5-1955

An Economic Analysis of Alfalfa Seed Production Costs and Returns in Utah, 1952

Jack B. Goodwin
Utah State University

AN ECONOMIC ANALYSIS OF ALFALFA SEED PRODUCTION COSTS AND RETURNS IN UTAH, 1952

by

Jack B. Goodwin

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Agricultural Economics

UTAH STATE AGRICULTURAL COLLEGE
Logan, Utah

1955

ACKNOWLEDGMENT

The writer wishes to express appreciation to Dr. V. L. Israelsen, Professor of Agricultural Economics and Marketing, and to other members of the Advisory Committee, Utah State Agricultural College for supervision and assistance in conducting this study. Acknowledgment is also made to Dr. George T. Blanch, Head of the Department, for making this study possible and to the alfalfa seed growers who cooperated in furnishing the data. My thanks are also extended to my wife for her secretarial assistance.

Jack B. Goodwin

TABLE OF CONTENTS

LIST OF TABLES

Appendix Tables

LIST OF FIGURES

INTRODUCTION

Alfalfa is the most important forage crop in the United States and a crop vital to the livestock industry. It is the ideal to which other hay crops are compared. In terms of total digestable nutrients and as an economical source of these nutrients, it is without equal. Other features in which alfalfa excels over other hay crops as a forage are: high yield, palatability, high protein and calcium content, and value as a source of vitamins A and D (4, p. 340). In addition it has great value in soil conservation practices for controlling erosion losses and nitrogen depletion. It also fits well in crop rotation plans. In Utah alfalfa is grown on more acres than any other crop except wheat (11).

Back of the alfalfa acreage in the United States is the alfalfa seed industry. It provides the basic source by which the alfalfa acreage is maintained. Alfalfa seed is of two-fold importance to agricultural residents of Utah. It serves as the source of seed for Utah and many other states, and also it is the primary source of income to many farmers and a supplementary income for many others. Cash farm income from alfalfa seed normally ranks in fourth or fifth place among the field crops in Utah annually.

Description of the alfalfa seed industry in the U. S. A.

The greater part of the alfalfa seed produced in the United States is grown in the Great Plains States and in the irrigated regions of the West. The semi-arid climatic conditions prevailing in these areas are favorable to good seed production.

Prior to 1949 alfalfa seed production held a unique position in Western agriculture. It had a distinct "in and out" characteristic providing the grower the alternative of deciding rather late in the season whether to "go for seed" or to cut a crop of alfalfa hay. It was also possible to raise alfalfa seed when hay production was relatively poor or if the first cutting of hay was adequate for the farmer's needs, thus providing supplementary income. Also, seed could be raised with very little specialized investment by the grower. Very little alfalfa acreage was devoted exclusively to seed.

Since 1949, however, the alfalfa seed industry has taken on a specialized characteristic in several seed growing areas, especially in the Western States. Among these, California is the most important. Beginning in 1949 and each year since, California has produced more seed than any other state. In 1952 more than one-fifth of the total seed produced in the United States was produced in California on 84,000 acres with an average per acre yield of 475 pounds (12). Annual production by states for the period 1949 through 1952 is shown in appendix table 1.

The new alfalfa seed industry as mentioned above is highly specialized. Alfalfa seed income is the only income derived from the land and specialized methods of production and equipment are used.

Trends in production areas. According to the Bureau of Agricultural Economics, the annual average for the ten-year period 1942-51, Kansas was the leading state in seed production. Oklahoma was second. Since 1949, however, emphasis on seed production has shifted to the far Western States. According to the 1949-52 annual average, California was the leading state. Washington was second, Kansas third, and Utah fourth. States ranked according to the 1949-52 annual average production are shown in table 1.

Table 1. Alfalfa seed production by the ten leading states ranked according to the 1949-52 annual average

State	Average annual production*	Production by years			
		1952	1951	1950	1949
		thousand pounds			
(1)	(2)	(3)	(4)	(5)	(6)
California	27,470	39,900	25,000	31,000	13,900
Washington	10,853	18,810	15,100	7,000	2,500
Kansas	10,600	27,500	2,900	2,300	9,700
Utah	10,350	10,600	11,500	8,900	10,400
Oklahoma	9,853	11,300	6,700	8,100	13,400
Arizona	9,250	6,800	9,700	11,100	9,400
Montana	7,375	7,800	5,900	6,300	9,500
South Dakota	7,240	12,960	2,900	3,100	10,000
Nebraska	7,178	15,800	2,200	1,710	9,000
Idaho	5,350	6,400	6,400	5,400	3,200

* Author's calculations

Source: U. S. Dept. of Agr. Bur. of Agr. Econ. Farm production, farm disposition and value of field seed crops. Crop Reporting Board. Washington, D. C. 1939-1950 1950-1951 1951-1952 1952-1953.

Alfalfa seed has been regarded as very much a gamble by farmers in past years (6) because of the many hazards which may have a profound effect on the seed yield. These hazards may be climatic, biological, or economic.

Climatic hazards depend upon the seed producing locality. Such factors as frost, hail, or too little or too much rainfall may be real risks in some areas and comparatively small in others.

The most serious biological hazards are plant insects such as lygus bugs, grasshoppers, cutworms, army worms, and weevil. Other hazards are plant diseases and weeds, especially noxious weeds which not only sap the soil of plant food and moisture, but also severely reduce the selling price of the seed where the latter is contaminated. Such noxious weeds as wild morning glory, dodder, and white top are very costly in areas where alfalfa seed is grown extensively year after year.

Price production relationship. The price of alfalfa seed is very sensitive to supply and demand relationships. These facts are shown in figure 1, p. 5. Through the war years a scarcity of alfalfa seed caused prices to be extremely high in relation to the amount of seed produced. After World War II with the development of insecticides to combat insect damage, production of alfalfa seed increased substantially with the exception of 1948. In the post-war years there appears to be a high inverse correlation between total domestic production and the price paid to growers. In 1952 a record crop of seed was produced. Partly due to experience in the use of insecticides and partly due to a large increase in acreage devoted to seed which was in turn inspired by the record high price of 1951, production of clean seed increased from 104,620,000 pounds in 1951 to 180,326,000 pounds in 1952. This was a 72 percent increase over the 1951 production and more than double the 1941-52 average of 82,007,000 pounds (9, p. 2). It is impossible to tell what might have happened to the price of alfalfa seed had government price supports not been used in that year. The price of non-certified seed was supported at $28 per hundredweight and certified at $40 per hundredweight. The resulting seasonal average price was $32.70 per hundredweight or about 28 percent less than the price in 1951.

Domestic supply and disappearance. The information in figure 2, p.6, indicates that consumption kept pace with production of alfalfa seed from 1939 to 1949 with only a normal carry-over. Since 1949, however, due to increased production, farm and dealer stocks have grown steadily. The record crop of 1952 left, in spite of increased consumption, a carry-over in government and dealer warehouses of 76,603,000 pounds. Data on production, exports, imports, and carry-over are included in appendix table II.

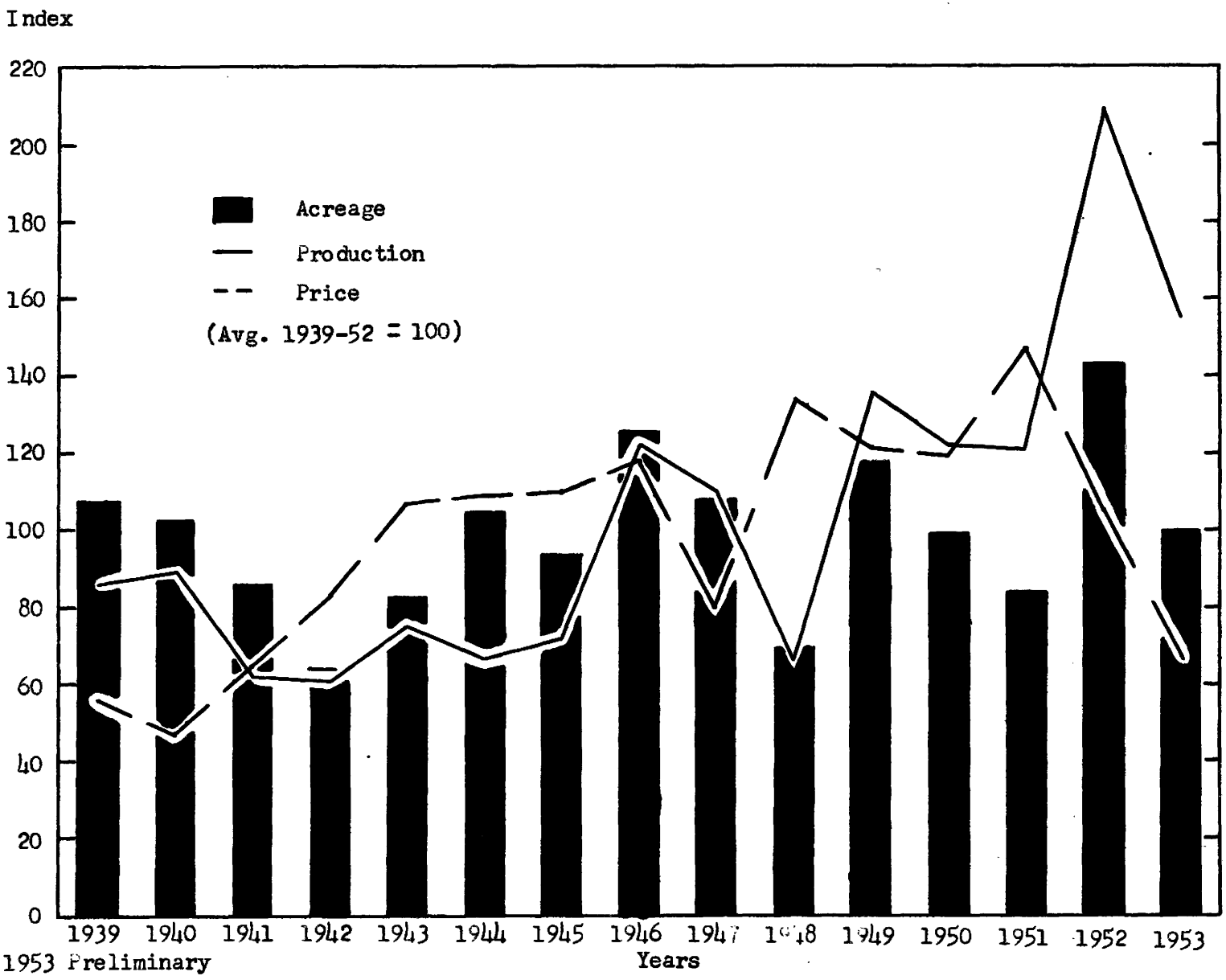


Figure 1. Alfalfa seed indices of acreage harvested, production, and price, United States, 1939-1953

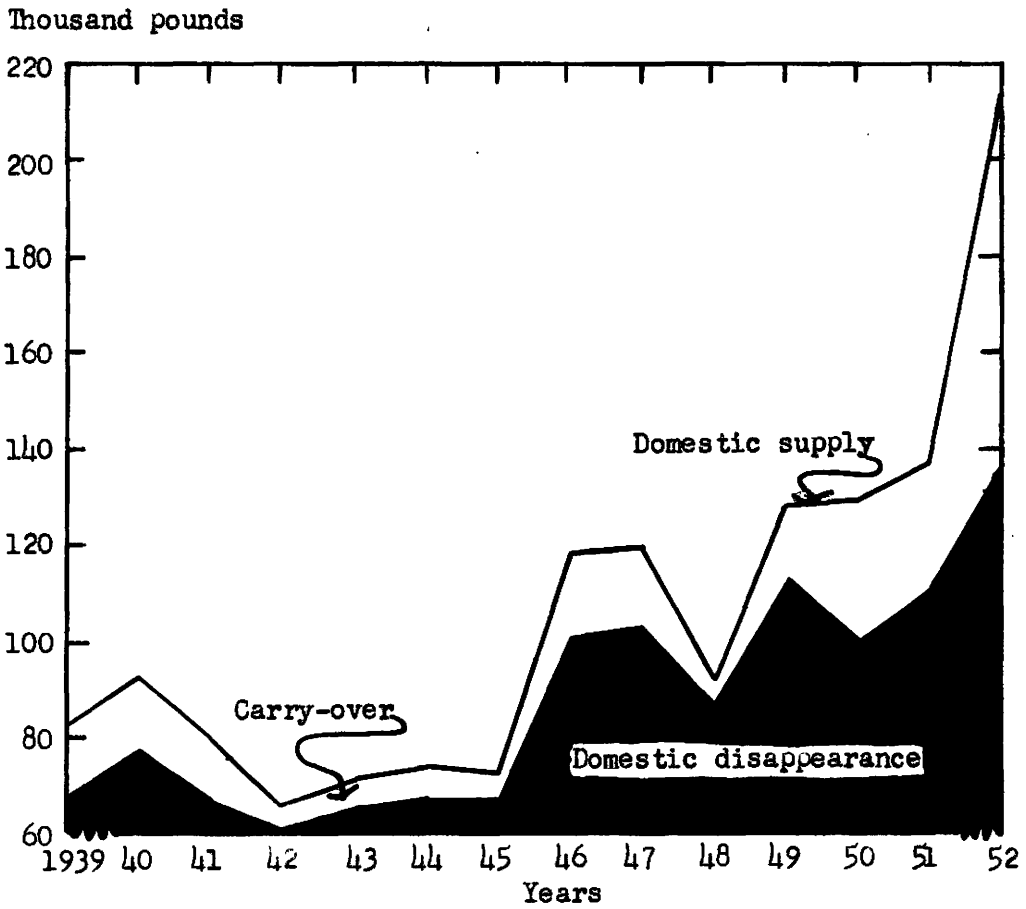


Figure 2. Domestic supply and domestic disappearance of alfalfa seed in the United States, 1939-1952

Production in 1953 was forecast at 140,640,000 pounds, but because of the carry-over, the supply of seed for the 1953-54 planting was estimated to be 5 percent more than in 1952 (13).

Description of alfalfa seed production in Utah

Utah is well adapted to alfalfa seed production. Its high mountain valleys and semi-arid climate are conducive to high quality seed so much in demand at the present time.

Approximately 10 percent of the total alfalfa acreage is left for seed annually. However, acreage devoted to alfalfa seed is subject to rather extreme fluctuations (8). For purposes of comparison, coefficients of variability were calculated for total alfalfa and seed acreage since 1920. The average annual acreage of alfalfa land in Utah since that time is 444,300 with approximately 12.3 percent variation from the average.

The average annual acreage devoted to alfalfa seed since 1920 is 41,700 with a variation of 36 percent from the average. In 1951 and 1952 alfalfa acreage devoted to seed was 17 and 15 percent respectively of the total alfalfa acreage. These data are found in table 2, p. 8.

Even though insecticides have been used extensively as a control device, there are still many non-controlled factors governing seed yields. Among these, frost is the most important cause of yield reduction. Since the second growth is usually left for seed, it is not uncommon for the grower to lose his entire crop as a result of frost damage. According to the 1952 survey approximately four-fifths of the alfalfa seed acreage was second cutting.

Alfalfa seed in Utah generally has maintained the "in and out" characteristic and, therefore, income from seed is generally supplementary

Table 2. The average, median, percentage, and coefficient of variability of alfalfa seed acreage to alfalfa acreage, Utah, 1920-1953

Year	Alfalfa acres	Alfalfa seed acres	Percent
	thousand	thousand	
(1)	(2)	(3)	(4)
1920	380	15	3.9
1921	412	28	6.8
1922	431	35	8.1
1923	458	45	9.8
1924	467	62	13.3
1925	490	72	14.7
1926	514	62	12.1
1927	519	72	13.9
1928	540	52	9.6
1929	551	50	9.1
1930	562	35	6.2
1931	495	32	6.5
1932	506	18	3.6
1933	481	22	4.6
1934	359	27	7.5
1935	449	29	8.9
1936	471	24	5.7
1937	471	28	5.9
1938	447	39	8.7
1939	427	43	10.0
1940	431	54	12.5
1941	435	30	6.9
1942	444	27	6.1
1943	417	30	7.2
1944	443	35	7.9
1945	430	38	8.8
1946	408	44	10.8
1947	388	46	11.9
1948	380	45	11.8
1949	388	53	13.7
1950	361	54	15.0
1951	362	62	17.1
1952	390	59	15.1
1953	398	50	12.6
Median	439	43	9.0
Average	444.3	41.7	9.4
Coefficient of variability	12.3%	36.0%	-

Source: Utah Crop Report. Annual Summaries 1920-1953
Author's calculations

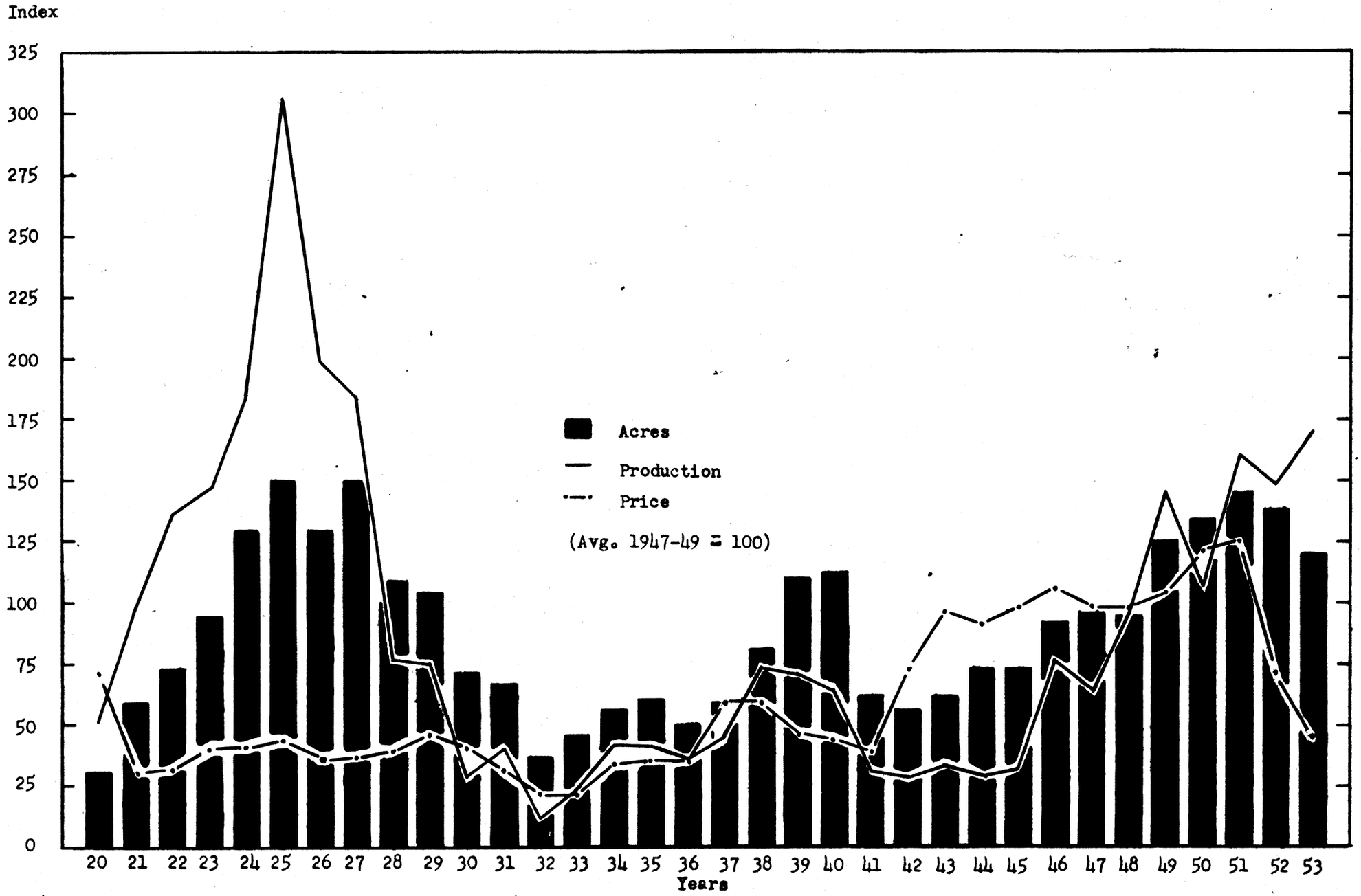
to most seed growers. In Millard County, however, alfalfa seed has long been a principal industry and is one of the major sources of income in that area. Approximately 20 percent of the total cash farm income in 1952 was derived from alfalfa seed.

Brief history. John W. Carlson[1] has indicated that as early as 1909 Utah, being ideally situated as to climatic conditions, was a leading state in alfalfa seed production (2). Statistical data were not available concerning production and acreage prior to 1920; however, the data in figure 3, p. 10, indicate that seed acreage and production increased rapidly after that date. The peak in production was attained in 1925 with a total output of nearly 22 million pounds of clean seed from more than 70 thousand acres. This represented 40 percent of total United States production. Per acre yield in that year was more than 300 pounds of clean seed.[2]

After 1925 production and acreage declined until production reached a low of 892,000 pounds in 1932. Research by the Utah Experiment Station established the cause of crop failure to be insect damage, the control of which was not known until after World War II.

In the years from 1932 to 1937 alfalfa seed acreage increased gradually to about 54,000 acres as the price paid for seed in Utah increased from $8.82 per hundredweight to $22.80 per hundredweight.

1. Dr. John W. Carlson is an agronomist with the U. S. Bureau of Plant Industry, Soils and Agricultural Engineering and works cooperatively with the Utah Station. He is a member of the Legume Seed Laboratory. He has worked on alfalfa seed production problems since the middle twenties and with Professor C. J. Sorenson, Professor of Entomology of the Utah Station, did the early work on the injurious effects of lygus bugs in seed production.
2. Before 1949 Utah crop reporting service figures were reported on a bushel basis and also thresher run weights. These figures were converted by the author to a hundredweight and also adjusted to a cleaned weight on the basis of the clean away indicated by an average of U. S. Department of Agriculture figures from 1939-52.



1953 Preliminary

Figure 3. Alfalfa seed indices of acreage harvested, production, and price, Utah, 1920-1953

Alfalfa seed in 1937 brought the highest price since 1920. This was undoubtedly responsible for a large part of the increase in seed acreage and production in the three years following.

At the beginning and during the World War II years the need for alfalfa hay to feed increasing livestock numbers took precedence and acres devoted to seed declined. The price of seed rose from $15.63 per hundredweight in 1941 to $38.33 per hundredweight in 1943. Beginning in 1946 the general trend of Utah's alfalfa seed production increased steadily. No doubt this was largely due to the application of effective insecticides and to the high prices prevailing. The largest acreage devoted to alfalfa seed since 1925 came in 1951. The price of seed that year was also the highest in the history of Utah. Alfalfa seed prices declined in 1952 from $49.50 per hundredweight to $28.20 per hundredweight, a drop of about 43 percent. In 1953 though acreage declined, production continued to rise and prices at the low point for the season were 19 percent under those of 1952 (8).

Objectives of this study

The objectives of this study are to: (1) determine the cost of producing alfalfa seed in the major producing areas of Utah for 1952; (2) determine the physical inputs necessary in alfalfa seed production; (3) determine the relative efficiencies of the various cultural methods; and (4) attempt to measure relative advantages or disadvantages of producing certified seed as compared to non-certified seed.

There is a dearth of information on the economic aspects of alfalfa seed production in Utah and growers have requested the Utah Experiment Station to compile cost and marketing information on the commodity. The opinion has been expressed that information of this type will aid

the growers with their economic problems concerning alfalfa seed.

Review of literature

Much has been written on the physical and biological factors affecting alfalfa seed production. Notable research conducted through the Utah Experiment Station and similar agencies has saved the seed industry from extinction in Utah. However, very little information was found having a direct bearing on alfalfa seed production costs and returns. A. I. Tippetts (6) in a Master's thesis described the early alfalfa seed industry in Utah. Emphasis was placed on the early marketing structure and the problems confronting the grower in marketing his seed crop before 1925.

In 1942 a Doctor's dissertation (1) was written at the University of Wisconsin reviewing the grass and legume seed industry on a national scale. Methods of obtaining data were analyzed, criticized, and recommendations made. Historical price and production trends were also given consideration.

In 1948 the Kansas Experiment Station in cooperation with the United States Department of Agriculture made an economic study of alfalfa seed production in Kansas. The study by R. E. Marx (3) reviewed the characteristics of the alfalfa seed industry in Kansas for the year 1946. Labor used to harvest the seed crop and costs of production were divided into five parts: (1) harvesting (field work and threshing); (2) cleaning the seed; (3) hauling and marketing the crop; (4) caring for the chaff; and (5) miscellaneous. Included in the latter item was interest on land investment, taxes, and overhead charges. Labor in the most popular harvesting method--combining with a pick-up attachment--was analyzed in detail. The cost per acre of producing

seed by the most popular method was determined to be $10.39 in 1946. Total income was $50.30 and management income was $39.91.

SOURCES OF DATA AND PROCEDURE

The data which form the basis for this study were obtained from a schedule taken to 110 alfalfa seed growers who produced seed in 1952. Each one was personally interviewed by the author to obtain detailed cost and return information covering the seed crop from the time it was decided "to go for seed" until the seed was sold.

In the interest of economy it was predetermined to secure information only from growers in those counties where there was normally more than 100,000 pounds of seed produced yearly. It was found that the counties concerned fell into three rather well defined sections. Area 1, the most important of these, consists of Millard and contiguous counties, Beaver, Juab, and parts of Sanpete and Utah Counties. Area 2 comprises parts of Cache and Box Elder Counties and differs from the other areas in that seed produced in these two counties is grown on non-irrigated land. Area 3 is located in the Uintah Basin in Uintah and Duchesne Counties.

Previous to interviewing the growers, a tour was made of each of the above counties. The county agent in each selected county was interviewed and names of all consistent seed growers were obtained. In addition a list of certified seed growers was procured from the Utah Crop Improvement Association.

From the names of growers so obtained, a random sample was selected according to the relative importance of the county in seed production. Letters were sent out to the farmers comprising this sample seeking their

cooperation. Additional information was obtained when necessary from the county tax roles and local seed dealers.

Explanation of cost items

For the purpose of this study, alfalfa seed was considered a separate enterprise and certain cost items were prorated over the various sources of income from the alfalfa land in the following manner: Interest on the value of the land at 5 percent, real estate taxes, and drainage assessments were prorated proportionately on the basis of the gross value of the total products produced on the land, that is, first crop hay, alfalfa seed, chaff, screenings, and fall pasture if any.

Water assessments for alfalfa seed include only that utilized after the first crop hay was removed in the event the second growth was saved for seed. The water costs were calculated on the basis of the amount of water applied to the seed acreage multiplied by the assessment rate per unit of water.

Classifying water costs presented some difficulty. There were several methods under which water was procured. The most important one was the share-assessment plan under a canal. Assessments were made on the basis of shares owned by the individual to cover the costs incurred by the water company. Since failure to pay the water assessment could result in loss of the water shares, this cost appeared to be about as fixed in nature as real estate taxes. Variations of the water-share plan occurred in a few cases where supplementary water was purchased. One grower purchased all water on an "as needed basis." There were a limited number of growers who derived their supply of water from privately owned wells. Because the great majority of growers procured their water on the share-assessment basis and because the alfalfa seed enterprise was

the major enterprise and accounted for more than half of total crop income on the farms studied in the areas where irrigation was necessary, it was decided to treat water costs on a fixed basis and prorate as nearly as possible the cost of water used to develop seed to that crop. It is known that some inaccuracies exist in this method, but it is believed that they are quite minor and have very little influence on the over-all result.

Allocation of the value of barnyard manure was based on the assumption that 50 percent would be utilized by plant growth in the year that it was applied, 30 percent in the second year, and 20 percent in the third growing season. All manure was valued at $1.40 per ton in the corral. Hauling and labor expended appear in the labor and power charges. If a first crop was cut for hay, there was a further allocation. One-third of the total available manure was charged to the seed crop since approximately two-thirds of the total foliage produced is taken off in the first crop.

Commercial phosphate was handled in the same manner except that the cost of the fertilizer was the actual price per ton paid by the producer.

Insecticide cost is the actual money outlay for such chemicals. The cost for labor and power in applying insecticides appears in labor and power costs except for those growers who contracted to have the job done.

Fees include charges for certification, sealing, tagging, and a state germination fee required of all growers applying for certified seed. State germination fees were also required of growers who applied for non-recourse loans from the government.

Interest on cash outlay was charged at 5 percent from the time the expense was incurred until the crop was sold. Since very little labor was hired other than for harvesting, interest on money expended for labor was charged for an average of three months.

Operator and family labor cost was based on the operator's estimate of the value of his time multiplied by the number of hours spent in each operation. Hired labor costs are the actual payments by the operator for hired labor for each operation related to seed production.

All power costs including horse, tractor, and truck power were charged at the custom rate for the power unit and the equipment necessary for the operation. The farmer was asked to estimate the rate he would charge for his equipment if he were doing the work for someone else. Where the custom rate was on a per acre basis, it was adjusted to an hourly basis by the author. Depreciation, obsolescence, and interest on investment for both the power unit and machinery are included in the rate charged. Man labor for operation of the power unit was computed at the customary wage and the balance was attributed to the power unit.

There was no attempt to make an allowance for general over-all risk as a cost item, nor was any attempt made to discover technological efficiencies in water and chemical application since they are different fields of study and much has already been written about them.

ECONOMICS OF ALFALFA SEED PRODUCTION IN UTAH

Description of alfalfa seed in the major producing areas

Alfalfa seed production is mainly carried on in three major areas in Utah. Area 1, the largest and most important, centers in west Millard County and produces approximately two-thirds of the state's total alfalfa seed. Other counties contiguous to Millard, considered for the purpose of this study to be in the same area, were more diversified and seed production was not so important. Area 2 in northern Utah centers in eastern Box Elder and western Cache Counties. Seed production in this area of any importance is relatively new and exists almost wholly in the non-irrigated sections. It is grown primarily on land that has limited alternatives for other crops or is used to restore depleted nitrogen to the soil. More than two-thirds of all the dry land seed acreage in the study was in Area 2. Area 3 is located in the eastern Utah Uintah Basin and centers around Myton and Pleasant Valley. Even though it is smaller than Area 1, seed is none the less important as a source of income. A map indicating the principal seed producing areas is shown in figure 4, p. 19.

Areas 1 and 3 have approximately the same characteristics and the greater part of the seed in these two areas is raised under irrigation. Although alfalfa seed is not a heavy water-consuming crop, approximately 60 percent of the seed land included in the survey was irrigated. Where plenty of water was available, it was applied at the discretion of the grower in an effort to maintain moisture condition at the level most conducive to seed production.

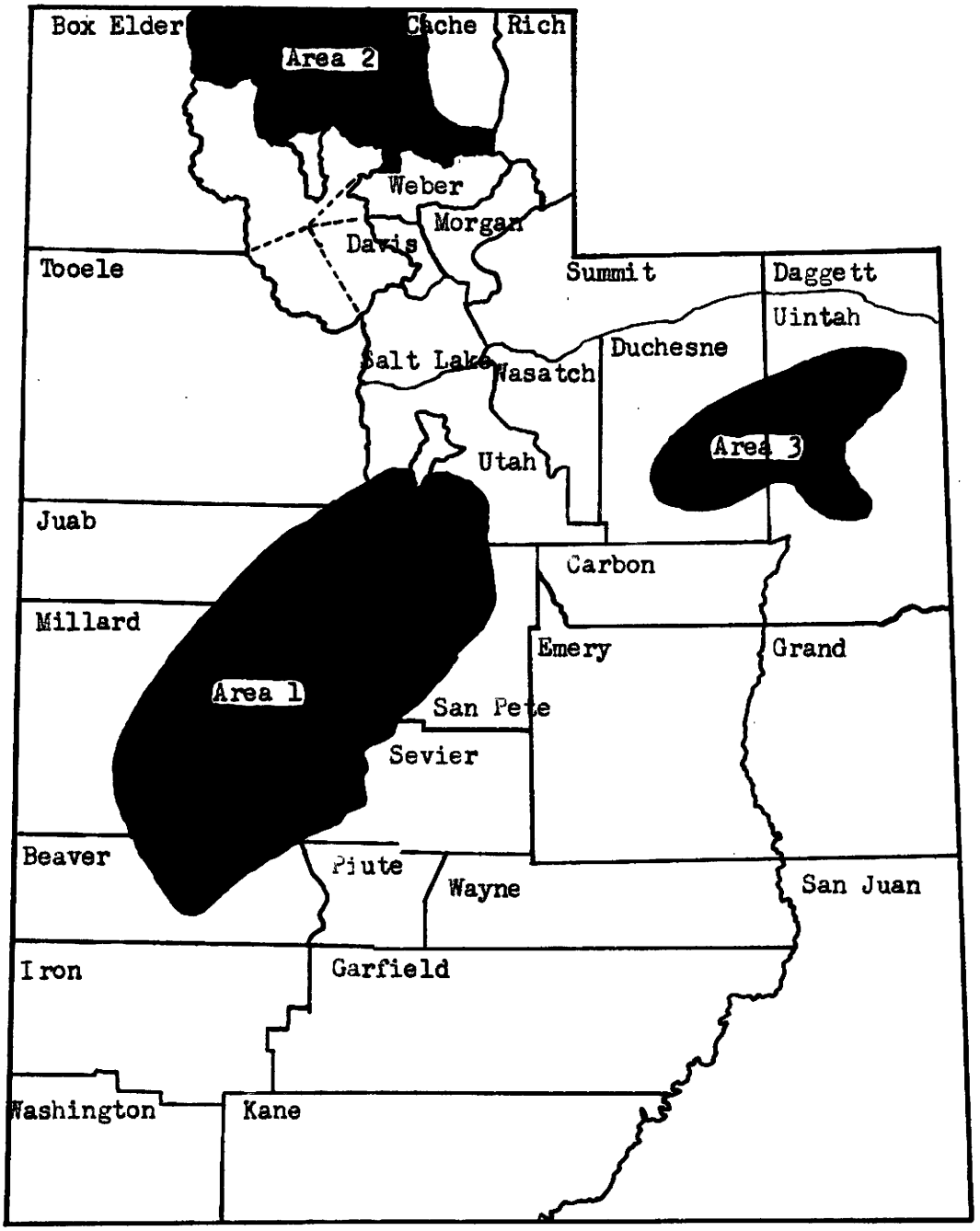


Figure 4. Major alfalfa seed producing areas, Utah 1952

About 26 percent of the seed land in the study was dry land. Alfalfa seed was incidental on approximately half of the dry land acreage included. That is, a first cutting of alfalfa hay was raised; then if moisture conditions were adequate, a seed crop was harvested. The rest of the dry land alfalfa was grown exclusively for seed.

The remaining 14 percent was designated as quasi-dry land. Seed land of this type would ordinarily be considered irrigated except that no water was applied to the alfalfa after it was left for seed. This method was followed in areas where early spring water was available for irrigation only for the first cutting, or if irrigation water was scarce, other crops took precedence.

Farms studied. Detailed information was taken only on the alfalfa seed enterprise. However, information was secured on total farm acreage and on seed land values. The farms in the study ranged from 20 to 1,600 acres averaging 324 acres in Area 1, 540 acres in Area 2, and 255 acres in Area 3, including all pasture, range, and waste land. As an indication of the relative importance of alfalfa seed in each area, approximately 69 percent of the cultivated acreage in the average seed farm in the Uintah Basin was devoted to seed; about 54 percent in the Millard Area; and about 20 percent in the Box Elder-Cache Area. The above information is given in table 3, p. 21.

Seed land value ranged from an estimated $40 to $350 per acre. Growers who reported their seed land in the study were asked to estimate its market value. One grower whose estimated land value seemed highly excessive was adjusted downward to fit other farms in the same local area. The land values in Areas 1 and 3 averaged $192 and $197 per acre respectively, and Area 2 averaged $119 per acre.

Table 3. Average acreage of alfalfa seed and other crops on farms in the major seed-producing areas, Utah, 1952

Crop	All areas	Area 1	Area 2	Area 3
	acres	acres	acres	acres
(1)	(2)	(3)	(4)	(5)
Alfalfa seed	78.2	87.7	69.4	62.1
Small grains	78.5	41.3	261.0	11.8
Forage crops for cutting	22.8	29.0	14.0	14.7
Row crops	3.1	4.6	-	1.9
Total cultivated	182.6	162.6	344.4	90.5
Range grazing & other	168.7	161.0	195.5	164.8
Total	351.3	323.6	539.9	255.3

The study included 8,606 acres of land devoted to seed or about 15 percent of the total alfalfa land in Utah devoted to seed in 1952. The acreage of seed in each area included in this study and also the relative importance of first and second cutting are presented in table 4.

Table 4. Acreages and cutting saved for alfalfa seed in principal producing areas in Utah, 1952

Area	First cutting	Second cutting	Total	Percent second cutting
	acres	acres	acres	
(1)	(2)	(3)	(4)	(5)
Area 1	1,113	4,415	5,528	83.5
Area 2	658	868	1,526	56.9
Area 3	175	1,377	1,552	88.7
Total	1,946	6,660	8,606	77.4

The acres of certified and non-certified seed in each area and their respective percentages were as follows:

Area	Certified	Non-certified	Percent certified
Area 1	457	5,071	8.2
Area 2	976	550	64.9
Area 3	288	1,264	18.5

A total of 1,721 acres of certified seed and 6,085 acres of non-certified were included.

Harvesting methods. Three principal methods of harvesting were employed. Within these principal groupings there may occur several minor variations. These three methods can be briefly described as follows: Method 1 consists of cutting, drying in the field and then hauling direct to a stationary thresher. Method 2 is similar to No. 1 except that the seed is hauled, stacked, and later fed into a stationary thresher. The third method consists of combining the crop, either directly from the stump or with a pick-up attachment. An interesting variation of this method is to spray the ripe seed with a defoliating compound to help in combining. This method is gaining in popularity in Millard County. More will be presented later on this relatively new technique.

Yield of seed

Since 1945 alfalfa seed yield per acre in Utah has been on the increase. The average yields in 1951 and 1952 were 185 and 180 pounds per acre respectively. These were the highest average yields per acre since 1927. Yield of seed was calculated on a weighted basis by dividing the total pounds of seed by the total acres. Yields for the fields included in this study ranged from 14 to 649 pounds per acre. This was a ratio of 46 to 1. The range in yields by area with cumulative percentages are presented in table 5, p. 23.

The highest reported yield per acre was on a Millard County field, but yields were consistently higher throughout the Uintah Basin. The average yield for all fields surveyed was 199 pounds of clean seed. Average yields by type of farming are indicated in table 6, p. 23.

Table 5. Yield per acre on 110 fields of alfalfa seed by area, with cumulative percentages for each group, Utah, 1952

Range in yield pounds	All areas	Area 1		Area 2		Area 3	
		No.	cumulative percent	No.	cumulative percent	No.	cumulative percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0 - 65	11	5	7.9	6	27.3	-	-
66 - 130	24	13	26.6	9	68.2	2	8.0
131 - 195	23	15	52.4	4	86.3	4	24.0
196 - 260	19	11	69.8	2	95.4	6	48.0
261 - 325	11	9	84.1	1	100.0	1	52.0
326 - 390	5	2	87.3	-	-	3	64.0
391 - 455	4	1	88.9	-	-	3	76.0
456 - 520	5	5	96.8	-	-	-	-
521 - 595	7	1	98.4	-	-	6	100.0
596 and over	1	1	100.0	-	-	-	-
Total	110	63		22		25	
Median (lbs.)	188	190		102		294	

Table 6. Yields of alfalfa seed by type of farming among the seed growing areas, Utah, 1952

Type of farming	All areas		Area 1		Area 2		Area 3	
	No. of fields	Yield per acre	No. of fields	Yield per acre	No. of fields	Yield per acre	No. of fields	Yield per acre
		lbs.		lbs.		lbs.		lbs.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Irrigated*	64	227	41	198	-	-	23	299
Dry land	30	114	8	149	22	96	-	-
Quasi-dry land**	16	246	14	241	-	-	2	357
All types	110	199	63	199	22	96	25	300

* Applied to fields that were irrigated after removal of first crop alfalfa.
** Fields irrigated to mature a first crop with no further irrigation to second growth left for seed.

Irrigation was a factor in making yields in Areas 1 and 3 higher than in Area 2. However, irrigation may not have been the principal factor. Yields on quasi-dry land were consistently higher than on irrigated land in each of the areas reporting that type of farming. This suggests a possibility that some irrigated fields were watered excessively or that moisture requirements on the quasi-dry fields were maintained throughout the critical period from an underground source.

The data gathered were not sufficient to indicate any real difference in the average yields between cuttings. Areas 1 and 2 indicate a slight advantage for first crop seed, but the data in Area 3 reveal a decided advantage in the second crop. Because of higher yields in Area 3, enough weight was given to the second cutting yields to increase the over-all average. This information is revealed in table 7, p. 25.

Labor and power requirements

Labor and power required in alfalfa seed production were divided into 3 parts. First, production and maintenance labor included all preharvest operations which could properly be allocated to the seed crop. The second, harvesting, included all operations involved in getting the ripened seed into the bag. Several methods of harvest have already been described. Third, marketing, consisted of hauling the seed to market or cleaning establishment where it was subsequently sold. Marketing is made to include all operations from the loading of seed onto the truck to leave the farm to the time the farmer says, "I'll take it," and a sale has been consumated.

Labor requirements. Production and maintenance labor varied from an average of 1.15 man hours per acre in Area 2 to an average of 2.76 man hours in Area 3. The greater expenditure of time in maintenance

Table 7. Yields of alfalfa seed by type of farming, crop, and by area, Utah, 1952

Type of farming	First crop	Second crop	Avg. all crops
	lbs.	lbs.	lbs.
(1)	(2)	(3)	(4)
Area 1			
Irrigated	235	190	198
Dry land	168	123	149
Quasi-dry land	-	241	241
All types (avg.)	208	196	199
Area 2			
Irrigated	-	-	-
Dry land	104	90	96
Quasi-dry land	-	-	-
All types (avg.)	104	90	96
Area 3			
Irrigated	210	310	299
Dry land	-	-	-
Quasi-dry land	-	357	357
All types (avg.)	210	312	300
All areas			
Irrigated	229	226	227
Dry land	130	99	114
Quasi-dry land	-	246	246
All types (avg.)	173	206	199

labor in the irrigated areas was due to the extra labor involved in irrigation and operations in preparing the fields for irrigation. Operations such as manuring, commercial fertilizing, diking, and dusting were practiced only on a small number of farms and, therefore, each operation made up only a small part of the average production and maintenance labor.

Harvesting operations required the greatest amount of labor. However, the amount necessary depended primarily on the method of harvest used. Harvesting labor in Area 1 accounted for 70 percent of

the total labor in producing an acre of seed. This was because the greater part of the seed in that area was cut and hauled to stationary threshers. In the other areas where the combine was used more extensively, harvesting labor hours were much less and accounted for only 52 and 53 percent respectively of the total labor in Areas 2 and 3.

Marketing labor accounted for only 2, 3, and 4 percent of total labor in Areas 1, 2, and 3 respectively.

The total amount of labor hours per acre of seed produced varied among the three areas from 2.67 hours per acre in Area 2 through 6.20 per acre in Area 3 to 6.42 hours per acre in Area 1, a ratio of 2.4 to 1. A detailed breakdown of labor requirements for each operation and each area is presented in table 8, p. 27.

The utilization of man labor in the harvesting methods employed is presented in table 9, p. 28. Combining was found to be the most economical in man labor expended, requiring only from 1.21 to 2.13 man hours per acre over the three areas. The greatest amount of combining time per acre was required in Area 3. This was apparently due to the heavy and rank growth of alfalfa foliage that seemed prevalent in the fields studied.

Method 2, hauling, stacking, and threshing, was found to require the greatest amount of labor. This is true because additional labor is needed in stacking the alfalfa and also more man labor is necessary in feeding the thresher from a large stack which has settled and become compact, than from a wagon or slip such as is used in Method 1. Hauling, stacking, and threshing was reported on only three fields in Area 3. Man power was saved on the largest of these farms through the use of buck rakes and stackers with an acknowledged great sacrifice in seed

Table 8. Man hours required for the various operations to produce one acre of alfalfa seed by area, Utah, 1952 (Index of time requirement: Area 2 = 100)

Operation	Area 1 Hours per acre	Per cent of total	Area 2 Hours per acre	Per cent of total	Area 3 Hours per acre	Per cent of total
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Production & maintenance						
Manuring	.08		-		-	
Com. fertilizing	.04		-		.06	
Cultivating	.28		.50		.28	
Ditching	.11		-		.16	
Diking	.02		-		.01	
Spraying	.29		.32		.26	
Dusting	.03		.02		.01	
Irrigating	.75		-		1.97	
Other	.20		.31		.01	
Sub total	1.80	28.0	1.15	43.1	2.76	44.0
Harvesting*						
Mowing)						
Bunching)						
Hauling)						
Stacking) ---	4.48		1.43		3.21	
Threshing)						
Combining)						
Other)						
Sub total	4.48	70.0	1.43	53.5	3.21	52.0
Marketing						
Hauling to plant	.14		.09		.23	
Sub total	.14	2.0	.09	3.4	.23	4.0
Total hours all operations	6.42	100.0	2.67	100.0	6.20	100.0
Index of time requirements	240		100		231	

* Since none of the three harvesting methods used were entirely comparable, harvesting operations were grouped into one figure.

yield. This variation would appear to account for the apparent discrepancy in table 9.

Conversations with growers in the Uintah Basin revealed that shortage of labor was the principal reason for making the investment in combines as harvesting equipment. Growers used combines in the Cache-

Table 9. Man hours required to harvest one acre of alfalfa seed by various harvesting methods in three principal areas, Utah, 1952

Operation	Hauling to thresher	Hauling stacking threshing	Combining
	hrs.	hrs.	hrs.
(1)	(2)	(3)	(4)
Area 1			
Harvesting			
Mowing	.65	.90	.10
Bunching	1.03	1.23	-
Hauling	2.04	3.17	-
Stacking	-	-	-
Threshing	1.13	2.65	-
Combining	-	-	1.06
Other	.19	-	.05
Total hours	5.04	7.95	1.21
Area 2			
Harvesting			
Mowing	.67	-	.20
Bunching	.67	-	-
Hauling	1.71	-	-
Stacking	-	-	-
Threshing	1.38	-	-
Combining	-	-	1.01
Other	-	-	.09
Total hours	4.43	-	1.30
Area 3			
Harvesting			
Mowing	.37	.74	.32
Bunching	1.09	.58	-
Hauling	3.53	2.91	-
Stacking	-	-	-
Threshing	1.71	1.51	-
Combining	-	-	1.81
Other	-	-	-
Total hours	6.70	5.74	2.13

Box Elder Area because the initial purchase had been made to harvest wheat and barley. Millard County growers had made the initial investment in stationary threshers and most of them were reluctant to change, at least until the existing machinery required replacement. However, with the introduction of defoliation in that area, farmers were beginning to invest in combines. Defoliation may well hasten the obsolescence of

the stationary thresher.

Comparative man-hour requirements by types of farming appear in appendix tables V, VI, and VII.

Power requirements. To facilitate analysis the three main divisions of power requirements already mentioned were further broken down into horse power, tractor power, and truck power. The producers reported the number of hours each type of power was required in the different operations. The average horse-tractor-truck hours for all areas was 3.21 per acre. Tractor power was by far the most important source of power, accounting for 2.39 hours per acre. Horse and truck power utilized .47 and .35 hours per acre respectively. A summary of power time requirements for each area and for each operation is given in table 10, p. 30.

Harvesting generally required about 74 percent of the total power time utilized in seed production. About 96 percent of all horse power, about 69 percent of all tractor power, and about 60 percent of all truck power were used in harvesting. Power requirements varied over the three areas from 2.13 hours per acre in Area 2 to 3.64 hours per acre in Area 1. Generally, the variation was due to differences in harvesting methods and types of farming.

A break down of the data by harvesting method revealed that combining required less than half of the average power time per acre than was required in the other two methods.

All horse, tractor, and truck power time spent in harvesting in each area was tabulated by each of the three harvesting methods. In Area 1, combining included in the study was contracted. Time for contracted operations could not be determined. Power time for the other

Table 10. Horse, tractor, and truck time required to produce one acre of alfalfa seed by producing area, Utah, 1952

Power	All areas	Area 1	Area 2	Area 3
	hours	hours	hours	hours
(1)	(2)	(3)	(4)	(5)
Horse power				
Prod. & maint.	.02	.02	-	-
Harvesting	.45	.64	-	.24
Marketing	-	-	-	-
Total horse power	.47	.66	-	.24
Tractor power				
Prod. & maint.	.74	.76	.79	.62
Harvesting	1.64	1.81	.98	1.67
Marketing	.01	.01	-	-
Total tractor power	2.39	2.58	1.77	2.29
Truck power				
Prod. & maint.	.06	.06	.06	.05
Harvesting	.21	.24	.23	-
Marketing	.08	.10	.07	.13
Total truck power	.35	.40	.36	.18
Grand total	3.21	3.64	2.13	2.71

two methods for all practical purposes was about 3 hours per acre. The heavy growth of alfalfa in Area 3 appears to be the factor responsible for much more time consumed in combining. This fact was indicated in the section on labor. It was interesting to note the extent to which horse power has been replaced by mechanical power. Horse power was used extensively only in Area 1. Horse power for hauling, stacking, and threshing in Area 3 appears high because two fields out of a total of three reporting this method of harvest utilized horse power. Power time by harvesting method is summarized in table 11, p. 31.

Measurement of cost factors

The input costs of the alfalfa seed enterprise at the 1952 level for purposes of analysis were divided into two groups: (1) fixed costs and (2) variable costs. In this section production costs are first

Table 11. Power time required to harvest one acre of alfalfa seed in the various seed producing areas by harvesting method, Utah, 1952

Item	Hauling to thresher	Hauling stacking threshing	Combining
	hours per acre		
(1)	(2)	(3)	(4)
Area 1			
Horse power	.76	.87	-
Tractor power	2.00	2.17	.83
Truck power	.30	-	-
Total Area 1	3.06	3.04	.83
Area 2			
Horse power	-	-	-
Tractor power	1.13	-	.98
Truck power	1.37	-	-
Total Area 2	2.50	-	.98
Area 3			
Horse power	-	1.35	-
Tractor power	2.56	1.65	1.56
Truck power	-	-	-
Total Area 3	2.56	3.00	1.56
All areas			
Horse power	.73	1.18	1.12
Tractor power	2.00	1.84	.07
Truck power	.31	-	-
Total all areas	3.04	3.02	1.19

compared by areas. An over-all average cost of production figure for the state of Utah, 1952 was thus obtained. Second, production costs are compared within areas by types of farming to discover differences in cultural practices.

Methods of computing and the components of all costs will be given in detail subsequently. Here the over-all picture of the various cost items is presented. The average total cost of producing alfalfa seed for all of the major areas in Utah, 1952 was $32.71 per acre or $15.13 per hundredweight. When broken down into the major areas, the average cost for Area 1 was $33.87 per acre; Area 2 was about $23 per acre; Area 3 was about $38 per acre (table 12, p. 32). The difference between

Table 12. Cost of producing alfalfa seed in selected areas of Utah by area, on a per acre and per hundredweight basis, 1952

Item	All areas		Area 1		Area 2		Area 3	
	Per acre	Per cwt.	Per acre	Per cwt.	Per acre	Per cwt.	Per acre	Per cwt.
	dollars							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fixed costs:								
Land costs	5.79	2.91	5.85	2.94	3.13	3.27	8.23	2.74
Taxes	.45	.23	.47	.24	.41	.43	.44	.15
Water assessment	1.25	.63	1.30	.65	-	-	2.35	.78
Drainage assessment	.18	.09	.28	.14	-	-	-	-
Depr. & int. on bldgs.	.17	.07	.14	.07	.28	.29	-	-
Sub total	7.84	3.93	8.04	4.04	3.82	3.99	11.02	3.67
Variable costs:								
Material & miscl. ser.								
Manure	.19	.10	.30	.15	-	-	-	-
Com. fertilizer	.59	.30	.85	.43	-	-	.24	.08
Insecticides	3.04	1.53	2.78	1.40	3.58	3.74	3.48	1.16
Bags	.53	.26	.51	.26	.44	.45	.68	.23
Fees	.19	.10	.10	.05	.36	.38	.35	.12
Other	.08	.04	-	-	.44	.46	-	-
Sub total	4.62	2.33	4.54	2.29	4.82	5.03	4.75	1.59
Contract services								
Seed cleaning	3.28	1.65	2.90	1.46	2.37	2.48	5.54	1.84
Apply insecticides	.68	.34	.76	.38	.67	.70	.44	.14
Harvesting	.59	.30	.69	.35	.58	.60	.23	.08
Hauling	.10	.05	.12	.06	.01	.01	.11	.04
Other	.04	.02	-	-	.20	.20	-	-
Sub total	4.69	2.36	4.47	2.25	3.83	3.99	6.32	2.10
Int. on cash outlay	.19	.09	.20	.10	.17	.18	.16	.05
Govt. handling and storage	.07	.04	.06	.03	.09	.09	.10	.04
Labor costs								
Operator	3.48	1.75	3.69	1.86	2.23	2.32	3.98	1.32
Hired	2.89	1.45	3.66	1.85	.78	.82	2.21	.73
Sub total	6.37	3.20	7.35	3.71	3.01	3.14	6.19	2.05
Power costs								
Horse	.30	.15	.44	.22	-	-	.06	.02
Tractor	8.02	2.66	8.10	4.08	6.62	6.92	9.10	3.03
Truck	.61	.37	.67	.35	.65	.68	.33	.11
Sub total	8.93	3.18	9.21	4.65	7.27	7.60	9.49	3.16
Total variable costs	24.87	11.20	25.84	13.03	19.19	20.03	27.01	8.99
Total all costs	32.71	15.13	33.87	17.07	23.01	24.02	38.03	12.66

Areas 1 and 3 is not statistically significant; however, a portion of this difference can be attributed to the higher land water costs of the Uintah Basin. Costs in Area 2 are highly significant when compared with either of the other areas. This is probably due to the fact that Area 2 is entirely a dry land area. More will be presented on areas after a consideration of the conventional cost breakdowns.

Fixed cost analysis. Fixed costs include cash and non-cash expenditures that tend to continue year after year whether a crop of seed or no crop at all is raised. These include: land costs or interest on investment in land, taxes, water assessment, drainage assessment, and depreciation and interest on buildings used. Reasons for placing water assessment in the fixed costs were explained in a previous section.

Fixed costs varied significantly from $3.82 per acre in Area 2 through $8.04 per acre in Area 1 to $11.02 per acre in Area 3, a ratio of almost three to one. The cause of this significant difference was in the land and water costs which account for approximately 90 percent of total fixed costs. It was interesting to note the high correlation between the cost of water and the land value in the areas that came under irrigation.

Variable cost analysis. Variable costs are those cash and non-cash expenditures which would not be incurred unless a crop of alfalfa seed is produced. The average total variable costs per acre for all areas was $24.87 or approximately 76 percent of the total cost of production. The range in variable costs was from $19.19 in Area 2 to about $27 in Area 3, a ratio of only 1.4 to 1. To facilitate analysis variable costs were grouped into four major divisions and two minor ones. Major divisions were: material and miscellaneous service charges, contract services, labor costs, power costs, and the two minor ones were:

interest on cash outlay, and government seed handling and storage charges.

Material and miscellaneous service charges included manure, commercial fertilizer, insecticides applied, bags, fees, and other incidental charges. The average total material costs for all areas were $4.62 or only about 18 percent of the total variable costs. Insecticides represented the most important material cost.

Contract services were all services which were performed for the operator on a contract basis (per pound or per acre). They include seed cleaning, applying insecticides, harvesting operations, contract hauling to market, and other minor items. Contract services averaged $4.69 per acre or about 19 percent of the total variable costs. Seed cleaning represented about 70 percent of contract services.

The average total labor cost for the three areas, including both operator and hired, was $6.37 per acre or $3.20 per hundredweight. Labor cost among areas ranged from about $3 per acre in Area 2 through $6.19 per acre in Area 3 to $7.35 per acre in Area 1. Most of the high cost of labor in Area 1 was due to the harvesting method which required large amounts of hired labor. Almost 50 percent of the labor cost in that area was expended for hired labor.

Power costs were the largest variable cost at $8.93 per acre and ranged from $7.60 per acre in Area 2 to $9.49 in Area 3. Tractor power was the largest single power cost.

Interest on cash outlay and government handling and storage costs accounted for 19 and 7 cents per acre respectively.

Harvesting costs. Harvesting costs in table 13, p. 35, include expenditures for contract harvesting operations plus labor and power costs incurred in the various harvesting operations depending upon the

Table 13. Cost of harvesting alfalfa seed per acre by area and by harvesting method, Utah, 1952

Harvesting costs	Hauling to thresher	Hauling stacking threshing	Combining
		dollars	
(1)	(2)	(3)	(4)
Area 1			
Contract operations	- *	-	4.16
Labor costs	5.73	8.74	1.58
Horse power	.51	1.08	-
Tractor power	6.04	6.30	5.17
Truck power	.46	-	-
Total harvesting costs	12.74	16.12	10.91
Area 2			
Contract operations	- *	-	.60
Labor costs	6.00	-	1.31
Horse power	-	-	-
Tractor power	4.54	-	4.26
Truck power	2.05	-	.27
Total harvesting costs	12.59	-	6.44
Area 3			
Contract operations	- *	-	.21
Labor costs	5.88	5.82	2.29
Horse power	-	.29	-
Tractor power	7.67	6.09	8.17
Truck power	-	-	-
Total harvesting costs	12.55	12.20	10.67
All areas			
Contract operations	.03	-	1.41
Labor costs	5.89	6.90	1.70
Horse power	.48	.58	-
Tractor power	6.07	6.17	5.76
Truck power	.47	-	.11
Total harvesting costs	12.94	13.65	8.98

* Less than 1 cent per acre

harvesting method. As before stated, harvesting operations were classified in three general harvesting methods. The variation in hauling to the thresher costs ranged from $12.55 per acre in Area 3 to $12.74 in Area 1. The practice of stacking seed before threshing was not as popular as it has been in the past. Although variations in this method in Area 3 reduced the average cost, it remained the most costly of the

three methods.

The most economical method of harvest was combining. With this method costs ranged from $6.44 per acre in Area 2 to $10.91 in Area 1. The chief source of economy was in the labor. Where the combine was used, labor costs were only $1.70 per acre compared to $5.89 and $6.90 per acre in the other harvesting methods. Smaller combines were usually one-man operations requiring only the farm operator. Larger combines of the self-propelled type usually required two men.

The average cost of combining in Area 1 was made to appear high through the cost of defoliation which was included as a contract operation on certain fields even though it materially facilitated the combining. Labor and power costs seemed primarily to be influenced by the kind and the amount available at the time of harvest and the amount of vegetable matter to be processed. Attention is drawn to the wide differences for labor and tractor power for combining in Area 2 and Area 3. Since Area 3 was chiefly an irrigated area and no defoliation was attempted, growth of alfalfa seemed generally to be heavy and rank. Thus, a greater average expenditure of labor and power was necessary.

Most of the certified seed in Area 1 included in this study was defoliated which accounts for higher cost of production.

Production costs by type of farming. When the areas were compared with each other and the types of farming within each area compared as to costs, some significant differences were observed. In table 14, p. 37, it will be noted that in Area 1 the most economical production was achieved on quasi-dry land. The per hundredweight cost of producing seed under these conditions averaged $12.82 as compared with $14.10 on non-irrigated land and $18.83 on irrigated land. Thus, costs on

Table 14. Cost of producing alfalfa seed by type of farming, Millard and contiguous counties, per acre and per hundredweight, Utah, 1952

Item	Irrigated		Dry land		Quasi-dry land	
	Per acre	Per cwt.	Per acre	Per cwt.	Per acre	Per cwt.
	dollars					
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fixed costs:						
Land costs	6.22	3.14	3.49	2.35	6.31	2.62
Taxes	.49	.25	.26	.17	.54	.23
Water assessment	1.88	.95	-	-	-	-
Drainage assessment	.40	.20	-	-	.01	-
Depr. & int. on bldgs.	.13	.07	.08	.05	.20	.08
Total fixed costs	9.12	4.61	3.83	2.57	7.06	2.93
Variable costs:						
Material & misc. service						
Manure	.44	.22	-	-	-	-
Com. fertilizer	1.22	.62	.05	.03	.06	.03
Insecticides	2.95	1.49	2.08	1.40	2.67	1.11
Bags	.46	.23	.52	.35	.70	.29
Fees	.12	.06	.09	.06	.02	.01
Sub total	5.19	2.62	2.74	1.84	3.45	1.44
Contract services						
Seed cleaning	3.02	1.52	2.35	1.58	2.92	1.21
Apply insecticides	.91	.46	-	-	.79	.33
Harvesting	.95	.48	.32	.22	-	-
Hauling	.07	.04	.32	.22	.14	.06
Sub total	4.95	2.50	2.99	2.02	3.85	1.60
Int. on cash outlay	.24	.12	.09	.06	.15	.06
Govt. handling and storage	.04	.02	.01	.01	.20	.08
Labor costs						
Operator	4.08	2.05	2.33	1.57	3.23	1.35
Hired	2.48	1.93	2.49	1.68	3.98	1.66
Sub total	6.56	3.98	4.82	3.25	7.21	3.01
Power costs						
Horse	.63	.25	.30	.27	.31	.12
Tractor	8.31	4.45	5.66	3.81	7.25	3.01
Truck	.57	.28	.37	.27	1.35	.57
Sub total	9.51	4.98	6.33	4.35	8.91	3.70
Total variable costs	26.49	14.22	16.98	11.53	23.77	9.89
Grand total	35.61	18.83	20.81	14.10	30.83	12.82

irrigated land exceeded quasi-dry land costs by 47 percent. Much of these differences can be explained by referring to table 6, p. 23. It will be observed that yields of quasi-dry land seed exceed dry land seed yields by 92 pounds per acre and irrigated seed yields by 43 pounds per acre.

As the data in table 15, p. 39, indicate, Area 2 is entirely a dry land area. On a hundredweight basis the cost of producing dry land seed in Area 2 exceeded the dry land seed in Area 1 because, as the data in table 6 indicates, the average yield per acre was extremely low in 1952.

The data in table 16, p. 40, show a comparison of types of farming in Area 3, which is somewhat comparable to Area 1 in that it is predominantly an irrigated section. The average cost of producing irrigated seed in Area 3 was $12.83 per hundredweight as compared to $7.60 per hundredweight on quasi-dry land. This is a differential of 68 percent and can be largely explained by the data in table 6, which shows the average yield of seed on quasi-dry land to exceed the average irrigated seed yields by 58 pounds per acre.

Additional advantages for the quasi-dry land seed in both Areas 1 and 2 are in the absence of water assessments and consequently no labor costs for irrigation or for operations in preparing the land for irrigation.

Gross receipts and net returns

Gross receipts. Since compensation has been made for the value of chaff and screenings, gross receipts in this study represent the cash income derived from the sale of seed plus the value of seed which was kept on the farm. In the event a commodity loan was taken, the seed

Table 15. Cost of producing alfalfa seed by type of farming, Box Elder-Cache Area, per acre and per hundredweight, Utah, 1952

Item	Irrigated		Dry land		Quasi-dry land	
	Per acre	Per cwt.	Per acre	Per cwt.	Per acre	Per cwt.
	dollars					
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fixed costs:						
Land costs	-	-	3.13	3.27	-	-
Taxes	-	-	.41	.43	-	-
Water assessment	-	-	-	-	-	-
Drainage assessment	-	-	-	-	-	-
Depr. & int. on bldgs.	-	-	.28	.29	-	-
Total fixed costs	-	-	3.82	3.99	-	-
Variable costs:						
Material & misc. services						
Manure	-	-	-	-	-	-
Com. fertilizers	-	-	-	-	-	-
Insecticides	-	-	3.58	3.74	-	-
Bags	-	-	.44	.45	-	-
Fees	-	-	.36	.38	-	-
Other	-	-	.44	.46	-	-
Sub total	-	-	4.82	5.03	-	-
Contract services						
Seed cleaning	-	-	2.37	2.47	-	-
Apply insecticides	-	-	.67	.70	-	-
Harvesting	-	-	.58	.60	-	-
Hauling	-	-	.01	.01	-	-
Other	-	-	.20	.21	-	-
Sub total	-	-	3.83	3.99	-	-
Int. on cash outlay	-	-	.17	.18	-	-
Govt. handling and storage	-	-	.09	.09	-	-
Labor costs						
Operator	-	-	2.23	2.32	-	-
Hired	-	-	.78	.82	-	-
Sub total	-	-	3.01	3.14	-	-
Power costs						
Horse	-	-	-	-	-	-
Tractor	-	-	6.62	6.92	-	-
Truck	-	-	.65	.68	-	-
Sub total	-	-	7.27	7.60	-	-
Total variable costs	-	-	19.19	20.03	-	-
Grand total	-	-	23.01	24.02	-	-

Table 16. Cost of producing alfalfa seed by type of farming, Uintah Basin Area, per acre and per hundredweight, Utah, 1952

Item	Irrigated		Dry land		Quasi-dry land	
	Per acre	Per cwt.	Per acre	Per cwt.	Per acre	Per cwt.
	dollars					
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fixed costs:						
Land costs	8.48	2.81	-	-	3.50	.98
Taxes	.46	.15	-	-	.06	.02
Water assessment	2.43	.81	-	-	-	-
Drainage assessment	-	-	-	-	-	-
Depr. & int. on bldgs.	-	-	-	-	-	-
Total fixed costs	11.37	3.77	-	-	3.56	1.00
Variable costs:						
Material & misc. services						
Manure	-	-	-	-	-	-
Com. fertilizer	.25	.08	-	-	-	-
Insecticides	3.43	1.15	-	-	5.06	1.42
Bags	.70	.23	-	-	.34	.09
Fees	.36	.12	-	-	-	-
Sub total	4.74	1.58	-	-	5.40	1.51
Contract services						
Seed cleaning	5.63	1.88	-	-	2.91	.82
Apply insecticides	.42	.14	-	-	.88	.25
Harvesting	.09	.03	-	-	4.65	1.30
Hauling	.11	.04	-	-	-	-
Sub total	6.25	2.09	-	-	8.44	2.37
Int. on cash outlay	.16	.05	-	-	.28	.08
Govt. handling and storage	.11	.04	-	-	-	-
Labor costs						
Operator	4.04	1.35	-	-	1.76	.49
Hired	2.17	.72	-	-	3.00	.85
Sub total	6.21	2.07	-	-	4.76	1.34
Power costs						
Horse	.06	.02	-	-	-	-
Tractor	9.27	3.10	-	-	1.50	1.12
Truck	.32	.11	-	-	.64	.18
Sub total	9.65	3.23	-	-	2.14	1.30
Total variable costs	27.12	9.06	-	-	21.02	6.60
Grand total	38.49	12.83	-	-	24.58	7.60

was valued at the support price.

Gross receipts in the study ranged from $6.43 per acre to $238 per acre. A distribution of gross receipts is shown in table 17.

Table 17. Gross receipts per acre from 110 fields of alfalfa seed by area, with cumulative percentages for each area, Utah, 1952

Range in receipts dollars per acre	All areas	Area 1	Area 2	Area 3
(1)	(2)	(3)	(4)	(5)
00 - 35.99	30	19	9	2
36.00 - 70.99	42	25	9	8
71.00 - 105.99	18	8	4	6
106.00 - 140.99	7	5	-	2
141.00 - 175.99	9	4	-	5
176.00 - 210.00	3	2	-	1
211.00 - 245.99	1	-	-	1
Total	110	63	22	25
Median	$56.83	$53.50	$43.77	$65.58

The average of gross receipts for all areas was about $59 per acre or $29.73 per hundredweight. The median or positional average was slightly less than the arithmetic average. Per acre receipts were highest in the Uintah Basin with an average of about $88 per acre. Comparable receipts in the Millard County Area averaged $57.49 per acre and the Cache-Box Elder Area averaged about $35 per acre. On the per hundredweight basis, areas where certified seed was predominant received higher average gross returns than the other areas. This was because of the price differential between certified and non-certified seed which was fixed by the price supports in 1952. Gross receipts and net returns for each of the producing areas are indicated in table 18, p. 42.

Table 18. Gross receipts and net returns from alfalfa seed production per acre and per hundredweight, Utah, 1952

Item	All areas		Area 1		Area 2		Area 3	
	Per acre	Per cwt.	Per acre	Per cwt.	Per acre	Per cwt.	Per acre	Per cwt.
	dollars							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Gross receipts	59.08	29.73	57.49	28.95	35.37	36.94	88.09	29.31
Total costs	32.71	15.13	33.87	17.07	23.01	24.02	38.03	12.66
Net returns	26.37	14.60	23.62	11.88	12.36	12.92	50.06	16.65

Net returns. The average net returns were calculated by subtracting total costs from total gross receipts and dividing by the total acres or total hundredweight of seed. Total costs include all charges that can be allocated against the alfalfa seed enterprise, including a wage for operator and family labor. The average net return for all areas was $26.37 per acre or $14.60 per hundredweight. Net returns for each individual producer ranged from a minus $9.51 per acre to $197.06 per acre. This latter figure was obtained on a Duchesne County field. A distribution of individual net returns appears in table 19, p. 43.

The data in each area were grouped according to net returns and the records were cumulated from lowest to highest income. This cumulative frequency forms the basis for the graphic comparison of net returns in each area in figure 5, p. 44. It will be noted that net returns in Area 3 are higher throughout than in either of the other areas. Eight percent of the area had a negative net return compared to 15.9 percent in Area 1 and 27.3 percent in Area 2. It will also be noted that approximately 70 percent of Areas 1 and 2 had net returns of $30 or less while nearly 70 percent of the growers in Area 3 had net returns of $90 or less per acre.

Table 19. Net returns per acre on 110 fields of alfalfa seed by area, with cumulative percentages for each area, Utah, 1952

Range in Net returns dollars	All areas No.	Area 1 No.	Area 1 cumulative percent	Area 2 No.	Area 2 cumulative percent	Area 3 No.	Area 3 cumulative percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
-10.00 - 9.99	39	24	38.1	10	45.5	5	20.0
10.00 - 29.99	31	21	71.4	5	68.2	5	40.0
30.00 - 49.99	13	6	81.0	5	90.9	2	48.0
50.00 - 69.99	7	1	82.5	2	100.0	4	64.0
70.00 - 89.99	6	5	90.5	-	-	1	68.0
90.00 - 109.99	5	2	93.7	-	-	3	80.0
110.00 - 129.99	4	2	96.8	-	-	2	88.0
130.00 - 149.99	3	1	98.4	-	-	2	96.0
150.00 - 169.99	1	1	100.0	-	-	0	96.0
170.00 - over	1	-	-	-	-	1	100.0
Total	110	63		22		25	
Median	$20.32	$15.15		$15.45		$50.48	

The difference in net returns between Area 1 and Area 3 is due primarily to the higher yields and the greater percentage of certified seed grown in Area 3 in 1952. It will be remembered from table 4 that the greatest variation in yields existed in Area 1. In this area the actual range in yield per acre was 37 to 649 pounds though nearly 70 percent of the fields had yields below 260 pounds per acre, whereas only 48 percent of the growers interviewed in the Uintah Basin had yields of less than 260 pounds per acre.

One very important reason for the large number of growers with low yields in the Millard County Area is noxious weed seed dockage. Although data on seed clean away were not taken, growers in that area thought it

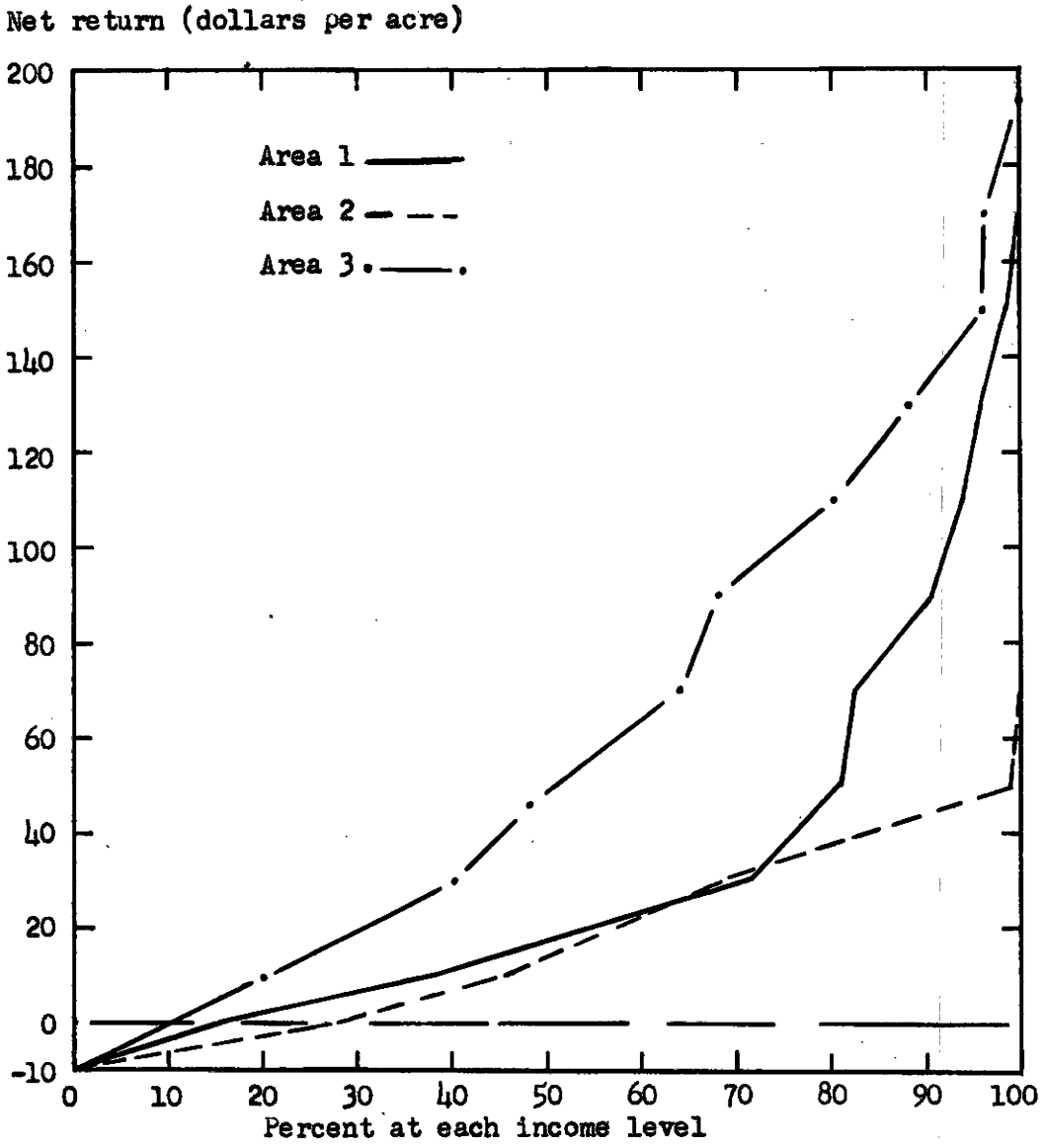


Figure 5. Net returns per acre of 110 fields of alfalfa seed ranked according to area and cumulative percentage, Utah, 1952

not uncommon for their seed to clean away 50 percent due to dodder seed. Farmers in the Millard Area expressed grave concern over the problem of dodder control. It is certain that a solution to the problem will not only be a boon to alfalfa seed producers, but also will do much to increase cash farm income throughout that area. This problem is in need of intensive study.

Marketing outlets

Information on the grower disposition of the seed included in this study by month and purchasing agency is indicated in table 20, p. 46. Marketing agencies were divided into four categories: (1) local dealers, (2) farmers' cooperatives, (3) outside dealers, and (4) other. Local dealers, as the term is used here, can be defined as buyers who buy, clean, and resell seed on their own account or who represent or buy seed for firms locally owned within the state of Utah. The seed which these dealers purchase may be either resold within or outside the state. Farmers' cooperatives are designated as farmer owned groups, either specialized or departments or larger cooperatives that purchased and processed seed for resale. Outside dealers include all agents or others who bought seed for processing and resale for companies located outside the state of Utah. This processing may or may not have been done within the state. The determining point is that the seed was owned by a foreign corporation or firm. "Other" includes all seed taken over by the Commodity Credit Corporation under non-recourse loans and the seed which was kept for planting or sold direct to other farmers.

Outside dealers purchased nearly 50 percent of the seed included in this study; 24 percent was turned over to the Commodity Credit Corporation; 18.1 percent was purchased by local dealers; and 8.3

Table 20. Thousands of pounds of alfalfa seed sold and percent of total sold each month by type of purchasing agency, Utah, 1952

Item	Total	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
					thousand pounds					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Grand total	1,710.1	2.3	*	184.8	571.9	454.1	154.5	98.3	36.6	207.7
Certified	339.9	2.3		2.5	67.8	107.7	62.6	8.2	8.0	80.9
Non-certified	1,370.2			182.3	504.1	346.4	91.9	90.1	28.6	126.8
Percent each mo.	100.0	.1		10.8	33.4	26.6	9.1	5.8	2.1	12.1
Local dealers										
Certified	22.3	2.3				12.0			8.0	
Non-certified	286.8			43.6	48.2	81.4	38.1	21.6	7.1	46.8
Percent each mo.	18.1	.1		2.5	2.8	5.5	2.2	1.3	.8	2.7
Farmers' cooperatives										
Certified	10.1						10.1			
Non-certified	132.1			1.3	68.7	46.9	15.1			
Percent each mo.	8.3			.1	4.0	2.7	1.5			
Outside seed dealer										
Certified	153.4			2.5	67.8	83.1				
Non-certified	695.0			137.4	302.3	174.5	31.8	27.0		22.0
Percent each mo.	49.6			8.2	21.6	15.1	1.9	1.6		1.3
Other										
Certified	154.2					12.6	52.5	8.2		80.9
Non-certified	256.3				84.9	43.6	6.9	41.5	21.5	58.0
Percent each mo.	24.0				5.0	3.3	3.5	2.9	1.3	8.1

* No sales were made by growers in September.

percent was sold through cooperatives. Current work is being done by the Utah Experiment Station which will be more accurate in ascertaining the relative importance of seed dealers.

Services rendered growers by the purchasing agencies were generally of the same type. They made available insecticides and supplies plus seed storage if the grower desired. Producers purchased the sacks but were allowed a certain percent of the cost of each sack on sale of the seed. The grower sold his seed either cleaned or in the dirt on the basis of the percent clean away of a sample taken by the dealer. Only 11 percent of the growers sold their seed in the dirt. These were usually located at considerable distances from the cleaning plants. Usually the dealer purchased this seed at the farm and assumed all shipping and handling charges.

Most of the seed was sold in the months immediately following the harvest season. Sale was usually made as soon as the owner was informed that his seed had been cleaned. Growers in this study had disposed of more than 70 percent of their seed by the end of December and more than one-third of the seed was sold in the month of November alone. Although reasons for early sale were not tabulated, discussion indicated that lack of faith in future seed prices and the need for cash were the two most important ones.

Seasonal price. Due to government price supports which were placed on alfalfa seed in 1952, the price was strikingly similar among purchasing agencies and throughout most of the crop year beginning in September. This data is substantiated in table 21, p. 48. Price supports tended to reduce the competitive nature of the seed market. In years prior to 1952 there was considerable competition among seed

Table 21. Average price per pound received by growers by month of sale and purchasing agency, Utah, 1952

Month	Local dealers	Farmers' co-op.	Outside dealers	Others
	cents per pound			
(1)	(2)	(3)	(4)	(5)
Seasonal avg. price				
Certified	.38	-	.40	.41
Non-certified	.26	.27	.27	.28
August				
Certified	.45	-	-	-
Non-certified	-	-	-	-
September				
Certified	-*	-	-	-
Non-certified	-	-	-	-
October				
Certified	-	-	.40	-
Non-certified	.28	.25	.29	-
November				
Certified	-	-	.40	-
Non-certified	-	.26	.26	.28
December				
Certified	.35	-	.41	.40
Non-certified	.27	.28	.27	.28
January				
Certified	-	.26**	-	.41
Non-certified	.26	.27	.26	.28
February				
Certified	-	-	-	.45
Non-certified	.28	-	.27	.28
March				
Certified	.40	-	-	-
Non-certified	.28	-	-	.31
April				
Certified	-	-	-	.40
Non-certified	.23	-	.28	.29

* No September sales were reported.

** Only one grower who did not receive the price differential given for his certified seed.

dealers at harvest time. The most popular method of sale among the growers and by far the most exciting was by sealed bids. Each competing buyer took a sample of the grower's seed, analyzed it, and placed his bid. On the appointed day when the bids were opened the highest one took the seed.

The all-season average price received by farmers included in this study for non-certified seed was 26 to 28 cents per pound and for certified seed was 38 to 40 cents per pound or approximately the support level for each type of seed.

Normally there is considerable fluctuation in alfalfa seed prices from month to month. According to U. S. Dept. of Agr. Crop Reporting Service figures for the years 1939 through 1952, the highest prices per hundredweight received by farmers each year occurred in March, April, May or June and the lowest prices were received during September, October, and November. In figure 6, p. 50, it is indicated that the highest average monthly price per hundredweight for those years occurred in May and the lowest average monthly price per hundredweight came in October.

The index in table 22, p. 51, based on November, the month in which most of the seed in this study was sold, indicates that the average price since 1939 increased 17.3 percent in the 6 months from November to May. The inference is that growers generally sell their seed too soon and that more income could be realized from the sale of seed if it were held until spring. Of course, the above price relationship may not exist in any one year depending upon the total supply of seed. Based on the average seasonal price fluctuation, however, the grower who has storage facilities is in a very favorable

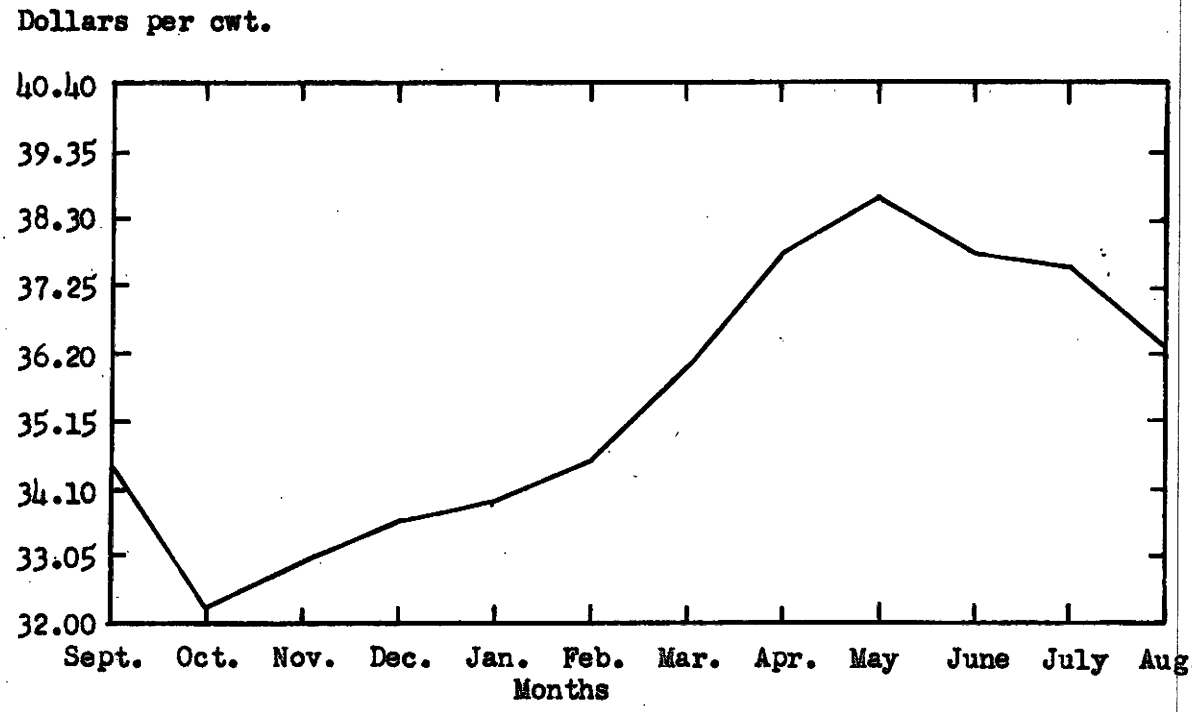


Figure 6. Average price received by Utah farmers for alfalfa seed during each month of the year, 1939 through 1953

Table 22. Average and index of prices received by farmers for alfalfa seed each month of the year, 1939 through 1953

Month	Average monthly price	Index
	dollars per cwt.	
(1)	(2)	(3)
Sept.	34.52	104.9
Oct.	32.22	97.9
Nov.	32.91	100.0
Dec.	33.53	101.9
Jan.	33.87	102.9
Feb.	34.55	105.0
Mar.	35.93	109.2
Apr.	37.70	114.5
May	38.61	117.3
June	37.77	114.8
July	37.58	114.2
Aug.	36.22	110.1

Source: U. S. Dept. of Agr. Crop Reporting Service

position since alfalfa seed adapts itself easily to storage. In 1952 storage costs were 5 cents per hundredweight per month with the seed cleaning companies. Certain dealers made no charge for storage if the seed was sold to them.

Defoliating alfalfa seed

Defoliation of alfalfa seed is a comparatively new method of field curing just prior to harvesting. It has been employed extensively in California and in some of the Plains States, particularly Kansas. It has been used in Millard County only a few years. Application is usually accomplished by spraying from an air plane, although ground spray units are now being used to some extent. The defoliating agent consists of a mixture of dinitro compound or some other contact spray mixed with fuel oil. This is applied when the crop is at the proper stage of maturity which is only a few days before harvesting is contemplated. The effect of defoliation causes the leaves to dry up and fall off, leaving only the stalks and the seed. A combine can then

move into the field and harvest the seed without the hampering weight of the green foliage.

Advantages. Defoliation appears to have distinct possibilities in alfalfa seed harvesting. It contributes toward the uniform dehydration of plant and seed over the field. Speeding this process through abruptly stopping plant growth is especially advantageous in the mountain area since it may preclude frost damage. If the seed is matured and dry enough early frosts will do little if any damage. Defoliation avoids the necessity of drying the seed after harvesting as is quite common when the product is combined from the stump in the usual manner. Wind and storm damages are constant threats at harvest time when seed is harvested by the conventional method. High autumn winds scatter and sweep away windrowed seed from many acres of curing alfalfa seed every year. Some farmers reported almost total crop loss as a result of heavy winds. Alternate wetting and drying also causes seed pods to open and shatter, losing much seed. In addition to losing seed, discoloration is likely to occur.

There is greater recovery of seed through seed defoliation because of much less vegetable matter to go through the machine. It also avoids seed loss from handling and mauling that is almost certain in the conventional methods. The considerable savings in man power that result by combining are also worthy of note.

Disadvantages. Defoliation of alfalfa seed, on the other hand, must be done at the right time. If it is done too early, seed yields may be curtailed. Also, harvesting must be done within a few days after spraying is done or much shattering will occur. Defoliating must be done under rather exacting weather conditions. There should be no wind and

the temperature should be no less than 60 degrees F. An extremely heavy growth of alfalfa will not allow sufficient penetration of defoliating compounds. However, a successful solution of this problem has been accomplished by spraying with half of the recommended application and then spraying again a few days later with the other half of the solution. For growers who feed the chaff or residue from seed harvest, defoliation is not popular since the condition of the chaff is very poor.

If defoliation gains universal acceptance, alfalfa seed production is likely to become more and more a specialized crop, losing its supplementary feature to many farmers.

Yields on defoliated as compared with non-defoliated fields. Since there were five defoliated fields reported in Area 1, a comparison has been made between these five fields and other irrigated fields in the same area where harvesting was done without the benefit of defoliation. Harvesting on all defoliated fields was by combining, though various other methods were employed in other fields in addition to combining. Other than harvesting methods, the general conditions prevailing can be regarded as similar.

Results of the comparison are given in table 23, p. 54. It will be noted that the average yield of seed for all irrigated fields in the area was 198 pounds per acre including those who defoliated. This latter group had an average yield of 424 pounds of seed per acre. Non-combined certified seed fields had an average yield of 133 pounds per acre and all other non-combined fields yielded 187 pounds per acre.

Harvesting costs for those who defoliated were somewhat higher than the average. Fourteen dollars and sixty-two cents per acre includes a charge of $6.50 per acre for defoliation and about $8 per acre

Table 23. Yield and selected factors in defoliated, certified, and non-certified irrigated seed production in Millard and contiguous counties in Utah, 1952
(Data figured on a per acre basis)

Defoliating and harvesting method	No. fields	Avg. acres	Harvest costs	Yield per acre	Receipts per acre	Costs per acre	Net returns
			dollars	lbs.	dollars		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Avg. all irrigated fields	41	92	12.80	198	58.54	37.32	21.22
Defoliated and combined fields	5*	73	14.62	424	162.51	51.17	111.34
Non-defoliated and combined fields	3	168	8.34	106	28.65	29.18	-.53**
Non-combined certified fields	2	48	9.90	133	38.18	36.38	1.80
All other fields	31	91	14.05	187	51.05	37.00	14.05

* Three growers produced certified seed; two produced common.
** Due to frost damage and resulting crop failure rather than method.

for combining. Partly as a result of the higher harvesting costs, the total cost of production is one and one-third times as high as the area average. Another reason for the high total cost of production is due to the apportionment factor. Since chaff was a minor factor and it was lost as a result of defoliation, the alfalfa seed had to stand a greater portion of prorated costs.

The net returns to growers who defoliated and combined were nearly five times the average for all growers. Since a system of weighted averages was used, the dominance of certified seed in proportion to the non-certified seed was much greater for those who defoliated than it was for all growers. Therefore, some of this high return must be attributed to certification which in turn is intensified by the high yield of the defoliated seed fields.

The data gathered were not sufficient to conclude that the difference between the average for all growers and those who defoliated

and combined is entirely due to defoliation. There are many factors which have a pronounced influence on seed yield. For example, non-defoliated and combined seed fields show an average yield of 106 pounds per acre. However, it is known that frost damage was a major factor in holding this particular average at a low level. Failure to defoliate may have actually invited the frost damage. Therefore, it appears reasonable to conclude that an important part of the increased yield is undoubtedly due to defoliation. This method of field treatment shows great promise. Further economic research should be conducted in this phase of alfalfa seed production in Utah.

Certified vs. non-certified seed

The seed certification program is carried on for the purpose of making available to the public high quality seed that has been grown and distributed under such conditions as to insure its genetic identity and purity. Varieties eligible for certification may have been in use many years or they may be recent varieties developed through plant breeding. In either case, certification helps to protect against the loss of such varieties by developing a planned method of production consistently carried forward.

Although varietal purity is the primary consideration in seed certification, other factors such as high viability, weed and disease control, cleaning, and grading also are important. One very effective means of preventing wider weed dispersion is by planting crop seed which is free of weed seed.

The International Crop Improvement Association, an organization of certifying agencies in the United States and Canada, was organized in 1919. Its purpose is to establish minimum standards for crop varieties

and to help member organizations in promoting production and distribution of high quality seed of superior crop varieties (5).

The Utah Crop Improvement Association is the certifying agency in Utah and is a member of the International Crop Improvement Association. It was organized in 1937, although seed was certified in Utah before that time.

Certified seed in the U.S.A. Production of certified alfalfa seed has grown rapidly in recent years. With the development of improved varieties of alfalfa having considerable resistance to bacterial wilt and other diseases, the demand for certified seed for planting has become increasingly important. Production of certified seed in 1952 was estimated at 42,466,000 pounds of clean seed. This is more than two and one-fifth times the 19,233,000 pound crop in 1951 and three and three-fifths times the 1,706,000 pound crop in 1950. Certified seed accounted for 24.6 percent of the total seed produced in 1952, 18.4 percent in 1951, and 11.2 percent in 1950 (14).

California has been by far the largest producer of certified alfalfa seed in recent years. In 1950, 1951, and 1952 California produced 39, 63, and 71 percent of the total certified seed in the United States.

The data in table 24, p. 57, disclose some of the emphasis which has been placed upon certified seed by the new production areas in the West.

Certified seed in Utah. Production of certified seed in Utah has been gradually increasing since 1946. The internal structure of Utah's certified seed picture has also been changing.

Table 24. Certified alfalfa seed in the five leading seed-producing states, 1952

State	Total production	Certified production	Percent certified
	thousand pounds		
(1)	(2)	(3)	(4)
California	39,900	30,200	75.6
Kansas	27,500	600	2.2
Washington	18,810	3,217	17.1
Nebraska	15,800	415	2.9
South Dakota	12,960	300	2.3

Source: U. S. Dept. of Agr. Crop Reporting Board. Annual Summary as of December 1953

Table 25, p. 58, lists the total acreage of certified seed by variety since 1946. It will be noted that acreage in new, improved varieties such as Ranger and Buffalo have been increasing and the older varieties have been decreasing. Thus, acreage in certified seed has not only been increasing, but also older varieties of seed have been replaced to a large extent with new wilt-resistant strains.

The trend in pounds of certified seed produced in Utah since 1946 is indicated in table 26, p. 58. Production of certified seed increased from 302,110 pounds to 1,038,860 pounds in 1952, a ratio of almost three and one-half to one. Column 5 lists certified seed as a percent of the total state production. Certified seed was nearly 10 percent in 1952 and more than 13 percent in 1953. In 1952 Utah harvested only 2.4 percent of the total certified seed produced in the United States. Utah is making the transition from a long-standing practice of growing common seed to producing a certified quality seed. The leading states in this development are new in the business. It was not a question of giving up an old practice and adopting a new one. Rather, it was moving into a new field of production. It was entirely logical for them to turn to certified seed.

Table 25. Total acres of alfalfa seed for which application for certification was requested, by variety, Utah, 1946-1953 [1]

Variety	1946	1947	1948	1949	1950	1951	1952	1953
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grimm	2,065	1,657	1,468	1,192	959	980	536	450
Pioneer	489	434	370	319	268	194	70	25
Ladak	145	202	120	105	72	4	12	-
Oriestan	555	50	40	20	20	15	8	-
Atlantic	50	49	180	124	236	77	144	168
Ranger	179	475	1,121	1,783	2,371	3,708	4,617	5,530
Buffalo	-	-	57	414	1,058	1,541	1,407	1,419
Wisc. Syn. C.	-	-	-	-	5	5	-	-
Wisc. Syn. G.	-	-	-	-	-	6	86	-
Narraganset	-	-	-	-	-	-	-	8
Vernal	-	-	-	-	-	-	-	13
All varieties*	3,483	2,867	3,356	3,957	4,989	6,530	6,880	7,613

* Acreage totals do not necessarily equal acreage harvest as shown in table 26.

Source: Utah Crop Improvement Association. Annual Reports 1946-53.

Table 26. Acreage and production of certified alfalfa seed in Utah, 1946-1953

Year	Yield per acre lbs.	Acres	Production lbs.	Percent of state total seed
(1)	(2)	(3)	(4)	(5)
1946	101.3	2,982.7	302,110	5.5
1947	95.5	2,867.0	273,824	5.9
1948	116.3	3,352.5	389,949	6.0
1949	199.9	3,955.8	791,117	7.5
1950	143.1	4,988.4	714,005	9.3
1951	115.1	6,530.2	751,662	6.5
1952	152.7	6,800.7	1,038,860	9.8
1953	216.2	7,613.3	1,646,145	13.4

Source: Utah Crop Improvement Association. Annual Reports 1946-53.

The 110 fields included in this study produced 1,710,118 pounds of seed in 1952. This was about 16 percent of the seed produced in Utah in that crop year. About 20 percent, or 339,946 pounds of seed

1. Golden L. Stoker, Secretary-Treasurer, Crop Improvement Association, furnished the data for tables 25 and 26.

in the study, was certified. This represented about 33 percent of the total certified seed produced. The other 80 percent, or 1,370,172 pounds, was non-certified and was equal to 14.3 percent of the total state production of non-certified seed. Figures for the non-certified seed were obtained by subtracting the total certified seed from the Bur. of Agr. Econ. estimated total production for 1952 and dividing that figure into the total non-certified seed reported by the growers covered by the study. The following tabulation for the 110 fields indicates the amount of certified seed reported and its percentage of the total seed reported in each area.

Area	Non-certified pounds	Certified pounds	Percent certified
Area 1	940,119	157,439	14.3
Area 2	58,302	87,786	60.1
Area 3	371,751	94,721	20.3

It will be noted that the proportion of certified to non-certified seed included in the sample is greater than the proportion of the certified to non-certified seed for the state as a whole in 1952. This is due to the sampling technique. The greater part of the fields included in the survey in Area 2 were certified and were in greater proportion to common seed than was the case in the other two areas.

Certified seed compared to non-certified seed. In an effort to discover relative advantages or disadvantages of raising certified seed compared to non-certified seed, the data in each area were sorted according to certification. A weighted per acre yield was obtained for each category. The results are presented in table 27, p. 60. It was interesting to observe that certified fields averaged 5.6 to 13.5 acres smaller than non-certified fields in the various seed-growing areas.

Table 27. Yield and other selected factors comparing certified and non-certified alfalfa seed production by area, Utah, 1952

Item	No. fields	Avg. acres	Avg. yield	Receipts per acre	Cost per acre	Net returns
		acres	lbs.	dollars		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Area 1						
Certified	6	76.2	345	136.43	44.77	91.66
Non-certified	57	88.9	185	50.37	32.91	17.46
Area 2						
Certified	15	65.0	94	38.74	22.55	16.19
Non-certified	7	78.5	99	29.38	23.84	5.54
Area 3						
Certified	5	57.6	329	129.47	38.63	90.88
Non-certified	20	63.2	294	78.66	37.89	40.77

Yield of certified fields in each of the irrigated areas averaged higher than the non-certified fields. In Area 1, certified seed out-yielded non-certified seed by an average of 160 pounds per acre. Some of this was undoubtedly due to the influence of defoliation since 311 of the 457 certified acres in Area 1 were defoliated. It will be noted that the advantage of certified seed is only an average of 35 pounds per acre in Area 3. Yield of seed in Area 2, the dry land area, was extremely low. Non-certified fields in that area seemed to have the advantage of more plentiful water reserve since several certified fields included in the study appear to have suffered extreme drought almost to the point of crop failure in 1952.

Since the average price of 40 cents per pound for certified seed and 27 cents for non-certified was more or less uniform throughout the state due to price supports and yields of the certified seed were greater, it is clear that gross receipts per acre of certified seed would exceed non-certified gross receipts in 1952.

Sufficient data were not collected to adequately determine the cost of certified seed as compared to non-certified seed by the weighted method. The figures in column 6 of table 27 indicate the average certified seed costs exceed the non-certified seed costsin Areas 1 and 3, but the reverse is true in Area 2. A definitive and complete answer on costs would require more data than are now available. The costs of defoliation prior to harvesting seed in Area 1 are largely responsible for the higher over-all costs in that area and happened to fall on certified fields. Two fields in Area 2 which had excessive insecticide control costs were responsible for the high cost reflected for non-certified seed in that area. In Area 3 where factors were more normal in 1952, the difference in cost is less than $1 per acre. This difference is not statistically significant. Therefore, it could not be concluded from the data collected that any real difference exists in cost of production for certified compared to non-certified seed. This problem would appear to merit additional study as assumed differences in cost are frequently given as the reason for failure to shift from common to certified seed production.

It would normally be expected that certified seed fields would have a higher average cost of production per acre since more effort is necessary in keeping fields and harvesting machinery free of weed seeds and meeting other requirements for certification. Then too, there are certain fees that must be paid in order to certify the fields. An initial certification fee of $10 for the first 50 acres and 15 cents per acre for each acre above 50 was charged in 1952. In addition, sealing and tagging fees of 30 cents per hundredweight were charged. Germination and purity analysis tests are required. These fees,

however, were nominal and were repaid many times over in the price spread between the two products. With the price differential in 1952, for instance, the average grower would recover his entire outlay for special fees in connection with certification from the first two hundred pounds of seed marketed.

The advantages of certified seed production in net returns are indicated in column 7. It will be noted that depending upon yield, net returns per acre from the sale of certified seed varied from two to five times as much as non-certified seed.

Gross receipts, costs, and net returns per acre for each certified and non-certified field included in the study were plotted on scatter charts according to yield of seed per acre.

Relationship of gross receipts per acre to yield of seed is indicated in figure 7, p. 63. The reader will quickly be able to visualize the price differential between certified and non-certified seed. The regression or trend lines drawn through the data indicate the average price per pound of seed. That is, as the yield of certified seed increased 100 pounds, gross receipts increased $39.69. For each 100 pounds increase in non-certified yield, gross receipts increased $27.25. The price differential was established in connection with the support price fixed on alfalfa seed in 1952.

Relationship of total cost and yields per acre is shown in figure 8, p. 64. It is evident that there is no clearly defined difference in the cost of producing certified and non-certified seed for the individual farmers. Observations on certified fields tend to concentrate in the lower left hand corner of the chart. This is due primarily to the low-yielding dry land certified fields in Area 2.

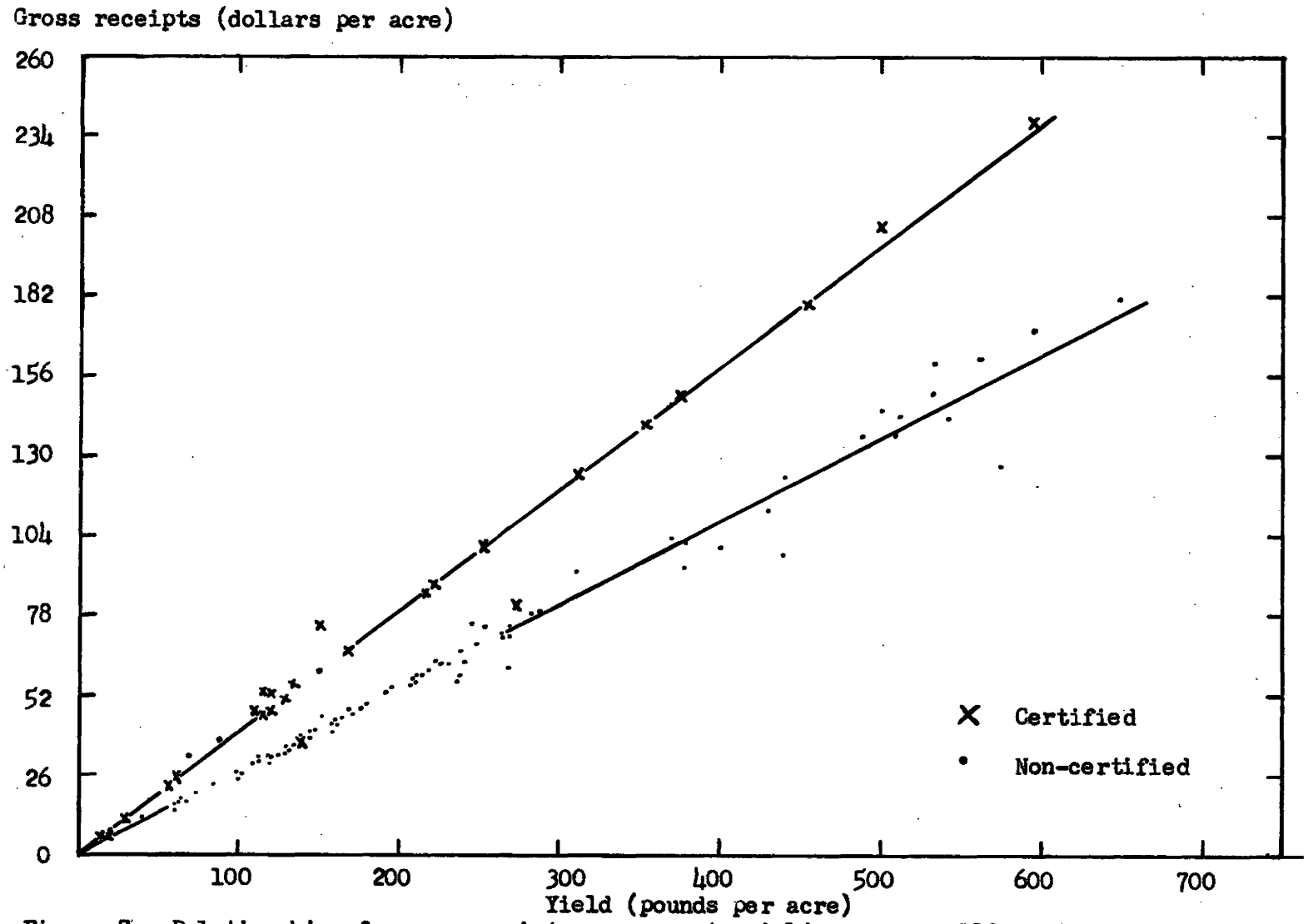


Figure 7. Relationship of gross receipts per acre to yield per acre, 110 producers of alfalfa seed, Utah, 1952

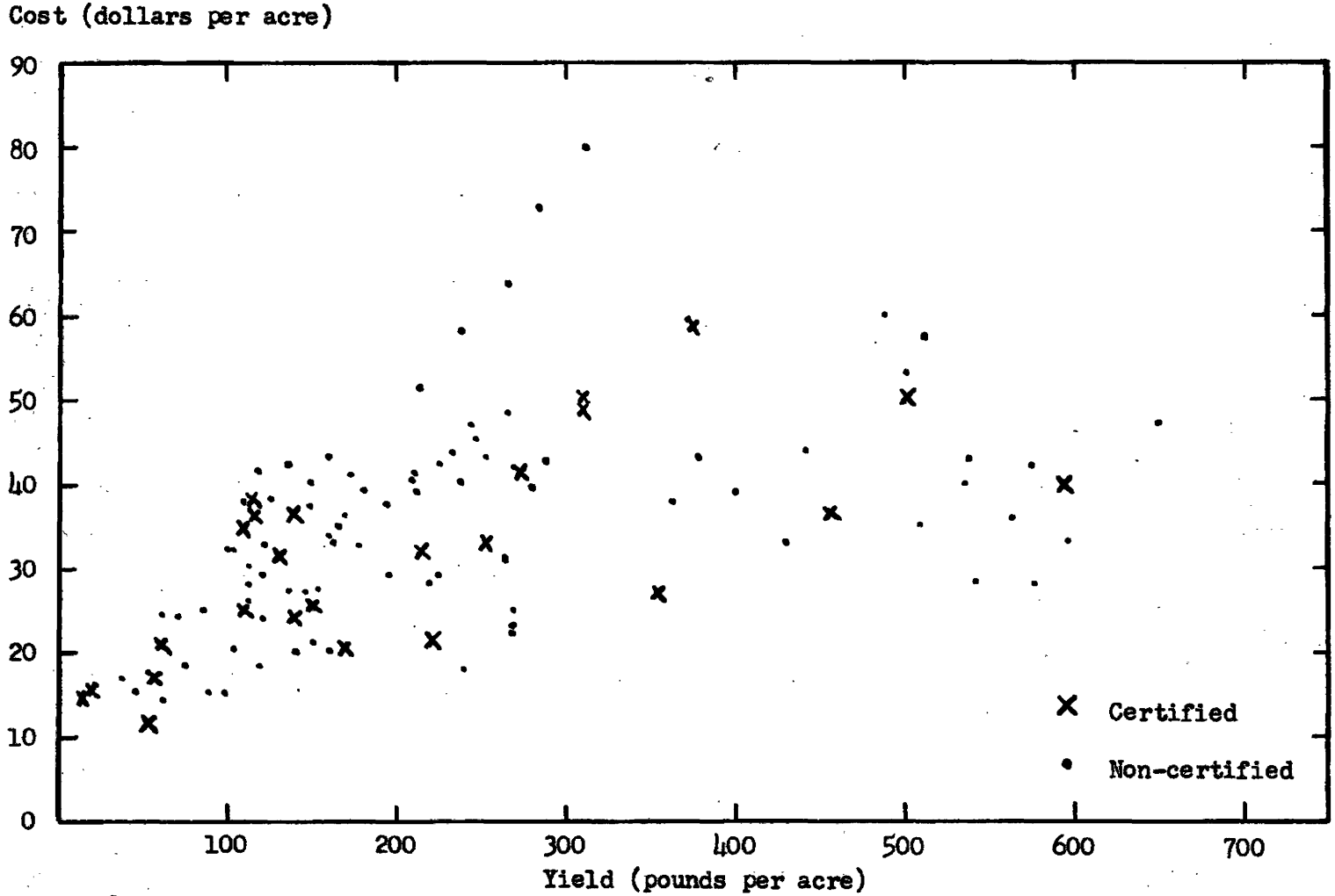


Figure 8. Relationship of cost per acre to yield per acre, 110 fields of alfalfa seed, Utah, 1952

The reader will observe that the concentration of data tends to rise on the chart as yield per acre increased up to 350 to 400 pounds per acre and then tended to level off. That is, the average cost of production per acre would be no greater at 600 pounds than at 400 pounds per acre.

Relationship of net returns to yield is shown in figure 9, p. 66. Here again there is a definite advantage to certified seed production. The regression lines indicate that for every increase of 100 pounds of certified seed, the average net return per acre increased $34.16, and for every 100 pounds per acre of non-certified seed, there was an increase of $23.40 in net income per acre.

The point where the regression lines intersect the zero axis indicates the break-even point or the point of zero profits. It will be remembered that net return is the return after all costs have been met, including a wage to the operator.

The break-even point for certified seed required an average yield of 59 pounds per acre while the break-even point for non-certified seed required an average of 110 pounds of seed per acre.

Factors affecting net returns in alfalfa seed production

There are many factors influencing net returns in alfalfa seed production. The data were analyzed to determine what factors determined success or failure. It was found that many factors could not be measured definitively from the data at hand. Discussions with experts in the field of alfalfa seed insecticides, for instance, indicate that many factors influence the effectiveness of insecticide application. Some of these factors are weather conditions at time of spraying, timeliness of spraying, use of the proper chemicals, etc. Proper procedures here are more important than the number of times insecticides

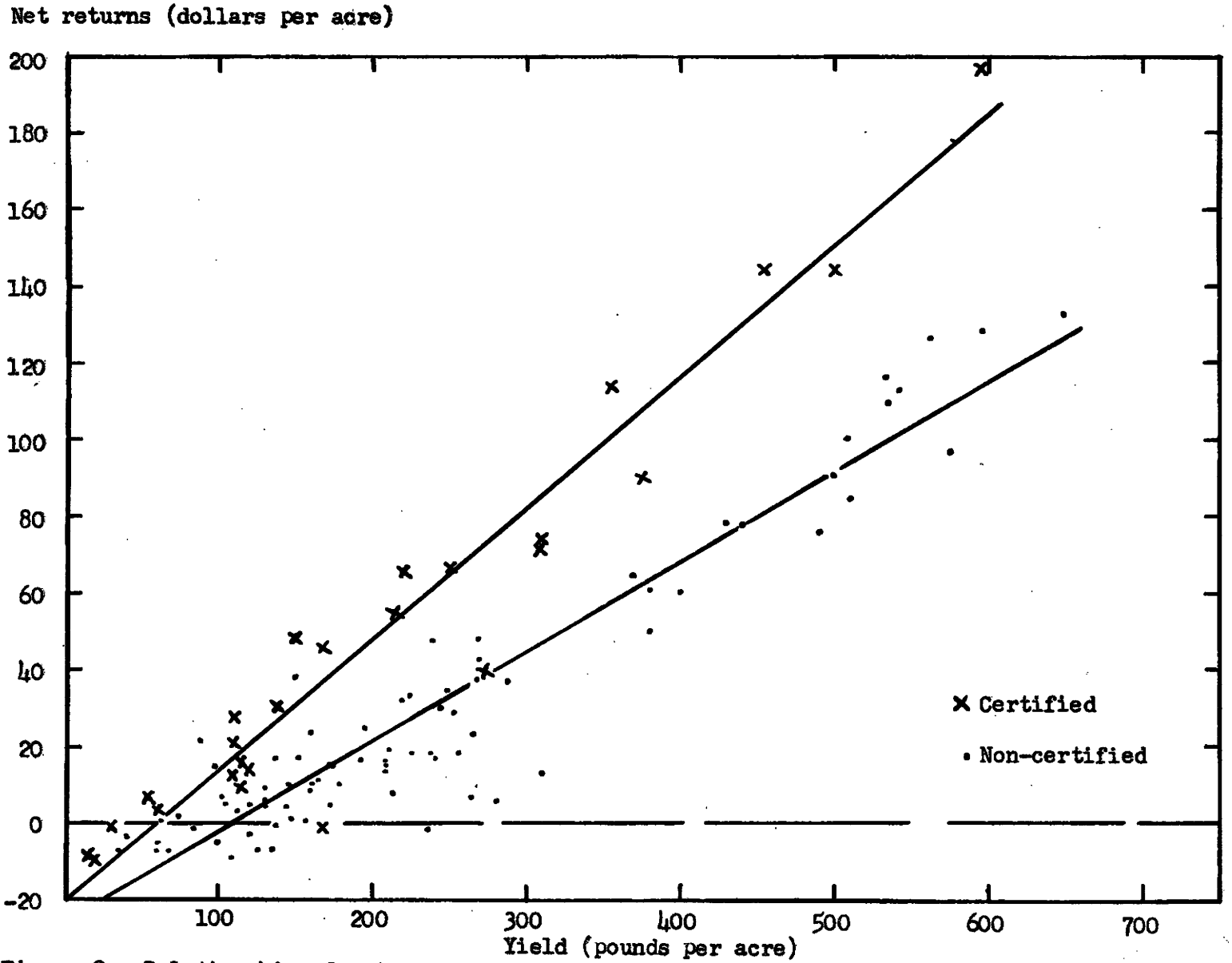


Figure 9. Relationship of net returns per acre to yield per acre, 110 fields of alfalfa seed, Utah, 1952

are applied. These will not be discussed further since they are fields of study in themselves and there is a considerable amount of literature available on the subject.

The effects of yield and cost upon net returns were readily obtained and analyzed. To help in presentation, the tabular method of analysis was used. The data were classified into quartile groups according to a given factor in an effort to hold the affect of that factor relatively constant. It was then possible to analyze the variations in other factors among the quartile groups. It is appropriate to observe that Area 1 is not strictly comparable since it is a compilation of both dry and irrigated fields. Simple averages were used rather than weighted averages which were employed in the fore part of the study because it was desired to show each farm on an individual basis rather than as an aggregate.

Yield. Yield of alfalfa seed is one of the most important factors affecting net returns, although yield is a variable factor in itself. When the data were grouped according to pounds of seed produced per acre in table 28, p. 68, it was possible to note the effect of yield on net returns and other factors in each area. As would be expected, there was a direct positive effect between yield and net returns in each area. In Area 1, as yield per acre increased from 91 pounds to 425 pounds, net returns increased from 88 cents per acre to $79.73. In Area 2, as yield increased from 31 pounds per acre to 194, net returns rose from a minus $3.62 per acre to $29.91 per acre. Area 3 increased in net returns from $4.89 to $128.23 per acre as yield increased from 152 to 564 pounds. It is worthy of note that the lower one-half of the growers in Areas 1 and 2 were barely breaking even whereas only the lower one-fourth were

Table 28. Relationship of yield to net returns and other selected factors in alfalfa seed production by area, Utah, 1952

Quartiles based on yield per acre	No. fields	Avg. acres	Avg. yield per acre	Cost per cwt.	Receipts per acre	Cost per acre	Net returns
pounds		acres	lbs.	dollars			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Area 1							
Q-1 37 - 120	16	113.5	91	26.98	25.43	24.55	.88
Q-2 121 - 193	16	102.8	154	21.71	42.36	33.44	8.92
Q-3 193 - 268	16	72.2	235	17.04	63.54	40.19	23.35
Q-4 269 - 649	15	60.7	425	12.08	131.05	51.32	79.73
Area 2							
Q-1 14 - 56	5	86.0	31	50.22	11.95	15.57	-3.62
Q-2 57 - 110	6	87.9	96	24.09	30.34	23.13	7.21
Q-3 111 - 150	6	58.5	127	24.31	55.74	30.87	25.17
Q-4 151 - 269	5	45.2	194	13.29	75.69	25.78	29.91
Area 3							
Q-1 122 - 208	7	72.6	152	23.65	40.84	35.95	4.89
Q-2 209 - 273	6	76.9	242	15.91	73.84	38.51	35.33
Q-3 274 - 454	6	58.5	402	10.87	125.37	43.71	81.66
Q-4 455 - 595	6	38.5	562	6.40	164.82	35.99	128.83

in that position in Area 3. Also, if it should be assumed that $25 is an acceptable return, it would require a yield of 125 pounds of seed per acre in Area 2 and a yield of about 175 pounds per acre in Area 3 and more than 200 pounds per acre in Area 1 on the basis of the 1952 data to make the acceptable net return. This is due to the higher cost of production per acre in the two irrigated areas.

As the yield increased, there was an increase in per acre costs in Area 1. Areas 2 and 3 reached a maximum cost in the third quartile and then actually declined somewhat indicating that after yields reached a certain point, it would cost just as much or perhaps more for 400 pounds per acre yield than for 500 or 600 pound yields. Generally, harvesting costs vary according to the amount of foliage to be threshed rather than the amount of seed which is harvested. Since harvesting

costs are a substantial part of total costs, the amount of foliage threshed has a profound effect upon the total cost of production. Therefore, yield of seed per acre does not necessarily affect the cost per acre.

As would be expected, costs per hundredweight declined consistently over each of the areas as yield increased except in Area 2. In the two middle quartile groups, the average yield differed by only 31 pounds and costs differed but slightly.

An interesting relationship may be observed between yield and the number of acres in fields included in each group. As the average size of field declined the yield increased. This relationship was quite consistent over the three growing areas. The tabulation below is based on acreages in seed of the one-fourth who experienced the poorest yields. It will be observed that in each area the farms with the highest yield had just about one-half the seed acreage of those with the poorest yields.

Index of acres per field in relation to yield per acre.
Lowest yield quartile = 100

Yield	Area 1	Area 2	Area 3
Poorest yield	100.0	100.0	100.0
Second poorest	90.5	102.2	105.9
Next to highest	63.6	68.0	80.6
Highest yield	53.5	52.6	53.0

Cost. When the data were grouped according to cost per acre, it became apparent that a high correlation between costs and net returns existed up until a certain point was reached. Then net returns began to decline as costs continued to rise. The point apparently varies with the type of farming practiced. These facts are presented in table 29, p. 70. In Area 2, the dry land area, the maximum cost per acre beyond which net returns decreased was about $26. In Area 3,

Table 29. Relationship of total costs to net returns in alfalfa seed production, Utah, 1952

Range in cost per acre quartile groups	No. fields	Avg. acres	Avg. yield	Receipts per pound	Receipts per acre	Avg. cost per acre	Avg. net returns
dollars		acres	lbs.	cents	dollars		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Area 1							
Q-1 14.96 - 27.14	16	104.6	116	26.6	30.86	21.40	9.46
Q-2 27.15 - 35.19	16	87.4	238	23.6	56.08	31.67	24.41
Q-3 35.20 - 43.54	16	92.5	238	27.4	65.17	39.30	25.87
Q-4 43.55 - 80.06	15	64.9	356	30.6	108.89	55.53	53.36
Area 2							
Q-1 13.33 - 16.18	5	87.4	37	40.8	15.10	13.30	-.20
Q-2 16.19 - 21.80	6	54.3	121	39.1	47.30	20.20	27.10
Q-3 21.81 - 31.83	6	86.6	145	37.8	54.82	26.13	28.69
Q-4 31.84 - 38.05	5	46.6	114	46.8	53.30	35.26	18.04
Area 3							
Q-1 10.38 - 33.27	7	69.4	287	26.8	76.93	28.21	48.72
Q-2 33.28 - 40.07	6	70.6	357	30.3	108.11	38.00	70.11
Q-3 40.08 - 42.56	6	58.6	328	31.6	103.74	41.55	62.19
Q-4 42.56 - 59.36	6	48.3	365	30.2	110.07	47.71	62.36

where irrigation was predominate, the point of highest net returns was reached at a cost of about $38 per acre. In the fourth quartile group of Area 2, yield per acre had declined, which accounts for the severe drop in net returns for that group.

The above relationship does not exist in Area 1. However, it might be inferred that this point has merely been postponed due to two factors that this method of analysis has failed to control. These factors are the effects of certification and defoliation. Column 5 in table 29, which indicates the influence of certified seed, shows that the fourth quartile in Area 1 is made up predominately of certified fields. This would undoubtedly have an effect upon the net returns in that group. The apparent discrepancy between the range in receipts per pound in column 5 and the statement on average price in

the section on marketing outlets is because both certified and non-certified seed were grouped together for this analysis. Defoliation also contributed to this condition. It will be noted in the section on defoliation that the cost of producing seed by this method was about $51 per acre. That would place the defoliated fields in the high quartile group. Since defoliation was associated with high yields, net returns would also be increased. Therefore, the point of optimum net returns appears to exist at an average cost of higher than $55 per acre.

There seemed no consistent relationship between cost per acre and the size of the field among the quartile groups, although the smaller fields were generally the highest in cost over all of the producing areas.

CONCLUSIONS

For more than a quarter of a century alfalfa seed has been commercially important in Utah's agricultural economy. Because of extreme variability in yield from year to year, farmers have undertaken its production at high risk. Thus, alfalfa seed became concentrated in areas where growing conditions seemed particularly favorable to its production and in areas where there were few or no other acceptable alternatives.

Successful development and use of insecticides to combat harmful insects have saved the alfalfa seed industry in Utah from extinction. Insecticides have also been one of many factors in bringing about revolutionary changes in the seed industry nationally. Alfalfa seed production has changed from a highly uncertain crop to a specialized industry in which the total income is derived from alfalfa seed. Other innovations contributing to specialized seed production are: (1) the development through plant breeding of new, improved varieties, causing a shift in demand, and (2) the adoption of new, more efficient methods of harvesting which speed up the harvesting process, reduce the effort necessary and make possible greater recovery of alfalfa seed.

Because of high post-war prices, new areas which have incorporated the above new features have been attracted into production and can raise seed to greater advantage than the older long-time seed producing areas. So great has been the resulting crops in recent years that seed consuming areas have been unwilling to purchase seed at the high prices

before 1952.

Utah with its high mountain valleys is well suited for the production of high-quality winter-hardy alfalfa seed. However, the profitability of future alfalfa seed production in Utah will depend on the ability of seed producers (1) to convert their seed acreage to improved varieties, (2) to adopt new, more efficient methods of harvest, and (3) to improve their marketing practices. The opinion has been expressed that the high opportunity costs attached to establishing new stands of improved varieties prohibits their expansion in Utah. It is highly probably that this assumption is false. However, more extensive research is necessary and would be highly profitable in this area of seed production.

Defoliation of alfalfa seed appears to offer one of the greatest opportunities for improvement and increase of seed income. Although harvesting costs are not decreased, there is less expenditure for labor and seed can be harvested at a more opportune time. This is especially valuable where the season is short and early frosts normally destroy much of the season's crop. Additional research in this area would also be of great value.

Improved marketing practices offer another area in which net returns to the grower might be increased. Current work by the Utah Experiment Station is designed to shed new light on this subject.

SUMMARY OF FINDINGS

1. An economic study was made of 110 fields of alfalfa seed grown in Utah in the crop year 1952. Records were obtained from growers by the list sampling method from the three principal areas of seed production.

Sixty-three records were secured from Millard and contiguous counties, 22 from Box Elder and western Cache Counties, and 25 from the Uintah Basin Area.

About 60 percent of the seed land included was under irrigation; about 26 percent was non-irrigated; and the remaining 14 percent was designated as quasi-dry land.

2. The average size of the alfalfa seed enterprise was 78.2 acres, ranging from 62.1 acres in Box Elder-Cache through 69.4 acres in the Uintah Basin to 87.7 acres in Millard and contiguous counties.

3. About 77 percent of the seed land included produced alfalfa seed from second cutting.

4. About 65 percent of the alfalfa land included in Box Elder-Cache produced certified seed, about 19 percent in the Uintah Basin, and about 8 percent in Millard and contiguous counties.

5. On a weighted basis the average yield of alfalfa seed was 199 pounds per acre. Yields of 300 pounds per acre were attained in the Uintah Basin Area, 199 pounds in Millard and contiguous counties, and 96 pounds in the Box Elder-Cache Area.

6. The total amount of labor hours expended per acre of seed produced varied amont the three areas from 2.67 hours in Box Elder-Cache through 6.16 hours in the Uintah Basin Area to 6.42 hours in Millard and contiguous counties. Most of the labor was utilized in harvesting. The amount depended upon the harvesting method used. Tractor power was the most important source of power accounting for 2.39 hours per acre; horse and truck power required .47 and .35 hours per acre respectively. Combining was the most economical method of harvest in terms of labor and power used per acre.

7. The average total cost of producing alfalfa seed was $32.71 per acre or $15.13 per hundredweight. Fixed costs represented 24 percent of the total cost; variable costs represented 76 percent of the total cost. Fixed costs are those cash and non-cash costs that tend to continue year after year whether a crop of seed or no crop at all is raised. Variable costs are cash and non-cash expenditures that would not be incurred unless a crop of alfalfa seed is raised. Harvesting costs varied with the method of harvest used.

The average cost of producing irrigated alfalfa seed was $35.61 per acre or $18.83 per hundredweight in Millard and contiguous counties and $38.49 per acre or $12.83 per hundredweight in the Uintah Basin.

Dry land alfalfa seed averaged $20.61 per acre or $14.10 per hundredweight in Millard and contiguous counties and about $23 per acre or about $24 per hundredweight in the Box Elder-Cache Area.

Quasi-dry land in Millard and contiguous counties averaged $30.83 per acre or $12.82 per hundredweight. Quasi-dry land seed in the Uintah Basin was produced at an average cost of $24.58 per acre or $7.60 per hundredweight.

8. Gross receipts represented the income or value of the seed produced since compensation for chaff, screenings and pasture were made in the cost of production. Average gross receipts per acre were about $59 and about $30 per hundredweight. The average gross receipts in each area varied according to the average yield. Gross receipts in the Uintah Basin amounted to about $88 per acre. In Millard and contiguous counties they averaged $57.49 per acre and $35.37 per acre in Box Elder-Cache.

Net returns were calculated by subtracting total costs from total gross receipts. Net returns in the Uintah Basin averaged about $50 per acre while the average net returns for Millard and contiguous counties were $23.62 per acre and in the Box Elder-Cache Area were $12.36 per acre.

9. Marketing outlets were divided into four categories: (1) local dealer, (2) farmers' cooperatives, (3) outside dealers, and (4) other (including Commodity Credit Corporation loans and farm sales). Services rendered by each of the purchasing agencies were somewhat the same. The seed was sold by the grower either cleaned or in the dirt on the basis of a sample clean away. Only 11 percent of the seed in the study was sold in the dirt.

Nearly 70 percent of the seed in this study was disposed of prior to December 1. The average price of alfalfa seed was 28 cents per pound for common seed and 40 cents for certified seed, approximately the support level that year.

On an average, 1939-1953, the price of alfalfa was lowest during the months of September, October, and November and highest during the months of March, April, May, and June. Using November, the month in

which most of the seed was sold, as a base the average price per hundredweight for alfalfa seed increased approximately 17 percent by the month of May.

10. Defoliation is a comparatively new method of field curing alfalfa seed just prior to harvesting. It has distinct possibilities in the Mountain West since it may preclude frost damage through dehydrating the plant and making earlier harvesting possible. The average yields of seed per acre where defoliating was done were 424 pounds while the average seed yield for all fields in the same area was only 199 pounds.

Harvesting costs are somewhat higher on an acre basis, but through higher recovery of seed, net returns from defoliated fields in the study averaged nearly five times the net returns of other seed fields.

11. Certified seed production is increasing. In 1952 certified seed was equal to 24.6 percent of the total seed produced in the United States whereas it was only 11 percent in 1950.

In 1952 California and Washington were the two leading certified seed-producing states. Seventy-six percent of the total seed produced in California was certified.

Certified seed has also been gaining in Utah. In 1952 certified seed was equal to about 10 percent of the total seed.

Yield of certified seed in each of the irrigated areas exceeded the non-certified seed although certification was not the only determining factor.

Sufficient data were not collected to adequately compare the cost of producing certified and non-certified seed.

Depending upon yield, net returns from certified seed were from two to five times net returns from non-certified seed.

The break-even point for certified seed producers came at a yield of 59 pounds per acre while yields of 110 pounds per acre were necessary for non-certified seed growers to reach the break-even point.

12. Yield of alfalfa although it is a variable factor in itself was one of the most important factors affecting net returns. There was a direct and positive relationship noted between variations in yield and net returns. A positive relationship between costs per acre and variation in yields was also noted up to 300 or 400 pounds and then costs per acre tended to decline. As the size of fields declined, the yield of seed per acre increased. The fields with the highest yields were just about half the size of the fields with the poorest yields. Net returns increased as cost of production increased to a certain point depending upon the type of farming practiced and then declined.

LITERATURE CITED

(1) Beck, Frank V. The grass and legume seed industry. (Ph.D. Thesis. Unpublished) University of Wisconsin, 1942.

(2) Carlson, John W. Centennial of alfalfa in Utah. Farm and Home Science. 12:36+. June 1951.

(3) Marx, Robert E. Economics of alfalfa seed production in Kansas. Agr. Econ. Report No. 36. Kansas Exp. Sta. Manhatten, Kansas, 1948.

(4) Morrison, Frank B. Feeds and feeding. A handbook for the student and stockman. 21st ed. New York. The Morrison Publishing Co., 1949.

(5) International Crop Improvement Assn. Minimum seed certification standards. Publication 17. 1950.

(6) Tippetts, A. I. Production and marketing of alfalfa seed with special reference to Utah. (M.S. Thesis) Utah State Agricultural College.

(7) Utah Crop Improvement Assn. Annual Summary 1946-53.

(8) Utah Crop Report. Annual Summary 1920-53.

(9) U. S. Dept. of Agr. Bur. of Agr. Econ. Crop Reporting Board. Revised Estimates 1939-1950. Farm production, farm disposition and value of field seed crops. Statistical Bulletin No. 119. Washington, D. C. 1952.

(10) U. S. Dept. of Agr. Bur. of Agr. Econ. Crop Reporting Board. Farm production, farm disposition and value of field seed crops. Washington, D. C. 1950-1951, 1951-1952, 1952-1953.

(11) U. S. Dept. of Agr. Bur. of Agr. Econ. Agr. Statistics. Washington, D. C. 1953.

(12) U. S. Dept. of Agr. Bur. of Agr. Econ. Crop Reporting Board. Annual Summary as of December. Washington, D. C. 1952, 1953.

(13) U. S. Dept. of Agr. Bur. of Agr. Econ. Crop Reporting Board. Alfalfa seed forecast as of October. Washington, D. C. 1953.

(14) U. S. Dept. of Agr. Bur. of Agr. Econ. Crop Reporting Board. Special certified alfalfa and red clover seed report, March. Washington, D. C. 1953.

APPENDIX

Appendix table I. Alfalfa seed production by states, 1949-1952

State	Production cleaned alfalfa seed				
	1949	1950	1951	1952	Average
	thousand pounds				
(1)	(2)	(3)	(4)	(5)	(6)
Ohio	270	320	250	920	440
Indiana	110	190	180	-	120
Michigan	2,400	1,400	990	1,300	1,522
Wisconsin	3,500	1,300	400	860	1,515
Minnesota	3,300	1,800	2,200	1,276	2,144
Iowa	400	440	200	130	293
North Dakota	4,600	1,000	2,900	2,500	2,750
South Dakota	10,000	3,100	2,900	12,960	7,240
Nebraska	9,000	1,710	2,200	15,800	7,178
Kansas	9,700	2,300	2,900	27,500	10,600
Oklahoma	13,400	8,100	6,700	11,300	9,875
Texas	3,200	4,000	2,300	5,000	3,625
Montana	9,500	6,300	5,900	7,800	7,375
Idaho	3,200	5,400	6,400	6,400	5,350
Wyoming	2,400	1,500	1,300	2,280	1,870
Colorado	3,500	2,300	2,000	2,990	2,698
New Mexico	1,400	2,000	1,600	1,600	1,650
Arizona	9,400	11,100	9,700	6,800	9,250
Utah	10,400	8,900	11,500	10,600	10,350
Washington	2,500	7,000	15,100	18,810	10,852
Oregon	810	1,300	2,000	3,600	1,928
California	13,900	31,000	25,000	39,900	27,470
United States	116,890	104,950	104,620	180,326	126,696

Source: U. S. Dept. of Agr., Crop Reporting Board, Annual Summary, 1952-53
U. S. Dept. of Agr., Crop Reporting Board, Farm production, farm disposition, and value of field seed crops, Revised estimates, 1939-50.

Appendix table II. Alfalfa seed acreage, yield, production, domestic supply and disappearance, United States 1939-1952

Year	Acres harvested	Yield per acre	Production	Carry-over total	Production plus carry-over	Imports *	Exports **	Domestic supply	Domestic disappearance
	acres	pounds	thousand pounds of clean seed						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1939	1,013,200	74	75,250	5,289	80,539	3,376	515	83,400	67,756
1940	965,700	80	77,150	15,644	92,794	1,523	958	93,359	76,938
1941	803,200	66	53,390	16,421	69,811	11,508	964	80,355	67,175
1942	603,700	87	52,660	13,180	65,840	1,992	1,642	66,190	61,069
1943	779,300	82	64,258	5,121	69,379	2,812	401	71,790	65,704
1944	982,000	59	58,030	6,086	64,116	10,331	253	74,194	67,434
1945	880,600	71	62,120	6,760	68,880	6,466	2,246	73,100	67,050
1946	1,182,200	89	104,850	6,050	110,900	9,259	1,282	118,877	100,325
1947	1,014,700	94	94,900	18,552	113,452	7,552	1,159	119,845	103,351
1948	644,900	88	56,790	16,494	73,284	20,268	1,196	92,356	86,907
1949	1,102,400	106	116,890	5,449	122,339	7,788	1,696	128,431	113,322
1950	926,600	113	104,950	15,109	120,059	12,755	3,258	129,556	100,197
1951	883,500	118	104,620	29,359	133,979	5,794	1,859	137,914	111,670
1952	1,339,500	135	180,326	26,244	206,570	8,717	1,427	213,860	137,257

* Imports for years beginning July 1 of year of crop harvest.
** Exports for years beginning July 1 of year of crop harvest.
Source: U. S. Dept. of Agr., Bur. of Agri. Econ., Field Crops Div., March 1953

Appendix table III. Alfalfa seed indices of acreage harvested, production and price per hundredweight, United States, 1939-1953 (Index 1947-1949 = 100)

Year	Acres harvested 1,000	Index	Production clean seed 1,000 lbs.	Index	Price per cwt.	Index
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1939	1,013.2	108.1	75,250	87.3	17.40	56.1
1940	965.7	103.0	77,150	89.5	14.60	47.0
1941	803.2	85.7	53,390	62.0	20.10	64.8
1942	603.7	64.4	52,660	61.1	25.70	82.8
1943	779.9	83.2	64,258	74.6	33.20	107.0
1944	982.0	104.8	58,030	67.4	33.90	109.2
1945	880.6	94.0	62,120	72.1	34.20	110.2
1946	1,182.2	126.1	104,850	121.7	36.50	117.6
1947	1,014.7	108.3	94,900	110.1	24.90	80.2
1948	644.9	68.8	56,790	65.9	41.60	134.0
1949	1,102.4	117.6	116,890	135.7	37.50	120.8
1950	926.6	98.9	104,950	121.8	36.80	118.6
1951	883.5*	94.3	104,620	121.4	45.20	146.6
1952	1,339.5*	142.9	180,326	209.3	32.70	105.3
Preliminary 1953	941.7	100.4	133,226*	154.6	20.70*	66.6
Avg. 47-49	937.3		86,156		31.04	

Source:

* U. S. Dept. of Agr., Bur. of Agr. Econ. Crop Reporting Board Bal of data: Farm Production, Farm Disposition and Value of Field Seed Crops, Revised Estimates, 1939-50.

Appendix table IV. Alfalfa seed, acreage, production, yield per acre, and price, Utah, 1929-1953
(Index 1947-1949 = 100)

Year	Seed 1000 acres	Index	Seed Prod. 1000 lbs.	Index	Seed yield per acre	Index	Converted price per cwt.	Index
			Cleaned basis					
							dollars	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1920	15	31.2	3,667	51.1	244	166.3	28.20*	71.1
1921	28	58.3	6,938	96.7	248	169.0	12.25	30.9
1922	35	72.9	9,714	135.5	277	188.8	12.52	31.5
1923	45	93.7	10,507	146.5	233	158.8	15.80	39.8
1924	62	129.1	13,233	184.6	213	145.1	16.30	41.1
1925	72	149.9	21,883	305.2	303	206.5	17.10	43.1
1926	62	129.1	14,252	198.8	229	156.1	14.18	35.7
1927	72	149.9	13,147	183.4	182	124.0	14.82	37.3
1928	52	108.3	5,451	76.0	105	71.5	15.63	39.4
1929	50	104.1	5,302	73.9	106	72.2	18.16	45.8
1930	35	72.5	2,081	29.0	59	40.2	15.70	39.6
1931	32	66.6	2,854	39.8	89	60.6	12.53	31.6
1932	18	37.4	892	12.4	50	34.0	8.82	22.2
1933	22	45.8	1,635	22.8	74	50.4	8.83	22.2
1934	27	56.2	2,944	41.0	109	74.3	12.50	34.0
1935	29	60.4	2,944	41.0	102	69.5	13.73	34.6
1936	24	49.9	2,616	36.4	109	74.3	13.98	35.2
1937	28	58.3	3,191	44.5	114	77.7	22.80	57.5
1938	39	81.2	5,203	72.5	133	90.6	23.03	58.0
1939	43	110.4	5,104	71.2	119	81.1	18.67	47.0
1940	54	112.4	4,559	63.5	84	57.2	17.33	43.7
1941	30	62.4	2,230	31.1	74	50.4	15.63	39.4
1942	27	56.2	1,982	27.6	73	49.7	28.87	72.8
1943	30	62.4	2,379	33.1	79	53.8	38.33	96.6
1944	35	72.9	2,081	29.0	59	40.2	36.47	92.0
1945	38	79.1	2,279	31.7	60	40.8	38.97	98.3
1946	44	91.6	5,451	76.0	123	83.8	41.95	105.8
1947	46	95.8	4,575	63.8	99	67.4	39.00	98.3
1948	45	93.7	6,442	89.8	143	97.4	38.68	97.5
1949	53	126.4	10,489	146.3	198	134.9	41.23	104.0
1950	54	128.4	7,631	106.4	142	96.7	48.00	121.0
1951	62	145.1	11,500	160.4	185	126.1	49.50	124.8
1952	59	138.9	10,600	147.8	180	122.6	28.20	71.1
1953	50	120.1	12,250	170.8	245	167.0	18.00	45.4
Avg. 47-49	48	100.0	7,169	100.0	147	100.0	39.64	100.0

Source: Utah Crop Reporting Board. Annual Summary. 1920-1953
* Prices converted to cwt. basis from USAC Dept. of Agr. Econ. data.

Appendix table V. Man hours required to produce one acre of alfalfa seed by type of farming, Millard and contiguous counties, Utah, 1952

Operation	Irrigated		Dry land		Quasi-dry land	
	Hours	Percent of total	Hours	Percent of total	Hours	Percent of total
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Production & maintenance						
Manuring	.12		-		-	
Com. fertilizing	.02		-		-	
Cultivating	.31		.48		.16	
Ditching	.15		-		-	
Diking	.03		-		-	
Spraying	.31		.26		.41	
Dusting	.05		.06		-	
Irrigating	1.04		-		-	
Other	.30		-		.01	
Sub total	2.33	33.4	.80	17.7	.58	10.0
Harvesting						
Mowing)						
Bunching)						
Hauling)						
Stacking)—	4.49		3.63		5.13	
Threshing)						
Combining)						
Other)						
Sub total	4.49	64.4	3.63	80.5	5.13	88.0
Marketing						
Hauling to plant	.15		.08		.12	
Other	-		-		-	
Sub total	.15	2.2	.08	1.8	.12	2.0
Grand total	6.97	100.0	4.51	100.0	5.83	100.0

Appendix table VI. Man hours required to produce one acre of alfalfa seed by type of farming, Box Elder-Cache Area, Utah, 1952

Operation	Irrigated		Dry land		Quasi-dry land	
	Hours	Percent of total	Hours	Percent of total	Hours	Percent of total
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Production & maintenance						
Manuring	-		-		-	
Com. fertilizing	-		-		-	
Cultivating	-		.50		-	
Ditching	-		-		-	
Diking	-		-		-	
Spraying	-		.33		-	
Dusting	-		.02		-	
Irrigating	-		-		-	
Other	-		.30		-	
Sub total	-	-	1.15	43.0	-	-
Harvesting						
Mowing)						
Bunching)						
Hauling)						
Stacking)---	-		1.43		-	
Threshing)						
Combining)						
Other)						
Sub total	-	-	1.43	53.5	-	-
Marketing						
Hauling to plant	-		.09		-	
Other	-		-		-	
Sub total	-	-	.09	3.5	-	-
Grand total	-	-	2.67	100.0	-	-

Appendix table VII. Man hours required to produce one acre of alfalfa seed by type of farming, Uintah Basin Area, Utah, 1952

Operation	Irrigated		Dry land		Quasi-dry land	
	Hours	Percent of total	Hours	Percent of total	Hours	Percent of total
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Production & maintenance						
Manuring	-		-		-	
Com. fertilizing	.02		-		-	
Cultivating	.28		-		.64	
Ditching	.12		-		-	
Diking	.01		-		-	
Spraying	.25		-		.40	
Dusting	.01		-		-	
Irrigating	2.04		-		-	
Other	.01		-		-	
Sub total	2.74	44.4	-	-	1.04	19.4
Harvesting						
Mowing)						
Bunching)						
Hauling)						
Stacking)---	3.21		-		3.84	
Threshing)						
Combining)						
Other)						
Sub total	3.21	52.0	-	-	3.84	71.6
Marketing						
Hauling to plant	.18		-		.16	
Other	.04		-		.32	
Sub total	.22	3.6	-	-	.48	9.0
Grand total	6.17	100.0	-	-	5.36	100.0

ALFALFA SEED PRODUCTION AND MARKETING SURVEY
UTAH AGRICULTURAL EXPERIMENT STATION AND
DEPARTMENT OF AGRICULTURAL ECONOMICS
U.S.A.C.
Logan, Utah

I. PERSONAL AND GENERAL DATA: Date_____ Record No. ____

A. Name of cooperator_____ County_____

1. Post Office Address_____

2. Married (yes, no) No. children living at home_____

B. Land use 1952

Crops	Total Acres	Indicate acres that are: Irrigated	Dryland	Drained
1. Alfalfa seed				
2. Small grains				
3. Forage crops for cutting				
4. Row crops				
5. Other crops				
6. Pasture				
7. Range grazing				
Grand total				

II. ALFALFA SEED PRODUCTION, OPERATIONS AND COSTS

A. Method of planting: Indicate approximate pounds planted per acre
Hills____, Rows____, Drilled____, Broadcast____,

B. Variety planted | Acres | Year planted | Approx. no. seed Crops one planting

1._____
2._____
3._____
4._____

C. Seed acreage, anticipated and acres actually harvested

Year	Acres intended for seed and acres harvested: Crop failures (not harvested for seed)	Acres seed harvested: First	Second	Yield per acre in pounds: In dirt	Cleaned
1. 1952					
2. 1951					
3. 1950					

D. Cause or causes of failure: (Check those that apply)

Insect damage_____ Frost_____ Drouth_____

Hail or rain_____ Wind_____ Other_____ Unknown_____

E. Capital and other specified costs in seed production:

Land Cost for 1952 seed crop (interest rate 5%)

	Acres seed by tracts	Estimated land value per acre	Total land value	Interest charge	Apport. to seed crop
1. Tract 1					
2. Tract 2					
3. Tract 3					
4. Tract 4					
Total					

F. Real estate taxes, water and drainage assessments

1. Real Estate taxes - 1952

Acres in Alfalfa seed	Average assessments per acre	Total assessed value	Property tax rate	Real estate taxes

2. Water assessment or pumping cost - 1952
Acres seed irrigated/total acres irr. X water assess. = _____

3. Drainage charge for seed acreage - 1952
Acres seed drained/total acres drained X drainage assess. = _____

G. Material costs for 1952 crop: (interest rate 5%)

Item	Date of Purchase	Quantity	Price per unit	Total cost	Interest charge	Total Material cost
1. Manure, tons						
2. Comm. fertilizers, cwt.						
3. Insecticides lbs.						
4. Sacks						
5. Fees, inspection, etc.						
6. Other ( )						
Total		XXX	XXXX			

7. Were substantially equal quantities of fertilizer and manure applied in 1949 (yes no) 1950 (yes no) 1951 (yes no).

H. Contract Services

	Price per unit	Total cost
1. Seed cleaning		
2. Apply insecticides		
3. Harvesting operations		
4. Other		

I. Machinery and Equipment Costs, 1952

Item	No.	Cost to op.	Year acquired	Est. years life	Annual depr.	Annual cost of repairs	Int. charge	Total annual cost	Percent used for seed	Charge to seed
1. Plow										
2. Harrow										
3. Ditcher										
4. Diker										
5. Mower										
6. Rake										
7. Wagon										
(combine) 8. Thresher										
9. Sprayer										
10. Duster										
11. Miscl.										
12. Other										
Total										

J. Facilities Cost - Buildings -- 1952

Item	No.	Cost to op.	Year acquired	Est. years life	Annual depr.	Annual cost of repairs	Int. charge	Total Annual cost	Percent used for seed	Charge to seed
1. Machine shed										
2. Storage shed										
3. Other										
Total										

K. Chemicals used in treating alfalfa seed - spray or dust.

Chemical used	lb. per acre	Chemical used	lb. per acre
1.		7.	
2.		8.	
3.		9.	
4.		10.	
5.		11.	
6.		12.	

L. Operator and family labor, power and automotive costs

Operation	Totals		No.	Man			Horse			Tractor			Truck		
	Labor cost	Power cost	op.	rate	hrs	amt	rate	hrs	amt	rate	hrs	amt	rate	hrs	amt
1. Production & Maintenance															
a.Manuring															
b.Comm.Fert.															
c.Cultivating															
d.Ditching															
e.Diking															
f.Spraying															
g.Dusting															
h.Irrigating															
Total Production and Maintenance															
2. Harvesting															
a.Mowing															
b.Bunching															
c.Hauling															
d.Stacking															
e.Threshing															
f. Combining															
Total Harvesting															
3. Marketing															
a.Hauling to plant															
Total Operator and family															

M. Hired Labor Power and Automotive Costs

Operation	Totals: Labor cost	Totals: Power cost	No. op.	Man: rate	Man: hr	Man: amt	Horse: rate	Horse: hr	Horse: amt	Tractor: rate	Tractor: hr	Tractor: amt	Truck: rate	Truck: hr	Truck: amt
1. Production and Maintenance															
a. Manuring															
b. Com. Fert.															
c. Cultivating															
d. Ditching															
e. Diking															
f. Spraying															
g. Dusting															
h. Irrigating															
Total Production and Maintenance															
2. Harvesting															
a. Mowing															
b. Bunching															
c. Hauling															
d. Stacking															
e. Threshing															
f. Combining															
Total Harvesting															
3. Marketing															
a. Hauling to plant															
Total Marketing															
Total Hired Labor and Power															
Total Operator and Family															
GRAND TOTAL															

III. MARKETING AND INCOME DATA FROM SEED ENTERPRISE

A. Time, Quantity, Variety and Class of Seed Sold 1952 Crop

Income from sales by months										
Month of sale	Variety and * grade	Quantity in pounds	Certified yes	Certified no	Cleaned yes	Cleaned no	Price per unit	Total value sales	Value of seed planted	Total sales and use on farm
Aug.										
Sept.										
Oct.										
Nov.										
Dec.										
Jan.										
Feb.										
Mar.										
April										
May										
June										
July										

* R - Ranger, B - Buffalo, G - Grimm, A - Atlantic, C - Common, L - Ladak, O - Oristan, P - Pioneer. 1 - First grade, 2 - Second grade, 3 - Third grade

Income value of hay and/or chaff, pasture

Item	Tons	Price per ton	Total value	Value of pasture	Total value, hay chaff, and pasture
First crop alfalfa					
Chaff					
Grand totals		XXX			

B. Indicate type of seed marketing agency purchasing your seed

	Anticipated 1953	Pounds 1952	1951	1950
1. Local seed dealer				
2. Farmers Co-op				
3. Outside seed dealer*				
4. Contract dealer				
5. Other ( )				

* Outside buyer is defined as an agent or buyer who buys on own account or represents and buys for a firm outside the seed producing area.

C. Storage facilities and costs, 1952.

Storage Ownership	Type of Structure	Pounds stored cwt.	No. of months stored	Cost per cwt. per month
1. Local dealer				
2. Co-op				
3. Outside seed buyer				
4. Own storage on farm				
5. Other (specify)				

D. Marketing Problems:

1. Delivery point of sale _____ Miles transported _____

2. Grower's own:

3. Of the Area:

4. How many years in the last 10 have you not produced seed?

1944 _____ 1945 _____ 1946 _____ 1947 _____ 1948 _____ 1949 _____
1950 _____ 1951 _____ 1952 _____ 1953 _____

Comments

_____
Enumerator

_____
Checked by

SUMMARY STATEMENT

Record Number _____ Area Number _____

I. Apportionment Factor	Amount
1. Gross income from land producing seed	
2. Seed sold and used - Value	
3. Item 2 as a percent of Item 1 (= Factor)	

II. Fixed Costs Apportioned to Seed	Amt
1. Land Costs	
2. Taxes	
3. Drainage Assessment	
4. Water Assessment	
5. Depreciation & Interest on Buildings Used	
6. TOTAL	

III. Interest on Cash Outlay in Crop Item	Time	Amt	Int
1. Labor: a. Maintenance			
b. Harvesting			
c. Marketing			
2. Materials			
3. Contract Services a. Cleaning			
b. Apply Insecticides			
c. Harvesting			
d. Hauling			
e. Storage			
4. TOTAL			

SUMMARY

IV. Variable Costs	Amount
1. Material Costs	
2. Operator & Family Labor	
3. Hired Labor Costs	
4. Operator's Power Costs	
5. Hired Power Costs	
6. Contract Services	
7. Interest on Money in Crop (Total of III)	
8. Total Variable Costs	
V. Fixed Costs Apportd. to Seed	
VI. Total Costs	

VII. Income Cost Summary	Amount
1. Income - Value of Seed(1.2)	
2. Total Costs (VI)	
3. Net Income (Line 1 minus Line 2)	

VIII. Unit Production & Unit Costs	
1. Number Acres	
2. Number Pounds Seed	
3. Yield Per Acre(Cleaned)	
4. Cost Per Acre	
5. Cost Per Pound	
6. Income Per Acre	
7. Total Man-hours Applied	
8. Man-hours Per Cwt.	