $ ****

Seed	13.50
Fertilizer	-
Crop chemicals	-
Crop insurance	-
Drying fuel	-
Irrigation energy	-
Water assessment	-
Custom hire	-
Direct crop labor	-
Fuel	1.79
Repairs	4.48
Packaging	-
Supplies	-
Miscellaneous	6.64
Operating interest expense	4.08
Total cash operating expense	30.49

PLANETOR FARM SUMMARIES

CONVENTIONAL FARM

Haywood County
PLANETOR Version 1.2
Center For Farm Financial Management
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Ag Extension Service, Univ. of Tennessee
User: LARRY JOHNSON

File: HAYWOOD Date: 05-18-1992

*** FIELD SUMMARY ***

Field	Acres	Year 1	Year 2	Year 3	Year 4
field 1	55.0	Soybeans	Soybeans	Soybeans	Soybeans
field 2	92.0	Cotton	Cotton	Cotton	Cotton
field 3	100.0	Soybeans	Soybeans	Soybeans	Soybeans
field 4	58.0	Corn	Corn	Corn	Corn
field 5	155.0	Cotton	Cotton	Cotton	Cotton

*** ENVIRONMENTAL SUMMARY ***

EROSION		Predicted Average Soil Loss / Year (tons)	Tolerable Soil Loss / Year (tons)	Soil Loss Rating
field 1	55.0	2.1	5.0	Low
field 2	92.0	7.6	5.0	Medium
field 3	100.0	16.1	3.0	*** High ***
field 4	58.0	13.0	3.0	*** High ***
field 5	155.0	16.8	5.0	*** High ***

WATER QUALITY	Year	Crop	Potential Problems
field 1	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
field 2	1	Cotton	High Cotoran runoff, High Treflan runoff
field 3	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Sencor runoff, High Treflan
field 4	1	Corn	Medium Atrazine leaching, High Atrazine runoff, High Lasso EC runoff, Medium Excess Nitrogen
	2	Corn	Medium Atrazine leaching, High Atrazine runoff, High Lasso EC runoff, Medium Excess Nitrogen
field 5	1	Cotton	Medium Treflan leaching, High Treflan runoff

PESTICIDE

Chemical	Label Toxicty	Chemical	Label Toxicty
Atrazine	Caution	Blazer	Danger
Cotoran	Caution	Gramoxone Extra	Danger
Lasso EC	Danger	Prowl	Warning
Sencor	Caution	Treflan	Warning

Haywood County
PLANETOR Version 1.2

*** ECONOMICS ***

PROFITABILITY	Year 1	Year 2	Year 3	Year 4
Income				
Corn equivalents	21468	21468	21468	21468
Soybeans	27249	27249	27249	27249
Cotton	93119	93119	93119	93119
Gross Farm Income	141836	141836	141836	141836
Expense				
Seed	5423	5423	5423	5423
Fertilizer	20573	20573	20573	20573
Crop chemicals	13277	13277	13277	13277
Misc. crop expense	49121	49121	49121	49121
Fuel and Oil	7360	7360	7360	7360
Repairs	18264	18264	18264	18264
Taxes	529	529	529	529
Insurance	1663	1663	1663	1663
Rent	9900	9900	9900	9900
Hired labor	940	940	940	940
Utilities	1200	1200	1200	1200
Miscellaneous	2000	2000	2000	2000
Interest	11360	11360	11360	11360
Total Farm Expense	141610	141610	141610	141610
Profit or Loss	226	226	226	226
Probability of Loss %	0.0	0.0	0.0	0.0
NET WORTH CHANGE				
Profit or Loss	226	226	226	226
Non Farm Income	0	0	0	0
Family Living Exp	18000	18000	18000	18000
Federal Income Tax	0	0	0	0
Social Security Tax	400	400	400	400
Net Worth Change	-18174	-18174	-18174	-18174
Prob of NW Decrease %	0.0	0.0	0.0	0.0

Haywood County
PLANETOR Version 1.2

*** RESOURCES ***

Labor Balance (Hours)	Year 1	Year 2	Year 3	Year 4
January	42	42	42	42
February	93	93	93	93
March	66	66	66	66
April	-24	-24	-24	-24
May	-24	-24	-24	-24
June	-2	-2	-2	-2
July	84	84	84	84
August	44	44	44	44
September	-80	-80	-80	-80
October	-104	-104	-104	-104
November	127	127	127	127
December	63	63	63	63
Labor Available	2400	2400	2400	2400
Labor Needed	2115	2115	2115	2115

ENERGY SUMMARY (Gallons of diesel equivalents)

Irrigation Diesel	0	0	0	0
Irrig Electricity	0	0	0	0
Drying LP Gas	0	0	0	0
Drying Electricity	0	0	0	0
Nitrogen Fertilizer	4201	4201	4201	4201
All Other Diesel	6742	6742	6742	6742
Total Diesel Equiv.	10943	10943	10943	10943

WATER SUMMARY

Inches Per Irrg. Acre	0.0	0.0	0.0	0.0
Total Acre Feet Used	0.0	0.0	0.0	0.0

MANURE SUMMARY (Pounds of nitrogen)

Nitrogen Prod	0	0	0	0
Nitrogen Used	0	0	0	0
Nitrogen Balance	0	0	0	0

Haywood County
PLANETOR Version 1.2

*** PRODUCTION SUMMARY ***

CROP ACRES		Year 1	Year 2	Year 3	Year 4
Corn		58	58	58	58
Cotton		247	247	247	247
Soybeans		155	155	155	155
*Wheat Winter		55	55	55	55
Total Acreage		460	460	460	460
* 2nd Crop Acreage		55	55	55	55
CROP PRODUCTION					
Corn	Bu.	5800	5800	5800	5800
Cotton	Lbs.	160550	160550	160550	160550
Soybeans	Bu.	4650	4650	4650	4650
Wheat Winter	Bu.	2750	2750	2750	2750
CORN EQUIVALENTS (Bushels)					
Produced		8825	8825	8825	8825
Fed		0	0	0	0
Balance		8825	8825	8825	8825

SUSTAINABLE FARM

Haywood County
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File: HAYWOOD1 Date: 05-18-1992

*** FIELD SUMMARY ***

Field	Acres	Year 1	Year 2	Year 3	Year 4
field 1	55.0	Soybeans	Corn	Soybeans	Corn
field 2	92.0	Soybeans	Cotton	Soybeans	Cotton
field 3	100.0	Cotton	Soybeans	Cotton	Soybeans
field 4	58.0	Corn	Soybeans	Corn	Soybeans
field 5	155.0	Cotton	Cotton	Cotton	Cotton

*** ENVIRONMENTAL SUMMARY ***

EROSION		Predicted Average Soil Loss / Year (tons)	Tolerable Soil Loss / Year (tons)	Soil Loss Rating
field 1	55.0	1.0	5.0	Low
field 2	92.0	2.9	5.0	Low
field 3	100.0	6.5	3.0	*** High ***
field 4	58.0	2.6	3.0	Low
field 5	155.0	7.9	5.0	Medium

WATER QUALITY	Year	Crop	Potential Problems
field 1	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
	2	Corn	Medium Atrazine leaching, Medium Furadan leaching, High Atrazine runoff, Medium Furadan runoff, High Gramoxone Extra runoff, High Lasso EC runoff
field 2	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
	2	Cotton	High Cotoran runoff, High Gramoxone Extra runoff, High Prowl runoff
field 3	1	Cotton	High Cotoran runoff, High Gramoxone Extra runoff, High Prowl runoff
	2	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
field 4	1	Corn	Medium Atrazine leaching, Medium Furadan leaching, High Atrazine runoff, Medium Furadan runoff, High Gramoxone Extra runoff, High Lasso EC runoff
	2	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
field 5	1	Cotton	High Cotoran leaching, Medium Gramoxone Extra leaching, Medium Prowl leaching, High Cotoran runoff, High Gramoxone Extra runoff, High Prowl runoff

PESTICIDE

Chemical	Label Toxicty	Chemical	Label Toxicty
Atrazine	Caution	Blazer	Danger
Cotoran	Caution	Furadan	Danger
Gramoxone Extra	Danger	Lasso EC	Danger
Prowl	Warning	Sencor	Caution

Haywood County
PLANETOR Version 1.2

*** ECONOMICS ***

PROFITABILITY	Year 1	Year 2	Year 3	Year 4
Income				
Corn equivalents	22779	22489	22779	22489
Soybeans	28427	30554	28427	30554
Cotton	99905	96587	99905	96587
Gross Farm Income	151111	149630	151111	149630
Expense				
Seed	5759	5761	5759	5761
Fertilizer	19553	20108	19553	20108
Crop chemicals	20283	20017	20283	20017
Misc. crop expense	39051	38759	39051	38759
Fuel and Oil	4769	4723	4769	4723
Repairs	14010	13898	14010	13898
Taxes	529	529	529	529
Insurance	1663	1663	1663	1663
Rent	9900	9900	9900	9900
Hired labor	1890	1890	1890	1890
Utilities	1200	1200	1200	1200
Miscellaneous	2000	2000	2000	2000
Interest	11273	11273	11273	11273
Total Farm Expense	131879	131719	131879	131719
Profit or Loss	19232	17911	19232	17911
Probability of Loss %	14.3	15.5	14.3	15.5
NET WORTH CHANGE				
Profit or Loss	19232	17911	19232	17911
Non Farm Income	0	0	0	0
Family Living Exp	18000	18000	18000	18000
Federal Income Tax	1031	847	1031	847
Social Security Tax	2717	2531	2717	2531
Net Worth Change	-2517	-3467	-2517	-3467
Prob of NW Decrease %	57.9	61.1	57.9	61.1

Haywood County
PLANETOR Version 1.2

*** RESOURCES ***

Labor Balance (Hours)	Year 1	Year 2	Year 3	Year 4
January	155	154	155	154
February	155	154	155	154
March	154	156	154	156
April	133	135	133	135
May	-159	-156	-159	-156
June	183	179	183	179
July	195	194	195	194
August	155	154	155	154
September	-87	-79	-87	-79
October	-111	-109	-111	-109
November	79	80	79	80
December	-3	-0	-3	-0
Labor Available	2400	2400	2400	2400
Labor Needed	1552	1538	1552	1538

ENERGY SUMMARY (Gallons of diesel equivalents)

Irrigation Diesel	0	0	0	0
Irrig Electricity	0	0	0	0
Drying LP Gas	0	0	0	0
Drying Electricity	0	0	0	0
Nitrogen Fertilizer	2935	2849	2935	2849
All Other Diesel	4340	4298	4340	4298
Total Diesel Equiv.	7274	7147	7274	7147

WATER SUMMARY

Inches Per Irrg. Acre	0.0	0.0	0.0	0.0
Total Acre Feet Used	0.0	0.0	0.0	0.0

MANURE SUMMARY (Pounds of nitrogen)

Nitrogen Prod	0	0	0	0
Nitrogen Used	0	0	0	0
Nitrogen Balance	0	0	0	0

Haywood County
PLANETOR Version 1.2

*** PRODUCTION SUMMARY ***

CROP ACRES	Year 1	Year 2	Year 3	Year 4
Corn	58	55	58	55
Cotton	255	247	255	247
Soybeans	147	158	147	158
*Wheat Winter	55	58	55	58
Total Acreage	460	460	460	460
* 2nd Crop Acreage	55	58	55	58

CROP PRODUCTION					
Corn	Bu.	6380	6050	6380	6050
Cotton	Lbs.	172250	166530	172250	166530
Soybeans	Bu.	4851	5214	4851	5214
Wheat Winter	Bu.	2750	2900	2750	2900

CORN EQUIVALENTS (Bushels)				
Produced	9405	9240	9405	9240
Fed	0	0	0	0
Balance	9405	9240	9405	9240

CONVENTIONAL FARM WITH GOVERNMENT PROGRAM PARTICIPATION

Haywood County GPROGRAM
PLANETOR Version 1.2
Center For Farm Financial Management
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User: LARRY JOHNSON

File: HAYWDGP Date: 05-18-1992

*** FIELD SUMMARY ***

Field	Acres	Year 1	Year 2	Year 3	Year 4
field 1	52.2	Soybeans	Soybeans	Soybeans	Soybeans
field 2	92.0	Soybeans	Soybeans	Soybeans	Soybeans
field 3	100.0	Cotton	Cotton	Cotton	Cotton
field 4	55.1	Corn	Corn	Corn	Corn
field 5	139.5	Cotton	Cotton	Cotton	Cotton
field1 sa	2.8	Wheat Winter	Wheat Winter	Wheat Winter	Wheat Winter
field4 sa	2.9	Wheat Winter	Wheat Winter	Wheat Winter	Wheat Winter
field5 sa	15.5	Wheat Winter	Wheat Winter	Wheat Winter	Wheat Winter

*** ENVIRONMENTAL SUMMARY ***

EROSION		Predicted Average Soil Loss / Year (tons)	Tolerable Soil Loss / Year (tons)	Soil Loss Rating
field 1	52.2	2.1	5.0	Low
field 2	92.0	7.2	5.0	Medium
field 3	100.0	16.8	3.0	*** High ***
field 4	55.1	13.0	3.0	*** High ***
field 5	139.5	16.8	5.0	*** High ***
field1 sa	2.8	1.3	5.0	Low
field4 sa	2.9	3.2	3.0	Medium
field5 sa	15.5	3.2	5.0	Low

WATER QUALITY	Year	Crop	Potential Problems
field 1	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
field 2	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Sencor runoff, High Treflan
field 3	1	Cotton	High Cotoran runoff, High Treflan runoff
field 4	1	Corn	Medium Atrazine leaching, High Atrazine runoff, High Lasso EC runoff, Medium Excess Nitrogen
	2	Corn	Medium Atrazine leaching, High Atrazine runoff, High Lasso EC runoff, Medium Excess Nitrogen
field 5	1	Cotton	Medium Treflan leaching, High Treflan runoff

PESTICIDE

Chemical	Label Toxicty	Chemical	Label Toxicty
Atrazine	Caution	Blazer	Danger
Cotoran	Caution	Gramoxone Extra	Danger
Lasso EC	Danger	Prowl	Warning
Sencor	Caution	Treflan	Warning

Haywood County GPROGRAM
PLANETOR Version 1.2

*** ECONOMICS ***

PROFITABILITY	Year 1	Year 2	Year 3	Year 4
Income				
Corn equivalents	22626	22626	22626	22626
Soybeans	25359	25359	25359	25359
Cotton	100266	100266	100266	100266
Gross Farm Income	148251	148251	148251	148251
Expense				
Seed	5464	5464	5464	5464
Fertilizer	19714	19714	19714	19714
Crop chemicals	12701	12701	12701	12701
Misc. crop expense	47255	47255	47255	47255
Fuel and Oil	7103	7103	7103	7103
Repairs	17616	17616	17616	17616
Taxes	529	529	529	529
Insurance	1663	1663	1663	1663
Rent	9900	9900	9900	9900
Hired labor	940	940	940	940
Utilities	1200	1200	1200	1200
Miscellaneous	2000	2000	2000	2000
Interest	11243	11243	11243	11243
Total Farm Expense	137327	137327	137327	137327
Profit or Loss	10924	10924	10924	10924
Probability of Loss %	0.0	0.0	0.0	0.0
NET WORTH CHANGE				
Profit or Loss	10924	10924	10924	10924
Non Farm Income	0	0	0	0
Family Living Exp	18000	18000	18000	18000
Federal Income Tax	0	0	0	0
Social Security Tax	1544	1544	1544	1544
Net Worth Change	-8619	-8619	-8619	-8619
Prob of NW Decrease %	0.0	0.0	0.0	0.0

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*** RESOURCES ***

Labor Balance (Hours)	Year 1	Year 2	Year 3	Year 4
January	46	46	46	46
February	95	95	95	95
March	73	73	73	73
April	-15	-15	-15	-15
May	-11	-11	-11	-11
June	10	10	10	10
July	87	87	87	87
August	47	47	47	47
September	-70	-70	-70	-70
October	-105	-105	-105	-105
November	132	132	132	132
December	67	67	67	67
Labor Available	2400	2400	2400	2400
Labor Needed	2044	2044	2044	2044

ENERGY SUMMARY (Gallons of diesel equivalents)

Irrigation Diesel	0	0	0	0
Irrig Electricity	0	0	0	0
Drying LP Gas	0	0	0	0
Drying Electricity	0	0	0	0
Nitrogen Fertilizer	4040	4040	4040	4040
All Other Diesel	6505	6505	6505	6505
Total Diesel Equiv.	10545	10545	10545	10545

WATER SUMMARY

Inches Per Irrg. Acre	0.0	0.0	0.0	0.0
Total Acre Feet Used	0.0	0.0	0.0	0.0

MANURE SUMMARY (Pounds of nitrogen)

Nitrogen Prod	0	0	0	0
Nitrogen Used	0	0	0	0
Nitrogen Balance	0	0	0	0

Haywood County GPROGRAM
PLANETOR Version 1.2

*** PRODUCTION SUMMARY ***

CROP ACRES		Year 1	Year 2	Year 3	Year 4
Corn		55	55	55	55
Cotton		240	240	240	240
Soybeans		144	144	144	144
Wheat Winter		21	21	21	21
*Wheat Winter		52	52	52	52
Total Acreage		460	460	460	460
* 2nd Crop Acreage		52	52	52	52
CROP PRODUCTION					
Corn	Bu.	5510	5510	5510	5510
Cotton	Lbs.	155675	155675	155675	155675
Soybeans	Bu.	4327	4327	4327	4327
Wheat Winter	Bu.	2351	2351	2351	2351
CORN EQUIVALENTS (Bushels)					
Produced		8096	8096	8096	8096
Fed		0	0	0	0
Balance		8096	8096	8096	8096

SUSTAINABLE FARM WITH GOVERNMENT PROGRAM PARTICIPATION

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*** FIELD SUMMARY ***

Field	Acres	Year 1	Year 2	Year 3	Year 4
field 1	52.0	Soybeans	Corn	Soybeans	Corn
field 2	92.0	Soybeans	Cotton	Soybeans	Cotton
field 3	100.0	Cotton	Soybeans	Cotton	Soybeans
field 4	55.1	Corn	Soybeans	Corn	Soybeans
field 5	139.5	Cotton	Cotton	Cotton	Cotton
field 1 sa	2.8	Wheat Winter	Wheat Winter	Wheat Winter	Wheat Winter
field 4 sa	2.9	Wheat Winter	Wheat Winter	Wheat Winter	Wheat Winter
field 5 sa	15.5	Wheat Winter	Wheat Winter	Wheat Winter	Wheat Winter

*** ENVIRONMENTAL SUMMARY ***

EROSION		Predicted Average Soil Loss / Year (tons)	Tolerable Soil Loss / Year (tons)	Soil Loss Rating
field 1	52.0	1.0	5.0	Low
field 2	92.0	2.9	5.0	Low
field 3	100.0	6.5	3.0	*** High ***
field 4	55.1	2.6	3.0	Low
field 5	139.5	7.9	5.0	Medium
field 1 sa	2.8	1.3	5.0	Low
field 4 sa	2.9	3.2	3.0	Medium
field 5 sa	15.5	3.2	5.0	Low

WATER QUALITY	Year	Crop	Potential Problems
field 1	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
	2	Corn	Medium Atrazine leaching, Medium Furadan leaching, High Atrazine runoff, Medium Furadan runoff, High Gramoxone Extra runoff, High Lasso EC runoff
field 2	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
	2	Cotton	High Cotoran runoff, High Gramoxone Extra runoff, High Prowl runoff
field 3	1	Cotton	High Cotoran runoff, High Gramoxone Extra runoff, High Prowl runoff
	2	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
field 4	1	Corn	Medium Atrazine leaching, Medium Furadan leaching, High Atrazine runoff, Medium Furadan runoff, High Gramoxone Extra runoff, High Lasso EC runoff
	2	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
field 5	1	Cotton	High Cotoran leaching, Medium Gramoxone Extra leaching, Medium Prowl leaching, High Cotoran runoff, High Gramoxone Extra runoff, High Prowl runoff

PESTICIDE

Chemical	Label Toxicty	Chemical	Label Toxicty
Atrazine	Caution	Blazer	Danger
Cotoran	Caution	Furadan	Danger
Gramoxone Extra	Danger	Lasso EC	Danger
Prowl	Warning	Sencor	Caution

Haywood County gprog2
PLANETOR Version 1.2

*** ECONOMICS ***

PROFITABILITY	Year 1	Year 2	Year 3	Year 4
Income				
Corn equivalents	24937	24597	24937	24597
Soybeans	27847	29993	27847	29993
Cotton	104036	100718	104036	100718
Gross Farm Income	156819	155309	156819	155309
Expense				
Seed	5772	5774	5772	5774
Fertilizer	18491	19046	18491	19046
Crop chemicals	19329	19062	19329	19062
Misc. crop expense	37167	36879	37167	36879
Fuel and Oil	4554	4509	4554	4509
Repairs	13376	13264	13376	13264
Taxes	529	529	529	529
Insurance	1663	1663	1663	1663
Rent	9900	9900	9900	9900
Hired labor	940	940	940	940
Utilities	1200	1200	1200	1200
Miscellaneous	2000	2000	2000	2000
Interest	11151	11151	11151	11151
Total Farm Expense	126072	125916	126072	125916
Profit or Loss	30748	29392	30748	29392
Probability of Loss %	6.4	4.6	6.4	4.6
NET WORTH CHANGE				
Profit or Loss	30748	29392	30748	29392
Non Farm Income	0	0	0	0
Family Living Exp	18000	18000	18000	18000
Federal Income Tax	2636	2447	2636	2447
Social Security Tax	4344	4153	4344	4153
Net Worth Change	5767	4792	5767	4792
Prob of NW Decrease %	34.1	34.7	34.1	34.7

Haywood County gprog2
PLANETOR Version 1.2

*** RESOURCES ***

Labor Balance (Hours)	Year 1	Year 2	Year 3	Year 4
January	155	155	155	155
February	155	155	155	155
March	156	158	156	158
April	137	139	137	139
May	-138	-135	-138	-135
June	185	181	185	181
July	195	195	195	195
August	155	155	155	155
September	-69	-62	-69	-62
October	-109	-107	-109	-107
November	88	88	88	88
December	6	8	6	8
Labor Available	2400	2400	2400	2400
Labor Needed	1486	1471	1486	1471

ENERGY SUMMARY (Gallons of diesel equivalents)

Irrigation Diesel	0	0	0	0
Irrig Electricity	0	0	0	0
Drying LP Gas	0	0	0	0
Drying Electricity	0	0	0	0
Nitrogen Fertilizer	2735	2648	2735	2648
All Other Diesel	4145	4103	4145	4103
Total Diesel Equiv.	6880	6751	6880	6751

WATER SUMMARY

Inches Per Irrg. Acre	0.0	0.0	0.0	0.0
Total Acre Feet Used	0.0	0.0	0.0	0.0

MANURE SUMMARY (Pounds of nitrogen)

Nitrogen Prod	0	0	0	0
Nitrogen Used	0	0	0	0
Nitrogen Balance	0	0	0	0

Haywood County gprog2
PLANETOR Version 1.2

*** PRODUCTION SUMMARY ***

CROP ACRES		Year 1	Year 2	Year 3	Year 4
Corn		55	52	55	52
Cotton		240	231	240	231
Soybeans		144	155	144	155
Wheat Winter		21	21	21	21
*Wheat Winter		52	55	52	55
Total Acreage		460	460	460	460
* 2nd Crop Acreage		52	55	52	55
CROP PRODUCTION					
Corn	Bu.	6061	5720	6061	5720
Cotton	Lbs.	162175	156455	162175	156455
Soybeans	Bu.	4752	5118	4752	5118
Wheat Winter	Bu.	2600	2755	2600	2755
CORN EQUIVALENTS (Bushels)					
Produced		8921	8750	8921	8750
Fed		0	0	0	0
Balance		8921	8750	8921	8750

INTEGRATED FARM MANAGEMENT SYSTEM

Haywood County GPROGRAM
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User: LARRY JOHNSON

File: HAYIFMPO Date: 05-18-1992

*** FIELD SUMMARY ***

Field	Acres	Year 1	Year 2	Year 3	Year 4
field 1	52.2	Soybeans	Soybeans	Soybeans	Soybeans
field 2	92.0	Soybeans	Soybeans	Soybeans	Soybeans
field 3	100.0	Cotton	Cotton	Cotton	Cotton
field 4	29.0	Corn	Corn	Corn	Corn
field 5	77.5	Cotton	Cotton	Cotton	Cotton
field1 sa	2.8	Wheat Winter	Wheat Winter	Wheat Winter	Wheat Winter
field4 sa	2.9	Wheat Winter	Wheat Winter	Wheat Winter	Wheat Winter
field5 sa	15.5	Wheat Winter	Wheat Winter	Wheat Winter	Wheat Winter
field4 ofa	14.5	Soybeans	Soybeans	Soybeans	Soybeans
field 4 rcc paid	11.6	Pasture Est	Pasture Est	Pasture Est	Pasture Est
field 5 ofa	38.8	Soybeans	Soybeans	Soybeans	Soybeans
field 5 rcc paid	23.3	Pasture Est	Pasture Est	Pasture Est	Pasture Est

*** ENVIRONMENTAL SUMMARY ***

EROSION		Predicted Average Soil Loss / Year (tons)	Tolerable Soil Loss / Year (tons)	Soil Loss Rating
field 1	52.2	2.1	5.0	Low
field 2	92.0	2.8	5.0	Low
field 3	100.0	7.9	3.0	*** High ***
field 4	29.0	2.9	3.0	Medium
field 5	77.5	7.9	5.0	Medium
field1 sa	2.8	1.3	5.0	Low
field4 sa	2.9	3.2	3.0	Medium
field5 sa	15.5	3.2	5.0	Low
field4 ofa	14.5	6.3	3.0	*** High ***
field 4 rcc paid	11.6	0.2	3.0	Low
field 5 ofa	38.8	6.3	5.0	Medium
field 5 rcc paid	23.3	0.2	5.0	Low

WATER QUALITY	Year	Crop	Potential Problems
field 1	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
field 2	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
field 3	1	Cotton	High Cotoran runoff, High Gramoxone Extra runoff, High Prowl runoff
field 4	1	Corn	Medium Atrazine leaching, Medium Furadan leaching, High Atrazine runoff, Medium Furadan runoff, High Gramoxone Extra runoff, High Lasso EC runoff, Medium Excess Nitrogen
field 5	1	Cotton	High Cotoran leaching, Medium Gramoxone Extra leaching, Medium Prowl leaching, High Cotoran runoff, High Gramoxone Extra runoff, High Prowl runoff
field4 ofa	1	Soybeans	Medium Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff
field 5 ofa	1	Soybeans	High Blazer leaching, Medium Gramoxone Extra leaching, Medium Prowl leaching, High Sencor leaching, High Blazer runoff, High Gramoxone Extra runoff, High Prowl runoff, High Sencor runoff

PESTICIDE

Chemical	Label Toxicty	Chemical	Label Toxicty
Atrazine	Caution	Blazer	Danger
Cotoran	Caution	Furadan	Danger
Gramoxone Extra	Danger	Lasso EC	Danger
Prowl	Warning	Sencor	Caution

*** ECONOMICS ***

PROFITABILITY	Year 1	Year 2	Year 3	Year 4
Income				
Corn equivalents	15840	15840	15840	15840
AUM equivalents	2510	2510	2510	2510
Soybeans	34721	34721	34721	34721
Cotton	72459	72459	72459	72459
Gross Farm Income	125529	125529	125529	125529
Expense				
Seed	6669	6669	6669	6669
Fertilizer	16436	16436	16436	16436
Crop chemicals	15858	15858	15858	15858
Misc. crop expense	32537	32537	32537	32537
Fuel and Oil	3960	3960	3960	3960
Repairs	11654	11654	11654	11654
Taxes	529	529	529	529
Insurance	1663	1663	1663	1663
Rent	9900	9900	9900	9900
Hired labor	940	940	940	940
Utilities	1200	1200	1200	1200
Miscellaneous	2000	2000	2000	2000
Interest	11243	11243	11243	11243
Total Farm Expense	114589	114589	114589	114589
Profit or Loss	10940	10940	10940	10940
Probability of Loss %	0.0	0.0	0.0	0.0
NET WORTH CHANGE				
Profit or Loss	10940	10940	10940	10940
Non Farm Income	0	0	0	0
Family Living Exp	18000	18000	18000	18000
Federal Income Tax	0	0	0	0
Social Security Tax	1546	1546	1546	1546
Net Worth Change	-8606	-8606	-8606	-8606
Prob of NW Decrease %	0.0	0.0	0.0	0.0

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*** RESOURCES ***

Labor Balance (Hours)	Year 1	Year 2	Year 3	Year 4
January	155	155	155	155
February	155	155	155	155
March	178	178	178	178
April	153	153	153	153
May	-84	-84	-84	-84
June	171	171	171	171
July	195	195	195	195
August	155	155	155	155
September	-27	-27	-27	-27
October	-73	-73	-73	-73
November	99	99	99	99
December	26	26	26	26
Labor Available	2400	2400	2400	2400
Labor Needed	1298	1298	1298	1298

ENERGY SUMMARY (Gallons of diesel equivalents)

Irrigation Diesel	0	0	0	0
Irrig Electricity	0	0	0	0
Drying LP Gas	0	0	0	0
Drying Electricity	0	0	0	0
Nitrogen Fertilizer	2892	2892	2892	2892
All Other Diesel	3600	3600	3600	3600
Total Diesel Equiv.	6491	6491	6491	6491

WATER SUMMARY

Inches Per Irrg. Acre	0.0	0.0	0.0	0.0
Total Acre Feet Used	0.0	0.0	0.0	0.0

MANURE SUMMARY (Pounds of nitrogen)

Nitrogen Prod	0	0	0	0
Nitrogen Used	0	0	0	0
Nitrogen Balance	0	0	0	0

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*** PRODUCTION SUMMARY ***

CROP ACRES	Year 1	Year 2	Year 3	Year 4
Corn	29	29	29	29
Cotton	177	177	177	177
Pasture Est	35	35	35	35
Soybeans	198	198	198	198
Wheat Winter	21	21	21	21
*Wheat Winter	52	52	52	52
Total Acreage	460	460	460	460
* 2nd Crop Acreage	52	52	52	52

CROP PRODUCTION					
Corn	Bu.	2900	2900	2900	2900
Cotton	Lbs.	115375	115375	115375	115375
Pasture Est	AUM	13715	13715	13715	13715
Soybeans	Bu.	5925	5925	5925	5925
Wheat Winter	Bu.	2351	2351	2351	2351

CORN EQUIVALENTS (Bushels)				
Produced	5486	5486	5486	5486
Fed	0	0	0	0
Balance	5486	5486	5486	5486

PASTURE (AUMS)				
Produced	13715	13715	13715	13715
Fed	0	0	0	0
Balance	13715	13715	13715	13715

VITA

Nancy Lynne Graham was born in Loudon, Tennessee on October 21, 1967. She was raised on Grahaven Farms, a former dairy and current row-crop operation located in Newport, Tennessee. After graduating valedictorian from Cocke County High School, she enrolled in Furman University in Greenville, South Carolina where she obtained a Bachelor of Arts in June of 1989 majoring in political science. While at Furman, she also achieved a South Carolina Teaching Certificate in social studies for secondary education. After graduation from Furman, she was employed shortly by Tennessee Truck Lines. In January 1990, she entered The University of Tennessee, Knoxville and in August 1992, received a Master of Science degree in agricultural economics.

In the fall of 1992, she completed a United States Department of Agriculture internship in Ireland working in the agribusiness industry. She is presently employed by the Tennessee Agriculture Extension Service at the University of Tennessee, Knoxville as an Extension Assistant.