Soybean Production Systems Utilized in the Soybean Research Verification Program in Lonoke County

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INTRODUCTION

During the last decade acreage planted to soybeans in Arkansas has decreased by 38%. Farmers cite the difficulty of producing soybeans profitably as the major reason for this acreage shift. In 1983 soybean workers from the Arkansas Cooperative Extension Service and the Arkansas Agricultural Experiment Station initiated an Arkansas Soybean Promotion Board-funded project entitled the "Soybean Research Verification Programs" (SRVP). One of the objectives of the SRVP was to demonstrate and give needed assurance and validity to farmers that soybeans can be produced more profitably by implementing all research-based recommendations. Another objective was to develop an on-the-farm data base for use in economic analyses. After eight years and 83 full-season irrigated trials, the average yield is 44.3 bu/acre with an average specified operating cost of $104.36/acre. Beginning in 1988 the SRVP included dryland production systems in the program (Lorenz et al., 1989, 1990). Typically, 20-25% or more of the specified operating costs for both irrigated and dryland fields relates to tillage practices. With the advent of both improved planting equipment and herbicides, soybean production systems utilizing reduced tillage can be used with improved opportunity for success. Beginning in 1985 the SRVP included full-season soybean fields that were seeded by grain drills instead of conventional row planters. This paper focuses on the agronomic and economic results of different tillage programs from selected SRVP fields that typified soybean production in Lonoke County, Arkansas.

MATERIALS AND METHODS

Production practices were conducted according to research-generated Extension recommendations. Preplant tillage operations were performed as necessary to prepare an adequate seedbed for planting and varied depending on previous crop residue and field condition. Cultivar selection was made utilizing the Extension computerized variety selection program, "SOYVA." In irrigated fields the water was applied when tensiometers read 50 centibars at the 10- to 12-in. depth for both silt loam and clay soils. Soybeans were harvested with the cooperating farmers' combine, and all yields were adjusted to 13% moisture. Harvest loss measurements were determined for each trial as well. Combine adjustments were made whenever harvest loss exceeded 5%.

RESULTS AND DISCUSSION

The date in Table 1 show selected field operations and agronomic measurements from Lonoke County SRVP trials for four years (Ashlock et al., 1985, 1986; Lorenz et al., 1989, 1990). The data in Table 2 show the yields, specified operating and ownership costs, breakeven prices and net returns above specified operation and ownership costs from different production systems commonly used in Lonoke County on the SRVP trials. Field number 1 had higher specified operating costs since the soybean crop followed a rice crop. The irrigated yield of 46 bu/acre for that field is considered good by producers in that area of the county (compared with typical irrigated yields of approximately 36 bu/acre). A final breakeven price of $6.40 makes it difficult to raise a profitable soybean crop following rice, as reflected in the net loss of $41.57/acre for that field. SRVP field 2 is on the same location as field 1 but was planted the following year (1986). Conventional 30-in. rows were used in 1986. Although yields were slightly lower, the reduction in preplant tillage trips (soybeans following soybeans) and weed control cost (data not shown) resulted in lower total specified operating costs with a net return to management of $26.30/acre greater than the preceding year. This reduction in economic loss was accomplished in spite of a 22-cent lower average soybean price in 1986.

Fields 3 through 6 represent the SRVP dryland trials. These fields include both early-season soybean production (ESSP), in which varieties from

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maturity groups III. and IV. are planted in April or early May, and conventional production, in which varieties from maturity groups V, VI or VII are planted in May or June.

Although the highest net return per acre was by a conventional variety with preplant tillage (field 4), the conventional variety planted on a stale seedbed (field 6) showed considerable promise in terms of net returns per acre. Field 5 was an early-season cultivar and indicated the potential of growing early-season soybeans on a stale seedbed. The data in Table 2 from the ESSP fields (3 and 5) indicate that this production system is comparable to other production systems (fields 1, 2, 4, and 6).

CONCLUSION

The yields obtained and specified operating costs incurred will vary depending on a host of factors, including previous crop, environmental conditions, row width, pest problems, etc., but these data indicate that reduced tillage production systems can be utilized with results equal to or possibly better than those of conventional production.

LITERATURE CITED

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Table 1. A summary of specific operations and agronomic data for selected Soybean Research Verification Program fields in Lonoke County.

	Field number/year					
Operation	1/1985	2/1986	3/1989	4/1989	5/1990	6/ 1990
Field size (acres)	42	42	45	15	17	17
Previous crop	rice	soybeans	soybeans	soybeans	soybeans	soybeans
Spring preplant tillage trips	6	5	6	5	0	0
Fertilizer required	Yes	Yes	no	no	no	no
Lime required	no	no	yes	Yes	no	no
Cultivar	A5474	Forrest	Fayette	Uoyd	A4715	Hartz 6686
Planting Date	5/20	5/16	4/3	5/25	5/9	5/9
Plant population'	—	—	157,653	115,434	137,400	97,076
Row spacing (in.)	13	30	7	24	7	7
Herbicide applied	yes	yes	Yes	Yes	Yes	Yes
Number of cultivations	0	1	0	2	0	0
Harvest date	---	11/16	8/21	10/26	9/17	11/1

[1]Average number of plants per acre

Table 2. A summary of yields and specified costs and returns from selected Soybean Research Verificatlon Program fields in Lonoke County.

	Field number/year					
costs	1/1985	2/1986	3/1989	4/1989	5/1990	6/1990
Yield[1] (bu/acre)	46	44.5	38	38	23	36
Total specified operating cost[2] ($/acre)	141.61	116.41	101.76	71.88	90.54	92.60
Total specified ownership cost' ($/acre)	79.02	64.73	31.66	36.93	21.a5	21.84
Breakeven price[4] ($/bu)	4.80	4.07	3.51	2.86	4.89	3.18
Final breakeven price[5] ($/bu)	6.40	5.34	4.68	3.82	6.52	4.24
Average annual selling price[6] ($/bu)	5.19	4.97	5.85	5.85	6.07	6.07
Net returns[7] ($/acre)	(41.57)	(15.27)	33.30	57.91	(7.68)	49.45

[1]Yields adjusted to 13% moisture.
[2]Includes those expenditures that would require an annual cash outlay.
[3]Includes depreciation, interest, taxes, insurance and miscellaneous costs.
[4]Price required by the farmer to equal total specified operating and ownership costs.
[5]Breakeven price plus a land charge of 25%.
[6]Based on Arkansas Agricultural Statistics Service annual reports.
[7]Net returns to overhead, risk and management above total specified operating and ownership costs plus a land charge of 25% based on the average annual selling price.