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**COMPARISONS OF THE PROFITABILITY OF CERTIFIED  
AND UNCERTIFIED ALFALFA SEED PRODUCTION  
IN SOUTH DAKOTA**

**BY  
ARNOLD LYLE ASPELIN**

**A Thesis submitted  
in partial fulfillment of the requirements for the  
degree Master of Science, Department of  
Economics, South Dakota State  
College of Agriculture  
and Mechanic Arts**

**June, 1960**

**COMPARISONS OF THE PROFITABILITY OF CERTIFIED  
AND UNCERTIFIED ALFALFA SEED PRODUCTION  
IN SOUTH DAKOTA**

This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree; but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Adviser

Head of the Major Department

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A. L. A.



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## CHAPTER I

## INTRODUCTION

Alfalfa is one of the most important crops grown in South Dakota. In recent years alfalfa acreages have been exceeded only by those of corn, oats, and wild hay. In this state, the alfalfa acreage has increased from 385,000 acres in 1946<sup>1</sup> to 2.3 million acres in 1958,<sup>2</sup> an increase of nearly 500 per cent. In South Dakota, alfalfa is grown primarily for hay production in support of the livestock industry, which accounts for a major portion of the state's farm income. Although only a small percentage of the total alfalfa acreage in South Dakota is harvested for seed, this state is a leading state in alfalfa seed production, ranking sixth in the nation in 1958.<sup>3</sup>

Approximately two per cent of the total alfalfa acreage harvested for seed in South Dakota during recent years has produced certified seed.<sup>4</sup> The other 98 per cent has produced uncertified seed, commonly referred to as "Northern" alfalfa seed. Northern alfalfa is winter hardy and has been quite well adapted to the northern areas of the United States.

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<sup>1</sup>South Dakota Agriculture 1947, p. 3, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota, 1948.

<sup>2</sup>South Dakota Agriculture 1958, p. 9, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota, 1959.

<sup>3</sup>Ibid., p. 8.

<sup>4</sup>Charles H. Benrud and D. C. Dahl, The Northern Alfalfa Seed Picture, Marketing Bulletin 482, p. 12, Agricultural Experiment Station, South Dakota State College: Brookings, South Dakota, September, 1959.

### Statement of The Problem

Until 1952, uncertified Northern alfalfa seed found a ready market in areas where winter hardiness is necessary. Since that time the demand for this seed has declined markedly. Prices paid to South Dakota producers have declined from 51 cents per pound in 1951 to 23.5 cents per pound in 1958 (Figure 1). In turn, South Dakota's cash farm income from alfalfa seed has declined greatly. Several factors have contributed to the decline in the market for Northern alfalfa seed.

One major contributing factor has been the development of new improved varieties of alfalfa seed such as "Ranger" and "Vernal". When these varieties were released they were in short supply and it was necessary to increase the amount available to growers. It was found possible to obtain much more rapid increases under the nearly optimum conditions to be found in the southwestern portion of the United States. As a result, an important specialized alfalfa seed industry was developed in California. Whereas California produced only 4.5 million pounds of alfalfa seed in 1948,<sup>5</sup> its production had increased to 84.6 million pounds in 1957, which was 53.1 per cent of all alfalfa seed produced in the United States that year.<sup>6</sup> Approximately three-fourths

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<sup>5</sup>Seed Crops By States, 1919-1954, Statistical Bulletin, No. 206, p. 10, United States Department of Agriculture, Marketing Service, Crop Reporting Board: Washington, D. C., April, 1957.

<sup>6</sup>Alfalfa Seed Production Forecast, p. 1, Colorado Crop and Live-stock Reporting Service: Denver, Colorado, October 16, 1958.



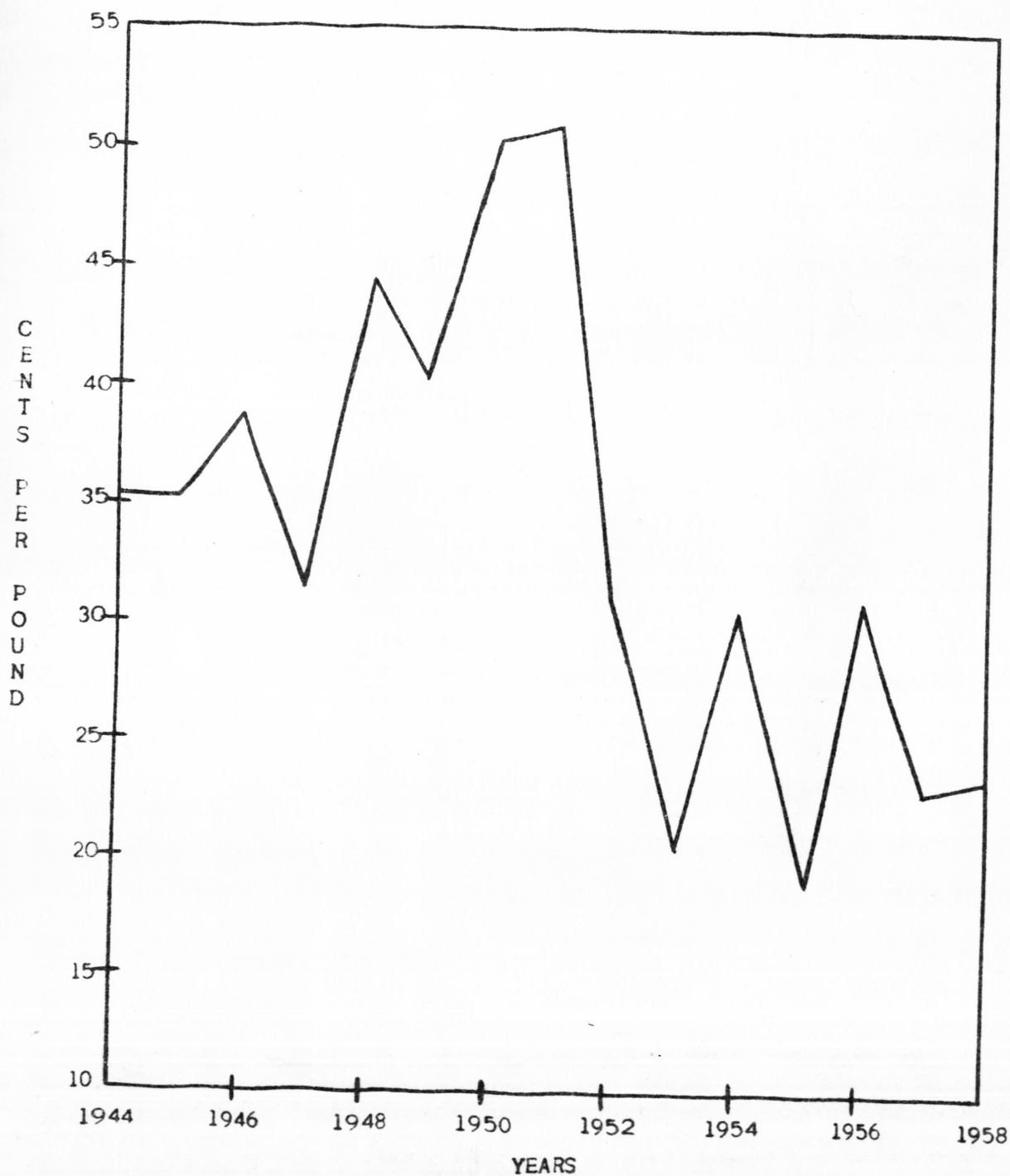


Figure 1. Prices Paid to Producers for Alfalfa Seed in South Dakota, 1944-1958

Source: South Dakota Agriculture for the years 1944 through 1958, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota.

of the total alfalfa seed acreage in California in recent years has been certified and has been producing large amounts of the new winter hardy varieties.<sup>7</sup>

Through vertical integration, California has been able to place on the market a continuous supply of winter-hardy certified seed. This seed has been advertised by use of well organized sales promotion techniques.

While this western grown seed has been highly advertised, Northern alfalfa seed has received only limited sales promotion. A relatively small and unorganized advertising program for Northern seed has had to compete with a large and well coordinated advertising program. One of the reasons for the lack of a well organized program promoting Northern seed is that the supply of this seed fluctuates greatly from year to year, making it nearly impossible to carry on effective advertising. Much the opposite has been true with western grown certified seed, where a more stable supply has facilitated marketing and advertising.

As large amounts of western grown certified seed were placed on the winter hardy alfalfa seed market, it entered into direct competition with Northern seed. The emergence of this seed on the market had a depressing effect on alfalfa seed prices.

Inasmuch as the new certified varieties have proven to be superior in yield ability and disease resistance, they have been recommended by Experiment Stations and farm service groups for pasture and

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<sup>7</sup>Benrud and Dahl, *op. cit.*, p. 15.

hay production. With the relatively small price differential which has existed between certified and uncertified seed at the retail level, growers have followed the recommendations and switched to using certified seed.

Meanwhile, growers in South Dakota and other Northern Great Plains states have continued to produce large amounts of uncertified seed. With the large amount of certified seed available and the reduced demand for Northern seed, a sizable marketing problem has developed. Research conducted by Dahl indicates that a definite price differential will probably be necessary in the future in order to market Northern seed.<sup>8</sup> If this is true, it could result in lower prices to producers of Northern seed.

The problem which has arisen requires an answer to the question: "Can South Dakota seed producers obtain greater net returns by producing certified rather than uncertified seed?" First, would it be more profitable for farmers and ranchers to produce certified rather than uncertified seed in conjunction with hay from solid stands? Secondly, would specialized production of certified alfalfa seed from row stands be profitable for South Dakota farmers and ranchers? The purpose of this study was to compare the profitability of alfalfa seed production on uncertified solid stands, certified solid stands and certified row stands.

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<sup>8</sup>D. C. Dahl, Marketing Northern Alfalfa Seed, Pamphlet 97, p. 125, Agricultural Experiment Station, South Dakota State College: Brookings, South Dakota, September, 1958.



### Procedure

In order to make the comparisons between the alternative types of production, it was necessary to obtain information on production practices and returns from alfalfa seed producers. Through personal interview, growers were contacted in two of the leading alfalfa seed producing counties in South Dakota. The counties selected for this study were Tripp and Brown.

A sample of 20 to 30 seed growers was selected for interviewing in each county. The sample included as nearly as was feasible, all of the growers who produced seed consistently year after year. The names of the growers contacted were obtained from local seed dealers, county agricultural agents and from seed certification records. The sample included both uncertified and certified seed growers.

On the basis of the information obtained from the growers, production costs and returns were estimated for the three types of production in each county. The estimated cost and return data were used in comparing the profitability of the three types of production.

### Review of Literature

Very limited amounts of research have been conducted on the economic aspects of alfalfa seed production. Most of the research conducted on alfalfa seed production has been in the area of physical and biological factors affecting seed production. In addition, a large amount of work has been directed toward the development and testing of new varieties of alfalfa.

Only two studies on the economic aspects of alfalfa seed production were located. The first of these studies was conducted in Kansas and the second was conducted in Utah. These studies have little bearing on this research and are discussed only briefly in this review.

### The Kansas Study

In 1946, Marx made a study of alfalfa seed production in Kansas.<sup>9</sup> This study described the alfalfa seed production industry of Kansas and estimated production costs for several seed harvesting methods. This study considered only uncertified seed production from solid stands.

### The Utah Study

In 1952, Goodwin wrote a Master's thesis on the economics of alfalfa seed production in Utah.<sup>10</sup> The major objectives of this study were, to determine seed production costs and returns, to compare the efficiency of various cultural methods and to measure the advantages and disadvantages of uncertified and certified alfalfa seed production.

This study was based on the 1952 seed production operations of 110 growers located in the three leading alfalfa seed producing counties of Utah.

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<sup>9</sup>Robert E. Marx, Economics of Alfalfa Seed Production in Kansas, Agricultural Economics Report No. 36, Kansas Agricultural Experiment Station: Manhattan, Kansas, October, 1948.

<sup>10</sup>Jack B. Goodwin, An Economic Analysis of Alfalfa Seed Production Costs and Returns in Utah, Unpublished Master's Thesis, Department of Agricultural Economics, Utah State University: Logan, Utah, 1952.

Goodwin found that higher net returns were obtained when the chemical defoliation-combine method of seed harvesting was used. In one area of the state, net returns from fields harvested by this method averaged four to five times greater than those obtained by any other harvesting method. The primary advantage of defoliation was that it allowed seed to be harvested before frost damage occurred.

Goodwin found that much higher net returns were obtained from certified fields. In the three areas studied, net returns per acre from certified fields were two to five times those obtained from uncertified fields. Although slightly higher yields were obtained from certified fields, the major factor contributing to the higher net returns was the higher price received for certified seed. The average price received for common seed was 28 cents per pound while growers received 40 cents per pound for certified seed. This study indicated that a yield of 59 pounds per acre was necessary in order to break even on certified fields and that a yield of 110 pounds was necessary in order to break even on uncertified fields.

Although Utah is well suited to alfalfa seed production, Goodwin indicated that continued profitability in the future would depend on the ability of producers to convert their acreages to new alfalfa varieties as they are developed, to adopt new harvesting methods such as defoliation, and to improve their marketing practices.



## CHAPTER II

### ALFALFA SEED PRODUCTION IN SOUTH DAKOTA

#### Types of Production

The two types of alfalfa seed production in South Dakota are solid stand production and row stand production. By far the most widely used is the solid stand method. In most areas of South Dakota, solid stand alfalfa produces two cuttings each year. Inasmuch as hay production is of primary importance in this state, the first cutting is most commonly harvested for hay and if seed is to be taken, the second cutting will be harvested for seed. The first cutting is seldom used for seed production.

Row production is designed more specifically for seed production and has been initiated only to a limited extent in South Dakota. In this type of production, alfalfa is planted in rows approximately 40 inches apart. These rows are cultivated or renovated several times each growing season in order to control weeds and to stimulate growth. In early summer the first growth is clipped or harvested for hay and the second growth is left to be harvested for seed. Seed yields obtained from row alfalfa are usually higher than from solid stands. Hay yields, on the other hand, are usually much lower.

## Production Practices

### Stand Establishment

In most areas of South Dakota, solid stands of alfalfa are established by planting the alfalfa with a nurse crop of small grain. The alternate method of planting the alfalfa alone is seldom used because alfalfa does not produce a crop the first year under normal growing conditions. By using the nurse crop method of stand establishment, the grower normally obtains a crop of small grain. In addition, the nurse crop helps to control weeds with which the small alfalfa seedlings are unable to compete during the first year.

Solid stands of alfalfa are usually planted in early spring with the same equipment used in planting small grain. Where the grain drill is used, the alfalfa seed may be mixed with the seed grain or it may be planted separately by using a grass seeding attachment. In cases where an endgate seeder is used, the grain and the alfalfa seed are usually planted together. However, some growers plant the grain and the alfalfa separately. At harvest time the nurse crop is harvested in a manner similar to that used for any other small grain crop.

Methods used in planting row alfalfa stands are not as well established as those used for planting solid stands. Some growers use a nurse crop; others do not. The amount of seedbed preparation varies from none to three or four field operations. Some growers plant with conventional grain drills and others use specially designed alfalfa seed planters.



The amount of seed used to establish a solid stand generally ranges from 4 to 15 pounds per acre. For row stands the amount of seed used is usually between one-fourth and one pound per acre.

### Renovation

In many areas of the state, growers renovate solid stand alfalfa with tillage implements to control weeds and to increase vigor. The following implements are among the more commonly used for this purpose: spiketooth harrows, one-way disks or surflexes, springtooth harrows, single disks, and tandem disks. Most growers renovate in early spring before the alfalfa has had a chance to begin growing. However, some growers renovate between the first and second cuttings or in the early fall after the last cutting had been harvested.

Row alfalfa is usually renovated or cultivated two to four times each year. In early spring and again after the first cutting is harvested, row fields are usually renovated with implements of the type used on solid stands. After the rows have grown back from the first cutting, the alfalfa is cultivated with a row crop cultivator. Some growers renovate again in the fall after the seed has been harvested, in order to work down the alfalfa straw.

### Hay Harvesting

There are several methods of hay harvesting used in South Dakota. Hay is cut with either a mower or a windrower. If a mower is used, the hay is usually raked into windrows with a dump rake or side-delivery rake. In cases where the windrower is used to cut a relatively heavy

hay crop, no raking is necessary. When the hay crop is in the windrow and has been allowed to cure, it is either baled or stacked.

### Insect Spraying

In recent years it has become of increasing importance to protect alfalfa seed crops from insect damage. Some of the most troublesome insects in South Dakota are lygus bugs, aphids, thrips, grasshoppers and alfalfa weevils. If insect infestations are not controlled, seed yields may be reduced greatly. In some cases growers must spray twice during a season to obtain satisfactory control. However, most growers spray only once a year. Usually the most critical time occurs when the second growth of alfalfa is in bloom.

The two general methods of spraying are ground spraying and airplane spraying. In most areas growers hire their spraying done by custom operators. The most commonly used method is by airplane. Custom rates generally range from \$1.50 to \$2.00 per acre.

### Pollination

Alfalfa is largely a self-sterile plant. When an alfalfa flower is fertilized with its own pollen, it is unlikely to set seed. In order to obtain a satisfactory seed set, alfalfa flowers must be cross-pollinated. Bees have been found to be the most satisfactory means of cross pollination in alfalfa. Attempts to facilitate cross fertilization or tripping of alfalfa flowers by chemical or mechanical means have met with failure in most cases.

In South Dakota there are two general types of bees: wild bees and honeybees. Wild bees visit flowers primarily to gather pollen. Inasmuch as wild bees are pollen gatherers, they trip a large percentage of the flowers they visit and therefore are conducive to a good seed set. Although wild bees are good alfalfa pollinators, they are not present in large enough numbers in most areas of the state to do a thorough job of tripping. At the present time there are no reliable methods of increasing wild bee population in seed producing areas. As a result, seed growers must depend primarily on honeybees to pollinate their alfalfa.

In the field force of the honeybee colony, work is divided according to the colony's needs. Some bees are water carriers, some are nectar gatherers, and some are pollen gatherers at any given time. Pollen gatherers are much better pollinators than are nectar gatherers.

Nectar gatherers trip only a small number of the flowers they visit. When a nectar gatherer trips an alfalfa flower, it becomes trapped and must struggle in order to get free. This experience is very frustrating to the bee and it soon learns to obtain the nectar without tripping the flower. In so doing, this type of bee becomes a rather poor pollinator.

Conversely, pollen gatherers trip a large proportion of the flowers they visit. It appears that pollen gatherers are not as adversely affected by the tripping mechanism on the alfalfa flower.

It has long been known that higher seed yields can be obtained where honeybees are present. However, South Dakota growers have exper-



lenced difficulty in getting satisfactory pollination by bees. The major problem is to get enough bees to work on a given acreage. Honeybees try to go to other flowers and leave alfalfa fields alone if they can. In South Dakota there is such a wide variety of other plants flowering at the same time as alfalfa that alfalfa pollination by honeybees is greatly reduced. Consequently, low seed yields result from lack of adequate cross-pollination.

In South Dakota, honeybee colonies are maintained primarily for honey production rather than for alfalfa pollination. Maximum honey production and optimum alfalfa pollination are not entirely compatible. In order for honeybees to increase seed yields significantly, up to five colonies should be placed on each acre. Inasmuch as beekeepers' returns come primarily from honey, this is seldom done in this state. If bees are placed on alfalfa fields in such high numbers as five colonies per acre, honey production per colony will be reduced greatly. Therefore, if growers want heavy concentrations of bees, they must subsidize beekeepers for the losses in honey production associated with heavy concentrations of bees. The farmer, however, has not been willing to pay the beekeeper for this service. This factor, together with the unspecialized nature of seed production, has resulted in bee populations of less than one colony per acre in nearly all areas of South Dakota. Such low bee populations have done little to increase seed yields.

### Seed Harvesting

A wide variety of alfalfa seed harvesting methods is used in this state. The straight combine method is used in many areas. This method eliminates such operations as windrowing and raking, but it has at least one serious disadvantage. In using this method the grower must leave the alfalfa crop standing until it is fully mature. As a consequence, many times early frosts have caused serious damage to seed crops before they have had time to become mature enough to combine.

Chemical defoliation may be used in order to get more uniformly mature stands early enough to avoid frost damage. Chemical defoliation has not been widely accepted in South Dakota, mainly because of the cost involved. This operation costs between \$3.50 and \$4.00 per acre when done by custom operators. Most defoliation in the state is done by custom operators.

Another seed harvesting method widely used in South Dakota is the windrow-combine method. When the alfalfa is approaching maturity, it is windrowed and allowed to cure before harvested with a pickup combine. This method has one serious disadvantage also. Alfalfa windrows are very easily damaged by strong winds, and consequently, many crops of alfalfa seed have been destroyed by wind after swathing.

A variety of other seed harvesting methods is being used in South Dakota. However, these methods have decreased in importance in recent years. Methods requiring large amounts of hand labor, such as stationary threshing and cocking alfalfa for curing, are rapidly being replaced by harvesting methods requiring less labor.

### Marketing

In general, South Dakota growers market their alfalfa seed "in the dirt".<sup>11</sup> Inasmuch as the majority of growers do not produce large amounts of seed every year, they cannot afford to own the expensive equipment required to clean and to otherwise prepare seed for retail marketing. In most cases, growers sell their seed to country buyers soon after harvesting. Seed may be sold by the growers on the farm, or it may be hauled to town and sold. Seed is usually sold in bulk; in some cases however, it is bagged before selling.

### Factors Affecting Production

The amount of alfalfa seed produced in South Dakota fluctuates greatly from year to year. In 1951, only 2.9 million pounds of seed was produced in this state, whereas the state's total production for the following year was 12.9 million pounds, an increase of over 300 per cent (Figure 2). This unstable production is due to highly variable yields and to large fluctuations in the acreage harvested for seed.

### Seed Yields

In South Dakota, alfalfa seed yields are notoriously variable between fields, between localities and between years. Yields vary from small amounts not worth harvesting to as high as 700 pounds per acre in extreme cases. During recent years, this state's average yield, on

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<sup>11</sup>"In the dirt" refers to seed as it comes from the threshing operation before any cleaning has taken place.



an acreage harvested basis, has ranged from 26 to 78 pounds per acre and the average yield for the 1958 growing season was 55 pounds per acre (Figure 3).

Much of the variation in seed yields is caused by adverse weather conditions during the growing season. In this state, rain cannot be depended upon to fall at the proper time and in the proper amounts. Complete crop failure has been caused by drouth. Rain during blooming may reduce the seed set. An abundance of rainfall early in the season may cause alfalfa plants to grow too vigorously for good seed production. Excess rainfall during harvest may cause large losses due to shattering.

Wind storms may reduce yields by shattering the maturing alfalfa seed. Alfalfa in the windrow is very easily damaged by strong winds.

Temperatures in South Dakota are often harmful to seed production. Many growers feel that extremely high temperatures during blooming time may reduce the seed set. In addition low temperatures during winter may cause alfalfa plants to winterkill.

Inasmuch as very little alfalfa is grown exclusively for seed production in South Dakota, most producers do not go to much extra trouble to insure high seed yields. During the 1947-1956 period this state's average seed yield was 53 pounds per acre, while the United States average for the same period was 130 pounds per acre.<sup>12</sup>

The low yields obtained by South Dakota growers are caused in part by the use of poor or inadequate production practices. Practices

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<sup>12</sup>South Dakota Agriculture 1958, p. 9, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota, 1959.

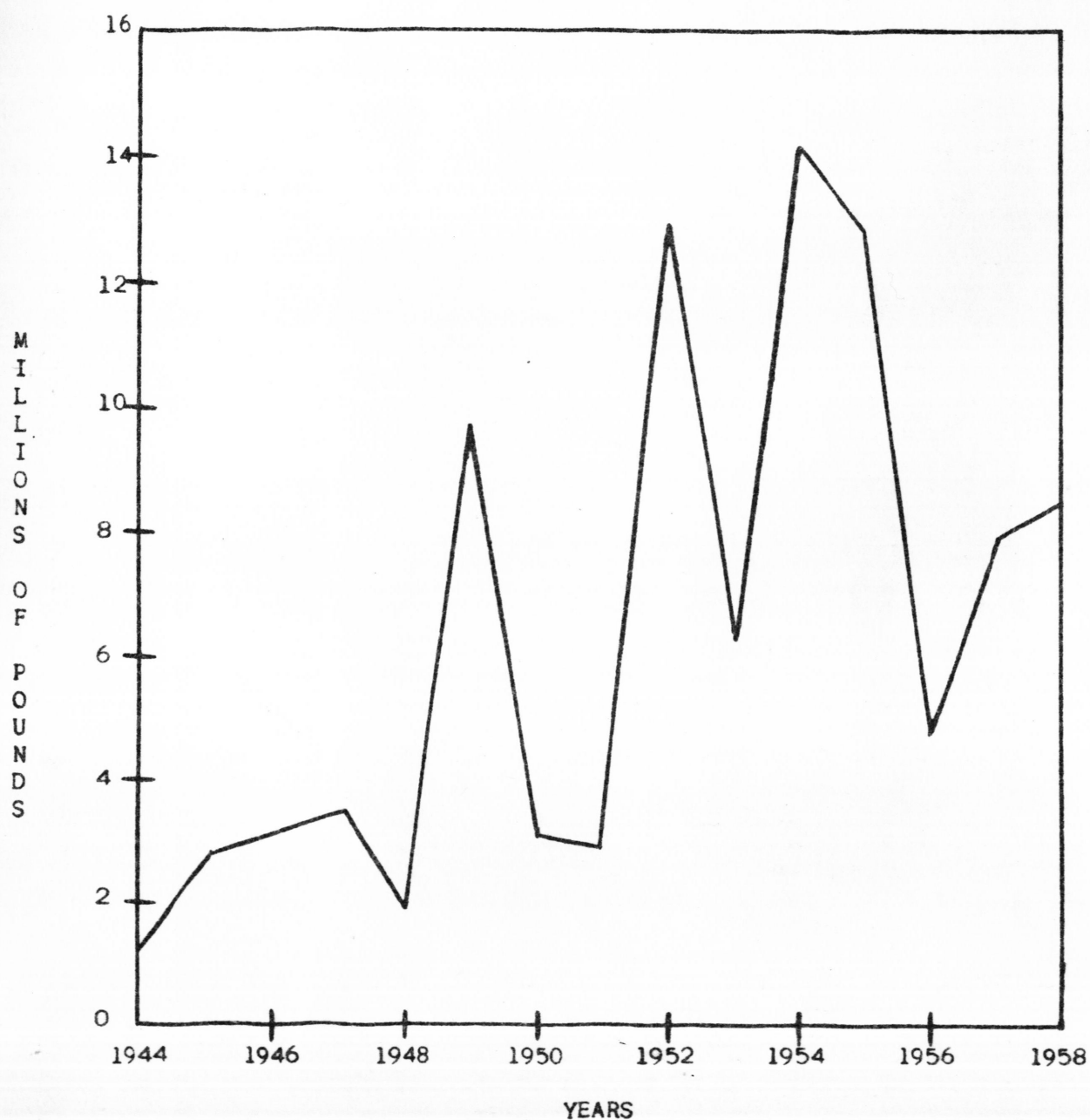


Figure 2. Total Alfalfa Seed Production for South Dakota, 1944-1958

Source: South Dakota Agriculture for the years 1944 through 1958, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota.



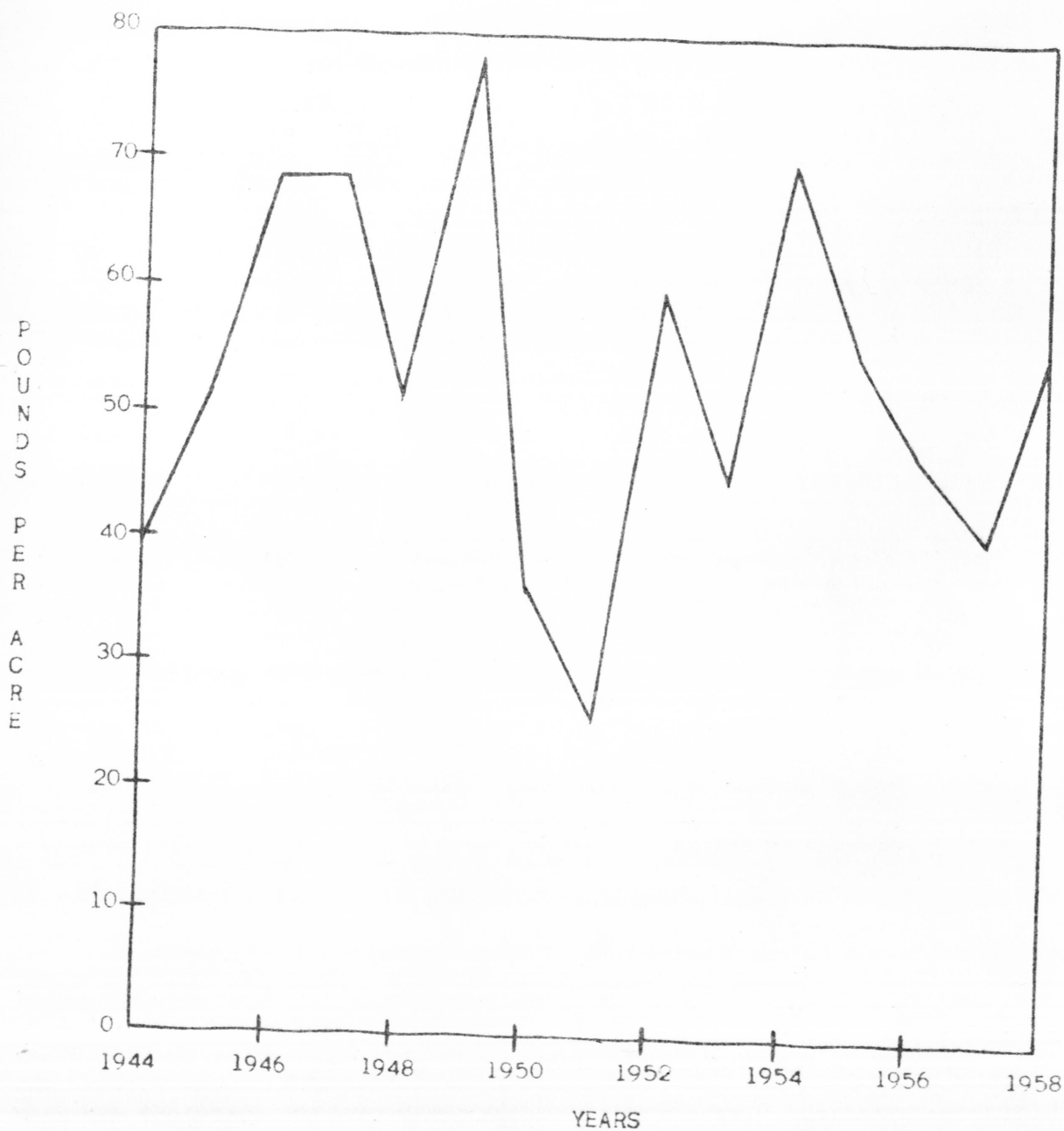


Figure 3. Alfalfa Seed Yields Per Acre in South Dakota, 1944-1958

Source: South Dakota Agriculture for the years 1944 through 1958, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota.

such as chemical defoliation, renovation, insect spraying, pollination by large numbers of honeybees, and row production have received only limited acceptance in most areas.

#### Acreage Harvested For Seed

Alfalfa seed production in South Dakota possesses a marked in-and-out characteristic. The acreage harvested for seed may increase or decrease by as much as 50 percent from one year to the next (Figure 4). These fluctuations are due primarily to the farmers' decision to utilize the last cutting for hay production, or to leave it for seed production.

In the major seed producing areas of this state, alfalfa produces two crops each year. If seed is to be taken, the most common practice is to harvest the first cutting for hay and leave the second cutting for seed. Since alfalfa is grown primarily for hay production in support of South Dakota's livestock industry, seed is usually taken when hay requirements have been fulfilled by the first cutting of hay or if the second crop is not worth harvesting for hay.

In years when the second crop is worth cutting for hay but the grower has decided to leave it for seed, he foregoes the opportunity of harvesting it as high quality hay. Should he find later that there will not be a satisfactory seed crop, the plants have lost many of their leaves and have become too coarse to make high quality roughage. As a result of leaving the crop for seed the grower has taken the risk that the seed crop he hopes to get will be worth more to him than the hay crop would have been. In addition, a seed crop can be seriously affected

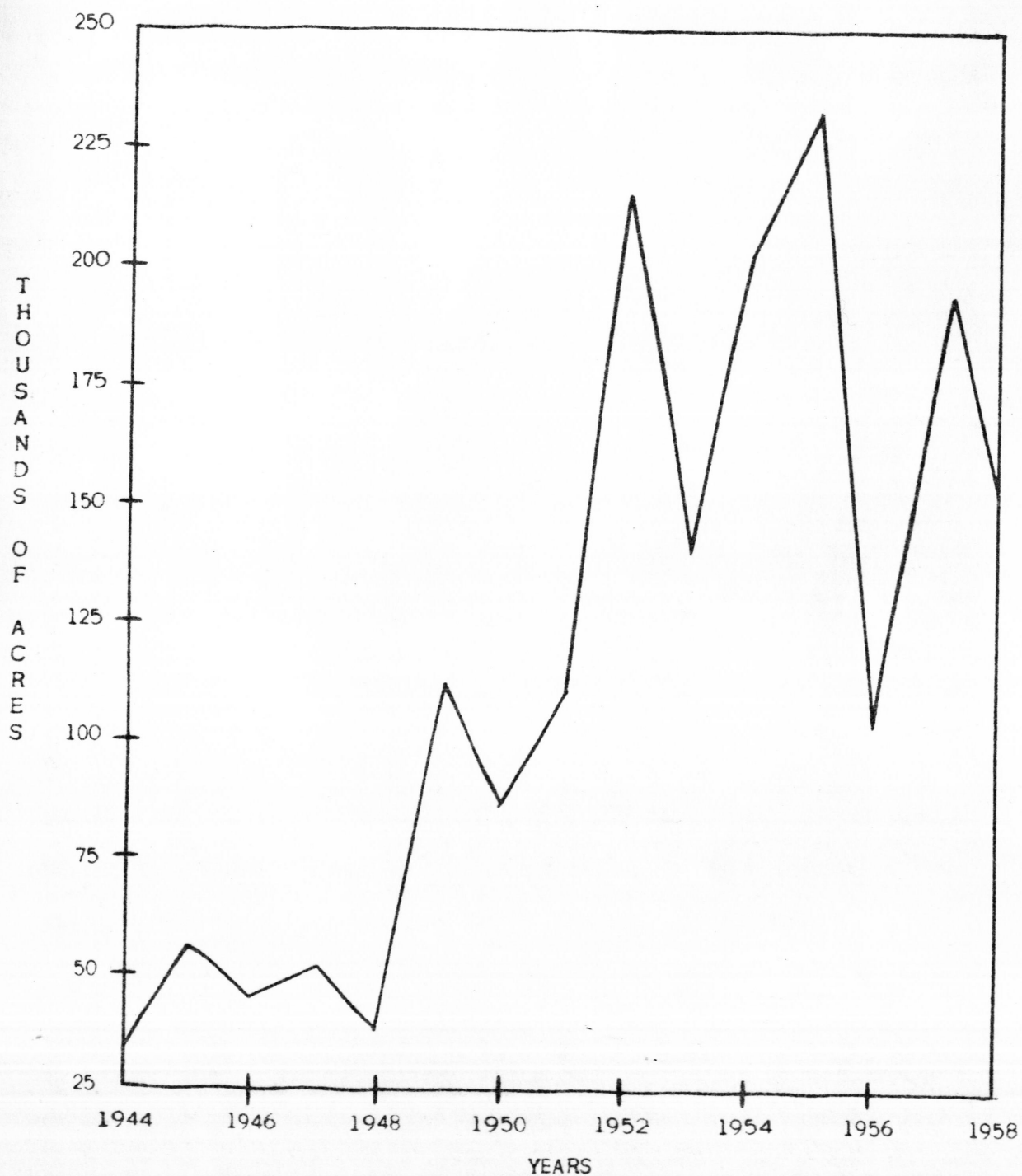


Figure 4. Acres of Alfalfa Harvested for Seed in South Dakota, 1944-1958

Source: South Dakota Agriculture for the years 1944 through 1958, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota.



by insects, which makes it necessary for the producer to spray even before he is at all sure of a worthwhile seed crop. This adds to the risk involved in trying for a seed crop rather than the more certain hay crop, especially if there is a possibility of high hay prices during the following feeding season.

### Seed Varieties

Many varieties of alfalfa are grown in South Dakota. The most commonly grown varieties are Grimm, Ladak, Cossak, Vernal, Ranger, and Northern Common. Northern Common is the name given to hardy seed from this area which is of mixed or uncertain origin. Most of the alfalfa grown in this state is of the Common variety.

### Alfalfa Seed Certification

Inasmuch as alfalfa is a cross-pollinated plant and varieties of seed are very difficult to identify, the methods of historical record keeping and visual inspection are required to maintain varieties free from contamination by weeds and other varieties of alfalfa.

In order to make it possible for the grower to purchase seed of guaranteed high quality, the International Crop Improvement Association has established a set of minimum standards which must be met before alfalfa seed may be certified. The blue certification tag on a bag of seed insures the grower that he is buying quality seed of known origin.

### Certification Requirements

The production of certified alfalfa seed is carefully controlled. The number of generations a variety of seed is allowed to be increased is limited. The four classes of certified seed for the most commonly grown varieties of alfalfa are: breeder seed, foundation seed, registered seed, and certified seed.

Breeder seed is the result of scientific plant breeding work by trained specialists. After many years of selection, crossing, and testing, this seed is released as a new variety of alfalfa. This seed, the supply of which is quite limited, is distributed to experience certified growers for planting to increase the amount of seed stock available. The seed resulting from a breeder seed planting is termed foundation seed.

Foundation seed is planted and its progeny is called registered seed. Registered seed is then planted and the crop harvested is termed certified seed. With some varieties of alfalfa, such as Vernal, there is no registered class of seed, as it goes directly from foundation seed to certified seed. In general, the seed produced from fields planted to certified seed of the new synthetic varieties is not eligible for certification.

Land must be free of volunteer alfalfa and other related crops before it can produce certified seed. In order for an alfalfa field to be eligible for certification, it must have been planted to crops other than alfalfa or related crops for at least three years previous to its being planted to alfalfa, unless the previous crop was alfalfa of the

same variety and certified. In addition, all off-type plants must be rogued out before the field is officially inspected for certification. Fields producing certified seed must receive one official inspection each year before they are harvested for seed.<sup>13</sup>

Because of alfalfa is a cross-pollinated plant, isolation requirements are necessary to maintain varietal purity. Fields producing foundation seed must be at least 120 rods away from uncertified fields of alfalfa or other related crops.<sup>14</sup> Fields producing registered or certified seed must maintain 30 rods of isolation.<sup>15</sup> As a result of substantial increases in South Dakota's alfalfa acreage, it is becoming more and more difficult for growers to maintain proper isolation requirements for certified seed plantings. In many areas of the state, this requirement has made certified seed production nearly impossible for many farmers.

#### Certification Costs

Inspection costs for alfalfa are a minimum of \$9.00 for acreages up to 30 acres and are 30 cents for each additional acre. An additional sealing service fee is charged for all certified seed sold for planting purposes. This fee is two percent of the total gross sales value of the

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<sup>13</sup>South Dakota Seed Certification Standards, p. 9-10, Seed Certification Service, South Dakota Crop Improvement Association: Brookings, South Dakota, 1959.

<sup>14</sup>Ibid.

<sup>15</sup>Ibid.



seed.<sup>16</sup>

### Certified Seed Varieties

With the exception of Northern Common, nearly all varieties of alfalfa being currently grown in South Dakota are eligible for certification. At the present time, Vernal and Ranger are the leading varieties grown for certification in South Dakota. The varieties of Grimm and Cossack will not be eligible for certification after 1960. After that year they will be eligible for Inter-State Certification only. This means that these two varieties are no longer recommended for planting in South Dakota but still may be raised here and sold as certified seed to growers in other states. At the present time Narragansett and Rhizoma alfalfa varieties are grown in South Dakota as Inter-State Certified seed for sale to growers in other states.<sup>17</sup>

Recently the South Dakota Agricultural Experiment Station released a multi-purpose variety of alfalfa called Teton. This variety of alfalfa is expected to gain wide acceptance in the northern areas of the United States because of its desirable characteristics. Tests conducted by the South Dakota Agricultural Experiment Station indicate that this variety is superior to other varieties now grown in this state with regard to winter hardiness, disease resistance, and ability to with-

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<sup>16</sup>Ibid., p. 8.

<sup>17</sup>Ibid., inside back cover.

stand severe grazing.<sup>18</sup> This variety will make it possible for farmers and ranchers to have a well adapted dual-purpose forage crop and in addition, it will allow growers to produce a high quality seed that will command premium prices on the northern alfalfa seed market. Large amounts of Teton were planted in 1959. After the 1960 crop is harvested, Foundation Teton is expected to be available in large enough amounts for general distribution to certified seed growers.

#### Certified Seed Production

Very little of the alfalfa seed produced in South Dakota is certified. Whereas approximately one-half of all alfalfa seed produced in the United States is certified seed, less than two per cent of this state's total alfalfa seed acreage produced certified seed in 1958.<sup>19</sup>

During recent years, the total acreage of certified alfalfa seed in this state has decreased markedly. South Dakota's certified seed producing acreage has decreased steadily from 5,600 acres in 1951 to less than 2,800 acres in 1958, a decrease of nearly 51 per cent (Figure 5).

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<sup>18</sup>M. W. Adams and George Semeniuk, Teton Alfalfa, Bulletin 469, pp. 3-8, Agricultural Experiment Station, South Dakota State College: Brookings, South Dakota, May, 1958.

<sup>19</sup>Charles H. Benrud and D. C. Dahl, The Northern Alfalfa Seed Picture. Marketing, Bulletin 482, pp. 9-12, Agricultural Experiment Station, South Dakota State College: Brookings, South Dakota, September, 1959.

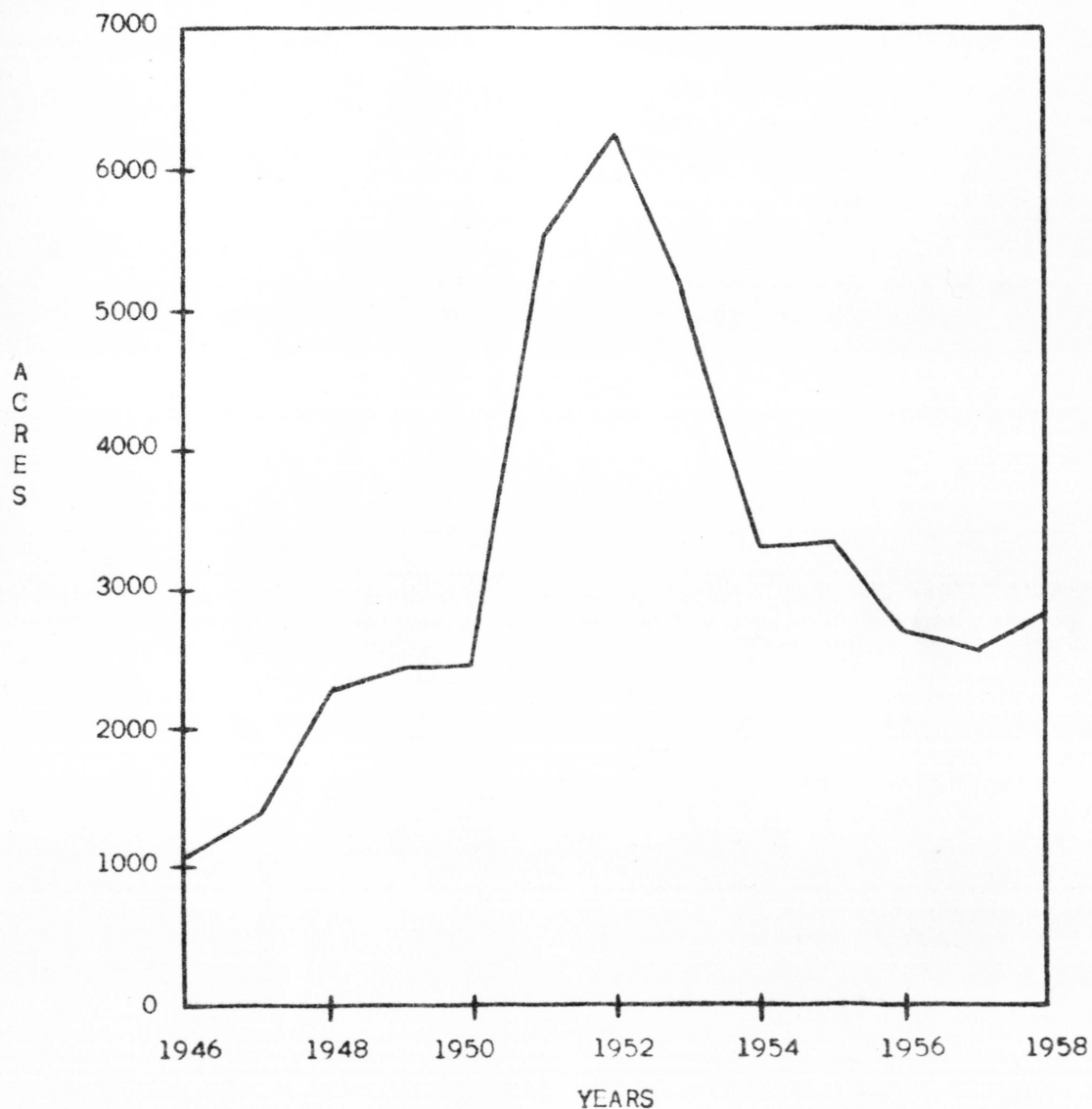


Figure 5. Total Acres of Certified Alfalfa in South Dakota, 1946-1958

Source: South Dakota Preliminary Certified Seed Directory for the years 1946-1958, Seed Certification Service, South Dakota Crop Improvement Association: Brookings, South Dakota.



### Major Alfalfa Seed Producing Areas

Alfalfa is grown in all of the counties of South Dakota. However, the major alfalfa seed producing areas are centered in the western, northeastern, and north central portions of the state. In order of importance, the leading seed producing counties in 1957 were Tripp, Meade, Gregory, Brown, Fall River, Mellette, Lyman, Faulk, Haakan and Pennington.<sup>20</sup> Although the acreages harvested for seed and seed production vary greatly from year to year, these counties have been consistently among the top ranking alfalfa seed producing counties of the state.

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<sup>20</sup>South Dakota Agriculture, 1958, p. 22, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota, 1959.

### CHAPTER III

#### GENERAL DESCRIPTIONS OF COUNTIES STUDIED

Tripp and Brown counties were selected for this study because they consistently have been among the state's top ranking alfalfa seed producing counties and also because they represent different "crop adaptation" areas.

Tripp County is located in areas C2 and C3 in the southern portion of the state, west of the Missouri River (Figure 6). Brown County is located in area C1 in the northern portion of the state, east of the Missouri.

Growing conditions within each crop adaptation area are quite uniform as the stratification is based on soils, rainfall, temperatures, topography and vegetation. Because of this, the results of this study may be expected to be applicable to the other counties located in areas C1, C2 and C3.

#### Tripp County

The basic industry of Tripp County is agriculture, and a large proportion of its population lives on farms. Large scale farming characterizes Tripp County agriculture. The average size of farm in 1954 was 871 acres.<sup>21</sup>

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<sup>21</sup>U. S. Census of Agriculture: 1954 North Dakota and South Dakota, V. 1-pt. 11, p. 231, 1956.

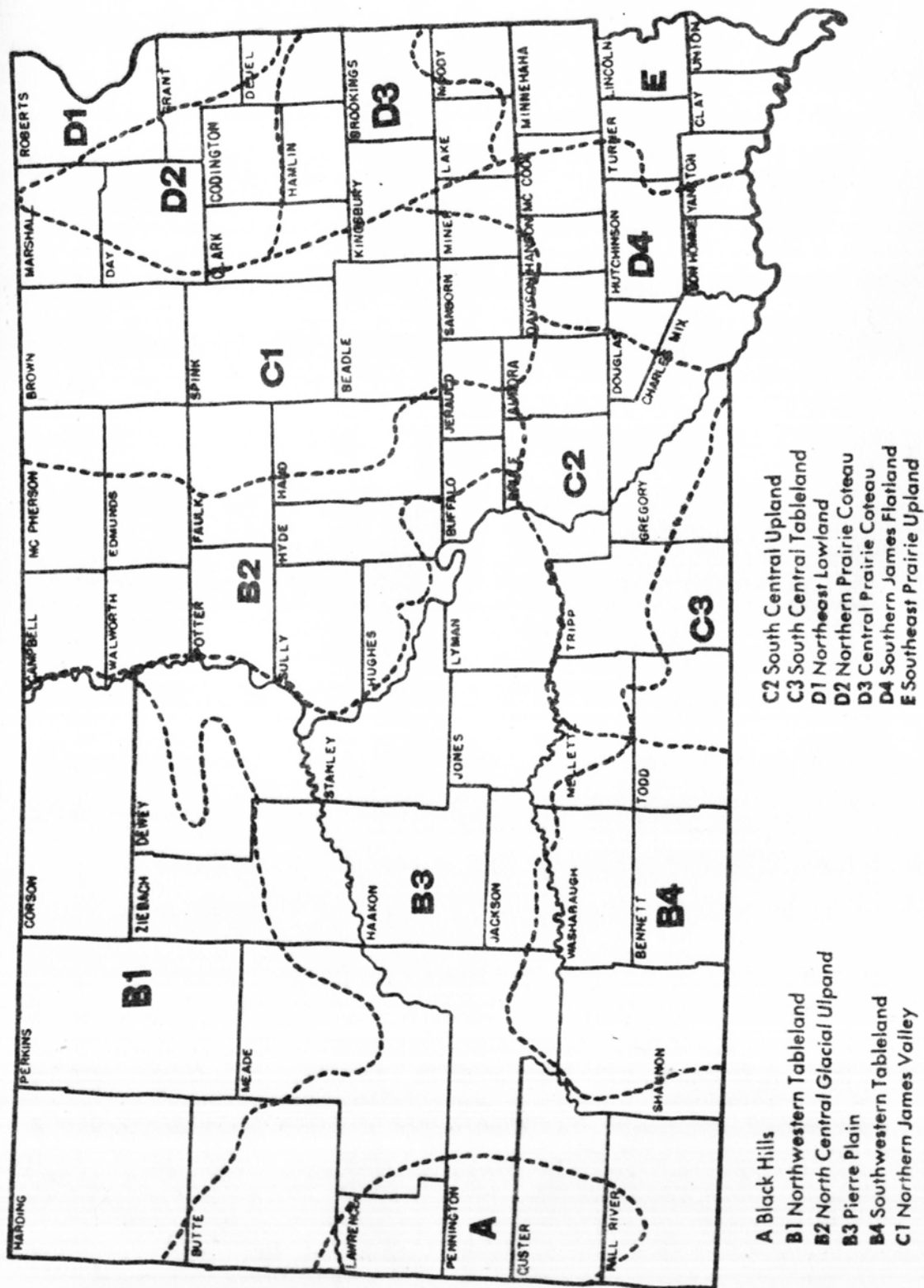


Figure 6. Crop Adaptation Areas of South Dakota

Source: Soil Survey, Agronomy Department, South Dakota State College: Brookings, South Dakota.



### Soils and Topography

The soils of Tripp County are of two distinct types. Those of the northern portion of the county are primarily clay and clay loam soils; those of southern portion are primarily sandy soils.

The notable difference between the soils of the northern and southern portion is the primary reason why these areas are located in different crop adaptation areas. The northern part of the county is located in crop adaptation area C2, South Central Upland, and the Southern portion is located in crop adaptation area C3, South Central Tableland (Figure 6).

The soils of the northern area of this county are generally dark colored and fine textured. During periods of insufficient surface moisture these soils become very hard and shrinkage causes large surface cracks to develop. In times of abundant surface moisture, these soils become sticky and difficult to manage. Because of these characteristics, these soils are locally referred to as "gumbo".

The topography of most of the northern area is characterized by long smooth slopes. An exception is a strip along the northern boundary of the country, adjacent to the White River, which possesses a rough, break-type topography having soils of a more coarse texture. The bottoms along the River are subject to flooding and are used mainly for the production of corn, alfalfa, and wild hay. The higher river bottoms are suitable for irrigation by sprinklers and gravity ditches.

The sandy soils, typical of the southern area were derived from sandstone and light colored silts and clay. Because of the sandy texture

of these soils, great care must be used to prevent erosion. As a result, cropping is more diversified and much of the land is used primarily for grazing in order to maintain good cover.

The topography of the southern area ranges from gently undulating in the south central to hummocky in the Sand Hills region along the Nebraska State line.<sup>22</sup>

### Climate

The length of growing season in this country is approximately 145 days. The average date of the last frost in the spring is May 8 and the average date of the first frost in the fall is September 30. The average annual temperature ranges from 45 to 48 degrees F.

Total annual precipitation ranges from 18 to 20 inches. Precipitation for the April through September growing season averages from 12 to 14 inches per year.<sup>23</sup>

### Agricultural Production

Crop production accounts for approximately one-third of the cash farm income in the county.<sup>24</sup> The major crops grown are corn, oats, alfalfa, winter wheat, spring wheat, sorghum and barley. These crops occupied 40 per cent of the acreage in the county during the 1956 growing

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<sup>22</sup>Tripp County Agriculture, pp. 29-31, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota, 1957.

<sup>23</sup>Ibid., pp. 27-28.

<sup>24</sup>Ibid., p. 18.

season. The remainder of the acreage in Tripp County is devoted primarily to pasture and wild hay production.<sup>25</sup>

Much of the crop production is utilized by livestock, which accounts for the other two-thirds of the cash farm income.

### Alfalfa Seed Production

Tripp County has long been one of South Dakota's leading alfalfa seed producing counties. In 1957 it led all other South Dakota counties in acreage harvested for seed with 11,600 acres.<sup>26</sup> During the last 13 years approximately 20 per cent of its total alfalfa acreage has been harvested for seed.<sup>27</sup>

Nearly all of the alfalfa seed produced in Tripp County is produced under dryland conditions. Only one of the growers contacted in this county had produced seed on irrigated land.

Most of the alfalfa seed produced in this county is uncertified and is produced from solid stands in a manner similar to that described in Chapter II. Although the bulk of the alfalfa seed produced is uncertified, Tripp County is one of the leading certified seed producing counties in South Dakota.

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<sup>25</sup>Ibid., p. 34.

<sup>26</sup>South Dakota Agriculture 1958, p. 22, South Dakota Crop and Livestock reporting service: Sioux Falls, South Dakota, 1959. Current statistics on amounts of seed produced and seed yields are not available by counties.

<sup>27</sup>Ibid.



During recent years, the acreage of certified alfalfa has increased greatly. The acreage of certified row fields increased from less than 100 acres in 1957 to over 300 in 1958 and to nearly 500 in 1959.<sup>28</sup>

The most popular variety of certified alfalfa in Tripp County is Vernal. With the exception of one field of Narragansett, all certified seed harvested in 1958 was of the Vernal variety.

### Brown County

Brown County is located in crop adaptation area C1, termed the "Northern James Valley" (Figure 6). The economy of this county is basically agricultural with both cash crops and livestock its principle sources of income.<sup>29</sup> Large scale farming is typical of this county. The average farm in 1954 was 580 acres in size.<sup>30</sup>

### Soils and Topography

Brown County is located in the "Chernozem" soil region of the United States. The Chernozem soils in this county range from dark grey to black in color and were developed under grassland in climate ranging

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<sup>28</sup>South Dakota Preliminary Certified Seed Directories, 1957, 1958, 1959, Seed Certification Service, South Dakota Crop Improvement Association: Brookings, South Dakota, 1957, 1958, 1959.

<sup>29</sup>Brown County Agriculture, p. 1, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota, 1951.

<sup>30</sup>U. S. Census of Agriculture: 1954 North Dakota and South Dakota, V. 1-pt. 11, p. 231, 1956.

from moist subhumid to semiarid. The Chernozem soils of Brown County are of two distinct types because of differences in the parent material from which they were developed.

The soils of the northwestern two-fifths of the county were developed from glacial till of the Mankato age whereas those of the southeastern three-fifths were developed from lacustrine materials from glacial Lake Dakota.

The soils of the northwestern area were developed from loam and clay loam parent materials. These soils are well to moderately well drained and are predominantly friable.

The topography of this area ranges from undulating to gently undulating to steep. The chief management problems associated with the soils in this area are maintaining nitrogen and organic matter and conserving moisture.

The soils of the southeastern three-fifths of Brown County were developed from lacustrine parent materials deposited by glacial Lake Dakota. In this area (once covered by Lake Dakota) are two types of soils.

The soils of the northeastern one-fifth of the county were developed from sandy parent material. Because of this, these soils are loose, friable, and sandy in texture. In addition, these soils are moderately well to excessively drained and are slightly acid. The topography of this area is nearly level to hummocky. Because of the sandy texture of the soils in this area, the main management problem is wind erosion.

The soils of the southeastern two-fifths of the county were developed from silts and clays of lacustrine origin. The soils of this area are silt loams and silty clay loams. These soils have a nearly level topography and are well to imperfectly drained. Some of the silty clay loams in this area are high in salts and are locally referred to as gumbo. The major soil management problem for this area is obtaining satisfactory drainage for the gumbo soils.<sup>31</sup>

### Climate

The length of growing season in the Brown County area is approximately 130 days. The date for the last killing frost in the spring is approximately May 12 and the date for the first killing frost in the fall is approximately September 22. Temperatures vary greatly in this area ranging from as high as 115 degrees F. to as low as -46 degrees F. The average annual temperature is approximately 45 degrees F.

Total precipitation for this area is approximately 20 inches each year. Approximately 16 inches of the total annual precipitation falls during the April through September growing period.<sup>32</sup>

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<sup>31</sup>Fred C. Westin, Leo F. Puhr and George J. Buntley, Soils of South Dakota, Soil Survey Series Number 3, pp. 11-18, Agricultural Experiment Station, South Dakota State College: Brookings, South Dakota, March, 1959.

<sup>32</sup>Brown County Agriculture, p. 16, South Dakota Crop and Livestock Reporting Service: Sioux Falls, South Dakota, 1951.



### Agricultural Production

The sale of crops accounts for approximately one-half of the value of products sold by Brown County farmers. The major crop grown is spring wheat. Oats, corn, alfalfa, flax, wild hay, and barley are the other leading crops.

The sale of livestock and livestock products accounts for the remaining 50 per cent of the total value of products sold by farmers in this county. The main types of livestock enterprises are beef cattle, hogs and sheep. Dairy and poultry are of lesser importance.<sup>33</sup>

### Alfalfa Seed Production

Brown County ranked fourth among South Dakota Counties in the acreage of alfalfa harvested for seed during the 1957 growing season. The total acreage harvested in Brown County in that year was 9,300 acres, just over twice the 4,600 acres harvested the previous year.<sup>34</sup> As these figures suggest, seed production in this county is highly variable and uncertain.

Alfalfa is grown in solid stands primarily for hay production, with seed production in most cases being of only secondary importance. The bulk of the alfalfa grown fits into the regular crop rotation program of the farmer.

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<sup>33</sup>Ibid., pp. 12, 39.

<sup>34</sup>South Dakota Agriculture, 1958, p. 22, South Crop and Livestock Reporting Service: Sioux Falls, South Dakota, 1959.

Very little certified alfalfa seed has been produced in this county during recent years. In 1958, only one grower was producing certified seed. However, the acreage producing certified seed is expected to increase greatly in the future. In 1958 and 1959, several growers planted fields to Foundation Vernal and Teton.

Seed production in Brown County is carried on almost without exception under dryland conditions. Very little irrigation is practiced at the present time.

## CHAPTER IV

### METHODS USED IN DETERMINING PRODUCTION COSTS

The determination of production costs for the three types of stands in each county was based on information obtained from the survey of growers. The data obtained from each grower included: a land use summary, a list of the field operations used in hay and seed production, a brief description of each machine used, and other miscellaneous information concerning production practices and costs.

This information was tabulated and the modal production practices were established. The modal production practices were used as a basis for determining production costs for each type of production.

Since hay and seed were produced as joint crops from both solid and row stands, total production costs for the hay and seed crops were computed for each type of production.

In the case of solid stands, production costs were first determined for uncertified stands. Once this had been done, production costs were estimated for certified solid stands by making the necessary adjustments. Except for the costs of meeting the certification requirements, production costs were the same for both uncertified and certified solid stands. All of the additional costs associated with certification were charged to the certified seed crop, leaving hay production costs the same as for uncertified stands. This was based on the assumption that certified stands under the same conditions would produce the same amount of hay as uncertified stands.



Costs for hay and seed produced from row stands were computed by the same general method as was used in the case of certified solid stands. No estimates were made for uncertified seed production for row stands.

#### Stand Establishment

In both counties, the majority of the growers used the nurse crop method for establishing solid stands of alfalfa. Inasmuch as oats (the most commonly used nurse crop) was grown for grain production in addition to being used as a nurse crop, it was assumed that the planting and the harvesting costs of the nurse crop would have been incurred whether or not alfalfa was planted with it.

In addition, the amounts of seed grain used and the yield of grain were indicated by the growers to be approximately the same as when planted alone. Therefore net returns from the nurse crop were assumed to be the same as those for a regular planting of small grain. The planting of alfalfa in solid stands was therefore considered supplementary to grain production. All planting costs except those pertaining directly to the planting of the alfalfa could be charged to the nurse crop. The only planting costs charged to the alfalfa enterprise in this analysis were the costs of the alfalfa seed.

The total seed costs per acre for solid stands were divided by the average number of years that a stand remained in production, which gave the annual planting cost per acre. This figure was increased to account for years when a satisfactory catch of alfalfa was not obtained.

The annual planting cost per acre per year was divided between hay and seed production. For uncertified solid stands the planting cost was divided equally between the hay and seed crop. The stand establishment cost for certified solid stands was divided differently, however. The planting cost charged to the hay crop for certified solid stands was assumed to be the same as for uncertified solid stands. All of the additional cost of the more expensive Foundation or Registered seed was charged to the seed enterprise.

The cost of establishing certified row stands was computed in the same manner as for certified solid stands, except that three-fourths of the planting costs were charged to the seed crop. The remaining one-fourth was added to the cost of producing the hay crop.

#### Machine Depreciation Costs

Depreciation costs for the model machines used in hay and seed production were estimated on the basis of the acreage of a model farm for each county. The acreage in each model farm was computed by averaging the acres of the various types of crops grown on the farms of the growers contacted in each county.

For each machine, the depreciation cost to be charged to an acre of alfalfa was estimated by dividing the annual depreciation cost by the number of acres on which the machine was used on the model farm. The annual depreciation for all machines was assumed to be one-tenth of its original cost. The original costs of machines were estimated from



price projections made by Berry<sup>35</sup> and from prices obtained from farm machinery dealers located in Brookings, South Dakota. This method was used for all machines other than tractors.

Depreciation costs for the tractors used in the modal field operations were computed on the basis of depreciation costs per hour. The depreciation costs per hour for tractors were calculated by dividing the annual depreciation cost by an assumed number of hours of annual use. Depreciation costs per acre were then calculated by applying the depreciation cost per hour to the number of hours required to do the various field operations.

#### Time Requirements

Time requirements for the various field operations were estimated with the following formula:  $C = \frac{WS}{10}$  where: C = capacity of machine in acres per hour, W = width of the machine in feet and S = rate of travel in miles per hour. The reciprocal of C is the number of tractor hours required per acre. The formula assumes a 17.5 per cent time loss due to turning, servicing, and other miscellaneous factors. A more complete discussion of the formula is contained in a recent publication by Pomersberger and Pratt.<sup>36</sup>

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<sup>35</sup>Russell L. Berry, Prices and Costs for Use in Farm and Ranch Planning, Pamphlet 92, pp. 53-63, Agricultural Experiment Station, South Dakota State College: Brookings, South Dakota, October, 1957.

<sup>36</sup>W. J. Pomersberger and G. L. Pratt, Power Requirements of Tillage Implements, Technical Bul. No. 415, pp. 16-17, Agricultural Experiment Station, North Dakota State College: Fargo, North Dakota, June, 1958.



### Machine Operating Costs

Fuel requirements for field operations were estimated by multiplying the number of hours required per acre by estimated fuel consumption rates per hour. Fuel consumption rates per hour for the various modal field operations were estimated in a manner similar to that used by Ulvilden.<sup>37</sup> Rated load (full load) fuel consumption rates per hour were determined for each tractor size. The tractors considered in this analysis were in the three and four plow size groups. The rated load fuel consumption rate for each size group was calculated by averaging the rated load fuel requirements of several tractors representative of each group. The rated load requirement for each tractor was obtained from published results of the Nebraska tractor tests.

When full load fuel requirements per hour were estimated for each tractor size group, it was necessary to determine at what per cent of full load a tractor would operate for a given field operation. On the basis of information in Ulvilden's publication,<sup>38</sup> fuel consumption rates expressed as a per cent of full load for the various field operations used in alfalfa hay and seed production were estimated to be: mowing, raking and bale hauling 50 per cent; combining, 100 per cent;

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<sup>37</sup>James Ulvilden, Farm Labor and Machinery Performance for Selected Operations Under Dryland and Irrigated Conditions in Central South Dakota, Pamphlet 43, pp. 23-24, Agricultural Experiment Station, South Dakota State College: Brookings, South Dakota, Revised, August, 1953.

<sup>38</sup>Ibid.

all other operations, 65 per cent. Fuel requirements for self-propelled machines were assumed to be the same as if the same size and type of machine had been pulled by a tractor.

It was assumed that tractors operating under farm conditions would not be as efficient as when operating under Nebraska test conditions. To allow for this, fuel requirements were increased to 25 per cent above the estimated requirements based on Nebraska test results. This was based primarily on a recent study conducted by Reece which indicated that the average farm tractor required between one-fourth and one-third more fuel than it should have according to the Nebraska tests.<sup>39</sup>

The fuel consumption rates per hour used in computing fuel costs for this study ranged from 1.84 to 3.69 gallons per hour for a three plow tractor and from 2.12 to 4.25 gallons per hour for a four plow tractor (Table I). The indicated fuel consumption rates were multiplied by the calculated machine hours per acre in order to determine fuel requirements per acre. Once the fuel requirement per acre was determined, the fuel cost was computed on the basis of a gasoline price of 21 cents per gallon.<sup>40</sup>

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<sup>39</sup>F. N. Reece, Tractor Care Pays Big Dividends, County Agent and Voc. Ag. Teacher Magazine, Vol. 15, No. 8, August, 1959.

<sup>40</sup>Berry, op. cit., p. 31.

TABLE I. FUEL CONSUMPTION PER HOUR (GALLONS) FOR THREE AND FOUR  
 PLOW GASOLINE TRACTORS OPERATING AT RATED, 65 PER CENT  
 AND 50 PER CENT LOADS\*

Percent of rated load	Three plow	Four plow
Rated (100)	3.69	4.25
65	2.40	2.76
50	1.84	2.12

\*Gallons per hour include a 25 per cent increase to allow for faulty adjustments and normal wear.

Oil and machine repair costs were estimated on the basis of fuel costs. Oil costs were estimated to be equal to 20 per cent of total fuel costs, and machine repair costs were equal to 100 per cent of total fuel costs.<sup>41</sup>

Labor requirements were based primarily on the calculated tractor or machine hours per acre. To allow for additional labor required for the various field operations, amounts were added to the time requirements determined by the WS formula. The additional amounts were estimated from 10 Ulvilden's data.<sup>42</sup>

<sup>41</sup>Ibid.

<sup>42</sup>Ulvilden, op. cit., pp. 24-47.



Labor costs for all types of production in all areas studied were determined on the basis of \$1.20 per hour.<sup>43</sup>

### Tax and Interest Costs

Tax and interest costs were estimated on the basis of average inventory values of seeding investments, machines and land used in the production of hay and seed. The average inventory value of all items except land was assumed to be equal to one-half the original cost. Land values used in computing tax and interest charges were assumed to be constant over time at a price provided by the county agent of each county.

The investment per acre was calculated for each item except land on the basis of the acreage in the model farm. Once the investment per acre was determined for each item, appropriate tax and interest rates were applied to determine the tax and interest costs per acre of alfalfa. Tax rates for each county were provided by personnel in the Economics Department. The interest rate on land was assumed to be five per cent. An interest rate of six per cent was applied to all other items.

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<sup>43</sup>Berry, op. cit., p. 38.

### Seed Hauling Costs

The most common method of seed marketing was to haul the seed to a local buyer and sell it in bulk form. All types of seed were assumed to be marketed in this way for all the areas. To facilitate comparisons, all seed was assumed to be hauled to market with a one and one-half ton truck. The cost of transportation was 8.4 cents per mile.<sup>44</sup> This rate was applied to the average number of miles growers hauled their seed to market in each area. The labor cost for hauling was estimated on the basis of the number of miles required for a round trip to and from market plus some additional time for unloading.

### Miscellaneous Costs

A miscellaneous cost of 40 cents per acre was charged to all uncertified solid stand fields and was divided equally between hay and seed production. This cost was for insurance, auto expense, social security and other miscellaneous costs. For certified stands the charge was increased to 60 cents per acre. The additional 20 cents was added to the cost of seed production making the miscellaneous cost 40 cents per acre for certified seed production. The 20 cent charge to hay production remained the same as for uncertified stands.

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<sup>44</sup>From unpublished data in Economics Department files.



## CHAPTER V

## DETERMINATION OF PRODUCTION COSTS FOR TRIPP COUNTY

For purposes of this study Tripp County was stratified into two parts. Separate analyses were made for northern and southern Tripp County. The line separating crop adaptation areas C2 and C3 was used as the basis for stratifying the county (Figure 6). It was necessary to do this because the soils and alfalfa seed production methods of the two areas were distinctly different.

For northern Tripp County production costs were estimated for all three types of production. For southern Tripp County, however, production costs were estimated for uncertified and certified solid stands only. No row producers were found in this area, and it is doubtful that this type of production would be feasible, because the sandy soils of the area are very susceptible to erosion.

Nearly all of the alfalfa seed produced in this county was produced under dryland conditions. Because of this, analyses were made only for seed production under dryland conditions.



## Determination of Production Costs for Uncertified Solid Stands in Northern Tripp County

### Basis for Cost Determination

A total of nine uncertified solid stand seed growers was contacted in this area. The information obtained from the growers provided a basis for the determination of production costs. The following paragraphs present a summary of the information which was used in estimating production costs for uncertified solid stands in this area.

Eight of the nine growers contacted in this area planted their alfalfa stands by using the nurse crop method. The most commonly used nurse crop was oats. The modal field operations used for planting alfalfa were as follows: one-way or surflex once, harrow once, plant the oats and alfalfa at the same time with a grain drill, and harrow once again after seeding.

The amount of alfalfa seed used to establish a stand ranged from five to ten pounds per acre. The average amount used by the nine growers was seven pounds per acre.

The number of years alfalfa fields remained in production in this area varied from four to 10 years. On the average, stands were plowed up after the sixth year of production.

Seven of the eight growers who used a small grain nurse crop harvested it for grain by windrowing and threshing with a pick-up combine. The other grower used the straight combine method. All eight growers had straw spreader or chopper attachments on their combines and usually left the nurse crop straw in the field.

The practice of renovating was used by only two of the nine seed producers. These growers harrowed or chiseled their fields only once every few years.

The modal method of hay harvesting was cutting with a self-propelled windrower and stacking with a farmhand hay loader. The second most commonly used method was mowing, raking and baling.

In most cases, producers sprayed for insects when it appeared that there would be a good seed crop or if there was a serious insect infestation. The majority of growers in this area hired custom operators to do their insect spraying. The most commonly used method was by airplane at a custom rate of \$1.75 per acre.

Two methods of alfalfa seed harvesting were used in this area. Six of the nine producers used the straight combine method; the other three used the windrow and pickup combine method. Chemical defoliation was not practiced by any of the nine producers.

The model farm for the northern Tripp County area had a total acreage of 2,810 acres (Table II). Of the 140 acres of alfalfa on this farm, 60 acres were harvested for seed and the remaining 80 acres were harvested for hay only.

TABLE II. LAND USE SUMMARY OF NORTHERN  
TRIPP COUNTY MODEL FARM

Land usage	Acres
Row crops	300
Fallow	200
Small grain	460
All alfalfa	140
Other hay	160
Pasture and waste	1,550
Total	2,810

#### Determination of Production Costs

Inasmuch as the majority of growers in this area used the nurse crop method of stand establishment, the only planting costs charged to the alfalfa enterprise were the alfalfa seed costs. At a price of 45 cents per pound,<sup>45</sup> seed costs were \$3.15 per acre. The total cost was increased to \$3.47 per acre because growers indicated that they had to replant approximately one field out of 10 in order to get a satisfactory stand established. Therefore, the planting cost was 58 cents per acre per year for a stand remaining in production for six years.

The modal machines used for harvesting hay were a 16 foot self-propelled windrower and a farmhand mounted on a three plow gasoline

<sup>45</sup>Berry, op. cit., p. 32.



tractor. The most commonly used machine for seed harvesting was a 16 foot self-propelled combine.

Depreciation costs per acre of alfalfa were estimated on the basis of the acreages in the model farm. The windrower and farmhand were each estimated to be used on 380 acres each year. For the combine, the acreage was estimated to be 520 acres. Using these acreages and the 10 year straight line depreciation method, depreciation costs per acre were 71 cents for the windrower, 26 cents for the farmhand and \$1.46 for the combine (Table III).

TABLE III. DEPRECIATION COSTS PER ACRE FOR ALFALFA HAY  
AND SEED HARVESTING MACHINES ON THE 2,810 ACRE  
MODEL FARM IN NORTHERN TRIPP COUNTY

Machine	Size	Original cost	Years of life	Annual depr.	Annual acres used	Depr. cost per acre
Self-propelled windrower	16'	\$2,700.00	10	\$270.00	380	\$ .71
Farmhand	--	990.00	10	99.00	380	.26
Self-propelled combine	16'	7,600.00	10	760.00	520	1.46

Depreciation costs per hour of use for the tractor were calculated by dividing the annual depreciation cost by an assumed number of hours of annual use. With a projected cost of \$2,800.00 and an estimated life of 10 years, annual depreciation was \$280.00. This, divided

by 800 hours of use annually,<sup>46</sup> gave a depreciation cost of 35 cents per hour for the tractor used for stacking hay.

Machine operating costs per acre including fuel, oil, repairs and labor costs were calculated for the hay and seed harvesting operations. The costs were as follows: windrowing 29 cents, hay stacking \$1.40 and seed combining 91 cents (Table IV).

TABLE IV. TIME REQUIREMENTS AND MACHINE OPERATING COSTS PER ACRE FOR HARVESTING HAY AND SEED FROM UNCERTIFIED SOLID STANDS ON THE 2,810 ACRE MODEL FARM IN NORTHERN TRIPP COUNTY

Operation	Time requirements per acre		Machine operating costs per acre			
	Machine hours	Man hours	Fuel costs	Oil & repair	Labor costs	Total costs
Hay windrowing	.12	.13	\$.06	\$.07	\$.16	\$.29
Hay stacking	.40	.80	.20	.24	.96	1.40
Seed combining	.21	.28	.26	.31	.34	.91

Depreciation costs per acre for the tractor used on the farmhand were 14 cents per acre. This figure was calculated by multiplying the depreciation cost per hour for the tractor by the machine hours required per acre for stacking.

The marketing of seed was accomplished by hauling it to a local buyer by truck soon after combining. Only two of the nine growers

<sup>46</sup>From unpublished material in Economics Department files.

stored their seed for more than one month. The average distance to market was 16 miles. Assuming that a one and one-half ton truck could haul the total seed crop from 60 acres in one load, the truck traveled approximately 32 miles and required 1.5 hours of labor. With trucking costs of 8.4 cents per mile, hauling costs were estimated to be \$2.70. Labor costs for hauling were \$1.80, giving a total cost for seed hauling of \$4.50 for the 60 acres or 7.5 cents per acre.

Taxes on machines and land were estimated on the basis of 1.3 per cent of the average inventory value. The tax charge to hay production was 44 cents per acre and to seed production 46 cents per acre (Table V).

Interest was charged on investment per acre for seeding costs, machinery, and land. The interest rate used was six percent for all items except land, for which five percent was used. Total interest charges were \$3.65 per acre (Table V). This charge was divided between hay and seed enterprises as follows: hay production \$1.78 and seed production \$1.87.



TABLE V. SUMMARY OF TAX AND INTEREST COSTS FOR ONE  
ACRE OF UNCERTIFIED ALFALFA ON THE 2,810 ACRE  
MODEL FARM IN NORTHERN TRIPP COUNTY

Item	Average inventory value	Number of acres	Investment per acre	Tax per acre	Interest per acre
Seeding investment	\$ 1.74	1	\$ 1.74	\$—	\$ .10
16' windrower	1,350.00	380	3.55	.05	.21
Loader	495.00	380	1.30	.02	.08
Three plow tractor	1,400.00	—	1.11	.01	.07
16' combine	3,800.00	520	7.31	.10	.44
Land	55.00	1	55.00	.72	2.75
Total			70.02	.90	3.65

Total production costs for the first cutting of hay were \$5.51 per acre (Table VI). Production costs for the seed crop were \$7.02 per acre and total costs for both the hay and seed crop were \$12.53 per acre.

TABLE VI. SUMMARY OF ANNUAL PRODUCTION COSTS PER ACRE FOR  
ALFALFA HAY AND SEED PRODUCED FROM UNCERTIFIED  
SOLID STANDS ON THE 2,810 ACRE MODEL FARM  
IN NORTHERN TRIPP COUNTY

Cost item	Total costs per acre	Hay costs per acre	Seed costs per acre
<u>Depreciation</u>			
Seed	\$ .58	\$ .29	\$ .29
Machines	2.57	1.11	1.46
<u>Machine operating costs</u>			
Windrowing hay	.29	.29	----
Stacking hay	1.40	1.40	----
Seed combining	.91	----	.91
Seed hauling	.08	----	.08
<u>Insect spraying</u>	1.75	----	1.75
<u>Taxes</u>	.90	.44	.46
<u>Interest</u>	3.65	1.78	1.87
<u>Miscellaneous</u>	.40	.20	.20
Total	12.53	5.51	7.02

### Determination of Production Costs For Certified Solid Stands in Northern Tripp County

In recent years there has not been any certified seed produced from solid stands in this area. Because of this, production costs for this type of production were determined by making the necessary adjustments to the cost estimates for uncertified solid stands in this area. It was assumed that growers would use the same amount of seed in planting certified stands as they used for uncertified fields. In addition, it was assumed that the same field operations would be used in hay and seed harvesting. The cost adjustments were made only in order to account for the additional costs associated with meeting certification requirements.

#### Determination of Production Costs

The establishment of certified solid stand fields was assumed to be supplementary to grain production of the nurse crop except for the cost of the alfalfa seed. In order for an alfalfa field to be eligible for certification, it must be planted to Registered or Foundation seed. Prices of this seed are much higher than the prices of other seed. Approximate retail prices per pound for some of the recommended varieties are as follows: Foundation Vernal \$1.00, Registered Teton \$1.25, and Registered Ranger 50 cents. Prices for Foundation Teton and Ranger are not included because these types of seed are not generally available to growers at the present time.

For purposes of this analysis, a price of \$1.00 per pound was used in determining planting costs of certified fields. At the seven



pound per acre seeding rate, seed costs were \$7.00 per acre. Because growers indicated that they failed to get a satisfactory catch one time out of 10, the seed cost was increased to \$7.78 per acre. Therefore the seed cost was \$1.30 per acre for each year of a six year stand. The seed cost charged to hay production remained at 29 cents per acre because certified stands were assumed to produce as much hay as uncertified stands. The remaining \$1.01 was charged to seed production.

In order for a field to meet certification requirements, all off-type plants must be rogued before the official field inspection. Inasmuch as there were no certified solid stands in this area, roguing costs were based on the roguing requirements indicated by the certified row producers in the area. Three of the four row producers indicated that roguing was necessary in their fields. Two of the three growers estimated that slightly more than one man-hour per acre was required for roguing their fields each year. The other grower indicated that ten man-hours per acre were required the first year because of large amounts of sweet clover. After the first year, however, much less time was required. Inasmuch as roguing requirements varied greatly in this area, an arbitrary figure of 1.5 man-hours per acre was used in this analysis. This gave a roguing cost of \$1.80 per acre per year.

Seed certification costs include a \$1.00 membership fee, a charge of 30 cents per acre, and a charge of two percent of the gross sales value of the seed crop. Because seed yields and prices vary greatly, certification costs for this analysis were assumed to be 72

cents per acre.

Interest costs remained the same as for uncertified fields except for the interest charge on the seed investment. Because of the more expensive seed used in planting certified stands, the interest cost was increased by 13 cents per acre. The additional interest costs were charged to the seed crop. Interest costs for hay production remained the same as for uncertified stands.

Miscellaneous costs were increased from 40 to 60 cents per acre for certified stands in order to cover the extra time involved in certification. The additional 20 cents was charged to seed production only. Miscellaneous charges to hay production remained at 20 cents per acre as in the uncertified analysis.

Total costs for producing a crop of seed from a certified solid stand were estimated to be \$10.59 per acre, assuming a seed crop was harvested each year of the six year life of the stand (Table VII). If a seed crop was not taken every year, the cost of planting the more expensive seed would be charged to fewer seed crops, making it less profitable to produce certified seed. Due to this, total seed production costs increased from \$10.59 per acre when a seed crop was harvested every year to \$14.17 per acre if only one seed crop was taken from a six year stand (Table VIII). The cost of producing the first cutting of hay when the second was used for seed production remained the same at \$5.51 per acre, regardless of how many seed crops were harvested.

TABLE VII. SUMMARY OF ANNUAL PRODUCTION COSTS PER ACRE FOR  
ALFALFA HAY AND SEED PRODUCED FROM CERTIFIED SOLID  
STANDS IN NORTHERN TRIPP COUNTY ON THE  
2,810 ACRE MODEL FARM

Cost item	Total costs per acre	Hay costs per acre	Seed costs per acre
<u>Depreciation</u>			
Seed*	\$1.30	\$ .29	\$1.01
Machines	2.57	1.11	1.46
<u>Machine Operating Costs</u>			
Windrowing hay	.29	.29	----
Stacking hay	1.40	1.40	----
Seed combining	.91	----	.91
Seed hauling	.08	----	.08
<u>Insect Spraying</u>	1.75	----	1.75
<u>Weed Roguing</u>	1.80	----	1.80
<u>Certification Costs</u>	.72	----	.72
<u>Taxes</u>	.90	.44	.46
<u>Interest</u>	3.78	1.78	2.00
<u>Miscellaneous</u>	.60	.20	.40
Total	\$16.10	\$5.51	\$10.59

\*Assumes a seed crop was taken each of the six years.



TABLE VIII. TOTAL HAY AND SEED PRODUCTION COSTS PER ACRE FOR  
 CERTIFIED SOLID STANDS FOR VARYING NUMBERS OF SEED  
 CROPS HARVESTED FROM A SIX YEAR STAND ON THE  
 2,810 ACRE MODEL FARM IN NORTHERN  
 TRIPP COUNTY

Number of seed crops	Total costs per acre	Hay costs per acre	Seed costs per acre
6	\$16.10	\$5.51	\$10.59
5	16.24	5.51	10.73
4	16.46	5.51	10.95
3	16.81	5.51	11.30
2	17.53	5.51	12.02
1	19.68	5.51	14.17

Determination of Production Costs for Certified Row  
 Stands in Northern Tripp County

Basis for Cost Determination

A total of four certified row producers was located in this area. The coming of certified row alfalfa seed production to this area has been rather recent, as all of these growers have begun row production during or since the 1956 growing season. With this limited history, yield potentials and best production practices have not as yet been well established.

Information on stand establishment practices was not available from one of the four growers, because he began operating the farm after the stand was established. The other three growers used the nurse crop

method. Oats was the most commonly used nurse crop.

Modal field operations used to prepare the land for planting were one-waying once and harrowing once. The growers indicated that approximately the same amount of preparation was used when oats was planted alone as when alfalfa was planted with oats.

All three growers planted the nurse crop first with a grain drill and then planted the alfalfa with a four-row planter made specifically for alfalfa. In each case the planter was rented from a local seed dealer at a cost of \$1.00 per acre.

Three of the growers had fields with 40 inch row spacings. The other grower's field had row spacings of 35 inches.

The average amount of seed used in planting row fields was one-half pound per acre.

Since row production of alfalfa seed had been practiced by these growers for only three years or less, the life of row stands could not be established accurately. For purposes of this analysis, the life expectancy of row stands was set at five producing years.

The growers harvested the nurse crop for grain by windrowing with a self-propelled windrower and combining with a pickup combine. The nurse crop straw was spread or chopped and left in the field.

All four of the producers harvested a crop of hay from their fields. They indicated that it was necessary to clip their fields around the first of June in order to get a satisfactory seed set. The most popular methods were to windrow, side-delivery rake, and bale the hay clippings in order to clear the field.

Several different types of cultivation were used by the four producers. The number of field operations varied from one to four each season. The various machines used were row-crop cultivators, one-ways, spiketooth harrows, chisels, and spring tooth harrows. The modal field operations were one-way once, harrow once, and row-crop cultivate once.

One grower indicated that spraying more than once for insects might be necessary in years when early infestations of insects occur. The usual practice, however, was to spray once when the alfalfa was in the early bud stage of development. All growers indicated that it was quite necessary to spray for insects in order to help insure a satisfactory seed crop.

Two methods of seed harvesting were used by the four growers. Chemical defoliation followed by straight combining was used by two of the growers. The other two growers used the windrow-combine method. This analysis considers only the chemical defoliation and straight combine method.

The determination of row production costs for this area was based on the same 2,810 acre model farm as was used in the determination of solid stand production costs.

#### Determination of Production Costs

The establishment of row stands was considered supplementary to the production of the small grain nurse crop. Only those costs which pertained directly to alfalfa planting were included in alfalfa production costs. Assuming a price of \$1.00 per pound, and a planting rate of one-half pound per acre, seed costs were 50 cents per acre. This



cost was not increased to allow for replanting, because the growers obtained satisfactory stands with the first planting.

The machines used in the modal field operations were as follows: 12 foot one-way, 25 foot spiketooth harrow, nine foot side-delivery rake, power-take-off baler, four-row cultivator, 14 foot self-propelled windrower and a 14 foot self-propelled combine. A three-plow gasoline tractor was used on all machines except the windrower and combine.

TABLE IX. SUMMARY OF MACHINE DEPRECIATION COSTS FOR  
CERTIFIED ROW STANDS ON THE 2,810 ACRE MODEL  
FARM IN NORTHERN TRIPP COUNTY

Machine	Size	Original cost	Years of life	Annual depr.	Annual acres used	Depr. cost per acre
One-way	12'	\$ 960.00	10	\$ 96.00	960	\$ .10
Harrow	25'	240.00	10	24.00	820	.03
Cultivator	4 row	530.00	10	53.00	660	.08
Windrower	14'	2,600.00	10	260.00	380	.68
S. D. rake	9'	520.00	10	52.00	380	.14
Baler	--	1,900.00	10	190.00	380	.68
Combine	14'	7,500.00	10	750.00	520	1.44

Machine operating costs per acre including fuel, oil, repairs and labor costs were calculated for each of the modal field operations (Table X).

TABLE X. TIME REQUIREMENTS AND MACHINE OPERATING COSTS PER ACRE  
FOR HARVESTING HAY AND SEED FROM CERTIFIED ROW  
STANDS ON THE 2,810 ACRE MODEL FARM IN  
NORTHERN TRIPP COUNTY

Operation	Time Requirement per acre		Machine operating costs per acre			
	Machine hours	Man hours	Fuel costs	Oil & repair costs	Labor costs	Total costs
Planting	.18	.20	\$.09	\$.11	\$.24	\$.44
One-waying	.28	.29	.22	.26	.35	.83
Harrowing	.08	.09	.04	.05	.11	.20
Cultivating	.18	.19	.09	.11	.23	.43
Raking	.22	.23	.08	.10	.28	.46
Baling*	.20	.24	.18	.21	.29	.91
Hauling and storing bales	.40**	.80**	.15	.18	.96	1.29
Windrowing	.14	.15	.07	.08	.18	.33
Combining	.24	.30	.29	.35	.36	1.00

\*Total includes costs of 23 cents for baling twine.

\*\*Source: Ulvilden, op. cit., p. 35.

The tractor was used 1.36 hours per acre in carrying out the annual field operations. With depreciation cost of 35 cents per hour, tractor depreciation costs were 48 cents per acre. These costs were apportioned 34 cents to hay production and 14 cents to seed production.

The total tax cost was 95 cents per acre (Table XI). This cost was apportioned 29 cents to hay production and 66 cents to seed production. The total interest cost was \$3.83 per acre. This cost was

TABLE XI. SUMMARY OF TAX AND INTEREST COSTS PER ACRE OF  
CERTIFIED ROW ALFALFA ON THE 2,810 ACRE MODEL  
FARM IN NORTHERN TRIPP COUNTY

Item	Average inventory value	Number of acres	Investment per acre	Tax per acre	Interest per acre
Seeding	\$ 1.00	1	\$ 1.00	\$---	\$ .06
One-way	480.00	960	.50	.01	.03
Harrow	120.00	820	.15	.01	.01
Cultivator	265.00	660	.40	.01	.02
Rake	260.00	380	.68	.01	.04
Baler	950.00	380	2.50	.03	.15
Windrower	1,300.00	380	3.42	.04	.20
Combine	3,750.00	520	7.21	.09	.43
Land	55.00	1	55.00	.72	2.75
Tractor	1,400.00	---	2.38	.03	.14
Total			73.24	.95	3.83

apportioned \$1.29 to hay production and \$2.54 to seed production.

Stand establishment costs including seed costs, planter rent, machine depreciation, and operating costs totaled \$2.00 per acre. For each of the five years, stand establishment costs were 40 cents per acre. These annual costs were apportioned 10 cents to hay production and 30 cents to seed production.

Several cost items remained the same as in the uncertified solid stands analysis. These costs were seed hauling, insect spraying,



weed roguing, certification, and miscellaneous costs. Chemical defoliation costs were \$4.00 per acre. This was the typical custom rate in the area.

Total production costs per acre were \$6.95 for the hay crop and \$16.09 for the seed crop, a total of \$23.04 (Table XII). If the windrow and pickup-combine method of seed harvesting were used, total seed production costs would be about \$3.00 per acre less.

TABLE XII. SUMMARY OF ANNUAL PRODUCTION PER ACRE FOR ALFALFA  
HAY AND SEED PRODUCED FROM CERTIFIED ROW STANDS  
ON THE 2,810 ACRE MODEL FARM IN  
NORTHERN TRIPP COUNTY

Cost item	Total costs per acre	Hay costs per acre	Seed costs per acre
<u>Depreciation</u>			
Stand establishment	\$ .40	\$ .10	\$ .30
Machines*	3.46	1.72	1.74
<u>Machine operating costs</u>			
One-waying	.83	.21	.62
Harrowing	.20	.05	.15
Cultivating	.43	.10	.33
Windrowing hay	.33	.33	--
Raking hay	.46	.46	--
Baling hay	.91	.91	--
Bale hauling and storing	1.29	1.29	--
Combining seed	1.00	--	1.00
Hauling seed	.08	--	.08
<u>Chemical defoliation</u>	4.00	--	4.00
<u>Insect spraying</u>	1.75	--	1.75
<u>Weed roguing</u>	1.80	--	1.80
<u>Certification costs</u>	.72	--	.72
<u>Taxes</u>	.95	.29	.66
<u>Interest</u>	3.83	1.29	2.54
<u>Miscellaneous</u>	.60	.20	.40
Total	23.04	6.95	16.09

\*Machines other than planter. Depreciation cost for seed production includes a charge of 15 cents per acre for wagons used in bale hauling.

Determination of Production Costs for Uncertified  
Solid Stands in Southern Tripp County

Basis for Cost Determination

A total of 16 uncertified solid stand seed growers were contacted in this area. The information obtained from these growers provided a basis for determining production costs. The following paragraphs present a summary of the information that was used in determining production costs for this area.

The nurse crop method of stand establishment used by 15 of the 16 growers. The nurse crop was oats in all cases. The modal field operations used in planting were single disking twice, spiketooth harrowing once, and planting the oats and alfalfa in one operation with a grain drill.

The amount of alfalfa seed used in planting varied from 5 to 10 pounds per acre. The average amount used was eight pounds per acre.

The number of years fields remained in production in this area ranged from 4 to more than 10 years. On the average, fields remained in production for eight years.

The nurse crop was harvested for grain in nearly all cases. It was harvested by either straight combining or by windrowing and pickup combining. The oats straw was usually chopped or spread and left in the field.

Renovation of alfalfa fields was not a regular practice with any of the growers in this area. Because of this it was not included in the cost determination.



The modal field operations for hay harvesting in this area were mowing, dump raking and stacking.

Insect spraying had been used by 10 of the 16 growers. In general, growers sprayed for insects when they intended to harvest seed from the second cutting. Most growers hired the spraying done by custom operators. The custom rate was \$1.75 per acre.

The straight combine method was used in seed harvesting by 14 of the 16 growers in this area. The other two used the windrow and pickup combine method. None of the growers used chemical defoliation in seed harvesting.

The model farm for Southern Tripp County had a total acreage of 1,380 acres (Table XIII). Of the 170 acres of alfalfa on this farm, 60 acres were harvested for seed. The other 110 acres were harvested for hay only.

TABLE XIII. LAND USE SUMMARY OF SOUTHERN TRIPP  
COUNTY MODEL FARM

Land Usage	Acres
Row crops	110
Small grain	100
Alfalfa	170
Other hay	200
Pasture and waste	800
Total	1,380

### Determination of Production Costs

Alfalfa planting was assumed to be supplementary to oats production except for the alfalfa seed costs. With a planting rate of eight pounds of alfalfa seed per acre and a seed price of 45 cents per pound, planting costs were \$3.60 per acre. This cost was increased to \$4.00 per acre because growers indicated that it was necessary to replant one time in ten. Therefore, the planting cost was 50 cents per acre per year for a stand remaining in production for eight years. This cost was divided equally between hay and seed production costs.

The machines most commonly used in hay and seed production were a seven foot tractor mower, a twelve foot dump rake, a farmhand, and a six foot pull-type combine with motor. A three-plow tractor was used on all of the machines.

Depreciation costs for the machines were calculated on the basis of the acreages on the model farm. The mower, rake, and farmhand were assumed to be used on 450 acres per year. For the combine, the acreage used was estimated to be 160 acres. Depreciation costs per acre were as follows: mower 70 cents, rake 4 cents, farmhand 22 cents and combine \$1.75 (Table XIV).

TABLE XIV. DEPRECIATION COSTS PER ACRE FOR ALFALFA HAY  
AND SEED HARVESTING MACHINES ON THE 1,380 ACRE  
MODEL FARM IN SOUTHERN TRIPP COUNTY

Machine	Size	Original cost	Years of life	Annual depr.	Annual acres used	Depr. cost per acre
Mower	7'	\$330.	10	\$33.	450	\$.07
Dump rake	12'	170.	10	17.	450	.04
Farmhand	--	990.	10	99.	450	.22
Combine	6'	2,800.	10	280.	160	1.75

Machine operating costs per acre were calculated for each of the hay and seed harvesting operations. The costs were as follows: mowing 67 cents, dump-raking 40 cents, hay stacking \$1.40 and seed combining \$1.97 (Table XV).

TABLE XV. TIME REQUIREMENTS AND MACHINE OPERATING COSTS  
PER ACRE FOR HARVESTING HAY AND SEED FROM UNCERTI-  
FIED SOLIDS STANDS ON THE 1,380 ACRE MODEL  
FARM IN SOUTHERN TRIPP COUNTY

Operation	Time required per acre		Machine operating costs per acre			
	Machine hours	Man hours	Fuel costs	Oil & repair	Labor costs	Total costs
Mowing	.32	.34	\$.12	\$.14	\$.41	\$.67
Dump-raking	.19	.21	.07	.08	.25	.40
Hay stacking	.40	.80	.20	.24	.96	1.40
Seed combining	.56	.62	.56	.67	.74	1.97



The tractor was used .91 hour per acre for hay production and .56 hour per acre for seed harvesting (Table XV). With a depreciation cost of 35 cents per hour for the tractor, depreciation costs were 32 cents per acre for hay production and 20 cents per acre for seed production.

Total tax charges were 75 cents per acre (Table XVI). These charges were apportioned 34 cents to hay production and 41 cents to seed production. Total interest charges were \$3.14 per acre (Table XVI). These charges were apportioned \$1.38 to hay production and \$1.76 to seed production.

TABLE XVI. SUMMARY OF TAX AND INTEREST COSTS PER ACRE OF  
UNCERTIFIED SOLID STAND ALFALFA ON THE 1,380 ACRE  
MODEL FARM IN SOUTHERN TRIPP COUNTY

Item	Average inventory value	Number of acres	Investment per acre	Tax per acre	Interest per acre
Seeding investment	\$ 2.00	1	\$ 2.00	\$---	\$ .12
Mower	165.00	450	.37	.01	.02
Dump rake	85.00	450	.19	.01	.01
Farmhand	495.00	450	1.10	.01	.07
Combine	1,400.00	160	8.75	.11	.52
Tractor	1,400.00	---	2.57	.03	.15
Land	45.00	1	45.00	.58	2.25
Total			59.98	.75	3.14

TABLE XVII. SUMMARY OF ANNUAL PRODUCTION COSTS PER ACRE FOR  
ALFALFA HAY AND SEED PRODUCED FROM UNCERTIFIED SOLID  
STANDS ON THE 1,380 ACRE MODEL FARM IN  
SOUTHERN TRIPP COUNTY

Cost item	Total Costs per acre	Hay costs per acre	Seed costs per acre
<u>Depreciation</u>			
Seed	\$ .50	\$ .25	\$ .25
Machine	2.60	.65	1.95
<u>Machine operating costs</u>			
Mowing	.67	.67	--
Dump raking	.40	.40	--
Hay stacking	1.40	1.40	--
Seed combining	1.97	--	1.97
Seed hauling	.08	--	.08
<u>Insect spraying</u>	1.75	--	1.75
<u>Taxes</u>	.75	.34	.41
<u>Interest</u>	3.14	1.38	1.76
<u>Miscellaneous</u>	.40	.20	.20
Total	13.66	5.29	8.37

Total production costs for the first cutting of hay were \$5.29 per acre (Table XVII). Total costs for producing a crop of uncertified alfalfa seed in Southern Tripp county were estimated to be \$8.37 per acre. The total cost for producing both the hay and the seed crop was \$13.66 per acre.

## Determination of Production Costs For Certified Solid Stands in Southern Tripp County

### Basis for Cost Determination

There were no certified solid stand alfalfa seed growers located in southern Tripp County. Because of this, production costs were determined by making the necessary adjustments to the production costs for uncertified solid stands in this area. It was assumed that the same seeding rates and field operations would be used for producing hay and seed from certified solid stands.

### Determination of Production Costs

Stand establishment was assumed to be supplementary to grain production of the nurse crop except for the cost of the alfalfa seed. At the eight pound per acre planting rate and a price of \$1.00 per pound for seed, alfalfa seed costs were \$8.00 per acre. Because growers failed to get a satisfactory stand established in one time out of 10, the cost was increased to \$8.88 per acre. The annual seed cost was \$1.11 for each year of an eight year stand. This cost was apportioned 25 cents to hay production and 86 cents to seed production.

Weed roguing costs were assumed to be the same as they were for certified stands in northern Tripp County (\$1.80 per acre).

Certification costs were assumed to be 72 cents per acre. This was based on a gross income from seed of \$20.00 per acre and a certified acreage of 60 acres.

Interest charges for seed production were increased from \$1.76



to \$1.90 per acre because of the increased cost of the alfalfa seed used in planting.

All other costs remained the same as for uncertified solid stands in this area except miscellaneous costs. The miscellaneous cost for seed production was increased from 20 to 40 cents per acre.

Total costs for producing a crop of seed from a certified solid stand were \$11.83 per acre when seed was taken every year (Table XVIII). If a seed crop was not harvested every year the additional cost of planting Foundation or Registered seed would be charged to fewer seed crops making the annual cost greater. Due to these additional costs, total seed production costs per acre increased from \$11.83 per acre when seed was harvested every year to \$16.10 per acre when only one seed crop was harvested from an eight year stand (Table XIX).

TABLE XVIII. SUMMARY OF ANNUAL PRODUCTION COSTS PER ACRE FOR ALFALFA  
HAY AND SEED PRODUCED FROM CERTIFIED SOLID STANDS ON THE  
1,380 ACRE MODEL FARM IN SOUTHERN TRIPP COUNTY

Cost item	Total costs per acre	Hay costs per acre	Seed costs per acre
<u>Depreciation</u>			
Seed*	\$1.11	\$ .25	\$ .86
Machines	2.60	.65	1.95
<u>Machine operating costs</u>			
Mowing	.67	.67	--
Dump raking	.40	.40	--
Hay stacking	1.40	1.40	--
Seed combining	1.97	--	1.97
Seed hauling	.08	--	.08
<u>Insect spraying</u>	1.75	--	1.75
<u>Weed roquing</u>	1.80	--	1.80
<u>Certification costs</u>	.71	--	.71
<u>Taxes</u>	.75	.34	.41
<u>Interest</u>	3.28	1.38	1.90
<u>Miscellaneous</u>	.60	.20	.40
Total	17.12	5.29	11.83

\*Assumes a seed crop was harvested each of the eight years.

TABLE XIX. TOTAL HAY AND SEED PRODUCTION COSTS PER ACRE FOR CERTIFIED  
SOLID STANDS FOR VARYING NUMBERS OF SEED CROPS HARVESTED FROM AN  
EIGHT YEAR STAND ON THE 1,380 ACRE MODEL FARM  
IN SOUTHERN TRIPP COUNTY

Number of seed crops	Total costs per acre	Hay costs per acre	Seed costs per acre
8	\$17.12	\$5.29	\$11.83
7	17.21	5.29	11.92
6	17.32	5.29	12.03
5	17.49	5.29	12.20
4	17.73	5.29	12.44
3	18.14	5.29	12.85
2	18.95	5.29	13.66
1	21.39	5.29	16.10



## CHAPTER VI

DETERMINATION OF PRODUCTION COSTS  
FOR BROWN COUNTYDetermination of Production Costs For Uncertified  
Solid Stands in Brown CountyBasis for Cost Determination

A total of 28 uncertified solid stand seed growers were contacted in Brown County. The information obtained from the growers provided a basis for determining production costs. The following paragraphs present a summary of the information which was used in estimating production costs.

All 28 of the growers used the nurse crop method of stand establishment. The most commonly used nurse crops were oats, flax and spring wheat. The modal method of planting was plowing with a mold board plow followed by a pony-press drill; 22 of the 28 growers used this method. The second most commonly used method was plowing, spike-tooth harrowing and planting with a grain drill.

The amount of alfalfa seed used in stand establishment ranged from 3 to 15 pounds per acre. The average for all growers was nine pounds per acre.

The number of years alfalfa stands remained in production ranged from 2 to 9 years. On the average, stands were plowed up after the fourth year of production.

The nurse crop was harvested for grain by straight combining or windrowing and pickup combining.

Two methods of hay cutting were used by the growers contacted in this county. Windrowing was used by 14 of the growers, whereas mowing and side-delivery raking were used by the other 14 growers. For purposes of this study, windrowing was considered to be the modal method of hay cutting.

Baling was the modal method of putting up hay, as 17 of the growers used this method; the remaining 11 usually stacked their hay.

Renovation was practiced by only six of the growers. Because of this, renovation was not considered a modal field operation in this analysis.

Insect spraying had been used by 20 of the growers. Most growers hired insect spraying done by custom operators with airplanes. The custom rate was \$2.00 per acre in most cases. Insect spraying was considered a modal operation because most growers indicated that it was advisable to spray if a seed crop was to be harvested.

The modal method of alfalfa seed harvesting was the windrow and pickup combine method. This method was used by 21 of the 28 producers. The other commonly used method was straight combining. None of the producers used chemical defoliation.

Seed produced in this county was usually sold in the dirt soon after harvest. It was usually hauled by truck to a local buyer in bulk form. A few growers however, did clean, sack and retail their seed from the farm yard. Marketing costs were 8 cents per acre as in Tripp County.

The model farm for Brown County had a total acreage of 1,790 acres (Table XX). Of the 220 acres of alfalfa on this farm, 35 acres



TABLE XX. LAND USE SUMMARY OF BROWN COUNTY MODEL FARM

Land Usage	Acres
Row crops	380
Fallow	240
Small grain	695
Alfalfa	220
Other hay	40
Pasture and waste	215
Total	1,790

were harvested for seed and the remaining 185 were harvested for hay only.

#### Determination of Production Costs

Alfalfa planting was assumed to be supplementary to grain production of the nurse crop except for the cost of the alfalfa seed. With a nine pound per acre planting rate and a price of 45 cents per pound, alfalfa seed costs were \$4.05 per acre. This cost was increased to \$4.50 per acre because of growers failure to get a satisfactory catch in one time out of 10. For each year of a four year stand the seed cost was \$1.12 per acre. This cost was divided equally between hay and seed production.

The modal machines used for hay and seed harvesting were a 14 foot self-propelled windrower, a power-take-off baler pulled by a three-plow gasoline tractor, and a 14 foot self-propelled combine.



TABLE XXI. DEPRECIATION COSTS PER ACRE FOR ALFALFA HAY  
AND SEED HARVESTING MACHINES IN THE 1,790 ACRE  
MODEL FARM IN BROWN COUNTY

Machine	Size	Original cost	Years of life	Annual depre- ciation	Annual acres used	Depreciation cost per acre
Windrower	14'	\$2600.	10	\$260.	440	\$ .59
Baler	--	1900.	10	190.	480	.40
Combine	14'	7500.	10	750.	730	1.03

Depreciation costs per acre for the three machines were calculated on the basis of the acreage in the model farm. Depreciation costs per acre were 59 cents for the windrower, 40 cents for the baler and \$1.03 per acre for the combine (Table XXI).

Machine operating costs per acre were 33 cents for windrowing (hay or seed), \$1.43 for baling, \$2.48 for bale hauling and storing and \$1.00 per acre for combining (Table XXII).

TABLE XXII. TIME REQUIREMENTS AND MACHINE OPERATING COSTS PER  
ACRE FOR HARVESTING HAY AND SEED FROM UNCERTIFIED  
SOLID STANDS ON THE 1,790 ACRE MODEL FARM  
IN BROWN COUNTY

Operation	Time Requirements		Machine operating costs per acre			
	Machine hours	Man hours	Fuel costs	Oil & repair	Labor costs	Total costs
Windrowing	.14	.15	\$ .07	\$ .08	\$ .18	\$ .33
Baling*	.24	.26	.26	.31	.31	1.43
Bale hauling and storing	.80**	1.50**	.31	.37	1.80	2.48
Combining	.24	.30	.29	.35	.36	1.00

\*Includes a cost of 55 cents for baling twine.

\*\*Source: Ulvilden, op. cit., p. 35.

The tractor was used 1.24 hours per acre in hay harvesting (Table XXII). With a depreciation cost of 35 cents per hour depreciation costs for the tractor were 43 cents per acre. There were no tractor depreciation costs charged to seed production.

Total tax charges based on a rate of 1.7 per cent of actual value were \$1.79 per acre (Table XXIII). The charges were 88 cents per acre for hay production and 91 cents per acre for seed production.

Total interest charges were \$5.56 per acre. The interest charges were \$2.75 per acre for hay production and \$2.81 per acre for seed production.

TABLE XXIII. SUMMARY OF TAX AND INTEREST CHARGES FOR ONE ACRE  
OF UNCERTIFIED SOLID STAND ALFALFA ON THE 1,790 ACRE  
MODEL FARM IN BROWN COUNTY

Item	Average inventory value	Number of acres	Investment per acre	Tax per acre	Interest per acre
Seed	\$ 2.25	1	\$ 2.25	\$ --	\$ .14
Windrower (hay and seed)	1,300.00	440	2.95	.10	.36
Baler	950.00	480	1.98	.03	.12
Tractor	1,400.00	---	2.17	.04	.13
Combine	3,750.00	730	5.14	.09	.31
Land	90.00	1	90.00	1.53	4.50
Total			104.49	1.79	5.56

Total production costs for the first cutting of hay were \$10.20 per acre (Table XXIV). Total costs for producing a crop of uncertified alfalfa seed in Brown County were \$9.51 per acre (Table XXIV). The costs of producing both a hay and a seed crop were \$19.71 per acre.



TABLE XXIV. SUMMARY OF ANNUAL PRODUCTION COSTS PER ACRE FOR  
ALFALFA HAY AND SEED PRODUCED FROM UNCERTIFIED  
SOLID STANDS ON THE 1,790 ACRE MODEL  
FARM IN BROWN COUNTY

Cost item	Total costs per acre	Hay costs per acre	Seed costs per acre
<u>Depreciation</u>			
Seed	\$1.12	\$ .56	\$ .56
Machines	3.19	1.57*	1.62
<u>Machine operating costs</u>			
Windrowing	.66	.33	.33
Baling	1.43	1.43	--
Bale hauling and storing	2.48	2.48	--
Seed combining	1.00	--	1.00
Seed hauling	.08	--	.08
<u>Insect spraying</u>	2.00	--	2.00
<u>Taxes</u>	1.79	.88	.91
<u>Interest</u>	5.56	2.75	2.81
<u>Miscellaneous</u>	.40	.20	.20
Total	19.71	10.20	9.51

\*Includes a cost of 15 cents for wagons used in bale hauling.

## Determination of Production Costs for Certified Solid Stands in Brown County

### Basis for Cost Determination

There were no certified solid stand seed producers located in Brown County. The determination of production costs for certified solid stands was made by adjusting the costs for uncertified solid stands for this county. It was assumed that growers would use the same amounts of seed as they used when planting uncertified stands. It was also assumed that the same hay and seed harvesting operations would be used. The cost of producing the hay crop remained the same as for uncertified stands with all of the additional costs of certification being charged to seed production.

### Determination of Production Costs

The establishment of certified solid stands was assumed to be supplementary to grain production of the nurse crop except for the cost of the alfalfa seed. With a seeding rate of nine pounds per acre and a seed price of \$1.00 per pound, seed costs were \$9.00 per acre. This cost was increased to \$10.00 per acre because of growers who failed to get a satisfactory stand established in one time out of 10. For each year of a four year stand the seed cost was \$2.50 per acre. The seed cost was apportioned 56 cents to hay production and \$1.94 per acre for seed production.

Weed roguing requirements were determined from estimates made by certified row producers in the area. The average amount of time required for hand roguing was .6 man hour per acre. With a labor cost of \$1.20

per hour, roguing costs were 72 cents per acre.

Certification costs were estimated to be 73 cents per acre. This includes the 3 cents membership fee, a 30 cent per acre charge for inspection and a 40 cent per acre charge based on two percent of a seed crop valued at \$20.00 per acre.

The interest cost to seed production was increased from \$2.81 to \$2.95 per acre because of the added investment associated with planting the more expensive seed.

Total costs for producing a seed crop from certified solid stands were \$12.68 per acre if seed were harvested every year (Table XXV). If a seed crop was not harvested every year the cost of planting the more expensive seed would be charged to fewer seed crops making annual production costs higher. Seed production costs would be as high as \$16.80 per acre if only one seed crop was harvested from a four year stand (Table XXVI).



TABLE XXV. SUMMARY OF ANNUAL PRODUCTION COSTS PER ACRE FOR  
ALFALFA HAY AND SEED PRODUCED FROM CERTIFIED SOLID  
STANDS ON THE 1,790 ACRE MODEL FARM IN  
BROWN COUNTY

Cost item	Total costs per acre	Hay costs per acre	Seed costs per acre
<u>Depreciation</u>			
Seed*	\$2.50	\$ .56	\$1.94
Machines	3.19	1.57	1.62
<u>Machine operating costs</u>			
Windrowing	.66	.33	.33
Baling	1.43	1.43	--
Bale hauling and storing	2.48	2.48	--
Seed combining	1.00	--	1.00
Seed hauling	.08	--	.08
<u>Insect spraying</u>	2.00	--	2.00
<u>Weed roguing</u>	.72	--	.72
<u>Certification costs</u>	.73	--	.73
<u>Taxes</u>	1.79	.88	.91
<u>Interest</u>	5.70	2.75	2.95
<u>Miscellaneous</u>	.60	.20	.40
Total	22.88	10.20	12.68

\*Assumes a seed crop taken every year.

TABLE XXVI. TOTAL HAY AND SEED PRODUCTION COSTS PER ACRE FOR  
 CERTIFIED SOLID STANDS FOR VARYING NUMBER OF SEED CROPS  
 HARVESTED FROM A FOUR YEAR STAND ON THE 1,790  
 ACRE MODEL FARM IN BROWN COUNTY

Number of seed crops	Total costs per acre	Hay costs per acre	Seed costs per acre
4	\$22.88	\$10.20	\$12.68
3	23.33	10.20	13.13
2	24.25	10.20	14.05
1	27.00	10.20	16.80

Determination of Production Costs for Certified  
 Row Stands in Brown County

Basis for Cost Determination

The determination of row production costs for this area was made on the basis of information obtained from three growers. At the time the survey of growers was conducted, only one certified row producer was located in Brown County. Because of this, information on production practices was obtained from an uncertified row seed producer in the county and from a certified row seed producer located in an adjoining county. The information obtained from these two growers was used to supplement the data obtained from the certified row producer located in Brown County. The following paragraphs present a summary of the information which was used as a basis for determining production costs.

The same general methods of stand establishment were used by these growers as were used by the solid stand producers in the area.

The alfalfa was planted with a nurse crop of small grain. The modal method was plowing followed by a press drill which planted the small grain and the alfalfa at the same time. The average amount of alfalfa seed planted was approximately one pound per acre.

The number of years which a row stand remained in production could not be established accurately from the information obtained from the growers. Because of this, row stands were assumed to have a producing life of five years.

The amount of cultivation varied from 2 to 6 field operations per year. The modal field operations were tandem disking once and row-crop cultivating twice.

Insect spraying and seed harvesting were done by the same methods as were used by the solid stand growers in this area.

The determination of row production costs was based on the same model farm as was used in the solid analysis in Brown County.

#### Determination of Production Costs

The establishment of row stands was assumed to be supplementary to grain production of the nurse crop except for the cost of the alfalfa seed. With a planting rate of one pound per acre and a seed price of \$1.00 per pound, planting costs were \$1.00 per acre. For each year of a five year stand, the planting cost was 20 cents per acre. This cost was apportioned, 5 cents to hay production and 15 cents to seed production.

The modal machines used in hay and seed production were: a 10 foot tandem disk, a four-row cultivator, a 14 foot self-propelled



windrower, a power-take-off baler and a 14 foot self-propelled combine. A four-plow gasoline tractor was used on all machines that were not self-propelled.

Depreciation costs for the machines other than the tractor were estimated on the basis of the acreage of the model farm. Depreciation costs for these machines totaled \$1.05 for hay production and \$1.81 for seed production (Table XXVII).

TABLE XXVII. SUMMARY OF MACHINE DEPRECIATION COSTS FOR  
CERTIFIED ROW STANDS ON THE 1,790 ACRE MODEL  
FARM IN BROWN COUNTY

Machine	Size	Original cost	Years of life	Annual depr.	Annual acres used	Depr. cost per acre
Tandem disk	10'	\$420.00	10	\$42.00	620	\$ .07
Cultivator	4 row	690.00	10	69.00	760	.09*
Windrower (hay or seed)	14'	2,600.00	10	260.00	440	.59
Baler	--	1,900.00	10	190.00	480	.40
Combine	14'	7,500.00	10	750.00	730	1.03

\*Costs were 18 cents per acre for two cultivatings.

Machine operating costs including fuel, oil, repairs, and labor costs were calculated for each of the modal field operations (Table XXVIII).

TABLE XXVIII. TIME REQUIREMENTS AND MACHINE OPERATING COSTS PER  
ACRE FOR PRODUCING HAY AND SEED FROM CERTIFIED ROW  
STANDS ON THE 1,790 ACRE MODEL FARM  
IN BROWN COUNTY

Operation	Time requirements per acre		Machine operating costs per acre			
	Machine hours	Man hours	Fuel costs	Oil & repair	Labor costs	Total costs
Disking	.33	.34	\$.19	\$.23	\$.41	\$ .83
Cultivating*	.24	.25	.14	.17	.30	.61
Windrowing	.14	.15	.07	.08.	.18	.33
Baling**	.24	.26	.17	.20	.31	.91
Hauling and storing bales	.40***	.80***	.18	.22	.96	1.36
Combining	.24	.30	.29	.35	.36	1.00

\*Figures are for one cultivating only.

\*\*Includes a cost of 23 cents for baling twine.

\*\*\*Source: Ulvilden, op. cit., p. 35.

The tractor was used a total of 1.45 hours per acre in carrying out the annual field operations. Assuming the tractor was used 800 hours per year and that it had an annual depreciation cost of \$330.00, depreciation costs were 41 cents per hour. Total tractor depreciation costs per acre for the tractor were 59 cents per acre. This cost was apportioned 34 cents to hay production and 25 cents to seed production.

The total tax cost was \$1.83 per acre (Table XXIX). This cost was apportioned 50 cents to hay production and \$1.33 to seed production.

TABLE XXIX. SUMMARY OF TAX AND INTEREST COSTS FOR ONE ACRE  
OF CERTIFIED ROW ALFALFA ON THE 1,790 ACRE  
MODEL FARM IN BROWN COUNTY

Item	Average inventory value	Number of acres	Investment per acre	Tax per acre	Interest per acre
Seed	\$ .50	1	\$ .50	\$ --	\$ .03
Disk	210.00	620	.34	.01	.02
Cultivator	345.00	760	.45	.02	.05
Windrower (hay and seed)	1,300.00	440	2.95	.10	.36
Baler	950.00	480	1.98	.03	.12
Tractor	1,650.00	---	2.98	.05	.18
Combine	3,750.00	730	5.14	.09	.31
Land	90.00	1	90.00	1.53	4.50
Total				1.83	5.57

The total interest cost was \$5.57 per acre. This cost was apportioned \$1.55 to hay production and \$4.02 to seed production.

Total production costs per acre were \$7.26 for the hay crop and \$14.05 for the seed crop, a total of \$21.31 per acre (Table XXX).



TABLE XXX. SUMMARY OF ANNUAL PRODUCTION COSTS PER ACRE FOR ALFALFA  
HAY AND SEED PRODUCED FROM CERTIFIED ROW STANDS ON THE 1,790  
ACRE MODEL FARM IN BROWN COUNTY

Cost item	Total costs per acre	Hay costs per acre	Seed costs per acre
<u>Depreciation</u>			
Seed	\$ .20	\$ .05	\$ .15
Machines	3.60	1.54*	2.06
<u>Machines operating costs</u>			
Disking	.83	.21	.62
Cultivating	1.22	.61	.61
Windrowing	.66	.33	.33
Baling	.91	.91	--
Bale hauling & storing	1.36	1.36	--
Seed combining	1.00	--	1.00
Seed hauling	.08	--	.08
<u>Insect spraying</u>	2.00	--	2.00
<u>Weed roguing</u>	.72	--	.72
<u>Certification costs</u>	.73	--	.73
<u>Taxes</u>	1.83	.50	1.33
<u>Interest</u>	5.57	1.55	4.02
<u>Miscellaneous</u>	.60	.20	.40
Total	21.31	7.26	14.05

\*Includes a 15 cent cost for wagons used in bale hauling.

## CHAPTER VII

COMPARISONS OF NET RETURNS FROM CERTIFIED AND UNCERTIFIED  
ALFALFA SEED PRODUCTION

The purpose of this chapter was to compare the profitability of alfalfa seed production on the three alternative types of stands: uncertified solid stands, certified solid stands and certified row stands.

## Methods

Certified Versus Uncertified Solid Stands

Comparisons of the profitability of certified and uncertified solid stand production were made on the basis of estimated net returns per acre. Net returns for the two types of production were estimated from total gross returns of both the hay and seed crops and the production costs for hay and seed production computed in the preceding chapters.

It was assumed that hay and seed yields were the same for uncertified and certified solid stands. Gross returns for the hay crop were the same for both types of production and were based on a price of \$14.00 per ton.<sup>47</sup> Gross returns for the two types of production in each county differed only because of the higher prices paid to growers for certified seed.

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<sup>47</sup>Russell L. Berry, Prices and Costs For Use in Farm and Ranch Planning, Pamphlet 92, p. 24, Agricultural Experiment Station, South Dakota State College: Brookings, South Dakota, October, 1957.



Uncertified seed prices ranged from as low as 12 cents per pound for poor quality seed to as high as 30 cents per pound for higher quality seed produced from fields planted to the newer varieties such as Ranger and Vernal. The average price received by the growers in the two counties for uncertified seed in 1958 was 22 cents per pound.

Prices paid to growers for certified seed varied greatly, depending primarily on the variety of seed. Two different varieties of certified seed of similar purity and germination commanded different prices. The average price received for certified Vernal was 40 cents per pound and the average price received for certified Ranger was 31 cents per pound. One grower who produced certified Narragansett received a price of 60 cents per pound for his 1957 seed crop and 55 cents per pound for his 1958 seed crop. In general the newly released varieties command higher prices than the older varieties.

It was assumed that the same number of seed crops would be harvested during the life of a certified solid stand as were harvested from an uncertified solid stand. It was necessary to make this assumption because production costs varied for certified solid stands as different numbers of seed crops were harvested from a stand with a given number of years of productive life.

Once the basis for gross returns and production costs for the hay crop and the seed crop had been determined, net returns were computed for the two types of solid stand production. Because seed yields varied greatly, net returns were computed for yields ranging from 10 to 110 pounds per acre. In addition, net returns were calculated for



varying seed prices. In the case of uncertified stands, net returns were computed for prices ranging from 10 to 30 cents per pound. In the case of certified stands, net returns were computed for seed prices ranging from 30 to 60 cents per pound.

Although net returns for uncertified stands were calculated for varying seed prices, it was necessary to select a single uncertified seed price in order to compare net returns of the two types of production at varying certified seed prices and seed yield levels. The uncertified seed price used was 22 cents per pound, which was the average price received by growers.

Comparisons of the profitability of the two types of production were made at varying yield levels by comparing net returns of certified solid stands at varying seed prices with net returns of uncertified solid stands based on a price of 22 cents per pound. Comparisons were made in this manner because less variation occurred in uncertified seed prices.

#### Certified Row Versus Certified Solid Stands

Net returns from certified row stands were computed for seed yields of 30 through 170 pounds per acre at prices ranging from 30 to 60 cents per pound. Returns from the hay crop were computed on the basis of \$14.00 per ton, the same as in the solid stand analysis.

Due to a lack of adequate seed yield data on row production, the average yields to be expected could not be established accurately in this study. The net returns for row stands indicated were only estimates of what the net returns would be if the various seed yields

were obtained.

Because of the lower hay yields associated with row stands, it was necessary to obtain higher seed yields from certified row stands than from certified solid stands in order to receive the same net returns. Estimates were made of the seed yields required from certified row stands in order to bring the same net returns as could have been received from certified solid stands at given seed yields and prices.

#### Northern Tripp County

##### Certified Versus Uncertified Solid Stands

Seed yield data for 1957, 1958, and the five years preceding 1957 were obtained from each solid stand grower. The seed yield data were on an acreage harvested basis and did not include the acreage that was not worth harvesting. Yields were highly variable, ranging from nearly complete failure to 300 pounds per acre. The average yield for a total of 380 acres harvested in 1957 by the nine growers contacted in this area was 122 pounds per acre and the average for 480 acres harvested in 1958 was 142 pounds per acre. The five year average yield indicated by the growers was 93 pounds per acre.

The average hay yield for the first cutting was .84 ton per acre. This was the average of the long term hay yields indicated by the nine growers. With the \$14.00 per ton hay price, gross returns for hay were \$11.76 per acre for both uncertified and certified solid stands.



Production costs for uncertified solid stands were \$5.51 per acre for the hay crop and \$7.02 for the seed crop, a total of \$12.53 per acre (Table VI).

With total production costs of \$12.53 per acre and hay returns of \$11.76 per acre, net returns ranged from 23 cents per acre with a 10 pound seed yield at a price of 10 cents per pound to \$32.23 per acre with a 110 pound seed yield at a price of 30 cents per pound (Table XXXI). Inasmuch as growers in this area were obtaining seed yields of 90 pounds per acre or more and an average price of 22 cents per pound for seed, net returns for uncertified solid stands were at least \$19.03 per acre.

TABLE XXXI. TOTAL NET RETURNS PER ACRE FOR ALFALFA HAY AND SEED PRODUCED FROM UNCERTIFIED SOLID STANDS AT VARYING SEED YIELDS AND PRICES ON THE 2,810 ACRE MODEL FARM IN NORTHERN TRIPP COUNTY\*

Price per pound (cents)	Seed yield per acre (pounds)							
	10	20	30	40	50	70	90	110
10	\$ .23	\$1.23	\$2.23	\$ 3.23	\$ 4.23	\$ 6.23	\$ 8.23	\$10.23
15	.73	2.23	3.73	5.23	6.73	9.73	12.73	15.73
20	1.23	3.23	5.23	7.23	9.23	13.23	17.23	21.23
22	1.43	3.63	5.83	8.03	10.23	14.63	19.03	23.43
25	1.73	4.23	6.73	9.23	11.73	16.73	21.73	26.73
30	2.23	5.23	8.23	11.23	14.23	20.23	26.23	32.23

\*Net returns based on a first cutting hay yield of .84 ton and total hay and seed production costs of \$12.53 per acre.



Net returns for certified solid stands were determined on the basis of the same hay and seed yields as were used in the case of uncertified solid stands.

Total hay and seed production costs were \$16.46 per acre because growers in this area harvested an average of four seed crops from a six year stand (Table VIII).

With total production costs of \$16.46 per acre and hay returns of \$11.76 per acre, net returns ranged from as low as \$-1.70 per acre with a 10 pound seed yield at a price of 30 cents per pound to a high of \$61.30 per acre with a yield of 110 pounds at a price of 60 cents per pound (Table XXXII). Since growers in this area were obtaining yields of 90 or more pounds per acre, net returns were at least \$22.30 per acre. A 90 pound yield of certified Vernal selling at 40 cents per pound gave net returns of \$31.30 per acre.

Comparisons of the profitability of uncertified and certified solid stands were made by computing the differences between net returns at various seed yield levels and certified seed prices with the uncertified seed price held constant at 22 cents per pound. At the 10 pound per acre seed yield level it was more profitable to produce uncertified than certified seed. However, it would probably be more profitable to produce hay rather than seed with only a 10 pound seed yield (Table XXXIII). In the 20 to 40 pound seed yield range, higher net returns could be obtained from certified solid stands only if the certified price was high enough to cover the additional costs. For all seed yield levels of 50 or more pounds per acre, net returns were higher for

TABLE XXXII. TOTAL NET RETURNS PER ACRE FOR ALFALFA HAY AND SEED  
PRODUCED FROM CERTIFIED SOLID STANDS AT VARYING SEED  
YIELDS AND PRICES ON THE 2,810 ACRE MODEL FARM  
IN NORTHERN TRIPP COUNTY\*

Price per pound (cents)	Seed Yield per acre (pounds)							
	10	20	30	40	50	70	90	110
30	\$-1.70	\$1.30	\$4.30	\$ 7.30	\$10.30	\$16.30	\$22.30	\$28.30
35	-1.20	2.30	5.89	9.30	12.80	19.80	26.80	33.80
40	- .70	3.30	7.30	11.30	15.30	23.30	31.30	39.30
45	- .20	4.30	8.80	13.30	17.80	26.80	35.80	44.80
50	.30	5.30	10.30	15.30	20.30	30.30	40.30	50.30
55	.80	6.30	11.80	17.30	22.80	33.80	44.80	55.80
60	1.30	7.30	13.30	19.30	25.30	37.30	49.30	61.30

\*Net returns based on a first cutting hay yield of .84 ton per acre and total hay and seed production costs of \$16.46 per acre.

certified stands if the price of certified seed was 30 cents per pound or more. Inasmuch as growers were receiving yields of more than 50 pounds per acre, net returns were much higher for certified stands.

#### Certified Row Versus Certified Solid Stands

The average seed yield obtained on 395 acres of row alfalfa during 1957 and 1958 was 70 pounds per acre. Included in the 395 acres were 60 acres which failed to produce a seed crop in 1958.

Seed yields obtained in 1957 were lower than those obtained in 1958. The average yield was 40 pounds per acre in 1957 and 82 pounds per acre in 1958.



TABLE XXXIII. ADDITIONAL NET RETURNS PER ACRE FOR PRODUCING  
CERTIFIED RATHER THAN UNCERTIFIED SEED AT VARYING  
CERTIFIED SEED PRICES FROM SOLID STANDS  
ON THE 2,810 ACRE MODEL FARM IN  
NORTHERN TRIPP COUNTY\*

Price per pound (cents)	Seed yield per acre (pounds)							
	10	20	30	40	50	70	90	110
30	\$-3.13	\$-2.33	\$-1.53	\$- .73	\$ .07	\$ 1.67	\$ 3.27	\$ 4.87
35	-2.63	-1.33	- .03	1.27	2.57	5.17	7.77	10.37
40	-2.13	- .33	1.47	3.27	5.07	8.67	12.27	15.87
45	-1.63	.67	2.97	5.27	7.57	12.17	16.77	21.37
50	-1.13	1.67	4.47	7.27	10.07	15.67	21.27	26.87
55	- .63	2.67	5.97	9.27	12.57	19.17	25.77	32.37
60	- .13	3.67	7.47	11.27	15.07	22.67	30.27	37.87

\*Uncertified seed price held constant at 22 cents per pound and hay yield held constant at .84 ton per acre.

One grower who obtained a yield of 100 pounds per acre in 1958 indicated that he believed that the yield would have been 200 pounds or more, had he been able to complete harvesting before a windstorm struck.

The average yield for the first cutting of hay from row stands as indicated by the growers in this area was .4 ton per acre. With a hay price of \$14.00 per ton, gross returns for hay were \$5.60 per acre.

Hay production costs were \$6.95 per acre and seed production costs were \$16.09 per acre, a total of \$23.04 per acre (Table XII).



TABLE XXXIV. TOTAL NET RETURNS PER ACRE FOR ALFALFA HAY  
AND SEED PRODUCED FROM CERTIFIED ROW STANDS AT  
VARYING SEED YIELDS AND PRICES ON THE  
2,810 ACRE MODEL FARM IN  
NORTHERN TRIPP COUNTY\*

Price per pound (cents)	Seed yield per acre (pounds)							
	30	50	70	90	110	130	150	170
30	\$-8.44	\$-2.44	\$3.56	\$ 9.56	\$15.56	\$21.56	\$27.56	\$33.56
35	-6.94	.06	7.06	14.06	21.06	28.06	35.06	42.06
40	-5.44	2.56	10.56	18.56	26.56	34.56	42.56	50.56
45	-3.94	5.06	14.06	23.06	32.06	41.06	50.06	59.06
50	-2.44	7.56	17.56	27.56	37.56	47.56	57.56	67.56
55	-.94	10.06	21.06	32.06	43.06	54.06	65.06	76.06
60	.56	12.56	24.56	36.56	48.56	60.56	72.56	84.56

\*Net returns based on a first cutting hay yield of .4 ton per acre and total hay and seed production costs of \$23.04 per acre.

Net returns per acre for row stands ranged from \$-8.44 per acre with a seed yield of 30 pounds at a price of 30 cents per pound to \$84.56 per acre with a yield of 170 pounds at a price of 60 cents per pound (Table XXXIV). Net returns were positive for all seed price-seed yield combinations above the 30 cent-50 pound combination. The yield necessary to cover costs was 44 pounds per acre for certified Vernal with a price of 40 cents per pound. For certified Ranger, the necessary yield was 56 pounds per acre with a price of 31 cents per pound. For the 70 pound yields which were obtained by growers, net

returns were \$10.56 per acre for certified Vernal and \$4.26 per acre for certified Ranger.

In order for row stands to give the same net returns as could have been obtained from certified solid stands at a given yield level, it was necessary to obtain additional gross returns from seed of \$12.74 per acre. The additional row yield required ranged from 21 pounds at a seed price of 60 cents per pound to 42 pounds at a price of 30 cents. Because solid stand growers were obtaining yields of 90 pounds or more per acre and row producers were obtaining only 70 pounds per acre, it appears that much higher seed yields from rows would be necessary before row production would be more profitable than solid stand production. Growers would need to obtain a row seed yield of more than 122 pounds per acre in order to receive net returns greater than those of a solid stand producing a 90 pound seed yield at a price of 40 cents per pound (Table XXXV).

TABLE XXXV. SEED YIELDS REQUIRED FROM CERTIFIED ROW STANDS TO BRING THE SAME NET RETURNS AS FROM CERTIFIED SOLID STANDS AT VARYING SEED YIELDS AND PRICES ON THE 2,810 ACRE MODEL FARM IN NORTHERN TRIPP COUNTY

Price per pound (cents)	Pounds per acre from solid stands							
	10	20	30	40	50	70	90	110
	<u>Pounds per acre required from row stands</u>							
30	52	62	72	82	92	112	132	152
35	46	56	66	76	86	106	126	146
40	42	52	62	72	82	102	122	142
45	39	49	59	69	79	99	119	139
50	35	45	55	65	75	95	115	135
55	33	43	53	63	73	93	113	133
60	31	41	51	61	71	91	111	131

#### Southern Tripp County

#### Certified Versus Uncertified Solid Stands

Seed yields in this area varied from near failure to 225 pounds per acre. The average of 1,238 acres harvested in 1957 was 56 pounds per acre and the average yield of 1,062 acres harvested in 1958 was 74 pounds per acre. The average yield indicated by the growers for the five year period preceding 1957 was 54 pounds per acre.

Seed yields obtained from fields which had been sprayed for insects were appreciably higher than yields from unsprayed fields. In 1957 the average yield of the sprayed acreage was 23 pounds per acre greater and in 1958 it was 36 pounds greater than the yield from



the unsprayed acreage.

The average yield for the first cutting of hay was .72 ton per acre. This was the average of the long term yield estimates made by the 16 growers contacted in the area. With a hay price of \$14.00 per ton, gross hay returns were \$10.08 per acre for uncertified or certified solid stands.

Production costs for uncertified solid stands were \$5.29 per acre for the hay crop and \$8.37 per acre for the seed crop, a total of \$13.66 per acre (Table XVII).

With hay returns of \$10.08 and total production costs of \$13.66, net returns ranged from \$-2.58 per acre with a 10 pound seed yield at a price of 10 cents per pound to as high as \$29.42 per acre with a yield of 110 pounds at a price of 30 cents (Table XXXVI). For all prices shown, a yield of 10 pounds per acre brought negative net returns. At the 20 pound yield level, returns with 10 and 15 cent prices were negative and for prices of 20 cents or more, net returns were positive. At the 30 pound yield level, returns were positive for all prices shown except for the 10 cent seed price. For all yields of 40 pounds or more, net returns were positive at all prices shown. Since growers were obtaining yields of 50 or more pounds per acre and an average price of 22 cents per pound, net returns were \$7.42 per acre or more.

Net returns for certified solid stands were computed on the basis of the same hay and seed yields as were used in the case of uncertified solid stands.

TABLE XXXVI. TOTAL NET RETURNS PER ACRE FOR ALFALFA HAY AND SEED  
PRODUCED FROM UNCERTIFIED SOLID STANDS AT VARYING SEED  
YIELDS AND PRICES ON THE 1,380 ACRE MODEL FARM  
IN SOUTHERN TRIPP COUNTY\*

Price per pound (cents)	Seed yield per acre (pounds)							
	10	20	30	40	50	70	90	110
10	\$-2.58	\$-1.58	\$- .58	\$ .42	\$ 1.42	\$ 3.42	\$ 5.42	\$ 7.42
15	-2.08	- .58	.92	2.92	3.92	6.92	9.92	12.92
20	-1.58	.42	2.42	4.42	6.42	10.42	14.42	18.42
22	-1.38	.82	3.02	5.22	7.42	11.82	16.22	20.62
25	-1.08	1.42	3.92	6.42	8.92	13.92	18.92	23.92
30	- .58	2.42	5.42	8.42	11.42	17.42	23.42	29.42

\*Net returns based on a first cutting hay yield of .72 ton per acre and total hay and seed production costs of \$13.66 per acre.

Total hay and seed production costs were \$17.49 per acre because the average eight year stand in this area produced five seed crops (Table XIX).

Net returns for certified solid stands were negative with a 10 pound seed yield for all seed prices ranging from 30 to 60 cents per pound (Table XXXVII). Net returns for the 20 pound yield level became positive between the 35 and 40 cent per pound prices. Net returns were positive at all price levels shown for all yields of 30 pounds or more per acre.



TABLE XXXVII. TOTAL NET RETURNS PER ACRE FOR ALFALFA HAY AND SEED  
PRODUCED FROM CERTIFIED SOLID STANDS AT VARYING SEED YIELDS  
AND PRICES ON THE 1,380 ACRE MODEL FARM  
IN SOUTHERN TRIPP COUNTY\*

Price per pound (cents)	Seed yield per acre (pounds)							
	10	20	30	40	50	70	90	110
30	\$-4.41	\$-1.41	\$ 1.59	\$ 4.59	\$ 7.59	\$13.59	\$19.59	\$25.59
35	-3.91	- .41	3.09	6.59	10.09	17.09	24.09	31.09
40	-3.41	.59	4.59	8.59	12.59	20.59	28.59	36.59
45	-2.91	1.59	6.09	10.59	15.09	24.09	33.09	42.09
50	-2.41	2.59	7.59	12.59	17.59	27.59	37.59	47.59
55	-1.91	3.59	9.09	14.59	20.09	31.09	42.09	53.09
60	-1.41	4.59	10.59	16.59	22.59	34.59	46.59	58.59

\*Net returns based on a first cutting hay yield of .72 ton per acre and total hay and seed production costs of \$17.49 per acre.

Since growers in this area were obtaining seed yields of 50 or more pounds per acre, net returns would be at least \$12.59 per acre for fields of certified Vernal and \$8.09 per acre for fields of certified Ranger.

Comparisons of the profitability of uncertified and certified solid stands for this area were made in the same manner as they were made for Northern Tripp County. At the 10 pound yield level, it was more profitable to produce uncertified seed (Table XXXVIII). However, net returns for uncertified stands were negative at this yield level also. It would probably be more profitable to produce two cuttings of



TABLE XXXVIII. ADDITIONAL NET RETURNS PER ACRE FOR PRODUCING CERTIFIED  
 RATHER THAN UNCERTIFIED SEED AT VARYING CERTIFIED SEED PRICES  
 FROM SOLID STANDS ON THE 1,380 ACRE MODEL FARM  
 IN SOUTHERN TRIPP COUNTY\*

Price per pound (cents)	Seed yield per acre							
	10	20	30	40	50	70	90	110
30	\$-3.03	\$-2.23	\$-1.43	\$- .63	\$ .17	\$ 1.77	\$ 3.37	\$ 4.97
35	-2.53	-1.23	.07	1.37	2.67	5.27	7.87	10.47
40	-2.03	- .23	1.57	3.37	5.17	8.77	12.37	15.97
45	-1.53	.77	3.07	5.37	7.67	12.27	16.87	21.47
50	-1.03	1.77	4.57	7.37	10.17	15.77	21.37	26.97
55	- .53	2.77	6.07	9.37	12.67	19.27	25.87	32.47
60	- .03	3.77	7.57	11.37	15.17	22.77	30.37	37.97

\*Uncertified seed price held constant at 22 cents per pound and hay yield held constant at .72 ton per acre.

hay from uncertified stands if a seed yield of only 10 pounds per acre were expected.

At the 20 pound yield level, it became more profitable to produce certified rather than uncertified seed between the 40 and 45 cent per pound seed price levels. For the 30 and 40 pound yield levels, certified seed production became more profitable when the seed price was increased from 30 to 35 cents per pound. For all seed yield levels of 50 or more pounds per acre, certified stands were more profitable at all prices shown.

If a grower were obtaining an average yield of at least 50 pounds per acre, as growers were in this area, additional net returns over those of uncertified stands would be a minimum of \$5.17 per acre for certified Vernal and 67 cents per acre for certified Ranger. Since average seed yields in this area were above 50 pounds per acre, it appears that certified solid stand seed production would be more profitable in this area.

#### Brown County

##### Certified Versus Uncertified Solid Stands

Seed yields in this county varied from 20 to 250 pounds per acre during the 1957 and 1958 growing seasons. The 28 growers obtained an average yield of 52 pounds per acre from a total harvested acreage of 987 acres in 1957. The average yield was 69 pounds per acre for 809 acres harvested in 1958. The five year average yield for the period preceding 1957 as indicated by the growers was 56 pounds per acre.

The average hay yield obtained by the growers on the first cutting was .95 ton per acre. This yield was the average of the long term estimates indicated by the 28 growers. With a hay price of \$14.00 per ton, gross hay returns were \$13.30 per acre for either uncertified or certified solid stands.

Production costs for uncertified solid stands were \$10.20 for the hay crop and \$9.51 for the seed crop, a total of \$19.71 per acre (Table XXIV).

With hay returns of \$13.30 per acre and total production costs of \$19.71 per acre, net returns varied from as low as \$-5.41 per acre with a seed yield of 10 pounds and a seed price of 10 cents per pound to as high as \$26.59 per acre with a seed yield of 110 pounds and a seed price of 30 cents per pound (Table XXXIX). For all seed prices shown, yields of 20 pounds or less brought negative returns. At the 30 pound yield level, net returns become positive between the price levels of 20 and 22 cents. At the 40 pound yield level net returns became positive between the seed price levels of 15 and 20 cents. At the 50 pound yield level net returns were positive for all price levels shown above 10 cents per pound. For yields of 70 pounds or more, net returns were positive for all seed price levels.

Inasmuch as growers were obtaining seed yields of 50 or more pounds per acre and an average seed price of 22 cents per pound, net returns were \$4.59 per acre or more.

Net returns for certified solid stands were computed on the basis of the same hay and seed yields as were used in the case of uncertified solid stands.

Total hay and seed production costs for certified solid stands were \$24.25 per acre because the average four year stand in this area produced two seed crops (Table XXVI).



TABLE XXXIX. TOTAL NET RETURNS PER ACRE FOR ALFALFA HAY AND SEED PRODUCED FROM UNCERTIFIED SOLID STANDS AT VARYING SEED YIELDS AND PRICES ON THE 1,790 ACRE MODEL FARM IN BROWN COUNTY\*

Price per pound (cents)	Seed yield per acre (pounds)							
	10	20	30	40	50	70	90	110
10	\$-5.41	\$-4.41	\$-3.41	\$-2.41	\$-1.41	\$ .59	\$ 2.59	\$ 4.59
15	-4.91	-3.41	-1.91	- .41	1.09	4.09	7.09	10.09
20	-4.41	-2.41	- .41	1.59	3.59	7.59	11.59	15.59
22	-4.21	-2.01	.19	2.39	4.59	8.99	13.39	17.79
25	-3.91	-1.41	1.09	3.59	6.09	11.09	16.09	21.09
30	-3.41	- .41	2.59	5.59	8.59	14.59	20.59	26.59

\*Net returns based on a first cutting hay yield of .95 ton per acre and total hay and seed production costs of \$19.71 per acre.

Net returns for certified solid stands were negative for all seed prices shown at the 10 pound per acre seed yield level (Table XL). At the 20 pound level, net returns were negative for all prices up to 55 cents per pound. At the 30 pound yield level net returns were positive for all seed prices shown above 35 cents per pound. For all yields of 40 pounds per acre or more, net returns were positive at all price levels shown.

Since growers were obtaining average yields of 50 pounds or more per acre and certified seed prices were more than 30 cents per pound, net returns were positive for certified solid stands.

TABLE XL. TOTAL NET RETURNS PER ACRE FOR ALFALFA HAY AND SEED PRODUCED FROM CERTIFIED SOLID STANDS AT VARYING SEED YIELDS AND PRICES ON THE 1,790 ACRE MODEL FARM IN BROWN COUNTY\*

Price per pound (cents)	Seed yields per acre (pounds)							
	10	20	30	40	50	70	90	110
30	\$-7.95	\$-4.95	\$-1.95	\$ 1.05	\$ 4.05	\$10.05	\$16.05	\$22.05
35	-7.45	-3.95	- .45	3.05	6.55	13.55	20.55	27.55
40	-6.95	-2.95	1.05	5.05	9.05	17.05	25.05	33.05
45	-6.45	-1.95	2.55	7.05	11.55	20.55	29.55	38.55
50	-5.95	- .95	4.05	9.05	14.05	24.05	34.05	44.05
55	-5.45	.05	5.55	11.05	16.55	27.55	38.55	49.55
60	-4.95	1.05	7.05	13.05	19.05	31.05	43.05	55.05

\*Net returns based on a first cutting hay yield of .95 ton per acre and total hay and seed production costs of \$24.25 per acre.

Comparisons of the profitability of uncertified and certified solid stands in Brown County were made in the same manner as they were made in Tripp County. At the 10 pound seed yield level it was more profitable to produce uncertified seed (Table XLI). However, net returns for both uncertified and certified solid stands were negative at the 10 pound level. It would probably be more profitable to produce two cuttings of hay from certified solid stands if a seed yield of only 10 pounds per acre were expected.

TABLE XLI. ADDITIONAL NET RETURNS PER ACRE FOR PRODUCING  
CERTIFIED RATHER THAN UNCERTIFIED SEED AT VARYING  
CERTIFIED SEED PRICES FROM SOLID STANDS ON  
THE 1,790 ACRE MODEL FARM  
IN BROWN COUNTY\*

Price per pound (cents)	Seed yield per acre (pounds)							
	10	20	30	40	50	70	90	110
30	\$-3.74	\$-2.94	\$-2.14	\$-1.34	\$- .54	\$ 1.06	\$ 2.66	\$ 4.26
35	-3.24	-1.94	- .64	.66	1.96	4.56	7.16	9.76
40	-2.74	- .94	.86	2.66	4.46	8.06	11.66	15.26
45	-2.24	.06	2.36	4.66	6.96	11.56	16.16	20.76
50	-1.74	1.06	3.86	6.66	9.46	15.06	20.66	26.26
55	-1.24	2.06	5.36	8.66	11.96	18.56	25.16	31.76
60	- .74	3.06	6.86	10.66	14.46	22.06	29.66	37.26

\*Uncertified seed price held constant at 22 cents per pound and hay yield held constant at .95 ton per acre.

At the 20 pound seed yield level, it became more profitable to produce certified rather than uncertified seed when the seed price increased to more than 44 cents per pound. At the 30 pound yield level, it became more profitable to produce certified seed as the seed price increased from 35 to 40 cents. At the 40 and 50 pound levels, certified seed production became more profitable than uncertified as the seed price increased from 30 to 35 cents per pound. For all yield levels of 70 or more pounds per acre, net returns were greater for certified solid stands.



Inasmuch as growers in Brown County were obtaining average seed yields of slightly over 50 pounds per acre, it would be more profitable to produce certified rather than uncertified seed from solid stands. For a yield of 50 pounds of certified Vernal per acre at a price of 40 cents per pound, the additional net returns would be \$4.46 per acre. For a grower producing certified Ranger at the current price of 31 cents per pound, it would be necessary to obtain a seed yield of 51 pounds or more per acre in order for it to be more profitable than uncertified solid stand production at the same yield level and an uncertified seed price of 22 cents per pound.

#### Certified Row Versus Certified Solid Stands

Inasmuch as row production had been initiated only to a limited extent in this area, it was not possible to estimate future seed yields from row stands. In addition, hay yields could not be established on the basis of information provided by the three growers. Because of this, first cutting hay yields from row stands were assumed to be the same as the average yield of .4 ton per acre indicated by certified row growers in northern Tripp County.

Hay production costs were \$7.26 per acre and seed production costs were \$14.05 per acre, a total of \$21.31 per acre (Table XXX).

Net returns per acre for row stands ranged from \$-6.71 with a seed yield of 30 pounds and a price of 30 cents per pound to as high as \$86.29 with a yield of 170 pounds and a price of 60 cents per pound (Table XLII). With the current price of certified Vernal (40 cents per pound) it would be necessary to obtain a seed yield of approximately 40

TABLE XLII. TOTAL NET RETURNS PER ACRE FOR ALFALFA HAY AND SEED  
PRODUCED FROM CERTIFIED ROW STANDS AT VARYING SEED YIELDS  
AND PRICES ON THE 1,790 ACRE MODEL FARM  
IN BROWN COUNTY\*

Price per pound (cents)	Seed yield per acre (pounds)							
	30	50	70	90	110	130	150	170
30	\$-6.71	\$- .71	\$5.29	\$11.29	\$17.29	\$23.29	\$29.29	\$35.29
35	-5.21	1.79	8.79	15.79	22.79	29.79	36.79	43.79
40	-3.71	4.29	12.29	20.29	28.29	36.29	44.29	52.29
45	-2.21	6.79	15.79	24.79	33.79	42.79	51.79	60.79
50	- .71	9.29	19.29	29.29	39.29	49.29	59.29	69.29
55	.79	11.79	22.79	33.79	44.79	55.79	66.79	77.79
60	2.29	14.29	26.29	38.29	50.29	62.29	74.29	86.29

\*Net returns based on a first cutting hay yield of .4 ton per acre and total hay and seed production costs of \$21.31 per acre.

pounds per acre in order to cover production costs. For certified Ranger selling for 31 cents per pound the necessary yield would be 51 pounds per acre.

In order for row stands to give the same net returns as could have been obtained from certified solid stands at a given yield level, it was necessary to obtain additional gross returns from seed of \$4.76 per acre. The additional row yield required ranged from 8 pounds at a seed price of 60 cents to 16 pounds at a price of 30 cents per pound (Table XLIII).



TABLE XLIII. SEED YIELDS REQUIRED FROM CERTIFIED ROW STANDS TO BRING  
THE SAME NET RETURNS AS FROM CERTIFIED SOLID STANDS AT VARYING  
SEED YIELDS AND PRICES ON THE 1,790 ACRE MODEL FARM  
IN BROWN COUNTY

Price per pound (cents)	Pounds per acre from solid stands							
	10	20	30	40	50	70	90	110
	<u>Pounds per acre required from row stands</u>							
30	26	36	46	56	66	86	106	126
35	24	34	44	54	64	84	104	124
40	22	32	42	52	62	82	102	122
45	21	31	41	51	61	81	101	121
50	20	30	40	50	60	80	100	120
55	19	29	39	49	59	79	99	119
60	18	28	38	48	58	78	98	118

Since solid stand growers in this area were obtaining average seed yields of 50 or more pounds per acre, it would be necessary to obtain seed yields from certified row fields ranging from more than 58 pounds at a price of 60 cents to more than 66 pounds at a price of 30 cents per pound in order for row production to be more profitable than certified solid stand production.

There is reason to believe that seed yields from row stands could be increased to more profitable levels. Row stand growers in both Tripp and Brown Counties indicated that they expected seed yields to increase in the future as they learned better production techniques. In addition,



growers with considerable experience in other areas of South Dakota and the United States have consistently obtained much higher seed yields from row stands. Their success is associated with refining their production methods over a period of years. It is therefore recommended that more research be conducted in the area of improving yields from row stands.

## CHAPTER VIII

## SUMMARY AND CONCLUSIONS

The purpose of this study was to compare the net returns of alfalfa seed production from uncertified solid stands, certified solid stands and certified row stands in order to determine which would be the most profitable for South Dakota farmers and ranchers.

Tripp and Brown Counties were selected for this study because they have been two of the leading alfalfa seed producing counties and also because they represent different areas of the state.

In each county a sample of seed growers was contacted by personal interview for the purpose of obtaining information on production practices and returns. The information obtained on each type of production was used as a basis for determining production costs and gross returns. Net returns per acre were then computed at varying seed yields and prices and the comparisons were made.

In both Tripp and Brown Counties it was found that with average yields and existing seed price relationships, it would be possible to obtain greater net returns per acre from certified than from uncertified solid stands.

If the present price relationship exists in the future, certified solid stand seed production should make it possible for growers located in the areas studied to earn greater net returns than they would have earned from uncertified solid stands. With a price differential of 10 or more cents per pound, greater net returns should result from certified

solid stands yielding 50 or more pounds per acre.

Although there may be some drop in the prices of current certified alfalfa varieties, it can be expected that seed of new varieties will continue to command prices well above those of uncertified seed. For example, the new variety Teton only recently has been released in South Dakota, and its seed should sell at premium prices on the hardy seed market for several years. Consequently, growers who produce certified seed of newly released varieties can reasonably expect to obtain the greater net returns from their seed enterprises.

For certified row stands, the future is more uncertain. The relative profitability of row and solid stand production in these counties could not be compared on the basis of empirical data. Inadequate seed yield data made it impossible to make satisfactory estimates of future seed yields for row stands.

Because of this, it was possible to compare certified solid and certified row stands only by computing the row yields that would give the same net returns as could have been obtained from certified solid stands at various prices. Since row stands produce lower hay yields than solid stands, higher seed yields are required in order to obtain the same net returns at a given seed price.

In northern Tripp County it was necessary for row stands to produce additional gross returns from seed of \$12.74 per acre. At the going price for certified Vernal of 40 cents per pound, the additional yield would need to be 32 pounds per acre. Inasmuch as solid stand growers in this area were obtaining higher seed yields than row producers,



it is evident that certified solid stands would be more profitable than row stands unless much higher seed yields can be obtained from row stands.

In Brown County it was necessary for row stands to produce additional gross returns from seed of \$4.76 per acre. At the 40 cent price, the additional yield required would be 12 pounds per acre. Since solid stand growers were obtaining seed yields of 50 or more per acre, the row yield would need to be 62 or more pounds with a seed price of 40 cents per pound. None of the row stands in this area had produced yields approaching 62 pounds per acre.

The primary conclusions of this study are: that growers can expect greater net returns from certified than uncertified solid stands and that higher seed yields must be obtained from certified row stands before row production will be more profitable than solid stand production. In addition, it appears that more work should be done in the area of improving seed yields, especially in the case of row production.

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