PRODUCTION PRACTICES AND ECONOMIC PERFORMANCE FOR ORGANIC COTTON NORTHERN SAN JOAQUIN VALLEY - 1995

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Abstract

Many of the production practices for organically grown cotton are similar to that of the conventionally grown crop. Differences are seen primarily in soil fertility and pest management, and in boll maturation and defoliation. Harvest and ginning practices are somewhat modified. Yields range from 1.3 to 2.5 (500 pound) bales cotton lint per acre. Returns range from $1.00 to $1.50 per pound lint with an organic premium. Cost calculations indicate that growers must receive a price premium for the crop to remain economically viable.

Background

This paper is part of a larger study entitled *Production Practices and Sample Costs for Organic Cotton - Northern San Joaquin Valley - 1995*. The complete study is one of a series of reports from the project Practices and Performance of California's Organically Grown Crops. The project was undertaken to document the production practices and associated costs for a variety of organically produced commodities in California. Overall goals include assessment of the economic viability of alternative farming systems, dissemination of information to growers, researchers, policy-makers, and industry, and identification of areas where further research is necessary.

Introduction

The California cotton production industry ranks second in cotton production in the nation with over one million acres of irrigated cropland. Cotton is the fifth largest contributor to total farm income in the state, and regularly has a gross value of approximately $1 billion in seed and lint.

In recent years California's organic agricultural industry has expanded considerably. The production of organic cotton has likewise increased. Several San Joaquin Valley growers now devote a portion of their acreage to the production of organic cotton, with a substantial number of those acres located in the Northern San Joaquin Valley. Crops rotated with organic cotton include alfalfa, dried beans, leguminous green manure crops (bell beans, peas, and vetch), processing tomatoes, oats, and wheat.

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Materials and Methods

Grower interviews served as the basis of information for *Production Practices and Sample Costs for Organic Cotton - Northern San Joaquin Valley - 1995*. The report was further developed in cooperation with extension specialists, farm advisors, researchers, and industry representatives. The larger study consists of two distinct parts: a narrative and an economic analysis. The narrative details the range of approaches possible for organic production of cotton, with sections on production and ginning practices, crop rotation and diversification, cover crops, pest management, grower risk and marketing, and state and federal organic regulation. A summary of the narrative section is included here.

The complete economic analysis is a cost and returns estimate for a hypothetical farm. Enterprise budgets are generated in several formats: costs per acre by operation, costs per acre by input, monthly cash costs, investment, and business overhead, and a profitability ranging analysis. Summary tables for cash costs per acre and net returns per acre above cash costs are presented after the references.

Results and Discussion

Many of the production practices for organically grown cotton are similar to that of the conventionally grown crop. Production differences are seen primarily in soil fertility and pest management, and in boll maturation and defoliation techniques. Harvest and ginning practices are somewhat modified.

Soil Fertility

Organic growers manage soil fertility using a number of different strategies. Composted animal manures are spread and incorporated into soils to provide organic matter, nitrogen, phosphorus, potassium, and other nutrients. Cover or green manure crops have also been successfully managed and rotated on a small scale in the short winter between production seasons. Grasses such as barley and wheat, and legumes such as bell beans, winter peas, and vetch are typically planted. In addition, crop rotation and diversification assist in nutrient cycling and organic matter management. Organic matter is particularly important for improving soil structure, and for providing nitrogen and other nutrients for crop production.

Pest Management

Pest identification, monitoring, and prevention are essential elements of successful cotton production. This is especially true for organic production because most of the pesticides that are currently used by producers of conventionally grown cotton are not approved for use by growers of organic cotton. Moreover, allowed pest control products

are generally not as effective as synthetic pesticides for immediate or acute problems.

Insect and mite pests are managed by monitoring the level of natural predators, parasites and parasitoids, and by the release of biological control agents to augment that which already exists in the field. Natural predators, parasites and parasitoids found in Northern San Joaquin Valley cotton fields include: assassin bugs (Family *Reduviidae*), bigeyed bugs (*Geocoris* spp.), minute pirate bugs (*Orius* spp.) and various spiders and parasitic wasps. Green lacewings larvae (*Chrysopa* spp.) are often released to help reduce populations of lygus bugs, mites and other soft-bodied insects such as aphids. Predaceous mites and beneficial wasps of the genus *Trichogramma* have also been released to help reduce populations of various insects and caterpillars.

Other strategies used for arthropod management include: plant neighboring trap crops or habitats to attract beneficial insects, crop rotation and diversification, water management, and the use of organically acceptable pesticides. For example, sulfur dust is sometimes used to control mites in fields or field perimeters.

Weeds are managed primarily with mechanical cultivations, and hand chopping and hoeing. Growers report greater difficulty in managing weeds in organic cotton acreages than in conventional cotton acreages. Furthermore, greater difficulty is encountered in managing perennial weeds over annual weeds. Perennial weeds are sometimes managed by rotating land with known problems out of cotton and into a winter wheat (or other grain) crop. By spring, the grain crop is established and has the potential to suppress germination of perennial weeds by excluding sunlight. Because the overwintered grain crop is not irrigated in the spring, weeds must also compete with the established crop for water. In some cases, fields may be fallowed over the winter and cultivated multiple times in the spring and early summer to reduce perennial weed growth. In contrast, herbicides, mechanical cultivations and hand hoeing are used to control annual and perennial weeds in conventional fields.

Boll Maturation and Defoliation

The synthetic growth regulators and defoliants used for conventionally grown cotton are not approved for use in organic cotton production. Growers instead rely on nutrient and water management to assist in boll maturation, opening and plant defoliation. For example, growers supply only enough nitrogen to insure fruit set and boll development on a yearly basis. Overfertilization or excessive soil nitrogen promotes vegetative growth and discourage boll maturation. Zinc sulfate is foliar-applied to assist in boll maturation and opening. A soil or plant deficiency in either zinc or sulfur must be demonstrated before this material can be applied. Also, water is cut off early in the season in an attempt to stress plants and aid in defoliation.

While helpful, these techniques do not always achieve the same results as the synthetically formulated materials. In cases where a low level of defoliation is attained, harvest may be slowed and cotton grades reduced, with trash levels and ginning costs increased.

Harvest and Ginning

Organically grown cotton is best harvested with a low moisture content so that, if necessary, cotton can be stored for a period of time prior to ginning without reducing grade or quality. To achieve this, harvest of organic cotton often begins later and is finished earlier in the day than is typical for conventionally grown cotton.

Low moisture content, and the potential for storage is particularly important because state law and certification agency regulations require organic and conventional cotton to remain separated at the gin if the product is to be sold on the organic market. Gins must shut down and clean out their machinery prior to processing organic cotton in order to meet these regulations. Consequently, a gin may not be immediately available to accept and gin the organic seed cotton, resulting in the need for storage. Cotton that is harvested at a relatively high moisture content, and not ginned promptly, may have lower grades due to lint staining caused by leaf trash. In addition, decomposition of seed cotton can occur.

Yields

Yields for organically produced cotton in the Northern San Joaquin Valley range from 1.3 to 2.5 (500 pound) bales per acre for cotton lint, and 1,100 to 1,500 pounds per acre for cottonseed. This yield range is somewhat lower than the five year average for conventionally grown cotton in the same area.

Costs and Returns

Cash costs are summarized in Table 1. Cultural costs include land pre-paration, planting, irrigation, and fertility and pest management. Labor, fuel, and repair costs are also included in this category. Ownership costs of durable (tractors, equipment, and irrigation system) are not included. Business overhead includes land rent, office expenses, soil analyses, sanitation services, liability and property insurance, and investment repairs. Assessment fees are paid to both state and certification agencies to comply with organic farming regulations. For various other purposes fees are also paid to the National Cotton Council, Cotton Incorporated, USDA High Volume Instrumentation, California Cotton Growers and Ginners Association and the California Department of Food and Agriculture Pink Bollworm Project.

Returns to organic growers usually range from $1.00 to $1.50 per pound lint which includes an organic premium. However, price premiums are not guaranteed, nor are all bales necessarily sold at one set price. At present the market for organic cotton is volatile, that is, demand and

price vary significantly from year to year. If a market for organic cotton lint is unavailable in any given year, lint is sold on the conventional market without receiving a premium. For 1995, the preliminary price is estimated to be $0.815 per pound lint.

Net returns per acre above cash costs are summarized in Table 2. With an estimated price premium of $1.00 per pound for organic cotton lint, net returns are positive at a yield of 850 pounds lint per acre. All yield and price combinations above this level are also positive. However, cost calculations indicate that growers must receive a price premium for the crop to remain economically viable.

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Note

To request a copy of the complete study, contact the Department of Agricultural Economics, University of California, Davis, CA 95616, telephone (916) 752-9376.

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Table 1. Cash Costs Per Acre for Organic Cotton

Cost Category	$/Acre
Cultural	464
Business Overhead	181
Harvest and Gin	194
Assessments	24
Total	863

Table 2. Net Returns Per Acre Above Cash Costs for Organic Cotton

Price	Yield (lb/Acre)				
$/lb Lint	650	850	925	1050	1250
1.00	-133	32	96	198	1250
1.30	94	326	415	558	789
1.50	246	522	628	797	1073