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**1976 COSTS
OF ESTABLISHING
AND PRODUCING
ALFALFA SEED
IN THE
COLUMBIA BASIN**

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1976 COSTS OF ESTABLISHING AND PRODUCING
ALFALFA SEED IN THE COLUMBIA BASIN

by

S. M. Doran and J. F. Elliot^{1/}

INTRODUCTION

Washington is one of the nation's largest producers of alfalfa seed. During the last decade, it has produced about 15 percent of the national crop. On a statewide basis, alfalfa seed now ranks about twentieth in annual value of farm crops. The Columbia Basin is one of the three principle alfalfa seed-producing areas in the state; it provides over one-third of the seed produced in the state, as shown below:

Alfalfa Seed Production in the Columbia Basin

<u>Year</u>	<u>Basin Acres in Seed Production</u>	<u>Percent of State Crop</u> %	<u>Average Yield Per Acre (Clean Seed)</u> (Pounds/A)
1973	14,984	37	580
1974	14,772	38	590
1975	13,385	36	480
1976	11,500	43	430

Source: Washington Agricultural Statistical Reporting Service and U.S. Bureau of Reclamation Annual Crop Reports.

The Columbia Basin area has become an intensively farmed but diversified crop area. In some areas of the Basin, alfalfa seed production has increased significantly in the last two decades. However, few Basin growers devote as much as half their cropland to alfalfa seed production.

Although most alfalfa seed producers in the area are less experienced in producing the crop than those in the Walla Walla or Yakima Valley areas, they are receptive to new seed production concepts. For example, many have adopted integrated pest management techniques to reduce the loss of alfalfa pollinators because of chemical insect control programs.

^{1/} Extension Economist and Research Assistant in the Department of Agricultural Economics, Washington State University, Pullman, Washington. Mr. Elliot's efforts were partially funded by the Washington State Pest Management Project.

The alfalfa leafcutting bee is the principle alfalfa pollinator in the area. In recent years, many growers have changed from using the drilled leafcutting bee boards to the loose cell method of housing bees. The loose cell system is presently used for nearly half the leafcutting bees in the area.

The area has more alfalfa seed produced under contract than any other area of the state. Most of the seed is one of the private varieties, produced under contract. The contracts generally allow a grower to produce seed from a stand for only four years. After that, the stand can no longer be used for seed production.

OBJECTIVES OF THE STUDY

Due to increasing awareness of the importance of an integrated pest management program on alfalfa seed production, studies were conducted on the importance of cultural practices on seed production in the three major production areas; i.e., Walla Walla, the Yakima Valley, and the Columbia Basin. The study reported herein was conducted to determine the normal practices and costs of establishing a seed stand, and the annual production practices and costs of producing alfalfa seed in the Columbia Basin area.

Specific objectives of the study were to:

1. Estimate the 1976 costs per acre of establishing 25 acres of alfalfa seed on a 350-acre, rill-irrigated farm in the Columbia Basin area.
2. Estimate the 1976 annual production costs per acre and per pound of clean seed when 75 acres of established alfalfa on a 350-acre farm in the Basin area were devoted to alfalfa seed production:
 - a. When 600 pounds of clean seed per acre were produced annually, and
 - b. When clean seed production yields ranged from 450 to 700 pounds per acre.
3. Calculate the operator's labor and management returns per acre for selected yields and prices:
 - a. When clean seed yields ranged from 450 to 700 pounds per acre, and
 - b. When alfalfa seed prices ranged from \$0.50 to \$1.50 per pound.

METHOD OF OBTAINING DATA

Data for the study were obtained from a committee of local growers that were experienced in establishing and producing the crop. The growers provided information about needed equipment, normal cultural practices, labor requirements, and 1976 costs of purchased inputs. After the data were assembled, the growers, and others familiar with the requirements for producing seed in the area, reviewed the material prior to its publication. The authors appreciate the information and other assistance provided by those people. However, the authors accept final responsibility for the data presented in this publication.

Because of the method of obtaining the data, and the various procedures used by alfalfa seed producers in the study area, the data in this publication reflect "typical" rather than "average" establishment and production costs for 1976. Nevertheless, the data should be helpful to alfalfa seed producers wanting to compare their costs of establishing a stand and producing seed; also, for buyers of alfalfa seed as well as persons considering getting into the business of producing alfalfa seed. Most of the tables have a column entitled "Your Estimate" that can be used by individual producers to compare their costs with those determined as a result of the study.

Due to the variable seed-producing situations in the Columbia Basin area, it was considered necessary to establish a "normal" production situation for the study. Thus, the following was used; it was believed to reflect the operations of a large number of growers in the area at the time of the study:

1. A 350-acre, rill-irrigated farm with 25 acres of alfalfa established annually and 75 acres in seed production, 125 acres in potatoes and/or sugar beets, and 125 acres in grain, peas and/or dry beans.
2. A six-year rotation was used, consisting of four years of alfalfa seed production, one year of sugar beets, and one year of grain.
3. A private variety of alfalfa seed was produced.
4. The alfalfa was seeded by drill in the late summer following grain.
5. The first-year alfalfa seed production was 500 pounds of clean seed per acre. Yields in the three subsequent years averaged 600 pounds of clean seed per acre.
6. Alfalfa leafcutting bees were used for pollinating the seed stands.
7. Charges for labor, materials, interest, etc., were based on 1976 costs as reported by the committee and others.

COSTS OF ESTABLISHING THE STAND

Columbia Basin alfalfa seed growers normally plant their new seed stands either in the late summer after grain, peas or beans, or in the spring after such late-harvested crops as potatoes, sugar beets or corn. For this study, it was assumed the field was planted in the late summer following a grain crop, and that the grain straw was chopped during grain harvest.

Fall Operations:

On that basis, land preparation consisted of fertilizing the field, rototilling, pre-irrigating and applying an herbicide, as shown in Table 1. It was assumed that all the fertilizer needed during the four years of seed production was applied before seeding. Estimated costs of the pre-plant operations were \$39.08 per acre. The seeding costs were \$5.69 per acre, with the charges for follow-up irrigation being \$7.77.

Spring and Summer Operations:

The spring operations for a fall-seeded stand consist primarily of controlling weeds and insects, and irrigating. Both mechanical and chemical weed control were practiced by the basin growers, at a reported cost of \$25.87 per acre. The annual irrigation charges were reported to be \$11.15 plus the irrigation district assessment.

The committee of growers indicated they normally applied one pre-bloom and two bloom sprays to control insects. Those operations cost about \$36.50 per acre when the material is custom-applied by aircraft.

Caring for the leafcutting bees during the year and monitoring their activity during the pollination season results in reported costs of \$20.81 per acre, as shown in Table 1.

Harvest Costs:

The alfalfa stands that are producing certified seed must be field inspected before harvest to determine whether they are sufficiently free of certain diseases and other pests. The fields are then chemically defoliated to facilitate the harvest. The inspection costs amounted to about 60 cents per acre while the custom charges for defoliation amounted to \$15.00 in 1976.

For this study, it was assumed the average field weight of the harvested seed from a first-year stand was 625 pounds per acre. But only about 75 percent is clean seed. Thus, the clean seed weight was estimated to be 500 pounds in the first year.

The charges for combining the seed and hauling it to the cleaning plant were \$22.86 per acre. There are additional costs for cleaning and bagging, seed inspection, and seed commission assessments. They amounted to \$34.00 per acre at that yield level.

Table 1. Estimated per Acre Costs of Establishing an Alfalfa Seed Stand in the Columbia Basin, 1976.

	Labor Hours/A	Labor Costs ^{1/} \$	Machinery Fuel, and Repairs \$	Material and Other \$	Total \$	Your Est. \$
<u>Fall Operations^{2/}</u>						
Chop straw (with combine) ^{3/}						
Fertilizer - application	.10	.35*	.51		.86	
- spreader rental				.50	.50	
- material				7.00	7.00	
Rototill and pack	.50	1.75*	3.80		5.55	
Corrugate	.33	1.16*	1.83		2.99	
Pre-irrigate	.75	2.62*	.25		2.87	
Herbicide - application	.07	.25	.48		.73	
- material				14.50	14.50	
- incorporate	.50	1.75*	2.33		4.08	
Seeding - application	.33	1.16	.53		1.69	
- 2 lbs. @ \$2.00				4.00	4.00	
Corrugate	.33	1.16	1.83		2.99	
Irrigate, 2X	1.25	4.38*	.40		4.78	
<u>Spring and Summer</u>						
Ditch repairs	.10	.35	.15	.20	.70	
Cultivate, 4X	1.00	3.50	5.56		9.06	
Herbicide - application	.07	.25	.48		.73	
- materials				12.00	12.00	
- incorporate	.50	1.75*	2.33		4.08	
Corrugate, 4X	1.33	4.66*	7.32		11.98	
Irrigate, 4X	3.00	10.50*	.65		11.15	
Pre-bloom - aerial application				4.50	4.50	
- material				9.00	9.00	
Bloom, 2X - aerial application				9.00	9.00	
- material				14.00	14.00	
Pollinators (5 boards/A)						
Bee care, board placement (15 min./bd.)	1.25	4.38	.30		4.68	
Shelter repair, placement	.10	.35	.18		.53	
Monitoring boards	1.50	5.25			5.25	
Insurance (\$0.35/board)				1.75	1.75	
Field monitoring - operator	1.00	3.50	.10		3.60	
- pest mgt. service				5.00	5.00	
<u>Harvest (500 lbs. clean seed/A)</u>						
Field inspection (\$2.50 + \$0.50/A)				.60	.60	
Defoliation - aerial application				5.00	5.00	
- material				10.00	10.00	

Table 1. (Cont'd)

	Labor		Machinery	Material	Total	Your Est.
	Hours/A	Costs ^{1/}	Fuel and Repairs	and Other		
		\$	\$	\$	\$	\$
Combine (with chopper) ^{4/}	1.0	4.00*	16.73		20.73	
Hauling (30 mi.)	.33	1.16*	.97		2.13	
Cleaning, bagging (\$0.50/lb.) ^{6/}				31.25	31.25	
Seed inspection (\$0.30/cwt.)				1.50	1.50	
Seed commission (\$0.25/cwt.)				1.25	1.25	
<u>Cash Overhead^{5/}</u>						
Taxes, R.E. and P.P.				15.00	15.00	
Irrigation district charges				12.00	12.00	
General overhead (8% of cash operating costs)				17.00	17.00	
Interest on operating capital (8 mo. @ 10%)				17.00	17.00	
TOTAL CASH COSTS PER ACRE		34.08	46.73	192.05	272.86^{7/}	
<u>NON-CASH COSTS</u>						
Operator's labor		20.15			20.15	
<u>Investment Overhead (equip., bldgs., land)^{8/}</u>						
Depreciation				107.96	107.96	
Interest on Investment				154.00	154.00	
TOTAL NON-CASH COSTS PER ACRE		20.15		261.96	282.11	
TOTAL COSTS PER ACRE		54.23	46.73	454.01	554.97	
NET COST PER ACRE FOR ESTABLISHING ALFALFA SEED STAND (\$554.97 - \$500)^{9/}					54.97	

Costs based on establishing 25 acres of seed annually on 350-acre, rill-irrigated farm.

* These operations done by hired labor.

^{1/} Labor rate based on \$3.50 per hour, which does not include OASI, other labor insurance, etc.

^{2/} Seeding may be done either in the late summer or in the spring.

^{3/} Chopping grain straw was charged to grain harvest operations.

^{4/} Combine operator hired at \$4.00 per hour plus OASI, other labor insurance, etc.

^{5/} Charges rounded to nearest whole dollar.

^{6/} Cleaning charge based on field weight, which was assumed to be 25% more than clean weight.

^{7/} The cash costs do not include \$20.15 for operator's labor.

^{8/} See Table 2 for details.

^{9/} Based on selling 500 pounds of seed at \$1.00 per pound.

Cash Overhead:

The cash overhead charges include property taxes, irrigation district charges and interest on the operating capital. The 8 percent, miscellaneous overhead charge was for such unitemized expenses as Social Security and other labor insurance, other insurance, electricity and other utilities, office expenses, miscellaneous supplies, business travel, etc. The charge for interest on operating capital assumed that all operating capital was borrowed. For those growers not borrowing the operating capital, this item would be a non-cash cost.

Total Cash Costs:

The total cash costs were thus determined to be \$272.86 per acre. That amount includes \$34.08 for hired labor, \$46.73 for machinery fuel and repairs, and \$192.05 for chemicals, custom work, supplies, taxes, irrigation district charges, etc.

Non-Cash Costs:

The charge for operator's labor was entered as a non-cash item. Other non-cash expenses were for depreciation of the needed equipment and buildings (\$107.96 per acre) and \$154.00 for interest on the buildings, equipment and land used to establish the stand. Details of those charges are shown in Table 2. The total non-cash costs equaled \$282.11 per acre.

Net Costs of Establishment:

The total costs to establish the alfalfa stand were determined to be \$554.97 per acre. But when \$500 was subtracted from that amount for the value of the first-year seed crop, the net establishment cost was reduced to \$54.97 per acre.

CAPITAL INVESTMENT FOR ESTABLISHING THE STAND

The estimated 1976 investment in land, equipment and buildings needed to establish an alfalfa seed stand in the study area are listed in Table 2. However, many of those items were also used for the established seed stand and for other crops produced on the farm. Therefore, only a portion of the annual depreciation and interest costs of those items were allocated to establishing the stand. Table 2 shows an annual depreciation charge of \$107.96 per acre and an interest charge of \$154.00 per acre. Those amounts were carried forward to Table 1.

The cash operating costs per hour of use (exclusive of labor charges) also are listed in Table 2.

IMPACT OF FIRST-YEAR YIELDS ON ESTABLISHMENT COSTS

The data in Table 1 assumed a first-year yield of 500 pounds of clean seed per acre. But the first-year yields do vary from field to field and from year to year, depending on time of planting, method of planting, climatic conditions, care of the stand after planting and many other factors. Therefore, Table 3 was prepared to show the impact of selected first-year yields on the net cost of establishing the alfalfa stand. For that purpose, yields were varied from 350 to 600 pounds of clean seed per acre.

Table 3 data show a net establishment cost of \$190.63 per acre when only 350 pounds of clean seed were produced the first year. On the other hand, the income from a 600-pound yield is shown to be more than the total cost of establishing the stand and harvesting the first-year crop by \$36.81 per acre. Table 4 shows how the establishment costs are prorated over the remaining life of the stand.

Table 2. Estimated Capital Investment for Establishing Alfalfa Seed.

	1976	Remaining Life (Years)	Salvage Value \$	Due to Est. Alfalfa (%)	Annual Costs		Cash Costs Per Hour		
	Current Value \$				Deprec. ^{1/} \$	Int. (9%) \$	Fuel, Oil \$	Repairs \$	Total \$
Tractor, 100 HP., D	12,000	4	2,200	10	245	108	3.25 ^{3/}	1.85	5.10
Tractor, 80 HP., D	8,000	6	1,450	8	87	58	2.26	1.60	3.86
Combine, 20'	30,500	8	3,700	12	402	329	2.90	13.83	16.73
Combine, 20'	6,425	3	1,750	12	187	69	2.90	13.83	16.73
Disc, 12'	2,350	5	425	4	15	8		1.65	1.65
Planter, 6 row	1,550	5	300	17	42	24		1.76	1.76
Harrow, 12'	520	6	100	7	5	3		.30	.30
Cultivator, 6 row	400	5	75	9	6	3		1.20	1.20
Sprayer, 500 gal.	1,200	6	400	7	9	8		1.80	1.80
Corrugator, headland	570	7	125	4	3	2		.70	.70
Cultipacker	620	5	115	12	12	7		.80	.80
Cultivator, rotary	1,800	5	325	9	27	15		1.70	1.70
Pollinators and equip. ^{4/}									
Leafcutting bee boards (5/A)									
- 125 @ \$40.00 ^{5/}	5,000	3.75	0	100	1,333	450			
Shelters, field									
- 7 @ \$25.00	175	5	0	100	35	16			
Phase-out boxes									
- 2 @ \$150.00	300	4	50	100	62	27			
Sapyga traps									
- 7 @ \$4.00	28	1	0	100	28	3			
Winter storage	1,000	10	100	25	22	22			
Truck, 2T, D	3,800	5	700	7	22	24	2.40	5.10	8.10
Pickup, 3/4 T	6,500	6	800	7	67	41	2.81	1.87	4.68
Shed, shop	10,000	15	0	7	47	63			
Shop equipment	2,500	10	0	7	18	16			
Irrigation equipment	50	2	0	100	25	4 ^{2/}			
Land - 25A @ \$1,200.00	30,000	-	-	100	-	2,550 ^{2/}			
TOTAL - 25 acres					2,699	3,850			
- per acre					107.96	154.00			

^{1/} Based on straight line method of depreciation on the remaining life of the items.

^{2/} Interest on land charges 8½%.

^{3/} Assumes the following fuel prices: gasoline @ 55¢ per gallon; diesel @ 44¢ per gallon.

^{4/} Bee boards were used instead of laminates, due to higher replacement costs per year, even though the initial costs of laminates was higher.

^{5/} At the end of the second year, half the boards are burned and half redrilled for use as catch boards for two more years.

Table 3. Estimated Per Acre Costs of Establishing an Alfalfa Seed Stand at Selected First-Year Yields.

	Yield, Pounds of Clean Seed per Acre						Your Est. \$
	350 \$	400 \$	450 \$	500 \$	550 \$	600 \$	
<u>CASH COSTS</u>							
Pre-harvest operations	139.40	139.40	139.40	139.40	139.40	139.40	
<u>Harvest</u>							
Field inspection	.60	.60	.60	.60	.60	.60	
Defoliation	15.00	15.00	15.00	15.00	15.00	15.00	
Combine	20.73	20.73	20.73	20.73	20.73	20.73	
Hauling	1.50	1.70	1.90	2.13	2.35	2.55	
Cleaning, bagging	21.87	25.00	28.12	31.25	34.37	37.50	
Seed inspection, commission	1.92	2.20	2.48	2.75	3.02	3.30	
<u>Cash Overhead</u>	59.00	60.00	61.00	61.00	61.00	62.00	
<u>TOTAL CASH COSTS PER ACRE</u>	258.52	264.63	269.23	272.86	276.47	281.08	
<u>NON-CASH COSTS</u>							
Operator's labor	20.15	20.15	20.15	20.15	20.15	20.15	
Investment overhead (depreciation, interest)	261.96	261.96	261.96	261.96	261.96	261.96	
<u>TOTAL NON-CASH COSTS PER ACRE</u>	282.11	282.11	282.11	282.11	282.11	282.11	
<u>TOTAL COSTS PER ACRE</u>	540.63	546.74	551.34	554.97	558.58	563.19	
<u>CROP VALUE (\$1.00/pound)</u>	350.00	400.00	450.00	500.00	550.00	600.00	
<u>NET ESTABLISHMENT COST</u>	190.63	146.74	101.34	54.97	8.58	- 36.81	

ANNUAL COSTS OF PRODUCING SEED IN SUBSEQUENT YEARS

The costs of establishing the alfalfa seed stand were terminated after seed harvest. Therefore, the annual costs for each subsequent year begin right after harvest, as shown in Table 4.

Fall Operations:

The normal fall operations after harvest include discing and irrigating each field, assuming the stand was chopped during harvest. The estimated cost of discing and irrigating was \$8.36 per acre.

Spring and Summer Operations:

The initial spring operations are discing the stand, cultivating, and irrigating. The cost of those operations was determined to be \$25.39 per acre. In late spring, the seed fields are usually clipped and then treated with an herbicide to eliminate dodder, weeds, etc. Those two operations are reported to cost \$17.28 an acre.

Before the alfalfa starts blooming, a pre-bloom insecticide is applied. It costs \$13.50 to have the material custom-applied by an aerial applicator. That treatment is followed by two or more bloom sprays, at a cost of \$11.50 per application.

As indicated for the establishment year, care of the leafcutting bees is very important. Caring for the bees during the year was reported to cost \$13.51 per acre. There is an additional \$8.60 per acre for monitoring the fields, to see that each field is free of pests and developing properly.

Harvest:

The growers reported that, for the most part, their harvest costs for an established alfalfa stand are the same as for a first-year stand. Therefore, the costs shown in Table 4 are the same as for the establishment year except for differences due to hauling, cleaning and bagging the larger yield, and the associated seed inspection and seed commission charges. The harvest-associated costs were determined to be \$79.83 for 750 pounds of uncleaned seed (equivalent to 600 pounds clean seed).

Cash Overhead:

Cash overhead charges, which were estimated to be \$52.00 per acre, were determined in the same manner as for Table 1.

Table 4. Estimated Annual Production Costs per Acre for Established Stands in the Columbia Basin, 1976

	Labor		Machinery Fuel and Repairs	Material and Other	Total	Your Est.
	Hours/A	Costs ^{1/}				
		\$	\$	\$	\$	\$
<u>Fall Operations</u>						
Disc	.25	.88*	1.37		2.25	
Corrugate	.33	1.16*	2.08		3.24	
Irrigate, 1X	.75	2.62*	.25		2.87	
<u>Spring and Summer</u>						
Ditch repairs	.10	.35	.15	.20	.70	
Disc & pack	.50	1.75*	3.14		4.89	
Cultivate	.25	.88*	1.47		2.35	
Corrugate, 2X	.66	2.32*	4.16		6.48	
Irrigate, 3X (24 hr. sets)						
- labor	2.25	7.88*	.60		8.48	
Cultivate, 2X	.5	1.75*	.74		2.49	
Clip stand	.25	.88*	1.17		2.05	
Herbicide - apply	.07	.25	.48		.73	
- materials				14.50	14.50	
<u>Insecticide</u>						
Pre-Bloom - aerial application				4.50	4.50	
- material				9.00	9.00	
Bloom, 2X - aerial application				9.00	9.00	
- material				14.00	14.00	
<u>Pollinators (5 boards per A)</u>						
Redrilling boards (1.0 @ \$1.30)				1.30	1.30	
Shelter repairs, placement	.1	.35*	.18		.53	
Board care, placement	1.25	4.38	.30		4.68	
Monitoring boards	1.5	5.25			5.25	
Insurance (\$0.35/board)				1.75	1.75	
Field Monitoring - operator	1.0	3.50	.10		3.60	
- pest mgt. ser.				5.00	5.00	
<u>Harvest (600 lbs., clean seed/A)</u>						
Field inspection (\$7.50 + \$0.50/A)				.60	.60	
Defoliation - aerial application				5.00	5.00	
- material				10.00	10.00	
Combine w/chopper ^{2/}	1.0	4.00*	16.73		20.73	
Hauling (60 mi. round trip)						
8 T per load	.40	1.54*	1.16		2.70	

Table 4. (Cont'd)

	Labor Hours/A	Labor Costs ^{1/} \$	Machinery Fuel and Repairs \$	Material and Other \$	Total \$	Your Est. \$
Cleaning, bagging (\$0.05/lb.) ^{3/}				37.50	37.50	
Seed inspection (\$0.30/cwt.) ^{4/}				1.80	1.80	
Seed commission (\$0.25/cwt.) ^{4/}				1.50	1.50	
<u>Cash Overhead^{5/}</u>						
Taxes, R.E. and P.P.				15.00	15.00	
Water				12.00	12.00	
General overhead (8% of cash operating costs)				14.00	14.00	
Interest on operating capital (6 mo. x 10%)				11.00	11.00	
TOTAL CASH COSTS PER ACRE		26.01	34.08	167.65	227.74 ^{6/}	
Operator's labor		13.73			13.73	
<u>Investment Overhead - bldgs., land, equip.</u>						
Depreciation				103.89	103.89	
Interest on investment				152.35	152.35	
Amortize alfalfa stand (\$55 - 3 yrs. @ 9%)				21.72	21.72	
TOTAL NON-CASH COSTS PER ACRE		13.73		277.96	291.69	
TOTAL COSTS - per acre		39.74	34.08	445.61	519.43	
- per pound of clean seed					.87	

* These operations done by hired labor.

1/ Labor rate based on \$3.50 per hour, which does not include OASI, labor insurance, etc.

2/ This operation done by hired labor.

3/ Based on 750 pounds per acre field weight.

4/ Based on clean seed weight (600 lbs./A).

5/ Rounded to nearest dollar.

6/ This is total cash costs per acre, therefore, does not include the \$13.73 non-cash costs for operator's labor.

Total Cash Costs:

The total cash costs were \$227.74 per acre. Of that amount, \$26.01 was for hired labor, \$34.08 was for machinery fuel and repairs, and \$167.65 was for supplies, chemicals, custom services, taxes and insurance, interest on operating capital, etc.

Non-Cash Costs:

Non-cash charges were determined in approximately the same manner as for Table 1. However, an additional \$21.72 per acre was assessed to amortize the established stand over its expected three-year remaining life.^{1/} Details on the annual charges for depreciation and interest on the capital invested in the alfalfa seed enterprise are shown in Table 5.

The total non-cash amount was determined to be \$291.69 per acre, which was 56 percent of the total annual costs.

Total Annual Production Costs:

Total annual costs of producing alfalfa seed in the Columbia Basin for operations of the type studied were determined to be \$519.43 per acre in 1976 when 600 pounds of clean seed were produced. Approximately 44 percent of that amount was for such cash costs as hired labor, machinery fuel and repairs, custom work, supplies, etc. At that production level, the total costs per pound of clean seed was 87 cents.

CAPITAL INVESTMENT FOR ESTABLISHED STANDS

Table 5 presents the estimated 1976 value of investment in equipment, buildings and land needed for an established alfalfa seed stand in the study area. As indicated for Table 2, many of the items are used to produce other crops. Therefore, only a portion of their annual ownership costs are assessed against the 75 acres of established alfalfa stand.

The estimated annual depreciation was \$103.89 per acre while the interest charges were \$152.35.

^{1/} Appendix Table 1 shows the amortization factor for three years and nine percent to be 0.395; thus \$55.00 times 0.395 equals \$21.72.

Table 5. Estimated Capital Investment for Alfalfa Seed Production.

	1976	Remaining Life (Years)	Salvage Value \$	Due to Producing Seed (%)	Annual Costs		Cash Costs Per Hour		
	Current Value \$				Deprec. ^{1/} \$	Int. (9%) \$	Fuel, Oil \$	Repairs \$	Total \$
Tractor, 100 HP., D	12,000	4	2,200	19	466	205	3.25	1.85	5.10
Tractor, 80 HP., D	8,000	6	1,450	21	229	151	2.26	1.60	3.86
Combine, 20'	30,500	8	3,700	38	1,273	1,043	2.90	13.83	16.73
Combine, 20'	6,425	3	1,750	38	592	220	2.90	13.83	16.73
Disc, 12'	2,350	5	425	25	96	53		1.65	1.65
Harrow, 12'	520	6	100	22	15	10		.30	.30
Cultivator, 6 row	400	5	75	20	13	7		1.20	1.20
Culti-packer	620	5	115	17	17	9		.80	.80
Mower, 9'	960	10	140	75	62	65		.80	.80
Corrugator, Headland	570	7	125	25	16	13		.70	.70
Sprayer, 500 gal.	1,200	6	400	22	29	24		1.80	1.80
Pollinators and equip. ^{4/}									
Leafcutting bee boards (5/A)									
- 375 @ \$40.00 ^{5/}	15,000	3.75	0	100	4,000	1,350			
Shelters, field									
- 20 @ \$25.00	500	5	0	100	100	45			
Phase-out boxes									
- 6 @ \$150.00	900	4	150	100	188	81			
Sapyga traps									
- 20 @ \$4.00	80	1	0	100	80	7			
Winter storage	1,000	10	100	75	68	68			
Truck, 2T, D	3,800	5	700	10	62	34	2.40	5.70	8.10
Pickup 3/4 T	6,500	6	800	22	209	129	2.81	1.87	4.68
Shed, shop	10,000	15	0	22	147	198			
Shop equipment	2,500	10	0	22	55	50			
Irrigation equipment	150	2	0	100	75	14 ^{2/}			
Land - 75 A @ \$1,200.	90,000	-	-	100	-	7,650 ^{2/}			
TOTAL - 75 acres					7,792	11,426			
- per acre					103.89	152.35			

1/ Based on straight-line method of depreciation on the remaining life of the items.

2/ Interest on land charged 8½%.

3/ Assumes the following fuel prices: gasoline @ 55.5¢ per gallon; diesel @ 44¢ per gallon.

4/ Bee boards were used instead of laminates, due to higher replacement costs per year, even though the initial costs of laminates was higher.

5/ At the end of the second year half the boards are burned and half redrilled for use as catch boards for two more years.

ANNUAL PRODUCTION COSTS FOR
ESTABLISHED STAND AT SELECTED YIELD LEVELS

As previously indicated, annual seed yields will vary from field to field and from year to year. Table 6 was prepared to illustrate the impact of yield differences on seed production costs, both on the basis of cost per acre and cost per pound of marketable seed produced.

For Table 6, it was assumed the pre-harvest operating costs would remain the same regardless of the amount of seed harvested. Therefore, the only adjusted cost items were those related to combining and hauling the seed, the charges for cleaning and bagging, and the commission and inspection charges.

The data in Table 6 suggest the 1976 costs of producing alfalfa seed in the Columbia Basin, for operations similar to those studied, ranged from about \$505 to \$527 per acre when the clean-seed yields were within the 450 to 700 pound range. The cost per pound of clean seed produced varied from about 75 cents to \$1.12 when the yields were in that production range.

OPERATOR'S LABOR AND MANAGEMENT
RETURN AT SELECTED YIELDS AND PRICES

The final phase of the study was to calculate the return an operator would receive for his labor and management, under the conditions assumed for the study, at selected seed yields per acre and selling prices. Table 7 presents the results for yields ranging from 450 to 700 pounds of clean seed per acre and for selling prices ranging from 50 cents to \$1.50 per pound. From that table it is also possible to approximate the break-even price (exclusive of any labor and management fee for the operator) at the selected yield levels. Conversely, one can determine the break-even yield at any of the designated selling prices.

It must be realized that Table 7 assumes the operator also will receive \$277.96 per acre annual compensation for his investment in the business. That amount consists of \$103.89 per acre for the non-cash depreciation of equipment and buildings plus \$152.35 for interest on the equipment, buildings and land, and \$21.72 per acre for amortizing the alfalfa stand.

Table 6. Estimated Production Costs per Acre and per Pound at Selected Yields.

	Yield, Pounds of Clean Seed Per Acre						Your Est. \$
	450 \$	500 \$	550 \$	600 \$	650 \$	700 \$	
<u>CASH COSTS</u>							
Pre-harvest operations	95.91	95.91	95.91	95.91	95.91	95.91	
<u>Harvest</u>							
Field inspection	.60	.60	.60	.60	.60	.60	
Defoliation	15.00	15.00	15.00	15.00	15.00	15.00	
Combine	20.73	20.73	20.73	20.73	20.73	20.73	
Hauling	2.00	2.25	2.45	2.70	2.90	3.15	
Cleaning, bagging	28.12	31.24	34.37	37.50	40.62	43.74	
Seed inspection, commission	2.48	2.75	3.02	3.30	3.58	3.85	
<u>Cash Overhead</u>	48.00	50.00	52.00	52.00	52.00	52.00	
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TOTAL CASH COSTS - per acre	212.84	218.48	224.08	227.74	231.34	234.98	
- per pound	.47	.44	.41	.38	.36	.33	
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<u>NON-CASH COSTS</u>							
Operator's labor	13.73	13.73	13.73	13.73	13.73	13.73	
<u>Investment overhead</u>							
Deprec. - bldgs., eqpt.	103.89	103.89	103.89	103.89	103.89	103.89	
Interest - bldgs., eqpt., land	152.35	152.35	152.35	152.35	153.35	152.35	
Amortize alfalfa stand	21.72	21.72	21.72	21.72	21.72	21.72	
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TOTAL NON-CASH - per acre	291.69	291.69	291.69	291.69	291.69	291.69	
- per pound	.65	.58	.53	.49	.45	.42	
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TOTAL ANNUAL COSTS - per acre	504.53	510.17	515.77	519.43	523.03	526.67	
- per pound	1.12	1.02	.94	.87	.81	.75	

Table 7. Operator's Labor and Management Returns per Acre at Selected Yield Levels and Selling Prices.^{1/}

Price per Pound \$	Yield, Pounds of Clean Seed per Acre						Your Estimate \$
	450 \$	500 \$	550 \$	600 \$	650 \$	700 \$	
0.50	-265.80	-246.44	-227.04	-205.70	-184.30	-162.94	
0.60	-220.80	-196.44	172.04	-145.70	-119.30	- 92.94	
0.70	-175.80	-146.44	117.04	- 85.70	- 54.30	- 22.94	
0.80	-130.80	- 96.44	62.04	- 25.70	10.70	47.06	
0.90	- 85.80	- 46.44	- 7.04	34.30	75.70	117.06	
1.00	- 40.80	3.56	47.96	94.30	140.70	187.06	
1.10	- 4.20	53.56	102.96	154.30	205.70	257.06	
1.20	49.20	103.56	157.96	214.30	270.70	327.06	
1.30	94.20	153.56	212.96	274.30	335.70	397.06	
1.40	139.20	203.56	267.96	334.30	400.70	467.06	
1.50	184.20	253.56	322.96	394.30	465.70	537.06	

^{1/} Operator also has \$277.96 per acre income to cover non-cash costs due to interest and depreciation and amortizing the seed stand.

APPENDIX TABLE 1. AMORTIZATION TABLE^{1/}

Year (n)	Annual Interest Rate							
	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
1	1.0650	1.0700	1.0750	1.0800	1.0850	1.0900	1.0950	1.1000
2	.5493	.5531	.5569	.5608	.5646	.5685	.5723	.5762
3	.3776	.3810	.3845	.3880	.3915	.3950	.3986	.4021
4	.2919	.2952	.2956	.3019	.3053	.3087	.3121	.3155
5	.2406	.2439	.2472	.2505	.2538	.2571	.2604	.2638
6	.2066	.2098	.2130	.2163	.2196	.2229	.2262	.2296
7	.1823	.1856	.1888	.1921	.1954	.1987	.2020	.2054
8	.1642	.1675	.1707	.1740	.1773	.1807	.1840	.1874
9	.1502	.1535	.1568	.1601	.1634	.1668	.1702	.1736
10	.1391	.1424	.1457	.1490	.1524	.1558	.1593	.1628
11	.1301	.1334	.1367	.1401	.1435	.1470	.1504	.1540
12	.1225	.1259	.1292	.1327	.1362	.1396	.1432	.1468
13	.1163	.1196	.1231	.1265	.1300	.1336	.1371	.1408
14	.1109	.1143	.1178	.1213	.1248	.1284	.1321	.1358
15	.1064	.1098	.1120	.1168	.1204	.1241	.1277	.1315
16	.1024	.1059	.1094	.1130	.1166	.1203	.1240	.1278
17	.0989	.1024	.1060	.1096	.1133	.1170	.1208	.1247
18	.0958	.0994	.1030	.1067	.1104	.1142	.1180	.1219
19	.0932	.0968	.1004	.1041	.1079	.1117	.1156	.1196
20	.0908	.0944	.0980	.1018	.1057	.1096	.1135	.1175
21	.0886	.0923	.0960	.0998	.1037	.1076	.1116	.1156
22	.0867	.0904	.0942	.0980	.1019	.1059	.1099	.1140
23	.0850	.0887	.0925	.0964	.1004	.1044	.1084	.1126
24	.0835	.0872	.0910	.0950	.0990	.1030	.1071	.1113
25	.0820	.0858	.0897	.0937	.0977	.1018	.1060	.1102
30	.0766	.0806	.0847	.0888	.0930	.0973	.1017	.1061
35	.0731	.0772	.0815	.0858	.0902	.0946	.0991	.1037
40	.0707	.0750	.0794	.0839	.0884	.0929	.0976	.1022
45	.0691	.0735	.0780	.0826	.0872	.0919	.0966	.1014
50	.0679	.0725	.0771	.0817	.0864	.0912	.0960	.1009

^{1/} Annual year-end payments needed to accumulate \$1.00 after an interest-bearing period of "n" years.

