The Economic Returns of Annual Ryegrass Production in Oregon's Willamette Valley, 1959 to 1975

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INTRODUCTION

Oregon's Willamette Valley grass seed industry has been the subject of considerable public and private interest in recent years stemming from the open field burning controversy [5]. While the environmental issues of the problem are relatively well known, what is not so clear are the economic impacts both to the grass seed industry and the broader public which has been the recipient of smoke emissions. The purpose of this study is to evaluate the economic conditions under which seed production took place from 1959 to 1975 for the annual ryegrass segment of the industry. While single year evaluations of economic conditions have been made, grass seed production is much more than a single year venture. Fixed capital investments require that annual costs and returns be evaluated over several years to provide a realistic perspective of the economic "well being" of the grass seed industry. This report is intended to serve that purpose. The adverse economic effects of smoke emissions on valley non-farm industry and citizenry are treated in another document [7].

An in-depth study of the economics of Willamette Valley grass seed production at the grower level was conducted in 1969 and reported by Conklin and Fisher [6]. In that study, 147 grass seed producers were interviewed and the physical and economic characteristics of their operations evaluated. The sample represented 10 to 20 percent of the estimated grower population. Dynamics of time produce change, however. The 1969 situation is not representative of economic conditions in years when market price and costs diverge from those in 1969. Strong inflationary pressures in the U.S. in recent years have increased markedly the price of purchased inputs used in production of grass seed, as shown in Figure 1. While 5 to 7 percent increases in prices paid annually were recorded in the early 1970's, a particularly large surge of input price increases occurred in 1973 and 1974. The price increase for all production items used in U. S. agriculture was 20 and 17 percent in 1973 and 1974 respectively. Fertilizer, as a single input,

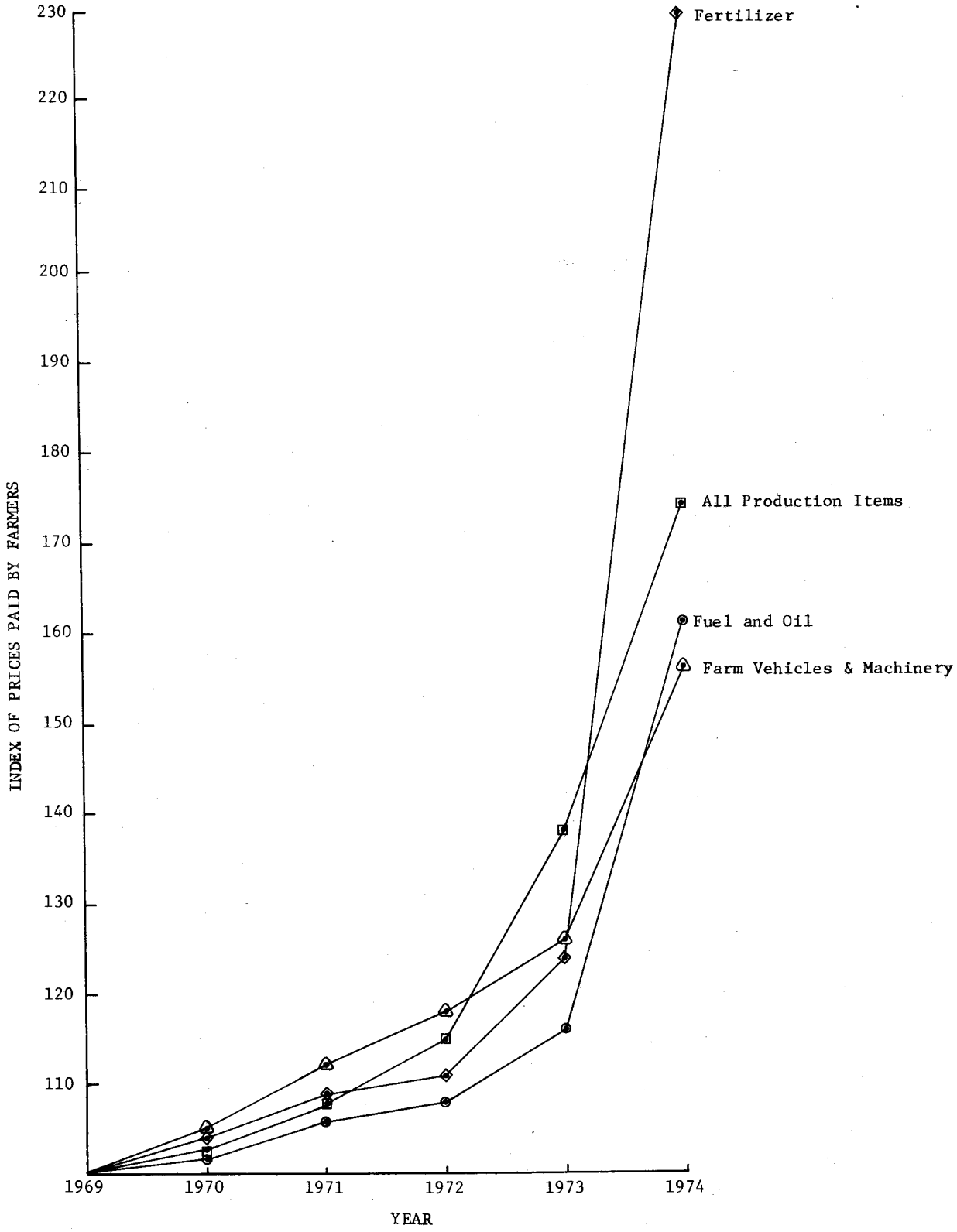


Figure 1. Relative prices paid by U.S. farmers, 1969 - 1974, [1969 = 100).

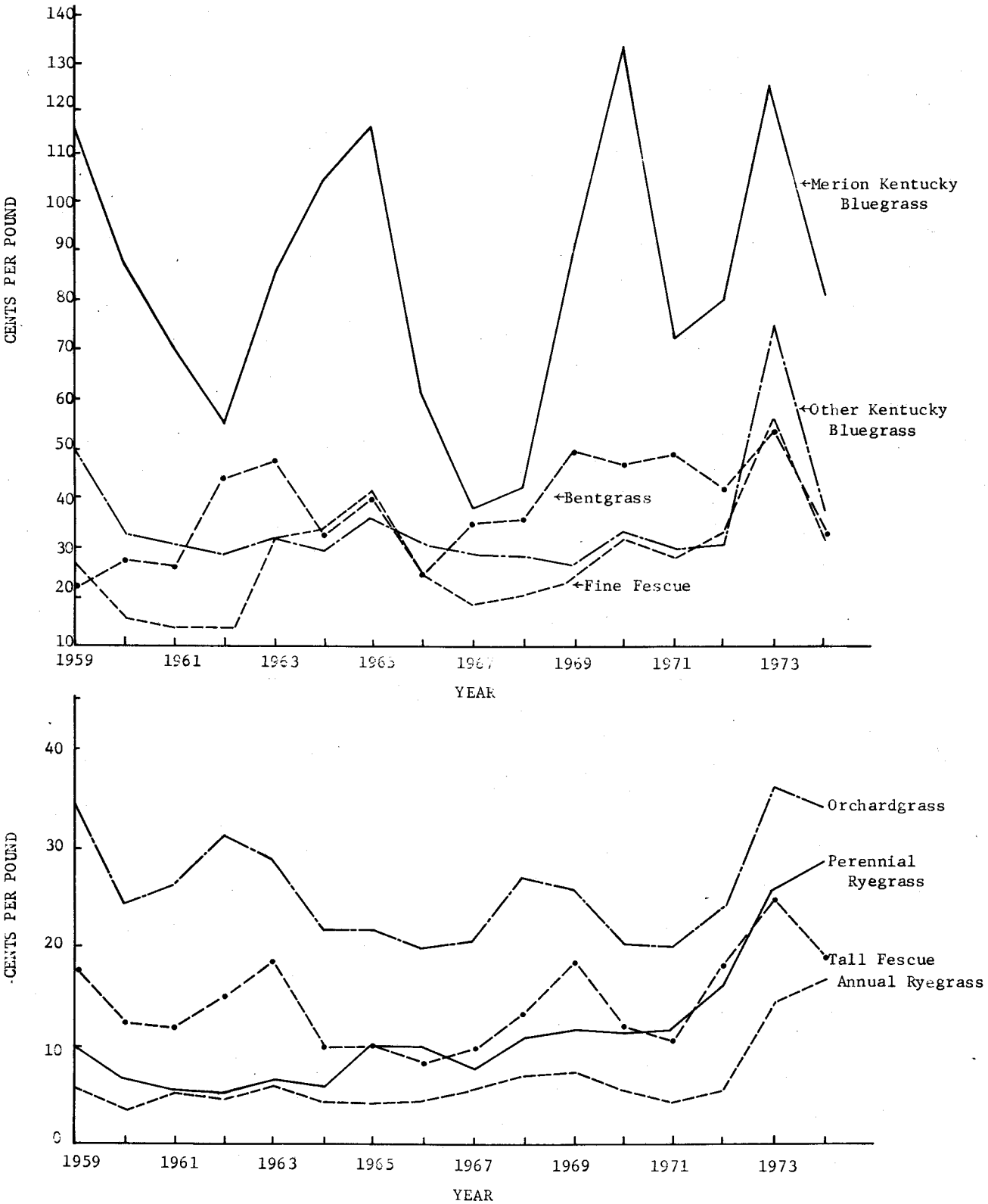
SOURCE: Agricultural Prices, Annual Summary 1973, Pr 1-3(74) and Pr 1 (12-74) Monthly Summary, Crop Reporting Service, U.S.D.A., Washington, D.C.

recorded the greatest increase. Certain fertilizers, as by-products of the petro-chemical industry, were strongly influenced by the recent oil crisis. A record 71 percent fertilizer price hike in 1974 over 1973 resulted. Price of purchased inputs is only one source of divergence between time periods. In addition, the market for grass seed is highly unstable from the standpoint of price. Large price variation is a common phenomenon [2,4]. While record high seed prices were realized in 1973, it was preceded by a record, or near record, low in farm gate prices in 1971 and again in the mid-1960's for most of the grass seed types as shown in Figures 2 and 3. The price for six of the eight major grass seed types dropped precipitously again in 1974 and the market outlook for all eight seed types in 1975 is poor [3].

STUDY PROCEDURES

The most accurate means for measuring the economic state of Willamette Valley grass seed producers would be to conduct annually an intensive survey as was done in 1969. Current conditions could be determined directly and compared with other years to evaluate changes between grass seed types, between growers, and between geographic regions within the Valley. Surveys and their analysis are costly and time consuming, however. Yet, an appraisal of the 1974 situation, and its comparison with other years, is appropriate when the field burning ban is reviewed by the State Legislature. Hence, this report involves some compromise between timeliness and comprehensiveness of information.

The procedure selected involves use of index numbers to adjust cost data from the 1969 study for changes in the prices of purchased inputs over time. The cost data are reported in Table 13, page 53 of the Conklin-Fisher study [6]. The annual price changes, expressed as index numbers, were obtained from United States Department of Agriculture sources [1] for individual cost components, and were reported in most cases for the national level. Oregon prices were used where the data were reported for the State of Oregon. Local price data were used for validation.



Figures 2 & 3. Average price per pound received by Oregon growers for specific grass seed types, 1959-1974.

SOURCE: Statistical Reporting Service, U.S.D.A. and Oregon State University cooperating.

The study is confined to annual ryegrass. It is the most important single grass seed type in terms of grass seed acreage and seed volume. In 1973, annual ryegrass accounted for 46 percent of the Valley's total grass seed acreage and 66 percent of the total volume of grass seed produced. The procedure followed here may be applied to all major grass seed types.

The format of the study involves first an estimation of 1974 production costs to demonstrate computational procedure. This is followed by presentation of estimated production costs each year from 1959 through 1974. These costs are combined with annual yield and price data to generate net returns per acre for each year of the 16-year period. The study concludes with a summary and implications.

ESTIMATED 1974 PRODUCTION COSTS

The estimated 1974 production costs for annual ryegrass are presented in Table 1. Production costs are separated into machine, materials, labor, stand establishment, general overhead, and land charge categories, the same as used in the 1969 study [6]. The sum of machine operating and overhead costs approximate machine custom charges. The sub-total is intended to estimate direct production costs while the remaining three categories represent overhead or indirect costs which exist regardless of the level of annual production.

Total production costs are estimated to have increased from $72.94 per acre in 1969 to $128.14 in 1974 for "average" cost producer conditions. This represents a 76 percent increase in total production costs per acre during the five-year period from 1969 through 1974. Individual cost component changes are not reflected accurately by the average, however. Herbicides, hired labor, and operator labor components increased less than 50 percent over the time period. Fertilizer is a special case. The fall-applied 16-20-0 showed only an 11 percent increase, while the spring-applied had a 165 percent increase from 1969. Spring fertilizer reflects the price impact from the oil crisis. Operating and overhead machine costs, general overhead, and establishment costs increased between 50 and 75 percent while seed and land charge categories increased more than 75 percent.

Table 1. Average Production Costs Per Acre for Annual Ryegrass, 1969 Actual, and 1974 Estimated

Cost components[a]	1969[a]	Index Number (1969=100)	1974
Machine operating costs	$10.24	154[b]	$15.77
Machine overhead costs	15.37	151[c]	23.21
Materials			
Fertilizer[d], Fall	3.60	111[e]	4.00
Spring	10.40	265[e]	27.56
Herbicides	.38	143[f]	.54
Seed	1.44	209[g]	3.01
Hired labor	1.66	145[h]	2.41
Operator labor	6.67	145[h]	9.67
SUB-TOTAL	$49.76	(173)[i]	$86.17
Amortized establishment costs[j]	2.98	173[k]	5.16
General overhead[ℓ]	2.64	163[m]	4.30
Land charge[n]	17.11	190[o]	32.51
TOTAL PRODUCTION COSTS	$72.94	(176)[i]	$128.14

[a] Component categories and costs taken from Table 13, page 53, of "Economic Characteristics of Farm Producing Grass Seed in Oregon's Willamette Valley," Agricultural Experiment Station Circular of Information 643, Oregon State University, November 1973 [6]. Costs for "average grower" conditions were used. Component and total costs represent the average of 44 sample farms producing annual ryegrass on Dayton (Whiteland) soils in Linn, Benton, and Lane Counties.

[b] "Motor Supplies" category [1].

[c] "Farm Machinery" category [1].

[d] Fall applied fertilizer is in the form of 16-20-0 while spring applied is 21-0-0 (ammonium sulphate).

[e] Oregon prices for 16-20-0 and 21-0-0 [1].

[f] "Farm Supplies" category [1].

[g] "Seed" category [1].

[h] "Labor" category [1].

[i] Obtained as a direct calculation of the 1974 total as a percentage increase from the 1969 total.

[j] An average annual seeding cost which reflects grassланding for a 3-year period followed by complete seedbed preparation, including plowing, prior to seeding only once every four years [6].

k/ Assumed to increase at the same rate as the average of the cost categories shown above.

l/ Includes such general items as office expenses, dues, travel, income tax preparation, legal fees, etc.

m/ Assumed to increase at the same annual rate as "Production items, interest, taxes, and wage rates" category [1].

n/ Includes property tax and interest on average investment.

o/ Estimated by the index of average values/acre of dryland in Oregon. Farm Real Estate Market Developments, CD-79, ERS, USDA, Washington, D.C., July 1974.

ESTIMATED PRODUCTION COSTS - 1959 TO 1975

The procedure used to estimate production costs for 1974 is used again to estimate costs each year for the 16-year period from 1959 through 1974. The price change for each cost component shown in Table 1 for each of the 16 years was obtained from U.S.D.A. sources and reported in Table 2. The total production costs for each year are reported in Table 3 for average, low-cost, and high-cost producers. Costs for the average producer case represent the average of the 44 sample farms producing annual ryegrass on Dayton (Whiteland) soil in Linn, Benton, and Lane Counties [6]. The low and high cost cases represent an average of those four growers from the 44 recording the lowest and highest costs per acre respectively. Reporting results for the three cost categories reflect cost variability among growers which average cost data do not show.

NET RETURNS - 1959 TO 1975

Net returns per acre represent gross income (price x yield per acre) minus production costs per acre. It is an approximate measure of profit or loss in production of annual ryegrass. Calculating net returns each year from 1959 to 1975 provides a dynamic perspective of how well annual ryegrass producers have fared economically over time in an industry which historically sees wide year-to-year variation in prices and yields and, more recently, also in production costs.

TABLE 2. Index Numbers of Prices Paid for Selected Production Items, 1969 = 100

Year	Machinery		Fertilizer		Herbicides	Seed	Labor	Land value	All production items
	Operating	Overhead	Fall (16-20-0)	Spring (21-0-0) Amm. sulphate					
1959....	91	73	107	107	92	80	61	56	88
1960....	92	75	107	107	92	83	62	56	87
1961....	93	77	108	108	93	82	64	66	88
1962....	92	78	108	108	93	85	66	68	89
1963....	92	80	107	107	93	91	67	74	90
1964....	92	81	106	106	94	90	69	78	89
1965....	93	84	107	104	94	93	72	88	91
1966....	93	87	107	103	95	91	78	90	93
1967....	95	91	109	105	96	93	84	86	94
1968....	97	95	108	104	98	98	91	90	96
1969....	100	100	100	100	100	100	100	100	100
1970....	102	106	101	103	102	104	108	116	104
1971....	106	113	95	93	106	111	113	124	108
1972....	108	121	103	104	109	119	119	137	115
1973....	116	130	111	112	115	153	130	151	138
1974....	154	151	243	265	143	209	145	190	162
Jan. 1975	158	168	264	288	157	219	146	195	172

Source: Agricultural Prices, Annual and monthly summaries [1] with exception of land values which were obtained for dryland in Oregon from Farm Real Estate Market Developments, CD-79, ERS, USDA, Washington, D.C.

TABLE 3. Estimated Net Returns Per Acre in Production of Annual Ryegrass for Low, Average, and High Cost Producer Conditions, 1959 to 1975.

Year	Price per pound (cents)[a/]	Average yield in pound/acre [a/] [b/]	Production Costs			Net returns/acre [d/]		
			Low cost[c/]	Average[c/]	High cost[c/]	Low cost	Average	High cost
1959.....	5.5	1100	36.53	56.52	81.91	7.47	3.98	- 9.03
1960.....	3.5	930	36.91	57.08	82.72	-14.86	-24.53	-42.30
1961.....	5.05	1000	39.06	59.54	85.55	- 3.71	- 9.04	-23.69
1962.....	4.3	1300	39.56	60.19	86.38	.74	- 4.29	-20.80
1963.....	5.9	1105	40.91	61.61	88.04	6.59	3.59	- 9.57
1964.....	4.15	1355	41.68	62.46	88.91	2.10	- 6.23	-23.34
1965.....	4.2	1290	43.97	64.94	91.63	- 2.39	-10.76	-28.00
1966.....	4.6	1280	44.83	66.20	93.37	.25	- 7.32	-24.14
1967.....	5.85	1218	45.16	67.27	95.21	8.54	3.98	-10.79
1968.....	7.0	1440	46.74	69.44	98.22	33.06	31.36	18.33
1969.....	7.3	1427	49.53	72.94	102.17	32.74	31.23	18.43
1970.....	5.7	1285	53.51	77.67	108.09	2.63	- 4.43	-22.02
1971.....	4.5	1643	55.77	80.17	110.85	4.66	- 6.23	-26.79
1972.....	5.5	1356	60.11	85.77	118.44	- 2.03	-11.19	-31.48
1973.....	14.08	1338	65.96	93.80	129.41	80.19	94.59	90.66
1974.....	16.8	1487	88.87	128.14	180.43	110.54	121.68	107.19

[a/] Source: Statistical Reporting Service, USDA and Oregon State Extension Service Cooperating.

[b/] Based on the 1969 study, low cost producers were assumed to average 300 pounds less per acre annually while high cost producers average 225 pounds more per acre than the average for each of the 16 years reported [6].

[c/] The 1969 base year costs were obtained from [6] while costs for the remaining years were derived using price indexes from Table 2.

[d/] Net returns per acre = (annual yield x annual price) - annual production cost.

Average yield in production of annual ryegrass reported by "low" and "high" cost producers was not the same as that with "average" cost producers in 1969 [6]. High cost producers obtained average yields of 1,652 pounds per acre, or 225 pounds greater than the average of 1,427 pounds. Low cost producers, on the other hand, averaged 1,127 pounds per acre, or 300 pounds less than the average. A review of the cost components shows fertilizer application levels as a major contributor to the yield differences. For purposes of this study, it is assumed that the 1969 yield difference between low, average, and high cost producers prevails in each of the 16 years.

Table 3 provides a tabular presentation of net returns for low, average, and high cost producers for each year of the 16-year period. Figures 4 through 6 provide a graphic presentation of net returns for each case. Net returns from annual ryegrass production generally were high in 1973 and 1974. But, in only four of the sixteen years did low, average, or high cost producers have positive net returns which were substantial. And, it is the magnitude of net returns, both positive and negative, over time which determines the "well being" of the industry. Summing net returns over the 16-year period shows a positive average net return for low and average cost producers which is largely attributable to the high price conditions in 1973 and 1974. Summing for the high cost producers shows a negative return.

The 1974 results may be overly optimistic. The majority of producers have not sold their 1974 crop, a situation common in many years where seed is held in storage until after January 1 of the following year. The volume of trading in early 1975 has been very low and conditions for the immediate future are not particularly bright [3].

It is important to recognize that U.S. agricultural production generally, and annual ryegrass in particular, can and do have years of high prices and high profits, but they also have years of low prices with low profits or even losses. In years of loss, growers may live off income reserves, depreciation, fail to cover certain overhead costs, and perhaps not meet fixed debt commitments to lending institutions. When adversity is severe enough, such as experienced in 1964, 1965, 1970, 1971, and perhaps 1975, the exodus of growers from the

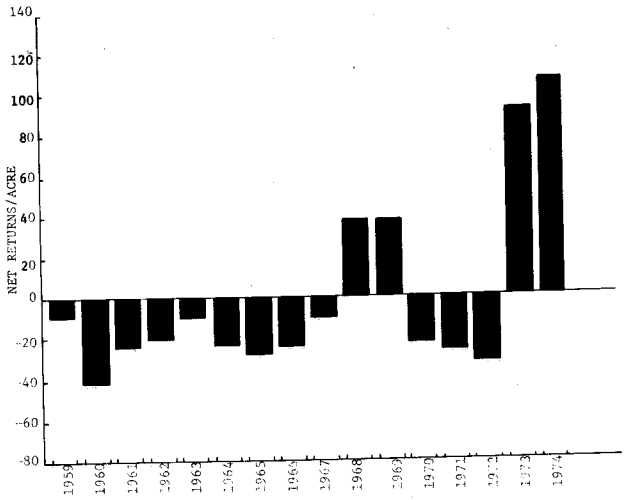


Figure 4. Annual Net Returns/Acre in Producing Annual Ryegrass by "High" Cost Producers, 1959-1974.

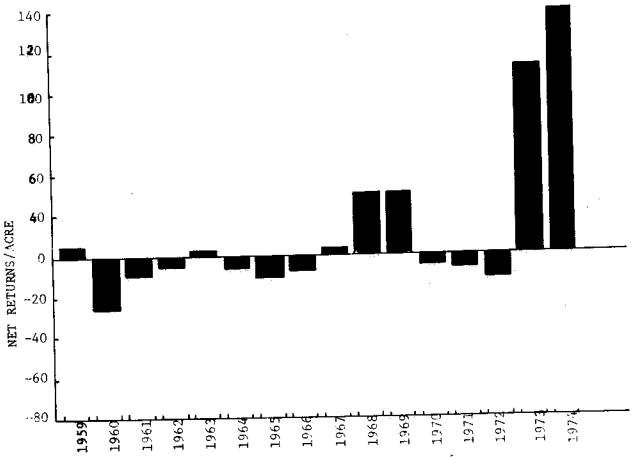


Figure 5. Annual Net Returns/Acre in Producing Annual Ryegrass by "Average" Cost Producers, 1959-1974.

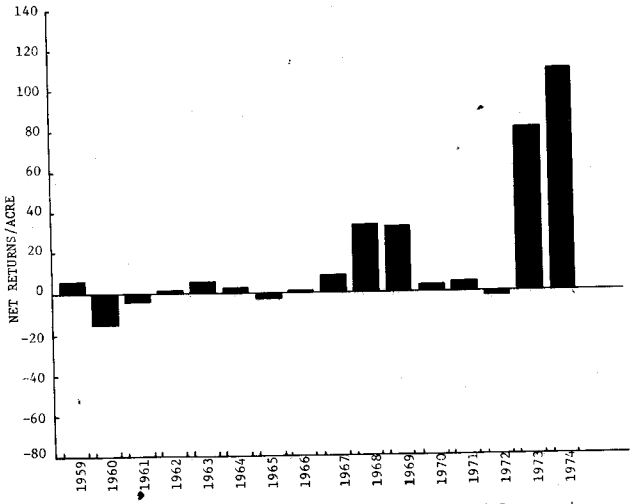


Figure 6. Annual Net Returns/Acre in Producing Annual Ryegrass by "Low" Cost Producers, 1959-1974.

industry is higher than normal [4]. It is important to note that, contrary to common belief, low cost producers did not fare as well as average cost producers in the high price years of 1973 and 1974, since their lower yield more than offset the price gain resulting in lower net return per acre.

VALIDATION OF SECONDARY DATA

In studies such as this, where secondary data sources are used, some error can be expected. This section is intended to review the degree to which error may exist in adjudging the accuracy of the results.

To accomplish an update of production costs using price indices for annual adjustment of production inputs, two assumptions concerning annual ryegrass production over time are made. They are:

1. That national price indices, where used, are a reasonable representation of price changes on ryegrass farms in Oregon.

2. That the proportion of annual production costs contributed by each cost component did not change significantly throughout the 16 year period.

Preliminary results of the study were discussed with local county agents, agri-business suppliers, grass seed producers, an office of the Oregon State Employment Service, and a local tax assessor. These sources concurred that the results were consistent with price information for individual production components which they had available. While local data reflected, in some cases a bit higher price, and in others a bit lower, on balance the national data appeared to reflect the Oregon condition quite well.

Over time, the relative importance of certain production components increases while for others it decreases. For example, in U.S. agriculture historically, the price of labor has consistently been high relative to machinery. Consequently, mechanization has largely replaced the labor component. It is possible then that greater machine intensification may

have occurred in ryegrass production over the past 16 years. If so, net returns specified for the early 1960's may be biased upward for average and high cost producers since this group historically has lagged behind low cost producers in technology adoption.

SUMMARY AND IMPLICATIONS FOR ALL GRASS SEEDS

Price and cost instability is a common phenomenon in Willamette Valley grass seed production. Year to year price and yield variability is high for annual ryegrass [6]. While 1968, 1969, and 1973 were generally profitable in production of annual ryegrass, low returns or losses were estimated to have occurred for ryegrass growers in twelve of the fifteen years from 1959 through 1973. Because very little of the 1974 crop has yet been sold and the 1975 market outlook for grass seeds is poor, expected net returns for the 1974 crop year are not anticipated to be high.

Of fundamental importance is a recognition that "profits" of an industry cannot be based upon observation from a single year. The health of growers in an industry must be judged by grower capacity to weather bad times as well as good. For annual ryegrass production, the historical profit margin has been small and, in some years, negative.

The estimating procedures used in this study were confined to the case of annual ryegrass production. However, the same procedure may be extended to all of the eight major grass seed types grown in the Willamette Valley for which good benchmark data provided by on-farm surveys are available.

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