RES-165

An Industry Amidst Conflict and Change: Practices and Perceptions of Idaho's Bluegrass Seed Producers

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EXECUTIVE SUMMARY

Despite being one of the more economically viable and environmentally adapted crops in northern Idaho, bluegrass seed production has come under increasing scrutiny due to the practice of burning bluegrass post-harvest residue[1]. Burning is critical to maintain stand longevity and productivity, and protects the environment by reducing soil erosion. Not-burning reduces stand life from an average of about ten years to three, and increases the potential for soil erosion and nutrient runoff. Some residents of northern Idaho counter that the smoke from field burning is a serious public health problem and it curtails tourism during the burn season. In this bulletin, we report the findings of a survey designed to examine the willingness and ability of bluegrass farmers in northern Idaho to adopt potential non-thermal production technologies currently being researched. In addition to the impacts on Kentucky bluegrass seed production, we also report here on the associated social and economic impacts a burning ban would have on the farmers' ability to continue bluegrass seed production.

Roughly 25 percent of the survey respondents depend upon bluegrass seed production for over 50 percent of their net income. Bluegrass production accounts for seed accounts for 20 percent or less of the net income for 28 percent of producers. Most respondents expressed the sentiment that burning bluegrass residue was one of the most stressful production practices they undertake, but felt it was a practice essential to the economic viability of bluegrass seed production in northern Idaho.

If a ban on bluegrass residue burning were implemented, 92 percent of respondents stated they would decrease the amount of acreage planted to bluegrass. Thirty-six percent stated they would curtail production by over 90 percent. Several factors are identified in the survey that may contribute to the respondents' apathy towards growing bluegrass seed under a no-burn production system, including:

- A reduction in the economic life of the bluegrass stand from a current ten years to three years.
- An estimated reduction in yield from a current average of 591 (dryland) and 765 lbs/ac (irrigated) to 263 (dryland) and 273 lbs/ac (irrigated).
- An expected increase in labor costs and investment in new equipment, and increased expense of residue management (i.e. fuel, equipment repair, depreciation, etc.) to adopt a no-burn production system.
- The sentiment by 84 percent of the respondents that an increase in windblown dust and soil erosion, and nutrient runoff would likely occur with a shorter crop rotation and more frequent stand establishment in a non-burn bluegrass production system.

In all, 74 percent of respondents estimated that their per acre net income from bluegrass seed production would decrease by at least 50 percent if they implemented a non-burn

[1] Hereinafter, we use the more succinct terms 'burning bluegrass residue' and 'bluegrass residue'.

production system. Most producers felt strongly about their right to burn bluegrass residue, with just over half stating they would not be willing to sell their rights to burn.

If forced to discontinue burning their bluegrass residue, most producers would grow other crops (most likely wheat) on their bluegrass acreage using at least some conventional tillage methods. However, some ground is poorly suited to raising annual crops, and would require either placing the land into CRP or trying to find another perennial crop to produce. Few respondents anticipate selling their agricultural acreage, but almost 40 percent would at least consider selling some land for residential development to ease the adjustment out of a burn production system.

Seventy percent of respondents indicated they had a good working knowledge of no-burn production techniques and most indicated they did not think a competitive no-burn production method would be developed within the next five to ten years. However, assuming economically viable non-burn methods were developed, 70 percent of respondents indicated confidence they could make the required farming adjustments to continue growing bluegrass seed.

INTRODUCTION

Kentucky Bluegrass Seed Production in the Pacific Northwest

During the past four decades, Kentucky bluegrass seed has become an important crop in the agricultural economy of northern Idaho. There are 36 million pounds of bluegrass seed — valued at $45 million — produced in northern Idaho annually, making up approximately 50 percent of the total Kentucky bluegrass seed grown in the United States. The grass seed crop thrives in the Idaho Panhandle region given the relatively cool summer climate and wet winters.

To maintain healthy bluegrass stands, producers have historically burned bluegrass post-harvest residue. Stand health is measured by the frequency of re-establishment and the yield rate. Stands are re-established about every six to ten years but in some cases, are left in production as a perennial crop for over fifteen years (Holman and Thill 2005a). Over recent decades, the increase in bluegrass acreage has helped reduce the soil and nutrient runoff of highly erosion-prone soils on many acres of farmland, thus reversing a pattern of environmental damage characteristic of the Palouse and surrounding regions during much of the twentieth-century. The reduction in soil erosion has the added benefit of increased protection of the soil and watershed quality in the region (Holman and Thill 2005b).

Traditionally, most bluegrass farmers have used field burning as the most effective method of removing residue. As reported by Holman and Thill (2005a, p. 8), the agronomic benefits of burning bluegrass are increasingly understood:

> Burning post-harvest residue is an integral component of Kentucky bluegrass seed production. Burning helps control weed, disease, insect, and rodent pest populations, produce high quality seed, manage post-harvest residue, cycle nutrients, and maintain stand productivity.

In recent years, controversy has surrounded the practice of residue burning in northern Idaho due to concerns about environmental air quality and public health (Burnham 2003; Whitman 2001).

Controversy Surrounding Idaho Bluegrass Seed Production

Washington and Oregon, both producing a significant share of US bluegrass seed, have passed statewide legislation to restrict or eliminate the burning of bluegrass residue. Several attempts to restrict or ban bluegrass burning in Idaho have also occurred in the last few years by those opposed to burning practices. Lawsuits have persisted at the state and federal level regarding the environmental impacts. In April, 2003 the Idaho Legislature passed House Bill 391, empowering the Idaho State Department of Agriculture (ISDA) to oversee and manage field burning "when no other economically viable alternative exists" (Idaho Legis. House 2003). In August 2004, the Idaho Supreme Court upheld House Bill 391 as constitutional, which also provides "safe harbor" to bluegrass seed producers from further lawsuits on the condition they follow regulatory guidelines for burning (Taylor and Russell 2004).

To apply for burning permits, farmers must first register fields they wish to burn. Prior to implementing a burn, farmers must receive authorization from smoke management coordinators, employed by the Idaho Department of Environmental Quality (DEQ), ISDA, and representatives of the Nez Perce and Coeur d'Alene Indian Tribes. House Bill 391 also gives ISDA the authority to institute penalties of up to $10,000 for violations of designated smoke management and crop residue disposal laws.

Research Objectives

As a part of a larger interdisciplinary project researching the potential alternatives to burning bluegrass residue, the University of Idaho conducted a census of bluegrass producers in the winter of 2002-2003. The purpose of the census was to determine the willingness and ability to adopt new non-thermal technologies, as well as the social and economic impacts a ban on bluegrass burning practices would have on their ability to continue to produce bluegrass.

Given the ongoing controversy over current burning practices, the objectives of this research were to measure the following for bluegrass farmers in northern Idaho:

- Preferences and practices related to burn and no-burn alternatives for residue removal;
- Economic conditions affected by potential changes in current burn policies; and
- Perceived impacts to community and the natural environment related to burn policies.

These measures serve as factors anticipated to contribute to a better understanding of patterns of on-farm decision-making and adaptation to changes in technology, best-management practices, and environmental policies (El-Osta and Morehart 1999; Habron 2004; Nowak 1987; Saltiel et al. 1994) related to managing post-harvest bluegrass seed residue, and the economic viability of alternatives to current burning practices (Burt and Wirth 1976; Van Tassell 2002).

METHODOLOGY

Study Area

The 10 most northern counties in Idaho (Figure 1) comprised the study area for this survey. Within this region, Kootenai, Benewah, Latah, Lewis, Nez Perce and Idaho counties produce the majority of bluegrass seed. During the past twenty-five years, the region as a whole experienced a dramatic increase in the residential population (Table 1). However, significant differences exist between some county populations that grew substantially (e.g., Kootenai, +56%), and others that remained stagnant or lost population (e.g., Shoshone, -1%).

Population estimates from 2002 for the study area totaled nearly 270,000 people, across a land-area of just over 21,000 square miles (U.S. Census 2001). The rapid demographic change within the region provides an important context for the data collected and presented here because of increasing pressure on the rural-urban interface and development of farmland (Sharp and Smith 2003).

Figure 1. Northern Idaho region with Kentucky bluegrass production.

Table 1. Demographic change in population in northern Idaho, 1990 – 2003.

County	Total Pop. 1990	Total Pop. 2000	Total Pop. 2003	% Change 1990 - 2000	% Change 2000 - 2003
Benewah	7937	9171	9029	15.5	-1.5
Bonner	26622	36835	39162	38.4	6.3
Boundary	8332	9871	10173	18.5	3.1
Clearwater	8505	8930	8401	-9.5	-5.9
Idaho	13768	15511	15413	12.7	-0.6
Kootenai	69795	108685	117481	55.7	8.1
Latah	30617	34935	35087	14.1	0.4
Lewis	3516	3747	3748	6.6	0.0
Nez Perce	33754	37410	37699	10.8	0.8
Shoshone	13931	13771	12993	-1.1	-5.6
Panhandle Region	216777	278866	289186	28.6	3.7
Idaho (State)	1006734	1293953	1366332	28.5	5.6

Sources: 1970, 1980 and 1990: U.S. Bureau of the Census, County Population Census Counts, http://www.census.gov/population/www/censusdata/cencounts.html
2000: U.S. Bureau of the Census, Census 2000 Gateway, http://www.census.gov/main/www/cen2000.htm
2000-2003: U.S. Bureau of the Census, Population Estimates Program, http://eire.census.gov/popest/estimates.php

Survey Technique and Data Collection

Between December 2002 and February 2003, researchers at the University of Idaho administered a mail survey to the known population of Kentucky bluegrass seed producers in northern Idaho using the Dillman method (Dillman 2000). A comprehensive list of growers was developed based on member lists from the North Idaho Farmers Association, Panhandle Environmental Resource Coalition, Inc., and Nez Perce Grass Growers Association. The survey focused on farmers' perspectives concerning production practices (see Appendix A for survey instrument). A pilot-test of the instrument was conducted in the study region with a series of producer-association representatives.

A total of 343 questionnaires were mailed to farmers on producer lists obtained from several regional organizations. One hundred and one (101) individuals registered with the producer associations and on the survey list were deemed ineligible because they did not grow bluegrass seed. A total of 159 producers completed and returned the questionnaires. One producer refused to participate in the survey and 82 did not respond, yielding an adjusted response rate of 66%.

DATA ANALYSIS AND RESULTS

Demographic Profile of Respondents

A profile of respondents indicates the average respondent was 50 years old with one to ten years of full-time experience producing bluegrass seed. Nearly three-quarters of all the growers fell between the ages of 41 and 60, and the overwhelming majority (87%) had at least some college and/or vocational training. Thirty-four percent of bluegrass producers in Idaho

completed college and an additional six percent completed some graduate or professional training beyond college. Ninety percent of the farmers surveyed are full-time and the median before-tax annual net income over the past five years fell within the range of $30,000 to $49,999.

Geographic Distribution of Bluegrass Acreage

As reported by producers that responded to the survey, Kentucky bluegrass seed production in Idaho occurs in seven of the ten northern counties: Benewah, Clearwater, Idaho, Kootenai, Latah, Lewis, and Nez Perce. Table 2 illustrates the percentage distribution of growers by county. The relative distribution of bluegrass seed acreage across northern Idaho illustrates the regional scale of the industry and how these farm operations connect to multiple small rural community areas. Most of the significant demographic changes northern Idaho has experienced have occurred in several concentrated areas of rural-urban interface. Despite the overall growth, much of the social and economic landscape remains intermixed with and still influenced by agricultural production, timber resources extraction, and more recently development associated with tourism and local amenity-based economies expanding in the rural West.

Table 2. Owned, leased, and total Kentucky bluegrass acreage, by county, as reported by respondents.

County	Owned Acres	Leased Acres	Total Acres
Benewah	3,568	10,373	13,941
Clearwater	202	384	586
Idaho	3,443	7,761	11,204
Kootenai	6,677	8,636	15,313
Latah	2,018	12,923	14,941
Lewis	4,776	5,028	9,804
Nez Perce	2,584	4,284	6,868
Washington State*	936	1,978	2,914
TOTALS	24,204	51,367	75,571

* Due to the Washington-Idaho boundary bisecting the predominant bluegrass-growing region in the Inland Pacific Northwest region, some growers had acreage in Washington as well as Idaho.

To gauge the extent to which bluegrass production has become a multi-generational crop, respondents were asked about the length of time (in years) they and their family had produced bluegrass seed. Figure 2 displays results from these questions.

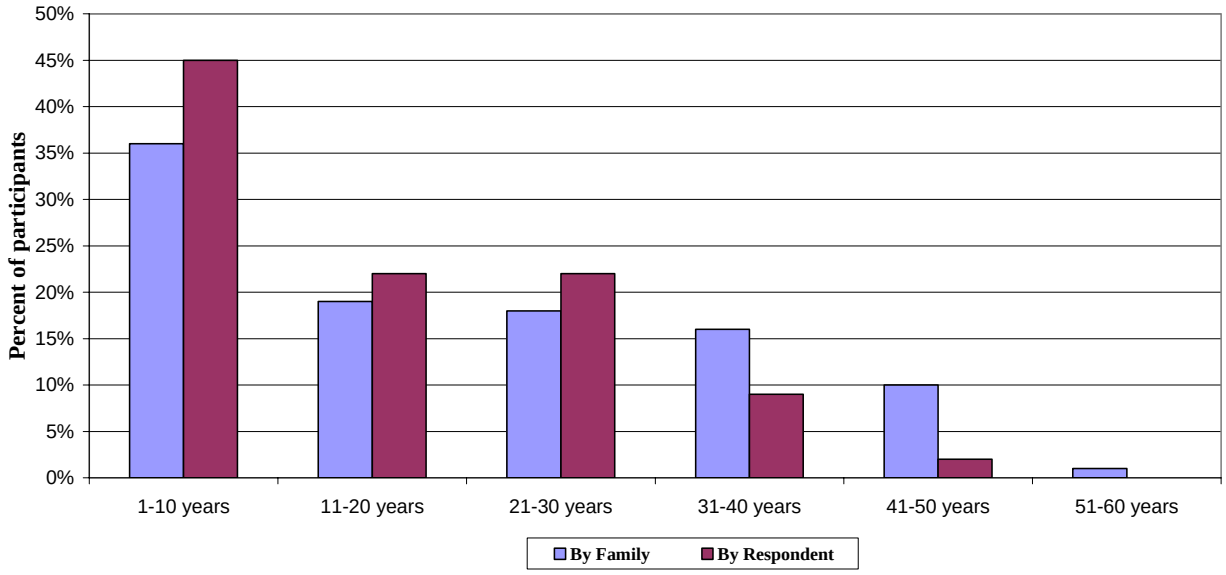

Figure 2. Number of years bluegrass seed has been grown by respondent and by respondent's family.

The most frequent response for number of years of growing bluegrass seed was 1-10 years for respondents (45%) as well as families (36%). Of the 159 respondents, one-third have had family members growing bluegrass longer than they themselves had as individual growers. As would be expected, responses to the categories of 31-40 years and 41-50 years of bluegrass seed production indicated a notably higher proportion of families have been producing bluegrass seed longer than individuals. This finding suggests a pattern of inter-generational continuity among a segment of bluegrass seed growers.

Bluegrass Seed Production

Under current production methods, bluegrass stands remain in production for several years before they are tilled and reestablished. As a result, soil erosion is substantially reduced. Many farmers utilize bluegrass, in comparison to crops such as wheat, barley, peas, and lentils as well as legumes that require annual tillage, to help decrease soil erosion rates on their land. Thirty-nine percent of farmers indicated that they grow 91-100% of their bluegrass on acreage that is more erodible than other parts of their farm. An additional 30% of producers grow 51-60% of their bluegrass on land that is susceptible to erosion.

Along with minimizing erosion, there is an economic incentive to maintaining bluegrass stand life as long as possible. When reestablishment of a bluegrass stand takes place, no production is obtained the first year after the stand is seeded.[1] In an irrigated environment such as on the Rathdrum Prairie area in Kootenai County, the annual burning of crop residue practices have been part of an operational system that enables bluegrass producers to maintain stands for an average of nine years. In dryland crop environments the average is slightly less — eight years — before producers normally reestablish bluegrass stands. Table 3 outlines the average, high

[1] An exception to this can be with irrigated acreage in the Columbia Basin if enough growth occurs in the fall reestablishment seeding.

and low number of years in continuous bluegrass seed production for both irrigated and dryland farm systems in northern Idaho.

Table 3. Reported average, low, and high for continuous production years and annual bluegrass seed yields in northern Idaho.

	Irrigated Environment		Dryland Environment	
	Stand Life (years)	**Seed Yield (lbs/ac clean seed)**	**Stand Life (years)**	**Seed Yield (lbs/ac clean seed)**
Average	9	765	8	591
Low	5	547	5	289
High	12	1081	12	946

Despite the perennial longevity of most stands, producers conventionally reestablish bluegrass seed crops when yields drop below an economically sustainable level. According to the farmers responding to the survey, irrigated crops during the past 10 years, under residue burning practices, yielded an average of 765 lbs/ac clean seed. For dryland bluegrass crops over the last 10 years, respondents indicated an average yield of 591 lbs/acre of clean seed. Table 3 summarizes the average, high, and low seed yields within irrigated and dryland farm systems for bluegrass production in northern Idaho.

Bluegrass seed yields correlate directly to the economic gains as well as the sustainability of a producer's operation. The next section presents bluegrass producers' responses related to the current economic structure of their operations as well as measures of the relative level of importance bluegrass seed production has within these overall operations.

Economics of Bluegrass Seed Production

Scientific inquiry about the relationships between agro-ecosystems and surrounding rural communities has continued to increasingly focus on sustainability amidst environmental conflicts that cannot justifiably be separated from their economic and social contexts (Flora 2001). To help provide economic stability from fluctuating prices and yields, accommodate the rotation of bluegrass, and break disease and weed cycles, many farmers diversify the crops they grow. To determine the importance of bluegrass seed production within the farming operation, we asked respondents to indicate the average annual acreage over the past five years for *all* crops grown on land they own or lease. Table 4 summarizes these. We separated leased land from owned land because ownership may determine what a producer chooses to do with the agricultural production occurring on that land. Leased land may require involvement of additional people (e.g., absentee owners) to participate in land-use decisions related to agricultural policy and the environmental condition of the land.

Table 4. Crops raised by bluegrass producers in northern Idaho on owned and leased land.

	Average Number of Acres Owned	Average Number of Acres Leased
Bluegrass seed	160	338
Wheat	277	467
Barley	80	99
Chickpeas	16	31
Peas/Lentils	113	191
Others	83	109
TOTALS	**729**	**1235**

Wheat is the predominant crop grown among bluegrass producers in northern Idaho, with an average of almost 750 acres/respondent (adding owned and leased land). Bluegrass seed (regardless of how it is grown—dryland, or irrigated) is the second most produced crop among respondents with an average of 160 acres grown on land owned and 338 acres on leased land.

To understand the economic impact a change in bluegrass production would have on individuals, we asked survey participants to indicate the percentage of their net farm income currently generated from bluegrass seed production. Figure 3 displays the results from this measure.

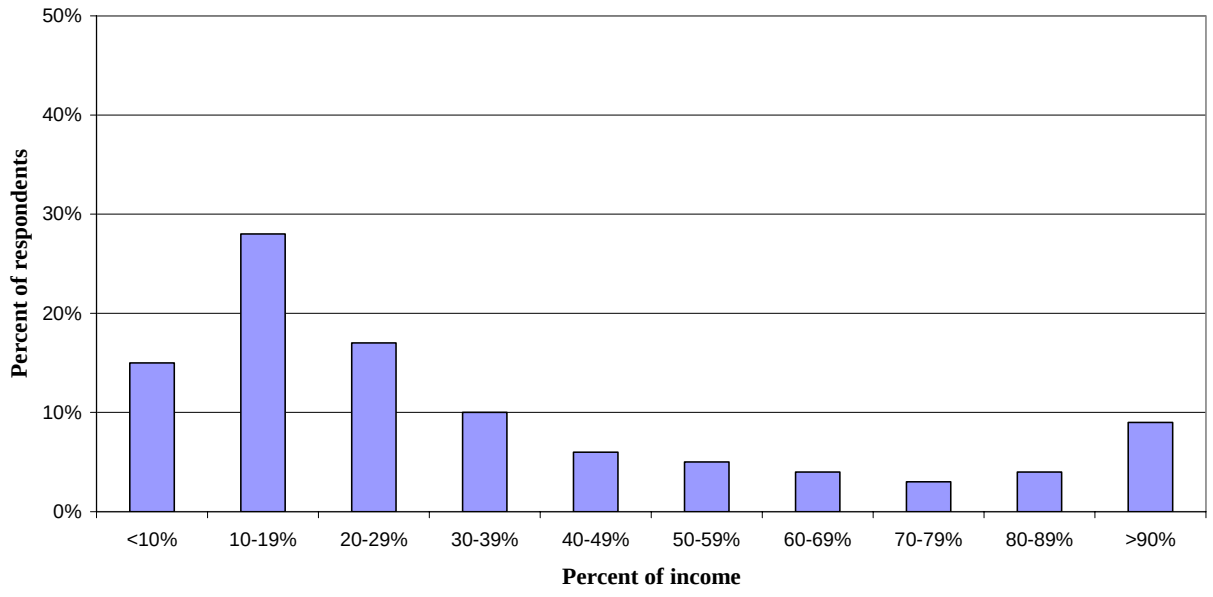

Figure 3. Percent of net farm income generated from bluegrass seed production.

Over one-quarter of all respondents (28%), indicated between 10-19% of their net farm income came from bluegrass seed production. However, a total of 25% stated that bluegrass seed production made up more than 50% of their net farm income. Nine percent of the growers

responded that more than 90% of their net farm income was derived directly from bluegrass seed production.

With respect to annual before-tax net farm income, considerable variation exists among those farmers who produce bluegrass seed in northern Idaho. Survey results here indicated 25% of the producers earned in the range of $30,000 – 49,999 as before-tax net income from farming operations over the last five years. On the higher end of the income scale, 13% of respondents made over $100,000 in annual before-tax net farm income and nine percent indicated earning less than $9,999.

While annual before-tax net farm income can serve as a measure of the profitability for a farming operation, it offers little insight to the financial stress an operation may experience as a result of a variety of other factors. Net farm income, as measured in this report, must cover federal and state taxes, family living expenses and debt retirement. To provide a more qualitative dimension to the economic situation associated with potential changes in bluegrass seed production, we asked northern Idaho bluegrass producers about their levels of financial stress. In the context of conflict associated with bluegrass residue burning and economic uncertainty related to conventional practices, Figure 4 illustrates that a majority of bluegrass producers in northern Idaho currently experience substantial levels of stress related to their finances. Forty-nine percent of the producers responding stated they felt "above average" financial stress and an additional 18% indicated they perceived themselves experiencing "severe" stress. With respect to bluegrass production, this reflects, at least in part, the current uncertainties many growers face given pending litigation and discussion among state and federal agencies about the future of management practices such as burning bluegrass residue

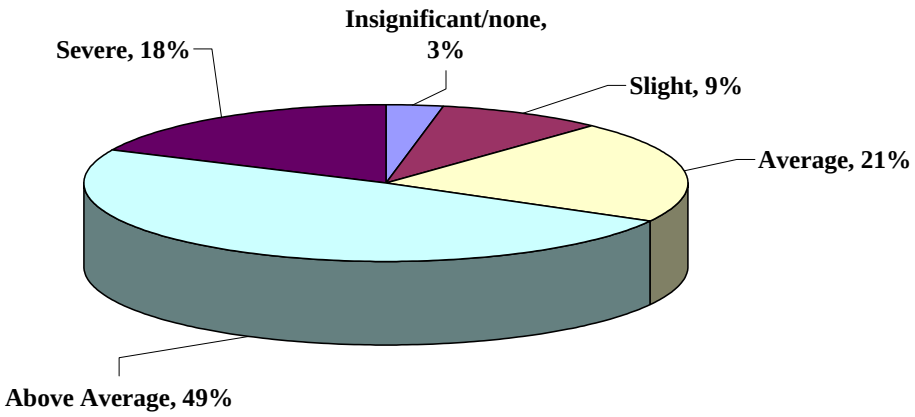

Figure 4. Respondents' rating of the level of financial stress they currently experience.

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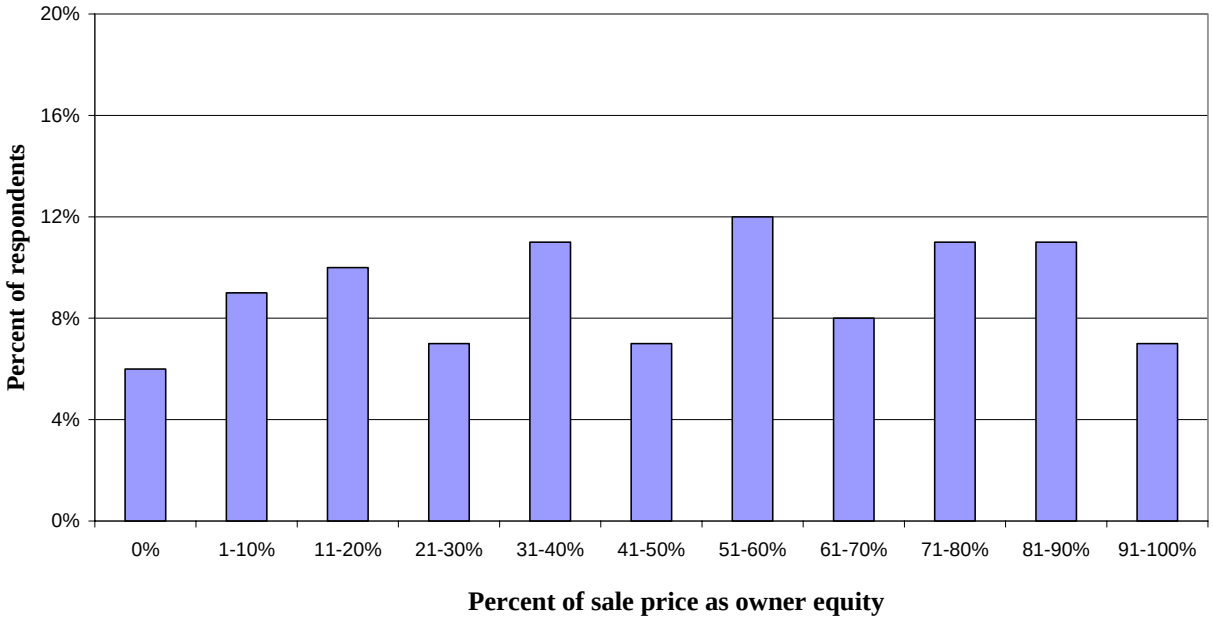

Figure 5. If you sold your farming operation, what percent of the sale price would be considered owners' equity?

We asked producers to identify the percentage of sales price that would be considered owners' equity they could expect in the event they may terminate and sell their farming operation. As shown in Figure 5, responses to this question varied considerably, with the most frequent category — 51- 60% — yielding 12% of the response. Seven percent of respondents indicated they would have 91-100% owner's equity if they sold their operation, and six percent of all respondents replied they would have 0% percent owner's equity. Apparently, a large share of the economic stress experienced by bluegrass farmers is partially related to large debt payments on some farm assets.

Adjustments to a Potential Ban on Residue Burning

Legislation in Washington state, and parts of Oregon during the 1980s and 1990s banned the practice of burning bluegrass due to an evaluation of the human and environmental health risks associated with smoke management (Roberts and Corkill 1998). Although producers can still burn bluegrass seed residue in parts of eastern Oregon, the northern region of Idaho remains the largest production area for bluegrass seed that still allows producers to burn residue under certain conditions. This fact remains a strong issue for some constituent groups, in part based on growing concerns about small-scale particulate matter in air quality pollutants (Roberts and Corkill 1998; Schwartz et al. 1994). The bluegrass residue smoke is currently being studied to determine whether its particulates are disproportionately harmful, compared to other air quality pollutants.

To understand hypothetical responses of the producers as a group, the survey contained measures designed to examine the attitudes and likelihood of producers to adjust their farm operations in response to the bluegrass residue burning controversy.

The survey presented a hypothetical scenario to respondents that included the following two components:

- the state of Idaho passed a law that no new acreage could be brought into bluegrass seed production where residue was burned; and
- producers were offered an opportunity to sell their rights to burn on their current acreage.

Given this scenario, respondents were asked whether they would be willing to sell their rights to burn, presumably back to the State of Idaho, and nearly one-half of the producers stated they *would. T*he other half *would not* sell those rights, making it unlikely that a voluntary buy-out program would succeed as a viable solution to the bluegrass burning controversy in Idaho.

If the state of Idaho were to impose a ban on bluegrass residue burning practices, 92% of the respondents stated that they would decrease the amount of acreage currently planted to bluegrass. Thirty-six percent stated they would decrease bluegrass seed production by 91-100%. If a bale and burn process only were allowed as a modified burning practice, 23% of the producers indicated they would decrease production by 91-100%. Figure 6 illustrates the frequencies for each of these potential management changes.

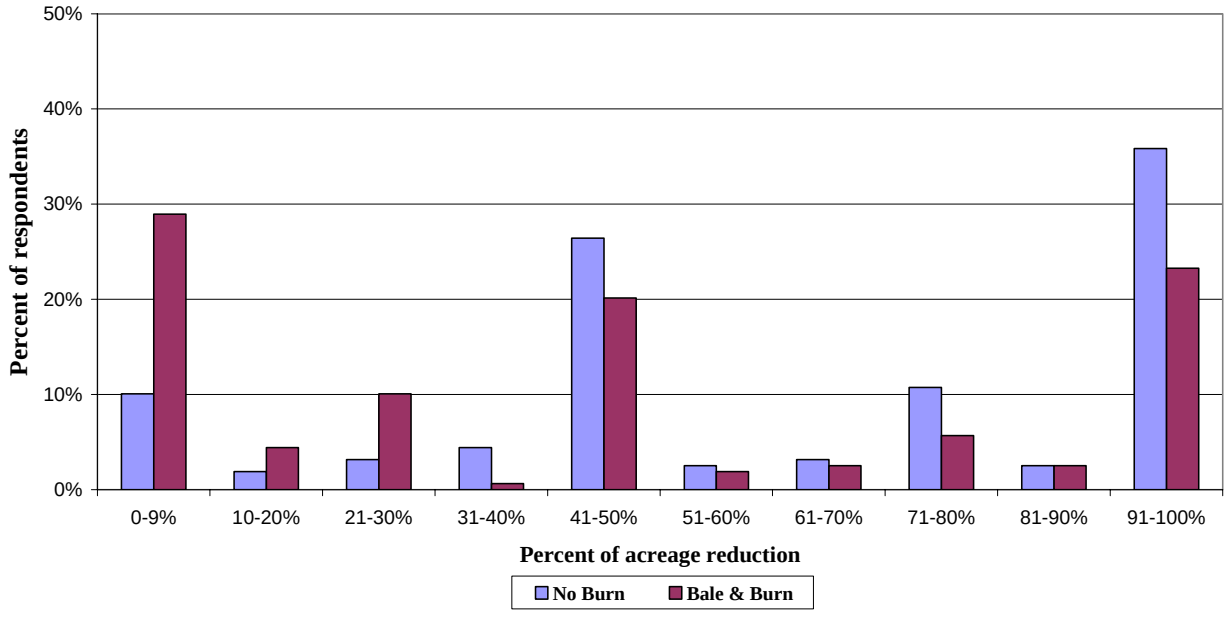

Figure 6. Percentage of respondents stated they would reduce their bluegrass seed acreage by if they were not allowed to burn or changed to a bale-and-burn production system.

Given a scenario that producers could not burn bluegrass residue on land they owned, 44% stated they would switch acreage from bluegrass seed to other crops. Similarly, on leased land, 41% stated they would switch acreage to other crops. Thirty-seven percent of respondents indicated they would grow wheat in place of bluegrass. An additional 20% indicated a likely switch to barley, while another 21% claimed they would switch to legumes.

With over 70% of respondents stating they would incorporate at least some conventional tillage practices to grow alternative crops under no-burn scenarios, they were also asked how this might impact windblown dust and soil erosion. The majority (84%) of producers expressed at least some belief that windblown dust and soil erosion would increase as a result of cereal grains and legumes being planted.

Figures 7, 8 and 9 display the full distribution of responses for these adjustment scenarios in the event of a discontinuation of burning on agricultural land. Just over 50% indicated that "maybe" they would try to grow bluegrass under a no-burn production system. Few felt they would lease-out their land or sell it for residential development, but almost 40% would consider selling some land for residential development. Most farmers expressed little hope that a conservation program would be available to enroll their bluegrass acreage in.

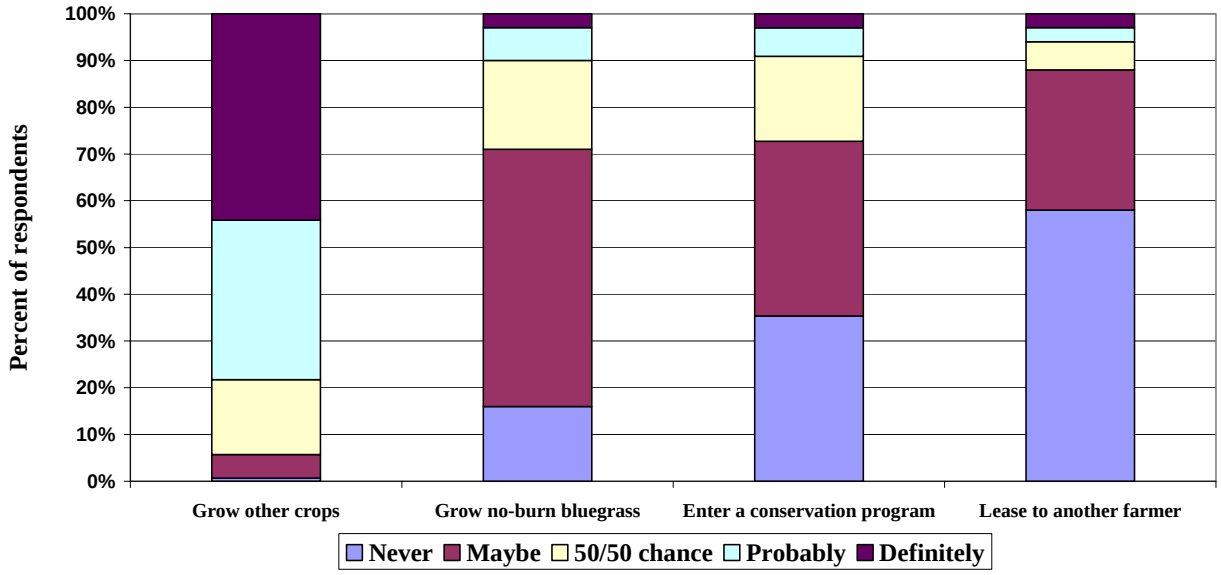

Figure 7. Probability of producers making specified changes on acreage they own if they were no longer allowed to burn bluegrass residue.

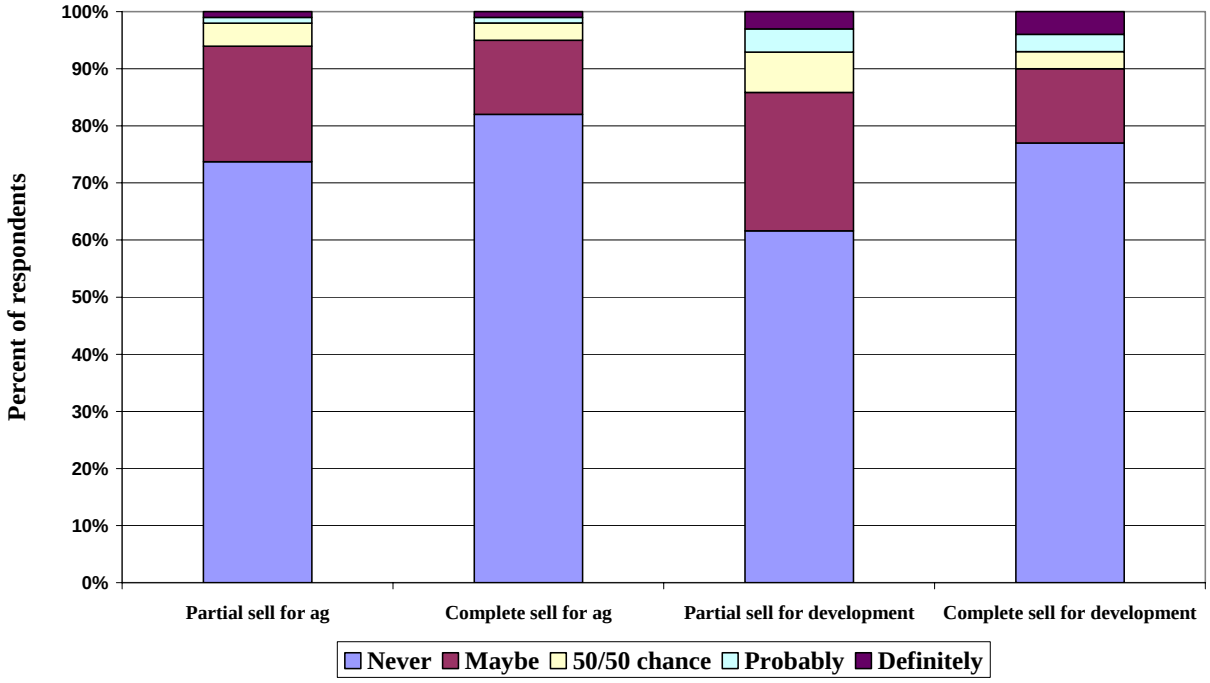

Figure 8. Probability of producers making specified changes on acreage they own if they were no longer allowed to burn bluegrass residue.

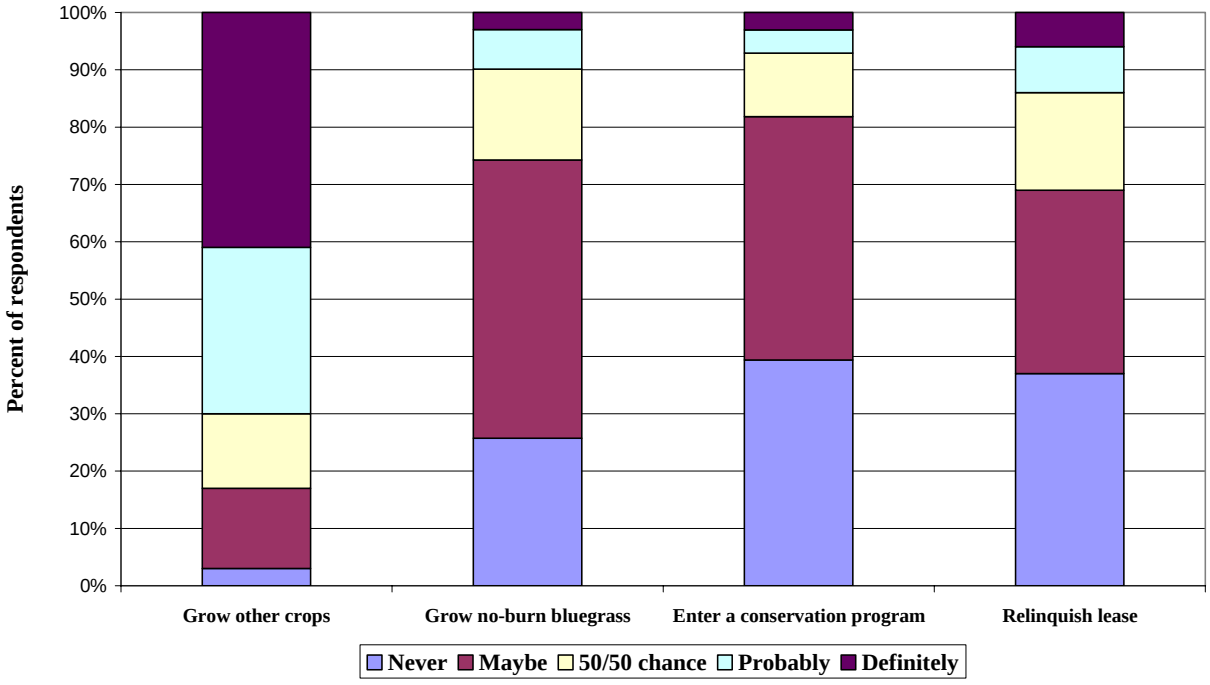

Figure 9. Probability of producers making specified changes on acreage they lease if they were no longer allowed to burn bluegrass residue.

In northern Idaho, several entities remain involved in the regulation, management, and oversight related to bluegrass seed production. These organizations and their jurisdictional roles

are outlined in Table 5. We asked producers their preference about what organization *should have* regulatory authority for bluegrass burning. The producers indicated a strong preference (89%) that the Idaho Department of Agriculture retain regulatory authority for burning bluegrass seed residue. In this context, management of the bluegrass residue burning controversy is tied to social and political structures in place to support agricultural industries within the state.

Table 5. Organizations and current jurisdictional roles involved in managing bluegrass seed burning in northern Idaho.

Organization	Jurisdictional Role
Idaho State Department of Agriculture	1) Co-coordinator of smoke management plan; 2) Agency that sets regulatory policy for residue management practices allowed where crops grow in the state of Idaho.
Idaho Department of Environmental Quality	1) Co-coordinator of smoke management plan; 2) Agency that protects public health from adverse environmental impacts (i.e., air quality pollutants) within the state of Idaho.
Coeur d'Alene Indian Tribe	Co-coordinator of smoke management plan.
Nez Perce Indian Tribe	Co-coordinator of smoke management plan.
U.S. Environmental Protection Agency	Federal agency that protects public health from adverse environmental impacts and provides oversight of state and Tribal management.

Projected Methods of Adjustment Among Bluegrass Producers

In the event that the state prohibits burning bluegrass residue, a few no-burn residue management systems exist as alternatives. Each of these alternatives has advantages and disadvantages, and some are currently being studied by a team of researchers at the University of Idaho. While many producers have expressed interest in the possible alternatives, significant concerns about economic viability in the long-term still exist. As indicated in Figure 10, if not allowed to burn, most producers would try to bale the residue after harvest. Other practices they would consider include harrowing, increasing chemical and fertilizer use, or changing bluegrass varieties.

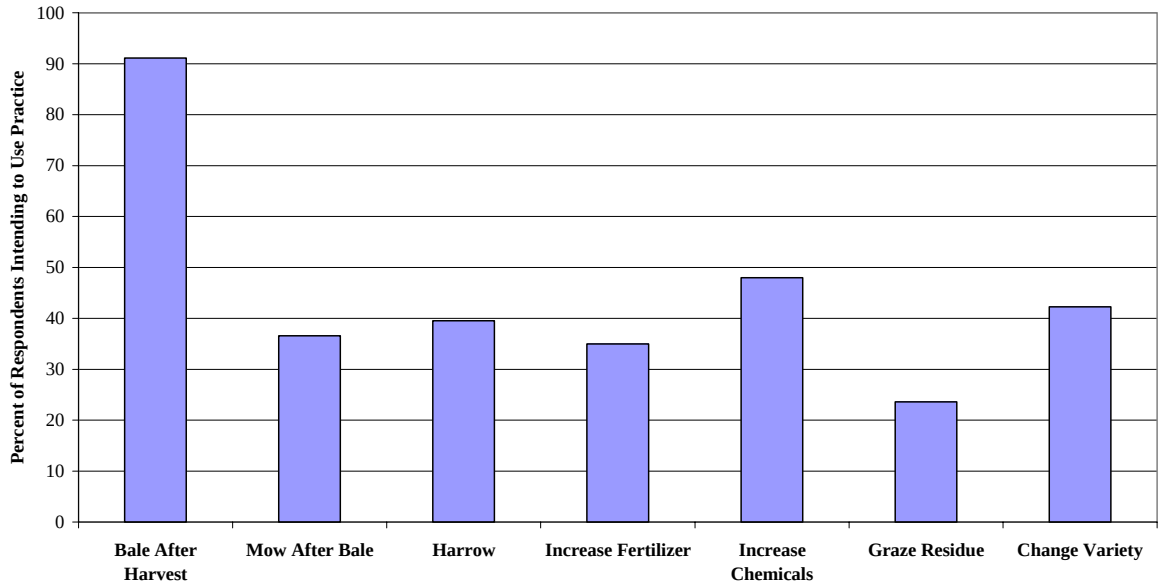

Figure 10. Projected production practices if respondent switched to no-burn bluegrass production.

To implement many of these no-burn production practices would require growers to invest in equipment they do not currently have. A majority (80%) of respondents stated they would need to purchase a baler and bale handling equipment. Figure 11 illustrates the variety and frequency of equipment producers would require to adjust to a no-burn policy. The economic impact associated with additional equipment needs would vary from farm to farm.

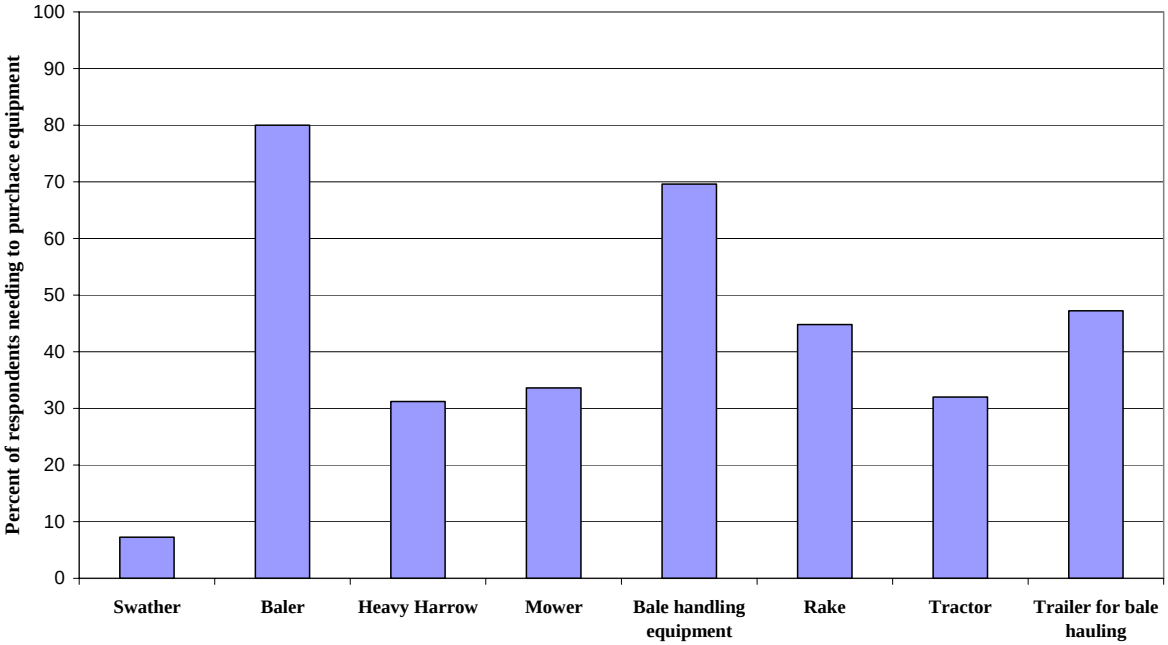

Figure 11. Additional equipment needs by growers to implement a no-burn production system.

Using one of the mechanical methods to produce bluegrass would also stimulate a need for additional labor. Twenty-five percent of respondents did not believe additional labor would be required. Thirty-five percent estimated additional labor needs between 1-100 hours, while another 19% estimated a need for an additional 101-200 hours. When asked about the ease of finding the additional labor, 88% of respondents stated it would be difficult or very difficult to find the additional labor. The latter claim is corroborated by the demographic shift of younger workers out of the agricultural sector in rural communities (Drabenstott and Smith 1995).

If baling becomes a required residue management practice, many producers have expressed concerns about marketing or disposal options for the bales. Most respondents (67%) indicated they would attempt to market the residue for livestock feed or to a remanufacturing plant. Ten percent expressed the possibility of using the bales to feed their own livestock, while the remaining 33% would let the bales decompose or go to an alternative use.

Reduced bluegrass yields and stand life will have significant impacts on producers if they are required to eliminate burning as a residue management tool. We included measures on the survey to assess the producers' estimates of these impacts. In a dryland farming environment, producers indicated that bluegrass yields could drop to an average of 263 lbs /ac clean seed. In an irrigated environment, they expected average yields would be slightly higher at 273 lbs/ac clean seed. These yields are in comparison to historical data showing average bluegrass seed yields under a burn system of 591 lbs/ac for dryland and 765 lbs/ac for irrigated land (Van Tassell 2002). Respondents also felt stand life would be shortened if they were prohibited from burning. Most producers estimated they would have to re-establish the bluegrass seed crop every three years compared to the current average of every 9 years in irrigated and 8 years in dryland (Van Tassell 2002).

Economic Implications of Change

Respondents were asked to estimate the corresponding per acre income change in the event they were required to employ no-burn production techniques. Twenty-two percent estimated they would lose 61-70% of net income per acre of bluegrass seed production. On the low side of the distribution, one percent of the participants estimated a zero percent loss of net income, while on the high side 13% estimated a loss greater than 90%. These results are summarized below in Figure 12.

Respondents were also asked to estimate the change in net farm income that would ensue if they were not forced to switch from growing bluegrass to alternative crops. Two percent of producers did not foresee a reduction in income; while 30% stated their net farm income would decrease by 11-20%. Twenty-three percent foresaw a reduction greater than 50% (Figure 13). The anticipated reduction in income appears to be lessened if respondents switch from no-burn bluegrass production to growing other crops. This finding is consistent with the previous discussion that respondents will decrease bluegrass acreage if a ban is placed on the burning practices. Thirty-four percent of respondents indicated they strongly agreed the bluegrass industry would relocate outside of the state, and an additional 46% somewhat agreed.

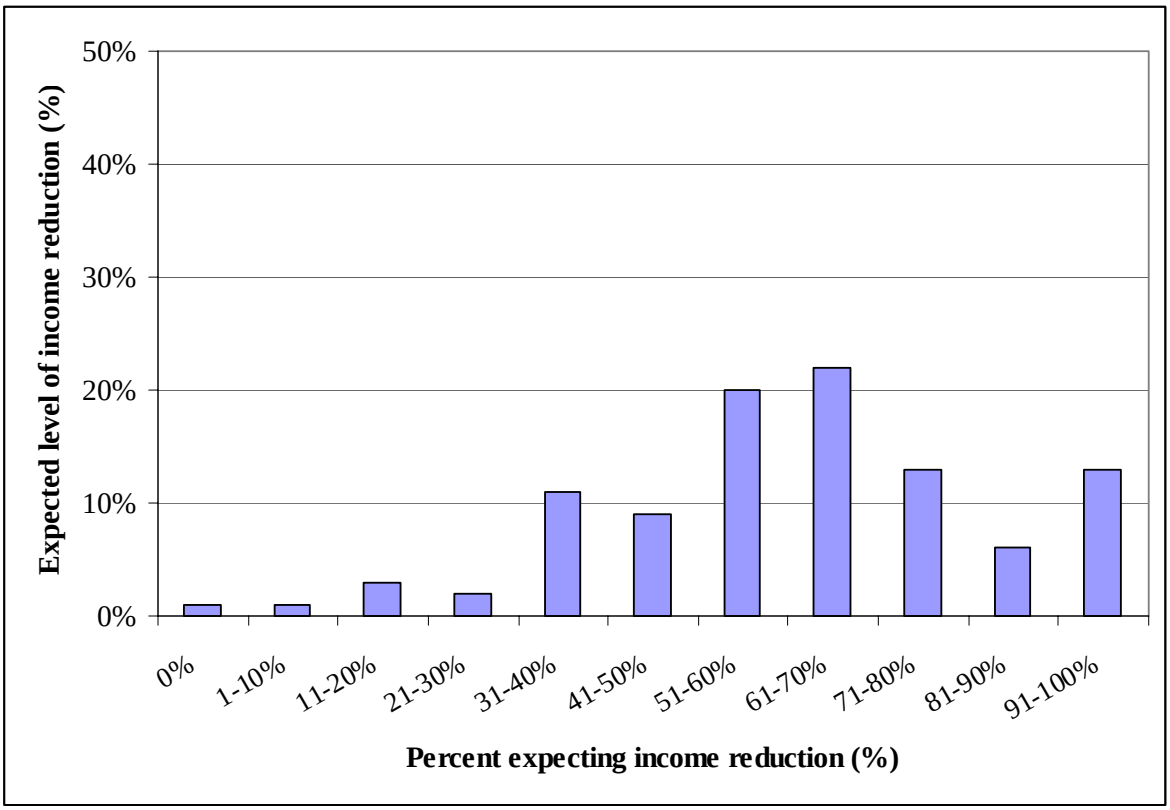

Figure 12. Percent of respondents expecting an associated income reduction if they shifted to no-burn bluegrass production techniques.

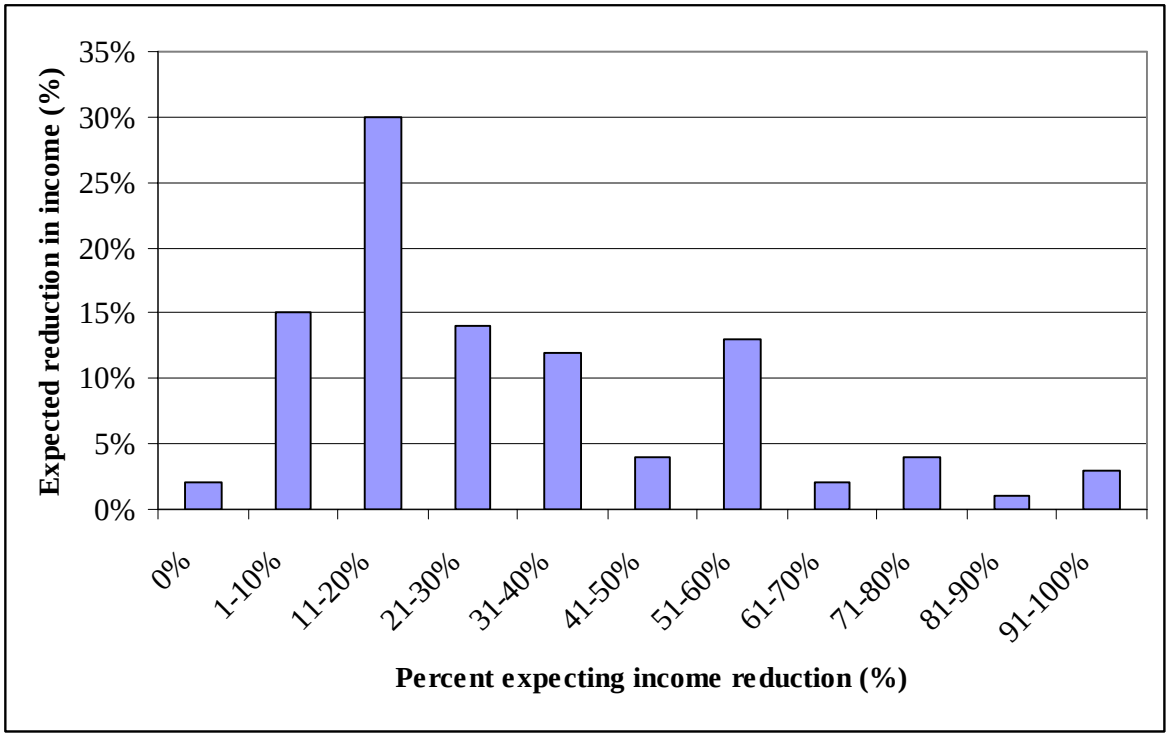

Figure 13. Percent of respondents expecting an associated income reduction if they shifted to alternative crops.

If a no-burn is instituted in Idaho, a majority (98%) of bluegrass producers expect to experience some type of negative financial impact. When asked who should bear the burden of the impact only 18% positively indicated that bluegrass farmers themselves should bear the burden. Forty-three percent of producers indicated federal tax dollars as the preferred support network to bear the financial burden. Private organizations and state tax dollars were favored to a slightly lesser degree to support the negative financial impacts.

On an economically related issue, we asked producers whether they expect their insurance companies to continue coverage of their farm operations in context of the recent controversy over the burning practices. A majority (79%) indicated a lack of confidence in the insurance company's willingness to cover the liability associated with agricultural burning (Figure 14). Recent decisions by some companies have denied insurance coverage to some farmers on their bluegrass acreage.

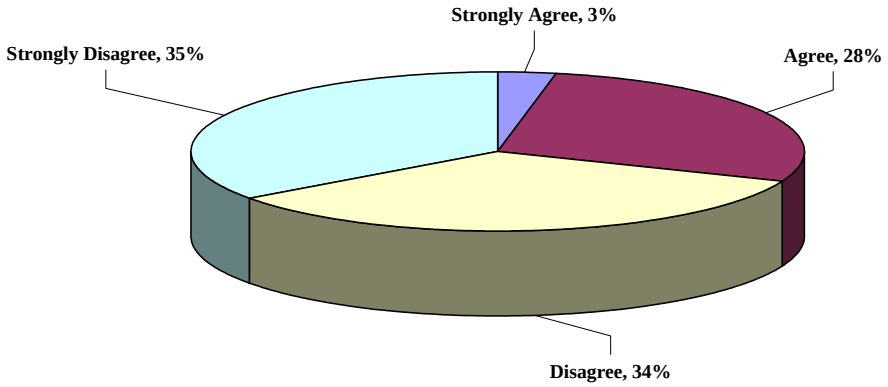

Figure 14. Respondents' level of agreement with the statement: "My insurance company will continue to insure me against liabilities associated with agricultural burning."

Technology Development and Adoption

To gauge the perceptions of bluegrass producers regarding their knowledge of and willingness to use new technology, several survey measures focused on future technology for the industry. With respect to their views of themselves as resistant or open to technology adoption, only 11% did not define themselves as aggressive adopters of new farming technologies. Seventy percent of respondents indicated they had a good working knowledge of no-burn production techniques and most (72%) indicated they did not think a competitive no-burn production system would be developed in the next five to ten years. However, if economically viable no-burn methods are developed, 70% of respondents said they are confident they could make the required farming adjustments to continue growing bluegrass seed. Figure 15 below summarizes this series of results.

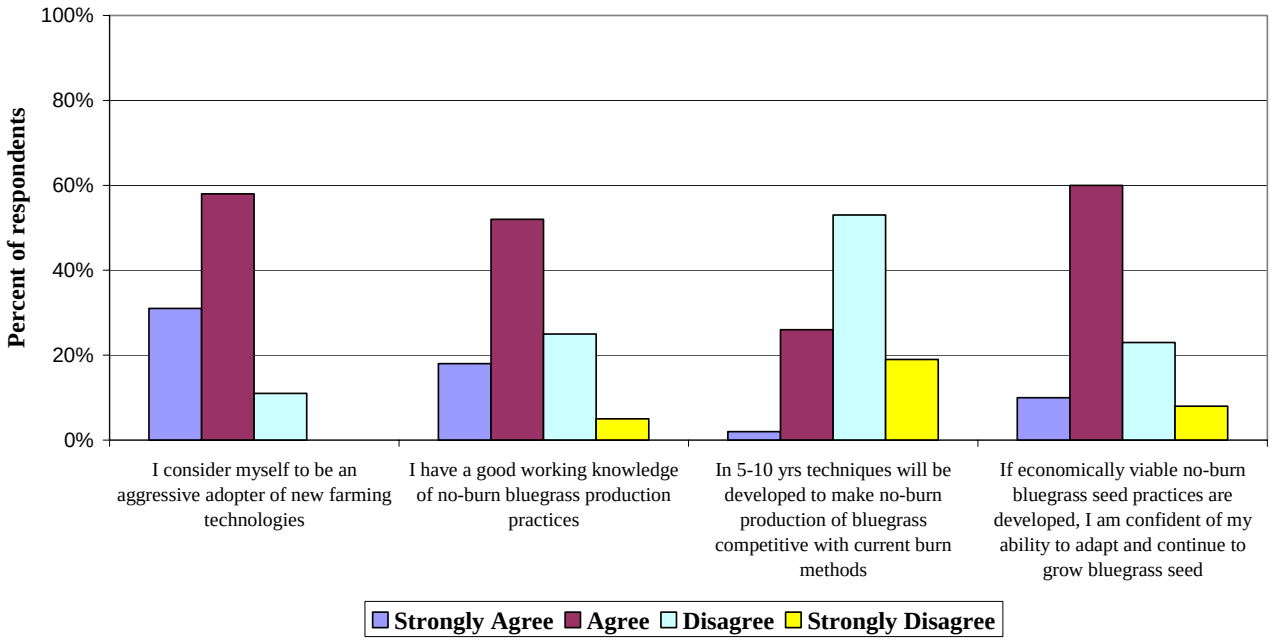

Figure 15. Comparison of respondents' knowledge and willingness to adopt to new or alternative technologies.

Other Adjustments in Farm Operations

A difficult social challenge related to community, family, and individuals could occur with a potential elimination of a conventional agricultural management system (i.e., burning of bluegrass seed residue). To better understand some of these issues, we included several questions regarding the impacts that changes in agricultural policies may have on individual bluegrass producers and their families.

As 33% of respondents have a tradition of growing bluegrass seed in their families, there is a concern that families be able to carry on that tradition. Survey participants were asked whether the option to burn bluegrass residue impacts their hope for their children's future in farming (Figure 16). Seventy percent expressed some degree of negative feelings toward the uncertain future of their children farming in a no-burn climate. Similarly, 90% of the producers claim to have witnessed an increase in family stress among their farm neighbors, especially related to the economic uncertainty of bluegrass farmers.

We asked producers to indicate the levels of emotional stress related to the actual burning process, and 80% of respondents agreed that burning is one of the most stressful farming practices they engage in. Another source of stress is with the uncertainty surrounding a new wave of environmental legislation regarding farming. We asked producers if they believed further regulation of bluegrass burning would make it easier to regulate other farming practices and 91 percent believe that it would set precedence (Figure 16).

Finally, the amount of time spent on issues not directly related to the management of the farming enterprise can often create undue stress, especially during planting and harvesting

activities. To examine the energy farmers expend with regard to the bluegrass burning controversy, we asked producers to indicate the amount of time they now devote to concern and/or activity related this topic. The difficulties associated with the practice in recent years have caused nearly all producers to increase the time they devote to this issue, with a majority (54%) spending an extra one to ten hours per month, and 43% of those surveyed spending between 11-40 extra hours a month.

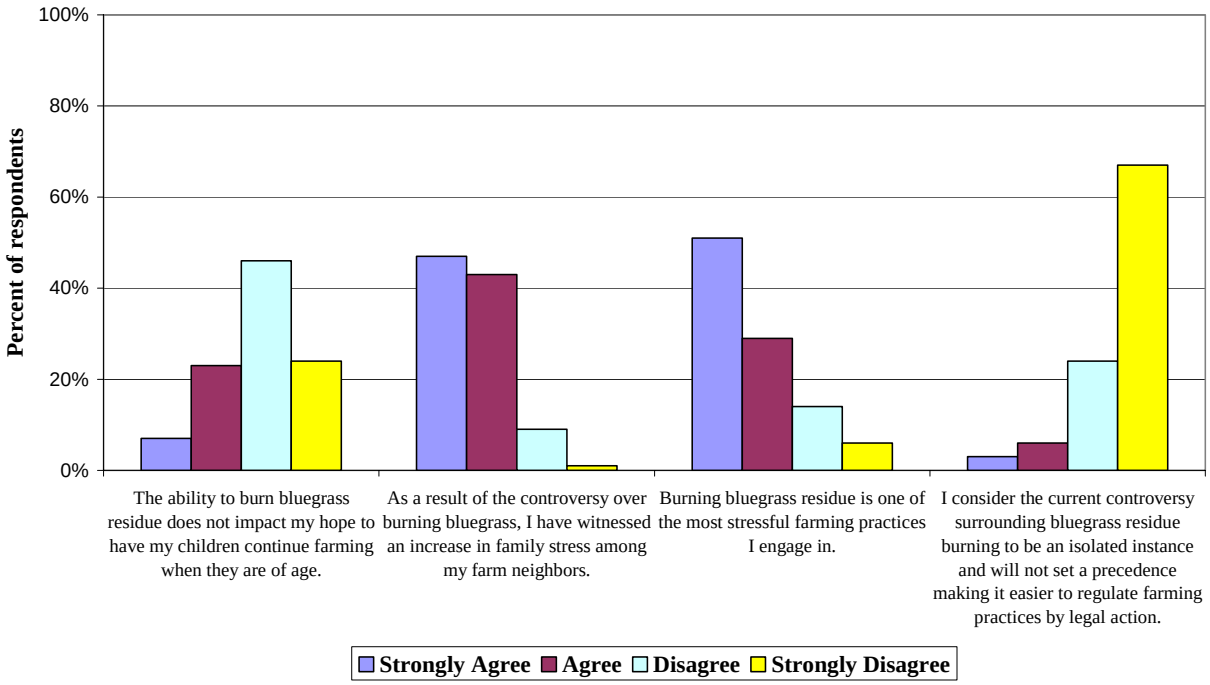

Figure 16. Comparison of respondents' response to social and family issues related to bluegrass residue burning.

CONCLUSIONS

Based on many of the measures presented here, our conclusion notes that in some cases these responses indicate producers' perceptions and projections of what may likely occur rather than actual behaviors observed. However, bluegrass seed production clearly plays a significant role in the livelihood of northern Idaho farmers represented in this study. Bluegrass seed production is trumped only by wheat in total acres. Roughly 25% of respondents depend on bluegrass seed production for over 50% of their net income. Bluegrass seed accounts for 20% or less of the farm income for only 28% of respondents. In this context, a change in burning policy would likely have significant effects on the industry in the region.

The majority of producers feel they understand current no-burn production technologies, and believe they are not economically viable. In all, 74% estimate their per acre net income from bluegrass seed production would decrease by at least 50% if they implemented a no-burn production system. If legislation were passed that prohibited producers from burning bluegrass residue, 93% of respondents would decrease the amount of acreage currently in bluegrass production.

While most respondents do not anticipate the development of economically viable no-burn production techniques over the next five to ten years, the majority are confident in their ability to accomodate them if they are developed. Based on results of the survey, such techniques would need to address the perceived limitations of current no-burn production systems such as reduced yield and stand life, increased labor and capital investment requirements, and a limited market to sell residue.

It is also important to note that most respondents tended to see the bluegrass burning controversy as more than just an economic issue. First, producers utilize the extended bluegrass stand life as an erosion control measure on much of their erosion prone land. Whatever system replaces current bluegrass production would need to be environmentally friendly with regard to erosion to satisfy these stewardship criteria. Second, producers feel that legislatively controlling their right to burn bluegrass residue could set a precedent in regulating farming practices by legal action. In fact, half of the respondents would not be willing to sell their rights to burn bluegrass residue if such an offer were made. Patience while alternative production systems are being developed to make an amiable solution possible is, therefore, important to the producers and industry as a whole. Third, for many producers, bluegrass production has provided a way-of-life, identity, and livelihood tied to their ancestors. As a group, the bluegrass seed producers have significant concerns that they will not be able to pass on their operations to future generations if they become non-viable economically.

The bluegrass residue burning controversy probably will not subside in the near future. Even if legislation prohibiting residue burning were to be passed, it appears that the adjustments required by producers would be considerable. In addition, other environmental problems could be created if bluegrass acres are shifted into annual crops. Continued research to address the production, economic, social, and environmental concerns portrayed by these survey results is only part of the solution. Patience and a willingness to work together for solutions by everyone involved in the controversy will remain a key factor.

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Appendix: KENTUCKY BLUEGRASS SEED PRODUCTION SURVEY

1. How many years have you been growing bluegrass for seed? _____ # of years

2. How many years has bluegrass seed been grown in your family? _____ # of years

3. Estimate the percent of your *net farm income* that comes from bluegrass seed production? _____%

4. If, given a ban on burning, and you continued to produce bluegrass using no-burn production practices, would you reduce the amount of your acreage in bluegrass production?

   G No
   G Yes → if yes, by what percent would you reduce your bluegrass production acreage? _____%

5. If open field burning was only allowed on a bale-and-burn basis, would you reduce the amount of your acreage in bluegrass production?

   G No
   G Yes → if yes, by what percent would you reduce your bluegrass production acreage? _____%

6. If you were no longer allowed to burn your bluegrass and changed to a no-burn production system, which of the following practices would you use: (***check all that apply***)

G Bale right after harvest	G Mow after baling	G Harrow after baling/mowing
G Increase fertilization	G Increase chemical applications	G Use livestock to graze residue
G Change bluegrass variety	G Other (list)_____	G Other (list)_____

7. What additional equipment would you need to purchase or lease to implement the production practices you checked in Q#6? (***check all that apply***)

G Swather	G Heavy harrow	G Bale handling equipment	G Tractor (horsepower: _____)
G Baler	G Mower	G Rake	G Trailer for bale hauling

G Other (specify): _____

8. How much additional labor would be required for you to produce under a no-burn bluegrass production system as compared to a burn production system?

_____ hours per week for _____ weeks

9. How difficult would it be to find the additional labor indicated in Q#8? (***check one***)

G very difficult G somewhat difficult G somewhat easy G very easy

10. If you changed to a no-burn bluegrass production system that included baling residue, what percent of the baled residue do you feel you would market or dispose of by:

_____% Feeding to your own livestock

_____% Selling to someone with livestock

_____% Selling to a remanufacturing plant (e.g., strawboard)

_____% Letting it decompose

_____% Other (please specify) _____

__100__% TOTAL (should add to 100%)

11. If you were not allowed to burn bluegrass residue and switched to no-burn production methods, how much would your *net income per acre of bluegrass* likely be reduced. (***please check one box***)

G 0% G 11-20% G 31-40% G 51-60% G 71-80% G > 90%

G 1-10% G 21-30% G 41-50% G 61-70% G 81-90%

12. Please estimate, on average, how many "extra" *hour per month* you have spent in the past year on the bluegrass burning issue as a result of this becoming a controversial topic.

G 0 G 1-10 G 11-20 G 21-30 G 31-40 G > 40

13. If, given a ban on burning, you switched all or part of your bluegrass acreage to other crops, what crops would you switch to, and would they be grown with conventional and/or notill practices?

Crop	Conventional	Notill/Direct Seed	Minimum Till
_____	G	G	G
_____	G	G	G
_____	G	G	G

14. After adjusting your bluegrass seed production to a no-burn system, by switching to other crops and/or using no-burn methods for growing bluegrass, how much would your average yearly *net farm income decrease*? (***please check one box***)

G 0% G 11-20% G 31-40% G 51-60% G 71-80% G > 90%

G 1-10% G 21-30% G 41-50% G 61-70% G 81-90%

15. Which organization (check which one), or organizations (check all that apply) would you prefer to have regulatory authority for bluegrass burning?

G Idaho Dept of Environmental Quality (DEQ) G Idaho Department of Agriculture

G Environmental Protection Agency (EPA) G Coeur d' Alene and Nez Perce Indian Tribes

G Other (please state)_____

16. If farmers are forced to reduce or eliminate burning, and this action has a negative financial impact on farmers, who should bear the financial burden of this action? (***check all that apply***)

G Bluegrass farmers G Federal tax dollars

G State tax dollars G Private organizations

G Other _____

17. Current regulations allow you to burn bluegrass residue on days approved by the Idaho State Dept. of Agriculture in cooperation with DEQ. Assume the State of Idaho passed a law that *no new acreage* could be brought into bluegrass seed production where residue was burned. If you were then offered an opportunity to sell your rights to burn bluegrass residue on your *current bluegrass acreage* (i.e., if you sold those burn rights, neither you, nor anyone you sold that bluegrass acreage to, could burn bluegrass residue on those acres), would you be willing to sell those rights to burn bluegrass residue?

G Yes G No

If **NO**, why?_____

_____

If **YES**, what price would you be willing to accept for your rights to burn bluegrass residue on your current bluegrass acreage?

$_____ per acre/year

18. Using the following scale, estimate the probability of making the following changes if you were no longer allowed to burn bluegrass residue. (***circle one response for each question***)

	Never	Maybe	50/50 Chance	Probably	Definitely
For acreage you own…					
Switch acreage to other crops	1	2	3	4	5
Switch to no-burn bluegrass production	1	2	3	4	5
Switch acreage to conservation programs (e.g., CRP) if available	1	2	3	4	5
Lease to another farmer	1	2	3	4	5
Sell *some* land for agricultural production	1	2	3	4	5
Sell *all* land for agricultural production	1	2	3	4	5
Sell *some* land for residential development	1	2	3	4	5
Sell *all* land for residential development	1	2	3	4	5

	Never	Maybe	50/50 Chance	Probably	Definitely
For acreage you lease…					
Switch acreage to other crops	1	2	3	4	5
Switch to no-burn bluegrass production	1	2	3	4	5
Switch acreage to conservation programs (e.g., CRP) if available	1	2	3	4	5
Give up your lease	1	2	3	4	5

19. ***Circle one response for each item below*** that best indicates how you feel about each of the following statements. There are no right or wrong answers.

Key: **SA** Strongly Agree **A** Agree **D** Disagree **SD** Strongly Disagree

a. If farmers in Idaho are *not allowed to* burn their bluegrass residue, the bluegrass industry will leave Idaho..... SA A D SD

b. Bluegrass burning issues *are* portrayed accurately in the news media ..... SA A D SD

c. Banning bluegrass burning *will have no* significant impact on residential and commercial development of farmland ..... SA A D SD

d. More restrictive bluegrass burning regulations *will not* result in farmers switching to crops that will cause windblown dust and soil erosion ..... SA A D SD

e. Within 5 to 10 years, techniques *will be* developed that will make no-burn production of bluegrass seed competitive with current burn methods..... SA A D SD

f. I consider myself *to be* an aggressive adopter of new farming technologies..... SA A D SD

g. I *have* a good working knowledge of no-burn bluegrass production practices ..... SA A D SD

h. The ability to burn bluegrass residue *does not impact* my hope to have my children continue farming when they are of age..... SA A D SD

i. As a result of the controversy over burning bluegrass, I *have* witnessed an increase in family stress among my farm neighbors..... SA A D SD

j. Burning bluegrass residue *is one* of the most stressful farming practices I engage in..... SA A D SD

k. I consider the current controversy surrounding bluegrass residue burning to be an isolated instance and *will not* set a precedence making it easier to regulate farming practices by legal action ..... SA A D SD

m. Despite the current bluegrass residue burning controversy, my insurance company will continue to insure me against liabilities associated with agricultural burning..... SA A D SD

n. If economically viable no-burn bluegrass seed production practices are developed, I am confident that I can make the required farming adjustments to continue growing bluegrass seed ..... SA A D SD

20. Please list the average annual acreage over the past 5 years for crops grown on land you own or lease. Include irrigated (Irr) and dryland (Dl) bluegrass produced by burn and no-burn methods.

Owned		*Leased*	
Irr. bluegrass (burn)	_____ac	Irr.bluegrass (burn)	_____ac
Dl. bluegrass (burn)	_____ac	Dl. bluegrass (burn)	_____ac
Irr. bluegrass (no-burn)	_____ac	Irr.bluegrass (no-burn)	_____ac
Dl. bluegrass (no-burn)	_____ac	Dl.bluegrass (no-burn)	_____ac
Wheat	_____ac	Wheat	_____ac
Barley	_____ac	Barley	_____ac
Chickpeas	_____ac	Chickpeas	_____ac
Peas/Lentils	_____ac	Peas/Lentils	_____ac
Others (please list):		Others (please list):	
_____	_____ac	_____	_____ac

21. What percent of your bluegrass seed production occurs in the following counties?

_____% Idaho	_____% Kootenai
_____% Lewis	_____% Spokane (WA)
_____% Nez Perce	_____% Whitman (WA)
_____% Latah	_____% Other (please specify)_____
_____% Benewah	_100_% TOTAL (should add to 100%)

22. What percentage of your bluegrass seed acreage is on land that you consider to be more erodible than land your other crops are grown on? _____%

23. What were your average, low and high bluegrass seed yields (lbs/ac clean seed) when allowed to burn over the last 10 years ***and*** what would you expect your yield to be if not allowed to burn?

	Average	Low	High	Expected yield (no-burn)
Dryland:	_____	_____	_____	_____
Irrigated:	_____	_____	_____	_____

24. How long (years) do you keep your bluegrass stands in before you re-establish them ***and*** how long would you expect your bluegrass stands to last if you were not allowed to burn?

	Average	Low	High	Expected length (no-burn)
Dryland:	_____	_____	_____	_____
Irrigated:	_____	_____	_____	_____

25. What year were you born? _____ (year)

26. Please circle the highest number of years of education you completed.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Elementary Jr. High High School College or Vocational Graduate or Professional

27. Do you consider your current involvement in farming to be: G Full-Time G Part-Time?

28. I would rate the ***financial*** stress I am currently experiencing as:

G insignificant/none G slight G average G above average G severe

29. If you sold your farming operation (land, equipment, etc.) what percent of the sales price would be considered owners equity (i.e., what percent of the sales value would be left after you paid all outstanding bills and loans)?

G 0% G 11-20% G 31-40% G 51-60% G 71-80% G 91-100%
G 1-10% G 21-30% G 41-50% G 61-70% G 81-90%

30. To the best of your knowledge, what was the average before-tax ***annual net income*** from your farm operation over the past 5 years?

G under $9,999 G $20,000-29,999 G $50,000-69,999
G $10,000-19,999 G $30,000-49,999 G $70,000-99,999 G $100,000 & over

Thank you for your time. Please return the survey in the enclosed envelope.