

RESULTS OF A DRILL BOX SURVEY TO DETERMINE THE
QUALITY OF SEED WHEAT PLANTED IN OKLAHOMA

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QUALITY OF SEED WHEAT PLANTED IN OKLAHOMA

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INTRODUCTION

Farmers generally spend considerable time and money in the preparation and fertilization of their land before seeding. It was felt that when inferior seed was used, a major share of the advantage gained in the use of good cultural practices was wasted or lost.

The use of certified seed wheat never has been practiced widely in Oklahoma. Generally, only enough certified seed wheat is produced in Oklahoma annually to plant from 3 to 5% of the state's wheat allotment. The 1958 production of Oklahoma certified seed wheat would have planted 5% of the state's wheat allotment. However, only enough of this seed was sold as seed to plant 1.8%^{/1} of Oklahoma's wheat allotment. Since Oklahoma farmers are using only limited amounts of certified seed, this study was designed to determine the quality of seed they are using.

^{/1} Exclusive of the certified seed growers' planting.

PREVIOUS WORK

Although numerous surveys have been conducted by various Crop Improvement Associations dealing with quality of seed wheat, most of the information derived from these surveys was passed on by the way of newsletters, word of mouth, and private correspondence in the particular states where the surveys were conducted.

Comments from states conducting drill box surveys were compiled by Oakley (8).^{/2} These comments showed that 22 states had conducted or were in the process of conducting a drill box survey. In practically every case the survey was conducted on one or more of the small grains. Vocational agriculture teachers and county agents drew the survey samples in most of the reporting states.

In South Carolina (2), 21 counties were sampled for wheat, oats, barley, and rye by county agents and vocational agriculture instructors. Each county agent drew 100 samples, and each agriculture teacher drew 10 samples. The sample was 2.5 pounds in size and was drawn at random in the field at planting time.

In New York, Crosier (4) found that out of 176 samples drawn, 77% of the farmers purchased seed from another

^{/2} Figures in parentheses refer to Literature Cited, page 41.

farmer. Garrison, Squires, and Shelley (5) found that 66.4% of the farmers in South Carolina planted home-grown seed of small grains, while 19.2% purchased seed from a neighbor, 13.8% from a seedsman, and .5% from other sources. Only 5.5% of the farmers used certified seed. Surveys conducted in Nebraska (3) showed that over 90% of the farmers used their own or another farmer's seed oats and wheat.

Hackleman (6) reported that Indiana surveys on oats indicated 64.5% of the seed being utilized was from the farmers' own production, 14.3% was obtained from a seed dealer, 10.9% from a certified seed producer, 10% from a neighbor, and .3% from a seed peddler. Of all seed sampled, 20% was certified. Hackleman (6) reported that Iowa surveys on oats revealed 76.2% of the seed was home-grown, 26.6% from a neighbor, 16.5% from a seedsman, and 4.2% from an elevator or other source. Approximately 10% of the farmers sampled used certified seed.

Crosier (4) found that common weed seed content on a per pound basis ranged from 0 to 8,400 in the oat samples collected in New York. Noxious weed and other crop seeds were found in nearly one half of the samples collected. The South Carolina survey conducted by Garrison, Squires, and Shelley (5) showed weed seed content ranged from none to 66,150 seeds per pound. The average sample collected contained .29% weed seed and .93% other crop seed. Surveys on small grains in Nebraska (3) revealed the average farmer planted 150 weed seeds per pound with one farmer planting

11,700 weed seeds per pound of oats. A survey of flax by the North Dakota Seed Certification Department (3) showed that uncleaned seed averaged 3,450 weed seeds per pound. Home cleaned seed averaged 711 weed seeds per pound, while seed cleaned at an elevator averaged 670 seeds per pound. Seed cleaned at state inspected cleaning plants averaged 58 weed seeds per pound. Sixty percent of the samples collected contained prohibitive or restrictive noxious weed seeds. Mathes (7) reported that a high percentage of Canadian farmers planted small grain seed which would not qualify even for the lowest commercial seed grade. The tolerance for the lowest seed grade in Canada is 4,800 weed and 12,000 other crop seeds per bushel.

Garrison, Squires, and Shelley (5) found that 44.5% of the farmers in South Carolina planted cleaned seed, while 32.3% planted seed which had been treated. The Indiana survey (6) indicated 73.7% of the farmers planted cleaned oat seed, and 43% planted treated seed. Iowa (3) studies revealed that 60% of the samples had been cleaned, and only 20% were treated.

The average laboratory germination for samples collected in South Carolina was 88% for non-certified and 93% for certified samples (5). Surveys conducted in Nebraska indicated farmers generally planted small grain seed with a germination of 90% or better, but the range was from 5 to 98% (3). In some counties only 25% of the farmers had tested their seed for germination prior to planting.

MATERIALS AND METHODS

Sampling Procedure

Eleven counties in Oklahoma were sampled in a wheat drill box survey during the fall planting season of 1957. Prior to drawing samples, preliminary information was obtained on the number of farms having wheat allotments within each county. Based upon this number, the following group separations were made: (1) counties with less than 1,000 wheat farms, (2) counties having between 1,000 and 2,000 wheat farms, and (3) counties with 2,000 or more wheat farms. Four counties were selected at random from each group giving a total of 12 counties to be surveyed. Harmon, Pawnee, Nowata, and Okfuskee counties were selected out of 41 counties to represent the group with less than 1,000 wheat farms. No samples were obtained from Okfuskee County; therefore, only three counties were sampled from this group. Dewey, Harper, Noble, and Comanche counties were selected out of 16 counties to represent the group having between 1,000 and 2,000 wheat farms. Alfalfa, Garfield, Custer, and Kiowa counties were selected out of 14 counties to represent the group having 2,000 or more wheat farms.

The plan of the study was to sample 5% of the wheat farms within each of the selected counties. In order to

allow for errors and loss of samples and to insure a 5% drill box sample, 6% of the wheat farm population within each county was to be sampled. When the samples were collected, it was found that only 3.4% of the farms with a wheat allotment were sampled from the 11 counties. A total of 601 samples was collected from the selected counties representing 83,406 acres or 1.9% of the 1958 Oklahoma wheat allotment.

Vocational agriculture instructors in the 11 participating counties drew the samples from farmers in their communities while engaged in routine work during the planting season. A 2.5 pound sample of seed was drawn from the drill box, bags of seed, or from the trucks containing seed wheat in the field. A copy of the instruction sheet which was sent to the vocational agriculture instructors participating in the survey is as follows:

Procedure for Instructors to Follow in Wheat Quality Survey

(1) Drawing Samples

Samples are to be drawn from the drill box, bags of seed, or from trucks containing seed wheat in the field. It is our desire to have the samples as representative as possible. They should be drawn at random during the instructors' routine work throughout their communities as they see farmers planting wheat.

(2) Size of Sample

A sample of at least 2.5 pounds should be drawn. Containers for collecting the seed will be provided by the Oklahoma Crop Improvement Association.

(3) When to Sample

Samples should be drawn during the planting season.

(4) Questionnaire

A questionnaire which is printed on the envelope in which the sample is placed is to be filled out completely. The farmer's name will be kept confidential.

Sample bags were furnished each instructor with a questionnaire, as shown on page 9, printed on the bag in which the sample was to be placed.

The information from the questionnaire was consolidated as to school, county, and state on the following points:

1. Average wheat acreage sampled.
2. Number of acres sampled.
3. Number of acres sampled by variety.
4. Percent of acreage sampled by variety.
5. Source of seed by percent of acreage planted.
6. Source of seed by percent of samples collected.
7. Percent of acreage planted to certified seed.

8. Percent of acreage planted to cleaned seed.
9. Percent of acreage planted with treated seed.
10. Average seeding rate per acre as to variety.
11. Average seeding rate of all varieties.

Laboratory Analysis

After the seed samples were collected, a detailed (laboratory) seed analysis, as prescribed by the Association of Official Seed Analysts (8), was made on each sample of seed, with the exception of the listing of the name and number of common weeds and other crop seeds which is not required for wheat analysis by the Association of Official Seed Analysts rules for seed testing.

Each sample was divided with a Precision Divider until a sample of 500 grams was obtained. The sample of 500 grams was further divided into samples of 100 and 400 grams. The 100-gram sample was used to determine the purity. The 400-gram sample was used in analyzing the number of noxious weed and other crop seed content. The purity test on the 100-gram sample consisted of the following separations:

(1) pure seed fraction, (2) other crop seed, (3) weed seed, and (4) inert matter. Each of the four component parts was weighed to the nearest 0.01 gram. The percentages by weight of each part were computed.

Survey Questionnaire

1. Name _____
2. Address of Farm _____
3. Variety Being Planted _____
4. Grower's Total Wheat Acreage of Above Variety in
County _____
5. Source of Seed (Check One)
Own
Another Farmer
Elevator
Commercial Seed Dealer
Other (Specify) _____
6. Is Seed Certified _____ or Non-Certified _____
7. If Non-Certified, How Many Years From Certified, if
known _____
8. Has Certified Wheat Ever Been Planted by Farmer? _____
9. Has Seed Been Cleaned? _____
10. Has Seed Been Treated? _____
Chemical Used (Check One)
Ceresan
Arasan
Panogen
Other (Specify) _____
Unknown
11. Seeding Rate Per Acre _____
12. Seeding Date _____
13. Instructor _____ School _____

The name and number of common weeds, as determined in the 100-gram sample, were multiplied by 5 in order to record the number and kind of common weed seeds on a per pound basis. The number of noxious weed seeds and other crop seeds was separated from both the 100 and 400-gram samples and reported on a per pound basis.

Germination tests were made on the pure seed fraction of each sample. Four samples of 100 seeds each were drawn at random from the pure seed fraction. These four samples were placed on the same tray within the germinator. A Stultz Dalite germinator¹³ set for 20° C. was used. No light was provided. The substrate used was blue-gray germination blotter paper. The first count was made at the end of four days and the final count at the end of seven days. The form, as shown on page 11, was used for reporting the analysis to vocational agriculture teachers.

Each sample was recorded on a master sheet as to school and county. Samples from each school were averaged for the percent pure seed, inert matter, other crop seed, weed seed, and germination. The number of noxious weeds, common weeds, and other crop seeds were recorded in number of seeds per pound. The county and state averages also were determined for these factors.

¹³Model B, manufactured by Stultz Scientific Supply Company, Springfield, Illinois.

Form Used for Analysis Report

Vo-Ag Chapter _____ Lab. No. _____

Farmer's Name _____

Address _____

Variety Declared _____

Pure Seed _____% Weed Seed _____%

Inert Matter _____% Germination _____%

Other Crop Seed _____%

Name and Number of Noxious Weeds Per Pound:

Name and Number of Common Weeds Per Pound:

Name and Number of Other Crop Seeds Per Pound:

Remarks:

During the course of the survey, an extensive amount of raw data was acquired and is not included in this paper.

The raw data are on file at the Oklahoma Crop Improvement Association Office, Stillwater, Oklahoma, and anyone interested may review them at the Crop Improvement Office.

Since the results obtained in this study were clearly evident, the data were not subjected to detailed statistical treatment.

RESULTS AND DISCUSSION

The data in Figure 1 show a comparison between the average size of wheat acreage sampled and the average wheat farm allotment within each county. The average wheat allotment for all counties sampled was 74.7 acres, ranging from 12.6 acres in Nowata County to 128.1 acres in Harper County. The average wheat acreage sampled ranged from 49.2 acres in Nowata County to 235.9 acres in Harmon County, with the average for the state being 138.8 acres.

In every county the average acreage sampled was higher than the average wheat allotment within the county. The average acreage sampled in Harper County was only four acres higher than the average wheat allotment, while there was a difference of 151.7 acres in Harmon County in favor of the acreage sampled.

Source of Seed

The source of seed in percent of total acreage sampled is shown in Figure 2. The state average showed that 74% of the acreage was planted with the farmers' own seed, 16% planted with seed from another farmer, 7.0% with seed from an elevator, and only 2% with seed purchased from a commercial seed dealer.

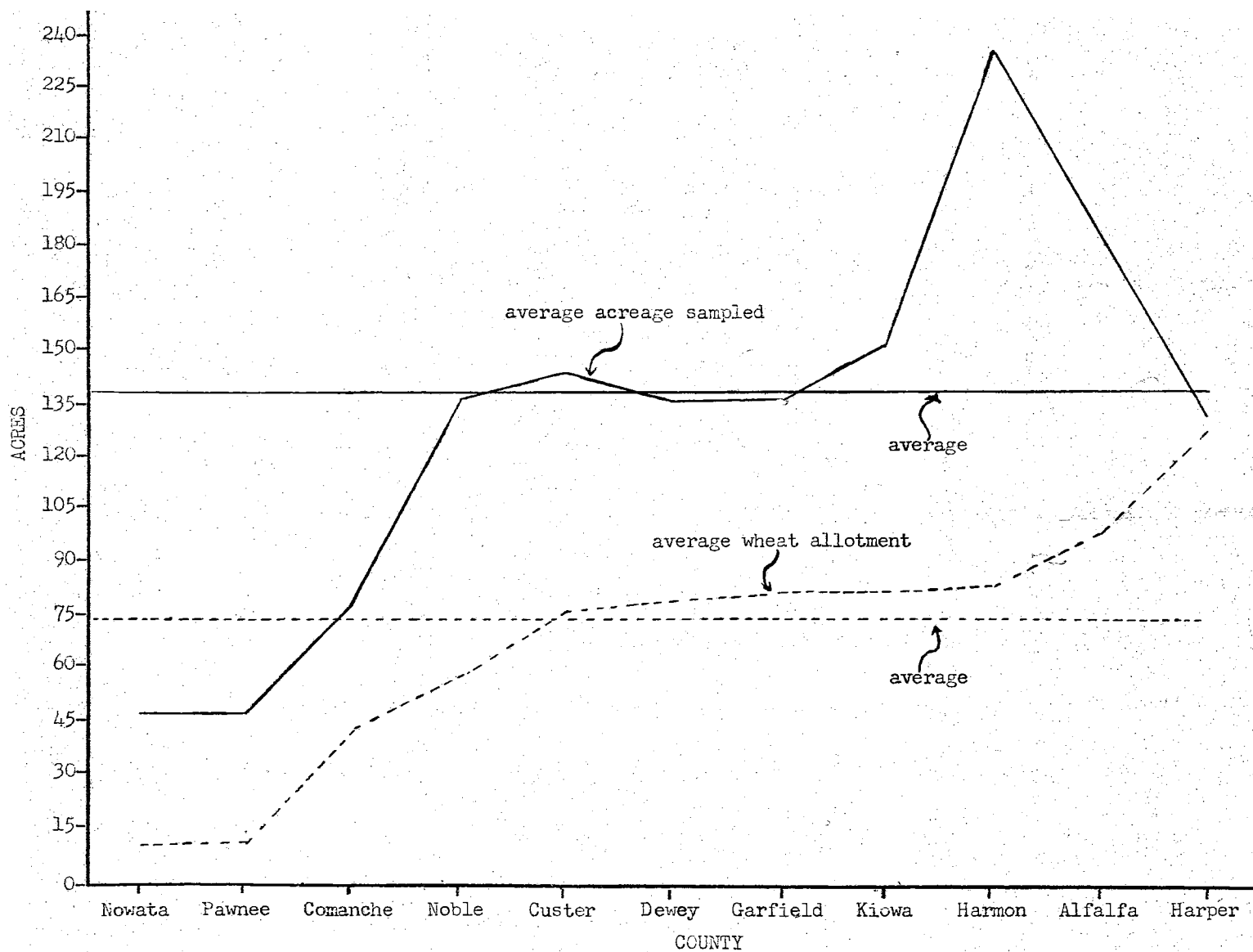


Fig. 1.--Average size of acreage sampled vs. average wheat allotment in 11 counties surveyed.

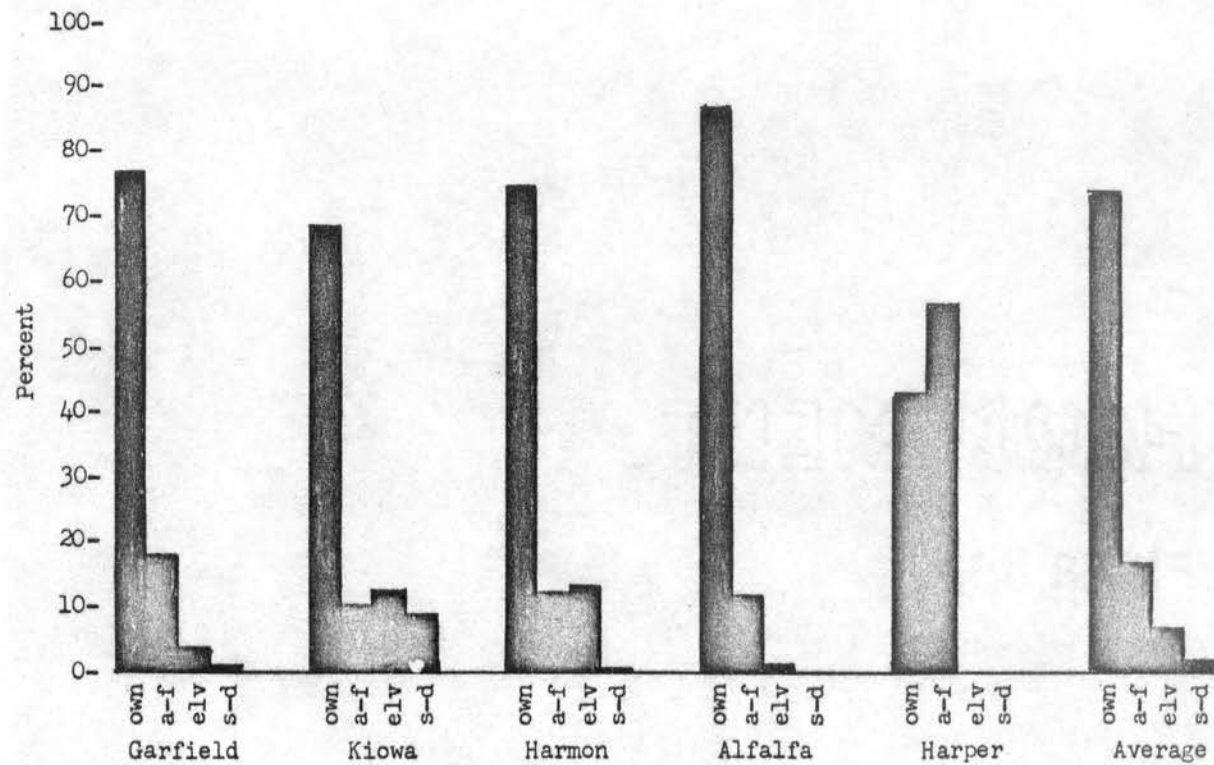
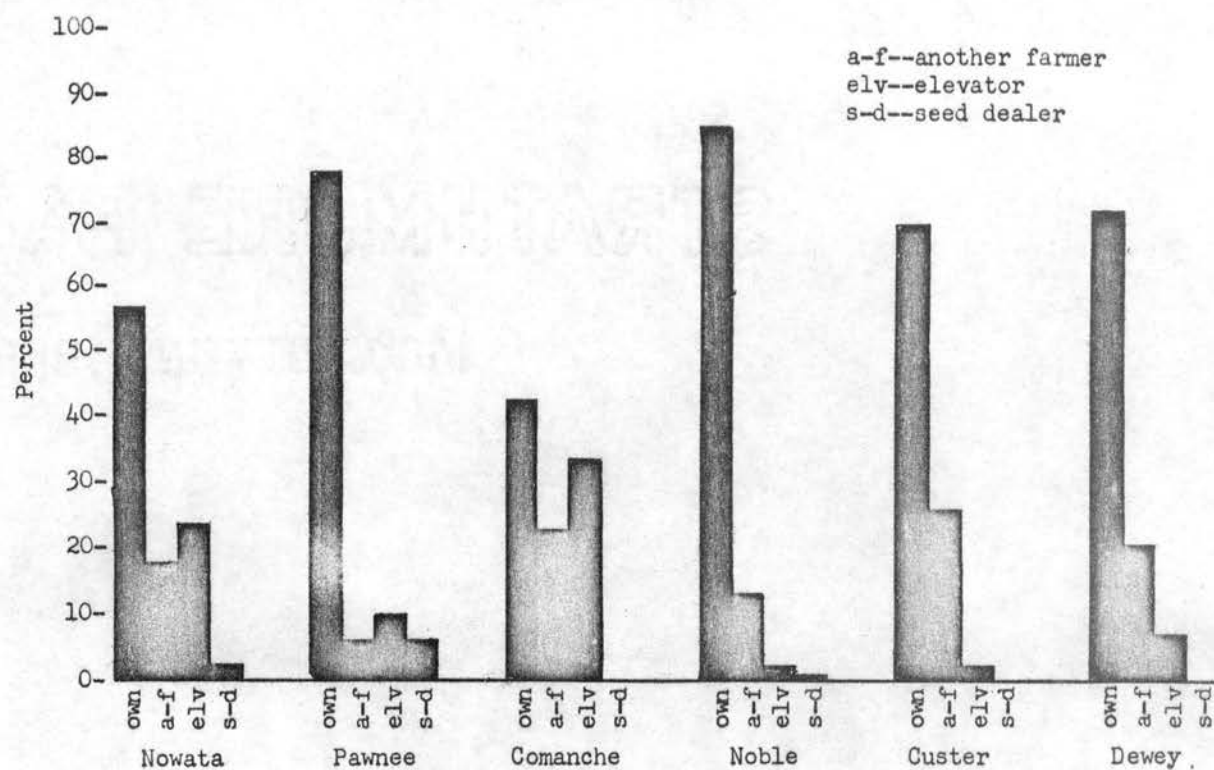


Fig. 2.--Source of seed in percent of acres in 11 counties sampled.

Harper County was the only county in which the bulk of the acreage sampled was not planted with the farmers' own seed. Seed from another farmer was used on 56% of the total acreage sampled in this county.

In all cases the acreages planted to seed purchased from a seed dealer were very low. None of the acreages planted with seed purchased from a seed dealer were sampled in Comanche, Custer, Dewey, Alfalfa, or Harper counties. Kiowa County, with 9%, was the largest user of seed purchased from a seed dealer.

Figure 3 represents the source of seed by county in percent of total samples drawn. In all counties, the bulk of the farmers planted their own seed. Only in Comanche County did farmers planting seed purchased from another farmer or elevator approach the number planting their own seed. While a greater portion of Harper County farmers planted their own seed (67%), the bulk (57%) of the acreage sampled was planted with seed secured from another farmer (Figure 2). The state average showed that 66% of the total farmers sampled planted their own seed, 21% planted another farmer's seed, 10% purchased seed from an elevator, and only 2% purchased seed from a commercial seed dealer. A comparison of Figures 2 and 3 shows that the 66% of the farmers sampled who planted their own seed planted this seed on 74% of the total acreage sampled.

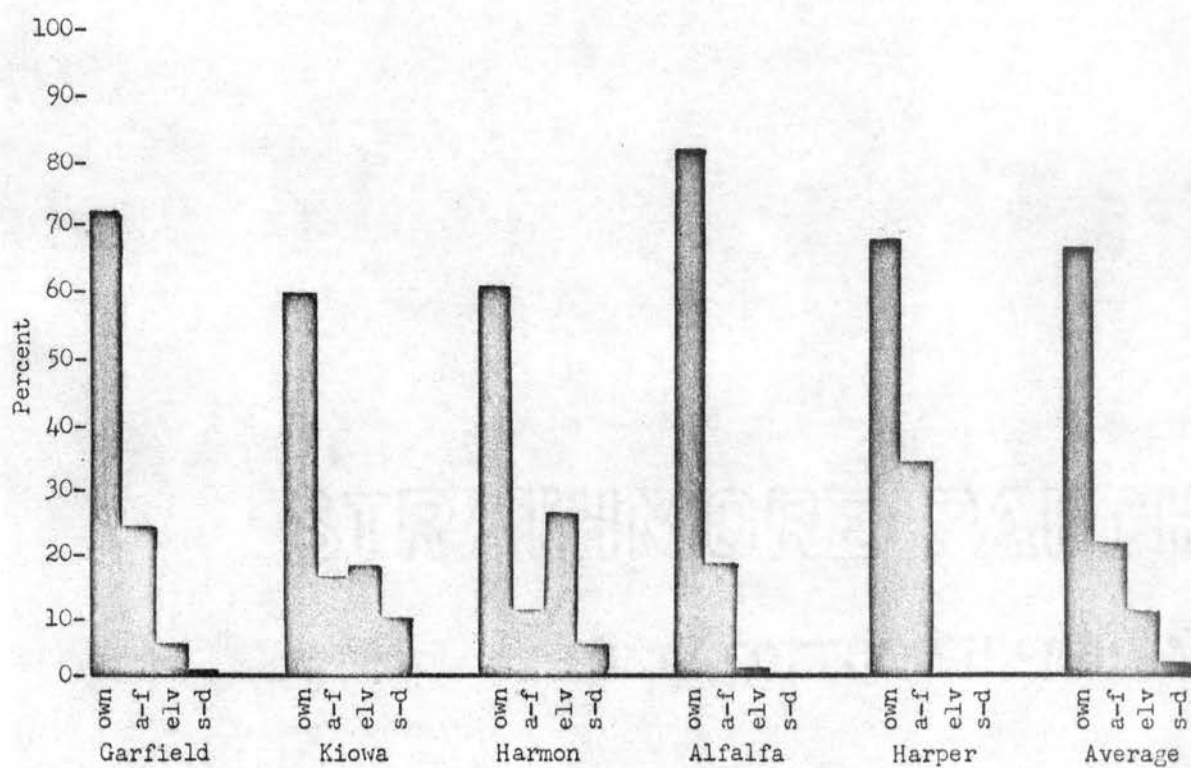
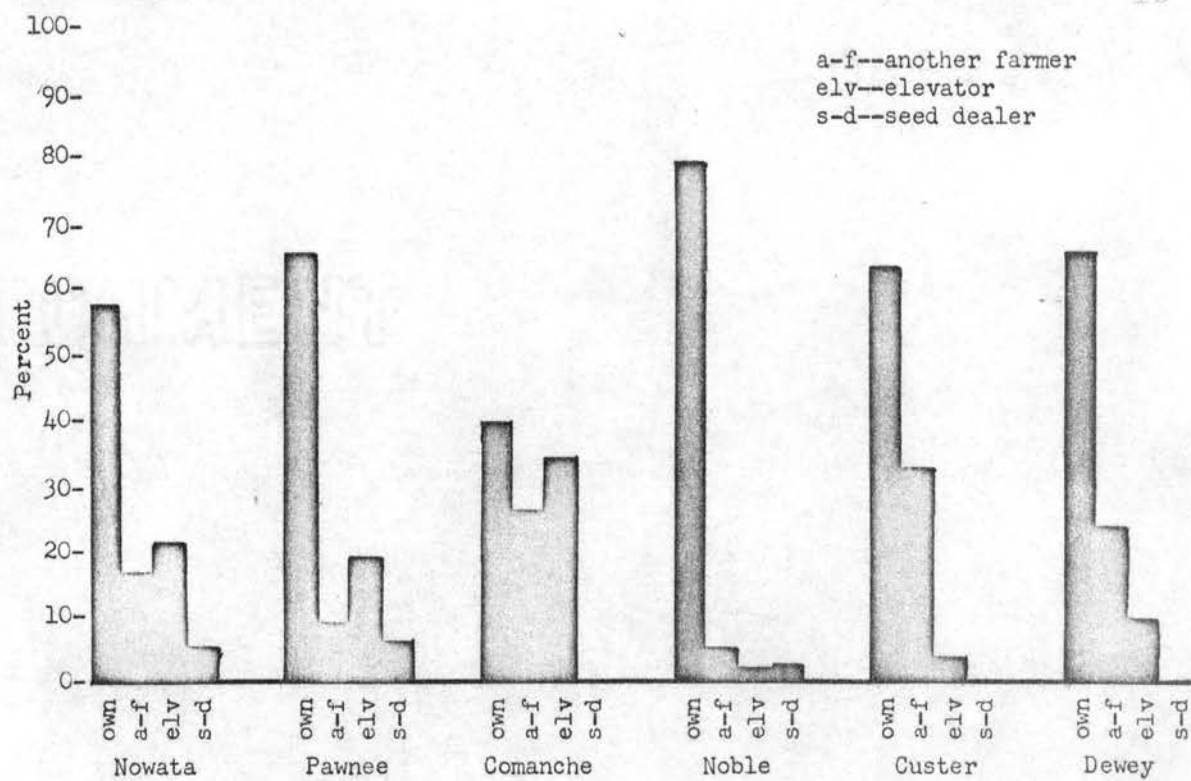


Fig. 3.--Source of seed in percent of samples collected.

Use of Certified Seed

Of the total acreage sampled, only 3.1% was planted with certified seed, as illustrated in Table 1. None of the acreage sampled represented certified seed in Nowata, Dewey, Harmon, Alfalfa, and Harper counties. Kiowa County farmers were the most frequent users of certified seed. Of the farmers sampled in this county, 10.5% (Table 1) used certified seed as planting stock. No attempt was made to verify any farmer's statement that he planted certified seed.

The state average showed that 2.8% of the growers sampled used certified seed. Kiowa County had the highest percentage (10.5%) of its growers using certified seed. Of the certified seed sampled, 29.4% was home-grown, 11.8% was secured from another farmer, 29.4% was handled by an elevator, and 29.4% was purchased from a commercial seed dealer. Of the total certified samples collected, tradesmen (elevator operators and seed dealers) handled 58.5% of this seed.

Varieties and Seeding Rates

Triumph was by far the most popular variety and was planted on 70.1% of the acreage sampled, as shown in Table 2. Harmon County, with 90.9%, had the highest percent of acres planted to Triumph, and it was also the most popular variety in seven of the 11 counties sampled. At the other

extreme, only 4.1% of the wheat acreage in Pawnee County was planted to Triumph.

Table 1.--Use of certified wheat in percent. of growers and acres sampled.

County	Growers %	Acres %
Nowata	0	0
Pawnee	3.1	2.2
Comanche	2.1	5.3
Noble	1.6	4.2
Custer	2.6	3.8
Dewey	0	0
Garfield	3.0	2.0
Kiowa	10.5	9.2
Harmon	0	0
Alfalfa	0	0
Harper	<u>0</u>	<u>0</u>
Average	2.8	3.1

Wichita was the second most popular variety, as it was planted on 15.6% of the acreage sampled. It was the most popular variety in Nowata, Pawnee, Dewey, and Harper counties. Although Wichita was the leading variety in these counties, it was far exceeded in total acres planted in the state by the variety Triumph.

Table 2.--Acreage percentages of the wheat varieties collected in 11 counties.

Variety	Nowata	Pawnee	Comanche	Noble	Custer	Dewey	Garfield	Kiowa	Harmon	Alfalfa	Harper	Average
Triumph	26.7	4.1	71.5	58.0	67.1	12.6	88.0	83.9	92.8	84.9	6.6	70.1
Wichita	34.0	79.3	0	25.3	18.7	58.1	4.9	0	.2	3.7	90.9	15.6
Concho	10.1	9.2	23.5	9.8	6.3	3.0	3.2	7.4	2.0	7.5	1.5	6.6
Westar	0	0	0	2.3	.9	2.1	0	6.0	0	.4	0	1.5
Unknown	17.7	2.6	2.6	2.5	.1	1.9	.6	0	5.0	0	0	1.4
Comanche	0	1.9	1.9	0	.8	1.9	3.3	.1	0	0	1.0	1.2
Pawnee	6.7	2.9	2.9	.5	1.2	3.3	0	0	0	.8	0	.7
Apache	0	0	0	0	0	8.6	0	0	0	0	0	.7
Kiowa	0	0	0	0	2.9	2.7	0	0	0	0	0	.6
Ponca	4.8	0	0	1.6	0	2.2	0	0	0	.9	0	.5
Crockett	0	0	0	0	0	0	0	2.0	0	0	0	.3
Cheyenne	0	0	0	0	0	3.5	0	0	0	0	0	.3
Red Chief	0	0	0	0	2.0	0	0	0	0	0	0	.3
KanKing	0	0	0	0	0	0	0	.6	0	0	0	.1
Pioneer	0	0	0	0	0	0	0	0	0	0	.4	.1

Concho was the third most popular variety. It was planted on 6.6% of the total acreage sampled. This variety was planted in every county sampled but on a limited acreage. Harper County had the lowest percentage of its acreage devoted to Concho (1.5%), while Comanche County had 23.5% planted to Concho for the highest percentage of any county sampled.

All other varieties accounted for only 7.7% of the total acreage sampled. The farmer was either uncertain or did not know what variety he planted on 1.4% of the acreage sampled. Nowata County had an extremely high percentage of its acreage (17.7%) devoted to unknown varieties. The cause for this is not known; however, it will be seen later that the lowest quality of seed also came from this area. The variety declared as Pioneer was a farmer's own selection from the variety Pawnee. It is not a recognized variety or name. The sample of Pioneer was drawn in Alfalfa County near Jet, Oklahoma.

If the percent of acres devoted to unknown varieties is excluded, 97.3% of the total wheat acreage was devoted to varieties approved for certification in Oklahoma. Only .4% of the varieties sampled is classified as undesirable by the milling and baking trade.

From the varieties sampled, it is definite that the bulk of Oklahoma's wheat acreage was devoted to the early maturing varieties, Triumph and Wichita. Concho was the only medium-maturing variety with an appreciable acreage.

Seeding rates (Table 3) were highly variable, more so among counties than among varieties. Excluding the varieties KanKing and Crockett, where only one sample of each was drawn, the seeding rate varied only 11.4 pounds per acre among varieties. When the seeding rates of all varieties were averaged, an extreme difference among counties was noted. The average seeding rate of all varieties in Harmon County was 39.3 pounds per acre compared to 79.5 pounds per acre in Nowata County. This is a difference of 40.2 pounds per acre. An unusual difference is noted in Harmon County where the average seeding rate for Triumph, which is considered a low tillering variety, was 36.5 pounds per acre. This is compared to Concho, a high tillering variety, which had a seeding rate of 60.0 pounds per acre. With few exceptions, seeding rates within each county were not affected greatly by variety. In most cases, they did not vary more than five to 10 pounds between varieties.

Noxious Weed Seed Content

The average number of noxious weeds per pound of wheat seed by county and state is shown in Table 4. It is noteworthy that no certified samples contained noxious weed seeds.

Table 3.--Seeding rates in pounds per acre of various varieties collected in 11 wheat producing counties in Oklahoma.

Variety	Nowata	Pawnee	Comanche	Noble	Custer	Dewey	Garfield	Kiowa	Harmon	Alfalfa	Harper	Average
Triumph	77.5	75.0	57.7	60.8	54.7	53.2	56.1	47.9	36.5	52.7	46.5	54.1
Wichita	82.8	77.1	0	61.1	58.0	52.1	58.7	0	60.0	53.2	48.3	60.2
Concho	78.8	67.5	50.7	52.2	49.6	45.3	49.3	41.5	59.0	42.0	45.0	51.4
Westar	0	0	0	60.0	60.0	55.0	0	49.8	0	45.0	0	53.4
Unknown	75.0	75.0	60.0	65.0	52.0	56.0	60.0	0	45.0	55.0	0	60.8
Comanche	0	75.0	62.5	0	73.5	60.0	60.0	45.0	0	0	60.0	62.5
Pawnee	82.5	65.0	0	60.0	50.0	49.0	0	0	0	56.0	0	59.5
Apache	0	0	0	0	0	60.0	0	0	0	0	0	60.0
Kiowa	0	0	0	0	60.0	56.5	0	0	0	0	0	57.7
Ponca	75.5	0	0	60.0	0	60.0	0	0	0	0	0	62.8
Crockett	0	0	0	0	0	0	0	33.0	0	0	0	33.0
Cheyenne	0	0	0	0	0	60.0	0	0	0	0	0	60.0
Red Chief	0	0	0	0	60.0	0	0	0	0	0	0	60.0
KanKing	0	0	0	0	0	0	0	45.0	0	0	0	45.0
Pioneer	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>50.0</u>	<u>50.0</u>
Average	79.5	73.9	56.4	60.2	55.4	52.9	56.1	47.1	39.3	51.6	48.4	55.4

Table 4.--Average number of noxious weed seeds per pound of wheat analyzed by county and source of seed sampled.

County	Own	Another Farmer	Elevator	Seed Dealer	All Sources	Certified
Nowata	205.0	129.0	3.0	0	139.8	0*
Pawnee	14.0	.3	.8	1.5	9.4	0
Comanche	13.7	4.3	.4	0*	6.7	0
Noble	45.0	10.9	8.0	.5	37.9	0
Custer	16.6	.8	0	0*	5.6	0
Dewey	24.6	2.8	1.4	0*	17.2	0*
Garfield	1.9	.7	1.0	0	1.6	0
Kiowa	.7	2.4	0	2.4	1.0	0
Harmon	.4	.5	0	0	.3	0*
Alfalfa	.6	.1	0	0*	.5	0*
Harper	<u>0</u>	<u>0</u>	<u>0*</u>	<u>0*</u>	<u>0</u>	<u>0*</u>
Average	16.2	5.1	.7	1.5	12.0	0

*No samples drawn from these sources.

Nowata County had the highest contamination of all sources with an average of 139.8 noxious weeds per pound. The farmer planting his own seed planted the highest concentration of noxious weeds from any source in all counties except Kiowa and Harmon counties. The farmers in Nowata County, who planted their own seed, planted an average of 205 noxious weed seeds per pound. Using Nowata County's average seeding rate of 79.5 pounds per acre (Table 3), this

would mean the average farmer using his own seed planted 16,297 noxious weeds per acre.

In most cases the number of noxious weeds per pound declined when the farmer planted seed from a source other than his own production. The most outstanding example of this was in Nowata County. Seed purchased from another farmer contained 129 noxious weeds per pound. While this cannot be considered good, it was a decrease of 76 noxious weeds per pound from the farmers planting their own seed. The largest drop occurred when a farmer purchased seed from an elevator where only an average of three noxious weeds per pound was found. Seed purchased from a seed dealer in this county was free of all noxious weed seeds.

Garfield, Kiowa, Harmon, Alfalfa, and Harper counties were decidedly lower than the other counties sampled in noxious weed seed content. Pawnee, Comanche, Noble, Custer, and Dewey counties, while being relatively low in noxious weed contamination in seed purchased from another farmer, elevator, or seed dealer, had a high amount of contamination in the farmer's own seed. This caused the over-all average of these counties to increase.

The state average indicated that the best place to purchase noxious weed-free seed wheat was the elevator followed by a seed dealer and another farmer. The highest concentration of noxious weed content was in the farmer's own seed.

Of all samples collected, 36.6% contained from one to 1,750 noxious weed seeds per pound. The average of all samples collected was 12 seeds per pound. Cheat was the most prevalent noxious weed. It was found in 24.6% of the samples analyzed and followed by Johnson Grass, 6.0%, Horsenettle, 3.5%, Dock, 1.2%, and Bracted Plantain, 1.2%. In many cases a combination of two or more of these weeds was found in the same sample. Of the farmers sampled in Nowata County, 73.7% planted seed which was contaminated with noxious weeds. Noble County farmers were also frequent users of seed contaminated with noxious weeds. Here 67.2% of the farmers planted one or more noxious weeds in each pound of wheat seed.

From the contamination of noxious weeds found and the average state seeding rate (Table 3), it can be assumed that 36.6% of the farmers in Oklahoma planted from 55 to 96,250 noxious weeds per acre. The average farmer, then, planted 665 noxious weeds per acre.

Common Weed Seed Content

Table 5 presents the average common weed seed content on a per pound basis. Of all certified samples collected, less than one common weed seed was found per pound of seed. The highest contamination of common weed seed was in Garfield County where an average of 1893.2 common weeds per pound was found in seed purchased from an elevator. Based on Garfield County's average seeding rate (Table 3), this

would have meant 106,209 common weed seeds per acre. This amount in Garfield County caused the average of all elevator samples to have the highest contamination of weed seed of any source.

Table 5.--Average number of common weed seeds per pound of wheat analyzed by county and source of seed sampled.

County	Own	Another Farmer	Elevator	Seed Dealer	All Sources	Certified
Nowata	293.0	95.0	1.5	0	185.1	0*
Pawnee	51.9	34.0	13.2	6.0	39.7	5.0
Comanche	92.9	15.5	3.8	0*	42.8	0
Noble	316.1	1124.0	5.0	93.0	422.9	0
Custer	89.1	7.9	1.3	0*	59.4	0
Dewey	29.9	2.9	12.8	0*	21.9	0*
Garfield	239.4	25.6	1893.2	0	262.1	0.5
Kiowa	41.4	38.2	12.9	0	34.5	0
Harmon	7.3	2.5	5.0	0	5.9	0*
Alfalfa	14.5	41.4	1.0	0*	18.9	0*
Harper	<u>6.1</u>	<u>1.4</u>	<u>0*</u>	<u>0*</u>	<u>4.5</u>	<u>0*</u>
Average	130.7	101.2	196.2	13.0	128.4	0.5

*No samples drawn from these sources.

Noble County had the highest over-all contamination with an average of 422.9 common weed seeds per pound from all sources. The seed purchased from another farmer also had the highest amount of common weeds of any of the

counties sampled from this source. There was an average of 316.1 common weed seeds per pound in the farmer's own seed in Noble County. This was the highest for all counties from this source.

Harper County had the cleanest seed with respect to common weed seed contamination with an average of 4.5 common weeds per pound for all sources. It should be noted that no samples were drawn from seed purchased from an elevator or seed dealer in this county.

All sources except that of the seed dealer were heavily contaminated with common weed seeds. Using the state average seeding rate of 55.4 pounds per acre (Table 3), it would mean the average farmer sampled planted 7,241 common weed seeds per acre if he planted his own seed, 5,606 weeds if the seed was purchased from another farmer, and 10,869 weeds if the seed was purchased from an elevator. However, the average farmer planted only 753 common weed seeds per acre if the seed was purchased from a seed dealer. Compared with this, certified samples contained only enough common weeds on an average to plant 28 seeds per acre.

Of all samples collected, 60.2% contained from 1 to 16,970 common weed seeds per pound, or enough to plant from 55 to 940,138 common weed seeds per acre. Evening Primrose was the most prevalent common weed, occurring in 18.4% of all samples collected, followed by Rescue Grass in 18.1%, Cupgrass in 12.5%, Pigweed in 10.8%, and Witchgrass in

10.0%. It is quite evident that proper cleaning of the seed before planting would be beneficial.

Other Crop Seed Content

The average number of other crop seed per pound, as to the source of the seed, is presented in Table 6. The state average shows that the farmer planting his own seed planted the highest contamination of other crop seeds with an average of 32.5 seeds per pound. Seed purchased from a seed dealer averaged 30.6 per pound and was followed by seed purchased from another farmer which averaged 23.9, while the elevator seed contained only 16.3 other crop seeds per pound. From these totals it is evident that a high amount of other crop seed was planted per acre regardless of source of seed used. It is well to make a comparison between non-certified and certified seed sampled at this point. In the certified wheat samples drawn, no other crop seeds were found, and it is apparent that the farmers' only assurance of planting seed wheat which is free of other crop seeds is to plant certified seed.

The only source of pure seed in the individual counties, other than certified, was from seed dealers in Nowata, Garfield, and Harmon counties. All other sources in these and the other counties contained a certain degree of contamination of other crop seeds. Noble County farmers planted wheat with the highest degree of other crop seed contamination of any county sampled with an average of 113.9

seeds per pound of seed wheat. Farmers in this county who planted seed purchased from a seed dealer averaged 167.5 other crop seeds per pound of wheat. This was the highest other crop seed contamination of seed purchased from a seed dealer in any county sampled. Farmers planting their own seed in Noble County also were planting more other crop seed than farmers planting their own seed in the other counties.

Table 6.--Average number of other crop seeds per pound of wheat analyzed by county and source of seed sampled.

County	Own	Another Farmer	Elevator	Seed Dealer	All Sources	Certified
Nowata	54.0	251.0	118.0	0	74.4	0*
Pawnee	80.0	135.3	19.3	35.0	70.9	0
Comanche	58.7	41.5	15.9	0*	39.7	0
Noble	129.9	25.3	19.0	167.5	113.9	0
Custer	22.9	7.8	42.3	0*	18.3	0
Dewey	17.1	30.7	47.6	0*	23.3	0*
Garfield	10.9	12.7	9.3	0	11.2	0
Kiowa	6.4	4.8	5.6	3.3	5.8	0
Harmon	7.6	11.0	2.2	0	6.2	0*
Alfalfa	3.1	4.2	12.0	0*	3.4	0*
Harper	<u>3.6</u>	<u>3.6</u>	<u>0*</u>	<u>0*</u>	<u>3.6</u>	<u>0*</u>
Average	32.5	23.9	16.3	30.6	29.0	0

*No samples drawn from these sources.

Seed purchased from another farmer in Nowata County contained the highest amount of other crop seed of any source in all counties sampled. They averaged planting 251 other crop seeds per pound or, using the averaging seeding rate for Nowata County (Table 3) of 79.5 pounds per acre, they were planting 19,954 other crop seeds per acre.

Seed purchased from an elevator, while not considered good with respect to other crop seed content, was the best over-all source of other crop free seed.

Oats was the most prevalent other crop seed found and occurred in 50.2% of all samples collected. It was followed by barley (35.1%), rye (14.8%), sorghum (14.1%), and vetch (6.5%). In many cases combinations of the preceding and other crop seeds were found in the same sample. Excluding the certified samples, 73.3% of all samples collected contained at least one, and in most cases more, other crop seed per pound. Based on this and the average seeding rate (Table 3), it can be assumed that 73.3% of the farmers in Oklahoma planted a minimum of 55 other crop seeds per acre and the average planted 1,606 other crop seeds per acre.

Inert and Purity Percentages

Average percentages of inert matter found are presented in Table 7. The state-wide averages for all seed source classes ranged under 2.00%. Harper County had the highest average of all counties with 2.53%. Certified samples

averaged 1.36% inert matter which was .49% better than the state average.

Table 7.--Average inert matter percentages found in samples analyzed from 11 counties and sources of seed within each county.

County	Own	Another Farmer	Elevator	Seed Dealer	All Sources	Certified
Nowata	.59	.79	3.20	.86	1.18	0*
Pawnee	2.10	1.38	1.10	.80	1.78	1.53
Comanche	1.37	1.13	1.59	0*	1.38	.66
Noble	1.79	3.34	1.70	3.79	2.09	1.54
Custer	1.89	2.04	1.47	0*	1.92	1.68
Dewey	2.55	1.92	2.19-	0*	2.37	0*
Garfield	1.58	1.67	1.76	.51	1.60	.88
Kiowa	2.19	1.71	2.02	1.39	2.02	1.56
Harmon	1.36	.44	1.48	2.85	1.37	0*
Alfalfa	1.96	2.55	1.26	0*	2.05	0*
Harper	<u>2.69</u>	<u>2.50</u>	<u>0*</u>	<u>0*</u>	<u>2.53</u>	<u>0*</u>
Average	1.86	1.90	1.69	1.67	1.85	1.36

*No samples drawn from these sources.

Purity percentages, which are largely determined by the percent inert matter, are shown in Table 8. All sources except the farmers' own seed averaged above 98.00% purity. Noble County had the lowest purity with an average of 97.43% for all sources. Certified samples averaged 98.64% or .64% higher than the average for the state.

Table 8.--Average purity percentages found in samples analyzed from 11 counties and sources of seed within each county.

County	Own	Another Farmer	Elevator	Seed Dealer	All Sources	Certified
Nowata	98.92	98.76	96.66	99.14	98.43	0*
Pawnee	97.54	98.54	98.83	98.88	97.93	98.46
Comanche	98.36	98.67	98.34	0*	98.43	99.34
Noble	97.68	96.37	98.19	95.50	97.43	98.46
Custer	97.98	97.92	98.34	0*	97.97	98.32
Dewey	97.31	98.06	97.55	0*	97.51	0*
Garfield	98.33	98.26	98.07	99.49	98.31	99.12
Kiowa	97.76	98.25	97.59	98.60	97.94	98.44
Harmon	98.59	99.49	98.51	97.15	98.58	0*
Alfalfa	98.02	97.41	98.66	0*	97.92	0*
Harper	<u>97.29</u>	<u>97.78</u>	<u>0*</u>	<u>0*</u>	<u>97.45</u>	<u>0*</u>
Average	97.97	98.01	98.11	98.26	98.00	98.64

*No samples drawn from these sources.

Laboratory Germination

The average germination percentages shown in Table 9 were all fairly high. All counties and sources within the counties averaged above 80%, with the exception of the farmers planting their own seed in Harper County. This source in Harper County averaged 76.2% germination, and the county as a whole averaged 79.8%. Much of the low

germination in this particular instance was due to chemical seed treatment injury.

Table 9.--Average germination of samples collected from 11 counties and sources of seed within each county.

County	Own	Another Farmer	Elevator	Seed Dealer	All Sources	Certified
Nowata	82.7	92.3	91.5	93.0	86.6	0*
Pawnee	86.0	96.3	87.5	86.0	87.2	85.0
Comanche	87.9	87.6	87.7	0*	87.7	93.0
Noble	88.1	87.0	88.0	95.5	88.1	93.0
Custer	89.6	89.5	92.3	0*	89.6	92.0
Dewey	87.2	90.9	82.2	0*	87.7	0*
Garfield	89.4	90.2	89.5	89.0	88.2	92.3
Kiowa	88.4	90.5	90.2	92.0	89.3	92.1
Harmon	88.8	94.0	95.0	93.0	91.9	0*
Alfalfa	88.5	86.5	95.0	0*	88.2	0*
Harper	<u>76.2</u>	<u>87.0</u>	<u>0*</u>	<u>0*</u>	<u>79.8</u>	<u>0*</u>
Average	88.0	89.5	89.2	91.6	88.5	91.8

*No samples drawn from these sources.

Several individual samples germinated rather low, and the lowest was 16%. Of all samples collected, 82.5% germinated 85% or better which is the minimum germination standard for certification. There were 13.8% of the samples which germinated between 70 and 85%, while 2.2% germinated between 50 and 70%. Only 1.5% germinated below 50%.

Certified seed samples averaged 91.8% germination which was 3.3% higher than the state average. However, this was only .2% higher than the average for all seed purchased from seed dealers.

Cleaning and Treating

The percentages of growers planting cleaned seed are shown in Table 10.

Table 10.--Average percentage of growers planting cleaned seed in 11 counties and sources of seed within each county sampled.

County	Own	Another Farmer	Elevator	Seed Dealer	All Sources	Certified
Nowata	72.7	33.3	100.0	100.0	73.7	0*
Pawnee	14.3	100.0	83.3	100.0	40.6	100.0
Comanche	36.8	75.0	75.0	0*	59.6	100.0
Noble	65.3	44.4	100.0	100.0	63.9	100.0
Custer	67.3	64.0	66.7	0*	66.2	100.0
Dewey	44.1	75.0	80.0	0*	54.9	0*
Garfield	76.8	80.6	66.7	100.0	77.4	100.0
Kiowa	66.7	90.9	100.0	100.0	78.9	100.0
Harmon	50.0	0	100.0	100.0	60.0	0*
Alfalfa	59.6	58.3	100.0	0*	60.0	0*
Harper	<u>60.0</u>	<u>80.0</u>	<u>0*</u>	<u>0*</u>	<u>66.7</u>	<u>0*</u>
Average	61.4	70.4	85.0	100.0	66.6	100.0

*No samples drawn from these sources.

The average for all sources and for the state was above 50% with the exception of Pawnee County where only 40.6% of the farmers sampled were planting cleaned seed. Only 14.3% of the farmers in Pawnee County who planted their own seed had cleaned it.

The relatively low percent of seed being cleaned is vividly reflected in the contamination by weed and other crop seeds (Tables 4, 5, and 6). There seems to be no explanation for the fact that, while 100% of the seed purchased from seed dealers was cleaned, these samples still contained several weed and other crop seeds per pound. Other crop seeds such as oats, rye, and barley would be difficult to separate, but most common weeds are readily separated by cleaning. With the exception of other crop seed, the seed purchased from seed dealers was of better general quality than the average, and this is reflected in the percent of this source of seed which was cleaned.

Generally, the farmer who planted his own seed planted the lowest quality, and this also was reflected by the percentage of these samples which had been cleaned (61.4%). Of the seed purchased from another farmer, 70.4% was cleaned, and 100% of the certified samples had, of course, been cleaned. Even though all of the seed purchased from seed dealers had been cleaned, this seed still contained numerous weed and other crop seeds. This points out that clean seed, free of other crop and weed seed contamination,

is a basic requirement, and cleaning will not solve entirely the problem of eliminating weed and other crop seed mixtures.

Seed treatment was not as widely practiced as seed cleaning (Table 11).

Table 11.--Average percentage of growers planting treated seed in 11 counties and sources of seed within each county sampled.

County	Own	Another Farmer	Elevator	Seed Dealer	All Sources	Certified
Nowata	18.2	0	75.0	100.0	31.6	0*
Pawnee	9.5	66.7	50.0	0	14.9	0
Comanche	26.3	50.0	12.5	0*	27.7	100.0
Noble	38.8	33.3	0	50.0	37.7	100.0
Custer	67.3	64.0	66.7	0*	66.2	50.0
Dewey	44.1	75.0	60.0	0*	52.9	0*
Garfield	31.6	29.0	33.3	100.0	31.6	75.0
Kiowa	60.0	81.8	92.3	100.0	72.4	87.5
Harmon	58.3	0	80.0	100.0	60.0	0*
Alfalfa	42.1	41.7	0	0*	41.4	0*
Harper	<u>20.0</u>	<u>80.0</u>	<u>0*</u>	<u>0*</u>	<u>40.0</u>	<u>0*</u>
Average	41.3	50.4	51.7	78.6	45.1	64.7

*No samples drawn from these sources.

Only 45.1% of the farmers in the state planted treated seed. Seed purchased from a seed dealer had the best chance of being treated (78.6%). In counties where samples were drawn with a seed dealer as the source, the dealers were treating 100% of their seed with the exception of those in Noble County. There was no county where 100% of the farmers, planting their own or another farmer's seed, planted treated seed. Only 14.9% of all farmers sampled in Pawnee County were planting seed which had been treated. Farmers in Kiowa County planted more treated seed than farmers in any of the other counties sampled (72.4%).

Of the certified seed sampled, 64.7% had been treated. This was exceeded only by the seed purchased from seed dealers and was 19.6% higher than the state average.

SUMMARY AND CONCLUSIONS

The results obtained in this survey indicate that Oklahoma farmers are not planting very high quality seed wheat. The average farmer sampled planted 12 noxious weeds, 128 common weeds, and 29 other crop seeds in each pound of wheat seeded. It would seem difficult for such seed to be placed on the commercial grain market--much less be used for seed.

Numerous farmers planted just "wheat." That is, they were not certain of, or actually did not know, the variety they were seeding. This group accounted for 1.4% of the total acreage sampled and would mean that 69,279 acres of Oklahoma's 1958 wheat crop were devoted to unknown varieties.

In all counties it was apparent that the wheat farmers with the larger acreages were sampled. If it can be assumed that this would indicate the better farmers within each of the counties were sampled, it would mean the average Oklahoma wheat farmer planted seed which contained even more mixture than was indicated by this survey.

The germination of all seed sources ran fairly high, as the average for all farmers sampled was 88.5%. However, of the samples collected, 17.5% germinated below 85%, and 3.7% germinated below 70%. It is quite evident that many of the

farmers did not have their seed tested for germination and purity prior to seeding. This question was not included in the questionnaire in the survey. In future surveys it is recommended such a question be included as part of the regular questionnaire.

This survey has shown clearly that many Oklahoma farmers do not recognize the importance of good seed. The use of good seed could do much for the reputation of Oklahoma wheat as a quality product.

Only 3.1% of the acreage sampled was planted with certified seed. Since certified seed is the farmers' only assurance of seed which is true to variety, free of excess weed seeds, other crop seeds, and high in germination, it is recommended by the Oklahoma Crop Improvement Association that certified seed of wheat be planted once every three years. In other words, certified seed should be used on 33% of Oklahoma's wheat acreage each year. However, the results of this study show that the majority of the farmers in Oklahoma planted their own seed. Only 26% of those sampled purchased seed from another source. Generally, each farmer would have had a much better chance of planting good clean seed had he obtained his seed from a source other than his own.

The early maturing varieties, Triumph and Wichita, were the favorites with most farmers. These varieties were planted on more than 85% of the acreage sampled.

Each sample collected was planted in an experimental plot in the fall of 1958 in order to determine the varietal purity. No attempt was made to determine varietal purity by laboratory analysis. It is expected much valuable information will be derived from the field plantings, but the data are not yet available.

Further studies of this type are needed, not only on wheat but on other crops as well. These studies also should include yield trials of samples collected in an effort to compare yields from certified and non-certified sources. If yield trials such as this show a higher yield with the use of certified seed, a stronger educational program can be developed in the favor of the use of good seed.

In future surveys such as this, it is recommended that additional or different personnel be used in the collection of the samples. The survey was set up to collect 1,104 samples, but only 601 were received. Wheat was seeded this year at a time when many of the vocational agriculture instructors were attending to other chores at county agricultural fairs and exhibitions. The collection of samples at this time worked a hardship upon them.

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