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ANNUAL RYEGRASS SEED PRODUCTION IN OREGON'S WILLAMETTE VALLEY

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Introduction

Oregon is the world's major producer of cool-season forage and turf grass seed and a widely recognized center of expertise in seed production. Most of the acreage is located in the Willamette Valley, the "grass seed capital of the world." Farm gate value of Oregon's 1994 production was over $200 million. Collectively, Oregon's Willamette Valley produces almost two-thirds of the total U.S. seed production of cool-season grasses.

Grass seed is produced on nearly 800 family farms, averaging 700 acres, with more than 60% of the total labor requirements provided by family members. Seed production of one or more grass species are the major enterprises, with growers using machine technology especially adapted to small seeds. Mild and moist winters with dry summers favoring seed development and harvest make the Willamette Valley an ideal place to produce high quality seed. Over 360 seed conditioning plants located in the Willamette Valley prepare the seed for market once the harvest operation is complete.

Oregon growers produce essentially all of the U.S. production of annual ryegrass, perennial ryegrass, bentgrass, and fine fescue. Smaller but significant amounts of bluegrass, orchardgrass, and tall fescue are also grown in Oregon

History

Prior to World War II, farms in the Willamette Valley were more diversified and smaller than farms today. Most farms in the northern half of the valley were

located on rich, loamy, and well-drained soils ideal for diversified crop production. In contrast, farms situated on the broad terraces in the southern half of the valley, between Albany and Eugene, were located on poorly drained clay soils. These farms could not compete with their valley counterparts in the production of grain, vegetable, and fruit crops.

Grass seed was introduced as early as the 1920's as an alternative crop for the south valley. Annual ryegrass was especially well adapted to the wet soils and soon became an important crop. Grass seed also established itself as an excellent alternative crop for the highly erodible foothill soils found on the valley's eastern flank. Since 1940, the industry has made steady growth, with many national and international seed companies located in the Willamette Valley. Currently, annual ryegrass is grown on over 125,000 acres (Miles, 1995). Acreage and usage has been very stable since the 1960's with over 100,000 acres produced in each of the last 20 years.

The Willamette Valley's mild, wet winters and dry summers have provided an ideal environment for the grass seed industry to expand. Grass seed growers in Linn, Benton, and Lane counties, in the southern Willamette Valley, tend to specialize in grass seed crops because of the extensive area of poorly-drained soils in the region. Most other crops will not survive the winter flooding on these soils. Grass seed crops are grown on more than 56% of the total harvested cropland in the southern Willamette Valley and 32% of all Willamette Valley counties.

Cultural Practices

Planting: The crop is seeded anytime after the annual ryegrass seed harvest in late summer or fall. Most is planted in August, September, and October. Overseeding in the winter is possible. Much of the annual ryegrass ground is in continuous or yearly production of the crop due to limited options for rotation on the wet soils. Historically, fields were open burned and then no-till drilled, or worked after burning and then planted. Currently, most of the acreage is not burned. The straw is chopped after combining, the field plowed and harrowed, and then seeded. Seeding rate is 15-20 pounds per acre.

Some annual ryegrass crops are grown simply by volunteering a stand; that is, just leaving the crop residue after harvest and allowing the shattered seed to grow. This works best on weed free fields. Yields are generally less than conventionally tilled and planted ground by 10% to 20%, but costs are less.

Fertilization: A complete fertilizer is used at planting, such as 150 pound per acre of 14-14-14. In the spring (late March to early May), about 120 pounds per acre of N is applied in one or two applications. Sulfur is deficient in soils in Western Oregon and annual applications of 15 to 30 pounds per acre are recommended (Youngberg, 1980). Most of the soils where annual ryegrass is grown are quite acid (very low pH), and require liming. Soil testing is recommended to determine lime needs.

Herbicide and other pesticide applications: Annual ryegrass has fewer inputs of agrichemicals than other grass seed crops. When fall rains sprout weed seeds, Roundup or Gramaxone is used to control them before planting or before crop emergence. Nortron (ethofumesate) is used to control grassy weeds, but is used only where needed because of the expense. Growers may just treat areas of fields or treat fields every second or third year, depending in part on post harvest residue management. For example, fields that are burned and no-till planted are treated with Nortron once every third year on average, while non-burned fields that are tilled may be sprayed every other year. In some cases, non-burned fields are sprayed every year with Nortron to keep grassy weeds in check. Broadleaf sprays such as 2,4-D and Banvel are used in the spring.

To date, there have been few disease or insect problems in annual ryegrass that required control. With reduced burning, this may change. There has been an outbreak of cereal stem moth (*Ochsenheimeria vacculella*) in one area, for example, that could spread through the production area. Labeled insecticides applied in March or April effectively control this pest.

Harvest: Annual ryegrass fields are swathed in June or July at about 35% seed moisture content. After drying in the field, the crop is combined. Similar to other

seed crops, the seed should be harvested and stored at 12% or less moisture content, and most years it is. Storing at higher moisture content reduces viability and storage life of the seed. Seed is cleaned on farms and at commercial cleaning plants. The low humidity conditions of summer in the Willamette Valley requires no artificial drying during conditioning and are excellent for maintaining seed viability.

Straw management: After harvest, the crop residue can be burned or chopped up and plowed in. It is not as important that burning be done in as timely a fashion as in the perennial seed crops, but from a management standpoint growers try to accomplish burning as soon as possible after combining so they can get their fall farming done before the rainy season begins.

The standard practice used to be to open-field burn the straw, and then no-till plant the next ryegrass crop with a no-till drill. The drill used is a type of no-till drill called a grassland drill, and this practice is referred to as a "burn and grassland drill" operation. Even in a predominately burn and no-till program, growers plow and work fields every few years to reduce surface compaction and destroy weedy perennial grasses such as bentgrass. Most growers plow the ground every 3 to 5 years, but some fields may be no-tilled up to 10 years before being worked. The burn and no-till program is the most economical method of growing annual ryegrass. Nutrients are recycled with the ash from burning, shattered weed and volunteer seeds on the soil surface are destroyed, and fuel inputs are less than non-burning approaches because there is no straw handling or annual tillage.

Restrictions on open-field burning, passed by the Oregon Legislature in 1991, have resulted in less than 30% of the acreage being burned in recent years. The common practice now is to flail chop the straw one or two times and work the residue into the ground using conventional tillage. Microbial decomposition of incorporated straw on soils where annual ryegrass is grown is greatly reduced by wet (anaerobic) conditions during winter and by protracted drought in summer. Thus, it is important that straw length be reduced by flailing prior to incorporation by moldboard plow, albeit at additional expense.

After flail chopping the straw, fields are plowed once, then harrowed, leveled and rolled to prepare a seedbed for planting. Growers have been able to maintain seed yields comparable to open burning with this approach. Some feel the tilth of their field has improved from working the straw in on an annual basis. The cost of this method is $50 to $80 per acre more than the burn and no-till practice due to the cost of flail chopping, tillage, and increased herbicide usage. Over 60% of the annual ryegrass acreage is currently managed by chopping and plowing.

Other strategies that have evolved in response to growers shifting to nonburning management in annual ryegrass include: (i) removing the straw by baling, then seeding into the stubble by no-tillage methods, and (ii) producing a new seed crop with volunteer seedlings from the previous crop without any straw removal. The producer's objective in choosing either option is to cut the production costs over standard seed bed preparation. Currently there is little off-farm market opportunity for annual ryegrass straw, so baled straw is often disposed of under stack burning provisions of the state's smoke management program. Both operations (baling and stack burning) result in additional grower expense. However, annual ryegrass straw is being considered as a possible fiber source for pulp manufacturing; the possibility of straw utilization by the pulp and paper industry would encourage its removal from fields.

Economic Structure

Annual ryegrass producers typically have larger than average land holding, ranging from 800-5,000 acres of owned and leased land. Perhaps as many as one-third of those producing annual ryegrass are specialized in that commodity. More common, however, is for a combined production of annual ryegrass and perennial grass species, with poorer soils devoted to annual ryegrass. In addition, almost all of Oregon's annual ryegrass seed is grown and marketed as uncertified production. Although 31 varieties were produced under the Oregon Seed Certification program in 1993, their combined acreage was only 4,084, or about 3% of the crop.

Two types of annual ryegrass dominate the seed trade: common and Gulf. Ryegrass marketed as common annual is generally accepted to be a mixture of Italian,

perennial ryegrass (*Lolium perenne*), and hybrid types, with the first predominating; they are classified, however, as *Lolium multiflorum*. Gulf annual ryegrass is a public variety that was released in 1958 by the Texas Agricultural Experiment Station. Improvements relative to common annual ryegrass witnessed in forage trials at Texas listed uniformity of maturity and a high percentage of rust-resistant plants.

As almost all (96.5%) annual ryegrass seed grown is marketed as uncertified production (certified Gulf annual ryegrass production in 1992 was only 56 acres), the best records of annual ryegrass production are the assessment reports prepared by the Oregon Ryegrass Growers Seed Commission. Their reports separate assessment income receipts (paid when seed leaves the farm) as "Annual" (common) and "Gulf." The most recent year's (FY 1992-93) report showed assessments were paid on 104,621,879 pounds of common annual and on 88,266,651 pounds of Gulf. Using the above figures one can state that 46% of the assessment income received by the commission on sales of annual ryegrass was paid on Gulf.

Cost of Production

Historically, growers have used no-till establishment methods to direct seed subsequent annual ryegrass crops into the unplowed soil following open field burning. Typically, growers would use conventional tillage and planting methods one year, and then annual ryegrass seed crops would be replanted for three to five years using a no-till management. This was a low input and low cost approach to growing annual ryegrass. Costs and returns of producing grass seed crops in the Willamette Valley of Oregon have been estimated. In general, annual ryegrass has been the grass species with the lowest profit margin. Thus, while relative profitability among perennial species can and does change over time, producers of annual ryegrass have been less able to absorb cost increases associated with non-burning alternatives.

Taylor et al. (1990) estimated costs of producing annual ryegrass under an open-field burn residue management strategy. As discussed above, the typical production system entails harvesting a crop, burning the residue, then using non-tillage planting to seed the next crop. Using this system, and based on the assumptions identified by Taylor et al., the total cost of production is estimated to be

$285.98 per acre. Subtracting this total economic cost from total revenue of $352.75 (assumes 1750 lb/a at $0.20/lb plus $2.75/a grazing income) per acre results in a net projected return of $66.77 per acre to the grower, representing a return to unpaid labor, management, and capital.

Young et al. (1994) developed an economic analysis of non-burned annual ryegrass seed production through a partial budget analysis. In their scenario, the crop residue is flail chopped twice following seed harvest. Plowing and secondary tillage are used to prepare a seedbed, and traditional planting techniques are used to establish the next crop. A fall application of herbicide is added to this budget for control of unwanted grasses. Additional herbicide is assumed to be necessary every other year, on average. The total cost of this production system is $349.15 per acre. Assuming that yield is unchanged, the net return per acre is $3.60. This illustrates that switching from thermal to non-thermal post-harvest management substantially decreases net return.

Break-even prices range between $0.16 and $0.20 per pound in the above scenarios assuming 1750 pounds per acre seed yield. Statistics on seed yield over the last 20 years range from 1300 to 2000 pound per acre, although 2500 pound seed yields are sometimes achieved. Although acreage has been fairly stable during the last 20 years, prices received by producers have ranged between $0.10 and $0.26 per pound. Modest declines in annual ryegrass prices may result in negative returns for growers that do not burn, while those that do burn can withstand greater drops in price. Thus, the adoption of nonthermal management in annual ryegrass may increase the risk of low to negative profit margins.

Marketing

In the seed trade, annual ryegrass is referred to as common and Gulf. More than half the acreage in Oregon is marketed as common. The variety Gulf is the most dominant named cultivar traded, followed by Marshall and Surrey. There are also Japanese varieties grown for seed through seed companies. Only 3% of the annual ryegrass seed crop is grown as Certified seed, the rest is grown as uncertified. In comparison to the perennial seed crops in Oregon, very little of the annual crop is

grown under contract with a seed company. However, all proprietary varieties of annual ryegrass are contract-produced and sold through the contracting company.

Growers often sell some of their uncertified production in advance through seed companies or seed brokers; most of the seed is eventually sold through these channels, rather than directly by farmers themselves. The largest volume of seed moved is in the fall for the forage and turf overseeding market in the southern states.

Oregon is the world's leading producer of annual ryegrass seed. The viability of Oregon's seed industry is enhanced by a stable infrastructure of growers, seed companies, university (Oregon State University) research and extension staff, and UDSA (National Forage Seed Production Research Center) seed scientists. Future markets for annual ryegrass, such as use in cover crops with soybean and corn, may expand seed production in Oregon. In addition, new improved forage varieties may result in a greater percentage of certified production. Oregon growers will also incorporate new production innovations to continue to be the world's leading producer of annual ryegrass seed.

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