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Relationships between characteristics of soybean production in Tennessee, the number of contacts the producer had with extension and their use of certain production practices

Stephen Levon Officer

To the Graduate Council:

I am submitting herewith a thesis written by Stephen Levon Officer entitled "Relationships between characteristics of soybean production in Tennessee, the number of contacts the producer had with extension and their use of certain production practices." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Extension.

Cecil E. Carter Jr., Major Professor

We have read this thesis and recommend its acceptance:

Roy Lessly, John Jared

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

To the Graduate Council:

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RELATIONSHIPS BETWEEN CHARACTERISTICS OF SOYBEAN PRODUCTION IN TENNESSEE, THE NUMBER OF CONTACTS THE PRODUCER HAD WITH EXTENSION AND THEIR USE OF CERTAIN PRODUCTION PRACTICES

A Thesis

Presented for the

Master of Science

Degree

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Stephen Levon Officer

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ABSTRACT

The major purpose of this study was to obtain information that might be useful in developing Extension plans and programs for the soybean producers of Tennessee, characterize soybean production in Tennessee, and identify variables related to the use of soybean production practices. A total of 965 soybean producers located in Tennessee provided survey data in 1982. Tennessee County Extension agents conducted personal interviews with the producers. The "nth" number method of sampling was used to select the producers to be surveyed. According to the guidelines of the survey, producers interviewed must have grown at least 25 acres of soybeans in 1982. Information was obtained regarding the general production practices and the number of contacts the producer had with Extension agents over a 12 month period.

The data were coded and computations were made by the University of Tennessee Computing Center. Chi-Square and a one-way analysis of variance F test were used to determine the strength of relationship between the dependent and independent variables. Chi-Square and F values which achieved the .05 probability level were accepted as significant.

Findings indicated that the disk was the major equipment used in seedbed preparation. Over one-half of the producers used an inoculant and molybdenum on seed at planting, planted certified seed, fertilized and limed according to soil test, planted disease free

seed and used crop rotation to control disease, used crop rotation to control cyst nematodes, and used chemicals to control weeds. The yield per acre which soybean producers had was significantly influenced by 38 out of 54 production practices. Producers fertilizing and liming by soil test had higher yield per acre than those not using soil test. There was a significant relationship between size and fertilization practices and harvesting, storing, and marketing practices. The number of contacts soybean producers had with Extension was significantly related to the use of 22 of the production practices.

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CHAPTER I

THE PROBLEM AND ITS SETTING

I. INTRODUCTION

Soybean production ranked second in cash received by agricultural producers from 1983 crop sales in Tennessee. Cash receipts from soybeans produced in 1983 were $209,060,000 totaling 11 percent of the state's agricultural receipts (10:80).* Tennessee soybean producers have received an average of $349 million per year over the last five years (1979-1983) from the sale of soybeans for seed. The soybean industry in Tennessee made tremendous growth from the early sixties to the late seventies. In 1957 there was 187,000 acres harvested (11). There was a total of 2,620,000 acres harvested in 1979 (10). Soybeans was the number one cash crop from 1973 to 1982.

The demand for soybeans stem from the worldwide demand for soybean oil and meal. Soybean oil is the most widely used edible oil in the world. Soybean meal is used mainly as a high-protein feed supplement for poultry, hogs, beef cattle, and dairy cattle. Soybeans make a major contribution toward supporting the value of the U.S. dollar and aiding the U.S. balance of payment since it is the leading dollar earner in the agricultural export market.

In Tennessee the Agricultural Extension Service has played an important role in Tennessee's agricultural industry. The Extension

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*Numbers in parenthesis refer to alphabetically numbered references in the Bibliography; those after the colon are page numbers.

Service has a responsibility to its soybean producers to supply updated information. Through the local county Extension agent, producers learn the latest in agriculture research and how to apply practical information. Extension agents disseminate information concerning soybean production using four main types of Extension contact methods (i.e., meetings, farm visits, office visits, and telephone calls). The use of this information will vary among soybean producers.

This study was conducted to characterize soybean production practices, yields, and study the relationship between the contacts the producer had with Extension agents and use of recommended practices.

II. NEED FOR THE STUDY

The purpose of the Agricultural Extension Service is to provide educational information to farmers and homemakers. Like most government agencies, the Extension Service is striving for increased accountability to taxpayers, legislators, and others.

To conduct an educational program, it is first necessary to know what areas need emphasis and improvement. This study was needed to assist county Extension agents in determining priorities and direction for future educational programs for soybean producers.

III. PURPOSE AND OBJECTIVE OF THE STUDY

The overall objective of this study was to obtain information that might be useful in developing plans and programs for the soybean producers of Tennessee. Furthermore, the purpose of this study was

to characterize soybean production practice in Tennessee and to identify variables related to the use of various soybean production practices.

The specific objectives of this study were:

1. To characterize soybean production in Tennessee.

2. To determine the relationships between use of selected soybean production practices and yield per acre of soybeans harvested for grain.

3. To determine the relationships between the number of acres harvested and production practices used by Tennessee soybean producers.

4. To determine the relationships between the number of Extension contacts and production practices used by Tennessee soybean producers.

IV. LIMITATION OF THE STUDY

This study was limited to the analysis of data from the 1982 Tennessee Agriculture Extension Service Soybean Production Survey conducted in the fall of 1982. The data were obtained by Extension agents through personal interviews with 965 soybean producers in the major soybean producing counties of Tennessee. The number of producers interviewed varied from county to county, depending on the number of soybean producers in the county.

V. METHOD OF INVESTIGATION

Population and Sample

The population of this study included soybean producers in Tennessee. Data were obtained through personal interviews by Extension

agents using interview schedules developed by Specialist at the University of Tennessee. The "nth" number technique was used to identify producers to be surveyed. The recommended sample size for each county was as follows:

1. Counties with under 25,000 acres would interview 20 producers.

2. Counties with 25,000 to 75,000 acres would interview 25 producers.

3. Counties with over 75,000 acres would interview 30 producers.

Each producer surveyed was to have grown at least 25 acres of soybeans. Completed surveys were returned to the Agricultural Extension Education Office.

Survey Instrument

The 1982 Soybean Production Survey was developed by The University of Tennessee Agriculture Extension Specialist Staff in Plant and Soil Sciences and Extension Education departments. Questions dealt primarily with producers use of production and marketing practices and the number of Extension contacts the producers had with Extension agents. Data also were obtained regarding the size of their soybean operation and yields per acre of soybeans grown.

Method of Analysis

Data on the situation of soybean producers in 1982 were processed for computer analysis. Computation and statistical analysis were made using the University of Tennessee Computing Center facilities.

Response to survey questions were summarized using means and frequency counts of producers' responses regarding the use of practices and the number of acres harvested and yields per acre of soybeans.

The Chi square test and one-way analysis of variance was used to determine the relationship between dependent and independent variables. Statistical tables were used to determine the significance of observed relationships. F-values and X^2 values achieving the .05 level of probability were judged to be significant.

VI. DEFINITION OF TERMS

1. County Extension Program--Each county in Tennessee has one county Extension program. All Extension work done in the county, including planning, evaluation, and reporting progress is made toward annual (POA) plans and four-year (POWP) objectives and goals. Each county Extension program disseminates information on Agriculture, Home Economics, 4-H (Youth), and Rural Development.

2. Number of Extension Contacts--This refers to the number of Extension group meetings attended, number of farm visits received, number of Extension office visits made, and number of telephone calls made, by soybean producers during the past 12 months.

3. Practice--A research verified and commonly accepted procedure or task, which, if performed correctly and on a regular basis, will increase or help insure a desired outcome or return.

4. Soybean Producer--Individuals making all or part of their farming income from the production of soybeans for sale. They constitute the target audience of this study.

5. Variable (Dependent)--The variable which one wishes to explain as a function of other variables. (Independent)--The explanatory variable in a statistical analysis.

CHAPTER II

REVIEW OF RELATED STUDIES

Several studies were reviewed concerning the relationships of the characteristics of producers and their contacts with Extension and the use of recommended production practices by producers.

Review of related studies cited in this chapter are reported under the following headings: (1) Relationships Between Characteristics of the Farming Operation and Extension Contacts, (2) Relationships Between Characteristics of Farming Operation and Use of Recommended Practices, and (3) Relationship Between Extension Contacts and Use of Recommended Practices.

I. RELATIONSHIPS BETWEEN CHARACTERISTICS OF THE FARMING OPERATION AND EXTENSION CONTACTS

Johnson's study of corn producers in 1982 revealed a significant relationship between use of soil management practices and Extension contacts. However only the practice of strip cropping was significantly related to all five methods of Extension contacts. The practices of using conventional tillage and planting on contour were not significantly related to any type of Extension contact (6).

Perry found in his study of Tennessee swine producers in 1980 that full-time farmers had significantly more total Extension contacts than part-time farmers. Also that "farrow-to-finish" producers used significantly more of the recommened pig production practices than did other swine producers (8).

Reburn found in his 1983 study of Tennessee Grade A Dairy producers that the larger producers, in terms of number of cows owned, number of full-time workers, acres of silage harvested, and acres of improved pasture, had significantly more total contacts with Extension than did smaller producers (9).

Yabaya, in the 1978 study of Tennessee corn producers who had more contacts with Extension had significantly more acreage and yield for both silage and grain than those who had fewer contacts (12).

II. RELATIONSHIPS BETWEEN CHARACTERISTICS OF FARMING OPERATION AND USE OF RECOMMENDED PRACTICES

Bradley found in the 1980 study of cotton producers that yields consistently increased as the number of recommended practices used also increased (1).

Freeman's 1978 Grade A Dairy producers study showed farmers who had larger farms or milked more cows used more of the total number of recommended dairy practices. Freeman also found that farmers who possessed higher herd average pounds of milk and butterfat were likely to have used more of the recommended dairy practices (2).

In 1977 Gordon found that farmers with college training used a higher percentage of recommended production practices than those producers whose education stopped at high school. However, age of farmers was not significantly related to their adoption of recommended production practices (3).

Hall's 1971 study showed that 74 percent of all soybean producers reported to have fertilized and limed their fields according

to soil test recommendations. Eighty-five percent of the producers were using the recommended production practices (4).

Johnson found in his study that producers who were using seven of the recommended practices had higher yield per acre of corn harvested for grain than those who were not using the same practices. The yield per acre of corn silage was significantly related to producers use of 5 of the 10 recommended corn production practices (6).

Reburn found, in his study of relationships between Grade A Dairy producers use of practices and their herd average pound of milk produced, that there was a significant relationship between the total number of practices producers used and their herd average pounds of milk produced. He found that Grade A Dairy producers who used a high number of total practices had significantly higher herd averages of milk than producers who used a low number of practices. The practices that were found to be significantly related to herd average pounds of milk were: (1) pasture and forage, (2) feeding, (3) breeding, (4) record keeping, (5) five of six herd management practices and (6) four of nine milking practices (9).

III. RELATIONSHIPS BETWEEN EXTENSION CONTACTS AND USE OF RECOMMENDED PRACTICES

Gordon found in his study that swine producers who were using recommended practices had made a larger number of contacts with Extension than producers who were not using the practices (3).

Jenkins found in his study of soybean producers in 1977 that nearly all of the producers were already using the recommended

soybean production practices. However he concluded that the use of practices was not significantly related to Extension contacts (5).

Johnson found in his study that the use of recommended practices regarding weed control, liming and fertilizing according to soil test and recommended plant population were significantly related to Extension contacts. He found that most producers were already using most of the older recommended practices (6).

Parker found in his tomato study in Lauderdale County, that producers major source of farm income was not significantly related to the contacts producers had with Extension. But, producers who limed by soil test attended significantly more Extension meetings, made significantly more phone calls to Extension office, and received significantly more farm visits from Extension agents than producers not using soil test (7).

Perry found that there was a significant relationship between the use of nine recommended swine production practices and the number of contacts producers had with Extension. He found that producers who used more of the recommended practices had significantly more Extension contacts than producers who used fewer practices (8).

CHAPTER III

STUDY FINDINGS

The findings of this study are summarized in four tables and discussed in four sections within this chapter. Selected variables are discussed under subheadings within each section.

Section I presents findings regarding the characteristics of soybean production in Tennessee. Section II presents findings regarding the relationships between use of production practices and yields per acre. Section III presents information regarding the relationship between the number of acres harvested and production practices used by Tennessee soybean producers. Section IV summarizes findings regarding the relationships between the number of Extension contacts and production practices used by Tennessee soybean producers.

I. CHARACTERISTICS OF SOYBEAN PRODUCTION IN TENNESSEE

Table I presents findings regarding variables which characterize soybean production in Tennessee. Number and percent of producers are used to summarize findings regarding each variable.

Varieties Planted

The variables included in this subsection are (1) early varieties, (2) medium varieties, and (3) late varieties.

Early variety. Data in Table I indicates that 82 percent of 700 producers planted Essex variety. Nathan variety was planted by 12 percent of the producers while only 5 percent planted Mitchell variety.

TABLE I. Characteristics of Soybean Production in Tennessee

Name of Variable	Number of Producers Responding (N=965)	Percent of Producers
VARIETIES PLANTED		
Early Variety		
Mitchell	31	5
Essex	575	82
Nathan	86	12
Other	8	1
TOTAL	700	100
Medium Variety		
Asgrow A5474	40	4
Bay	89	9
Bedford	260	27
Dare	8	1
Forrest	248	26
McNair 500	2	0
York	88	9
Other	230	24
TOTAL	965	100
Late Variety		
Centennial	114	50
Coker 136	6	3
Lee 74	35	15
Picket 71	38	16
RA604	8	3
Bragg	27	12
Other	2	1
TOTAL	230	100
SEEDBED PREPARATION AND SEED TREATMENT		
Major Equipment Used		
Plow	195	20
Disk	361	38
Chisel plow	276	29
No-till planter	116	12
Other	11	1
TOTAL	959	100
Used Inoculation on Seed		
Not needed	364	38
Needed--not used	44	4
Applied on part	245	26
Applied on all	303	32
TOTAL	956	100
Used Fungicide on Seed		
None	522	55
Part	162	17
All	263	28
TOTAL	947	100
Used Molybdenum on Seed		
Not needed	237	25
Needed, not applied	85	9
Applied as needed	635	66
TOTAL	957	100
Used Certified Seed		
No	243	26
Yes, part	560	60
Yes, all	127	14
TOTAL	930	100
PLANTING DATES AND RATES		
Single Crop Planting Dates		
None, single cropped	79	8
Before April 25	29	3
April 25 to June 15	808	84
After June 15	49	5
TOTAL	965	100

TABLE I (Continued)

Name of Variable	Number of Producers Responding (N=965)	Percent of Producers
Double Crop Planting Dates		
None, double cropped	280	29
Before June 15	36	4
June 15 to July 1	584	60
After July 1	65	7
TOTAL	965	100
Conventional Practice-Row Width Used		
None, conventional row width	125	14
Under 32 inches	125	14
32 to 36 inches	229	25
Over 36 inches	420	47
TOTAL	899	100
Conventional Practice-Seed/Ft. Row		
None, conventional row width	210	22
6 seeds or less	41	4
7-9 seed	177	18
10 seed	229	24
11-12 seed	271	28
13 and over	37	4
TOTAL	965	100
Pounds of Seed Broadcast/Acre		
None broadcast	650	67
Under 60 lbs.	86	9
60 lbs.	109	11
61-75 lbs.	57	6
76 lbs. and over	63	7
TOTAL	965	100
Row Widths Used in No-Till Practice		
None, no-till	601	62
16 inches and under	97	10
17-19 inches	101	11
20-29 inches	75	8
30 inches and over	91	9
TOTAL	965	100
Seed/Ft. Row in No-Till Practice		
None, no-till	640	66
6 or less	57	6
7-9	142	15
10-12	106	11
13 and over	20	2
Total	965	100
FERTILIZATION		
Acres Fertilized According to Soil Test		
Not any	424	44
50 or less	91	9
51-100	123	13
101-200	120	12
201 and over	207	22
TOTAL	965	100
Acres Limed According to Soil Test		
Not any	461	48
50 or less	121	12
51-100	143	15
101-200	89	9
201 and over	151	16
TOTAL	965	100
Pounds of Nitrogen/Acre Without Soil Test		
Not any	661	69
1-10 lbs.	142	15
11-20 lbs.	120	12
21 lbs. and over	42	4
TOTAL	965	100

TABLE I (Continued)

Name of Variable	Number of Producers Responding (N=965)	Percent of Producers
Pounds of Phosphate/Acre Without Soil Test		
Not any	355	37
20 lbs. or less	84	9
21-30 lbs.	80	8
31-40 lbs.	202	21
41-60 lbs.	197	20
61-150 lbs.	47	5
TOTAL	965	100
Pounds of Potash/Acre Without Soil Test		
Not any	320	33
Under 40 lbs.	124	13
40-59 lbs.	263	27
60 lbs.	173	18
61 lbs. and over	85	9
TOTAL	965	100
INSECT PROBLEMS		
Were Foliage Insect a Problem	775	80
No	190	20
Yes	965	100
TOTAL		
Were Pod Feeding Insect a Problem		
No	843	87
Yes	122	13
TOTAL	965	100
Were Stem Feeding Insect a Problem		
No	934	97
Yes	31	3
TOTAL	965	100
DISEASE AND NEMATODE CONTROL		
Planted Disease Free Seed		
Do not know	232	24
No	212	22
Yes	521	54
TOTAL	965	100
Planted Seed Treated with Fungicide		
No	578	60
Yes	387	40
TOTAL	965	100
Used Crop Rotation to Control Disease		
No	396	41
Yes	569	59
TOTAL	965	100
Used Disease Resistant Varieties		
Do not know	370	38
No	202	21
Yes	393	41
TOTAL	965	100
Were Cyst Nematodes a Problem		
Do not know	86	9
No	586	61
Yes	293	30
TOTAL	965	100
Used Crop Rotation to Control Cyst Nematodes		
No	448	46
Yes	517	54
TOTAL	965	100
Used Resistant Varieties to Control Cyst Nematodes		
No	257	27
Yes	179	18
Does not apply	529	55
TOTAL	965	100

TABLE I (Continued)

Name of Variable	Number of Producers Responding (N=965)	Percent of Producers
Used Chemicals to Control Cyst Nematodes		
No	895	93
Yes	70	7
TOTAL	965	100
WEED CONTROL		
Used Rotation with Cotton or Corn to Control Weeds		
No	399	41
Yes	566	59
TOTAL	965	100
Used Rotary Hoeing to Control Weeds		
No	825	86
Yes	140	14
TOTAL	965	100
Used Cultivation to Control Weeds		
No	268	28
Yes	697	72
TOTAL	965	100
Applied Preplant Chemical to Control Weeds		
No	198	20
Yes	767	80
TOTAL	965	100
Applied Preemergence Chemical to Control Weeds		
No	451	47
Yes	514	53
TOTAL	965	100
Applied Postemergence Chemical to Control Weeds		
No	205	21
Yes	760	79
TOTAL	965	100
How Effective were the Weed Control Methods		
None used	36	4
Not very effective	108	11
Effective	518	54
Very effective	303	31
TOTAL	965	100
HARVESTING, STORING, AND MARKETING		
Moisture Content at Harvesting		
Do not know	112	11
Above 12 percent on all crop	123	13
Above 12 percent on part of crop	500	52
12 percent or below on all of crop	230	24
TOTAL	965	100
Was Harvesting Loss a Major Problem		
No	854	89
Yes	111	11
TOTAL	965	100
Was the Amount of Harvesting Loss Checked		
No	526	55
Yes	439	45
TOTAL	965	100
Amount of Grain Stored on Farm		
None	450	46
Part	334	35
All	181	19
TOTAL	965	100

TABLE I (Continued)

Name of Variable	Number of Producers Responding (N=965)	Percent of Producers
How was Soybeans Marketed		
Sold before harvest	92	10
Sold after harvest	590	62
Stored	265	28
TOTAL	947	100
Total Acres Harvested		
Under 100 acres	267	28
100-199 acres	180	19
200-500 acres	289	30
501-over	229	23
TOTAL	965	100
Yield Per Acre		
Under 25 bushels	116	12
25-30 bushels	404	42
31-40 bushels	387	40
41-56 bushels	54	6
TOTAL	961	100
EXTENSION CONTACTS		
Number Extension Meetings Attended		
None	244	25
1	287	30
2	197	20
3 and over	220	23
No response	17	2
TOTAL	965	100
Number Visits Made to Extension Office		
None	238	24
1	183	19
2	193	20
3	111	12
4 and over	214	22
No response	26	3
TOTAL	965	100
Number of Farm Visits Received from Extension Agent		
None	202	21
1	174	18
2	163	17
3	124	13
4 and over	267	28
No response	35	3
TOTAL	965	100
Number of Telephone Calls Made to Extension Office		
None	164	17
1-2	251	26
3-4	202	21
5-9	200	21
10-40	144	15
No response	4	0
TOTAL	965	100
Total Number Extension Contacts Over Past 12-Months		
None	407	42
1-5	50	5
6-10	220	23
11 and over	253	26
No response	35	4
TOTAL	965	100

Medium variety. Four percent of the 965 producers surveyed planted Asgrow A5474 variety. Nine percent planted Bay and York, while 27 percent planted Bedford and 26 percent planted Forrest. Two producers planted McNair 500 and 24 percent planted some other variety.

Late variety. Only 230 of the 965 producers surveyed planted late varieties in 1982. Centennial was planted by 50 percent of the producers while Lee 74 and Pickett 71 were planted by 15 percent and 16 percent, respectively. Twelve percent planted Bragg. Coker 136 and RA604 each were planted by 3 percent of the producers.

Seedbed Preparation and Seed Treatment

The variables included in this subsection are: (1) major equipment, (2) inoculation on seed, (3) fungicide on seed, (4) molybdenum on seed, and (5) certified seed.

Major equipment used. Twelve percent of the 959 producers surveyed were using no-till planters to prepare seedbed. Thirty-eight percent prepared the seedbed by disking while 29 percent used chisel plow. Twenty percent used the plow and 1 percent used other equipment.

Used inoculation on seed. Only 32 percent of the 956 producers surveyed used inoculation on all seed planted. Twenty-six percent used inoculation on part of the seed and 38 percent decided inoculation was not needed on the seed. However 4 percent revealed it was needed but not used.

Used fungicide on seed. Fifty-five percent of the 947 producers used a fungicide on none of the seed planted. One hundred sixty-two (17 percent) used a fungicide on part of the seed and 263 (28 percent) on all seed.

Used molybdenum on seed. Twenty-five percent of the 957 producers surveyed revealed that molybdenum was not needed on seed. Nine percent needed it but did not apply it. Sixty-six percent applied it as it was needed.

Used certified seed. Over one-half (60 percent) planted part certified seed, while 14 percent planted all certified seed, and 26 percent used no certified seed.

Planting Dates and Rates

The variables included in this subsection are: (1) single crop planting dates, (2) double crop planting dates, (3) row width used in conventional practice, (4) seed per foot of row in conventional practice, (5) pounds of seed broadcast per acre, (6) row width used in no-till practice, and (7) seed per foot of row in non-till practice.

Single crop planting dates. Eighty-four percent of the producers planted their single crop soybeans between April 25 and June 15, while 3 percent planted before April 25, and 5 percent after June 15. Eight percent did not single crop.

Double crop planting dates. Sixty percent of the producers who were double cropping planted soybeans between June 15 and July 1,

while 4 percent planted before June 15, and 7 percent after July 1. Twenty-nine percent did not double crop.

Conventional practice-row width used. Forty-seven percent of producers who used the conventional practice used row widths that were over 36 inches, while 25 percent used 32 to 36 inch rows, and 14 percent used under 32 inch rows. One hundred twenty-five (14 percent) did not use the conventional practice.

Conventional practice-seed per foot of row. Four percent of producers who used the conventional practice planted 6 seed or less per foot of row, while 18 percent planted between 7 and 9 seed, 24 percent planted 10 seed, 28 percent planted 11 or 12 seed, and 4 percent planted 13 seed or more.

Pounds of seed broadcast per acre. Over two-thirds (67 percent) of the producers did not plant any seed by broadcasting. Nine percent broadcast under 60 pounds per acre, while 11 percent broadcast 60 pounds, 6 percent broadcast between 61-75 pounds, and 7 percent broadcast 76 pounds or more.

Row width used in no-till practice. Sixty-two percent of the producers did not use the no-till practice. Ten percent of the producers who used no-till used row widths of 16 inches and under, while 11 percent used 17 to 19 inch rows, 8 percent used 20 to 29 inch rows, and 9 percent used 30 inches and over.

Seed per foot row in no-till practice. Almost two-thirds (66 percent) of the producers did not use the no-till practice. Six percent of the producers who use no-till planted 6 seed or less per foot of row, 15 percent planted between 7 and 9 seed, 11 percent planted between 10 and 12 seed, and only 2 percent planted 13 or more seed.

Fertilization

The variables included in this subsection are: (1) acres fertilized according to soil test, (2) acres limed according to soil test, (3) pounds of nitrogen applied per acre without soil test, (4) pounds of phosphate applied per acre without soil test, and 95) pounds of potash applied per acre without soil test.

Acres fertilized according to soil test. Forty-four percent of the 965 producers surveyed did not fertilize any acres according to soil test, while 9 percent fertilized 50 acres or less, 13 percent fertilized between 51 and 100 acres, 12 percent fertilized between 101 and 200 acres, and 22 percent fertilized over 200 acres.

Acres limed according to soil test. Four hundred sixty-one (48 percent) of producers did not lime any acres according to soil test, while 12 percent limed 50 acres or less, 15 percent limed 51 to 100 acres, 9 percent limed 101 to 200 acres, and 16 percent limed over 200 acres.

Pounds of nitrogen per acre without soil test. Sixty-nine percent of the producers did not use any nitrogen without soil test. Fifteen

percent used between 1 and 10 pounds per acre, while 12 percent used between 11 and 20 pounds, and 4 percent used over 20 pounds.

Pounds of phosphate per acre without soil test. Thirty-seven percent of the producers did not apply any phosphate without soil test, while 9 percent applied 20 pounds or less, 8 percent applied 21-30 pounds, 21 percent applied 31-40 pounds, 20 percent applied 41-60 pounds, and 5 percent applied 61-150 pounds.

Pounds of potash per acre without soil test. Almost one-third (33 percent) of the producers did not use any potash without soil test, while 13 percent used under 40 pounds, 27 percent used between 40 and 59 pounds, 18 percent used 60 pounds, and 9 percent used over 60 pounds.

Insect Problem

Selected variables included in this subsection are information about foliage, pod and stem feeding insect.

Were foliage feeding insect a problem. Eighty percent of 965 producers reported that foliage insect were not a problem, while 20 percent reported them to be a problem.

Were pod feeding insect a problem. Only 13 percent of producers revealed that pod feeding insect were a problem, while 87 percent reported them not to be a problem.

Were stem feeding insect a problem. Thirty-one (3 percent) of the producers surveyed reported that stem feeding insect were a problem, while 97 percent reported them not to be a problem.

Disease and Nematode Control

Eight variables relate to soybean diseases and nematode control. These variables dealt with whether or not producers: (1) planted disease free seed, (2) planted seed treated with fungicide, (3) used crop rotation to control disease, (4) used disease resistant varieties, (5) used crop rotation, (6) used crop rotation to control nematodes, (7) used resistant varieties to control nematodes, and (8) used chemicals to control cyst nematodes.

Planted disease free seed. Over one-half (54 percent) of the producers planted seed free from disease, while 22 percent did not plant seed free from disease, and 24 percent did not know if the seed planted was free or not.

Planted seed treated with fungicide. Sixty percent of the producers surveyed did not plant seed treated with a fungicide, whereas 40 percent did plant seed treated with fungicide.

Use crop rotation to control disease. Fifty-nine percent of the producers used crop rotation to control disease, whereas 41 percent did not use crop rotation.

Used disease resistant varieties. Forty-one percent of the producers used varieties that were resistant to disease, while 21 percent did not, and 38 percent did not know.

Were cyst nematodes a problem. Sixty-one percent of the producers surveyed did not have a problem with cyst nematodes, while 30 percent

had a problem with cyst nematodes, and 9 percent did not know if cyst nematodes were a problem.

Used crop rotation to control cyst nematodes. Fifty-four percent of the producers were using crop rotation to control cyst nematodes, whereas 46 percent were not using crop rotation.

Used resistant varieties to control cyst nematodes. Only 18 percent of the producers used cyst nematode resistant varieties, whereas 27 percent were not using resistant varieties.

Used chemicals to control cyst nematodes. Eight hundred ninety-five (93 percent) of producers indicated they were not using chemicals to control cyst nematodes, while only 7 percent were using chemicals to control cyst nematodes.

Weed Control

The variables included in this subsection dealt with whether or not soybean producers: (1) used rotation with cotton or corn to control weeds, (2) used rotary hoeing to control weeds, (3) used cultivation to control weeds, (4) applied preplant chemicals to control weeds, (5) applied preemergence chemicals to control weeds, (6) applied postemergence chemicals to control weeds, and (7) how effective the weed control method.

Used rotation with cotton or corn to control weeds. Fifty-nine percent of the producers reported rotating soybeans with corn or cotton to control weeds, while 41 percent were not using crop rotation.

Used rotary hoeing to control weeds. Eighty-six percent of the producers did not use rotary hoeing to control weeds, whereas 14 percent used rotary hoeing.

Used cultivation to control weeds. Seventy-two percent of the producers were using cultivation to control weeds, while 28 percent were not using cultivation.

Applied preplant chemicals to control weeds. Eighty percent of the producers surveyed applied preplant chemicals to control weeds, while 20 percent did not apply a preplant chemical.

Applied preemergence chemical to control weeds. Over one-half (53 percent) of the producers applied a preemergence chemical to control weeds, while 47 percent did not apply a preemergence chemical.

Applied postemergence chemical to control weeds. Seventy-nine percent of the producers applied a postemergence chemical to control weeds, whereas 21 percent did not apply a postemergence chemical.

How effective were the weed control methods. Thirty-six (4 percent) of the producers indicated no method was used to control weeds, while 11 percent indicated method used not very effective, 54 percent indicated effective, and 31 percent indicated very effective.

Harvesting, Storing and Marketing

The variables included in this subsection are: (1) moisture control at harvesting, (2) was harvesting loss a major problem, (3)

was the amount of harvesting loss checked, (4) amount of grain stored on farm, (5) how was soybean marketed, and (6) yield--bushels per acre.

Moisture content at harvesting. Eleven percent of the producers indicated that moisture content of soybeans at harvesting was unknown. Thirteen percent of the producers indicated that the moisture content of soybeans at harvesting was above 12 percent on all of crop, while 500 (52 percent) of the producers indicated it was above 12 percent on part of crop, and 230 (24 percent) of the producers indicated it was 12 percent or below on all of crop.

Was harvesting loss a major problem. Eighty-nine percent of the producers indicated that harvesting loss was not a major problem, while 11 percent indicated harvesting loss was a major problem.

Was the amount of harvesting loss checked. Fifty-five percent of the producers reported that the amount of harvesting loss was not checked, whereas 45 percent checked amount of loss.

Amount of grain stored on farm. Forty-six percent of the producers were not storing any grain on the farm, while 35 percent stored part of grain, and 19 percent was storing all of grain.

How was soybeans marketed. Ten percent of the producers surveyed sold soybeans before harvesting, while 62 percent sold after harvesting, and 28 percent put soybeans in storage.

Total acres harvested. Thirty percent of the producers harvested between 200 and 500 acres of soybeans, while 28 percent harvested under 100 acres, 23 percent harvested over 500 acres, and 19 percent harvested between 100-199 acres.

Yield per acre. Only 6 percent of the producers had yields of soybean between 41-56 bushels, while 42 percent was between 25 and 30 bushels, 40 percent was between 31 and 40 bushels, and 12 percent had yields under 25 bushels.

Extension Contacts

The variables included in this subsection which dealt with the Extension contacts are: (1) Extension meetings, (2) office visits, (3) farm visits, (4) telephone calls, and (5) total Extension contacts.

Number Extension meetings attended. Thirty percent of the 965 producers surveyed attended 1 Extension meeting, while 20 percent attended 2 meetings, and 23 percent attended 3 or more meetings.

Number visits made to Extension office. Nineteen percent of the producers made 1 visit to the Extension office, while 20 percent made 2 visits, 12 percent made 3 visits, and 22 percent made 4 or more visits.

Number farm visits received from Extension agent. Eighteen percent of producers surveyed received 1 farm visit from Extension agent. Seventeen percent received 2 farm visits, while 13 percent received 3 visits, and 28 percent received 4 or more visits.

Number telephone calls to Extension office. Seventeen percent of the producers did not make any telephone calls to the Extension office, while 26 percent made 1 to 2 telephone calls, 21 percent made 3 to 4 telephone calls, 21 percent made 5 to 9 telephone calls, and 15 percent made 10 to 40 telephone calls.

Total number Extension contacts over past twelve months. Five percent of the producers had between 1 and 5 total Extension contacts over the past 12 months, while 23 percent had 6 to 10 total contacts, and 26 percent had 11 or more total contacts.

II. RELATIONSHIPS BETWEEN USE OF PRODUCTION PRACTICES AND YIELD PER ACRE

Table II presents data indicating relationships between soybean producers use of soybean production practices and yield per acre in 1982. The purpose of the analysis was to determine what influence, if any, that production practice had on yields per acre.

The analysis of variance F test was used to determine the strength of the relationship between practices used and yields. F values which achieved the .05 probability level were considered significant.

Varieties Planted

This subsection presents findings regarding producers use of recommended early, medium and late soybean varieties.

Early variety. The early variety Nathan grown by 85 (12.2 percent) of the producers surveyed yielded 29.9 bushels per acre which

TABLE II. Relationships Between Use of Production Practice and Yield Per Acre

Name of Variable	Number Responding	Mean Yield bu./ac.
VARIETIES PLANTED		
Early Varieties		
Mitchell	31	33.2
Essex	573	31.9
Nathan	85	29.9
Other	8	31.6
TOTAL	697	31.7
Variance Ratio F = 3.4; p = .018		
Medium Varieties		
Asgrow A5474	40	32.7
Bay	89	30.5
Bedford	260	29.3
Dare	8	29.5
Forrest	247	30.0
McNair 500	2	30.0
York	88	32.1
Other	227	33.3
TOTAL	961	30.9
Variance Ratio F = 8.9; p = .001		
Late Varieties		
Centennial	114	29.1
Coker 136	6	30.0
Lee 74	35	30.0
Pickett 71	38	27.1
RA604	8	30.9
Bragg	26	28.8
Other	2	25.0
TOTAL	229	28.8
Variance Ratio F = 1.2; p = .293		
SEEDBED PREPARATION AND TREATMENT		
Major Equipment Used to Prepare Seedbed		
Plow	194	31.5
Disk	361	30.2
Chisel	274	31.1
No-till	115	32.0
Other	11	31.8
TOTAL	955	31.0
Variance Ratio F = 2.5; p = .040		
Used Inoculation on Seed		
Not needed	363	29.6
Needed but not used	44	28.8
Applied on part	243	31.2
Applied on all	302	32.6
TOTAL	952	30.9
Variance Ratio F = 16.0; p = .001		
Used Fungicide on Seed		
None	520	30.5
Part	160	29.9
All	263	32.3
TOTAL	943	30.9
Variance Ratio F = 11.1; p = .001		
Used Molybdenum on Seed		
Not needed	236	30.1
Needed but not applied	85	27.5
Applied as needed	632	31.7
TOTAL	953	30.9
Variance Ratio F = 21.7; p = .001		
Used Certified Seed		
No	242	30.1
Yes, part	560	31.3
Yes, all	127	30.7
TOTAL	929	30.9
Variance Ratio F = 3.4; p = .033		

TABLE II (Continued)

Name of Variable	Number Responding	Mean Yield bu./ac.
PLANTING DATES AND RATES		
Single Crop Planting Dates		
None, single crop	79	31.1
Before April 25	29	32.1
April 25 to June 15	806	31.0
After June 15	47	28.4
TOTAL	961	30.9
Variance Ratio F = 3.5; p = .016		
Double Crop Planting Dates		
None, double crop	279	30.9
Before June 15	36	31.4
June 15 to July 1	581	31.0
After July 1	65	30.4
TOTAL	961	30.9
Variance Ratio F = 0.3; p = .839		
Conventional Practice-Row Width Used		
None, conventional row width	125	31.3
Under 32 inches	124	32.4
32-36 inches	228	31.6
Over 36 inches	419	30.0
TOTAL	896	30.9
Variance Ratio F = 6.8; p = .001		
Conventional Practice--Seed/Ft. Row		
None, conventional	209	31.1
6 seed or less	41	30.4
7-9 seed	177	31.0
10 seed	228	32.1
11-12 seed	271	29.8
13 seed and over	35	31.8
TOTAL	961	30.9
Variance Ratio F = 4.1; p = .001		
Broadcast Practice-Pounds of Seed/Acre		
None broadcast	647	30.8
Under 60 lbs.	86	35.0
60 lbs.	109	30.3
61-75 lbs.	57	29.5
76 lbs. and over	62	28.8
TOTAL	961	30.9
Variance Ratio F = 14.2; p = .001		
No-Till Practice-Row Width Used		
None, no-till	600	30.1
16 inches and under	96	34.9
17-19 inches	99	31.6
20-29 inches	75	31.3
30 inches and over	91	31.4
TOTAL	961	30.9
Variance Ratio F = 14.7; p = .001		
No-Till Practice-Seed/Ft. Row		
None, no-till	639	30.3
6 seed or less	56	31.2
7-9 seed	142	33.4
10-12 seed	106	31.4
13 seed and over	18	30.3
TOTAL	961	30.9
Variance Ratio F = 7.9; p = .001		
FERTILIZATION		
Acres Fertilized According to Soil Test		
Not any	422	29.4
50 or less	90	32.2
51-100 acres	123	32.2
101-200 acres	120	32.3
201 acres and over	260	32.0
TOTAL	961	30.9
Variance Ratio F = 12.8; p = .001		

TABLE II (Continued)

Name of Variable	Number Responding	Mean Yield bu./ac.
Acres Limed According to Soil Test		
Not any	460	29.7
50 or less	120	32.9
51-100	142	31.5
101-200	89	32.1
201 and over	150	31.9
TOTAL	961	30.9
Variance Ratio F = 10.3; p = .001		
Pounds of Nitrogen/Acre Without Soil Test		
Not any	657	31.0
1-10	142	32.5
11-20	120	29.5
21 and over	42	28.5
TOTAL	961	30.9
Variance Ratio F = 7.9; p = .001		
Pounds of Phosphate/Acre Without Soil Test		
Not any	353	31.8
20 or less	83	33.8
21-30	80	28.2
31-40	201	29.7
41-60	197	30.7
61-150	47	30.5
TOTAL	961	30.9
Variance Ratio F = 10.8; p = .001		
Pounds of Potash/Acre Without Soil Test		
Not any	318	31.7
Under 40	124	31.5
40-59	261	29.6
60	173	31.1
61 and over	85	30.9
TOTAL	961	30.9
Variance Ratio F = 5.1; p = .001		
INSECT PROBLEMS		
Were Foliage Feeding Insect a Problem		
No	771	30.9
Yes	190	31.0
TOTAL	961	30.9
Variance Ratio F = 0.1; p = .817		
Were Pod Feeding Insect a Problem		
No	839	31.0
Yes	122	30.2
TOTAL	961	30.9
Variance Ratio F = 2.0; p = .158		
Were Stem Feeding Insect a Problem		
No	930	30.9
Yes	31	31.5
TOTAL	961	30.9
Variance Ratio F = .3; p = .579		
DISEASE AND NEMATODE CONTROL		
Planted Disease Free Seed		
Do not know	232	30.3
No	211	30.2
Yes	518	31.5
TOTAL	961	30.9
Variance Ratio F = 5.4; p = .005		
Planted Seed Treated with Fungicide		
No	576	30.3
Yes	385	31.9
TOTAL	961	30.9
Variance Ratio F = 17.3; p = .001		

TABLE II (Continued)

Name of Variable	Number Responding	Mean Yield bu./ac.
Used Crop Rotation to Control Disease		
No	395	30.8
Yes	566	31.0
TOTAL	961	30.9
Variance Ratio F = 0.3; p = .576		
Used Disease Resistant Varieties		
Do not know	369	30.3
No	202	32.6
Yes	390	30.6
TOTAL	961	30.9
Variance Ratio F = 10.6; p = .001		
Were Cyst Nematodes a Problem		
Do not know	86	32.6
No	584	31.2
Yes	291	29.9
TOTAL	961	30.9
Variance Ratio F = 7.9; p = .001		
Used Crop Rotation to Control Cyst Nematodes		
No	447	31.1
Yes	514	30.7
TOTAL	961	30.9
Variance Ratio F = 1.1; p = .295		
Used Resistant Varieties to Control Cyst Nematodes		
Does not apply	256	32.1
No	179	32.7
Yes	526	29.8
TOTAL	961	30.9
Variance Ratio F = 2.2; p = .001		
Used Chemicals to Control Cyst Nematodes		
No	891	30.9
Yes	70	30.7
TOTAL	961	30.9
Variance Ratio F = .1; p = .777		
WEED CONTROL		
Used Rotation with Cotton or Corn		
No	399	30.0
Yes	562	31.6
TOTAL	961	30.9
Variance Ratio F = 18.1; p = .001		
Used Rotary Hoeing to Control Weeds		
No	821	30.9
Yes	140	31.2
TOTAL	961	30.9
Variance Ratio F = 0.4; p = .529		
Used Cultivation to Control Weeds		
No	267	31.9
Yes	694	30.5
TOTAL	961	30.9
Variance Ratio F = 10.5; p = .001		
Applied Preplant Chemical to Control Weeds		
No	197	30.1
Yes	764	31.1
TOTAL	961	30.9
Variance Ratio F = 4.4; p = .036		
Applied Preemergence Chemical to Control Weeds		
No	450	30.9
Yes	511	31.0
TOTAL	961	30.9
Variance Ratio F = .03; p = .870		

TABLE II (Continued)

Name of Variable	Number Responding	Mean Yield bu./ac.
Applied Postemergence Chemical to Control Weeds		
No	204	31.8
Yes	757	30.7
TOTAL	961	30.9
Variance Ratio F = 5.7; p = .017		
How Effective Were the Control Methods Used to Control Weeds		
None used	36	30.3
Not very effective	108	29.1
Effective	516	30.5
Very effective	301	32.4
TOTAL	961	30.9
Variance Ratio F = 11.1; p = .001		
HARVESTING, STORING, AND MARKETING		
Moisture Content at Harvesting		
Do not know	112	28.9
Above 12 percent on all crop	120	30.7
Above 12 percent on part of crop	500	30.7
12 percent or below on all of crop	229	32.5
TOTAL	961	30.9
Variance Ratio F = 10.1; p = .001		
Was Harvesting Loss a Major Problem		
No	850	31.1
Yes	111	29.6
TOTAL	961	30.9
Variance Ratio F = 6.0; p = .015		
Was the Amount of Harvesting Loss Checked		
No	524	30.8
Yes	437	31.0
TOTAL	961	30.9
Variance Ratio F = 0.2; p = .631		
Amount of Grain Stored on Farm		
None	448	29.9
Part	332	31.2
All	181	32.8
TOTAL	961	30.9
Variance Ratio F = 15.7; p = .001		
How was Soybeans Marketed		
Sold before harvest	92	32.4
Sold after harvest	586	30.2
Stored	265	32.2
TOTAL	943	31.0
Variance Ratio F = 13.7; p = .001		

was the lowest yield of the early varieties evaluated in the survey. The highest yielding early variety was Mitchell which was grown by 31 (4.5 percent) producers and yielded 33.2 bushels per acre. When tested by the variance F test, there was a significant relationship between the mean yield per acre and early variety planted.

Medium variety. The medium variety Bedford, grown by 260 (27.1 percent) of the producers surveyed, yielded 29.3 bushels per acre which was the lowest yield of the medium varieties evaluated in the survey. Two hundred twenty-seven (23.6 percent) producers, which grew some other medium variety than these surveyed, yielded 33.3 bushels per acre, the highest yielding medium variety grown. When tested by the variance F test there was a significant relationship between the mean yield per acre and medium variety grown.

Late varieties. The late variety RA604 grown by only 8 (3.5 percent) of the producers surveyed yielded 30.9 bushels per acre which was the highest yield of the late varieties evaluated in the survey. Centennial was grown by 114 (49.8 percent) of the producers and yielded 29.1 bushels per acre. The differences were not significant at the .05 level. Therefore the mean yield per acre was not significantly related to the late variety grown.

Seedbed Preparation and Seed Treatment

This subsection presents findings regarding producers use of five seedbed preparation and seed treatment practices.

Major equipment used. The 115 (12 percent) producers who used the no-till equipment as the major equipment in seedbed preparation had an average yield of 32 bushels per acre. Three hundred sixty-one (37.8 percent) producers used the disk and averaged 30.2 bushels per acre. When tested by the F test, the differences were significant at the .05 level. Thus the yield per acre was significantly related to the major equipment used to prepare seedbed.

Used inoculation on seed. Three hundred two (31.7 percent) producers applied an inoculant on all seeds planted and had a mean yield of 32.6 bushels per acre. Forty-four (4.6 percent) producers reported they needed an inoculant but did not use it and had a mean yield of 28.8 bushels per acre. The differences were significant at the .05 level, when tested by the F test. Therefore the mean yield per acre was significantly related to the use of inoculation on seed.

Used fungicide on seed. One hundred sixty (17 percent) of the producers surveyed reported using a fungicide on part of the seed at planting and had a mean yield of 29.9 bushels per acre. Two hundred sixty-three (27.9 percent) producers who used a fungicide on all seed reported a mean yield of 32.3 bushels per acre. When tested by the F test, there was a significant relationship between the mean yield and use of fungicide on seed.

Used molybdenum on seed. Molybdenum was applied as needed by 632 (66.3 percent) of soybean producers surveyed and they reported

a mean yield of 31.7 bushels per acre. The 85 (9 percent) producers who recognized they needed it but did not apply it reported a mean yield of 27.5 bushels per acre. When tested by the F test, there was a significant difference in mean yield as it related to the use of molybdenum.

Use certified seed. Two hundred forty-two (26.1 percent) of the producers surveyed did not use certified seed and had a mean yield of 30.1 bushels per acre. One hundred twenty-seven (13.7 percent) producers use all certified seed and had a mean yield of 30.7 bushels of soybean per acre, while 560 (60.3 percent) producers used some certified seed had a mean yield of 31.3 bushels per acre. When tested by the F test, the differences were significant at the .05 level. Thus, the mean yield was significantly related to whether or not certified seed was used. Producers using certified seed had higher soybean yields.

Planting Dates and Rates

This subsection presents findings regarding producers use of seven planting dates and rate practices.

Single crop planting dates. The majority (806, 83.9 percent) of the producers who planted single crop soybeans planted between April 25 and June 15 and their mean yield was 31.0 bushels per acre. The 47 (4.9 percent) producers who planted after June 15 had a mean yield of 28.4 bushels per acre. While only 29 (3 percent) producers planted

before April 25, they had a mean yield of 32.1 bushels per acre. The F test indicated a significant relationship between mean yield and planting dates for single crop soybeans.

Double crop planting dates. Thirty-six (3.8 percent) of the producers surveyed planted their double crop soybeans before June 15 and had a mean yield of 31.4 bushels per acre. Five hundred eighty-one (60.5 percent) producers planted between June 15 and July 1 and their mean yield was 31.0 bushels per acre. Sixty-five (6.8 percent) producers planted after July 1 and had a mean yield of 30.4 bushels per acre. The differences were not significant. Consequently the mean yield per acre was not significantly related to the dates used to plant double crop soybeans.

Conventional practice row width used. One hundred twenty-four (13.8 percent) producers used rows with widths under 32 inches in conventional practice, and had a mean yield of 32.4 bushels per acre. Four hundred nineteen (46.8 percent) producers use widths of 36 inches or more and had a mean yield of 30.0 bushels per acre. When tested by the F test, the differences were significant at the .05 level. Thus the mean yield per acre was significantly related to width of row used in conventional practice.

Conventional practice-seed per foot of row. Two hundred seventy-one (28.2 percent) producers who used the conventional practice and planted 11 or 12 seed per foot row had a mean yield of 29.8 bushels

per acre, while 228 (23.7 percent) producers planted 10 seed and had a mean yield of 32.1 bushels per acre. When tested by the F test, there was a significant relationship between mean yield per acre and number of seed planted per foot of row in conventional practice.

Pounds of seed broadcast per acre. Six hundred forty-seven (67.3 percent) of the producers did not use the broadcast practice and had a mean yield of 30.8 bushels per acre. Eighty-six (9 percent) producers broadcasted less than 60 pounds of seed per acre and had a mean yield of 35 bushels per acre. Sixty-two (6.5 percent) producers broadcasted over 76 pounds per acre and had a mean yield of 28.8 bushels per acre. The differences were significant at the .05 level, when tested by the F test. Therefore, the mean yield per acre was significantly related to the pounds of seed broadcasted per acre.

Row width used in no-till practice. Ninety-six (10 percent) of the producers surveyed used row widths of 16 inches or less in their no-till practice and reported a mean yield of 34.9 bushels per acre of soybeans. Seventy-five (7.8 percent) producers used row widths between 17 and 19 inches and had a mean yield of 31.3 bushels per acre. The differences were significant at the .05 level. Thus, the mean yield per acre was significantly related to width of row used in the no-till practice.

Seed per foot of row in no-till practice. The highest mean yield of 33.4 bushels per acre was reported by 142 (14.8 percent) no-till producers who planted between 7 and 9 seed per foot of row. Eighteen

(1.9 percent) producers planted 13 or more seed per foot of row and showed a mean yield of 30.3 bushels per acre. There was a significant difference in mean yield as it related to the number of seed planted per foot of row in no-till practice.

Fertilization

This subsection presents findings regarding producers use of five fertilization practices.

Acres fertilized according to soil test. Four hundred twenty-two (43.9 percent) of the producers surveyed did not fertilize any acres according to soil test and reported the lowest mean yield of 29.4 bushels per acre. One hundred twenty (12.5 percent) of the producers fertilized between 101 and 200 acres according to soil test and reported a mean yield of 32.3 bushels per acre. When tested by the F test, there was a significant difference in mean yield per acre as it related to the number of acres fertilized according to soil test. The data indicated that producers who fertilized by soil test had higher yields than those who did not.

Acres limed according to soil test. Four hundred sixty (47.9 percent) of the producers surveyed did not lime any acres according to soil test and reported the lowest mean yield of 29.7 bushels per acre. One hundred twenty (12.5 percent) of the producers limed 50 acres or less according to soil test and had a mean yield of 32.9 bushels per acre. The differences were significant. Thus, the yield

per acre was significantly related to the number of acres limed according to soil test. Producers who limed by soil test had higher yields than those who did not use soil test.

Pounds of nitrogen per acre without soil test. One hundred forty-two (14.8 percent) of the producers surveyed applied between 1 and 10 pounds of nitrogen per acre without soil test and reported a mean yield of 32.5 bushels per acre of soybeans. The lowest yield of 28.5 bushels per acre was reported by 42 (4.4 percent) producers who used 21 or more pounds of nitrogen per acre. Six hundred fifty-seven (68.4 percent) producers used no nitrogen and showed a mean yield of 31 bushels per acre. When tested by the F test, there was a significant difference in mean yield as it related to the amount of nitrogen applied per acre without soil test.

Pounds of phosphate per acre without soil test. Eighty (8.3 percent) of the producers surveyed applied between 21 and 30 pounds of phosphate per acre without soil test and reported the lowest mean yield of 33.7 bushels per acre. Eighty-three (8.6 percent) of the producers applied 20 pounds or less of phosphate per acre and reported a mean yield of 33.8 bushels per acre. When tested by the F test, there was a significant difference in mean yield as it related to pounds of phosphate applied per acre without soil test.

Pounds of potash per acre without soil test. Three hundred eighteen (33.1 percent) producers of those surveyed did not apply any potash without a soil test and reported a mean yield of 31.7 bushels per acre.

Two hundred sixty-one (5.5 percent) producers reported 29.6 bushels per acre and applied between 40 and 59 pounds of potash per acre without a soil test. When tested by the F test, the differences in mean yield as it related to pounds of potash applied per acre without a soil test was significantly related at the .05 level.

Insect Problems

This subsection presents findings regarding three variables of insect problems.

Were foliage feeding insect a problem. Seven hundred seventy-one (80.2 percent) of the producers surveyed reported foliage feeding insect were not a problem and had a mean yield of 30.9 bushels per acre. One hundred ninety (19.8 percent) producers reported foliage feeding insect were a problem and had a mean yield of 31 bushels per acre. When tested by the F test, the difference in mean yield of soybean per acre as it related to foliage feeding insect problems was not significantly related at the .05 level.

Were pod feeding insect a problem. Eight hundred thirty-nine (87.3 percent) of the producers surveyed reported pod feeding insect were not a problem and had a mean yield of 31 bushels per acre. One hundred twenty-two (12.7 percent) producers reported they were a problem and had a mean yield of 30.2 bushels per acre. When tested by the F test, the difference in mean yield as it related to pod feeding insect problem was not significantly related at the .05 level.

Were stem feeding insect a problem. The majority of the producers, 930 (97 percent), surveyed reported stem feeding insect were not a problem and had a mean yield of 30.9 bushels per acre. Thirty-one (3 percent) of the producers reported stem feeding insect a problem and had a mean yield of 31.5 bushels of soybean per acre. When tested by the F test, the difference in mean yield per acre as it related to stem feeding insect problem was not significantly related at the .05 level.

Disease and Nematode Control

This subsection presents findings regarding producers use of eight disease and nematode control practices.

Planted disease free seed. Five hundred eighteen (53.9 percent) of the producers surveyed planted seed that was free from disease and had a mean yield of 31.5 bushels per acre. Two hundred eleven (22 percent) producers surveyed did not plant seed free from disease and had a mean yield of 30.2 bushels per acre. When tested by the F test, there was a significant relationship between mean yield per acre and whether or not disease free seed had higher soybean yields.

Planted seed treated with fungicide. Three hundred eighty-five (40 percent) of the producers planted seed treated with a fungicide and had a mean yield of 31.9 bushels per acre. Five hundred seventy-six (59.9 percent) of the producers did not plant seed treated with fungicide and had a mean yield of 30.3 bushels per acre. When tested by the F test, there was a significant relationship between the mean

yield per acre and whether or not seed planted had been treated with a fungicide. Producers treating soybean seed with a fungicide had higher yields than those not treating seeds.

Used crop rotation to control disease. Five hundred sixty-six (58.9 percent) producers used crop rotation to control disease and had a mean yield of 31 bushels per acre. Three hundred ninety-five (41.1 percent) producers did not use crop rotation to control disease and had a mean yield of 30.8 bushels per acre. The difference was not significant at the .05 level. Therefore, the mean yield per acre was not significantly related to use of crop rotation to control disease.

Used disease resistant varieties. Two hundred two (21 percent) of the producers surveyed reported not to have some disease resistant varieties and reported a mean yield of 32.6 bushels per acre. Three hundred ninety (40.6 percent) producers used resistant varieties and reported a mean yield of 30.6 bushels per acre. When tested by the F test, there was a significant relationship between the mean yield per acre and the use of disease resistant varieties.

Were cyst nematodes a problem. Five hundred eighty-four (60.8 percent of the producers surveyed reported cyst nematodes were not a problem and had a mean yield of 31.2 bushels per acre. Two hundred ninety-one (30.3 percent) of the producers reported cyst nematodes were a problem and had a mean yield of 29.9 bushels per acre. The

difference was significant. When tested by the F test, the difference in the mean yield per acre as it related to cyst nematode problems was significantly related at the .05 level. Producers who had cyst nematode problems tended to have lower mean yields.

Used crop rotation to control cyst nematodes. Four hundred forty-seven (46.5 percent) producers did not use crop rotation to control cyst nematodes and had a mean yield of 31.1 bushels per acre. Five hundred fourteen (53.5 percent) producers did use crop rotation and had a mean yield of 30.7 bushels per acre. When tested by the F test, the difference in mean yield per acre as it related to use of crop rotation to control cyst nematodes was not significant at the .05 level. It would seem that producers who did not use this practice would not have cyst nematode problems and had higher yields. Therefore, producers who did not use this practice tended to have higher yields.

Used resistant varieties to control cyst nematodes. One hundred seventy-nine (18.6 percent) of the producers surveyed reported not to use resistant varieties to control cyst nematodes and had a mean yield of 32.7 bushels per acre. Five hundred twenty-six (54.7 percent) producers used resistant varieties to control cyst nematodes and had a mean yield of 29.8 bushels per acre. Producers who did not use this practice had a higher mean yield per acre. It would seem they did not have a cyst nematode problem. When tested by the F test, the differences in mean yield per acre as it related to use of resistant varieties to control cyst nematodes was significantly related at the .05 level. Producers who did not use resistant varieties tended to have higher yields.

Used chemicals to control cyst nematodes. Eight hundred ninety-one (92.7 percent) of the producers surveyed did not use chemicals to control cyst nematodes and had a mean yield of 30.9 bushels per acre. Seventy (7.3 percent) producers used chemicals to control cyst nematodes and had a mean yield of 30.7 bushels per acre. The producers who did not use chemicals to control cyst nematodes probably did not have cyst nematode problems. However, when tested by the F test, the difference in mean yield per acre as it related to use of chemicals to control cyst nematodes was not significantly related at the .05 level.

Weed Control

This subsection presents findings regarding producers use of seven weed control practices.

Used rotation with cotton or corn to control weeds. Five hundred sixty-two (58.5 percent) producers used crop rotation to control weeds and had a mean yield of 31.6 bushels per acre. Three hundred ninety-nine (41.5 percent) producers did not use crop rotation to control weeds and had a mean yield of 30 bushels per acre. When tested by the F test, differences were significant at the .05 level. Thus, the mean yield was significantly related to the use of crop rotation to control weeds. Producers who used crop rotation to control weeds tended to have higher yields.

Used rotary hoeing to control weeds. Eight hundred twenty-one (85.4 percent) producers reported not using rotary hoeing to control weeds and had a mean yield of 30.9 bushels per acre. One hundred forty

(14.6 percent) of the producers reported using rotary hoeing and had a mean yield of 31.2 bushels per acre. As tested by the F test, there was not a significant relationship between mean yield and whether or not rotary hoeing was used to control weeds.

Used cultivation to control weeds. Two hundred sixty-seven (27.8 percent) of the producers surveyed did not use cultivation to control weeds and had a mean yield of 31.9 bushels per acre. Six hundred ninety-four (72.2 percent) producers used cultivation and had a mean yield of 30.5 bushels per acre. When tested by the F test, the differences were significant at the .05 level. Thus, the mean yield per acre was significantly related to use of cultivation to control weeds. Those producers who used cultivation tended to have lower yields.

Applied preplant chemicals to control weeds. Seven hundred sixty-four (79.5 percent) of the producers surveyed applied preplant chemicals to control weeds and had a mean yield of 31.1 bushels per acre. One hundred ninety-seven (20.5 percent) producers did not apply preplant chemicals and had a mean yield of 30.1 bushels per acre. The differences were significant at the .05 level, when tested by the F test. Therefore, the mean yield per acre was significantly related to the use of preplant chemicals to control weeds. Producers who used preplant chemicals to control weeds tended to have higher yields.

Applied preemergence chemical to control weeds. Five hundred eleven (53.2 percent) of the producers surveyed applied preemergence chemicals to control weeds and had a mean yield of 31.0 bushels per

acre. Four hundred fifty (46.8 percent) producers did not apply preemergence chemicals and had a mean yield of 30.9 bushels per acre. When tested by the F test, there was a significant difference in mean yield per acre as it related to the use of preemergence chemicals to control weeds. Producers who used preemergence chemicals to control weeds tended to have higher yields.

Applied postemergence chemicals to control weeds. Two hundred four (21.2 percent) of the producers were not using postemergence chemicals to control weeds and had a mean yield of 31.8 bushels per acre. Seven hundred fifty-seven (78.8 percent) producers did use postemergence chemicals to control weeds and had mean yields of 30.7 bushels per acre. The differences were significant. Thus, the yield per acre was significantly related to use of postemergence chemicals to control weeds. Producers who did not apply postemergence chemicals tend to have higher yields. Producers who did not apply postemergence chemicals probably were doing a better job with weed control.

How effective were the weed control methods. Three hundred one (31.3 percent) of the producers reported their weed control methods were very effective and reported yields of 32.4 bushels per acre. One hundred eight (11.2 percent) of the producers reported their weed control methods were not very effective and reported yields of 29.1 bushels per acre. The differences were significant. Thus, the yield per acre was significantly related to the effectiveness of the weed control methods. Producers who had the most effective weed control method tend to have higher yields.

Harvesting, Storing, and Marketing

This subsection presents findings regarding producers use of five harvesting, storing, and marketing practices.

Moisture content at harvesting. Two hundred twenty-nine (23.8 percent) of the producers surveyed reported the moisture content of soybean was 12 percent or below at harvesting and reported a mean yield of 32.5 bushels per acre. One hundred twenty (12.5 percent) of the producers surveyed reported the moisture content was above 12 percent at harvesting and reported a mean yield of 30.7 bushels per acre. When tested by the F test, the differences were significant at the .05 level. Thus, the mean yield per acre was significantly related to moisture content at harvesting. Producers who harvested at a lower moisture content tended to have higher yields.

Was harvesting loss a major problem. Eight hundred fifty (88.5 percent) of the producers surveyed reported that harvesting loss was not a major problem and reported a mean yield of 31.1 bushels per acre. One hundred eleven (11.5 percent) producers reported harvesting loss was a major problem and had a mean yield of 29.6 bushels per acre. The differences were significant at the .05 level, when tested by the F test. Therefore, the mean yield per acre was significantly related to whether or not harvesting loss was considered a major problem. Producers who did not report harvesting loss as a major problem tended to have higher yields.

Was the amount of harvesting loss checked. Four hundred thirty-seven (45.5 percent) of the producers surveyed checked harvesting loss and had a mean yield of 31 bushels per acre. Five hundred twenty-four (54.5 percent) of the producers surveyed did not check harvesting loss and had a mean yield of 30.8 bushels per acre. When tested by the F test, the differences were not significant at the .05 level. Thus, the mean yield was not significantly related to whether or not harvesting loss was checked.

Amount of grain stored on farm. Four hundred forty-eight (46.6 percent) of the producers surveyed did not store any grain on the farm and had a mean yield of 29.9 bushels per acre. One hundred eighty-one (18.8 percent) of the producers stored all their grain on the farm and had a mean yield of 32.8 bushels per acre. When tested by the F test, the differences were significant at the .05 level. Thus, the mean yield was significantly related to the amount of grain stored on the farm. Soybean producers who stored grain on the farm tend to have higher yields.

How was soybeans marketed. Ninety-two (9.8 percent) of the producers surveyed reported they sold soybeans before harvest and had a mean yield of 32.4 bushels per acre. Five hundred eighty-six (62.1 percent) producers sold soybeans after harvest and had a mean yield of 30.2 bushels per acre. When tested by the F test, there was a significant difference in mean yield as it related to how soybeans were marketed. Producers who sold soybeans before harvest tended to have higher yields.

Table Summary

Findings revealed a significant relationship between yields and use of 38 out of 54 production practices by soybean producers. All the seedbed preparation and seed treatment practices and fertilization practices were significantly related to yields. Producers fertilizing and liming their soybean land by soil test had higher per acre yield than those not using soil tests. There was no significant difference between soybean yields and all variables regarding insect control.

III. RELATIONSHIPS BETWEEN THE NUMBER OF ACRES HARVESTED AND PRODUCTION PRACTICES USED BY TENNESSEE SOYBEAN PRODUCERS

Table III presents data indicating relationships between the number of acres harvested and production practices used by producers. The purpose of the analysis was to determine relationships between the total number of acres harvested and the use of certain production practices. The variables are grouped under the following subheadings: (1) varieties planted, (2) seedbed preparation and treatment, (3) planting dates and rates, (4) fertilization, (5) insect control, (6) disease and nematode control, (7) weed control, (8) harvesting, storing, and marketing, and (9) Extension contacts.

Varieties Planted

The variables included in this subsection are: (1) early varieties, (2) medium varieties, and (3) late varieties.

TABLE III. Relationships Between the Number of Acres Harvested and Production Practices Used by Tennessee Soybean Producers

Name of Variable	Number of Acres Harvested: Under 200 No.	Under 200 Percent	200-Over No.	200-Over Percent
VARIETIES PLANTED				
Early Varieties				
Mitchell	13	4.4	18	4.4
Essex	249	84.4	326	80.5
Nathan	28	9.5	58	14.4
Other	5	1.7	3	.7
TOTAL	295	100.0	405	100.0
Chi-Square Test $x^2 = 4.92$; df = 3; p = 0.178				
Medium Varieties				
Asgrow A5474	11	2.5	29	5.6
Bay	30	6.7	59	11.4
Bedford	90	20.1	170	32.8
Dare	3	.7	5	1.0
Forrest	98	21.9	150	29.0
McNair 500	1	.2	1	.2
York	48	10.7	40	7.7
Other	166	37.1	64	12.4
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 94.83$; df = 8; p = .001				
Late Varieties				
Centennial	22	31.9	92	57.1
Coker 136	1	1.4	5	3.1
Lee	20	29.0	15	9.3
Pickett 71	16	23.2	22	13.7
RA604	4	5.8	4	2.5
Bragg	4	5.8	23	14.3
Other	2	2.9	0	0.0
TOTAL	69	100.0	161	100.0
Chi-Square Test $x^2 = 30.81$; df = 6; p = 0.001				
SEEDBED PREPARATION AND TREATMENT				
Major Equipment Used				
Plow	130	29.3	65	12.6
Disk	163	36.7	198	38.4
Chisel plow	97	21.8	179	34.8
No-till planter	51	11.5	65	12.6
Other	3	.7	8	1.6
TOTAL	444	100.0	515	100.0
Chi-Square Test $x^2 = 48.39$; df = 4; p = 0.001				
Used Inoculation on Seed				
Not needed	170	38.5	194	37.8
Needed but not used	30	6.8	14	2.7
Applied on part	101	22.8	144	28.0
Applied on all	141	31.9	162	31.5
TOTAL	442	100.0	514	100.0
Chi-Square Test $x^2 = 11.04$; df = 3; p = 0.012				
Used Fungicide on Seed				
None	285	65.6	237	46.2
Part	42	9.7	120	23.4
All	107	24.7	156	30.4
TOTAL	434	100.0	513	100.0
Chi-Square Test $x^2 = 44.82$; df = 2; p = 0.001				
Used Molybdenum on Seed				
Not needed	134	30.3	103	20.0
Needed but not applied	43	9.7	42	8.2
Applied as needed	266	60.0	369	71.8
TOTAL	443	100.0	514	100.0
Chi-Square Test $x^2 = 15.59$; df = 2; p = 0.001				
Used Certified Seed				
No	109	25.3	134	26.8
Yes, part	254	59.1	306	61.2
Yes, all	67	15.6	60	12.0
TOTAL	430	100.0	500	100.0
Chi-Square Test $x^2 = 2.53$; df = 2; p = 0.282				

TABLE III (Continued)

Name of Variable	Number of Acres Harvested: Under 200 No.	Under 200 Percent	200-Over No.	200-Over Percent
PLANTING DATES AND RATES				
Single Crop Planting Dates				
None, single crop	56	12.5	23	4.4
Before April 25	11	2.5	18	2.5
April 25 to June 15	353	79.0	455	87.8
After June 15	27	6.0	22	4.3
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 23.77$; df = 3; p = 0.011				
Double Crop Planting Dates				
None, double crop	196	43.8	84	16.2
Before June 15	17	3.8	19	3.7
June 15 to July 1	216	48.3	368	71.0
After July 1	18	4.1	47	9.1
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 92.69$; df = 3; p = 0.001				
Row Width Used in Conventional Practice				
None, conventional row width	67	15.8	58	12.3
Under 32 inches	31	7.4	94	19.7
32-36 inches	116	27.4	113	23.7
Over 36 inches	209	49.4	211	44.3
TOTAL	423	100.0	476	100.0
Chi-Square Test $x^2 = 29.43$; df = 3; p = 0.001				
Seed/Ft. of Row in Conventional Practice				
None, conventional	108	24.2	102	19.7
6 seed or less	14	3.1	27	5.2
7 to 9 seed	77	17.2	100	19.3
10 seed	105	23.5	124	23.9
11-12 seed	127	28.4	144	27.8
13 seed and over	16	3.6	21	4.1
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 5.41$; df = 5; p = 0.368				
Pounds of Seed Broadcast/Acre				
None broadcast	332	74.3	318	61.4
Under 60 pounds	42	9.4	44	8.5
60 pounds	34	7.6	75	14.5
61-75 pounds	16	3.6	41	7.9
76 pounds and over	23	5.1	40	7.7
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 26.24$; df = 4; p = 0.001				
Row Width Used in No-Till Practice				
None, no-till	323	72.3	278	53.7
16 inches and less	38	8.5	59	11.4
17-19 inches	36	8.1	65	12.5
20-29 inches	19	4.3	56	10.8
30 inches and over	31	6.9	60	11.6
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 38.72$; df = 4; p = 0.001				
Seed/Ft. in No-Till Practice				
None, no-till	334	74.7	306	59.1
6 or less	18	4.0	39	7.5
7-9	54	12.1	88	17.0
10-12	36	8.1	70	13.5
13 and over	5	1.1	15	2.9
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 27.94$; df = 4; p = 0.001				
FERTILIZATION				
Acres Fertilized According to Soil Test				
Not any	212	47.4	212	40.9
50 or less	83	18.6	8	1.5
51-100	92	20.6	31	6.0
101 and over	60	13.5	267	52.6
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 283.85$; df = 4; p = 0.001				

TABLE III (Continued)

Name of Variable	Number of Acres Harvested: Under 200 — No.	Under 200 — Percent	200-Over — No.	200-Over — Percent
Acres Limed According to Soil Test				
Not any	246	55.0	215	41.5
50 or less	92	20.6	29	5.6
51-100	75	16.8	68	13.1
101 and over	34	7.6	206	39.8
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 181.11$; df = 4; p = 0.001				
Pounds of Nitrogen/Acre Without Soil Test				
Not any	275	61.5	386	74.5
1-10 pounds	83	18.6	59	11.4
11-20 pounds	65	14.5	55	10.6
21 pounds and over	24	5.4	18	3.5
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 19.27$; df = 3; p = 0.001				
Pounds of Phosphate/Acre Without Soil Test				
Not any	158	35.3	197	38.0
20 pounds or less	53	11.9	31	6.0
21-30 pounds	46	10.3	34	6.6
31-40 pounds	98	21.9	104	20.1
41-60 pounds	73	16.3	124	23.9
61-150 pounds	19	4.3	28	5.4
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 21.85$; df = 5; p = 0.001				
Pounds of Potash/Acre Without Soil Test				
Not any	146	32.7	174	33.6
39 pounds or less	88	19.7	36	6.9
40-59 pounds	121	27.1	142	27.4
60 pounds	54	12.1	119	23.0
61 pounds and over	38	8.5	47	9.1
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 46.34$; df = 4; p = 0.001				
INSECT CONTROL				
Were Foliage Insect a Problem				
No	371	83.0	404	78.0
Yes	76	17.0	114	22.0
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 3.49$; df = 1; p = 0.062				
Were Pod Feeding Insect a Problem				
No	415	92.8	428	82.6
Yes	32	7.2	90	17.4
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 21.76$; df = 1; p = 0.001				
Were Stem Feeding Insect a Problem				
No	434	97.1	500	96.5
Yes	13	2.9	18	3.5
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 0.10$; df = 1; p = 0.753				
DISEASE AND NEMATODE CONTROL				
Planted Disease Free Seed to Control Disease				
Do not know	119	26.6	113	21.8
No	95	21.3	117	22.6
Yes	233	51.1	288	55.6
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 3.04$; df = 2; p = 0.219				
Planted Seed Treated with Fungicide				
No	303	67.8	275	53.1
Yes	144	32.2	243	46.9
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 20.97$; df = 1; p = 0.001				

TABLE III (Continued)

Name of Variable	Number of Acres Harvested: Under 200 No.	Under 200 Percent	200-Over No.	200-Over Percent
Used Crop Rotation to Control Disease				
No	192	43.0	204	39.4
Yes	255	57.0	314	60.6
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 1.12$; df = 1; p = 0.290				
Used Disease Resistant Varieties				
Do not know	203	45.4	167	32.2
No	98	21.9	104	20.1
Yes	146	32.7	247	47.7
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 24.55$; df = 2; p = 0.001				
Used Crop Rotation to Control Cyst Nematodes				
No	236	52.8	212	40.9
Yes	211	47.2	306	59.1
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 13.12$; df = 1; p = 0.001				
Used Resistant Varieties to Control Cyst Nematodes				
Does not apply	145	32.4	112	21.6
No	108	24.2	71	13.7
Yes	194	43.4	335	64.7
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 44.49$; df = 2; p = 0.001				
Used Chemicals to Control Cyst Nematodes				
No	423	94.6	472	91.1
Yes	24	5.4	46	8.9
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 3.89$; df = 1; p = 0.049				
WEED CONTROL				
Used Rotation with Cotton or Corn				
No	189	42.3	210	40.5
Yes	258	57.7	308	59.5
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 0.23$; df = 1; p = 0.630				
Used Rotary Hoeing				
No	418	93.5	407	78.6
Yes	29	6.5	111	21.4
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 41.99$; df = 1; p = 0.001				
Used Cultivation				
No	126	28.2	142	27.4
Yes	321	71.8	276	72.6
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 0.04$; df = 1 ; p = 0.845				
Applied Preplant Chemical				
No	128	28.6	70	13.5
Yes	319	71.4	448	86.5
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 32.72$; df = 1; p = 0.001				
Applied Preemergence Chemicals				
No	248	55.5	203	39.2
Yes	199	44.5	315	60.8
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 24.93$; df = 1; p = 0.001				
Applied Postemergence Chemicals				
No	162	36.2	43	8.3
Yes	285	63.8	475	91.7
TOTAL	447	100.0	518	100.0
Chi-Square Test $x^2 = 110.30$; df = 1; p = 0.001				

TABLE III (Continued)

Name of Variable	Number of Acres Harvested: Under 200 No.	Under 200 Percent	200-Over No.	200-Over Percent
HARVESTING, STORING, AND MARKETING				
Moisture Content at Harvesting				
Do not know	87	19.5	25	4.8
Above 12 percent on all of crop	58	13.0	65	12.5
Above 12 percent on part of crop	174	38.9	326	62.9
12 percent or below on all of crop	128	28.6	102	19.7
TOTAL	447	100.0	518	100.0
Chi-Square Test x^2 = 79.07; df = 3; p = 0.001				
Was Harvesting Loss a Major Problem				
No	407	91.1	447	86.3
Yes	40	8.9	71	13.7
TOTAL	447	100.0	518	100.0
Chi-Square Test x^2 = 4.88; df = 1; p = 0.027				
Was the Amount of Harvesting Loss Checked				
No	294	65.8	232	44.8
Yes	153	34.2	286	55.2
TOTAL	447	100.0	518	100.0
Chi-Square Test x^2 = 41.77; df = 1; p = 0.001				
Amount of Grain Stored on Farm				
None	297	66.4	153	29.5
Part	84	18.8	250	48.3
All	66	14.8	115	22.2
TOTAL	447	100.0	518	100.0
Chi-Square Test x^2 = 137.37; df = 2; p = 0.001				
How was Soybeans Marketed				
Sold before harvest	27	6.1	65	12.8
Sold after harvest	327	74.3	263	51.9
Stored	86	19.5	179	35.3
TOTAL	440	100.0	507	100.0
Chi-Square Test x^2 = 50.79; df = 2; p = 0.001				
Yield Bushels/Acre				
Under 25	60	13.5	56	10.9
25-30	171	38.4	233	45.2
31-40	179	40.2	208	40.3
41-56	35	7.9	19	3.7
TOTAL	445	100.0	516	100.0
Chi-Square Test x^2 = 11.38; df = 3; p = 0.010				

Early varieties. Over 98 percent of the soybean producers who harvested under 200 acres planted recommended early varieties, while over 99 percent of the producers who harvested over 200 acres planted recommended early varieties. The early variety planted was not significantly related to acres of wheat harvested. A high percentage (over 80 percent) of all producers who planted an early variety were using the Essex variety.

Medium varieties. Almost 63 percent of the soybean producers who harvested under 200 acres planted recommended medium varieties, whereas 88 percent of the producers who harvested over 200 acres planted recommended medium varieties. The number of acres of soybeans harvested was significantly related to the medium variety planted. The larger producers were more likely than the smaller producers to be using a recommended middle season variety. Forrest and Bedford were the most popular medium varieties by all producers.

Late varieties. Ninety seven percent of the producers who harvested under 200 acres planted recommended late varieties, whereas 100 percent of the producers who harvested over 200 acres planted recommended late varieties. Although relatively few producers planted a late variety, the Centennial variety was planted by over 57 percent of the producers who harvested 200 or more acres compared to almost 32 percent of those who harvested under 200 acres. Lee and Pickett were popular late varieties among the producers with fewer acres. The late variety planted was significantly related to acres harvested.

Seedbed Preparation and Treatment

The variables included in this subsection are: (1) major equipment, (2) inoculation on seed, (3) fungicide on seed, (4) molybdenum on seed, and (5) certified seed.

Major equipment. Of the soybean producers who harvested under 200 acres, over 29 percent were using the plow and almost 22 percent were using the chisel plow as the major equipment used in preparing the seedbed. Whereas, of the producers harvesting over 200 acres, less than 13 percent were using the plow and over 34 percent were using the chisel plow as the major equipment in preparing the seedbed. The number of acres harvested was significantly related to the major equipment used in seedbed preparation. Data indicated that a high proportion of the producers harvesting under 200 acres were using the plow and the chisel plow was used more frequently by producers harvesting over 200 acres of soybeans.

Used inoculation on seed. A higher percentage, (6.8 percent) of the producers harvesting under 200 acres than of those harvesting over 200 acres (2.7 percent) did not use inoculation on seed when it was needed. About one-third of all producers used inoculant on all their soybean seeds. The number of acres harvested was significantly related to the use of an inoculant on seed. Producers harvesting more acres were more likely to be using seed inoculation.

Used fungicide on seed. Nearly 10 percent of the producers who harvested under 200 acres used a fungicide on part of the seed planted, whereas over 23 percent of the producers who harvested over 200 acres

used a fungicide on part of seed. Almost 66 percent of the producers who harvested under 200 acres were not using a fungicide on any seed, whereas just over 46 percent of the producers who harvested over 200 acres were not using a fungicide on any seed. The number of acres harvested was significantly related to the use of a fungicide on seed at planting. A higher proportion of the larger producers were using a fungicide on seed at planting as compared to smaller producers.

Used molybdenum on seed. Sixty percent of producers who harvested under 200 acres applied molybdenum on seed as it was needed, while over 71 percent of the producers who harvested over 200 acres applied molybdenum on seed as needed. The number of acres harvested was significantly related to the use of molybdenum on seed. The data indicated that a higher proportion of producers harvesting over 200 acres used the recommended practice of applying molybdenum as needed.

Used certified seed. Almost 75 percent of the producers who harvested under 200 acres were planting certified seed, whereas over 73 percent of the producers who harvested over 200 acres were planting certified seed. These differences, however, were not significant at the .05 level.

Planting Dates and Rates

The variables included in this subsection are: (1) single crop planting dates, (2) double crop planting dates, (3) row width used in conventional practice, (4) seed per foot of row in conventional

practice, (5) pounds of seed broadcast per acre, (6) row width used in no-till practice, and (7) seed per foot of row in no-till practice.

Single crop planting dates. Almost 82 percent of the producers who harvested under 200 acres planted the single crop soybeans before June 15, while over 91 percent of the producers who harvested over 200 acres planted the single crop soybeans before June 15. The number of acres harvested was significantly related to the planting dates of single crop soybeans. Data indicated that the larger producers were more likely than smaller producers to plant soybeans during the recommended time period (April 15 to June 15).

Double crop planting dates. Almost 52 percent of the soybean producers who harvested under 200 acres planted double crop soybeans before July 1, while over 75 percent of the producers who harvested over 200 acres planted double crop soybeans before July 1. The number of acres harvested was significantly related to the planting of double crop soybeans. Data indicated that a larger proportion of producers who harvested over 200 acres than those who harvested fewer acres planted double crop soybeans before July 1.

Row width used in conventional practice. Over 7 percent of the producers who harvested under 200 acres were using under 32 inch row width in conventional practices, while almost 20 percent of the producers who harvested over 200 acres were using under 32 inch row widths in conventional practice. Almost 50 percent of the producers who harvested under 200 acres were using row width over 36 inches,

while only about 44 percent of the producers who harvested over 200 acres were using row width over 36 inches. The number of acres harvested was significantly related to width of row used in conventional practice. Data indicated that larger producers were more likely than smaller producers to use narrower width of row in conventional practice.

Seed per foot of row in conventional practice. About 69 percent of the producers who were harvesting under 200 acres, compared to 71 percent of those harvesting over 200 acres, were planting between 7 and 12 seed per foot of row in conventional practice. The number of acres harvested was not significantly related to the number of seeds producers planted per foot of row in conventional practice.

Pounds of seed broadcast per acre. About 25 percent of the producers who harvested under 200 acres compared to almost 39 percent of those who harvested over 200 acres used the broadcast method of planting seeds. About 11 percent of the smaller producers compared to 22 percent of those harvesting 200 acres used between 60 and 75 pounds of seed per acre. The number of acres harvested was significantly related to the pounds of seed broadcast per acre. Larger producers were less likely than smaller producers to broadcast soybeans but were more likely to use more pounds of seed per acre.

Row width used in no-till practice. Over 12 percent of the producers who harvested under 200 acres were using a row width between 17 and 29 inches compared to over 23 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly

related to the width of row used by producers in no-till practice. A higher proportion of producers who harvested over 200 acres than those harvesting under 200 acres were using rowth width between 17 and 29 inches in no-till practice.

Seed per foot in no-till practice. About 20 percent of the producers who harvested under 200 acres were planting between 7 and 12 seed per foot in no-till practice compared to almost 31 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly related to the number of seed planted per foot of row in no-till practice. Larger soybean producers were planting more seed per foot of row in no-till operations than were the smaller producers.

Fertilization

The variables included in this subsection are: (1) acres fertilized according to soil test, (2) acres limed according to soil test, (3) pounds of nitrogen applied per acre without soil test, (4) pounds of phosphate applied per acre without soil test, and (5) pound of potash applied per acre without soil test.

Acres fertilized according to soil test. Nearly 19 percent of the soybean producers who were harvesting under 200 acres were fertilizing 50 acres or less according to soil test, compared to only about 2 percent of the soybean producers who were harvesting over 200 acres. Less than 14 percent of the soybean producers who were harvesting under 200 acres were fertilizing over 100 acres according

to soil test, compared to almost 53 percent of the soybean producers who harvested over 200 acres. As expected, the number of acres harvested was significantly related to the number of acres fertilized according to soil test. Larger producers were fertilizing more acres of soybeans by soil test than were the smaller producers.

Acres limed according to soil test. Almost 21 percent of the producers who harvested under 200 acres were liming 50 acres or less according to soil test, compared to only about 6 percent of the producers who harvested over 200 acres. Less than 8 percent of the producers who harvested under 200 acres limed over 100 acres, compared to almost 40 percent of those harvesting over 200 acres of soybeans. The number of acres harvested was significantly related to number of acres limed according to soil test. Larger producers were liming more acres of soybean land by soil test than were the smaller producers.

Pounds of nitrogen applied per acre without soil test. Almost 62 percent of the producers who harvested under 200 acres were not applying any nitrogen without soil test, while nearly 75 percent of the producers who harvested over 200 acres were not applying any nitrogen without soil test. The number of acres harvested was significantly related to the pounds of nitrogen applied per acre without a soil test. A higher proportion of producers who harvested over 200 acres were not applying any nitrogen per acre without a soil test, as compared to producers who harvested under 200 acres.

Pounds of phosphate applied per acre without soil test. Almost 12 percent of the producers who harvested under 200 acres were applying less than 21 pounds of phosphate per acre without a soil test, while 6 percent of the producers who harvested over 200 acres were applying less than 21 pounds of phosphate per acre without a soil test. Over 16 percent of the producers who harvested under 200 acres were applying between 41 and 60 pounds of phosphate per acre without a soil test, whereas almost 24 percent of the producers who harvested over 200 acres were applying between 41 and 60 pounds of phosphate per acre without a soil test. The number of acres harvested was significantly related to the pounds of phosphate applied per acre without a soil test. Data indicated that a higher proportion of the producers who harvested over 200 acres were applying over 40 pounds of phosphate per acre without a soil test.

Pounds of potash per acre without soil test. Almost 20 percent of the producers who harvested under 200 acres were applying less than 40 pounds of potash per acre without a soil test, while almost 7 percent of the producers who harvested over 200 acres were applying less than 40 pounds of potash per acre without a soil test. Only about 12 percent of the producers who harvested under 200 acres were applying 60 pounds of potash per acre without a soil test, while 23 percent of the producers who harvested over 200 acres were applying 60 pounds of potash per acre without a soil test. The number of acres harvested was significantly related to the pounds of potash applied per acre

without a soil test. A higher proportion of the producers who harvested over 200 acres were applying 60 or more pounds of potash per acre without a soil test, as compared to producers who harvested under 200 acres.

Insect Control

The variables included in this subsection are: (1) were foliage insect a problem, (2) were pod feeding insect a problem, and (3) were stem feeding insect a problem.

Were foliage insect a problem. Eighty three percent of the producres who harvested under 200 acres indicated that foliage insects were not a problem, while 78 percent of the producers who harvested over 200 acres indicated that foliage insects were not a problem. The number of acres harvested was not significantly related to the problem of foliage insect.

Were pod feeding insect a problem. Almost 93 percent of the producers who harvested under 200 acres indicated that pod feeding insects were not a problem, while only about 83 percent of the producers who harvested over 200 acres indicated that pod feeding insects were not a problem. The number of acres harvested was significantly related to the problem of pod feeding insects. A higher proportion of producers who harvested under 200 acres were not having a problem with pod feeding insects compared to the producers who harvested over 200 acres.

Were stem feeding insect a problem. Over 97 percent of the producers who harvested under 200 acres indicated that stem feeding insects were not a problem, while almost an equal percentage (96.5 percent) of the producers who harvested over 200 acres indicated that stem feeding insects were not a problem. The number of acres harvested was not significantly related to the problem of stem feeding insects.

Disease and Nematode Control

Eight variables were studied relating to soybean diseases and nematode control. These variables dealt with whether or not producers: (1) planted disease free seed, (2) planted seed treated with fungicide, (3) used crop rotation to control disease, (4) used disease resistant varieties, (5) used crop rotation, (6) used crop rotation to control nematodes, (7) used resistant varieties to control nematodes, and (8) used chemicals to control cyst nematodes.

Planted disease free seed to control disease. Over 52 percent of the producers who harvested under 200 acres planted disease free seed to help control disease, compared to almost 56 percent of the producers who harvested over 200 acres. The number of acres harvested was not significantly related to planting disease free seed to help control disease.

Planted seed treated with fungicide. Over 32 percent of the producers who harvested under 200 acres planted seed treated with a fungicide, compared to almost 50 percent of the producers who harvested

over 200 acres. The number of acres harvested was significantly related to planting seed treated with fungicide. A higher proportion of producers who harvested over 200 acres were planting seed treated with fungicide as compared to producers who harvested under 200 acres.

Used crop rotation to control disease. Fifty-seven percent of producers who harvested under 200 acres used crop rotation to help control disease compared to almost 61 percent of the producers who harvested over 200 acres. The number of acres harvested was not significantly related to using crop rotation to help control disease.

Used disease resistant varieties. Almost 33 percent of producers who harvested under 200 acres planted varieties of seed resistant to disease compared to almost 48 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly related to planting varieties of seed resistant to disease. A higher proportion of the producers who harvested over 200 acres were planting varieties of seed resistant to disease as compared to the producers who harvested under 200 acres.

Used crop rotation to control cyst nematodes. Over 47 percent of the producers who harvested under 200 acres used crop rotation to control cyst nematodes, compared to over 59 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly related to using crop rotation to control cyst nematodes. A higher proportion of the producers who harvested over 200 acres were using crop rotation to control cyst nematode compared to the producers who harvested under 200 acres.

Used resistant varieties to control cyst nematodes. Only 43 percent of the producers who harvested under 200 acres were using resistant varieties to control cyst nematodes compared to over 64 percent of the producers who harvested over 200 acres. The number of acres of soybeans harvested was significantly related to the use of resistant varieties to control cyst nematodes. A higher proportion of the larger producers were using resistant varieties to control cyst nematodes as compared to smaller producers.

Used chemicals to control cyst nematodes. About 5 percent of the producers who harvested under 200 acres were using chemicals to control cyst nematodes compared to almost 9 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly related to the use of chemicals to control cyst nematodes. Larger producers were more likely than smaller producers to be using chemicals to control cyst nematodes.

Weed Control

The variables included in this section dealt with whether or not soybean producers: (1) used rotation with cotton or corn to control weed, (2) used rotary hoeing to control weeds, (3) used cultivation to control weeds, (4) applied preplant chemicals to control weed, (5) applied preemergence chemicals to control weeds, and (6) applied post-emergence chemicals to control weeds.

Used rotation with cotton or corn to control weeds. Almost 58 percent of the producers who harvested under 200 acres were using

rotation with cotton or corn to control weeds compared to over 59 percent of the producers who harvested over 200 acres. These differences were not significant therefore the number of acres harvested was not significantly related to the use of rotation with cotton or corn to control weeds.

Used rotary hoeing to control weeds. Almost 7 percent of the producers who harvested under 200 acres of soybeans used rotary hoeing to control weeds compared to over 21 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly related to the use of rotary hoeing to control weeds. The data indicated that a higher proportion of the larger producers than of the smaller producers used rotary hoeing to control weeds.

Used cultivation to control weeds. Almost 72 percent of the producers who harvested under 200 acres used cultivation to control weeds compared to almost 73 percent of the producers who harvested over 200 acres. The number of acres harvested was not significantly related to the use of cultivation to control weeds.

Applied preplant chemical to control weeds. Only 71 percent of the producers who harvested under 200 acres applied preplant chemicals to control weeds compared to almost 87 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly related to applying preplant chemical to control weeds. The data indicated that a higher proportion of the larger producers than of the smaller producers applied preplant chemicals.

Applied preemergence chemicals. Over 44 percent of the producers who harvested under 200 acres were applying preemergence chemicals to control weeds compared to almost 61 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly related to applying preemergence chemicals to control weeds. The data indicated that a higher proportion of the larger producers than of the smaller producers applied postemergence chemicals to control weeds.

Harvesting, Storing, and Marketing

The variables included in this subsection are: (1) moisture content at harvesting, (2) was harvesting loss a major problem, (3) was the amount of harvesting loss checked, (4) amount of grain stored on farm, (5) how was soybeans marketed, and (6) yield-bushels per acre.

Moisture content at harvesting. Almost 29 percent of the producers who harvested under 200 acres were harvesting with the moisture content 12 percent or below compared to only 20 percent of the producers who harvested over 200 acres. Twenty percent of the producers who harvested under 200 acres did not know the moisture content at harvesting compared to only 5 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly related to moisture content at harvesting. The data indicated that a higher proportion of the smaller than of the larger producers responded that moisture content at harvesting was 12 percent or below.

Was harvesting loss a major problem. Ninety-one percent of the producers who harvested under 200 acres indicated that harvesting loss was not a major problem compared to 86 percent of the producers who harvested over 200 acres. The number of acres harvested was significantly related to harvesting loss being a major problem. A higher proportion of the larger producers than of the smaller producers felt that harvesting loss was a major problem.

Was the amount of harvesting loss checked. Fifty-five percent of the producers harvesting over 200 acres compared to about 34 percent of those harvesting under 200 acres checked the amount of their harvesting loss. These differences were significant. Larger producers were more likely than the smaller producers to check the amount of soybean harvest loss.

Amount of grain stored on farm. Almost 71 percent of the soybean producers who harvested over 200 acres compared to about 33 percent of those harvesting under 200 acres were storing part or all of their soybeans on their farm. These differences were significant. Larger producers were more likely than smaller producers to store soybeans on their farm.

How was soybeans marketed. Almost 75 percent of the smaller producers compared to about 52 percent of the larger producers sold soybeans after harvest. Acres harvested was significantly related to how soybeans were marketed. Larger producers were more likely than

smaller producers to either sell soybeans before harvest and/or store soybeans on the farm for later sales.

Yield in bushels per acre. A higher proportion of the smaller producers (13.5 percent) as compared to the larger producers (10.9 percent) had a soybean yield of under 25 bushels per acre. This was also true in the high yield category, above 40 bushels. Almost 8 percent of the smaller producers compared to under 4 percent of the larger producers had an average soybean yield of above 40 bushels per acre. The Chi-square test indicates a significant relationship between acres of soybeans harvested and yield per acre. However, the direction of relationship (e.g., who had the highest yield) was not conclusive.

Table Summary

Significant relationships existed between the number of acres harvested and each of the fertilization practices and harvesting, storing, and marketing practices. As the number of acres harvested increased, the percent fertilizing and liming according to soil test increased, the percent storing grain on farm increased, the percent sold before harvest increased, and yield per acre of soybeans harvested also increased with acreage grown.

Other selected production practices significantly related to the number of acres harvested were major equipment used in seedbed preparation, use of molybdenum on seed, planting date of single crop and double crop soybeans, row width used in conventional practice, seed planted per foot in no-till practice, and used resistant varieties to control cyst nematodes.

Nine of the 42 production practices used by Tennessee soybean producers were not significantly related to the number of acres harvested.

IV. RELATIONSHIPS BETWEEN NUMBER OF EXTENSION CONTACTS AND PRODUCTION PRACTICES USED BY TENNESSEE SOYBEAN PRODUCERS

Table IV presents data indicating relationships between the total number of Extension contacts within the past 12 months and production practices used by producers. The purpose of the analysis was to determine the relationships between the total number of Extension contacts within the past 12 months and the use of selected soybean production practices. The variables are classified under the following subheadings: (1) seed preparation and treatment, (2) planting dates and rates, (3) fertilization, (4) insect control, (5) disease and nematode control, (6) weed control, and (7) harvesting, storing and marketing. The Chi-square test was used to determine significant relationships between variables.

Seed Preparation and Treatment

The variables included in this subsection are: (1) inoculation on seed, (2) fungicide on seed, (3) molybdenum on seed, and (4) certified seed.

Used inoculation on seed. Twenty percent of the producers who had no Extension contacts in the past 12 months used an inoculant on

TABLE IV. Relationships Between the Number of Extension Contacts and Production Practices Used by Tennessee Soybean Producers

Production Practice	Extension Contacts: Not Any No.	Not Any Percent	1-9 No.	1-9 Percent	10-Over No.	10-Over Percent
SEED PREPARATION AND TREATMENT						
Used Inoculation on Seed						
Not needed	26	33.8	177	43.9	146	34.0
Needed--not used	9	11.7	19	4.7	11	2.6
Applied on part	25	32.5	116	28.8	98	22.8
Applied on all	17	22.0	91	22.6	174	40.6
TOTAL	77	100.0	403	100.0	429	100.0
Chi-Square Test $x^2 = 46.56$; df = 6; p = 0.001						
Used Fungicide on Seed						
None	50	64.9	240	60.5	202	47.4
Part	13	16.9	84	21.1	63	14.8
All	14	18.2	73	18.4	161	37.8
TOTAL	77	100.0	397	100.0	426	100.0
Chi-Square Text $x^2 = 43.51$; df = 4; p = 0.001						
Used Molybdenum on Seed						
Not needed	29	37.2	116	28.6	87	20.4
Needed--not applied	10	12.8	36	8.9	29	6.8
Applied as needed	39	50.0	253	62.5	310	72.8
TOTAL	78	100.0	405	100.0	426	100.0
Chi-Square Test $x^2 = 20.01$; df = 4; p = 0.001						
Used Certified Seed						
No	18	25.7	105	26.6	110	26.3
Yes, part	43	61.4	256	64.8	235	56.2
Yes, all	9	12.9	34	8.6	73	17.5
TOTAL	70	100.0	395	100.0	418	100.0
Chi-Square Test $x^2 = 14.64$; df = 4; p = 0.005						
PLANTING DATES AND RATES						
Single Crop Planting Dates						
None, single crop	3	3.8	32	7.8	39	9.1
Before April 25	6	7.7	9	2.2	12	2.8
April 25 to June 15	61	78.2	349	85.4	360	83.7
After June 15	8	10.3	19	4.6	19	4.4
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 14.15$; df = 6; p = 0.028						
Double Crop Planting Dates						
None, double crop	34	43.6	129	31.5	102	23.7
Before June 15	2	2.6	14	3.4	19	4.4
June 15 to July 1	33	42.3	242	59.2	280	65.1
After July 1	9	11.5	24	5.9	29	6.7
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 20.71$; df = 6; p = 0.002						

TABLE IV (Continued)

Production Practice	Extension Contacts: Not Any No.	Not Any Percent	1-9 No.	1-9 Percent	10-Over No.	10-Over Percent
Row Width Used in Conventional Practice						
None, conventional row width	9	12.5	51	13.4	59	14.7
Under 32 inches	10	13.9	58	15.3	56	13.9
32-36 inches	16	22.2	94	24.7	102	25.4
Over 36 inches	37	51.4	177	46.6	185	46.0
TOTAL	72	100.0	380	100.0	402	100.0
Chi-Square Test $x^2 = 1.22$; df = 6; p = 0.976						
Seed/Ft. of Row in Conventional Practice						
None, conventional	32	41.0	74	18.1	97	22.6
6 or less	7	9.0	15	3.7	17	4.0
7-9	8	10.3	94	23.0	63	14.7
10	11	14.1	84	20.5	123	28.6
11-12	17	21.8	122	29.8	118	27.4
13 and over	3	3.8	20	4.9	12	2.8
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 44.18$; df = 10; p = 0.001						
Pounds of Seed Broadcast/Acre						
None broadcast	64	82.1	299	73.1	250	58.1
Under 60	3	3.8	20	4.9	57	13.3
60	4	5.1	38	9.3	65	15.1
61-75	4	5.1	20	4.9	30	7.0
76 and over	3	3.8	32	7.8	28	6.5
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 41.63$; df = 8; p = 0.001						
Row Width Used in No-Till Practice						
None, no-till	59	75.6	272	66.5	243	56.5
16 inches or less	6	7.7	28	6.8	55	12.8
17-19 inches	3	3.8	50	12.2	44	10.2
20-29 inches	9	11.5	20	4.9	39	9.1
30 inches and over	1	1.3	39	9.5	49	11.4
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 31.96$; df = 8; p = 0.001						
Seed/Ft. in No-Till Practice						
None, no-till	71	91.0	286	69.9	257	59.8
6 or less	3	3.8	17	4.2	32	7.4
7-9	2	2.6	66	16.1	62	14.4
10-12	1	1.3	35	8.6	66	15.3
13 and over	1	1.3	5	1.2	13	3.0
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 43.30$; df = 8; p = 0.001						
FERTILIZATION						
Acres Fertilized According to Soil Test						
Not any	56	71.8	203	49.6	141	32.8
50 or less	4	5.1	42	10.3	41	9.5
51-100	5	6.4	56	13.7	56	13.0
101-200	8	10.3	56	13.7	53	12.3
201 and over	5	6.4	52	12.7	139	32.3
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 81.12$; df = 8; p = 0.001						

TABLE IV (Continued)

Production Practice	Extension Contacts: Not Any No.	Not Any Percent	1-9 No.	1-9 Percent	10-Over No.	10-Over Percent
Acres Limed According to Soil Test						
Not any	57	73.1	221	54.0	157	36.5
50 or less	4	5.1	54	13.2	58	13.5
51-100	12	15.4	61	14.9	65	15.1
101-200	2	2.6	37	9.0	47	10.9
201 and over	3	3.8	36	8.8	103	24.0
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 72.77$; df = 8; p = 0.001						
Pounds of Nitrogen/Acre Without Soil Test						
Not any	44	56.4	271	66.3	311	72.3
1-10	16	20.5	62	15.2	57	13.3
11-20	15	19.2	57	13.9	44	10.2
21 and over	3	3.8	19	4.6	18	4.2
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 10.69$; df = 6; p = 0.099						
Pounds of Phosphate/Acre Without Soil Test						
20 or less	19	24.4	126	30.8	184	42.8
21-30	6	7.7	35	8.6	41	9.5
31-40	11	14.1	35	8.6	30	7.0
41-60	16	20.5	102	24.9	80	18.6
61-150	23	29.5	92	22.5	72	16.7
Over 150	3	3.8	19	4.6	23	5.3
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 27.23$; df = 10; p = 0.002						
Pounds of Potash/Acre Without Soil Test						
Not any	19	24.4	112	27.4	169	39.3
1 to 39	15	19.2	51	12.5	53	12.3
40 to 59	23	29.5	133	32.5	101	23.5
60	14	17.9	77	18.8	69	16.0
61 and over	7	9.0	36	8.8	38	8.8
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 20.60$; df = 8; p = 0.008						
DISEASE AND NEMATODE CONTROL						
Planted Disease Free Seed to Control Disease						
Do not know	25	32.1	103	25.2	98	22.8
No	9	11.5	94	23.0	97	22.6
Yes	44	56.4	212	51.8	235	54.7
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 6.97$; df = 4; p = 0.138						
Used Crop Rotation to Control Disease						
No	33	42.3	170	41.6	169	39.3
Yes	45	57.7	239	58.4	261	60.7
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 0.55$; df = 2; p = 0.759						

TABLE IV (Continued)

Production Practice	Extension Contacts: Not Any No.	Not Any Percent	1-9 No.	1-9 Percent	10-Over No.	10-Over Percent
Used Disease Resistant Varieties to Control Disease						
Do not know	43	55.1	181	44.3	124	28.8
No	9	11.5	84	20.5	101	23.5
Yes	26	33.3	144	35.2	205	47.7
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 33.51$; df = 4; p = 0.001						
Used Crop Rotation to Control Cyst Nematodes						
No	33	42.3	186	45.5	202	47.0
Yes	45	57.7	223	54.5	228	53.0
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 0.64$; df = 2; p = 0.728						
Used Resistant Varieties to Control Cyst Nematodes						
Does not apply	12	15.4	112	27.4	121	28.1
No	15	19.2	85	20.8	73	17.0
Yes	51	65.4	212	51.8	236	54.9
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 8.00$; df = 4; p = 0.092						
Used Chemicals to Control Cyst Nematodes						
No	70	89.7	386	94.4	392	91.2
Yes	8	10.3	23	5.6	38	8.8
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 4.03$; df = 2; p = 0.134						
WEED CONTROL						
Used Rotation with Cotton or Corn						
No	35	44.9	165	40.3	171	39.8
Yes	43	55.1	244	59.7	259	60.2
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 0.72$; df = 2; p = 0.70						
Used Rotary Hoeing						
No	71	91.0	359	87.8	354	82.3
Yes	7	9.0	50	12.2	76	17.7
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 7.12$; df = 2; p = 0.028						
Used Cultivation						
No	22	28.2	118	28.9	116	27.0
Yes	56	71.8	291	71.1	314	73.0
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 0.370$; df = 2; p = 0.831						
Applied Preplant Chemicals						
No	25	32.1	96	23.5	66	15.3
Yes	53	67.9	313	76.5	364	84.7
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 15.69$; df = 2; p = 0.001						

TABLE IV (Continued)

Production Practice	Extension Contacts: Not Any No.	Not Any Percent	1-9 No.	1-9 Percent	10-Over No.	10-Over Percent
Applied Preemergence Chemicals						
No	38	48.7	207	50.6	184	42.8
Yes	40	51.3	202	49.4	246	57.2
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 5.28$; df = 2; p = 0.071						
Applies Postemergence Chemicals						
No	19	24.4	103	25.2	74	17.2
Yes	59	75.6	306	74.8	356	82.8
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 8.38$; df = 2; p = 0.015						
HARVESTING, STORING, AND MARKETING						
Moisture Content at Harvesting						
Do not know	20	25.6	40	9.8	48	11.2
Above 12 percent on all of crop	7	9.0	45	11.0	60	14.0
Above 12 percent on part of crop	26	33.3	227	55.5	227	52.8
12 percent or below on all of crop	25	32.1	97	23.7	95	22.1
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 25.43$; df = 6; p = 0.001						
Was the Amount of Harvesting Loss Checked						
No	52	66.7	239	58.4	205	47.7
Yes	26	33.3	170	41.6	225	52.3
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 15.21$; df = 2; p = 0.001						
Amount of Grain Stored on Farm						
None	46	59.0	210	51.3	172	40.0
Part	20	25.6	126	30.8	171	39.8
All	12	15.4	73	17.9	87	20.2
TOTAL	78	100.0	409	100.0	430	100.0
Chi-Square Test $x^2 = 16.53$; df = 4; p = 0.002						
How was Soybean Marketed						
Sold before harvest	5	6.6	39	9.8	44	10.4
Sold after harvest	56	73.7	250	62.6	250	60.4
Stored	15	19.7	110	27.6	124	29.2
TOTAL	76	100.0	399	100.0	424	100.0
Chi-Square Test $x^2 = 4.89$; df = 4; p = 0.299						

all soybeans planted, compared to almost 41 percent of the producers who had 10 or more Extension contacts in the past 12 months. The total number of Extension contacts in the past 12 months was significantly related to the use of an inoculant on seed at planting. A higher proportion of the producers who had a total of 10 or more Extension contacts in the past 12 months applied an inoculant to all seed at planting as compared to the producers who had fewer Extension contacts.

Used fungicide on seed. Only 18 percent of the producers who had no Extension contacts in the past 12 months planted seed treated with a fungicide, while almost 38 percent of the producers had 10 or more total Extension contacts. The total number of Extension contacts the producers had in the past 12 months was significantly related to the use of fungicide on seed at planting. A higher proportion of the producers who had a total of 10 or more Extension contacts in the past 12 months used fungicide on seed at planting as compared to the producers who had fewer Extension contacts.

Used molybdenum on seed. Fifty percent of the producers who had no Extension contacts used molybdenum on seed as needed, compared to almost 73 percent of producers who had 10 or more Extension contacts. The number of contacts producers had with Extension within the past 12 months was significantly related to use of molybdenum on seed at planting. A larger percentage of the producers who had 10 or more Extension contacts than those who had fewer contacts followed the recommended practice of applying molybdenum on seed as needed.

Used certified seed. Almost 18 percent of the producers who had 10 or more Extension contacts planted all certified seed compared to only about 13 percent of the producers who had no contacts. The number of Extension contacts in the past 12 months was significantly related to whether the producer planted certified seed. Only a small percentage of the producers planted all certified seed, but a higher proportion of the producers who had 10 or more total Extension contacts than those who had fewer contacts planted certified seed.

Planting Dates and Rates

The variables included in this subsection are: (1) single crop planting dates, (2) double crop planting dates, (3) row width used in conventional practice, (4) seed per foot of row in conventional practice, (5) pounds of seed broadcast per acre, (6) row width used in no-till practice, and 97) seed per foot in no-till practice.

Single crop planting dates. Almost 84 percent of the producers with 10 or more Extension contacts were following the recommended planting date for single crop soybeans (April 25 to June 15), compared to 72 percent of the producers with no Extension contacts. The number of Extension contacts the producer had was significantly related to the planting date of single crop soybeans. A higher proportion of the producers who had 1 or more Extension contacts compared to those producers who had no Extension contacts were planting between April 25 and June 15.

Double crop planting dates. Only about 42 percent of the producers who had no Extension contacts were using June 15 to July 1 as the planting date for double crop soybeans, compared to over 65 percent of the producers who had over 10 Extension contacts. The total number of Extension contacts the producer had was significantly related to the planting date of double crop soybeans. A higher percentage of the producers who had 1 or more Extension contacts used June 15 through July 1 as the planting dates for double crop soybeans compared to producers who had no Extension contacts.

Row width used in conventional practice. Of those producers who had no Extension contacts, 22 percent were using 32 to 36 inch row width in conventional practice compared to 25 percent of the producers who had 10 or more Extension contacts. The total number of Extension contacts the producer had was not significantly related to the width of row used in conventional practice.

Seed per foot of row in conventional practice. Almost 29 percent of the producers who had 10 or more Extension contacts were planting 10 seed per foot of row in conventional practice, compared to 14 percent of the producers who had no Extension contacts. The total number of contacts made with Extension within the past 12 months was significantly related to number of seed the producer planted per foot of row in conventional practice. A higher proportion of producers who had 10 or more Extension contacts within the past 12 months were planting over 6 seed per foot of row in conventional practice as compared to producers with no Extension contacts.

Pounds of seed broadcast per acre. Over 15 percent of the producers who had 10 or more Extension contacts were broadcasting 60 pounds of seed per acre, compared to only 5 percent of the producers with no Extension contacts. The total number of Extension contacts the producer had was significantly related to the pounds of seed they broadcast per acre. A greater percentage of those producers who had 1 or more Extension contacts than those who had no Extension contacts used the broadcast method of planting and also planted more pounds of seed per acre.

Row width used in no-till practice. One percent of the producers who had no Extension contacts were using row width over 30 inches in no-till practice compared to almost 11 percent of the producers who had 10 or more Extension contacts. There was a significant relationship between the total number of Extension contacts and width of row used in no-till practice. A greater percentage of the producers who had 1 or more Extension contacts during the past 12 months than those producers who had no Extension contacts were using no-till and were using less space between rows on no-till soybeans.

Seed per foot of row in no-till practice. Over 15 percent of the producers who had 10 or more Extension contacts planted between 10 and 12 seed per foot of row in no-till practice compared to about 1 percent of the producers who had no Extension contacts. There was a significant relationship between the total number of Extension contacts and number of seed planted per foot of row in no-till practice.

A higher proportion of the producers who had 1 or more Extension contacts as compared to those producers who had no contacts during the past 12 months were planting over 6 seed per foot in no-till practice.

Fertilization

The variables included in this subsection are: (1) acres fertilized according to soil test, (2) acres limed according to soil test, (3) pounds of nitrogen per acre without soil test, (4) pounds of phosphate per acre without soil test, and (5) pounds of potash per acre without soil test.

Acres fertilized according to soil test. About 6 percent of the producers who had no Extension contacts were fertilizing over 200 acres according to soil test compared to 32 percent of the producers who had 10 or more Extension contacts. Using the Chi-square test there was a significant relationship between total Extension contacts in the past 12 months and the number of acres fertilized according to soil test. Producers who had at least 1 Extension contact in the past 12 months were more likely than those who had no Extension contacts to fertilize according to soil test and to fertilize a larger number of soybean acres.

Acres limed according to soil test. About 4 percent of the producers who had no Extension contacts were liming over 200 acres according to soil test compared to 24 percent of the producers who

had 10 or more Extension contacts. There was a significant relationship between total Extension contacts and the number of acres limed according to soil test. A higher percentage of the producers who had at least 1 Extension contact compared to those who had no contacts limed according to soil test and applied lime to a larger number of soybean acres.

Pounds of nitrogen per acre without soil test. Over 72 percent of the producers who had 10 or more Extension contacts were not applying any nitrogen per acre compared to 56 percent of the producers who had no Extension contacts. There was no significant relationship between the total Extension contacts the producers had and pounds of nitrogen applied per acre without soil test.

Pounds of phosphate per acre without soil test. Almost 17 percent of the producers who had 10 or more Extension contacts were applying between 61 and 150 pounds of phosphate per acre without soil test compared to over 29 percent of the producers who had no Extension contacts. There was a significant relationship between the number of Extension contacts a producer had and the amount of phosphate applied per acre without a soil test. The direction of the relationship is inconclusive. However, it appears that producers who had more contacts with Extension were more likely to use 20 pounds or less of phosphate per acre than producers who had fewer contacts.

Pounds of potash per acre without soil test. Sixteen percent of the producers who had 10 or more Extension contacts compared to almost 18 percent of the producers who had no Extension contacts were applying 60 pounds of potash per acre without a soil test. Using the Chi-square test there was a significant relationship between the total Extension contacts in the past 12 months and the amount of potash applied per acre without a soil test. A higher proportion of the producers who had no Extension contacts tended to apply fewer pounds of potash per acre without soil test as compared to producers who had 10 or more Extension contacts.

Disease and Nematode Control

The variables related to soybean disease and nematode control are presented in this subsection and are: (1) planted disease free seed to control disease, (2) used crop rotation to control disease, (3) used disease resistant varieties to control disease, (4) used crop rotation to control cyst nematodes, (5) used resistant varieties to control cyst nematodes, and (6) used chemicals to control cyst nematodes.

Planted disease free seed to control disease. Almost 55 percent of the producers who had 10 or more Extension contacts, as compared to 56 percent of the producers who had no Extension contacts, indicated they planted disease free seed to control disease. There was no significant relationship between total number of Extension contacts the producers had in the past 12 months and whether they planted disease free seed to control disease.

Used crop rotation to control disease. Almost 61 percent of the producers who had 10 or more Extension contacts used crop rotation to control disease, compared to 58 percent of the producers who had no Extension contacts. However, there was no significant relationship between total number of Extension contacts and the use of crop rotation to control disease.

Used disease resistant varieties to control disease. Only about 33 percent of the producers who had no Extension contacts as compared to almost 48 percent of the producers who had 10 or more Extension contacts were using disease resistant varieties to control disease. A higher proportion of the producers who had at least 1 contact with Extension during the last 12 months used disease resistant varieties as compared to producers who had no Extension contacts. The total number of Extension contacts was significantly related to the use of disease resistant varieties to control disease.

Used crop rotation to control cyst nematodes. Almost 58 percent of the producers who had no Extension contacts as compared to 53 percent of the producers who had 10 or more Extension contacts used crop rotation to control cyst nematodes. There was no significant relationship between total number Extension contacts the producers had in the past 12 months and whether or not they used crop rotation to control cyst nematodes.

Used resistant varieties to control cyst nematodes. Over 65 percent of the producers who had no Extension contacts used resistant varieties to control cyst nematodes compared to about 55 percent of the producers who had 10 or more Extension contacts. Using the Chi-square test there was no significant relationship between the number of Extension contacts and the use of resistant varieties to control cyst nematodes.

Used chemicals to control cyst nematodes. Almost 9 percent of the producers who had 10 or more Extension contacts used chemicals to control cyst nematodes compared to over 10 percent of the producers who had no Extension contacts. Using the Chi-square test there was no significant relationship between the number of Extension contacts and the use of chemicals to control cyst nematodes.

Weed Control

The variables related to soybean weed control are presented in this subsection and are: (1) used rotation with cotton or corn, (2) used rotary hoeing, (3) used cultivation, (4) applied preplant chemicals, (5) applied preemergence chemicals, and (6) applied post-emergence chemicals.

Used rotation with cotton or corn. Only about 55 percent of producers who had no Extension contacts were using rotation with cotton or corn to control weeds compared to over 60 percent of the producers who had 10 or more Extension contacts. However, when tested by the Chi-square test the total number of Extension contacts the producer

had was not significantly related to whether the producer used rotation with cotton or corn to control weeds.

Used rotary hoeing. Only 9 percent of the producers who had no Extension contacts were using rotary hoeing to control weeds compared to almost 18 percent of the producers who had 10 or more Extension contacts. The total number of Extension contacts was significantly related to the use of rotary hoeing to control weeds. A higher proportion of the producers who had 10 or more Extension contacts during the past 12 months tended to use rotary hoeing to control weeds as compared to producers who had no Extension contacts.

Used cultivation. Seventy-three percent of the producers who had 10 or more Extension contacts used cultivation to control weeds compared to almost 72 percent of the producers who had no Extension contacts. The total number of Extension contacts was not significantly related to the use of cultivation to control weeds.

Applied preplant chemicals. While only 68 percent of the producers who had no Extension contacts applied preplant chemicals to control weeds, almost 85 percent of the producers with 10 or more Extension contacts applied preplant chemicals to control weeds. There was a significant relationship between the number of total Extension contacts and use of preplant chemicals to control weeds. A higher percentage of the producers who had at least 1 Extension contact compared to those who had no Extension contacts used preplant chemicals to control weeds.

Applied preemergence chemicals. Over 51 percent of the producers who had no Extension contacts applied preemergence chemicals to control weeds compared to about 57 percent of the producers who had 10 or more Extension contacts. The total number of Extension contacts was not significantly related to the use of preemergence chemicals to control weeds.

Applied postemergence chemicals. Almost 76 percent of producers who had no Extension contact compared to about 83 percent of the producers who had 10 or more Extension contacts applied postemergence chemicals to control weeds. There was a significant relationship between total Extension contacts and the use of postemergence chemicals to control weeds. A higher percentage of the producers who had 10 or more Extension contacts compared to producers who had no Extension contacts used postemergence chemical to control weeds.

Harvesting, Storing, and Marketing

The variables included in this subsection are related to soybean harvesting, storing, and marketing and are: (1) moisture content at harvesting, (2) was the amount of harvesting loss checked, (3) amount of grain stored on farm, and (4) how was soybeans marketed.

Moisture content at harvesting. Thirty-two percent of the producers who had no Extension contacts were harvesting soybeans when moisture content was 12 percent or below on all of the crop, compared to only 22 percent of the producers who had 10 or more Extension contacts. The total number of Extension contacts was significantly

related to the moisture content of soybeans at harvesting. A higher proportion of the producers who had no Extension contacts tended to harvest soybeans when moisture content was 12 percent or below on all of the crop, as compared to producers who had 10 or more Extension contacts.

Was the amount of harvesting loss checked. Thirty-three percent of the producers who had no Extension contacts as compared to over 52 percent of the producers who had 10 or more Extension contacts, checked the amount of harvesting loss. The total number of Extension contacts was significantly related to producers checking the amount of harvesting loss. A higher proportion of the producers who had at least 1 Extension contact checked the amount of harvesting loss as compared to producers who had no Extension contacts.

Amount of grain stored on farm. Forty percent of the producers who had 10 or more Extension contacts in the past 12 months did not store any grain on the farm compared to 59 percent of the producers who had no Extension contacts in the past 12 months. The total number of Extension contacts in the past 12 months was significantly related to the amount of grain stored on the farm. A higher proportion of the producers who had no Extension contacts in the past 12 months stored no grain on the farm as compared to producers who had at least one Extension contact in the past 12 months.

How was soybeans marketed. Only about 60 percent of producers who had 10 or more Extension contacts in the past 12 months sold

soybeans after harvest, compared to almost 74 percent of the producers who had no Extension contacts. The total number of Extension contacts the producer had in the past 12 months was not significantly related to how soybeans were marketed.

Table Summary

A significant relationship existed between the number of contacts producers had with Extension and the use of 22 of the 33 production practices.

All the seed preparation and treatment practices were significantly related to the number of contacts producers had with Extension. Producers who were using these practices had more contacts with Extension. Seed preparation and treatment practices significantly related to the number of contacts producers had with Extension were the use of inoculation on seed, fungicide on seed, molybdenum on seed, and use of certified seed. As the number of Extension contacts increased, the percent of producers using inoculation on all seed increased, the percent using fungicide on all seed increased, and the percent using molybdenum on seed as needed increased. Producers use of certified seed was significantly related to the number of Extension contacts. However, the direction of the relationship was not clear.

Selected production practices that were significantly related to the number of Extension contacts were planting dates of double crop soybeans, seed per foot of row in conventional practices, row width and seed per foot of row in no-till practice, acres fertilized and

limed according to soil test, used disease resistant varieties to control disease, used rotary hoeing to control weeds, and applied preplant chemicals to control weeds.

Although not significantly related, several tendencies were revealed upon further analysis of the findings presented in this section. There was a tendency for producers having more Extension contacts to use crop rotation to control disease. Producers with more contacts tended to use less crop rotation to control cyst nematodes. Producers with more contacts tended to rotate more with cotton and corn to control weeds. Producers with more Extension contacts tended to store more soybeans.

CHAPTER IV

SUMMARY OF MAJOR FINDINGS

I. PURPOSE AND SPECIFIC OBJECTIVES

Purpose

The overall objective of this study was to obtain information that might be useful in developing Extension's plans and programs for the soybean producers of Tennessee. Furthermore, the purpose of this study was to characterize soybean production in Tennessee and to identify variables related to the use of soybean production practices.

Specific Objectives

The specific objectives were:

1. To characterize soybean production in Tennessee
2. To determine the relationships between use of selected soybean production practices and yields per acre of soybeans harvested for grain.
3. To determine the relationships between the number of acres harvested and production practices used by Tennessee soybean producers.
4. To determine the relationships between the number of Extension contacts and production practices used by Tennessee soybean producers.

II. METHODS OF INVESTIGATION

Population and Sample Studies

The population of this study included soybean producers in Tennessee. Data were obtained through personal interviews by Extension

agents using interview schedules developed by Specialists at the University of Tennessee. The "nth" number technique were used to identify producers to be surveyed.

The recommended sample size for each county was as follows:

1. Counties with under 25,000 acres would interview 20 producers.

2. Counties with 25,000 to 75,000 acres would interview 25 producers.

3. Counties with over 75,000 acres would interview 30 producers.

Each producer surveyed was to have grown at least 25 acres of soybeans. Completed surveys were returned to the Agricultural Extension Education Office.

Survey Instrument

The 1982 Soybean Production Survey was developed by the University of Tennessee Agriculture Extension Specialist Staff in Plant and Soil Science and Extension Education departments. Questions dealt primarily with producers use of production and marketing practices and the number of Extension contacts the producers had with Extension agents. Data also were obtained regarding the size of their soybean operation and yields per acre of soybeans grown.

Methods of Analysis

Data on the situation of soybean producers in 1982 were processed for computer analysis. Computation and statistical analysis were made using the University of Tennessee Computing Center facilities.

Response to survey questions were summarized using means and frequency counts of producers' responses regarding the use of the mean

number of acres harvested and yields per acre of soybeans. The Chi-Square test and the one-way of variance was used to determine the relationship between dependent and independent variables. Statistical tables were used to determine the significance of observed relationships. F-values and x^2 values achieving the .05 level were judged to be significant.

III. FINDINGS

The findings presented in this study are organized according to the study objectives and the tables presented in earlier sections.

Characteristics of Soybean Production in Tennessee

Findings revealed that most producers planted Essex for early season variety, Bedford and Forrest for medium season variety, and Centennial for late season variety. The disk was the major equipment used in seedbed preparation. Over one-half of the producers used an inoculant and molybdenum on the seed at planting, and planted certified seed. Eighty-four percent of those producers surveyed planted single crop soybeans between April 25 and June 15, with over half (60 percent) planting double crop soybeans between June 15 and July 1. In conventional practice almost one-half (47 percent) of the producers used over 36 inch row width while 18 percent of the producers planted between 7 and 9 seed per foot of row. Of the one-third of the producers who used no-till practice 8 percent planted 20 to 29 inch row width and 15 percent planted between 7 and 9 seed per foot of row. Fifty-six percent of the producers fertilized according to soil test. Fifty-two percent of the producers limed according to soil test. Sixty

nine percent of the producers did not apply any nitrogen without soil test. Without soil test, 20 percent of the producers applied between 41 and 60 pounds of phosphate and 18 percent of the producers used 60 pounds of potash per acre.

Most of the producers reported insect were not a problem. In order to control disease 54 percent of the producers planted disease free seed, 40 percent planted seed treated with fungicide, 59 percent used crop rotation, and 41 percent used resistant varieties.

Of the 30 percent of the producers who had problems with cyst nematode, 54 percent used crop rotation, 18 percent used resistant varieties, and 7 percent used chemicals to control cyst nematodes.

To control weeds, 59 percent of the producers rotated soybeans with corn or cotton, 14 percent used rotary hoeing, 72 percent used cultivation, 80 percent applied preplant chemicals, 53 percent applied preemergence chemicals and 79 percent applied postemergence chemicals. Eighty-five percent of the producers indicated the weed control method they had used was effective.

Twenty-four of the producers harvested soybeans with 12 percent or below on all of the crop. Harvesting loss was reported as a major problem by 11 percent of the producers, while only 45 percent of the producers checked the amount of loss. Forty-six percent of the producers did not store any grain on the farm, whereas 10 percent sold soybeans before harvesting. Thirty percent of the producers surveyed harvested between 200 and 500 acres of soybeans, and 40 percent had yields of between 31 and 40 bushels per acre.

Of the producers reporting Extension contacts during the past 12 months, 41 percent attended 1 Extension meeting, 26 percent made 1 visit to the Extension office, 24 percent received 1 farm visit from the Extension agent, 26 percent made between 1 and 2 telephone calls to the Extension office, and 48 percent had over 10 total Extension contacts during the past 12 months.

Relationships Between Use of Production Practices and Yield Per Acre

Findings revealed a significant relationship between yields and use of 38 out of 54 production practices by soybean producers. All the seedbed preparation and seed treatment practices, fertilization practices, and number of Extension contacts were significantly related to yields. Producers fertilizing and liming their soybean land by soil test had higher per acre yield than those not using soil tests. There was no significant difference between soybean yields and all the variables regarding insect control.

Relationships Between the Number of Acres Harvested and Production Practices Used by Tennessee Soybean Producers

Significant relationships existed between the number of acres harvested and use of each of the fertilization practices and the harvesting, storing and marketing practices. As the number of acres harvested increased the percent fertilizing and liming according to soil test increased, the percent storing grain on farm increased, the percent sold before harvest increased and yield per acre of soybeans harvested also increased with an increase in acreage grown.

Other selected production practices significantly related to the number of acres harvested were major equipment used in seedbed preparation, use of molybdenum on seed, planting date of single crop and double crop soybeans, row width used in conventional practice, seed planted per foot in no-till practice and used resistant varieties to control cyst nematodes. Nine of the 42 production practices used by Tennessee soybean producers were not significantly related to the number of acres harvested.

Relationships Between Number of Extension Contacts and Production Practices Used by Tennessee Soybean Producers

Significant relationship existed between the number of contacts producers had with Extension and the use of 22 of 33 production practices. All the seed preparation and treatment practices were significantly related to the number of contacts producers had with Extension. Producers who were using these practices had more contacts with Extension. Seed preparation and treatment practices significantly related to the number of contacts producers had with Extension were the use of inoculation on seed, fungicide on seed, molybdenum on seed, and use of certified seed. As the number of Extension contacts increased, the percent of producers using inoculation on all seed increased, the percent using fungicide on all seed increased, and the percent using molybdenum on seed as needed increased. The number of producers who planted certified seed was significantly related to the number of Extension contacts. However, the direction of the relationship was not clear.

Use of selected production practices that were significantly related to the number of Extension contacts were planting dates of double crop soybeans, seed planted per foot of row in conventional practice, row width and seed planted per foot of row in no-till practice, acres fertilized and limed according to soil test, used disease resistant varieties to control disease, used rotary hoeing to control weeds, and applied preplant chemicals to control weeds.

Although not significantly related, several tendencies were revealed upon futher analysis of the findings presented in this section. There was a tendency for producers having more Extension contacts to use crop rotation to control disease. Producers with more contacts tended to use less crop rotation to control cyst nematodes. Producers with more contacts tended to rotate more with cotton and corn to control weeds. Producers with more Extension contacts tended to store more soybeans.

IV. IMPLICATIONS AND RECOMMENDATIONS

Based upon finding of this study, the implications and recommendations are stated as follows:

1. Almost one-half of the producers did not fertilize and lime according to soil test. Producers who fertilized and limed according to soil test had significantly higher yields than those producers who did not follow soil test. This would indicate that emphasis be placed on educating producers about the need to soil test.

2. Larger producers used no-till practice and chemicals to control weeds more frequently than smaller producers. With cheap soybean prices and the need for using more conservation programs, producers need to look for ways to cut production cost. There seems to be a need to increase emphasis on Extension programs for small producers.

3. Only about 8 percent of the producers did not have any contacts with Extension in 1982 through one of the contact methods. While the percentage is small, the positive relationship between certain production practices used and Extension contacts deems it necessary that efforts should be made to reach all producers.

V. RECOMMENDATIONS FOR FURTHER STUDY

1. A similar study should be conducted over a period of years to determine if Tennessee soybean producers are using practices put forth by The University of Tennessee and to help the Extension service adjust its teaching methods and educational programs.

2. The survey method of collecting data is only as good as the person who is interviewing the respondent. Extension specialists should continue to improve survey instruments and procedures and provide instructions to Extension agents gathering survey data. Variables need to be specific and easy to understand.

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APPENDIX

TENNESSEE AGRICULTURAL EXTENSION SERVICE

1982 Soybean Production Survey
(See Instructions On Last Page)

County ___ ___ ___
(1) (2) (3)

A. Varieties Planted
1. Early? ___ (1 = none; 2 = Mitchell; 3 = Essex; 4 = Nathan; 5 = other).
(4)

2. Medium? ___ (1 = none; 2 = Asgrow A5474; 3 = Bay; 4 = Bedford; 5 - Dare; 6 = Forrest;
(5)
7 = McNair 500; 8 = York; 9 = other).
3. Late? ___ (1 = none; 2 = Centennial; 3 = Coker 136; 4 = Lee 74; 5 = Pickett 71; 6 = RA604;
(6)
7 = Bragg; 7 = other).
4. Were seeds certified or registered? ___ (1 = no; 2 = yes; 3 = yes, all).
(7)

B. Seedbed Preparation
Major equipment used? ___ (1 = plow; 2 = disk; 3 = chisel plow; 4 = no-till planter; 5 =
(8)
other).

C. Seed Treatment
1. Inoculation? ___ (1 = not needed; 2 = needed but not applied; 3 = applied to part of
(9)
fields; 4 = applied to all fields).
2. Fungicide? ___ (1 = none; 2 = part; 3 = all).
(10)
3. Molybdenum? ___ (1 = not needed; 2 = needed but not applied; 3 = applied as needed).
(11)

D. Planting Dates
1. Single crop? ___ (1 = before April 25; 2 = April 25 to June 15; 3 = after June 15).
(12)
2. Double crop? ___ (1 = before June 15; 2 = June 15 to July 1; 3 = After July 1).
(13)

E. Seeding Rate
1. Conventional: Row width in inches? ___ ___. b). Seeds/ft. row? ___ ___.
(14) (15) (16) (17)
2. Broadcast: Pounds of seed per acre? ___ ___.
(18) (19)
3. No-till: a). Row width in inches? ___ ___. b). Seeds planted/ft. row? ___ ___.
(20) (21) (22) (23)

F. Fertilization
1. Acres fertilized according to soil test? ___ ___ ___.
(24) (25) (26)
2. Acres limed according to soil test? ___ ___ ___.
(27) (28) (29)
3. On land not soil tested: a). Pounds N/acre ___ ___ ___. b). Pounds P_2O_5/acre
(30) (31) (32)
___ ___ ___. c). Pounds K_2O/acre ___ ___ ___.
(33) (34) (35) (36) (37) (38)

G. Insects
1. Foliage feeders: Were foliage insects a problem? ___ (1 = no; 2 = yes). If yes: How
(39)
severe? ___ (1 = control not needed; 2 = control needed but not applied; 3 = control
(40)
needed and applied).
2. Pod feeders: Were pod feeder insects a problem? ___ (1 = no; 2 = yes). If yes: How
(41)
severe? ___ (1 = control not needed; 2 = control needed but not applied; 3 = control
(42)
applied).
3. Stem feeders: Were stem feeder insects a problem? ___ (1 = no; 2 = yes). If yes: How
(43)
severe? ___ (1 = control not needed; 2 = control needed but not applied; 3 = control
(44)
applied).

Coding Instructions:
1. Fill all blanks
2. Right justify
3. Use a nine (9) in each blank when the question does not apply and when data are not available.

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H. Disease
Method used to control diseases: a). Planted disease free seed? ____ (45) (1 = no; 2 = yes; 9 = do not know). b). Applied fungicide seed treatment? ____ (46) (1 = no; 2 = yes). c). crop rotation? ____ (47) (1 = no; 2 = yes). d). Used disease resistant varieties? ____ (48) (1 = no; 2 = yes; 9 = do not know).

I. Soybean Cyst Nematode
1. Were either Race or Race 4 or both Soybean Cyst Nematode a problem? ____ (49) (1 = no; 2 = yes; 9 = do not know).
2. Method used to control? a). Crop rotation? ____ (50) (1 = no; 2 = yes; 9 = does not apply). b). Resistant varieties? ____ (51) (1 = no; 2 = yes; 9 = noes not apply). c). Chemical control? ____ (52) (1 = no; 2 = yes; 9 = does not apply).

J. Weed Control
1. Cultural methods: a). Rotation with cotton or corn? ____ (53) (1 = no; 2 = yes). b). Rotary hoeing? ____ (54) (1 = no; 2 = yes). c). Cultivation? ____ (55) (1 = no; 2 = yes).
2. Chemical methods: a). Applied preplant? ____ (56) (1 = no; 2 = yes). b). Applied pre-emergence? ____ (57) (1 = no; 2 = yes). c). Applied postemergence? ____ (58) (1 = no; 2 = yes).
3. How effective were the control methods used? ____ (59) (1 = not very effective; 2 = effective; 3 = very effective; 9 = had no weed problem).

K. Harvesting
1. Moisture content? ____ (60) (1 = don't know; 2 = above 12% on all crop; 3 = above 12% on part of crop; 4 = 12% or below on all of crop).
2. Harvesting loss: a). Was this a major problem? ____ (61) (1 = no; 2 = yes). b). Was the amount of loss checked? ____ (62) (1 = no; 2 = yes).

L. Farm storage? ____ (63) (1 = none stored; 2 = part stored; 3 = all stored).

M. Marketing? ____ (64) (1 = sold before harvest; 2 = sold after harvest; 3 = stored).

N. General Production Information
1. Total acres harvested? ____ (65) (66) (67) (68).
2. Yield per acre? ____ (69) (70).

O. Extension contacts: (Note: Agent and/or farmer should estimate the number of contacts the producers had with Extension over the past 12-months). a). Meetings attended? ____ (71). b). Office visits made? ____ (72). c). Farm visits received? ____ (73). d). Telephone calls made ____ (74) (75).

General Instructions for 1982 Soybean Survey

1. Date Due: December 6, 1982.
2. Disposition: To Associate District Supervisor
3. Counties to be Surveyed: Counties where at least 10,000 acres grown annually. District I; All counties. District II; Bedford, Giles, Lawrence, Lincoln, Maury, Montgomery, Robertson, Rutherford, Sumner, Wayne and Williamson. District III; Coffee, Franklin, Marion, Warren. District IV; Cannon and DeKalb. Other counties also may want to conduct the survey.
4. Sample Size:
   a. Counties with under 25,000 acres soybeans interview 20 producers.
   b. Counties with 25,000 to 75,000 acres interview 25.
   c. Counties with over 75,000 acres interview 30.
5. Survey Population: Producers who grew at least 25 acres of soybeans in 1982.
6. Sampling Procedure: Use the Nth number technique.

VITA

Stephen Levon Officer, the son of the late Mr. and Mrs. Robert L. Officer, was born in White County, Tennessee, on June 21, 1953. He grew up in White County, Tennessee, where he attended elementary school and was graduated from White County High School in 1971. He entered Tennessee State University, Nashville, Tennessee, majoring in Animal Science and received a Bachelor of Science degree in May 1976.

He was employed in March 1977 as an Assistant Extension Agent in DeKalb County, Tennessee, responsible for youth agriculture programs and in 1986 became the Extension Leader.

He is married to the former Cathy Gwyn of McMinnville, Tennessee, and the have two sons, Brian, age 4 years and David, age 3 months.