Cost and Returns of Grass Seed Production in Oregon's Willamette Valley, 1959 to 1975

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Authors: Frank S. Conklin is Associate Professor, and Jon Dean is a Graduate Student, Department of Agricultural and Resource Economics, Oregon State University, Corvallis.

CONTENTS

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Frank S. Conklin and Jon Dean

SUMMARY

The Willamette Valley grass seed industry of Oregon must comply with air quality regulations specified by the 1975 Oregon Legislature. The regulations, documented in Senate Bill 311, include a phased reduction in acres open field burned and a payment of burning fees. They do not include compensatory payments to offset production cost increases associated with compliance of the regulations. This generates concern by some as to ability of the industry to economically survive. This issue is determined largely by economic viability of the industry and its ability to adjust to changing socio-economic conditions.

The purpose of this study is to measure the economic history of eight major grass seed types produced during the 17-year period from 1959 through 1975. The seed types analyzed are annual ryegrass, perennial ryegrass, orchardgrass, tall fescue, bentgrass, fine fescue, Merion Kentucky bluegrass, and other Kentucky bluegrass.

A comprehensive on-farm analysis of costs and returns associated with individual grass seed types was conducted in 1969. The cost portion of that data base is used in this study and adjusted by use of price indices for individual production components to estimate production costs each year from 1959 through 1975. The procedure accounts explicitly for inflationary forces which change input price levels over time. The estimates were compared with Extension Service Enterprise Cost Studies as an alternative source for estimating production costs. Minor adjustments were made in the data base as a result of the comparison. Time series data on Willamette Valley farm gate prices and yields by seed type were used in generating gross incomes

each year for the 17-year period from 1959 through 1975.

Results show that farm gate prices and yields for grass seeds have varied widely from year to year and have been the major contributors to gross income instability for the Willamette Valley grass seed industry over time. Since the energy crisis of 1973, strong inflationary pressure affecting prices of purchased inputs has become a contributor to cost instability. Annual net returns per acre by seed type were erratic over time with positive returns occurring in some years and negative returns in others. Annual ryegrass, which accounts for about 50 percent of total grass seed acreage, showed negative returns in over half of the 17 years studied. On the average, profit margins were especially low for annual ryegrass, perennial ryegrass, tall fescue, and highland bentgrass. Merion Kentucky bluegrass was the only seed type which showed a positive return in all years and consistently had the highest return of all seed types. Its scope, however, has been limited to less than 4,000 acres because of proprietary controls and unsuitability for production on poorly drained lands.

The year 1973 generated a record, or near record, high in net returns per acre for each seed type. This was followed by national conditions in late 1973 which generated serious inflationary pressures on production costs while simultaneously contributing to a precipitous drop in grass seed prices. The effect has been an especially serious cost-price squeeze for the industry in 1974 and 1975 with corresponding record low, mostly negative, farm returns.

Results of the study are clear that the economic history of grass seed producers, as measured by net returns, cannot be evaluated effectively on a single year's observation. Evaluation over several years is necessary to effectively interpret the economic impacts of income variability and use of production processes which commit land and machine resources over several years.

Because results show low, and often negative, average returns from grass seed production generally, it is often concluded that the grass seed industry cannot survive under current air quality regulations. Historical

evidence for the grass seed industry and U. S. agriculture do not support that conclusion [4, 5]. The trend over time has been an increase rather than decrease in overall (industry) volume of production as individual farmers adopt cost reducing technologies, primarily from machine size economies, to offset forces which increase production costs. Adjustment takes the form of fewer and larger farms with the rate being more rapid in years when the cost-price squeeze is more acute. The Willamette Valley grass seed industry will continue to face economic pressures over time as do all industries. Current issues center on (1) limited cropping alternatives, especially on ryegrass land, (2) an increase of restrictive trade barriers to the European Economic Community (EEC) and Japan as principal export markets for grass seed, (3) large volume of domestic carryover stocks of U.S. produced grass seed, (4) increased production costs from inflation and curtailment of open field burning, and (5) some shifting of grass seed production to other producing regions. Each of these forces contribute to cost-price squeeze and further reduction in number of seed growers, but not necessarily in total volume of production.

What conditions might leave future survival of the industry in doubt? A number of possibilities exist: (1) If demand for home lawns, golf courses, and red meats were to diminish markedly, then derived demand for grass seed would decline. (2) If new cost reducing technology were not available, growers would not have a means to counteract forces which increase production costs. (3) If the cost-price squeeze is borne unequally between producing regions, the Willamette Valley might lose some of its comparative advantage resulting in further production shifts to other regions. While the first two possibilities are not very likely to occur, the third is a definite possibility. If shifts occur, they more likely will be with tall fescue, the bluegrasses and orchardgrass since significant competition with these seed types occur from other producing regions. This adjustment should not be interpreted necessarily as a signal for imminent collapse of the industry, however.

STUDY PROCEDURES

The purpose of the study is to measure the economic history of the eight major grass seed types produced in the Willamette Valley. To do so requires knowledge of price, yield, and production cost information each year of the time period concerned. Official statistics prepared by the Crop Reporting Service, USDA, report annual price and yield by seed type for the Willamette Valley since 1959. Grass seed production costs are not reported annually. Two data sources are available which report production costs in certain years. One source is a 1969 research survey of a sample of Willamette Valley grass seed producers prepared by the Department of Agricultural and Resource Economics, Oregon State University [2]. The second source is periodic enterprise cost estimates by grass seed type. This latter work is conducted by county agent and farm management specialists of Oregon State University Extension Service [6].

The primary purpose of the 1969 research survey was to identify physical and economic factors which were characteristic of grass seed production by seed type and which influenced farm income. Detailed physical and economic information was recorded on field questionnaires from personal interviews with 147 grass seed producers. Averages and ranges in production costs and returns were calculated by farm and seed type to measure the level and variability of returns among seed types and among farms.

Enterprise cost studies were prepared for several grass seed types in 1969, 1970, and 1975. The primary purpose of such studies is to provide a format and procedure to assist growers in determining how to calculate production costs by crop and livestock enterprise for a specific moment in time on their own farm. It is recommended only secondarily as a source of comparative information. Information on farm size, production practices, machinery costs, labor requirements, material, and other costs is obtained from a small group of selected growers. Because the growers are selected rather than sampled it usually is not possible to determine the extent to which they are representative of the industry. At times, those selected may be the

more progressive, innovative growers. The usual approach is to hold a meeting of the selected growers. The cost information is summarized in a budget format using a consensus approach in arriving at what is perceived by the group to be a typical cost estimate for each cost component. This approach does not measure economic and physical variability between farms.

Costs from the 1969 research survey were chosen to provide the cost data base for this study. The 1969 costs are adjusted using price indices for individual production components to estimate annual production costs per acre each year during the 17-year period from 1959 through 1975. Annual price indices for selected production cost components were obtained from Agricultural Prices, prepared by USDA [1]. Price indices for fertilizer and land charge categories use Oregon data while the remaining categories represent U.S. averages. The procedure explicitly accounts for inflationary forces which influence the price level of inputs over time. The 1975 cost estimates were compared with 1975 Enterprise Cost Studies prepared on grass seed production to appraise probable accuracy of the study estimates. Some adjustment of the 1975 estimates was made to incorporate cost effects of certain technology change, as detected by the 1975 Enterprise Cost Studies, which has occurred since 1969. The adjustments include modification of overhead cost component rates and addition of a cleaning and processing charge which was omitted in the 1969 research survey.

Time series data on Willamette Valley annual farm gate prices and yields by seed type were used in generating gross incomes by seed type. The data are reported jointly by the Crop Reporting Service, USDA, and OSU Extension Service for the 17-year period from 1959 through 1975 [1]. The annual yield data represent yield by seed type for "average" cost producer conditions in the Valley. Annual yield for "low" and "high" cost producer categories utilizes the same time series after being adjusted from the 1969 data base to reflect yield differences between producer cost types.

The format of the study presents first the Net Return estimates from 1959 through 1975 for each of the eight grass seed types. This is followed by

presentation of procedures for calculating average gross returns per acre which includes annual farm price and yield information. Production cost estimates are presented as the final part.

NET RETURNS FROM 1959 THROUGH 1975

Annual net returns calculated in the study provide an estimated measure of profit or loss in production of the eight major grass seed types produced in the Willamette Valley. Calculation of net returns for each of the 17 years from 1959 through 1975 provides a dynamic perspective of how well each seed type has served as a contributor to farm income. The nature of the study prevents making specific conclusions concerning economic returns to total farm units on which several grass seed types may be grown jointly.

Net returns per acre from 1959 through 1975 are presented graphically in Figure 1 for each seed type. Results are presented as a band to reflect within year cost and yield variation among growers in the production of a specific seed type. The band is excluded for the two bluegrasses for lack of data. The upper boundary of each band generally reflects the "low" cost producer group which consistently had a higher annual net return than did the "high" cost producer group. There was one exception to this situation. In 1974, the "high" cost producer of annual ryegrass had a higher net return than the "low" cost producer because the value of the higher yield more than offset the higher cost of achieving it. The lower boundary of each band reflects the "high" cost producer group. While "high" cost producers generally had higher seed yields than the average, the additional costs for achieving higher yields generally were greater than the value of the additional yield. While the basis for this situation is not fully understood, it is suspected that "high" cost producers may be in a better financial position to accept risk associated with potential for a higher net return than are low-cost producers who may be more conservative and hedge against major loss. In any case, risk preference and aversion strategies are suspected as playing important roles. It is not possible to measure this effect in the study since only ex post rather than ex ante data are available. It is not possible to conclude from the results that the "low" cost producer has a more profitable farm operation over time than do "average" or "high" cost producers. Total farm evaluation over time would be necessary to test validity of that contention.

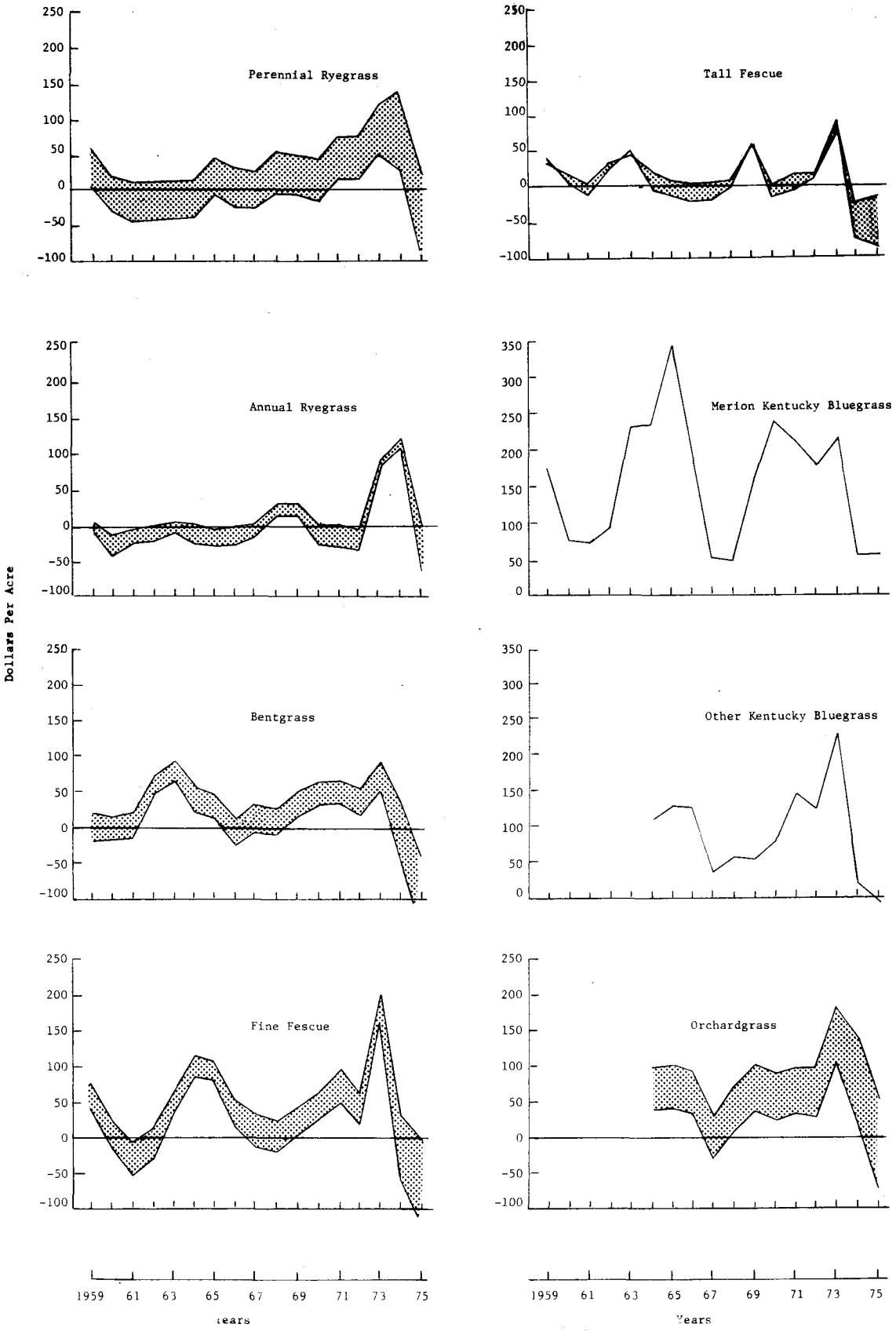

Figure 1. Estimated annual net returns per acre for eight grass seed types and ranges for six types, Willamette Valley, Oregon, 1959 - 1975.

Several characteristics of annual net returns in grass seed production are observed for all seed types. Annual net returns are erratic, with no assurance that they are positive. For annual ryegrass, the return has been, on the average, more negative than positive over the 17-year study period. This undoubtedly has been a major contributor to the rapid decline in number of grass seed producers in the Willamette Valley over the past two decades [2]. On the average, profit margins historically have been low or negative for annual ryegrass, perennial ryegrass, tall fescue, and highland bentgrass. Orchardgrass and fine fescue generally showed positive returns. The bluegrasses had consistently higher profit margins that the other seed types. Merion Kentucky bluegrass was the only seed type not recording any negative annual returns. Because a variability band on net returns could not be calculated for the bluegrasses, interpretation of general economic returns to bluegrass producers is limited, however.

The year 1973 saw a record, or near record, net return per acre for each of the seed types. While that situation continued to persist into 1974 for annual and perennial ryegrasses, the market price began to fall precipitously for tall fescue, highland bentgrass, fine fescue, orchardgrass, and other Kentucky bluegrass. Conditions worsened in 1975 as farm gate prices declined further while inflationary pressures continued to exert a strong upward trend on production costs. Only Merion Kentucky bluegrass weathered the cost-price squeeze in 1975 with a positive net return. Unfortunately, Merion Kentucky bluegrass accounts for less than 2 percent of total Willamette Valley grass seed acreage and is not expected to expand significantly because of proprietary controls and unsuitability for production on poorly drained lands. The same restraints generally hold true for expansion of orchardgrass and fine fescue acreage as well.

AVERAGE ANNUAL GROSS RETURNS

Average annual farm seed price and annual seed yield are combined to generate average annual gross returns per acre. Annual gross return estimates are presented graphically in Figure 2. The variability of gross income for the 17-year period for each seed type is summarized in Appendix Table 1. Review of Appendix Table 1 shows that gross incomes of annual and perennial ryegrasses are, relatively speaking, more variable than other grass seed types in terms of combined yield and price variability effects. Other Kentucky bluegrass, orchardgrass, and bentgrass were, relatively speaking, the least variable. In general, however, all grass seed types exhibit considerable price and yield variability. Market price is a much larger contributor to income instability than is crop yield as shown in the next two sections.

Average Annual Farm Price

The average annual farm gate price for the eight Oregon grass seeds is presented graphically in Figure 3 for the 17-year period from 1959 through September 1975. Tabular listing of farm prices is presented in Appendix Table 2. Wide variations in farm price occur from year to year as a regular market phenomenon. While record or near record highs were realized in 1959, 1969, and 1975 for most grass seed types, they were countered by record or near record lows in 1961, 1967, 1971, and 1975. Relative magnitude of price variation is presented in Appendix Table 3. Annual and perennial ryegrasses had the lowest average farm gate prices with 6.52 cents and 11.54 cents per pound, respectively. Merion Kentucky bluegrass had the highest average farm price at 83.13 cents per pound. Annual and perennial ryegrasses exhibited the greatest price variability over time as measured by the coefficient of variation. Orchardgrass and bentgrass showed the least price variability.

Grass seed producers and seed handlers maintain storage facilities which serve to dampen seasonal market price fluctuations. Most of a

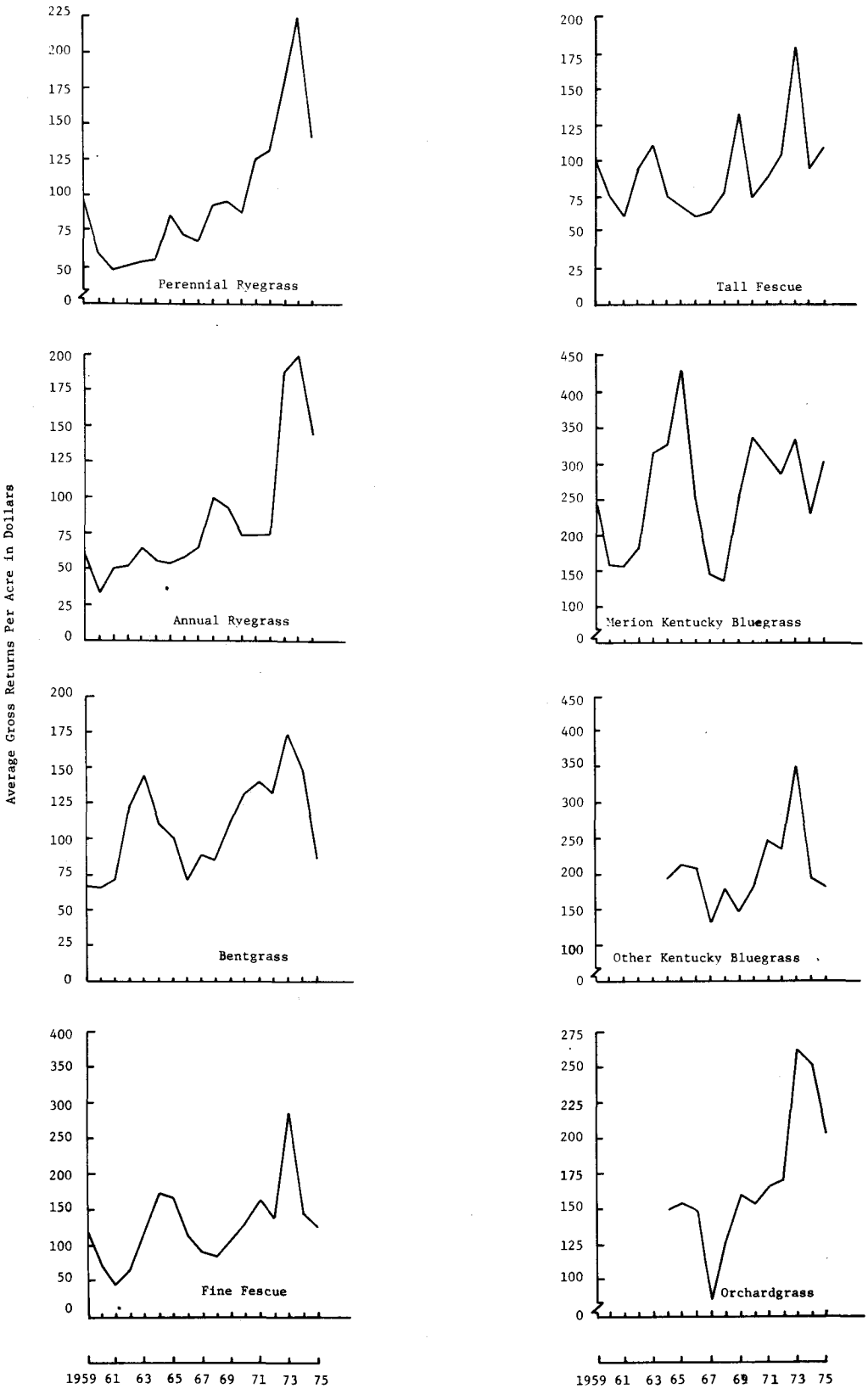

Figure 2. Average gross returns per acre by seed type, Willamette Valley, Oregon, 1959 - 1975.

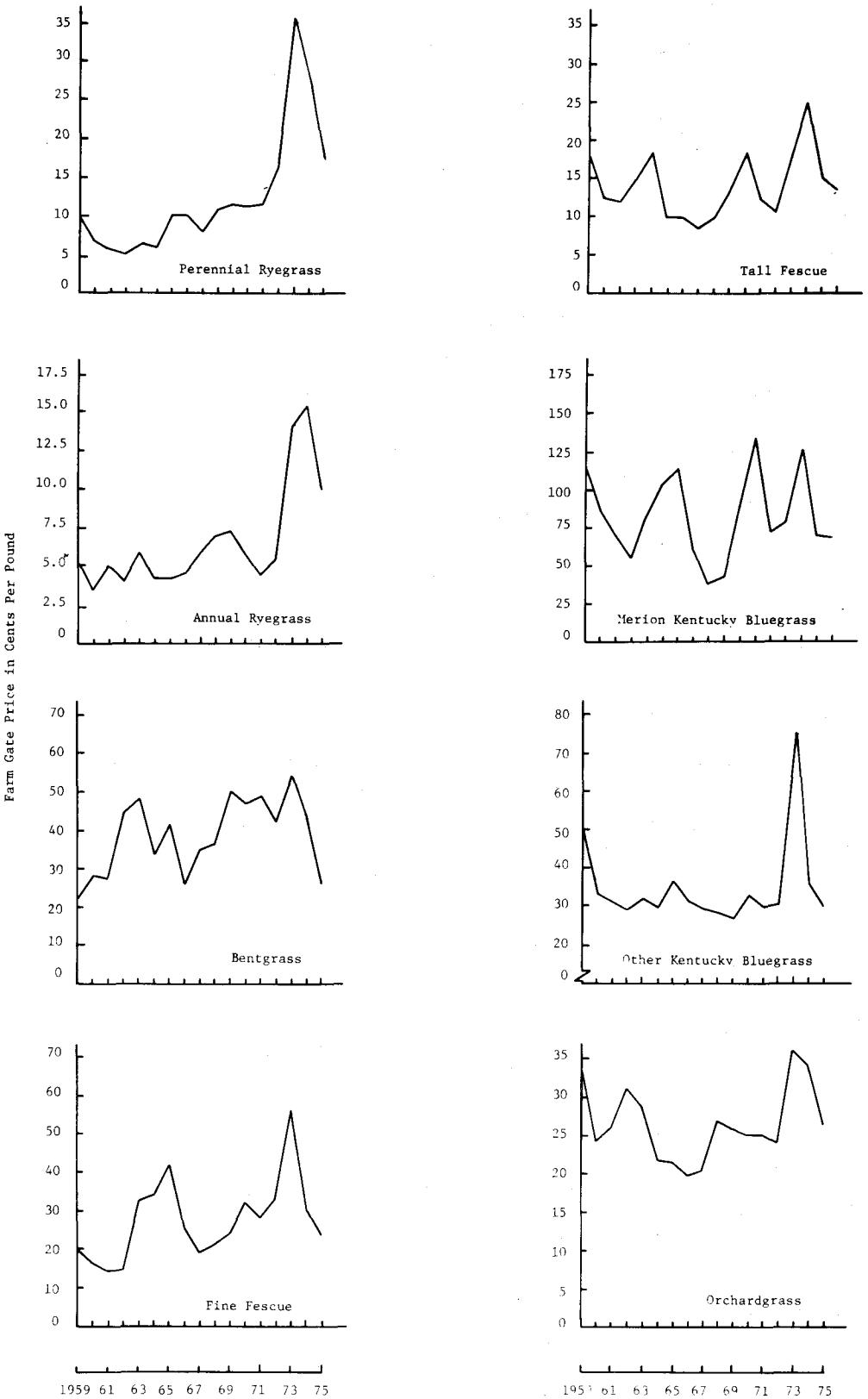

Figure 3. Average price per pound received by Oregon growers by grass seed type, 1959 - 1975.

year's crop production is held in storage until after January 1, and sold in the next calendar year. Very little demand exists for grass seed for turf, cover crop, and pasture purposes until spring. With exception of annual ryegrass, only limited amounts of grass seed used for winter overseeding in the southeastern and southwestern U.S. move into market channels in the late fall and winter months following harvest.

Average Annual Yield

Grass seed, like other non-irrigated crops, is subject to year-to-year variability because of weather and other natural forces. Seed growers themselves contribute to yield variation over time by adopting new seed varieties, changing the level of fertilizer and herbicide use, and changing cultural practices to meet changing social and economic conditions.

A graphic presentation of average annual yields for the eight major seed types grown in the Willamette Valley for the 17-year period from 1959 through 1975 is shown in Figure 4.[1/] A tabular presentation of the yield data is given in Appendix Table 4. Annual ryegrass had the highest average yield of 1,263 pounds per acre, while bentgrass had the lowest with 277 pounds per acre.

A linear trend line was calculated for each seed type and shown in Figure 2 as the straight line passing through the erratic yield line. Variation around the trend line represents weather influences primarily while the slope of the trend line represents, for the most part, the yield effect from technology change over time. The trend line is included in Figure 2 as an aid to separate weather and technology effects upon yield over time. It is not used in cost and return calculations of the study.

Annual ryegrass shows the greatest positive yield effect from technology of 24 pounds per year average increase. Other Kentucky bluegrass exhibited

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[1/] Yield averages for other Kentucky bluegrass and orchardgrass seed type categories were not reported prior to 1964 so the time series is limited to the 11-year period from 1964 through 1975.

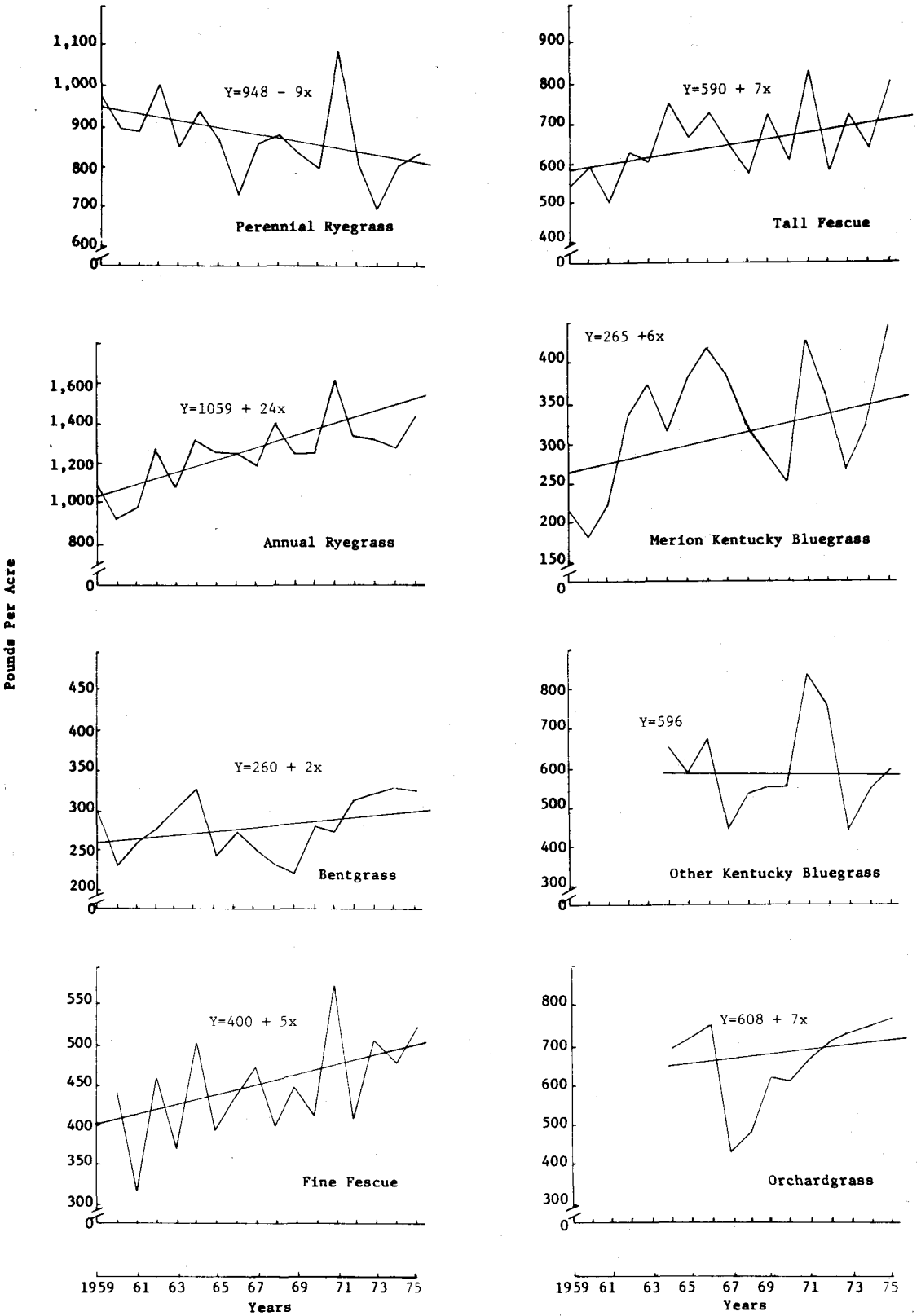

Figure 4. Average annual yields per acre for eight selected grass seed types grown in the Willamette Valley, Oregon, 1959-1975.

no positive yield trend. Perennial ryegrass was the only seed type exhibiting a negative yield trend. The basis for this is not fully understood. However, substantial shifts from use of public to proprietary perennial ryegrass varieties having lower average yields and greater yield variability but offsetting higher quality and better physiological characteristics appear to be contributing factors.

The relative magnitude of year-to-year yield variation is presented in Appendix Table 5. While absolute yield variability measured by standard deviation was quite different between seed types, relative yield variability measured by the coefficient of variation was remarkably similar for each of the eight grass seed types. This very likely reflects similar seed type growth responses to weather changes and similar field cultural practices across grass seed types. Yield variability, measured by the coefficient of variation, is much lower than price variability.

Estimation of Annual Yield for "Low" and "High" Cost Producers

The 1969 research survey showed grass seed yields for a given year varying considerably from one producer to another growing the same seed type. Physical, economic, technical, and institutional forces contributed to the differences. That study reported yields for "low", "average", and "high" cost producer categories. Table 1 shows yield levels by seed type for each of the three producer cost groups used in the 1969 study. Yields for "low" and "high" cost producers are included and expressed as changes from "average" cost producer yields.

In this study, annual yield for "average" cost producers by seed type uses Willamette Valley average annual yields, shown in Appendix Table 4. Annual yields for "low" and "high" cost producers use the same time series data base adjusted to reflect yield differences among producer cost categories which existed in 1969 as shown in the two right hand columns of Table 1. For purposes of this study, it is assumed that the 1969 yield differences from the field survey for "low", "average", and "high" cost producer categories, as shown in Table 1, prevailed throughout the 17 years covered in the study.

Table 1. Average 1969 Yield Reported by Seed Type for "Low", "Average", and "High" Cost Producer Categories, Expressed in Pounds Per Acre

Seed Type	1969 Yield per acre by producer cost category			Yield difference from "average" cost producer category as used in this study	
	"Low cost"	"Average cost"[a/]	"High cost"	"Low cost"	"High cost"
	pounds per acre				
Annual ryegrass	1128	1427	1650	-300	+225
Perennial ryegrass	850	851	850	0	0
Tall fescue	700	846	1000	-150	+150
Orchardgrass	912	816	912	+100	+100
Bentgrass	345	337	394	0	+ 50
Fine fescue	563	560	644	0	+100
Merion Kentucky bluegrass[b/]	611	621	738	0	0
Other Kentucky bluegrass[b/]					

SOURCE: Conklin, Frank S. and Douglas E. Fisher. "Economic Characteristics of Farms Producing Grass Seed in Oregon's Willamette Valley," Circular of Information 643, Agricultural Experiment Station, Oregon State University, Corvallis, November 1973.

[a/] Yields shown here represent averages for the 147 grass seed farms sampled in the 1969 survey. Consequently, they are somewhat different from those reported for 1969 in Appendix Table 4 which represent yield averages for all Willamette Valley grass seed producers.

[b/] 1969 field survey did not report bluegrass by separate categories.

In 1969, "high" cost producers generally used more fertilizer and had correspondingly higher yield than the "average" and "low" cost producers. This situation occurred with five of the grass seed types. This was not so with production of perennial ryegrass, however, which did not appear to respond to high fertilizer rates. This may be a reflection of increased grower importance of proprietary varieties of perennial ryegrass and their low response to fertilizer. Because the 1969 survey did not report the bluegrasses by separate categories, it was not possible to discern within year yield differences among producers for Merion Kentucky bluegrass and other Kentucky bluegrass.

ESTIMATED ANNUAL PRODUCTION COSTS

Estimation of annual production costs is not a simple matter. Requirements include specification of relevant cost components, whose production costs are considered, and to what time period the costs pertain. Several reasons exist for care in specification of these factors. First, the prices of the components which make up production costs change over time. Second, the relative importance of specific components in the production process change over time. Third, production practices among growers producing the same seed type often differ considerably. Finally, calculation of fixed or overhead cost components at the farm level and their allocation to individual grass seed crop is, at best, an arbitrary process subject to researcher judgment. These factors however, influence cost levels among grass seed producers and among seed types.

The relative price changes for selected production components used in production of grass seed are treated first. This is followed by a presentation of the procedure used in estimating annual production costs, then compares adjusted study cost estimates with Enterprise Cost Studies for 1975, and concludes with specification of production costs over time by seed type and production cost levels that reflect different production practices among growers of the same seed type.

Changes in Price of Purchased Inputs

Annual price changes for selected production input categories from 1959 through 1975 are presented in tabular form in Appendix Table 6. The relative price changes are expressed as index numbers using 1969 as the base year with a price index number of 100.

From 1959 through 1971, increases in prices of purchased inputs were minimal, averaging 1 to 2 percent per year. During that time,the absolute price of fertilizers declined while those for herbicides and gas and oil used in machine operations remained nearly constant. Labor and land prices showed the largest price increases, averaging 3 to 4 percent per year.

Since 1971, strong inflationary pressures in the U. S. economy have influenced prices of purchased inputs. Relative price increases since 1969 for selected production inputs are shown in Figure 5. Fertilizer price increases precipitated by the energy crisis in the fall of 1973 were the most dramatic. The price of fertilizer more than doubled in one year, from 1973 to 1974. Inflationary effects upon capital costs of farm vehicle and machinery were felt strongly in 1974 and were even more pronounced in 1975. Impact of the energy crisis was less dramatic on price of gasoline and oil used with agricultural machinery. These prices increased only slightly more rapidly than did labor prices which, of the major production inputs, had the smallest rate of increase since 1969.

Land, as an input, increased in price relative to other inputs at a rate slightly higher than other inputs from 1959 through 1974, thereby increasing its absolute role in determination of total production costs of grass seed. In 1975, the absolute price of Oregon non-irrigated land declined, the only input to do so since 1971. The marked drop in price of grass seeds and other Oregon grown crops and livestock since 1973 has very likely been a contributing factor. Land rents, a proxy for land prices, reflect this trend in Benton County. There, rents declined some $4 to $11 per acre from 1974 to 1975 for Class I, II, and III non-irrigated land used for grass seed production. In Linn County, a constant or slight increase occurred in rental values from 1974 to 1975 [7]. The extent to which leveling off or decline in rents for grass seed land can be viewed as a trend is speculative. Market conditions for Oregon produced crops, availability of cost-reducing technology for grass seed growers, use of land as a hedge against inflation, and urbanization pressures will likely be important forces influencing Willamette Valley land values in the future.

Estimation of 1975 Production Costs

Price indexes discussed in the previous section are used to adjust annual production cost per acre from the 1969 field survey to estimate annual production costs each year of the 17-year period from 1959 through

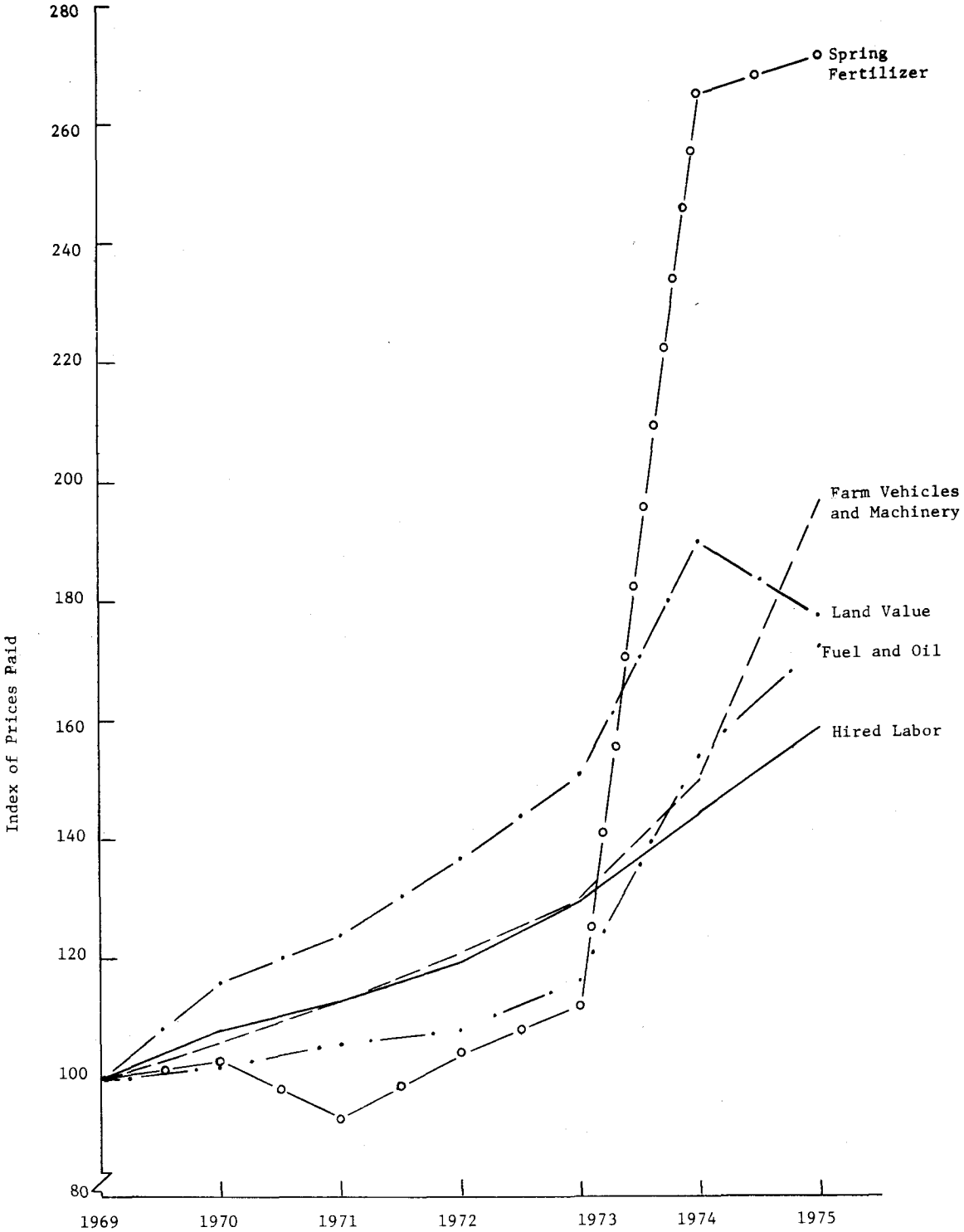

Figure 5. Relative prices paid by grass seed producers for selected production inputs, 1969-1975 [1969=100].

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.

NOTE: Fertilizer and land values are quoted for Oregon. The remainder represent U.S. averages.

1975 for each of eight seed types. To demonstrate the computational procedure used, derivation of 1975 production cost estimates are presented in detail for the annual ryegrass seed type in Table 2. The procedure is the same as that used by Conklin and Wilson to report estimated annual ryegrass costs over time in a previous publication [3].

A cleaning and processing cost component was added to this study which was not included in the earlier annual ryegrass publication or in the 1969 field survey. This oversight was detected in comparing cost estimates from this study with those from the 1975 Enterprise Cost Studies. That component was added after determining that it represents a legitimate production, rather than marketing, cost for Pacific Northwest produced seed. Grass seed in Oregon is sold at the farm gate on a cleaned and bagged basis with market price quotations reflecting that condition. In other parts of the U.S., farm gate price represents grass seed sold on a field run or "in the dirt" basis. Cost estimates for the cleaning and processing component are taken from 1975 Enterprise Cost Studies.

The 1975 cost components of annual ryegrass show a 59 to 171 percent increase from the 1969 base year. The largest increases, exceeding 160 percent, occurred with spring and fall applied fertilizers and seed. The smallest cost increases were in the hired and operator labor categories with a 59 percent change. The materials component increased its share of total production cost by a few percentage points due primarily to fertilizer price increases. Because fuel and oil used in machine operations comprise such a small percentage of total production costs, 14 percent in 1969 and 12 percent in 1975 for annual ryegrass, their relative importance has declined in spite of increased fuel prices.

Estimated 1975 production costs, using the price index procedure described above,were calculated for "low", "average", and "high" cost producer categories used in the 1969 field survey. Low and high cost categories were obtained by averaging cost data from the four sample farms in the survey for each seed type which had the lowest and highest operating costs respectively for each seed type. Merion Kentucky bluegrass and other

Table 2. Estimated Average Production Cost Per Acre for Annual Ryegrass in 1975, Using Price Indices and 1969 Actual Costs

Cost components[a]	1969 Actual cost[a]	1969 % of total	Price index (1969 = 100)	1975[b] Estimated costs	1975[b] % of total
Machine operating costs	$10.24		172[c]	$17.61	
Machine overhead costs	15.37	29	196[d]	30.13	27
Materials					
Fertilizer[e], Fall	3.60		267[f]	9.61	
Spring	10.40		271[f]	28.18	
Herbicides	.38	18	169[g]	.64	24
Seed	1.44		229[h]	3.30	
Hired labor	1.66	10	159[i]	2.64	8
Operator labor	6.67	10	159[i]	10.61	8
SUB-TOTAL	$49.76	57	(206)[j]	$102.72	59
Amortized establishment costs[k]	2.98	3	206[l]	6.14	4
General overhead[m]	2.64	3	176[n]	4.65	3
Land charge[o]	17.11	20	177[p]	30.28	17
Cleaning and processing[q]	14.86	17	206[l]	30.61	17
TOTAL PRODUCTION COSTS	$87.35	100	(200)[j]	$174.40	100

[a] Component categories and costs taken from Table 13, page 53, of "Economic Characteristics of Farms Producing Grass Seed in Oregon's Willamette Valley," Agricultural Experiment Station Circular of Information 643, Oregon State University, November 1973 [2]. Costs for "average grower" conditions were used which represent the average of 44 sample farms producing annual ryegrass on Dayton (Whiteland) soils in Linn, Benton, and Lane Counties.

[b] Because the study was conducted in September 1975, average 1975 calendar year price indexes were not yet available. The most current price indexes by USDA reported cost categories were used for 1975.

The USDA categories and their reporting dates are as follows:

"Motor Supplies" - July, 1975
"Farm Machinery" - September, 1975
"Fertilizer (Oregon)" - April 30, 1975
"Farm Supplies" - August, 1975
"Seed" - September, 1975
"Wages" - September, 1975
"Production Items" - September, 1975

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

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

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

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

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

[h] "Seed" category [1].

[i] "Labor" category [1].

[j] Obtained as a direct calculation of the 1975 total as a percentage increase from the 1969 total.

[k] An average annual seeding cost which reflects grassland ing for a 3-year period followed by complete seedbed preparation, including plowing, prior to seeding only once every four years [2].

[l] Assumed to increase at the same rate as the average of the cost categories shown above.

[m] Includes such general items as office expenses, dues, travel, income tax preparation, legal fees, etc.

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

[o] Includes property tax and interest on average investment.

[p] 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, 1975.

[q] Estimated from 1975 Enterprise Cost Studies, OSU Extension Service.

Kentucky bluegrass seed types were lumped together for production cost purposes since the 1969 field survey did not treat them separately. The 1969 average producer cost estimates are presented in Appendix Table 7. The 1975 estimated production costs by seed type and producer cost categories are summarized in Table 3. On the average, total production costs per acre in 1975 approximately doubled those which prevailed in 1969. Inflationary pressure on general price levels, including agricultural production inputs, was the major contributory factor.

Comparison between "low", "average", and "high" cost producer category estimates shows a large degree of cost variability among producers growing the same seed type. The "high" cost producer category shows production costs per acre approximately double that for the "low" cost producer. Factors which contribute to the large cost differences among growers appear diverse. A highly complex set of unique characteristics existed on each sample farm in 1969 and the way in which they were combined not only influenced the costs that prevailed in 1969 but the 1975 estimates as well. The factors which made one producer a high cost operator were not necessarily the same factors which caused high costs for other operators. However, the "high" cost producer generally used more fertilizer and chemicals in 1969 than did the "low" cost producers. As a result, the estimation procedure of this study shows "high" cost producers to be more adversely affected in 1975 by the energy crisis than "low" cost producers.

The reader should be warned that the "low" and "high" cost producer categories are based on only four observations in each category. If a producer is "high" cost in one seed type it is quite likely that he is also a "high" cost producer in the production of other seed types. The same issue likely exists with the "low" cost producer category as well.

Changing weather conditions over time makes it possible in some years for high fertilizer applications by "high cost" per acre producers to become "low unit cost" per pound seed producers. This result might offset low returns for "high" cost producers to some degree. Changes in management decisions over time as affected by changing capital positions and risk

Table 3. Estimated 1975 Annual Production Costs Per Acre by Seed Type for "Low", "Average", and "High" Cost Producers, Willamette Valley, Oregon

Cost Components	Annual Ryegrass			Perennial Ryegrass			Bentgrass			Tall Fescue			Fine Fescue			Orchardgrass			Kentucky Bluegrass		
	low	avg.	high	low	avg.	high	low	avg.	high	low	avg.	high	low	avg.	high	low	avg.	high	low	avg.	high
Machine costs																					
Operating	11.63	17.61	27.00	5.92	11.46	19.59	12.80	14.47	19.57	5.04	12.14	20.57	14.90	17.01	25.94	6.33	14.71	23.00	12.04	17.96	23.19
Overhead	19.87	30.13	46.00	10.09	18.60	31.16	21.81	24.74	33.50	8.58	19.27	35.22	25.46	29.05	44.32	16.82	25.11	39.38	20.54	30.69	39.61
Materials																					
Fertilizer - Fall	2.35	9.61	2.38	2.46	7.48	25.63	3.12	8.52	26.97	7.85	15.19	20.79	0	15.46	30.49	2.35	17.00	37.27	5.50	13.46	25.15
- Spring	14.82	28.18	41.79	12.60	30.62	48.67	21.46	25.77	37.43	18.70	36.10	48.29	19.84	20.16	26.18	23.39	29.30	39.08	27.29	34.09	46.04
Herbicides	.54	.64	2.10	4.11	5.49	14.62	4.07	8.79	18.39	6.88	13.25	17.75	5.92	10.61	12.96	7.01	11.34	22.71	12.91	16.56	32.28
Seed	2.31	3.30	21.62	.92	.92	.92	.50	.50	.50	.53	.53	.53	.91	1.24	1.24	1.15	1.15	1.15	1.44	1.44	1.44
Labor																					
Hired	1.11	2.64	3.82	1.48	2.31	2.58	1.64	2.15	3.59	2.37	3.20	4.55	.76	1.24	1.35	2.42	3.45	6.82	2.43	3.28	7.57
Operator	4.39	10.61	15.28	2.73	5.09	6.71	6.52	8.59	14.36	3.86	5.31	7.44	6.87	11.21	12.26	3.61	8.05	10.26	7.30	9.79	11.40
Amortized Establishment Costs	6.05	6.14	6.11	13.40	15.91	21.24	10.41	19.93	39.72	12.80	15.49	19.68	16.48	29.17	65.46	15.93	18.82	26.25	18.44	24.79	33.39
General Overhead	2.46	4.65	6.88	2.02	3.78	6.69	3.38	4.66	7.96	2.55	4.77	7.04	3.84	5.63	8.99	3.06	5.17	8.41	4.10	6.27	28.53
Land Charge	30.28	30.28	30.28	33.70	33.70	33.70	31.01	31.01	31.01	32.66	32.66	32.66	26.62	26.62	26.62	35.31	35.31	35.31	34.41	34.41	34.41
Cleaning & Processing	30.61	30.61	30.61	19.76	19.76	19.76	17.26	17.26	17.26	22.15	22.15	22.15	26.79	26.79	26.79	32.73	32.73	32.73	28.36	38.40	48.43
TOTAL PRODUCTION COSTS	126	174	234	109	155	231	134	166	250	119	180	231	148	194	283	150	202	282	175	231	331
Percent of 1969 production costs	196	200	200	195	202	206	196	197	201	192	203	199	194	197	201	199	200	202	204	199	223

preference can also change the relative cost relationships between producer cost categories.

Comparison of Adjusted Study Cost Estimates with Enterprise Cost Studies for 1975

Price indices, as used in this study, reflect changes in the prices of inputs used in the production of grass seed. They do not measure absolute or relative changes which occur in the physical quantities of inputs used over time, however. Cost effects from technological change are an example. While the price index procedure adjusts for the input price changes over time, the physical relationships which existed at the time of the field survey in 1969 are assumed to prevail throughout the 17 years of the study. If technological change occurs over time, price indices may overstate or understate actual costs. While the Willamette Valley grass seed industry constantly faces changing conditions, those which have occurred since 1970 have been especially pronounced. More costly field sanitation, residue removal and field cultural practices have begun to replace lower cost traditional open field burning which is no longer socially acceptable for environmental reasons.

The Oregon Extension Service prepared Enterprise Cost Study estimates for each of the major grass seed types in 1975. These estimates provide a means for evaluating technology changes which have occurred since 1969. This section provides a detailed comparison of both approaches and identifies those cost adjustments made in this study arising from the comparison. A summary of 1975 production costs derived from the Enterprise Cost Study approach is presented in Appendix Table 8 to permit the reader a direct comparison with 1975 estimates derived from this study which are presented in Table 3.

While the cost categories used in each approach are not identical, they are similar enough that comparisons can be made without major difficulty. Comparison of total costs generated by each approach shows Enterprise Cost Study estimates to be consistently higher. Either they were comparable to the "high" cost producer category of this study or they exceeded it. Comparison

of individual cost components is necessary to evaluate the basis for major cost differences.

Fertilizer costs from the Enterprise Cost Studies were within the range of the "low" and "high" cost producer categories for all seed types except annual ryegrass and the bluegrasses. Because plowdown began to appear as a cultural practice on annual ryegrass in 1975, the additional fertilizer cost may be explained by heavier use of nitrogen to enhance decomposition of the stubble after plowdown. For the bluegrasses, an increasing importance of proprietary varieties which require extra care including additional fertilization may explain the higher cost. Further, it must be recognized that small sample size in the 1969 field survey required combining all bluegrasses into one seed type category, thereby precluding measurement of cost differences between specific bluegrass types.

The contrast with chemical use was similar to that with fertilizer. Updating of the 1969 survey showed chemical costs ranging only as high as $20 per acre across seed types. It ran as high as $50 per acre on bluegrasses in the Enterprise Cost Study estimates. This difference cannot be explained generally but may be related to the increases in proprietary varieties which, for economic reasons, may justify chemical sanitation and, for biological reasons, their yields may be more sensitive to weed competition than public varieties.

Hired and operator labor costs show a similar contrast. The higher costs from the Enterprise Cost Studies reflect a higher wage per hour for machine operator labor, $5 per hour, and the inclusion of a $3 per acre management charge.

Machinery costs were consistently lower with the Enterprise Cost Studies by $6 to $20 per acre. This may reflect that some machinery, labor, and chemical input substitution has occurred from 1969 to 1975. A more likely reason involves procedural differences in machine cost calculations between the two approaches. It is difficult to allocate the overhead cost (depreciation, interest, taxes, insurance, and repairs) component of machine costs to individual enterprises. Any allocation scheme is somewhat arbitrary.

The problem is compounded as cost standardization procedures are used to "average" machine costs among many farms, as was done with both cost estimation approaches. Cost standardization, while having simplicity in its favor, eliminates actual cost variability among farms due to economies of size, machine utilization, and field performance effects. It is impossible to tell which of the two procedures comes closest to providing a representative average of 1975 machine costs.[2/]

Comparison of amortized establishment costs indicates no great differences except for orchardgrass, fine fescue, and the bluegrasses. Differences there are attributable, to a large degree, to the years of stand life assumed. The 1969 field survey had stand life on the perennial grasses ranging from 10 to 17 years. The Enterprise Cost Studies assume only five to 10 year life. It is not unreasonable to expect that stand life may decrease as more acreage is devoted to proprietary grass seeds which are more sensitive to climatic and cultural practice changes than the traditional public varieties. At present their percentage of total acreage is still very small.

As stated earlier, a cleaning and processing cost component was added to the production cost list of this study. This omission from the 1969 field survey was detected in the initial comparison between the two cost estimates. The cost quotation is identical in each approach for cleaning and processing because the 1969 field survey update uses the Enterprise Cost Studies as its source.

[2/] In the 1969 field survey, the combined cash and overhead machine costs are intended to approximate machine custom rates. A standard hourly rate for machine overhead was imputed, representing 150 percent of cash machine cost to estimate depreciation, interest, repairs, taxes, and insurance on machinery. In the Enterprise Cost Studies, machine overhead costs ranged from 155 to 165 percent of cash machine costs depending upon the seed type. The typical size of grass seed enterprise relative to total farm size and the kind and size of "typical" farm machinery are taken into account in approximating current machine size economies which influence machine overhead costs when expressed on a per acre basis.

A miscellaneous cost category is used in each approach. It is called "general overhead" in the 1969 field survey update and "other" in the Enterprise Cost Studies. The costs ranged from $6 to $9 per acre in the former and from $14 to $30 per acre in the latter. In the former, it was intended to include such farm overhead costs as office expenses, dues, and travel. This was estimated at 5 percent of operating and establishment costs in 1969, and due to general price increases, was increased to about 7 percent in 1975. The "other" category from Enterprise Cost Studies was estimated at 9 percent of total cash costs and included insurance, general office expenses, DEQ field burning fee, and miscellaneous supplies. The estimate from the 1969 field survey update appears to be overly conservative. Since both approaches use a similar arbitrary procedure, their accuracy depends on the cash cost component to determine if any bias exists. If cash costs are biased on the high side, a "miscellaneous" or "other" cost category compounds any upward cost bias.

The final comparison involves the land charge category. Here the contrast is the greatest. The Enterprise Cost Studies show a cost range of $77 to $95 per acre across seed types which is some $45 to $60 per acre higher than the 1969 field survey update. Comparison of the results with current land rent values from Linn and Benton County tax assessors indicates that the 1969 update provides a more reasonable estimate [7]. The discrepancy can be explained in that ownership (property tax and an expected 9 percent return on investment) costs rather than land rents were used in the Enterprise Cost Study calculations. Tax assessor information indicates that landowners are willing to accept a rate of return on investment considerably less than the 9 percent used in the Enterprise Cost Studies. Furthermore, market values for agricultural land do not change as rapidly as do changes in grass seed market prices which affect annual profits from grass seed production. Also, non-agricultural market forces, including urbanization demands, influence agricultural land values. Farm rental values, as used in this study, are more responsive to changes in agricultural market conditions since they are tied directly to annual cropping decisions and a willingness to pay.

In summary, it appears that some technological changes have occurred from 1969 to 1975 for which the 1969 field survey update did not account. This appeared to show up on fertilizer and chemical cost comparisons. However, higher estimates persisted across all cost categories, except machinery, in use of the Enterprise Cost Studies. The yields reported in the Enterprise Cost Studies were close to the yield averages shown in Figure 2.

Comparison of the two production cost estimating procedures suggests that an extensive sample survey provides a more accurate basis for estimating production costs in a given year than do Enterprise Data Studies when evaluation of a cross-section of the grass seed growers is desired and variation is an important characteristic to be measured. If statistically sound sampling procedures are used to identify the grower sample, its representativeness of the total industry is reasonably well assured. While this approach was used in the 1969 survey, the growers for the Enterprise Cost Studies were hand picked thus limiting ability to generalize from them to a broad cross section of grass seed producers. The Enterprise Cost Study approach, however, is useful in quickly identifying specific technology practices such as fertilizer application rates, chemical use, machinery operations, and years of stand life which exist at a particular moment in time. For that reason, the Enterprise Cost Studies serve an important monitor role for this study.

Production Costs from 1959 through 1975

The application of annual indices of prices paid for production cost components permits estimation of costs by production categories each year of the 17-year period from 1959 through 1975 by grass seed type. The production cost components are totaled to provide total production costs per acre on an annual basis. Annual results for the "average" producer condition are expressed graphically by seed type in Figure 6. The same procedure is used with "low" and "high" cost producer categories to estimate their production costs in determining net returns per acre bands shown in Figure 1.

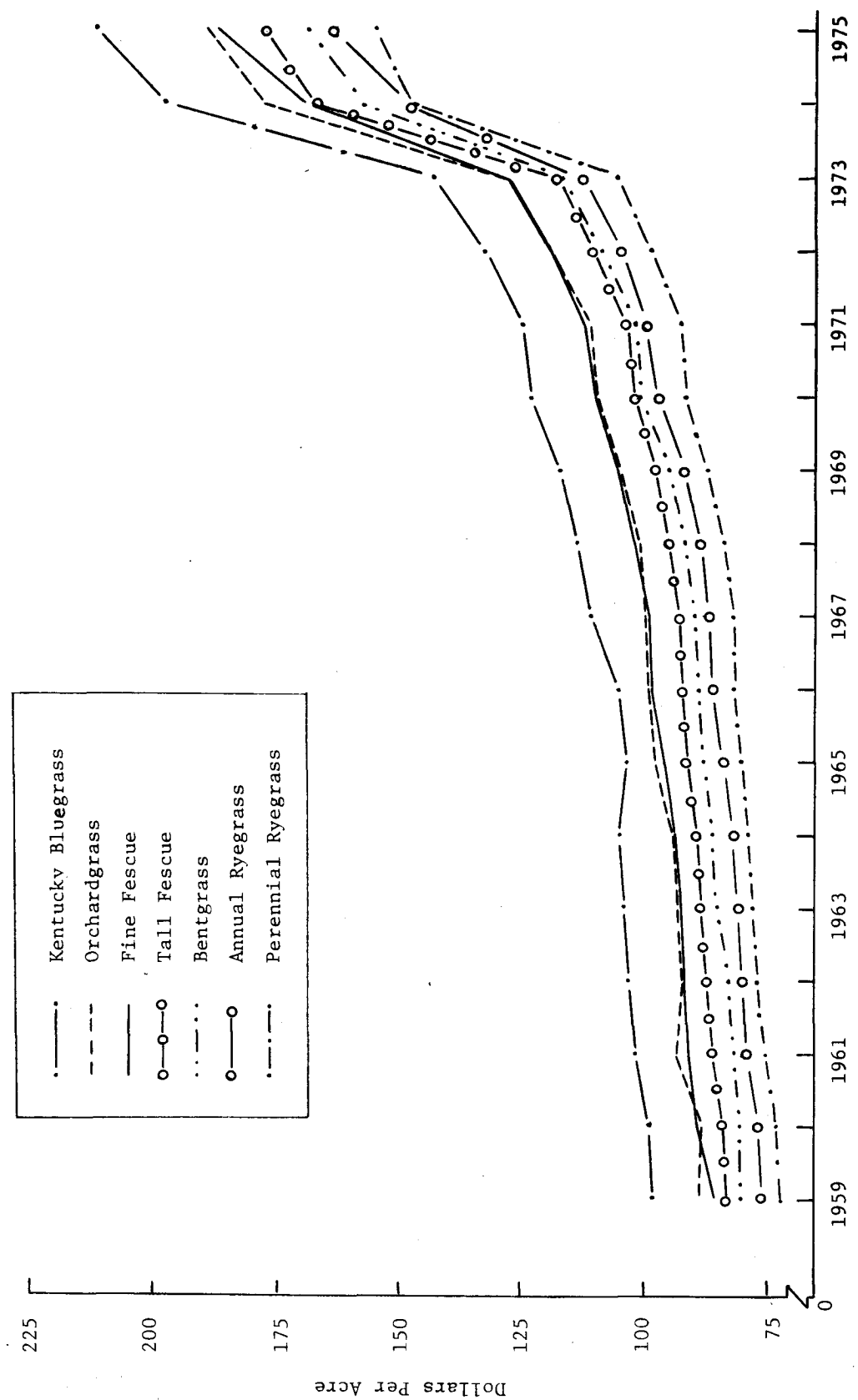

Figure 6. Estimated average production costs per acre for seven grass seed types over the 17-year period from 1959-1975.

Figure 6 shows that production cost increases for each grass seed type were gradual during the time period from 1959 through 1970, averaging 2 to 4 percent annually. Inflationary pressures produced a cost increase averaging 6 percent in 1970, 1971, and 1972, followed by a 9 percent increase in 1973. The effect of the energy and related crises generated an overall 36 percent cost increase in 1974. This impact was dampened in 1975, resulting in an annual increase of about 12 percent.

An interpretive word of caution is necessary when using price indices to estimate production costs from a base period. The longer the time period of extrapolation, before or after the 1969 base year, the less certain is the accuracy of the economic estimates because of the constant technology assumption which is implied with this form of analysis. The 1975 cost and return estimates generated by the study are believed to be reasonably accurate and a good indicator of the economic condition of specific grass seed types in the Willamette Valley grass seed industry. The Enterprise Cost Studies are used to correct deficiencies in the study analysis, particularly for 1975 estimates. Unfortunately, no such comparison is available for validating production cost estimates for the ten-year period from 1959 to 1969. Some caution in interpretation of results for that time period, therefore, is necessary.

STUDY LIMITATIONS

Cost and return estimates developed in this study represent the authors' best estimates of the economic condition of eight major grass seed types grown by Willamette Valley grass seed producers over a 17-year period. Because the work is dynamic and the analysis used in this study if an abstraction of a selected number of dynamic components measured at certain points in time, the results are subject to possible error. It is important for the reader to be aware of potential error sources in this study. They include the following:

1. Most of the price series for production cost components are from U.S., rather than Oregon sources. This very likely is a minor difficulty since direction and magnitude of price changes in Oregon generally are close to U.S. averages.

2. Only limited technology changes affecting production costs were accounted for in the study. Because of this it is plausible that 1975 production cost estimates may be understated to some extent. Cost estimates for the 1959 to 1969 time period are subject to the same error source.

3. Technology changes over time which affect yield differences between "low", "average", and "high" cost producer categories were assumed constant. Yield levels between these categories is expected to vary over time as affected by changing capital positions, risk preferences and weather. The effect of these forces was not identified in this study.

4. Overhead cost calculations used in estimating production costs are, at best, somewhat arbitrary and the assumptions used will influence cost levels.

5. Generalizations from return estimates by seed type to total farm situations cannot be achieved. No attempt was made in this study to evaluate level of resource utilization, enterprise combination effects and economies of size relationships which influence economic conditions of total farm operations.

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APPENDIX

Appendix Table 1. Mean Gross Return Per Acre and Dispersion Characteristics by Grass Seed Type, for the 17-Year Period From 1959 Through 1975

Seed type	Mean[a/] gross return	Standard[b/] deviation	Coefficient[c/] of variation
	.....dollars per acre.....		percent
Annual ryegrass	81.57	46.82	57
Perennial ryegrass	95.69	49.09	51
Tall fescue	91.59	31.02	34
Orchardgrass	166.63	50.19	30
Bentgrass	190.32	33.05	17
Fine fescue	127.18	56.26	44
Merion Kentucky bluegrass	235.49	103.31	44
Other Kentucky bluegrass	217.76	58.75	27

SOURCE: Data from which the mean price, standard deviation, and coefficient of variation were derived are from Appendix Tables 2 and 4.

[a/] Average for the 17-year period 1959-1975, Willamette Valley, Oregon.

[b/] Standard deviation (S_x) measures how far from the mean each item within a frequency distribution is located. One standard deviation measures the expected range of dispersion within which two-thirds of the elements of the data series were found.

[c/] Coefficient of variation = $\frac{S_x}{\bar{x}}$ = standard deviation expressed as a percent of the mean.

Appendix Table 2. Average Price Received by Oregon Growers for Eight Major Grass Seed Types, 1959-1975

Year	Perennial Ryegrass	Annual Ryegrass	Bentgrass	Fine Fescue	Tall Fescue	Merion Kentucky Bluegrass	Other Kentucky Bluegrass	Orchard-grass
	Dollars per 100 Pounds							
1959	9.80	5.50	22.00	27.19	18.00	115.00	50.00	34.00
1960	6.60	3.50	28.00	16.45	12.50	86.00	33.00	24.20
1961	5.50	5.05	27.50	14.50	12.00	70.00	31.10	26.00
1962	5.10	4.03	44.50	14.87	15.00	55.00	29.00	31.00
1963	6.30	5.90	48.00	32.87	18.50	85.00	32.00	28.50
1964	5.90	4.15	33.50	34.40	10.00	104.00	29.70	21.70
1965	10.00	4.20	41.50	42.26	10.00	114.00	36.50	21.50
1966	10.00	4.60	25.50	25.50	8.50	60.00	31.50	19.70
1967	7.95	5.85	35.00	19.23	9.90	38.00	29.40	20.50
1968	10.70	7.00	36.50	21.47	13.50	42.50	28.50	26.75
1969	11.50	7.30	50.00	24.46	18.50	90.00	27.00	25.80
1970	11.16	5.70	47.00	32.25	12.20	135.00	33.00	25.05
1971	11.60	4.50	49.00	28.50	10.60	72.50	30.00	25.00
1972	16.40	5.50	42.00	33.50	18.00	80.00	31.00	24.00
1973	35.60	14.08	54.00	56.50	25.00	127.00	75.40	36.00
1974	28.00	15.50	44.00	30.50	15.00	70.00	36.40	34.00
1975[a/]	17.20	10.00	26.50	23.80	13.60	68.50	30.35	26.35

SOURCE: Statistical Reporting Service, USDA and OSU Extension Service cooperating. 1975 prices were obtained from grass seed dealers.

[a/] Preliminary.

Appendix Table 3. Mean Oregon Farm Price and Dispersion Characteristics by Grass Seed Type for the 17-Year Period From 1959 Through 1975

Seed Type	Mean[a/] price	Standard[b/] deviation	Coefficient[c/] of variation
	...cents per pound...		percent
Annual ryegrass.....	6.52	3.40	52
Perennial ryegrass.....	11.54	6.50	56
Tall fescue.....	14.19	4.30	30
Orchardgrass.....	26.45	4.84	18
Bentgrass.....	38.41	10.09	26
Fine fescue.....	28.20	10.52	37
Merion Kentucky bluegrass....	83.18	28.21	34
Other Kentucky bluegrass.....	35.09	11.60	33

SOURCE: Data from which the mean price, standard deviation, and coefficient of variation were derived are from Appendix Table 2.

[a/] Average for the 17-year period 1959-1975, Willamette Valley, Oregon.

[b/] Standard deviation (S_x) measures how far from the mean each item within a frequency distribution is located. One standard deviation measures the expected range of dispersion within which two-thirds of the elements of the data series were found.

[c/] Coefficient of variation = $\frac{S_x}{\bar{x}}$ = standard deviation expressed as a percent of the mean.

Appendix Table 4. Average Annual Yield/Acre by Grass Seed Type, Willamette Valley, 1959-1975

Year	Perennial Ryegrass	Annual Ryegrass	Bentgrass	Fine Fescue	Tall Fescue	Merion Kentucky Bluegrass	Other Kentucky Bluegrass	Orchard-grass
1959	981	1100	301	446	551	217	---	---
1960	897	930	232	448	599	184	---	---
1961	889	1000	260	319	507	224	---	---
1962	1007	1300	278	461	635	333	---	---
1963	850	1105	300	374	607	372	---	---
1964	940	1355	327	503	757	313	648	689
1965	870	1290	243	393	670	378	585	720
1966	730	1279	272	437	727	418	665	752
1967	860	1218	251	472	653	382	443	427
1968	880	1440	232	399	579	322	535	480
1969	835	1280	222	448	722	285	550	620
1970	800	1285	280	412	611	251	551	613
1971	1085	1643	274	577	833	427	828	664
1972	808	1355	312	409	582	358	753	711
1973	696	1338	321	508	720	263	467	730
1974	804	1285	330	473	630	326	534	740
1975[a/]	822	1455	326	523	805	444	600	767

SOURCE: Statistical Reporting Service, USDA and OSU Extension Service cooperating. 1975 prices were obtained from grass seed dealers.

[a/] Preliminary.

Appendix Table 5. Mean Yield and Dispersion Characteristics by Grass Seed Type Grown in the Willamette Valley of Oregon for the 17-Year Period From 1959 Through 1975

Seed Type	Mean[a] yield	Standard[b] deviation	Coefficient[c] of variation
	.....pounds/acre.....		percent
Annual ryegrass	1,263	170	13
Perennial ryegrass	871	99	11
Tall Fescue	649	85	13
Orchardgrass	650	108	17
Bentgrass	277	35	17
Fine fescue	277	35	13
Merion Kentucky bluegrass	316	73	23
Other Kentucky bluegrass	596	117	20

SOURCE: Yield data from Appendix Table 4.

[a] Average for the 17-year period 1959-1975, Willamette Valley, Oregon.

[b] Standard deviation (S_x) measures how far from the mean each item within a frequency distribution is located. One standard deviation measures the expected range of dispersion within which two-thirds of the elements of the data series were found.

[c] Coefficient of variation = $\frac{S_x}{\bar{x}}$ = standard deviation expressed as a percent of the mean.

Appendix Table 6. Index Numbers of Prices Paid for Selected Production Input Items used by Willamette Valley Grass Seed Producers, 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	57	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
1975	172	196	267	271	169	229	159	177	176

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.

Appendix Table 7. 1969 Actual Production Costs Per Acre by Seed Type for "Average Producer" Conditions

Cost components	1969 costs (actual)						
	Perennial Ryegrass	Annual Ryegrass	Bentgrass	Fine Fescue	Tall Fescue	Kentucky Bluegrass	Orchard-grass
Machinery operating costs.....	6.66	10.24	8.41	9.89	7.06	10.44	8.55
Machinery overhead costs	9.49	15.37	12.62	14.82	9.83	15.66	12.81
Materials							
Fertilizer, Fall.....	2.80	3.60	3.19	5.79	5.69	5.04	6.37
Spring.....	11.30	10.40	9.51	7.44	13.32	12.58	10.81
Herbicides.....	3.25	.38	5.20	6.28	7.84	9.80	6.71
Seed.....	.40	1.44	.22	.54	.23	.63	.50
Hired labor.....	1.45	1.66	1.35	.78	2.01	2.06	2.17
Operator labor.....	3.20	6.67	5.40	7.05	3.34	6.16	5.06
Amortized establishment costs....	7.47	2.98	9.77	14.44	7.27	12.15	9.05
General overhead.....	2.15	2.64	2.65	3.20	2.71	3.56	2.94
Land change.....	19.04	17.11	17.52	15.04	18.45	19.44	19.95
TOTAL PRODUCTION COSTS....	67.21	72.94	75.84	85.27	77.75	97.52	84.92

SOURCE: Conklin, Frank S. and Douglas E. Fisher. "Economic Characteristics of Farms Producing Grass Seed in Oregon's Willamette Valley," Circular of Information 643, Agricultural Experiment Station, Oregon State University, Corvallis, November 1973.

Appendix Table 8. Estimated 1975 Average Production Costs Per Acre by Grass Seed Type, from Enterprise Cost Studies, Willamette Valley, Oregon

Cost Components	Annual Ryegrass (no-till)	Annual Ryegrass (till)	Perennial ryegrass	Tall fescue	Orchard-grass	Bentgrass	Fine fescue	Merion Kentucky bluegrass	Other Kentucky bluegrass
Fertilizers.....	$ 50.90	$ 50.90	$ 47.80	$ 57.12	$ 53.40	$ 31.00	$ 46.27	$ 70.75	$ 70.75
Chemicals[a/].....			7.25	14.06	28.67	20.06	22.08	54.16	43.86
Labor and Management[b/].....	14.22	23.54	13.34	13.34	18.34	14.60	18.64	30.86	22.99
Machinery[c/].....	28.14	52.20	24.27	24.14	26.64	25.87	26.91	29.35	29.78
Land charge[d/].....	76.80	76.80	79.10	84.36	94.97	84.36	89.61	94.81	94.81
Amortized establishment[e/]..			15.50	31.04	37.23	28.19	61.65	70.83	54.03
Processing and cert.[f/].....	30.61	30.61	19.76	22.15	32.73	17.26	26.79	28.36	48.43
Other[g/].....	19.66	21.57	13.56	19.03	21.50	14.35	20.15	29.52	29.37
TOTAL PRODUCTION COSTS	$222.33	$255.62	$220.58	$265.24	$313.48	$235.69	$312.10	$408.64	$394.02

SOURCE: Nelson, Gene, Manning Becker, Steve Besse, Gale Gengrich, Gordon Herron, Hugh Hicherson, Dan Lowrie, Harold Werth, and Harold Youngburg. "Estimated Costs for Establishing and Producing Grass Seed Crops, Oregon's Willamette Valley, 1975." Department of Agricultural and Resource Economics, Oregon State University Extension Service, December 1975.

a/ Materials and custom application.

b/ Hired and operator labor and management.

c/ Depreciation, interest, taxes, insurance, repairs, fuel, and lubrication.

d/ Interest and taxes including firebreaks.

e/ Annual cost to amortize establishment of stand.

f/ Cleaning, bags, seed tests, and commodity commission fees.

g/ Operating capital interest, general overhead, field burning fee, seed for annual ryegrass, minus any credit for grazing.