

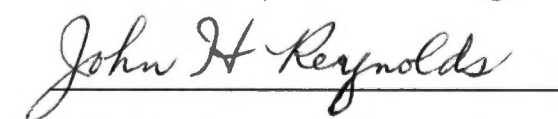
To the Graduate Council:

I am submitting herewith a thesis written by Paul Thomas McCallie, Sr. entitled "Relationships Between Characteristics of Wheat Producers, Their Farming Operations and Their Use of Recommended Production Practices and the Number of Contacts They Had With Extension in 1982."

I have examined the final 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:

Accepted for the Council:


Vice Provost
and Dean of the Graduate School

RELATIONSHIPS BETWEEN CHARACTERISTICS OF WHEAT PRODUCERS, THEIR
FARMING OPERATIONS AND THEIR USE OF RECOMMENDED PRODUCTION
PRACTICES AND THE NUMBER OF CONTACTS THEY HAD
WITH EXTENSION IN 1982

A Thesis
Presented for the
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ABSTRACT

The major purpose of this survey was to determine the relationships between the characteristics of wheat producers, their farm operation, their use of recommended wheat practices and the number of contacts they had with the Agricultural Extension Service in the major wheat producing counties. Data were obtained from 722 randomly selected wheat producers in 37 counties which produced at least 5000 or more acres of wheat in 1981. Twenty producers per county who planted 25 or more acres of wheat for grain were randomly selected. The "nth" number method of sampling was used to select the producers to be surveyed. Information was obtained about the general production characteristics of wheat producers, their use of recommended wheat production practices and the number of contacts they had with Extension Agents over a 12-month period.

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

Major findings include the following:

1. Sixty-seven percent of the wheat producers seeded during recommended seeding dates of October 1 to November 1.
2. About 75 percent of the producers surveyed received 1 to 8 farm visits from Extension Agents in 1982.

3. Soil testing was significantly related to yield. Those producers who tested reported higher mean yields of wheat per acre than those who did not.

4. Number of Extension meetings attended by wheat producers was not significantly related to mean yield. However, number of visits made to the Extension office and number of farm visits received were significantly related.

5. There was a significant difference in seeding rate in bushels per acre as it related to size of farm operation. Seeding rate tended to increase with increase in size of operation.

6. Winterkill was significantly related to mean yield. Those producers who reported no problem reported a mean yield of 6 or more bushels per acre more than those who had a winterkill problem.

7. The largest producers who harvested an average of 250 acres of wheat for grain used the McNair 1003 variety and reported the highest yield of 41.5 bushels per acre.

8. The larger producers used the no-till method of seedbed preparation and there was a significant difference as it related to size of wheat operation for grain.

9. The larger producers used crop rotation with all or part of their wheat crop and there was a significant relationship as it related to size of operation.

10. Disease control and weed control were used more often by larger producers and the difference in size of operation for grain was significantly related to these practices.

11. There was a significant difference in number of each type of Extension contact as it related to size of farm operation. Again, the larger producers on the average attended more meetings, made more office visits and received more farm visits.

12. Three hundred seventy-six producers who used the recommended method of seeding, which was drilling, received more farm visits from agents than any other group.

13. Soil test was significantly related to each type of Extension contact. Those producers who tested all their wheat acreage reported the largest number of Extension contacts.

14. Acres of wheat harvested for grain was significantly related to all the methods of Extension contacts. Larger producers who harvested 500 acres or more reported the largest number of contacts.

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CHAPTER I

THE PROBLEM AND ITS SETTING

I. INTRODUCTION

Wheat production ranked sixth in importance as a cash crop in Tennessee in 1982. Cash receipts of wheat produced amounted to \$101,138,000 for the 1982 growing season (5:7).¹ Tennessee wheat growers have averaged producing 17,754,000 bushels of wheat over the last 7 years (1976-1982). Production in 1981 increased considerably to 37,400,000 bushels and was down by about 10 percent in 1982 to 33,660,000 bushels. Wheat marketings during 1982 accounted for about 4.8 percent of total cash receipts from crops.

In order for wheat to compete with more profitable crops, yields must be increased. The average yield for 1982 wheat crop in the state was 36 bushels per acre. In order for growers to obtain higher yields, the latest research information in management and production practices must be used.

The Agricultural Extension Service plays an important role in disseminating the latest research information on management and production practices in wheat.

This study is concerned with the extent to which wheat producers in Tennessee are following the recommended wheat production

¹Numbers in parentheses refer to alphabetically numbered references in the Bibliography; those after the colon are page numbers.

practices and the extent to which wheat producers had been in contact with the Agricultural Extension Agent. The relationship between factors influencing yield and use of production practices as they relate to farm operation was also a concern of this study.

II. NEED FOR STUDY

One of the main concerns of Tennessee Extension Agents is the desire and need to improve their educational program to increase income and standard of living of the clientele across the state. In order for Extension programs to be improved, adequate information must be available to help establish priorities in their program and to aid assessing the effectiveness of these programs.

The need existed to analyze data from the 1982 Tennessee Wheat Production Survey in order to determine how to improve Extension programs and thus help wheat producers to become more efficient. This study should serve as a basis for determining the need for and direction of change in the educational programs of Extension staff members concerned with wheat production in the future.

III. PURPOSE AND OBJECTIVE OF THE STUDY

The Agricultural Extension Service provides up-to-date research information to wheat producers in order to improve their productivity. The purpose of this study was to determine the relationships between selected characteristics of wheat producers and their farming operations upon their participation in the Extension program.

The specific objects of this study were:

1. To characterize 722 randomly selected wheat producers in 37 counties in Tennessee where 5,000 or more acres of wheat were planted in 1981.
2. To determine the relationship between the use of recommended wheat production practices and the yield obtained by the wheat producers.
3. To determine the relationship between size of farm operation and their use of recommended production practices and the number of contacts they had with Extension.
4. To determine the relationship between the use of the recommended production practices and the number of contacts producers had with Extension.
5. To determine the relationships between the number of contacts producers had with Extension and their wheat yield.

IV. LIMITATIONS OF THE STUDY

This study is limited to the analysis of data available from the 1982 Tennessee Wheat Production Survey which was conducted in October 1982. The data were obtained by Extension Agents through personal interviews of 722 wheat producers in 37 counties in Tennessee where 5,000 or more acres of wheat were planted in 1981. The 58 remaining counties did not meet this criterion, therefore they were not included.

The counties included in this study were located in State Extension Districts I, II, III, and IV. From District IV only White County is included and no counties in District V met the criterion.

The survey included 117,920 acres of the 935,000 estimated acres of wheat produced in Tennessee during the 1982 growing season.

V. METHODS AND PROCEDURES

Population and Sample Studied

The population of this study included all wheat producers who planted 25 or more acres of wheat for grain in 1982 in counties where 5,000 or more acres of wheat were planted in 1981. Data collected in the 1982 Tennessee Wheat Production Survey were secured from 722 producers in 37 counties through personal interviews by Extension Agents.

Selection of Sample

The sample included twenty producers from counties producing 5,000 acres or more of wheat in 1982.

A list of all wheat (grain) producers who grew 25 or more acres of wheat in 1982 was made in each county to be surveyed. The "nth" number technique was used to identify twenty-five producers. The last five producers identified were used as alternates. Alternates were used only to replace producers who, for good reason, could not be interviewed.

Methods of Analysis

Data collected by the survey were coded and computations made by the University of Tennessee Computer Center.

Responses to the survey questions were summarized using means and frequencies. The one-way analysis of variance F test was used to determine the association between each dependent variable and each of the independent variables. Analysis of variance results in the test statistic called F , or the variance ratio. The computation consists of two steps. First, the mean for each group is found, and considering this set of means a distribution, the variance of the means is found. This value is called the between-group variance. Then using the variance of each group, and considering this set of variances another distribution, the mean of variance, is found. This value is the within-group variance. The ratio Between/Within is the F ratio, values for which are tabulated in the most general distribution used in statistical inference. F values which achieved the .05 level of probability were accepted as being statistically significant.

VI. DEFINITION OF TERMS

The following terms are defined as follows to give the writer and reader a common understanding of the terms of this study:

Wheat Producer. The individual responsible for earning all or part of their agricultural income from the production and sale of wheat. They constitute the target audience of this study.

Dependent Variable. The variable to be explained as a function of other variables.

Independent Variable. The factor with which one seeks to explain the variation in the dependent variable.

Extension Contacts. The number of Extension meetings attended, number of telephone calls and office visits made to the County Extension office or the number of farm visits received by wheat producers during the 12 months preceding the survey.

Number to Extension Meetings. The number of group contacts by the target audience conducted by Extension personnel over a 12-month period to discuss subject matter.

Number of Farm Visits. The number of on-farm or in-field individual contacts by Extension agents over a 12-month period to discuss subject matters of interest.

Number of Office Visits. The number of individual contacts made at Extension offices over a 12-month period for information on subject matters of interest.

Practice. A research verified and commonly accepted procedure, if performed correctly and on a scheduled basis, will increase or help the desired outcome or return.

VII. RELATED STUDIES

A study was done in 1979 by Abduliah Idris Bin Tengku on time planned and expended in five selected counties and contacts made

by wheat producers for fiscal years 1975 and 1977. He found in this study that from the 1975 and 1977 surveys the average yields in bushels of wheat per acre were 38.8 and 42.6, respectively, for the two years. Significantly higher percents of those producing yields of over 42.6 bushels per acre from the 1977 survey, on the average, used a larger number of the ten recommended practices. He also found an increase in total agent days planned and expended on wheat subjects between FY 1975 and FY 1977. An increase was also noted in total contacts made by agents with wheat producers between FY 1975 and FY 1977. The survey implied that the district-wide survey of wheat producers did not appreciably influence Extension programs during the period.

In a 1982 study, Johnson (3:73) found that corn producers who contacted Extension more often tended to harvest more total acres of corn for grain and silage. The number of contacts producers had with Extension in 1979 tended to be significantly related to the yield of corn for grain and corn for silage.

The study also showed that grain harvested and silage harvested by producers were significantly related to the number of recommended corn production practices used. The yield per acre of both corn for grain and silage was significantly related to the number of Extension meetings attended by producers in 1979. Yield for both grain and silage increased as the number of meetings attended also increased. The number of Corn Production Meetings attended and yield were significantly related. Yield increased as number of meetings attended also increased. The number of telephone calls to the Extension office

and yield of corn for grain and silage were significantly related. Yield increased with increase in number of telephone calls made requesting information. The number of farm visits and yield for both grain and silage were significantly related. Yield of both increased as visits also increased. The yield of corn for silage was significantly related to the total contacts. Producers with larger acreages for corn silage reported more contacts than those having fewer acres.

Jamison Jenkins found in his study of Soybean producers in 1975 (2:70) that full-time farmers attended significantly more Extension meetings than part-time farmers.

In a 1977 study, Michael Gordon (1:64) showed that the number of contacts feeder pig producers had with Extension was significantly related to the size of operation. The larger producers had more contacts with Extension. Also, producers with plans to expand swine operations made significantly more contacts with Extension than those who did not have plans for expansion.

Solomon Yabaya, in his 1978 study of Tennessee Corn Producers (7:136), found that producers who had more contacts with Extension had significantly more acreage and yield for both grain and silage than those who had fewer contacts.

James Perry in his 1980 study (4:29) found that Swine producers who were full-time farmers attended significantly more Extension meetings, made more visits and telephone calls to the Extension office, received more farm visits from Extension agents and had more total Extension contacts than part-time farmers.

CHAPTER II

STUDY FINDINGS

Findings of this study are presented in four tables with each table constituting a section. Each table presents findings regarding variables selected from the survey instrument. Each variable is discussed under a separate heading.

Section I presents findings regarding the number and percentage of wheat producers using the production practices set forth in the survey.

Section II presents findings regarding factors related to wheat yield in 1982.

Section III presents findings regarding the characteristics of wheat production and size of farm operations.

Section IV presents findings regarding the use of various production practices and the number of contacts producers had with Extension.

I. CHARACTERISTICS OF OPERATIONS OF WHEAT PRODUCERS IN TENNESSEE

Findings regarding the number and percentage of wheat producers using the production practices set forth in the survey are presented in Table I. The variables presented in this table characterize the wheat producer. Numbers and percentage of producers are reported for each variable.

TABLE I. Characteristics of Operations of Wheat Producers in Tennessee

Name of Variable	Number of Producers (N = 722)	Percent of Producers*
<u>Variety**</u>		
Abe	21	2.9
Arthur	314	43.5
Coker 747	149	20.6
Doublecrop	15	2.1
Hart	16	2.2
McNair 1003	51	7.1
Pioneer 76	22	3.0
Pioneer 78	16	2.2
Southern Belle	100	13.9
No Response	18	2.5
<u>Date Seeded</u>		
Oct. 1 - 15	130	18.0
Oct. 15 - Nov. 1	359	49.7
Nov. 1 - Nov. 15	182	25.2
Nov. 15 - Dec. 1	37	5.1
Before Oct. 1	11	1.5
After Dec. 1	3	.4
<u>Seeding Rate in Bushels</u>		
Under 1 Bushel	9	1.2
One Bushel	63	8.7
Bushel and Half	218	30.2
Two Bushels	326	45.2
Over 2 Bushels	98	13.6
No Response	8	1.1
<u>Method Used to Seed</u>		
Drill	383	53.0
Spinner	150	20.8
Airplane	35	4.8
In Fertilizer	152	21.1
No Response	2	.3
<u>Method Used to Prepare Seedbed</u>		
Plow	101	14.0
Disk	551	76.3

TABLE I. (Continued)

Name of Variable	Number of Producers (N = 722)	Percent of Producers*
No Till	30	4.2
Other	23	3.2
No Response	17	2.4
<u>Seed Treatment</u>		
None	581	80.5
Treated	135	18.7
No Response	6	.8
<u>Method Used to Treat Seed</u>		
Dust	54	7.5
Liquid	64	8.9
No Response	604	83.7
<u>Materials Used to Treat Seed</u>		
Vitavax 200	86	11.9
Vitavax 75%	22	3.0
Other	14	1.9
No Response	600	83.1
<u>Crop Rotation Used</u>		
All	525	72.7
Part	159	22.0
None	27	3.7
No Response	11	1.5
<u>Pounds Nitrogen Applied/Acre</u>		
Under 60 lbs	203	28.1
60-79 lbs	252	34.9
80-119 lbs	218	30.2
120 lbs - Over	49	6.8
<u>Pounds Phosphate Applied/Acre</u>		
Under 40 lbs	210	29.1
40-60 lbs	354	49.0
61-89 lbs	94	13.0
90 lbs - Over	64	8.9

TABLE I. (Continued)

Name of Variable	Number of Producers (N = 722)	Percent of Producers*
<u>Pounds Potash Applied/Acre</u>		
30 lbs - Under	179	24.8
31 - 60 lbs	374	51.8
61 - 90 lbs	121	16.8
91 lbs - Over	48	6.6
<u>Limestone Applied</u>		
Not Needed	354	49.0
Not Applied	109	15.1
Applied	195	27.0
No Response	64	8.9
<u>Soil Tested</u>		
None Tested	282	39.1
Part Tested	195	27.0
All Tested	190	26.3
No Response	55	7.6
<u>Were Insects a Problem</u>		
No	652	90.3
Yes	63	8.7
<u>Major Insect Problem</u>		
Hessian Fly	3	.4
Armyworms	40	5.5
Aphids	18	2.5
Other	5	.7
No Response	656	90.9
<u>How Severe was the Insect Problem?</u>		
Control Not Needed	38	5.3
Control Needed	31	4.3
No Response	653	90.4
<u>Was An Insecticide Used</u>		
No	40	5.5
Yes	25	3.5
No Response	657	91.0

TABLE I. (Continued)

Name of Variable	Number of Producers (N = 722)	Percent of Producers*
<u>Were Diseases a Problem</u>		
No	356	49.3
Yes	360	49.9
No Response	6	.8
<u>Major Disease in 1982</u>		
Barley Yellow Dwarf Virus	24	3.3
Leaf Rust	141	19.5
Powdery Mildew	99	13.7
Septoria Blotch	37	5.1
Glume Blotch	38	5.3
Loose Smut	18	2.5
Other	6	.8
No Response	359	49.7
<u>How Severe Was the Disease</u>		
Yield Not Reduced	54	7.5
Yield Reduced Some	197	27.3
Yield Greatly Reduced	42	5.8
No Response	429	59.4
<u>Was Any Disease Control Used</u>		
No	259	35.9
Yes	71	9.8
No Response	392	54.3
<u>Were Weeds a Problem</u>		
No	447	61.9
Yes	273	37.8
No Response	2	.3
<u>Major Weed in 1982</u>		
Wild Garlic	247	34.2
Winter Annual Broadleaf	28	3.9
Other	18	2.5
No Response	429	59.4

TABLE I. (Continued)

Name of Variable	Number of Producers (N = 722)	Percent of Producers*
<u>How Severe Was Weed Problem</u>		
Yield Not Reduced	179	24.8
Yield Reduced Some	64	8.9
Yield Reduced Greatly	8	1.1
No Response	471	65.2
<u>Did You Spray For Weeds</u>		
No	103	14.3
Yes	214	29.6
No Response	405	56.1
<u>Did Wheat Winterkill</u>		
Not a Problem	447	61.9
Yes is a Problem	267	37.0
No Response	8	1.1
<u>How Severe was Winterkill</u>		
Yield Not Reduced	27	3.7
Yield Reduced Some	150	20.8
Yield Reduced Greatly	83	11.5
No Response	462	64.0
<u>Did Wheat Lodge</u>		
Not a Problem	605	83.8
Yes is a Problem	108	15.0
No Response	9	1.2
<u>How Severe was Lodging</u>		
Yield Not Reduced	54	7.5
Yield Reduced Some	73	10.1
Yield Reduced Greatly	5	.7
No Response	590	81.7
<u>Moisture Content at Harvest</u>		
Moisture Not Known	115	15.9
Above 13% All	206	28.5
Above 13% Part	218	30.2
13% or Less All	147	20.4
No Response	36	5.0

TABLE I. (Continued)

Name of Variable	Number of Producers (N = 722)	Percent of Producers*
<u>Storage of Wheat</u>		
None Stored	321	44.5
Some Stored	193	26.7
All Stored	169	23.4
Cut Hay or Silage	25	3.5
No Response	14	1.9
<u>Stored Grain Protected from Insects</u>		
No	51	7.1
Yes	154	21.3
No Response	517	71.6
<u>Market for Grain</u>		
None Sold	193	26.7
Contracted	217	30.1
Sold at Harvest	273	37.8
No Response	39	5.4
<u>Acres Wheat Planted for Grain</u>		
Under 30 Acres	85	11.8
31 - 100 Acres	293	40.6
101 - 499 Acres	252	34.9
500 Acres - Over	92	12.7
<u>Acres Wheat Planted for Forage</u>		
Under 30 Acres	24	3.3
31 - 99 Acres	48	6.6
100 Acres - Over	650	90.0
<u>Acres Wheat Harvested for Grain</u>		
60 Acres - Under	234	32.4
61 - 150 Acres	236	32.7
151 - 499 Acres	157	21.7
500 Acres - Over	95	13.2
<u>Acres Wheat Harvested for Forage</u>		
30 Acres - Less	34	4.7
31 - 80 Acres	38	5.3
81 Acres - Over	650	90.0

TABLE I. (Continued)

Name of Variable	Number of Producers (N = 722)	Percent of Producers*
<u>Yield Grain/Acre Wheat Grown</u>		
25 Bushels - Less	76	10.5
26 - 30 Bushels	96	13.3
31 Bushels - Over	550	76.2
<u>Yield Forage in Tons Silage/Acre</u>		
3 - 5 Tons/Acre	12	1.7
6 - 9 Tons/Acre	29	4.0
10 - 15 Tons/Acre	11	1.5
No Response	670	92.8
<u>Yield Hay Tons/Acre</u>		
1	2	.3
2	22	3.0
3	13	1.8
4	1	.1
9	3	.4
15	1	.1
No Response	680	94.2
<u>Number Extension Meetings Attended</u>		
0	194	26.9
1	190	26.3
2	158	21.9
3	82	11.4
4	41	5.7
5	17	2.4
6	21	2.9
7	3	.4
8	3	.4
No Response	13	1.8
<u>Number Visits Made to Extension Office</u>		
0	163	22.6
1	144	19.9
2	163	22.6
3	87	12.0

TABLE I. (Continued)

Name of Variable	Number of Producers (N = 722)	Percent of Producers*
4	70	9.7
5	33	4.6
6	20	2.8
7	2	.3
8	11	1.5
No Response	29	4.0
<u>Number Farm Visits</u>		
0	136	18.8
1	122	16.9
2	141	19.5
3	85	11.8
4	74	10.2
5	47	6.5
6	38	5.3
7	12	1.7
8	15	2.1
No Response	52	7.2

* Percents may not total to 100 because of rounding off of numbers.

** All were recommended varieties.

Seeding

Variety. Table I indicates that 314 (43.5%) of the producers surveyed planted Arthus variety. One hundred forty-nine (20.6%) producers planted Coker 747 variety. Twenty-one producers (2.9%) planted Abe. Fifteen producers (2.1%) planted Doublecrop. Sixteen (2.2%) planted Hart. Fifty-one (7.1%) planted McNair 1003. Twenty-two (3.0%) of the producers planted Pioneer 76. One hundred (13.9%) producers planted Southern Belle variety. All these varieties were on the recommended list of varieties for 1981-82.

Date seeded. The recommended seeding date for wheat for grain is October 1 through November 1. Four hundred eight-nine (67.7%) of the 722 producers surveyed seeded during the recommended dates. One hundred eight-two (25.2%) of the producers seeded between November 1 and November 15. Thirty-seven (5.1%) of the producers seeded between November 15 and December 1. Eleven producers seeded before October 1 and three producers seeded after December 1.

Seeding rate in bushels. The recommended seeding rate in bushels of wheat for grain is 1-1½ bushels per acre. Two hundred eight-one (38.9%) of the producers followed this recommendation and seeded with 1 to 1½ bushels per acre. Nine producers (1.2%) seeded under one bushel. The largest number consisting of 326 (45.2%) producers seeded at the rate of two bushels per acre. Ninety-eight of those surveyed (13.6%) seeded over two bushels per acre.

Method used to seed. The recommended method for seeding wheat is by drilling. Of the 722 producers surveyed, 383 (53%) seeded by drill. One hundred fifty (20.8%) used the spinner method to seed. Thirty-five (4.8%) used the airplane. One hundred fifty-two (21.1%) producers seeded in the fertilizer.

Method used to prepare seedbed. One hundred and one producers (14%) prepared the seedbed by plowing. Five hundred fifty-one (76.3%) of the producers prepared the seedbed by disking. Thirty used the no-till method and 23 used other methods. Preparing the seedbed by disking is usually all that is necessary for wheat following corn, soybeans, grain sorghum or other row crops.

Seed treatment. Five hundred eighty-one (80.5%) of the producers surveyed used no seed treatment. One hundred thirty-five (18.7%) of the producers treated the seed before seeding. It is recommended that a seed treatment be used to control seedling blight, root rot and smuts. These diseases are caused by fungi which live over from year to year in the soil, on the surface of seed or internally.

Method used to treat seed. Eighty-six (11.9%) of the producers used Vitavax 200 to treat the seed. Twenty-two (3.0%) used Vitavax 75% to treat the seed. These materials may be used in treating seed as hopper-box dust treatment, slurry or liquid spray. However, best results are obtained when applied as a slurry. Fourteen producers used other materials.

Crop rotation used. Five hundred twenty-five (72.7%) of the producers surveyed used crop rotation with all their wheat acreage. One hundred fifty-nine (22.0%) used rotation with part of their acreage. Twenty-seven (3.7%) of the producers used none.

Fertilization

Pounds nitrogen applied per acre. At planting 15-30 pounds of nitrogen per acre is recommended with 30-60 pounds recommended as a topdressing.

Two hundred three (28.1%) of the producers applied under 60 pounds of nitrogen per acre. Two hundred fifty-two (34.9%) of the producers applied 60-79 pounds per acre. Two hundred eighteen (30.2%) of the producers applied 80-119 pounds per acre of nitrogen. Forty-nine (6.8%) of the producers applied 120 pounds and over.

Pounds phosphate applied per acre. Two hundred ten (19.1%) of the 722 producers surveyed used under 40 pounds of phosphate per acre. Three hundred fifty-four (49%) used 40-60 pounds per acre. Ninety-four (13.0%) of the producers used 61-89 pounds of phosphate per acre and 64 producers reported using 90 pounds and over per acre. Recommended applications per acre are 80 pounds per acre for low soil test, 40 pounds per acre for medium test and 20 pounds per acre for high test.

Pounds potash applied per acre. One hundred seventy-nine (24.8%) producers applied 30 pounds or less of potash. Three hundred seventy-four (51.8%) of the producers applied 31-60 pounds per acre.

One hundred twenty-one (16.8%) of the producers surveyed applied 61-90 pounds per acre and 48 of those surveyed applied 91 pounds or more per acre. Recommended applications of potash per acre are 40 pounds for low test, none for medium test and none for high test.

Limestone applied. Three hundred fifty-four (49%) of the producers reported that limestone was not needed. One hundred nine (15.1%) reported limestone was needed but they did not apply. One hundred ninety-five (27%) reported limestone was needed and was applied.

Soil tested. Two hundred eight-two (39.1%) of the producers surveyed reported none of their wheat acreage was soil tested. One hundred ninety-five (27%) tested part of their total acreage. One hundred ninety producers tested all their acreage.

Insects

Were insects a problem? Six hundred fifty-two (90.3%) of the producers reported no insect problems in 1982. Sixty-three (8.7%) reported having insect problems.

Major insect problem. Three producers reported a problem with Hessian Fly. Forty producers had problems with Armyworms. Eighteen producers had problems with Aphids and five reported other insect problems.

How severe was the insect problem? Thirty-eight producers reported that control was not needed. Thirty-one reported that control was needed.

Was an insecticide used? Forty producers reported no insecticide was used. Twenty-five reported they used an insecticide.

Disease

Were diseases a problem? Three hundred fifty-six (49.3%) producers indicated that disease was not a problem in 1982. Three hundred sixty (49.9%) indicated disease was a problem.

Major disease in 1982. Twenty-four (3.3%) producers of those surveyed reported Barley Yellow Dwarf Virus as the major disease in their wheat crop. One hundred forty-one (19.5%) of the producers reported Leaf Rust as the major disease. Ninety-nine (13.7%) reported that Powdery Mildew was the major disease problem. Thirty-seven (5.1%) producers reported Septoria Blotch as the major disease. Thirty-eight (5.3%) reported Glume Blotch as the major disease and 6 (.8%) of the producers surveyed reported other disease problems.

How severe was the disease? Fifty-four (7.5%) of the producers indicated that yield was not reduced. One hundred ninety-seven (27.3%) of the producers surveyed indicated that yield was reduced some and 42 (5.8%) indicated that yield was greatly reduced.

Was any disease control used? Two hundred fifty-nine (35.9%) producers reported that no disease control was used. Seventy-one (9.8%) reported that disease control was used.

Weed Control

Were weeds a problem? Four hundred forty-seven (61.9%) of the producers reported no weed problem with their wheat crop. Two hundred seventy-three (37.8%) reported that there was a weed problem.

Major weed in 1982. Wild garlic was the major weed problem reported by 247 (34.2%) of the producers surveyed. Twenty-eight (3.9%) indicated winter annual broadleaves as the major weed problem. Eight (2.5%) of the producers reported other weeds as a problem.

How severe was weed problem? One hundred seventy-nine (24.8%) of the producers indicated no reduction in yield due to weeds. Sixty-four (8.9%) reported yield reduced some because of weed problem. Eight (1.1%) of the producers surveyed reported a great reduction in yield due to the weed problem.

Did you spray for weeds? One hundred and three (14.3%) of the producers reported that no chemical was used against weeds. Two hundred fourteen (29.6%) of the producers reported that a weed control spray was used.

Other Problems

Did wheat winterkill? Four hundred forty-seven (61.9%) of the producers surveyed indicated that winterkill was not a problem. Two hundred sixty-seven (37.0%) of the producers indicated winterkill was a problem.

How severe was winterkill? Twenty-seven (3.7%) producers reported no reduction in yield due to winterkill. One hundred fifty (20.8%) of the producers reported some reduction in yield. Eighty-three (11.5%) producers reported that yield was reduced greatly.

Did wheat lodge? Six hundred and five (83.8%) of the producers surveyed indicated that lodging was not a problem with their wheat crop. One hundred and eight (15.0%) of the producers reported that lodging was a problem.

How severe was lodging? Fifty-four (7.5%) of the producers reported no reduction in yield due to lodging. Seventy-three (10.1%) reported some reduction in yield due to lodging and five of the producers indicated yield was reduced greatly due to lodging.

Harvesting

Moisture content at harvest. Wheat is ripe and dry enough for satisfactory combine harvest when the moisture content of the grain reaches 14 percent or less. Wheat must be 13.5 percent moisture or less to be marketed without a discount price. One hundred

and fifteen (15.9%) of the 722 producers surveyed did not know the moisture content of their wheat. Two hundred and six (28.5%) of the producers reported that all their wheat was harvested at a moisture content above 13%. Two hundred and eighteen (30.2%) reported part of their harvest above 13%. One hundred forty-seven (20.4%) of the producers indicated that all their wheat was harvested at 13% or less moisture content.

Farm Storage

Storage of wheat. Three hundred twenty-one (44.5%) of the producers surveyed reported that none of their wheat harvest was stored. One hundred ninety-three (26.7%) reported some of their harvest stored and 169 (23.4%) of the producers stored all their wheat. Twenty-five (3.5%) of the producers stored their wheat crop as hay or silage.

Stored grain protected from insects. Among those producers surveyed that stored grain, 51 (24.9%) of them used no protection from insects. One hundred fifty-four (75.1%) producers did use an insecticide to protect their wheat in storage.

Marketing

Market for grain. One hundred ninety-three (26.7%) producers indicated that none of their harvest was sold as grain. Two hundred seventeen (30.1%) contracted their harvest and 273 (37.8%) sold their grain as it was harvested.

Acres Planted

Acres planted for grain. Eighty-five (11.8%) of the producers surveyed planted under 30 acres of wheat for grain. Two hundred ninety-three (40.6%) planted between 31 and 100 acres of wheat for grain. Two hundred fifty-two (34.9%) of the producers planted between 101 and 499 acres for grain. Ninety-two (12.7%) of the producers planted 500 acres and over for grain.

Acres wheat planted for forage. Ninety percent or 650 producers reported planting 100 acres or more for forage in 1982. Forty-eight (6.6%) planted 31-99 acres for forage and 24 (3.3%) planted under 30 acres of wheat for forage.

Acres Harvested

Acres harvested for grain. Two hundred thirty-four (32.4%) of the producers surveyed harvested 60 acres or less of their wheat for grain. Two hundred thirty-six (32.7%) of the producers harvested 61-150 acres for grain. One hundred fifty-seven (21.7%) harvested between 151 and 499 acres of wheat for grain. Ninety-five (13.2%) of the producers harvested 500 or more acres of wheat for grain.

Acres wheat harvested for forage. Thirty-four (4.7%) of the producers harvested 30 acres or less for forage. Thirty-eight (5.3%) producers harvested 31 to 80 acres of wheat for forage and 650 (90%) harvested 81 or more acres of wheat for forage. Acres harvested

for forage was less than acres planted. This could be due to some of the acreage being used for pasture. There was no place on the survey to report pasture.

Yield Per Acre

Yield grain per acre wheat grown. Seventy-six percent or 550 producers had a yield of 31 bushels or more of wheat per acre. Ninety-six (13.3%) harvested 26 to 30 bushels of wheat per acre for grain. Seventy-six (10.5%) reported a harvest of 25 bushels or less of wheat for grain.

Yield forage in tons silage per acre. Six hundred seventy (92.8%) of the producers surveyed did not respond to this variable. Twelve producers reported a yield of 3-5 tons per acre of wheat for forage. Twenty-nine producers reported a yield of 6-9 tons per acre for forage and 11 reported 10-15 tons per acre.

Yield hay tons per acre. Forty-two producers from the 722 surveyed reported yield of hay in tons per acre. Two producers reported a yield of 1 ton per acre. Twenty-two producers reported a yield of 2 tons per acre. Thirteen producers reported a yield of 3 tons per acre. One producer reported 4 tons per acre. Three producers reported a yield of 9 tons per acre and one reported 15 tons per acre.

Extension Contacts

Number extension meetings attended. One hundred ninety-four (26.9%) of the producers surveyed attended no Extension meetings. One hundred ninety (26.3%) of the producers attended one Extension meeting. One hundred fifty-eight (21.9%) producers attended 3 Extension meetings. Forty-one (5.7%) of the producers attended 4 meetings. Seventeen (2.4%) of the producers attended 5 meetings. Twenty-one (2.9%) of the producers attended 6 meetings. Three producers attended 7 Extension meetings and 3 attended 8 meetings.

Number visits made to extension office. One hundred sixty-three (22.6%) of the 722 wheat producers surveyed made no visits to the Extension office. One hundred forty-four (19.9%) of the producers surveyed visited the Extension office one time to obtain information on wheat production. One hundred sixty-three (22.6%) of the producers made 2 visits to the Extension office. Eight-seven (12.0%) of the producers made 3 Extension office visits. Seventy (9.7%) of the producers made 4 visits. Thirty-three (4.6%) made 5 visits. Twenty (2.8%) made 6 visits. Two producers made 7 visits to the Extension office and 11 made 8 visits.

Number farm visits received. One hundred thirty-six (18.8%) of the producers surveyed reported no visits received from Extension agents at their farm. One hundred twenty-two (16.9%) of the producers received 1 farm visit from agents. One hundred forty-one (19.5%)

of the producers received 2 farm visits from Extension agents. Eighty-five (11.8%) of the producers received 3 farm visits. Seventy-four (10.2%) of the producers received 4 farm visits. Forty-seven (6.5%) received 5 farm visits from Extension agents. Thirty-eight (5.3%) of the producers received 6 farm visits. Twelve (1.7%) received 7 farm visits and 15 (2.1%) producers received 8 farm visits.

II. STATE SUMMARY 1982 WHEAT SURVEY:

FACTORS RELATED TO WHEAT YIELD

Section II presents findings regarding factors that relate to wheat yield in 1982. The mean yield for all wheat producers in Tennessee in 1982 was 36.0 bushels of wheat per acre. Production for 1982 was down by 10 percent from the record 37,400,000 bushels produced in 1981. The table indicates the number of producers using the practices listed in the survey as well as the mean yield per acre for class of producers.

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.

Seeding

The variables related to seeding in the survey are shown in the first part of Table II.

Variety grown. The variety Abe grown by 21 of the producers surveyed yielded 31.6 bushels per acre which was the lowest yield

TABLE II. State Summary 1982 Wheat Survey: Factors Related to Wheat Yield

Name of Variable	Number Respondents	Mean Yield per Acre Bushel
<u>A. Seeding</u>		
1. Variety Grown		
Abe	21	31.6
Arthur	310	34.2
Coker 747	149	37.7
Double Crop	15	32.3
Hart	16	39.4
McNair 1003	51	41.5
Pioneer 576	19	33.9
Pioneer 578	16	35.8
Southern Belle	99	33.3
Total	713	35.3
Variance Ratio	F=3.55 P=0.0002	
2. Date Seeded		
Oct. 1-15	129	33.7
Oct. 15-Nov. 1	353	36.1
Nov. 1-15	180	35.4
Nov. 15-Dec. 1	37	33.9
Before Oct. 1	11	31.4
After Dec. 1	3	36.7
Total	713	35.3
Variance Ratio	F=1.04 P=0.3954	
3. Seeding Rate		
Under 1 Bu.	9	30.3
One Bu.	63	30.8
Bu. Half	216	36.7
Two Bu.	320	35.6
Over 2 Bu.	97	34.5
Total	705	35.3
Variance Ratio	F=3.41 P=0.009	
4. Method of Seeding		
Drill	379	34.9
Spinner	147	35.3

TABLE II. (Continued)

Name of Variable	Number Respondents	Mean Yield per Acre Bushel
Broadcast by Airplane	35	39.7
Broadcast in Fertilizer	150	35.3
Total	711	35.3
Variance Ratio	$F=1.62$ $\bar{P}=0.183$	
5. Seedbed Preparation		
Plow	99	33.0
Disk	546	35.5
No-Till	28	38.9
Other	23	35.6
Total	696	35.3
Variance Ratio	$F=2.06$ $\bar{P}=0.1039$	
6. Seed Treatment		
No Treatment Used	573	34.9
Treated	134	37.1
Total	707	35.3
Variance Ratio	$F=3.64$ $\bar{P}=0.0568$	
a. Method of Treatment		
Dust	53	35.9
Liquid	64	37.7
Total	117	36.9
Variance Ratio	$F=0.56$ $\bar{P}=0.4548$	
b. Material Used		
Vitavax 200	85	38.9
Vitavax 75%	22	34.6
Other	14	32.1
Total	121	37.3
Variance Ratio	$F=2.32$ $\bar{P}=0.1031$	
7. Crop Rotation		
All	519	35.4
Part	158	35.0
None	26	32.6

TABLE II. (Continued)

Name of Variable	Number Respondents	Mean Yield per Acre Bushel
Total	703	35.6
Variance Ratio	$F=0.69$ $\bar{P}=0.5002$	
<u>B. Fertilization</u>		
1. Pounds N/Acre		
Under 60 lbs.	178	35.2
60-79 lbs.	222	36.0
80-119 lbs.	187	37.5
120 lbs.-Over	42	34.7
Total	629	36.1
Variance Ratio	$F=3.134$ $\bar{P}=0.025$	
2. Pounds Phosphate/Acre		
Under 40 lbs.	185	33.7
40-60 lbs.	307	37.1
61-89 lbs.	83	37.3
90 lbs.-Over	54	37.3
Total	629	36.1
Variance Ratio	$F=8.048$ $\bar{P}=0.00001$	
3. Pounds Potash/Acre		
30 lbs.-Under	158	35.4
31-60 lbs.	327	36.1
61-90 lbs.	104	37.0
91 lbs.-Over	40	36.9
Total	629	36.1
Variance Ratio	$F=0.965$ $\bar{P}=0.4090$	
4. Limestone Applied/Acre		
None Needed	306	35.8
Needed--Not--Applied	101	36.9
Applied as Needed	164	36.2
Total	571	36.1
Variance Ratio	$F=0.724$ $\bar{P}=0.4851$	

TABLE II. (Continued)

Name of Variable	Number Respondents	Mean Yield per Acre Bushel
5. Soil Test		
None Tested	251	34.8
Part Tested	165	37.6
All Tested	163	36.3
Total	579	36.1
Variance Ratio	$F=6.258$ $\bar{P}=0.0020$	
C. Insects		
1. Were Insects a Problem?		
No	570	36.1
Yes	53	36.5
Total	623	36.1
Variance Ratio	$F=0.107$ $\bar{P}=0.7439$	
D. Disease		
1. Were Diseases a Problem?		
No	308	36.4
Yes	315	36.0
Total	623	36.2
Variance Ratio	$F=0.302$ $\bar{P}=0.5828$	
E. Weed Control		
1. Were Weeds a Problem?		
No	385	36.3
Yes	242	35.9
Total	627	36.1
Variance Total	$F=0.223$ $\bar{P}=0.6367$	
F. Other Problems		
1. Winter Kill		
Not a Problem	387	38.0
Yes is a Problem	237	32.9
Total	624	36.1
Variance Ratio	$F=65.65$ $P=00.00001$	

TABLE II. (Continued)

Name of Variable	Number Respondents	Mean Yield per Acre Bushel
2. Lodging		
Not a Problem	532	36.0
Yes a Problem	91	36.9
Total	623	36.1
Variance Ratio	$F=0.967$ $\bar{P}=0.3258$	
<u>G. Extension Contacts</u>		
1. Number Extension Meetings Attended		
0	173	35.6
1	179	36.6
2	133	37.0
3	72	35.7
4	33	34.6
5	12	35.7
6	10	34.6
7	3	37.7
8	2	22.0
Total	617	36.1
Variance Ratio	$F=1.377$ $\bar{P}=0.203$	
2. Visits Made to Extension Office		
0	145	33.2
1	128	36.7
2	142	37.2
3	76	37.4
4	58	35.8
5	28	37.0
6	18	38.7
7	2	36.0
8	9	36.3
Total	606	36.1
Variance Ratio	$F=3.299$ $\bar{P}=0.001$	
3. Number Farm Visits Received		
0	119	33.8
1	110	37.0
2	131	36.0
3	75	35.8

TABLE II. (Continued)

Name of Variable	Number Respondents	Mean Yield per Acre Bushel
4	60	36.0
5	36	36.1
6	30	38.8
7	11	40.8
8	13	36.2
Total	585	36.0
Variance Ratio	$F=2.26$ $\bar{P}=0.022$	

of any of the recommended varieties evaluated in the survey. The highest yielding variety was McNair 1003 which was grown by 51 of the producers and yielded a mean yield of 41.5 bushels per acre. Nine producers surveyed did not respond to this variable. When tested by the analysis of variance F test, there was a significant relationship between variety grown and mean yield per acre.

Date seeded. The recommended seeding rate for wheat for grain is between October 1 and November 1. Five hundred eight-two (68%) of the producers surveyed seeded during the recommended time. Producers that seeded October 1 to October 15 had a mean yield of 33.7 bushels per acre. Those seeding between October 15 and November 1 had a yield of 36.1 bushels per acre. The yield reported by 11 producers who seeded before October 1 was 31.4 bushels per acre. The yield reported by 3 producers who seeded after December 1 was 36.7 bushels per acre. When tested by the F test the difference in yield as it related to date seeded was not significant at the .05 level.

Seeding rate. The recommended seeding rate of wheat for grain is one bushel and a half per acre. Two hundred sixteen of the producers surveyed reported using the recommended rate of $1\frac{1}{2}$ bushels per acre and reported the highest yield of 36.7 bushels per acre. The lowest yield was reported by 9 producers which was 30.3 bushels per acre. Sixty-three of the producers seeded with one bushel per acre and reported a yield of 30.8 bushels per acre. Three hundred twenty of the producers used a seeding rate of 2 bushels and the

yield was 35.6 bushels per acre. A further reduction in yield was reported by 97 producers who seeded with over 2 bushels per acre with a yield of 34.5 bushels per acre. When tested by the F test the difference in yield was significantly related to the seeding rate.

Method of seeding. The recommended method of seeding is by drilling. Three hundred seventy-nine (53%) of the producers surveyed used the recommended method of drilling with a mean yield of 34.9 bushels per acre. Thirty-five producers used the airplane method and reported a yield of 39.7 bushels per acre. When tested by the F test the difference in mean yield as it related to method of seeding was not significantly related at the .05 level.

Seedbed preparation. Ninety-nine of the 722 producers surveyed plowed the land before seeding and those who used this practice had a mean yield of 33 bushels per acre of wheat. A mean yield of 38.9 bushels per acre was reported by 28 producers who used the no-till practice for seedbed preparation. The largest number of producers (546) used the disk to prepare the seedbed and their mean yield was 35.5 bushels per acre. When tested by the F test, there was no significant relationship between mean yield and method of seedbed preparation.

Seed treatment. Five hundred seventy-three producers from those surveyed reported that they used no seed treatment and had a

mean yield of 34.9 bushels per acre. One hundred thirty-four producers did use a seed treatment and reported a mean yield of 37.1 bushels per acre. When tested by the F test the difference in mean yield as it related to seed treatment was significantly at the .05 level. The method of treatment and the material used was not significantly related at the .05 level when tested by the F test.

Crop rotation. Crop rotation was used on all the wheat acreage of 519 of the wheat producers surveyed and they reported a mean yield of 35.4 bushels per acre. There was only a slight difference in yield for 158 producers who used crop rotation on part of their wheat crop with a mean yield of 35 bushels per acre. Twenty-six producers used no crop rotation and had a mean yield of 32.6 bushels per acre. When tested by the F test the difference in mean yield as it related to crop rotation was not significant at the .05 level.

Fertilization

Pounds nitrogen per acre. One hundred eighty-seven of the producers surveyed applied 80 to 119 pounds of nitrogen per acre and reported a mean yield of 37.5 bushels per acre of wheat. The lowest yield of 34.7 bushels per acre was reported by 42 producers who used 120 pounds and over of nitrogen per acre. One hundred seventy-eight producers used under 60 pounds of nitrogen per acre and showed a mean yield of 35.2 bushels per acre. Two hundred twenty-two producers applied 60-79 pounds per acre and reported a yield of 36

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.

Pounds phosphate per acre. One hundred eighty-five of the producers surveyed applied under 40 pounds of phosphate per acre and reported the lowest mean yield of those surveyed of 33.7 bushels per acre. Three hundred seven of the producers applied 40 to 60 pounds phosphate per acre and reported a mean yield of 37.1 bushels per acre. There was very little difference in yield when a higher rate was applied. However when tested by the F test there was a significant difference in mean yield as it related to pounds of phosphate applied per acre.

Pounds potash per acre. One hundred fifty-eight producers of those surveyed applied 30 pounds and under of potash per acre and reported a mean yield of 35.4 bushels per acre. One hundred four producers reported 37 bushels per acre. When tested by the F test the difference in mean yield as it related to pounds of potash applied per acre was not significantly related at the .05 level.

Limestone applied per acre. Three hundred six of the producers surveyed indicated they needed no limestone and reported a mean yield of 35.8 bushels per acre of wheat. One hundred one of the producers indicated they needed limestone but did not apply it and reported a mean yield of 36.9 bushels per acre. One hundred sixty-four of

the producers applied the limestone as needed and reported a mean yield of 36.2 bushels per acre. When tested by the F test the difference in mean yield as it related to limestone applied per acre was not significantly related at the .05 level.

Soil test. Two hundred fifty-one of the producers surveyed did not take a soil test and reported a mean yield of 34.8 bushels per acre. One hundred sixty-five producers did test part of their soil and had a mean yield of 37.6 bushels. One hundred sixty-three producers reported testing all their wheat land and had a mean yield of 36.3 bushels per acre. When tested by the F test the difference in mean yield as it related to soil test was significantly related at the .05 level.

Insects

Were insects a problem? Five hundred seventy producers surveyed reported no insect problem and 53 reported they did have an insect problem. When tested by the F test the difference in mean yield of wheat per acre as it related to insect problems was not significantly related at the .05 level.

Disease

Were diseases a problem? Three hundred eight producers indicated no disease problem and had a mean yield of 36.4 bushels per acre. Three hundred fifteen reported there was a disease problem

and had a mean yield of 36.0 bushels per acre. When tested by the F test the difference in mean yield as it related to disease problems was not significantly related at the .05 level.

Weed Control

Were weeds a problem? Three hundred eighty-five producers surveyed indicated they had no weed problem and had a mean yield of 36.3 bushels per acre of wheat. Two hundred forty-two of the producers reported that they had a weed problem and had a mean yield of 35.9 bushels per acre. When tested by the F test the difference in mean yield as it related to weed problems was not significantly related at the .05 level.

Other Problems

Winterkill. Three hundred eighty-seven of the producers surveyed indicated they had no problem with winterkill and had a mean yield of 38 bushels per acre. Two hundred thirty-seven of the producers reported having a problem with winterkill and had a mean yield of 32.9. When tested by the F test the difference in mean yield as it related to winterkill was significantly related at the .05 level.

Lodging. Lodging was not a problem for 532 producers surveyed who reported a 36 bushel per acre mean yield. Ninety-one producers did have a problem with lodging, however their mean yield was reported

as 36.9 bushels per acre. When tested by the F test the difference in yield was not significantly related to lodging.

Extension Contacts

Number extension meetings attended. One hundred seventy-three of the producers attended no Extension meetings and harvested 35.6 bushels of wheat per acre. The highest number of Extension meetings attended was 8 and these 2 producers had a mean yield of 22 bushels per acre. There were 105 missing cases. The mean yield for all producers was 36.1 bushels per acre. The relationship between the number of Extension meetings attended and the yield of grain in bushels per acre was not significant at the .05 level.

Visits made to extension office. One hundred forty-five of the producers made no visits to the Extension office and harvested 33.2 bushels of wheat per acre. The highest number of office visits was 8 and those 9 producers harvested a mean yield of 36.3 bushels of wheat per acre. There were 116 missing cases. When tested by the F test the difference in mean yield as it relates to visits made to the Extension office for information concerning wheat production was highly significantly related at the .05 level.

Number farm visits received. One hundred nineteen of the producers received no visits to the farm by the Extension agent and harvested 33.8 bushels per acre. The highest number of farm visits received was 8 and those 13 producers harvested 36.2 bushels per acre

of wheat. There were 137 missing cases. When tested by the F test the difference in yield as it related to the number of farm visits received was significant at the .05 level.

III. CHARACTERISTICS OF WHEAT PRODUCTION AND SIZE OF FARM OPERATIONS

Findings regarding the variables in the survey to characterize wheat production and size of farm operations are presented in Table III. The mean acres of wheat harvested for grain and number of producers are shown for each variable.

Seeding

Variety. Fifty-one of the largest producers harvested an average of 250.8 acres of wheat for grain and those producers planted the McNair 1003 variety. The smallest producers (15) harvested an average of 78.5 acres of wheat for grain and planted the Pioneer 78 variety. There were 50 producers who did not respond. The difference in mean acres of wheat harvested by each producer as it related to variety was significant at the .05 level.

Date seeded. Three producers harvested 216.7 acres of wheat for grain that was seeded after December 1. The recommended seeding date was October 1 to November 1. One hundred seventeen of the producers surveyed harvested 163.2 acres of wheat for grain and seeded between October 1 and October 15. Three hundred forty-four producers harvested 179.5 acres for grain and seeded between October 15 and

TABLE III. Characteristics of Wheat Production and Size of Farm Operation

Name of Variable	Acres Wheat Harvested for Grain (Mean)	Number of Producers (N = 722)
<u>Variety</u>		
Abe	100.7	20
Arthur	175.6	295
Coker 747	182.1	147
Doublecrop	109.6	15
Hart	169.9	16
McNair	250.8	51
Pioneer 76	82.3	18
Pioneer 78	78.5	15
Southern Belle	161.1	95
No Response		50
Variance Ratio	$F=2.44$ $\bar{P}=0.01$	
<u>Date Seeded</u>		
Oct. 1-15	163.2	117
Oct. 15-Nov. 1	179.5	344
Nov. 1-Nov. 15	180.0	174
Nov. 15-Dec. 1	119.8	37
Before Oct. 1	67.0	10
After Dec. 1	216.7	3
No Response		37
Variance Ratio	$F=1.24$ $\bar{P}=0.29$	
<u>Seeding Rate Bushels/Acre</u>		
Under 1 Bushel	85.3	8
One Bushel	109.7	57
Bushel and Half	163.3	212
Two Bushels	176.3	309
Over 2 Bushels	229.2	91
No Response		45
Variance Ratio	$F=3.68$ $\bar{P}=0.006$	
<u>Method Used to Seed</u>		
Drill	183.6	363
Spinner	124.9	143
Airplane	240.5	35

TABLE III. (Continued)

Name of Variable	Acres Wheat Harvested for Grain (Mean)	Number of Producers (N = 722)
In Fertilizer	175.2	142
No Response		39
Variance Ratio	$F=4.34$ $\bar{P}=0.005$	
<u>Method Used to Prepare Seedbed</u>		
Plow	89.7	94
Disk	180.4	526
No-Till	288.1	27
Other	230.8	23
No Response		52
Variance Ratio	$F=9.21$ $\bar{P}=0.00001$	
<u>Seed Treatment</u>		
None	164.2	551
Treated	205.8	129
No Response		42
Variance Ratio	$F=4.38$ $\bar{P}=0.03$	
<u>Method Used to Treat Seed</u>		
Dust	120.7	51
Liquid	262.6	62
No Response		609
Variance Ratio	$F=11.15$ $\bar{P}=0.001$	
<u>Materials Used to Treat Seed</u>		
Vitavax 200	230.9	84
Vitavax 75%	186.1	20
Other	127.3	12
No Response		606
Variance Ratio	$F=1.10$ $\bar{P}=0.34$	
<u>Type Crop Rotation Used</u>		
All	173.2	497
Part	176.9	152
None	64.8	26

TABLE III. (Continued)

Name of Variable	Acres Wheat Harvested for Grain (Mean)	Number of Producers (N = 722)
No Response		47
Variance Ratio	$F=3.85$ $\overline{P}=0.02$	
<u>Were Insects a Problem</u>		
No	175.9	617
Yes	120.6	62
No Response		43
Variance Ratio	$F=4.19$ $\overline{P}=0.04$	
<u>Major Insect Problem</u>		
Hessian Fly	45.0	3
Armyworms	123.1	40
Aphids	142.3	16
Other	64.6	5
No Response		658
Variance Ratio	$F=0.42$ $\overline{P}=0.74$	
<u>How Severe Were Insects</u>		
Control Not Needed	116.8	37
Control Needed	137.7	30
No Response		655
Variance Ratio	$F=0.23$ $\overline{P}=0.63$	
<u>Was an Insecticide Used</u>		
No	143.4	38
Yes	110.7	24
No Response		660
Variance Ratio	$F=0.47$ $\overline{P}=0.49$	
<u>Were Diseases a Problem</u>		
No	121.7	329
Yes	220.3	350
No Response		43
Variance Ratio	$F=42.1$ $P=0.00001$	

TABLE III. (Continued)

Name of Variable	Acres Wheat Harvested for Grain (Mean)	Number of Producers (N = 722)
<u>Major Disease in 1982</u>		
Barley Yellow Dwarf Virus	90.4	24
Leaf Rust	262.7	140
Powdery Mildew	208.4	96
Septoria Blotch	223.2	35
Glume Blotch	160.1	35
Loose Smut	147.9	17
Other	306.7	6
No Response		369
Variance Ratio	$F=3.10$ $\bar{P}=0.006$	
<u>How Severe Was Disease</u>		
Yield Not Reduced	240.9	51
Yield Reduced Some	228.8	194
Yield Greatly Reduced	201.1	41
No Response		436
Variance Ratio	$F=0.33$ $\bar{P}=0.71$	
<u>Was Any Disease Control Used</u>		
No	195.1	251
Yes	327.4	70
No Response		401
Variance Ratio	$F=18.4$ $P=0.00001$	
<u>Were Weeds a Problem</u>		
No	158.0	413
Yes	191.4	270
No Response		39
Variance Ratio	$F=4.47$ $\bar{P}=0.03$	
<u>Major Weeds</u>		
Wild Garlic	199.9	244
Winter Annual Broadleaf	112.1	28
Other	173.6	18
No Response		432
Variance Ratio	$F=2.59$ $\bar{P}=0.07$	

TABLE III. (Continued)

Name of Variable	Acres Wheat Harvested for Grain (Mean)	Number of Producers (N = 722)
<u>How Severe Was Weed Problem</u>		
Yield Not Reduced	192.9	177
Yield Reduced Some	177.9	63
Yield Reduced Greatly	93.3	8
No Response		474
Variance Ratio	$F=1.09$ $\bar{P}=0.34$	
<u>Did You Spray for Weeds</u>		
No	142.0	97
Yes	214.9	213
No Response		412
Variance Ratio	$F=8.92$ $\bar{P}=0.003$	
<u>Did Wheat Winterkill</u>		
Not a Problem	179.8	427
Yes is a Problem	158.1	252
No Response		43
Variance Ratio	$F=1.80$ $\bar{P}=0.18$	
<u>How Severe Was Winterkill</u>		
Yield Not Reduced	138.1	26
Yield Reduced Some	168.9	142
Yield Greatly Reduced	146.4	78
No Response		476
Variance Ratio	$F=0.60$ $\bar{P}=0.54$	
<u>Did Wheat Lodge</u>		
Not a Problem	176.5	574
Yes is a Problem	154.0	104
No Response		44
Variance Ratio	$F=1.08$ $\bar{P}=0.30$	
<u>How Severe Was Lodging</u>		
Yield Not Reduced	153.8	52
Yield Reduced Some	145.4	70

TABLE III. (Continued)

Name of Variable	Acres Wheat Harvested for Grain (Mean)	Number of Producers (N = 722)
Yield Greatly Reduced	54.0	5
No Response		595
Variance Ratio	$F=0.72$ $\bar{P}=0.49$	
<u>Moisture Content at Harvest</u>		
Moisture Not Known	74.8	111
Above 13% All	172.2	206
Above 13% Part	243.3	217
13% or Less All	140.3	146
No Response		42
Variance Ratio	$F=20.17$ $\bar{P}=0.00001$	
<u>Storage of Wheat</u>		
None Stored	142.0	319
Some Stored	233.3	190
All Stored	157.7	168
Cut Hay or Silage	30.0	1
No Response		44
Variance Ratio	$F=8.83$ $\bar{P}=0.00001$	
<u>Stored Grain Protected from Insects</u>		
No	162.3	50
Yes	251.4	152
No Response		522
Variance Ratio	$F=4.42$ $\bar{P}=0.03$	
<u>Market for Grain</u>		
None Sold	119.2	172
Contracted	268.8	217
Sold at Harvest	132.2	271
No Response		62
Variance Ratio	$F=38.72$ $\bar{P}=0.00001$	

TABLE III. (Continued)

Name of Variable	Acres Wheat Harvested for Grain (Mean)	Number of Producers (N = 722)
<u>Extension Meetings Attended</u>		
0	147.7	185
1	145.8	186
2	180.0	147
3	177.2	76
4	225.2	36
5	254.2	17
6	486.9	19
7	28.3	3
8	33.3	3
No Response		50
Variance Ratio	$F=8.03$ $P=0.00001$	
<u>Visits Made to Extension Office</u>		
0	166.4	158
1	131.4	139
2	144.7	152
3	213.4	83
4	191.1	63
5	146.5	30
6	199.0	19
7	37.5	2
8	246.6	10
No Response		66
Variance Ratio	$F=2.09$ $P=0.03$	
<u>Farm Visits Received</u>		
0	137.1	130
1	119.3	117
2	162.3	135
3	157.7	82
4	192.7	67
5	207.8	42
6	210.9	34
7	193.3	12
8	171.5	14
No Response		89
Variance Ratio	$F=2.08$ $P=0.03$	

November 1. Thirty-seven producers did not respond. The difference in mean acres of wheat harvested for grain by each producer as it related to date seeded was not significant at the .05 level.

Seeding rate bushels per acre. The largest producers (91) harvested 229.2 acres of wheat for grain. These producers used a seeding rate of over 2 bushels per acre. The smaller producers (8) who harvested 85.3 acres for grain seeded under 1 bushel per acre. Two hundred sixty-nine producers seeded the recommended rate of $1-1\frac{1}{2}$ bushels per acre. Fifty-seven of them harvested 109.7 acres of wheat for grain and seeded one bushel per acre. Two hundred twelve of them harvested 163.3 acres and seeded with one bushel and a half per acre. The difference in mean acres of wheat harvested for grain by each producer as it related to seeding rate in bushels per acre was significant at the .05 level.

Method used to seed. Thirty-five producers harvested an average of 240.5 acres of wheat for grain and those producers used the airplane method for seeding. Three hundred sixty-three producers who harvested 183.6 acres for grain used the recommended method of drilling. One hundred forty-three of the smaller producers who harvested an average of 124.9 acres used the spinner method of seeding. One hundred forty-two producers who harvested an average of 175.2 acres seeded in fertilizer. There were 39 of the 722 producers surveyed that did not respond. The difference in mean acres of wheat harvested for grain by each producers as it related to method used to seed was significant at the .05 level.

Method used to prepare seedbed. The largest producers (27) harvested 288 acres of wheat for grain. These producers used the no-till method to prepare the seedbed. The smaller producers (94) harvested 89.7 acres of wheat and plowed the ground before seeding. The largest number of producers (526) harvested 180 acres and prepared the seedbed by disking. The difference in mean acres of wheat harvested for grain by each producer as it related to method used to prepare the seedbed was significant at the .05 level.

Seed treatment. Five hundred fifty-one of the producers surveyed harvested a mean of 164 acres of wheat for grain and used no seed treatment. One hundred twenty-nine of the producers harvested an average of 205 acres of wheat for grain and did treat the seed before sowing. The difference in mean acres of wheat harvested for grain as it related to seed treatment was significant at the .05 level.

Method used to treat seed. One hundred thirteen of the producers who treated their wheat seed responded to this question. The larger producers used a liquid treatment and the smaller producers used a dust treatment. The difference in mean acres of wheat harvested for grain by each producers as it related to method used to treat seed was significant at the .05 level.

Materials used to treat seed. Of those producers who treated seed the larger producers (84) harvested a mean of 231 acres of wheat

for grain and used Vitavax 200 to treat the seed. Twenty producers who harvested an average of 186 acres for grain used Vitavax 75% Dust to treat their wheat seed. Twelve of the producers used other materials to treat the seed. The difference in mean acres of wheat harvested for grain by each producer as it related to materials used to treat seed was not significant at the .05 level.

Type crop rotation used. Four hundred ninety-seven producers who harvested a mean of 173 acres of wheat for grain used crop rotation on all their wheat acreage. One hundred fifty-two producers who harvested a mean of 177 acres for grain used crop rotation on part of their total acreage of wheat. Twenty-six producers who averaged 65 acres used no crop rotation at all. There was a significant difference between type of crop rotation used and mean acreage harvested by each producer at the .05 level.

Insects

Were insects a problem? Six hundred seventeen producers harvested an average of 176 acres of wheat for grain and indicated no insect problem. Sixty-two of the producers harvested an average of 120 acres and reported they had insect problems. The difference in mean acres harvested as it related to insect problems was significant at the .05 level.

Major insect problem. The larger producers reported Armyworms and Aphids as the major insect problem with their wheat crop. The smaller producers reported Hessian Fly and other insects as their

major insect problem. There was no significant difference between mean acres of wheat harvested by each producer and major insect problem at the .05 level.

How severe were insects? Thirty-seven producers indicated that insect control was not needed and thirty producers indicated control was needed. There was no significant difference in mean acres of wheat harvested for grain and the severity of insects when tested by the F test at the .05 level.

Was an insecticide used? Thirty-eight producers harvested a mean of 143 acres of wheat for grain and used no insecticide. Twenty-four producers harvested a mean of 111 acres for grain and indicated they used an insecticide. The difference in mean acres of wheat for grain as it related to use of an insecticide was not significantly related at the .05 level.

Disease

Were diseases a problem? Three hundred fifty producers harvested an average of 220 acres of wheat for grain and indicated they had a disease problem with their wheat. Three hundred twenty-nine of the producers who harvested 122 acres of grain indicated no disease problem. The difference in mean acres of wheat harvested for grain as it relates to whether or not there was a disease problem was significant at the .05 level.

Major disease in 1982. Of those producers who reported a disease problem, 24 producers who harvested an average of 90 acres of wheat for grain indicated Barley Yellow Dwarf Virus as their major problem. One hundred forty producers harvested an average of 263 acres for grain and reported Leaf Rust as their major problem. Ninety-six producers who harvested an average of 208 acres reported Powdery Mildew as the major problem. Thirty-five producers harvested an average of 223 acres for grain and indicated Septoria Blotch as the major disease problem. Thirty-five producers harvested 160 acres for grain and indicated Glume Blotch as the major disease problem. Seventeen producers harvested 148 acres of wheat for grain and reported Loose Smut as the major disease problem. Six producers harvested 307 acres and reported diseases other than those listed on the survey as their major disease problem. The difference in mean acres of wheat harvested as it related to major disease in 1982 was significant at the .05 level.

How severe was disease? Yield was not reduced for 51 producers who harvested an average of 241 acres of wheat for grain. Yield was reduced some for 194 producers who harvested an average of 229 acres for grain. Forty-one of the producers who harvested 201 acres of wheat for grain reported yield greatly reduced. The difference in mean acres of wheat harvested for grain as it relates to severity of disease problem was not significant at the .05 level.

Was any disease control used? Two hundred fifty-one producers who harvested 195 acres of wheat for grain indicated they used no

disease control. Seventy producers harvested an average of 327 acres of wheat for grain and indicated they did use a disease control. The figures indicated the larger producers used a control. The difference in mean acres of wheat harvested for grain as it relates to whether or not a disease control was used was significant at the .05 level.

Weed Control

Were weeds a problem? Two hundred seventy producers who harvested an average of 191 acres of wheat for grain indicated they had a weed problem with their wheat crop. Four hundred thirteen producers harvested an average of 158 acres for grain and indicated no weed problem. The difference in mean acres of wheat harvested for grain as it related to whether or not there was a weed problem was significant at the .05 level.

Major weeds. Wild garlic was the major weed reported by the largest number of producers (244) who harvested an average of 200 acres of wheat for grain. Twenty-eight producers harvested an average of 112 acres for grain and indicated winter annual broadleaf as the major weed problem. Eighteen producers indicated other weeds as the major weed problem. The difference in mean acres harvested for grain as it related to the major weed problem was not significant at the .05 level.

How severe was weed problem? One hundred seventy-seven of the producers who had a weed problem reported that yield was not

reduced. These producers harvested an average of 193 acres of wheat for grain. Sixty-three producers reported some reduction in yield and harvested an average of 178 acres for grain. Eight producers reported a great reduction in yield due to weed problems. These producers harvested an average of 93 acres of wheat for grain. The difference in mean acres wheat harvested for grain and severity of the weed problem on yield reduction was not significant at the .05 level.

Did you spray for weeds? Two hundred thirteen producers who harvested an average of 215 acres of wheat for grain indicated they sprayed for weed control. Ninety-seven producers harvested 142 acres and did not spray. The figures indicated that the larger producers sprayed. The difference in mean acres of wheat harvested for grain as it related to whether or not they spray for weeds was significant at the .05 level.

Other Problems

Did wheat winterkill? Four hundred twenty-seven producers harvested an average of 180 acres of wheat for grain and indicated that winterkill was not a problem. Two hundred fifty-two producers harvested an average of 158 acres and reported winterkill was a problem. There was no significant difference in mean acres harvested as it related to winterkill.

How severe was winterkill? Of those producers who indicated a problem with winterkill, 142 of them harvested an average of 169

acres of wheat for grain and indicated some reduction in yield. Twenty-six producers harvested a mean of 138 acres and reported no reduction in yield. Seventy-eight producers harvested 146 acres and indicated a great reduction in yield. The difference in mean acres of wheat harvested as it related to severity of winterkill was not significant at the .05 level.

Did wheat lodge? Five hundred seventy-four of the producers surveyed harvested 176 acres of wheat for grain and reported they had no problem with lodging of wheat. One hundred four producers harvested 154 acres and reported they had a problem with lodging. The difference in mean acres of wheat harvested as it relates to lodging was not significant at the .05 level.

How severe was lodging? Fifty-two of those producers who reported a problem with lodging harvested a mean of 154 acres of wheat for grain and indicated yield was not reduced. Seventy producers reported some reduction in yield on their average 145 acres of wheat harvested for grain. Five of the smaller producers who harvested an average of 54 acres reported yield greatly reduced. The difference in mean acres of wheat harvested for grain as it relates to severity of lodging was not significant at the .05 level.

Harvesting

Moisture content at harvest. The larger producers (217) harvested an average of 243 acres of wheat for grain and harvested part

of their wheat with a moisture content above 13%. Two hundred six producers who harvested an average of 172 acres for grain harvested all their wheat above 13% moisture. One hundred forty-six producers harvested an average of 140 acres of wheat for grain and harvested all their wheat at 13% or less. One hundred eleven of the producers surveyed who harvested an average of 75 acres for grain indicated they did not know the moisture content. Forty-two producers did not respond. The difference in mean acres harvested for grain by each producer as it relates to moisture content at harvest was significant at the .05 level.

Farm Storage

Storage of wheat. The larger producers (190) harvested an average of 233 acres of wheat for grain and indicated they stored only part of their grain. One hundred sixty-eight producers harvested 158 acres for grain and reported storing all their grain. Three hundred nineteen producers harvested an average of 142 acres and indicated they stored none of their wheat. One producer cut his 30 acres for hay or silage and 44 producers did not respond. The difference in mean acres of wheat harvested for grain as it relates to storage was significant at the .05 level.

Stored grain protected from insects. The larger producers (152) harvested an average of 251 acres of wheat for grain and indicated they used some protection against insects on their stored grain.

Fifty producers harvested an average of 162 acres and used no protection on their stored wheat against insects. The difference in acres harvested as it relates to insect protection for stored grain was significant at the .05 level.

Marketing

Market for grain. Two hundred seventeen producers who harvested a mean of 269 acres of wheat for grain marketed their grain by contract. Two hundred seventy-one producers harvested an average of 132 acres and indicated they sold all their grain at harvest. One hundred seventy-two producers harvested an average of 119 acres and indicated they sold none of their wheat. Sixty-two producers did not respond. The difference in acres of wheat harvested for grain as it relates to how it was marketed was significant at the .05 level.

Extension Contacts

Extension meetings attended. Nineteen producers surveyed harvested an average of 487 acres of wheat for grain and reported attending 6 Extension meetings during the year. Four hundred sixty-two producers who harvested an average of 146 to 254 acres of wheat for grain reported attending 1 to 5 Extension meetings. One hundred eighty-five producers who harvested an average of 148 acres for grain did not attend any meetings. There were 50 producers who did not respond. The difference in mean acres of wheat harvested for grain

as it relates to number of Extension meetings attended was significant at the .05 level.

Visits made to extension office. Ten producers who harvested an average of 247 acres of wheat for grain reported 8 visits to the Extension office to obtain information pertaining to wheat production. One hundred fifty-eight producers harvested an average of 166 acres and reported no visits to the Extension office. The difference in mean acres of wheat harvested for grain as it relates to number of visits made to the Extension office was significant at the .05 level.

Farm visits received. Those producers who received the most farm visits (8) were the 14 producers who harvested an average of 172 acres of wheat for grain. Thirty-four of the larger producers who harvested an average of 211 acres reported receiving 6 visits to the farm by Extension personnel. One hundred thirty of the producers surveyed harvested an average of 137 acres for grain and reported no farm visits received from agent. The difference in mean acres of wheat harvested for grain as it relates to number of farm visits was significant at the .05 level.

IV. RELATIONSHIPS BETWEEN PRACTICE USE AND THE NUMBERS OF EXTENSION CONTACTS

Findings regarding the relationship between the use of wheat production practices and number of Extension contacts are presented

in Table IV. Each wheat producer on the average attended 1.7 Extension meetings, made 2.0 visits to the Extension office, and received 2.4 farm visits from Extension agents.

Seeding

Variety. Fifty-one producers grew the wheat variety McNair 1003 and attended more Extension meetings. Thirteen producers grew the variety Doublecrop. The average number of contacts made by all the 691 producers who responded was 5.8. When tested by the F test there was no significant difference in office visits made, farm visits received or total Extension contacts made as it related to variety grown. There was, however, a significant difference in the number of Extension meetings attended and the variety grown.

Date seeded. Four hundred seventy-nine producers seeded their wheat during the recommended time of October 1 through November 1. One hundred twenty-six producers seeded from October 1-15 and 353 producers seeded from October 15-November 1. The average number of contacts with Extension was 5.8 for 709 producers. When tested by the F test there was no significant difference in Extension meetings attended, office visits made, farm visits received or total Extension contacts as to date seeded.

Seeding rate. Two hundred seventy-six of the producers surveyed seeded with the recommended one to one and a half bushels per acre. Nine respondents seeded with under 1 bushel per acre. Ninety-four producers used a seeding rate of over 2 bushels per acre. The

TABLE IV. Relationships Between Practice Use and the Numbers of Extension Contacts

Name of Variable	No. Respondents	Mean Number of Extension Contacts			Total Ext. Contacts
		Wheat Meetings	Office Visits	Farm Visits	
<u>Variety</u>					
Abe	21	1.6	2.2	2.0	5.0
Arthur	308	1.6	1.8	2.4	5.6
Coker 747	148	1.7	2.1	2.4	5.9
Double Crop	13	1.7	2.9	3.3	7.9
Hart	16	1.3	2.3	2.6	5.4
McNair 1003	51	2.5	2.6	2.6	7.0
Pioneer 76	21	1.1	2.0	1.6	4.8
Pioneer 78	15	1.4	1.4	2.1	4.8
Southern Belle	98	1.7	2.0	2.4	6.0
Total	691	1.65	2.02	2.41	5.8
Variance Ratio		F=2.4 P=0.02	F=1.7 P=0.09	F=0.88 P=0.53	F=1.3 P=0.24
<u>Date Seeded</u>					
Oct. 1-15	126	1.9	1.9	2.2	5.5
Oct. 15-Nov. 1	353	1.7	2.1	2.6	6.1
Nov. 1-15	179	1.5	2.1	2.4	5.7
Nov. 15-Dec. 1	37	1.5	1.8	2.2	5.5
Before Oct. 1	11	1.6	2.0	1.7	4.6
After Dec. 1	3	0.0	1.7	2.3	4.0
Total	709	1.65	2.0	2.4	5.8
Variance Ratio		F=1.36 P=0.24	F=0.50 P=0.78	F=1.02 P=0.40	F=0.82 P=0.54

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts			
		Wheat Meetings	Office Visits	Farm Visits	Total Ext. Contacts
<u>Seeding Rate</u>					
Under 1 Bushel	9	2.4	2.0	1.9	5.9
One Bushel	59	1.9	1.8	2.2	5.5
Bushel and Half	217	1.6	2.1	2.4	5.8
Two Bushel	322	1.6	2.0	2.5	5.9
Over Two Bushel	94	1.8	2.1	2.6	6.0
Total	701	1.66	2.0	2.43	5.9
Variance Ratio		F=1.29 P=0.27	F=0.47 P=0.76	F=0.67 P=0.61	F=0.14 P=0.97
<u>Method of Seeding</u>					
Drill	376	1.7	2.1	2.7	6.2
Spinner	146	1.4	2.0	2.0	5.2
Airplane	34	2.0	2.0	1.9	4.6
In Fertilizer	151	1.7	1.9	2.3	5.7
Total	707	1.65	2.01	2.42	5.8
Variance Ratio		F=1.78 P=0.15	F=0.22 P=0.88	F=4.26 P=0.005	F=2.54 P=0.06
<u>Seedbed Preparation</u>					
Plow	99	1.4	1.8	2.0	5.1
Disk	541	1.7	2.0	2.5	6.0
No Till	29	2.0	2.0	2.6	5.9
Other	23	1.7	2.1	2.0	5.0

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts			
		Wheat Meetings	Office Visits	Farm Visits	Total Ext. Contacts
Total	692	1.7	2.0	2.4	5.8
Variance Ratio		F=1.70 $\bar{P}=0.17$	F=0.49 $\bar{P}=0.69$	F=1.76 $\bar{P}=0.15$	F=1.46 $\bar{P}=0.22$
<u>Seed Treatment</u>					
None	570	1.6	2.0	2.4	5.7
Treated	133	1.8	2.1	2.7	6.2
Total	703	1.65	2.01	2.4	5.8
Variance Ratio		F=1.15 $\bar{P}=0.28$	F=0.07 $\bar{P}=0.41$	F=1.76 $\bar{P}=0.18$	F=0.95 $\bar{P}=0.33$
<u>Method of Treatment</u>					
Dust	53	1.6	2.5	3.1	7.1
Liquid	63	2.0	1.9	2.3	5.7
Total	116	1.82	2.2	2.7	6.4
Variance Ratio		F=1.09 $\bar{P}=0.30$	F=3.08 $\bar{P}=0.08$	F=4.76 $\bar{P}=0.03$	F=2.90 $\bar{P}=0.09$
<u>Material Used</u>					
Vitavax 200	84	1.9	2.2	2.7	6.5
Vitavax 75%	21	1.4	1.9	2.1	4.5
Other	14	1.9	3.4	4.0	9.2
Total	119	1.83	2.29	2.75	6.5
Variance Ratio		F=0.90 $\bar{P}=0.41$	F=3.25 $\bar{P}=0.04$	F=3.63 $\bar{P}=0.03$	F=5.39 $\bar{P}=0.006$

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts			
		Wheat Meetings	Office Visits	Farm Visits	Total Ext. Contacts
<u>Crop Rotation</u>					
All	517	1.6	2.0	2.5	5.8
Part	154	1.6	2.2	2.4	6.0
None	27	2.1	1.7	1.6	4.7
Total	698	1.7	2.0	2.4	5.8
Variance Ratio		F=1.20 P=0.30	F=1.79 P=0.17	F=2.34 P=0.10	F=0.94 P=0.39
<u>Fertilization Pounds N/Acre</u>					
Under 60	202	1.5	1.9	2.1	5.4
60-79	246	1.6	1.8	2.2	5.4
80-119	215	1.7	2.2	2.8	6.4
120-Over	46	2.0	3.0	3.3	7.7
Total	709	1.7	2.0	2.4	5.8
Variance Ratio		F=1.32 P=0.27	F=6.91 P=0.0001	F=7.21 P=0.0001	F=5.52 P=0.001
<u>Pounds P₂O₅/Acre</u>					
Under 40	204	2.0	2.1	2.5	6.2
40-60	348	1.6	2.1	2.5	6.0
61-89	93	1.1	1.6	2.2	4.8
90-Over	64	1.7	1.9	2.2	5.4
Total	709	1.7	2.0	2.42	5.8
Variance Ratio		F=6.93 P=0.0001	F=1.88 P=0.13	F=1.06 P=0.37	F=2.40 P=0.07

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts				Total Ext. Contacts
		Wheat Meetings	Office Visits	Farm Visits		
<u>Pounds K₂O/Acre</u>						
30-Under	173	1.7	2.1	2.3		5.6
31-60	369	1.6	2.0	2.6		6.0
61-90	120	1.5	1.7	2.2		5.4
91-Over	47	2.0	2.5	2.3		6.3
Total	709	1.7	2.0	2.4		5.8
Variance Ratio		F=1.16 P=0.33	F=2.85 P=0.04	F=1.53 P=0.21		F=0.916 P=0.43
<u>Limestone Applied/Acre</u>						
None Needed	344	1.7	1.9	2.4		5.8
Needed-Not Applied	108	1.5	1.8	2.4		5.3
Applied as Needed	193	1.6	2.3	2.7		6.4
Total	645	1.7	2.04	2.5		5.9
Variance Ratio		F=1.35 P=0.26	F=3.39 P=0.03	F=1.50 P=0.22		F=2.20 P=0.09
<u>Soil Test</u>						
None Tested	280	1.4	1.7	2.1		5.1
Part Tested	194	1.8	2.1	2.7		6.2
All Tested	183	1.9	2.4	2.7		6.7
Total	657	1.7	2.0	2.5		5.9
Variance Ratio		F=6.94 P=0.001	F=7.72 P=0.0008	F=5.59 P=0.004		F=9.3 P=0.001

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts			
		Wheat Meetings	Office Visits	Farm Visits	Total Ext. Contacts
<u>Were Insects a Problem?</u>					
No	640	1.7	2.0	2.4	5.9
Yes	62	1.6	1.8	2.3	5.3
Total	702	1.7	2.0	2.4	5.8
Variance Ratio		$F=0.004$ $\overline{P}=0.95$	$F=0.80$ $\overline{P}=0.29$	$F=0.22$ $\overline{P}=0.64$	$F=0.827$ $\overline{P}=0.36$
<u>Were Diseases a Problem?</u>					
No	348	1.5	2.0	2.2	5.4
Yes	356	1.8	2.0	2.7	6.2
Total	704	1.7	2.0	2.4	5.8
Variance Ratio		$F=4.62$ $\overline{P}=0.03$	$F=0.80$ $\overline{P}=0.37$	$F=9.23$ $\overline{P}=0.003$	$F=5.28$ $\overline{P}=0.02$
<u>Were Weeds a Problem?</u>					
No	436	1.6	2.0	2.4	5.8
Yes	271	1.7	2.0	2.4	5.8
Total	707	1.7	2.0	2.4	5.8
Variance Ratio		$F=0.71$ $\overline{P}=0.40$	$F=0.11$ $\overline{P}=0.74$	$F=0.143$ $\overline{P}=0.71$	$F=0.010$ $\overline{P}=0.92$
<u>Winterkill</u>					
Not a Problem	439	1.6	2.0	2.4	5.7
Yes is a Problem	263	1.8	2.0	2.4	6.0

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts			
		Wheat Meetings	Office Visits	Farm Visits	Total Ext. Contacts
Total Variance Ratio	702	1.7 F=1.32 $\overline{P}$ =0.25	2.0 F=1.10 $\overline{P}$ =0.80	2.4 F=5.58 $\overline{P}$ =0.94	5.8 F=0.97 $\overline{P}$ =0.43
<u>Lodging</u>					
Not a Problem	593	1.7	2.1	2.5	5.9
Yes a Problem	107	1.7	1.9	2.0	5.5
Total Variance Ratio	700	1.7 F=0.008 $\overline{P}$ =0.93	2.0 F=1.10 $\overline{P}$ =0.29	2.4 F=5.58 $\overline{P}$ =0.02	5.9 F=0.97 $\overline{P}$ =0.32
<u>Moisture Content at Harvest</u>					
Moisture Not Known	114	1.2	1.7	1.7	4.3
Above 13% All	201	1.5	2.2	2.4	5.9
Above 13% Part	215	1.7	1.9	2.6	6.0
13% or Less, All	143	2.0	2.0	2.5	6.0
Total Variance Ratio	673	1.6 F=7.32 $\overline{P}$ =0.0001	2.0 F=1.66 $\overline{P}$ =0.17	2.4 F=4.84 $\overline{P}$ =0.002	5.7 F=4.90 $\overline{P}$ =0.0023
<u>Storage of Wheat</u>					
None Stored	313	1.4	1.9	2.3	5.3
Some Stored	192	1.8	2.0	2.4	6.0
All Stored	165	1.9	2.1	2.5	6.1

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts			
		Wheat Meetings	Office Visits	Farm Visits	Total Ext. Contacts
Cut Hay or Silage	25	2.2	2.8	3.5	8.6
Total	695	1.7	2.0	2.4	5.8
Variance Ratio		F=6.09 $\bar{P}=0.0004$	F=2.32 $\bar{P}=0.07$	F=2.64 $\bar{P}=0.48$	F=5.62 $\bar{P}=0.0008$
<u>Wheat Marketed for Grain</u>					
None Sold	190	1.7	2.1	2.5	6.1
Contracted	209	1.8	2.1	2.7	6.2
Sold at Harvest	271	1.4	1.9	2.2	5.3
Total	670	1.6	2.0	2.4	5.8
Variance Ratio		F=3.46 $\bar{P}=0.03$	F=0.94 $\bar{P}=0.39$	F=3.05 $\bar{P}=0.048$	F=2.73 $\bar{P}=0.07$
<u>Acres Wheat Planned for Grain</u>					
Under 30 Acres	82	1.5	2.0	2.3	5.4
31-100 Acres	289	1.6	1.9	2.2	5.6
101-499 Acres	247	1.5	2.0	2.5	5.8
500 Acres-Over	91	2.3	2.5	3.0	7.2
Total	709	1.7	2.0	2.4	5.8
Variance Ratio		F=5.81 $\bar{P}=0.0006$	F=2.24 $\bar{P}=0.08$	F=3.47 $\bar{P}=0.02$	F=3.43 $\bar{P}=0.02$

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts			
		Wheat Meetings	Office Visits	Farm Visits	Total Ext. Contacts
<u>Acres Wheat Planted for Forage</u>					
Under 30 Acres	24	1.9	2.3	2.3	6.3
31-99 Acres	46	2.0	2.2	2.8	6.8
100 Acres-Over	639	1.6	2.0	2.4	5.8
Total	709	1.7	2.0	2.4	5.8
Variance Ratio		$F=1.46$ $\overline{P}=0.23$	$F=0.79$ $\overline{P}=0.45$	$F=0.92$ $\overline{P}=0.40$	$F=1.38$ $\overline{P}=0.25$
<u>Acres Wheat Harvested for Grain</u>					
60 Acres-Under	230	1.5	1.9	2.2	5.4
61-150 Acres	229	1.5	1.9	2.2	5.4
151-499 Acres	156	1.7	2.1	2.8	6.3
500 Acres-Over	94	2.3	2.5	3.0	7.3
Total	709	1.7	2.0	2.4	5.8
Variance Ratio		$F=8.05$ $\overline{P}=0.0001$	$F=2.66$ $\overline{P}=0.04$	$F=5.91$ $\overline{P}=0.0006$	$F=5.59$ $\overline{P}=0.0009$
<u>Acres Wheat Harvested for Forage</u>					
30 Acres-Less	33	2.2	2.4	2.9	7.2
31-80 Acres	37	1.9	2.1	2.7	6.6
81 Acres-Over	639	1.6	2.0	2.4	5.7
Total	709	1.7	2.0	2.4	5.8
Variance Ratio		$F=2.23$ $\overline{P}=0.11$	$F=0.66$ $\overline{P}=0.52$	$F=1.31$ $\overline{P}=0.27$	$F=2.70$ $\overline{P}=0.07$

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts			
		Wheat Meetings	Office Visits	Farm Visits	Total Ext. Contacts
<u>Yield Grain per Acre</u>					
<u>Wheat Grown</u>					
25 Bushels-Less	74	1.4	1.3	1.7	4.3
26-30 Bushels	95	1.7	1.9	2.1	5.4
31 Bushels-Over	540	1.7	2.1	2.6	6.1
Total	709	1.7	2.0	2.4	5.8
Variance Ratio		F=1.37	F=7.97	F=6.89	F=6.41
		$\overline{P}=0.25$	$\overline{P}=0.004$	$\overline{P}=0.001$	$\overline{P}=0.0018$
<u>Yield Forage in Tons</u>					
<u>Silage per Acre</u>					
3-5 Tons/Acre	12	2.2	1.7	2.2	6.2
6-9 Tons/Acre	29	1.9	2.3	2.5	6.6
10-15 Tons/Acre	11	1.9	2.0	3.4	7.1
Total	52	2.0	2.1	2.6	6.6
Variance Ratio		F=0.96	F=0.71	F=1.92	F=0.71
		$\overline{P}=0.49$	$\overline{P}=0.70$	$\overline{P}=0.08$	$\overline{P}=0.70$
<u>Yield Hay Tons per Acre</u>					
1 Ton	2	3.0	3.5	2.5	9.0
2 Tons	20	2.1	2.5	3.7	8.0
3 Tons	13	1.4	2.4	1.9	5.7
4 Tons	1	1.0	1.0	2.0	4.0
9 Tons	3	2.7	1.7	0.7	5.0

TABLE IV. (Continued)

Name of Variable	No. Respondents	Mean Number of Extension Contacts			
		Wheat Meetings	Office Visits	Farm Visits	Total Ext. Contacts
15 Tons	1	6.0	8.0	6.0	20.0
Total	40	2.0	2.5	2.9	7.3
Variance Ratio		F=2.49	F=2.44	F=5.8	F=5.36
		$\bar{P}=0.05$	$\bar{P}=0.05$	$\bar{P}=0.0005$	$\bar{P}=0.001$

average number of contacts with Extension was 5.9 for 701 producers. When tested by the F test there was no significant difference in Extension meetings attended, office visits made, farm visits received, or total Extension contacts as to seeding rate.

Methods of seeding. Three hundred seventy-six producers used the recommended method of drilling the seed. These producers received more farm visits from Extension. Thirty-four producers used the airplane method. The average number of contacts with Extension was 5.8 for 707 producers. When tested by the F test there was no significant difference in Extension meetings attended and office visits made as to method of seeding. There was, however, a significant difference in the number of farm visits received and total Extension contacts as they related to method of seeding used by producers.

Seedbed preparation. Twenty-nine producers used the no-till method to prepare the seedbed. Twenty-three producers reported using other methods. The average number of contacts with Extension was 5.8 for 692 producers. When tested by the F test there was no significant difference in Extension meetings attended, office visits made, farm visits received or total Extension contacts as they related to method of seedbed preparation.

Seed treatment. One hundred thirty-three producers surveyed reported they did use a seed treatment on their wheat seed before planting. Five hundred seventy producers did not treat their seed.

The average number of contacts with Extension was 5.8 for 703 producers. When tested by the F test there was no significant difference in Extension meetings attended, office visits made, farm visits received or total Extension contacts as they related to whether or not a seed treatment was used.

Method of treatment. Fifty-three producers who used a seed treatment used a dust as the method of treatment and received more farm visits than those using liquid as treatment method. Sixty-three producers used the liquid method of treatment. The average number of contacts with Extension was 6.4 for 116 producers. When tested by the F test there was no significant difference in Extension meetings attended, office visits made or total Extension contacts. There was, however, a significant difference in the number of farm visits received from Extension agents as it related to method of seed treatment.

Material used. Eighty-four producers used Vitavax 200 to treat the wheat seed before planting. Twenty-one producers used Vitavax 75%. Those 14 producers using other materials made more office visits to Extension office and received more farm visits. The average number of contacts with Extension was 6.5 for 119 producers. When tested by the F test there was no significant difference in Extension meetings attended as it related to material used to treat seed. There was, however, a significant difference in office visits made, farm visits received and total Extension contacts as they relate to material used to treat seed.

Crop rotation. Five hundred seventeen producers reported using crop rotation on all their wheat acreage. One hundred fifty-four producers used crop rotation on only part of their crop. Those 27 producers who used no crop rotation attended more Extension meetings. The average number of contacts with Extension was 5.8 for 698 producers. When tested by the F test there was no significant difference in Extension meetings attended, office visits made, farm visits received and total Extension contacts as they relate to use of crop rotation.

Fertilization

Fertilization pounds nitrogen per acre. Two hundred two producers surveyed used under 60 pounds per acre of nitrogen fertilizer per acre on their wheat crop and averaged a total of 5.4 Extension contacts. Two hundred forty-six producers applied 60-79 pounds N per acre and also averaged a total of 5.4 Extension contacts. Two hundred fifteen producers applied 80-119 pounds N per acre and averaged 6.4 Extension contacts. Forty-six producers used 120 pounds or more of nitrogen per acre and made more office visits to Extension office and received more farm visits than those producers using less nitrogen per acre. The average number of contacts with Extension was 5.8 for 709 producers. When tested by the F test there was no significant difference in Extension meetings attended as it relates to pounds nitrogen applied per acre. There was, however, a significant difference

in number of office visits, farm visits received and total contacts made with Extension as they relate to pounds of nitrogen applied per acre.

Pounds phosphate per acre. Two hundred four producers applied under 40 pounds phosphate per acre attended more Extension meetings than those using over 40 pounds. The average number of contacts with Extension was 5.8 for 709 producers who responded to the survey. When tested by the F test there was no significant difference in office visits made, farm visits received or total Extension contacts as they relate to pounds phosphate applied per acre. There was, however, a significant difference in number of Extension meetings attended and pounds phosphate applied per acre.

Pounds potash per acre. Three hundred sixty-nine producers applied 31-60 pounds of potash per acre. Forty-seven producers applied 91 pounds or more potash per acre and made more office visits to the Extension office. The average number of contacts with Extension was 5.8 for 709 producers. When tested by the F test there was no significant difference in Extension meetings attended, farm visits received or total Extension contacts as they relate to pounds potash applied per acre. There was, however, a significant difference in office visits made as it relates to pounds potash applied per acre.

Limestone applied per acre. Three hundred forty-four producers indicated that no limestone was needed. One hundred ninety-three producers applied limestone as needed and made more office

visits than the other groups. One hundred eight reported limestone needed but not applied. The average number of total contacts with Extension was 5.9 for 645 producers. When tested by the F test there was no significant difference in Extension meetings attended, farm visits received and total Extension contacts as they relate to whether or not limestone was applied. There was, however, a significant difference in the number of office visits made by producers as it relates to whether limestone was applied or not.

Soil test. Two hundred eighty producers indicated they did no soil test for their wheat acreage. One hundred ninety-four reported testing part of their wheat acreage and received more farm visits from Extension agents. One hundred eighty-three producers tested all their wheat acreage and attended more Extension meetings, made more office visits and received the same number of farm visits as those who tested part. The average number of contacts with Extension was 5.9 for 657 producers. When tested by the F test there was a significant difference in number of all three types of Extension contacts as they related to soil test.

Insects

Were insects a problem? Six hundred forty producers reported no insect problem with their wheat crop. Sixty-two producers reported an insect problem. The average number of contacts with Extension was 5.8 for 702 producers. When tested by the F test there was no

significant difference in Extension meetings attended, office visits made, farm visits received and total Extension contacts as they relate to whether or not there was an insect problem.

Diseases

Were diseases a problem? Three hundred forty-eight producers reported no disease problem. Three hundred fifty-six producers reported a disease problem and attended more Extension meetings and received more farm visits. The average number of contacts with Extension was 5.8 for 704 producers. When tested by the F test there was no significant difference in office visits made as it related to disease problems. There was, however, a significant difference in Extension meetings attended, farm visits made and total Extension contacts as they related to whether or not there was a disease problem.

Weed Control

Were weeds a problem? Four hundred thirty-six producers reported no weed problem. Two hundred seventy-one producers reported a weed problem. The average number of total Extension contacts was 5.8 for 707 producers. When tested by the F test there was no significant difference in meetings attended, office visits made, farm visits received and total Extension contacts as they related to whether or not weeds were a problem.

Other Problems

Winterkill. Four hundred thirty-nine producers reported no problem with winterkill. Two hundred sixty-three producers reported a winterkill problem. The average number of contacts with Extension was 5.8 for 702 producers. When tested by the F test there was no significant difference in either type of Extension contact as they related to winterkill.

Lodging. Five hundred ninety-three producers reported no problem with lodging and received more farm visits than those having a lodging problem. One hundred seven producers reported a problem with lodging. The average number of contacts with Extension was 5.9 for 700 producers. When tested by the F test there was no significant difference in Extension meetings attended, office visits made and total contacts as they related to problems with lodging. There was, however, a significant difference in farm visits received from Extension agents as it related to lodging.

Harvesting

Moisture content at harvest. One hundred fourteen producers indicated they did not know the moisture content of their wheat at harvest. Two hundred one producers harvested all their crop above 13% moisture. Two hundred fifteen producers reported harvesting only part of their wheat above 13% moisture content and received more farm visits. One hundred forty-three producers harvested all

their wheat at 13% or less moisture content. The average number of contacts with Extension was 5.7 for 673 producers. When tested by F test there was no difference in office visits made by producers as it related to moisture content of their wheat at harvest. There was, however, a significant difference in Extension meetings attended, farm visits received and total Extension contacts as they relate to moisture content at harvest.

Farm Storage

Storage of wheat. Three hundred thirteen producers reported none of their wheat stored. One hundred ninety-two reported storing some of their wheat and 165 producers indicated all their wheat was stored. Twenty-five producers stored their wheat as hay or silage and this group attended more Extension meetings. The average number of contacts with Extension was 5.8 for 695 producers. When tested by the F test there was no significant difference in office visits made or farm visits received as they relate to storage of wheat. There was, however, a significant difference in Extension meetings attended and total Extension contacts as they related to storage of wheat.

Marketing

Wheat marketed for grain. One hundred ninety producers indicated that none of their wheat was sold. Two hundred nine contracted their wheat and attended more Extension meetings and received more

farm visits. Two hundred one producers reported selling all their wheat at harvest. The average number of contacts with Extension was 5.8 for 670 producers. When tested by the F test there was no significant difference in office visits or total contacts as they relate to how wheat was marketed for grain. There was, however, a significant difference in Extension meetings attended, and farm visits received as they relate to how wheat was marketed for grain.

Acres Planted

Acres wheat planted for grain. Eighty-two producers planted under 30 acres of wheat for grain. Two hundred eighty-nine producers planted 31-100 acres for grain. Two hundred forty-seven planted 101-499 acres for grain. Ninety-one producers planted 500 or more acres of wheat for grain. The numbers indicate that these largest producers attended more Extension meetings and received more farm visits from Extension agents. The average number of contacts with Extension was 5.8 for 709 producers. When tested by the F test there was no significant difference in office visits made to Extension office by producer as it related to number of acres of wheat planted for grain. There was, however, a significant difference in Extension meetings attended, farm visits received and total contacts with Extension as they related to number acres of wheat planted for grain.

Acres wheat planted for forage. Twenty-four producers planted under 30 acres of wheat for forage. Forty-six producers planted 31-99 acres for forage. Six hundred thirty-nine producers reported

planting 100 acres or more wheat for forage. The average number of contacts with Extension was 5.8 for 709 producers. When tested by the F test there was no significant difference in either method of contact as they relate to acres of wheat planted for forage.

Acres Harvested

Acres wheat harvested for grain. The largest producers (94) who harvested 500 acres or more for grain attended more Extension meetings, made more office visits and received more farm visits than any other group of producers surveyed. The average number of contacts with Extension was 5.8 for 709 producers. When tested by the F test there was a significant difference in mean number of Extension contacts by each method as they related to acres wheat harvested for grain.

Acres wheat harvested for forage. Thirty-three producers harvested 30 acres or less of wheat for forage. When tested by the F test there was no significant difference in either method of contact as they relate to acres of wheat harvested for forage.

Yield Per Acre

Yield grain per acre wheat grown. Five hundred forty producers reported a yield of 31 bushels or more per acre of wheat for grain and made more office visits and received more farm visits. Ninety-five producers reported a yield of 26-30 bushels per acre. The average number of contacts with Extension was 5.8 for 709 producers.

When tested by the F test there was no significant difference in Extension meetings attended as it relates to yield of grain per acre of wheat grown. There was, however, a significant difference in office visits made, farm visits received and total Extension contacts as they relate to yield of grain per acre of wheat grown.

Yield forage in tons silage per acre. Twelve producers reported a yield of 3-5 tons per acre of forage from their wheat silage. Twenty-nine producers had a yield of 6-9 tons per acre. Eleven producers had a yield of 10-15 tons per acre. The average number of contacts with Extension was 6.6 for 52 producers. When tested by the F test there was no significant difference in either method of contact as they related to yield of forage in tons of silage per acre.

CHAPTER III

SUMMARY OF MAJOR FINDINGS

I. PURPOSES AND SPECIFIC OBJECTIVES

Purposes

The purposes of this study was to determine the relationships between selected characteristics of wheat producers and their farming operations upon their participation in the Extension program.

Specific Objectives

The specific objectives of this study were:

1. To characterize 722 randomly selected wheat producers in 37 counties in Tennessee where 5,000 or more acres of wheat were planted in 1981.
2. To determine the relationship between the use of recommended wheat production practices and the yield obtained by the wheat producers.
3. To determine the relationship between size of farm operation and their use of recommended production practices and the number of contacts they had with Extension.
4. To determine the relationship between the use of the recommended production practices and the number of contacts producers had with Extension.
5. To determine the relationship between the number of contacts producers had with Extension and their wheat yield.

II. METHODS OF INVESTIGATION

The population of this study included all wheat producers who planted 25 or more acres of wheat for grain in 1982 in counties where 5,000 or more acres of wheat were planted in 1981. Data collected in the 1982 Tennessee Wheat Production Survey were secured from 722 producers in 37 counties through personal interviews by Extension agents.

The sample included twenty producers from each county producing 5,000 acres or more of wheat in 1981.

A list of all wheat (grain) producers who grew 25 or more acres of wheat in 1982 was made in each county to be surveyed. The "nth" number technique was used to identify twenty-five producers. The last five producers identified were used as alternates. Alternates were used only to replace producers who, for good reason, could not be interviewed.

Data collected by the survey were coded for statistical analysis by the University of Tennessee Computer Center.

Responses to the survey questions were summarized using means and frequencies. The one-way analysis of variance F test was used to determine the association between each dependent variable and each of the independent variables. F values which achieved the .05 level of probability were accepted as being statistically significant.

III. MAJOR FINDINGS

Major findings were classified and presented under headings related to the objectives of the study.

Characteristics of Operations of Wheat

Producers in Tennessee

1. The largest number of wheat producers (43.5%) seeded the Arthur variety.
2. Sixty-seven percent of the wheat producers seeded during recommended seeding date of October 1 to November 1.
3. Thirty percent of the producers followed the recommendation of 1 to 1½ bushels per acre seeding rate.
4. Fifty-three percent of the producers used the recommended method of drilling to seed their wheat.
5. Seventy-six percent of the wheat producers used the disking method to prepare the seedbed.
6. Eighty percent of the producers used no seed treatment.
7. Seventy-two percent of the producers used crop rotation with all their wheat acreage.
8. Over 53 percent of the producers took a soil test of part or all their total wheat acreage.
9. Ninety percent of the producers reported no insect problem.
10. About 50 percent of the producers reported they had a disease problem with their wheat crop.

11. About 62 percent of the producers reported no weed problem with their wheat crop.

12. The major weed problem reported by most of the producers who had a weed problem was Wild Garlic.

13. About 62 percent of the wheat producers indicated winterkill was a problem and 32 percent reported yield reductions due to winterkill.

14. Eighty-three percent of the producers reported no problem with lodging.

15. Only 20 percent of the producers indicated that their wheat was at 13 percent or less moisture content when harvested. Wheat must be 13.5 percent or less to be marketed without a discount price.

16. Acres of wheat planted for grain ranged from under 30 acres planted by 11 percent of the producers to over 500 acres planted by 12 percent of the producers. The largest percentage (40%) of the producers planted 31 to 100 acres.

17. Ninety percent of the producers reported planting 100 acres or more for forage in 1982.

18. Wheat yields for grain ranged from 25 bushels or less to 31 or more bushels per acre reported by 76 percent of the producers.

19. About 5 percent of the producers surveyed harvested their wheat for hay.

20. Wheat producers attended up to 8 Extension meetings concerning wheat production. About 27 percent attended no Extension meetings.

21. Wheat producers who were surveyed reported up to 8 visits to the Extension office. Twenty-six percent of these producers made no visits to the Extension office.

22. About 75 percent of the producers surveyed received 1 to 8 farm visits from Extension agents in 1982. About 19 percent received no visits.

Factors Related to Wheat Yield

1. There was a significant relationship between variety grown and mean yield of wheat per acre. The highest yielding variety was McNair 1003 which yielded a mean yield of 41.5 bushels per acre.

2. Date seeded was not significantly related to mean yield of wheat per acre.

3. The recommended rate of seeding of one and a half bushels per acre was used by about 30 percent of those surveyed and the mean yield was 36.7 bushels per acre. Seeding rate was significantly related to mean yield per acre.

4. Method of seeding was not significantly related to mean yield of wheat per acre.

5. Those producers who used no-till method of seedbed preparation had a mean yield of 38.9 bushels per acre. However, seedbed preparation was not related significantly to yield.

6. Pounds of nitrogen applied per acre was significantly related to mean yield of wheat per acre. Those producers who applied 80-119 pounds per acre had the highest yield of 37.5 bushels per

acre. Those who applied 120 pounds and over had the lowest yield of 34.7 bushels per acre.

7. Pounds of phosphate applied per acre was significantly related to mean yield per acre. Those who applied 40 to 90 pounds and over yielded 37 bushels per acre. Those who applied under 40 pounds reported a yield of 33.7 bushels per acre.

8. Pounds potash applied per acre was not significantly related to mean yield of wheat per acre.

9. Limestone applied per acre was not significantly related to yield.

10. Soil test was significantly related to mean yield of wheat per acre. Those producers who tested reported a higher mean yield of wheat per acre than those who did not test.

11. Insect, disease and weed problems were not significantly related to mean yield of wheat per acre.

12. Winterkill was significantly related to mean yield. Those producers who reported no problem with winterkill reported a mean yield of about 6 more bushels per acre than those who said it was a problem.

13. Lodging was not related significantly to mean yield of wheat per acre.

14. Number of Extension meetings attended was not significantly related to mean yield of wheat per acre. However, visits made to the Extension office and number of farm visits received from

Extension agents were significantly related to mean yield of wheat per acre. Those producers who made no office visits and received no farm visits reported the lowest mean yields.

Characteristics of Wheat Production and Size of Farm Operations

1. The largest producers who harvested an average of 250 acres of wheat for grain used the McNair 1003 variety of wheat. The smallest producers who harvested an average of 78 acres for grain used the Pioneer 78 variety. There was a significant difference between variety grown and mean acres of wheat harvested for grain.

2. The larger producers seeded between October 1 and November 15. There was no significant difference in date seeded as it related to mean acres harvested for grain.

3. There was a significant difference in seeding rate in bushels per acre as it related to size of farm operation. Seeding rate tended to increase with increase in size of operation.

4. There was a significant difference in method used to seed wheat as it related to acres of wheat harvested for grain. The largest producers seeded by airplane.

5. The largest producers used the no-till method of seedbed preparation and there was a significant difference as it related to size of wheat operation for grain.

6. The larger producers used Vitavax 200 liquid seed treatment to treat the wheat seed before planting. There was a significant difference in whether or not seed treatment was used and method

used as they related to mean acres of wheat harvested for grain. However, there was no significant difference in material used.

7. There was a significant difference in all or part crop rotation and no crop rotation. The smaller producers reported using no crop rotation. The larger producers used crop rotation with all or part of their wheat crop.

8. There was a significant difference in whether or not insects were a problem and size of wheat operation. Larger producers reported no problem.

9. There was a significant difference in whether or not diseases were a problem as it related to acres of wheat grown for grain. The larger producers reported they had disease problems.

10. The major diseases reported were significantly related to the size of wheat operation for grain.

11. A disease control was used by the larger producers and this was significantly related to mean acres of wheat harvested for grain.

12. There was a significance between whether or not a spray was used on weeds as it related to acres of wheat harvested for grain. The larger producers used a weed control spray.

13. Moisture content of wheat at harvest was significantly related to size of wheat operation. The largest producers harvested only part of their wheat above 13% moisture.

14. Storage of wheat was significantly related to mean acres of wheat harvested for grain. The largest producers stored only part

of their wheat and the smallest producers cut their wheat for hay or silage.

15. The larger producers protected their stored grain from insects and this was significantly related to the size of operation.

16. The method used to market their wheat grain was significantly related to mean acres of wheat harvested for grain. The largest producers contracted their harvest.

17. There was a significant difference in number of Extension meetings attended, visits made to Extension office and number of farm visits received from Extension agents as it related to size of operation. The largest producers attended an average of 6 meetings, visited the Extension office an average of 8 times and received an average of 6 farm visits from Extension agents.

Relationship Between Practice Use and the Numbers of Extension Contacts

1. Variety of wheat grown was significantly related to the number of Extension wheat meetings attended. Those 51 producers who seeded the McNair 1003 variety attended the most Extension wheat meetings.

2. Date seeded was not significantly related to either type of Extension contacts.

3. Seeding rate was not significantly related to either type of Extension contact.

4. The method of seeding was significantly related to number of farm visits received from Extension agents but was not related to

other types of Extension contacts. Those 376 producers who used the recommended method of drilling received more farm visits.

5. Seedbed preparation was not significantly related to either type of Extension contact.

6. Seed treatment was not significantly related to either type of Extension contact but the method of treatment was significantly related to number of farm visits received from Extension agents.

7. Materials used for seed treatment was not significantly related to number of Extension wheat meetings attended but was significantly related to number of office visits and farm visits received.

8. Crop rotation was not significantly related to either type of Extension contact.

9. Pounds of nitrogen applied per acre was not significantly related to Extension wheat meetings attended but was related to number of office visits made and farm visits received. Those who applied 120 pounds and over made the largest number of contacts.

10. Pounds phosphate applied per acre was not significantly related to number of office visits or number of farm visits received but was significantly related to number of Extension wheat meetings attended.

11. Pounds potash applied per acre was not significantly related to number of Extension wheat meetings attended or number of farm visits received but it was related to number of office visits made to Extension office. Those who used 91 pounds and over made the largest number of office visits.

12. Whether or not limestone was applied was significantly related to number of office visits made to Extension office. Those who made more visits applied limestone as needed.

13. The extent to which soil test was used was significantly related to each type of Extension contact. Those producers that tested all their wheat acreage reported the largest number of total Extension contacts.

14. Whether or not insects was a problem was not significantly related to either method of Extension contact.

15. Whether or not diseases were a problem was not related to number of office visits made but was related to number of Extension meetings attended and number farm visits received from Extension agents. Those producers who reported a disease problem reported more total Extension contacts.

16. The problem with weeds was not significantly related to either type of Extension contact.

17. Whether or not winterkill was a problem was not significantly related to either method of Extension contact.

18. Whether or not lodging was a problem was not significantly related to number of Extension wheat meetings attended or number of office visits made but was significantly related to number of farm visits received.

19. Moisture content reported at harvest was significantly related to number of Extension wheat meetings attended and number

of farm visits received from Extension agents. It was not related to number of office visits made by producers to the Extension office.

20. Storage of wheat was significantly related to the number of Extension meetings attended but was not related to other methods of contact.

21. How wheat was marketed by the producers was significantly related to the number of Extension meetings attended and number of farm visits received but was not related to number office visits made.

22. Acres of wheat planted for grain was significantly related to the number of Extension wheat meetings attended and farm visits received but not related to number of office visits made. The 91 largest producers who planted 500 acres and over reported the largest number of contacts for each method.

23. Acres of wheat planted for forage was not significantly related to either method of contact.

24. Acres of wheat harvested for grain was significantly related to all the methods of Extension contacts reported. The larger producers who harvested 500 acres or more reported the largest number of contacts in each case.

25. Acres of wheat harvested for forage was not related significantly to either method of contact.

26. Yield of grain per acre of wheat grown was significantly related to number of office visits made and farm visits received

but was not related to Extension wheat meetings attended. Five hundred forty producers who harvested 31 or more bushels of wheat per acre reported the most total contacts.

27. Yield of forage in tons of silage per acre was not significantly related to either method of contact.

28. Yield of hay in tons per acre was significantly related to number of farm visits received but was not significantly related to other methods of contact.

IV. IMPLICATIONS

The findings of this study suggest that the staff of the University of Tennessee Agricultural Extension Service did help to influence the use of wheat production practices. There were a large number of contacts with wheat producers made through Extension wheat meetings, office visits and farm visits. Those producers who frequently made contact with Extension agents were using more of the recommended production practices than those who either had less contact or none at all. The trend was for the larger producers to make more Extension contacts than smaller producers. Also, those who made more contacts had higher yields on the average. There has been a lot of emphasis on no-till and crop rotation and the larger producers used these practices more than the smaller producers. With larger producers making more Extension contacts and having significantly higher yields, it would seem important that the Extension Service

continue to serve these wheat producers as effectively as possible. Even more important, however, agents need to place a higher priority on the smaller producers who may be more hesitant to contact Extension for help. This could possibly improve their efficiency in production and mean more returns per acre for them. If it takes personal contact with these producers to encourage use of recommended practices this should be done if at all possible.

V. RECOMMENDATIONS FOR FURTHER STUDY

1. Similar studies should be conducted in Tennessee to determine why wheat producers do not adopt the recommended practices put forth by The University of Tennessee and determine how the farmer feels about the Extension effort and effectiveness of the Extension educational program in their county.

2. Similar studies should be conducted in other agricultural areas to determine the effectiveness of Extension teaching on adoption of recommended practices.

3. A continual effort to improve surveys used in collecting data should be made. Variables need to be specific and easy to understand.

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APPENDIX

TENNESSEE AGRICULTURAL EXTENSION SERVICE

1982 Tennessee Wheat Production Survey
(See Instructions On Last Page)



County
(1) (2) (3)

A. Seeding

1. Variety planted? (1 = Abe; 2 = Arthur; 3 = Coker 747; 4 = Doublecrop; 5 = Hart;
(4)
6 = McNair 1003; 7 = Pioneer brand S76; 8 = Pioneer brand S78; 9 = Southern Belle;
10 = other).
2. Date seeded? (1 = Oct. 1-15; 2 = Oct. 15-Nov. 1; 3 = Nov. 1-15; 4 = Nov. 15-Dec. 1;
(5)
5 = before Oct. 1; 6 = after Dec. 1).
3. Seeding rate? (1 = under one bu; 2 = one bu; 3 = 1½ bu; 4 = 2 bu; 5 = over 2 bu).
(6)
4. Method of seeding? (1 = drill; 2 = spinner type seeder; 3 = broadcast by airplane;
(7)
4 = broadcast in fertilizer).
5. Seedbed preparation? (1 = plow; 2 = disk; 3 = no-till; 4 = other).
(8)
6. Seed treatment? (1 = no treatment used; 2 = seed treated for disease). If treated:
(9)
a). method of treatment? (1 = dust; 2 = slurry or liquid). b). Materials
(10)
used? (1 = Vitavax-200; 2 = Vitavax-75% WP; 3 = other).
(11)
7. Crop rotation? (1 = all of wheat followed row crops; 2 = part of wheat followed row
(12)
crops; 3 = none of wheat followed row crops).

B. Fertilization

1. Pounds N/acre? . 4. Limestone? (1 = none needed; 2 = needed but
(13) (14) (15) (22)
not applied; 3 = applied where needed).
2. Pounds P₂O₅/acre? . 5. Soil test? (1 = none tested; 2 = part
(16) (17) (18) (23)
tested; 3 = all tested).
3. Pounds K₂O/acre? .
(19) (20) (21)

C. Insects

1. Were insects a problem? (1 = no; 2 = yes).
(24)
2. If yes: a). Major insect? (1 = Hessian fly; 2 = Armyworms; 3 = Aphids; 4 = other).
(25)
b). How severe? (1 = control not needed; 2 = control was needed). c). In-
(26)
secticide? (1 = no; 2 = yes).
(27)

D. Disease

1. Were diseases a problem? (1 = no; 2 = yes).
(28)
2. If yes: a). Major disease? (1 = Barley yellow dwarf virus; 2 = Leaf rust; 3 = Powder
(29)
mildew; 4 = Septoria leaf blotch; 5 = Flume blotch; 6 = Loose smut; 7 = other). b).
How severe? (1 = yield was not reduced; 2 = yield reduced somewhat; 3 = yield
(30)
greatly reduced). c). Any control measure used? (1 = no; 2 = yes).
(31)

E. Weed Control

1. Were weeds a problem? (1 = no; 2 = yes). If yes: a). Major weed? (1 = wild garlic;
(32) (33)
2 = Winter annual broadleaf; 3 = other). b). How severe? (1 = yield not re-
(34)
duced; 2 = yield reduced somewhat; 3 = yield greatly reduced). c). Wheat sprayed
for weeds? (1 = no; 2 = yes).
(35)

Coding Instructions

1. Fill each column (blank)
2. Right justify all column entries
3. Use a nine (9) in each blank when a question does not apply.

- F. Other Problems
1. Winter kill? (1 = not a problem; 2 = yes, definitely a problem). If yes: How severe? (1 = yield not reduced; 2 = yield reduced somewhat; 3 = yield greatly reduced). (36)
(37)
 2. Lodging? (1 = not a problem; 2 = yes, definitely a problem). If yes: a). How severe? (1 = yield not reduced; 2 = yield reduced somewhat; 3 = yield greatly reduced). (38)
(39)
- G. Harvesting? (1 = Moisture content not known; 2 = Moisture content above 13.0 percent on all crop; 3 = Moisture content above 13.0 percent on part of crop; 4 = Moisture content 13.0 percent or below on all of crop; 9 = Does not apply - used as forage). (40)
- H. Farm Storage? (1 = None of grain stored on farm; 2 = some of grain stored on farm; 3 = all of grain stored on farm; 4 = cut for hay or silage). If stored on farm for grain: a). grain protected from insects? (1 = no; 2 = yes). (41)
(42)
- I. Marketing? (1 = none sold; 2 = contracted to sell before harvest; 3 = sold when harvested) (43)
- J. Acres planted: a). for grain ; b). for forage . (44) (45) (46) (47) (48) (49)
- K. Acres harvested: a). for grain ; b). for forage . (50) (51) (52) (53) (54) (55)
- L. Yield per acre: a). bushels grain ; b). tons silage ; c). tons hay . (56) (57) (58) (59) (60) (61)
- M. Extension Contacts: (Note: Extension agent and/or farmer should estimate the number of contacts the producer had with Extension over the past 12-months.) a). Meetings attended? ; b). Office visits made? ; c). Farm visits received? . (62) (63) (64)

General Survey Instructions

1. Date Due: October 4, 1982
2. Disposition: Mail the completed survey forms to the Associate District Supervisor of Agricultural programs.
3. Counties Included: A. Counties where 5,000 or more acres of wheat were planted in 1981. The following counties meet this criterion: In District I, Carroll, Chester, Crockett, Dyer, Fayette, Gibson, Hardeman, Hardin, Haywood, Henderson, Henry, Lake, Lauderdale, Madison, McNairy, Obion, Shelby, Tipton and Weakley. Counties included in District II are: Bedford, Giles, Hickman, Lawrence, Lincoln, Marshall, Maury, Montgomery, Robertson, Rutherford, Sumner, Williamson and Wilson. Counties included in District III are: Blount, Coffee, Franklin, McMinn, Monroe and Warren. From District IV only White county is included and not any counties in District V meet this criterion.
B. Other counties may want to conduct the survey.
4. Sample Size: Twenty (20) producers per county. Use the Nth number technique.
5. Survey Population: All wheat producers who planted 25 or more acres of wheat for grain in 1982.
6. Sampling Procedures:
A. Make a list of all wheat (grain) producers who grew 25 or more acres of wheat in 1982.
B. Apply the Nth number technique to identify 25 producers. The last five (5) producers identified will be used as alternates. Alternates should be used only to replace producers who for some good reason cannot be interviewed or who grew less than 25 acres of wheat (grain) in 1982.

VITA

Paul Thomas McCallie, Sr., was born in Monroe County, Tennessee, on January 28, 1948. He is the son of Fred McCallie and Mary Josephine McCallie. He attended public schools in Monroe County and graduated from Sweetwater High School in May 1965.

He served a four-year tour of duty with the United States Marine Corps, having served in Vietnam as a helicopter crew chief and gunner. He is presently a member of the Marine Corps Reserve in Knoxville where he serves as Platoon Sargeant. He entered Cleveland State Community College, Cleveland, Tennessee, in August 1975 in the evening program, while working as a welder at Vincent's Machine Shop in Athens, Tennessee. Upon completion of courses at Cleveland State, he entered The University of Tennessee, Knoxville, in January 1977. On completing requirements for a Bachelor of Science degree in Agriculture, Plant and Soil Science in December 1978, he enrolled in Graduate School. Upon completion of one quarter of graduate work, he took the position of Assistant Extension Agent for the Agricultural Extension Service in Roane County. In February 1982, he continued his graduate studies in Agricultural Extension Education.

He has two sons, Paul Thomas, Jr. (age 16 years) and Michael Jon (age 12 years).