

Lauren Brzozowski, Plant and Soil Sciences; Ayla Koehler, Horticulture; and Yoko Kusunose, Agricultural Economics



The number of organic farms and acreage doubled in Kentucky between 2016 and 2021. During that time, the number of farms grew from 100 to 207, and acreage increased from 10,255 to 20,467, according to the 2016 and 2021 USDA NASS Certified Organic Surveys. However, only 12 farms produced organic small grains, including wheat, rye, barley, and oats, in that same period. A survey by the University of Kentucky Cooperative Extension in 2007 reported that organic growers found growing wheat and oats organically to be "easy" or "easy to moderate" but did not identify specific areas for further research, Extension programs or education on grain crops. In this publication, we report results from a survey of current and prospective organic grain growers in Kentucky and the surrounding region to better understand the current challenges and opportunities for local organic small grain production for human food and animal feed or forage.

Survey implementation

The survey had two tracks: one for current growers and another for "aspiring growers," those interested in but not yet producing small grains. The survey asked participants for general information about their farms, their motivations for growing small grains, and the role that small grains play on their farms. Participants were then asked to rate specific challenges by steps in the production process (e.g., planting, managing, harvesting, and marketing) as either "major," "minor," or "not an obstacle." Other questions included desired characteristics of seed varieties, marketing venues, and free response questions.

The survey was approved following University of Kentucky (UK) IRB protocol 88031. The survey was distributed in early 2024 electronically through the Organic Association of Kentucky (OAK) listserv and direct emails to regional farmers, cooperators, and Extension agents. Paper copies of the survey were directly mailed to the 54 certified organic growers who list organic grains as a current crop in Kentucky, Tennessee, and West Virginia in a USDA database; they were also distributed at the 2024 OAK Annual Conference.

Survey responses

A total of 25 responses were received: 13 online, 7 mailed, and 5 paper surveys from conference attendees. Most responses were from Kentucky (19), and others were from Indiana (1), Ohio (1), West Virginia (1), and Tennessee (3). Survey responses were received from 19 current and 6 aspiring growers. Of the 19 current growers, 10 were certified organic, 6 used organic practices (but not certified), and 3 used conventional practices but would like to grow organically. Of the 6 aspiring growers, 2 were certified organic and 4 used organic practices.

Key Results

Analysis of the survey responses resulted in eight key findings, which are summarized in this publication, along with suggestions for future research, Extension and educational efforts.

1. Small grains are widely used in soil health-promoting practices.

Current growers were primarily motivated to grow small grains to improve soil health and—relatedly—reduce soil erosion (Table 1). Similarly, all aspiring growers were motivated to grow grains for their contributions to soil health (results not shown).

Similarly, current growers—especially certified organic growers—frequently listed "cover crop" as a primary reason for growing small grains (Table 2). Some growers employed other soil health practices, like no-till (7 of 19 growers and 2 of 10 certified organic growers) and growing grains in multispecies mixtures (6 of 19 growers and 3 of 10 certified organic growers). All aspiring growers envisioned small grains serving as cover, rotational, or nurse crops.

Takeaways

- Research and education efforts could focus on soil health-promoting potential of small grains.
- Small grain cover crop trials, including growing grains as multispecies mixtures, could be prioritized.

2. Organic small grains are critical as feed or forage for organic animal production, especially for certified growers.

The most common purpose for organic small grains following cover crops was use in feed (11 of 19 growers), forage, hay, or grazing (12 of 19 growers; Table 2). Only one quarter of farmers used grains for on-farm animal feed or forage exclusively (4 of 19), but many used grains for animal production combined with other purposes. The use of grains as a forage, hay, or grazing crop was a nearly uniform response among certified organic growers (9 of 10). Most aspiring growers (4 of 6) likewise would use grains for feed or forage. Most current growers (12 of 19) had grazing animals, and some (6 of 19) had non-grazing animals. Of note, 8 of 10 certified organic growers had grazing animals on-farm, including all certified organic growers in Kentucky, compared to only half of the growers who were not certified (4 of 9). Three certified and non-certified growers each had non-grazing animals. The strong relationship between organic grain production and animal feed, forage, or grazing likely reflects the elevenfold growth in value of the organic livestock and poultry products market in Kentucky in recent years (from \$5.5 million in 2016 to \$60.5 million in 2021, according to the 2016 and 2021 USDA NASS Certified Organic Surveys), as certified organic feed and forage are required for certified organic livestock production.

Takeaways

- Organic grain production is closely tied to organic animal production, and educational efforts could be specifically designed to reach organic animal producers.
- Research efforts for organic small grain production could focus on forage potential, grazing tolerance, or feed quality.

3. Organic small grain producers farm at multiple scales across the region.

Farm size of current growers ranged from greater than 200 acres (7 of 19 growers) to less than 10 acres (5 of 19 growers), and aspiring growers ranged from "home garden" size (2 of 6 growers) to 10 to 50 acres (2 of 6 growers).

Within Kentucky, there were 4, 9, and 6 responses from the Western, Central and Eastern regions of UK Extension (https://extension.ca.uky.edu/county), respectively. Current Kentucky growers' farms were mostly located in Western Kentucky (4 of 14) and Central Kentucky (8 of 14), and less frequently in Eastern Kentucky (2 of 14), but aspiring Kentucky growers were exclusively from Central Kentucky (1 of 5) and Eastern Kentucky (4 of 5).

Table 1. Current grain growers' motivations to grow small grains.*

Motivator	Strong Motivation	Somewhat Motivating	Not a Motivation	Unsure
Improve soil health	16	2	0	0
Increase ground cover, reduce erosion	15	2	1	0
Competition for weeds	13	4	1	0
On-farm biodiversity	11	5	2	0
Reduced agrichemical inputs	13	3	2	0
Reduced farm input costs	10	5	2	1
Marketability or profit	11	5	2	0

*based on 18 responses from current growers (one farmer did not respond to this question)

Table 2. The role or purpose of small grains on the farms of current grain growers.*

Role of Small Grains	Number of Certified Organic Farmers*	Number of Non-certified Farmers*	
Grain crop for human consumption (food)	4	7	
Grain crop for animal consumption (feed)	6	5	
Forage, hay, or grazing crop**	9	3	
Cover crop**	9	6	
Rotation crop	4	5	
Nurse crop	5	3	

*based on 19 total responses from 10 certified organic farmers and 9 non-certified farmers **including in multispecies mixtures While many current producers also grew corn (15 of 19 current growers), soybean production was less common (6 of 19), indicating that most growers were not growing a double crop (corn, winter small grain, and soybean) rotation. Finally, current growers also frequently had vegetable production (14 of 19) or fruit production (6 of 19). Most aspiring growers (4 of 6) also grew vegetables.

Takeaways

- Scale and scope of organic small grain production differs from that of conventional small grain production, which will require research and educational programs to include different scales, equipment sizes, and rotational contexts.
- Outreach and research efforts for organic small grains should include broad geographic areas.

4. Most farmers grow multiple small grain species and need Kentucky-adapted organic seed varieties.

Rye was the most commonly grown small grain species (13 of 19 current growers), followed by oats (12 of 19) and wheat (11 of 19), then barley and triticale (5 of 19 growers for each), and rice (2 of 19). Only five growers grew a single small grain species. About one third of producers grew grains in multispecies mixtures (6 of 19 total current growers and 3 of 10 certified organic growers).

Access to appropriate seed varieties was ranked as a major obstacle by 4 of 19 growers and as a minor obstacle by 8 of 19 growers. In a free response question, one grower cited access to "regionally adapted seed varieties" as a critical need. Another grower indicated in a free response that their "current varieties do not ... [have desired] characteristics." However, 7 of 19 growers said that access to seed varieties was not an obstacle. In choosing varieties, most growers said that weed competitiveness, pest and disease resistance, and profit were "very important," and quality, yield, vigorous emergence, and nutrition had similar ratings (Table 3). In a section where growers were asked to elaborate, one grower wrote that "weed pressure on yield is the biggest trouble," underscoring the need for weed management strategies for organic grain production.

Takeaways

- Organic production requires education and research on diverse grain species.
- Specific trialing and breeding of organic Kentucky-adapted varieties, especially for the traits of weed competitiveness, disease resistance, and performance in multispecies mixtures, would benefit organic growers.

Table 3. Growers'	nriorities in	organic small	arains	varieties *
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Trait	Very Important	Important or Somewhat Important	Not Important	Unsure
Yield	8	10	0	1
Early maturation	2	13	2	2
Short or dwarfing	0	5	12	2
Vigorous emergence	8	9	0	2
Heat/drought resilient	7	9	1	2
Cold/winter resilient	5	12	0	2
Pest/disease resistant	10	8	0	1
Weed competitive	10	8	0	1
Deep roots	6	12	0	1
High quality	9	8	0	2
Nutritious grain	8	7	3	1
Hull-less (oats, barley)	2	6	6	5
Historic, heritage, or cultural importance	3	10	4	2
Profit	10	6	2	1
Grazing/cutting tolerance	3	8	4	4
Other (free entry)	Straw yield			

*based on 19 survey responses from current small grains farmers

5. Key challenges in organic grain production include weed management, vertebrate predation, grain guality, and weather.

Weeds and vertebrate predation (bird, deer, or animal damage) were the most significant obstacles to managing organic grains, and grain quality or moisture was a significant challenge at harvest (Table 4). Other significant challenges were drought or heat stress, cold or winter stress, seed emergence , plant lodging, and disease pressure.

Weather was also a challenge throughout the growing season. At planting, soil conditions were a major (3 of 19 growers) or minor (13 of 19) challenge for most growers. While a question was not asked about weather during the growing season, one grower noted "unpredictable weather" as a major obstacle in the free entry section. Finally, 5 and 12 of the 19 growers noted weather at harvest as a major or minor obstacle, respectively.

Takeaways

- The key target for organic agronomic research is weed and predation management.
- Research toward strategies to mitigate weather challenges, such as planting date, may also benefit organic growers.

6. Marketing organic small grains for human consumption is hindered by a lack of consumer awareness about local organic grains.

Over half of current growers (10 of 19) sold food grains for human consumption, and half of aspiring growers (4 of 6) envisioned growing food grains. While use of grains as a forage, hay, or grazing crop was the most common use for certified organic growers (9 of 10), food grain production was the most common use for non-certified growers (7 of 9). The 10 growers who sold food grains marketed them through a variety of venues, including direct to consumer (6 of 10), farmers markets (6 of 10), restaurants (4 of 10), bakers (3 of 10), distillers (2 of 10), brewers (1 of 10), and millers (1 of 10).

Of the growers who sold grain for human consumption, the predominant marketing obstacle was consumer awareness of local grains, followed by low prices for grains and lack of price incentives for organic grains (Table 5). This sentiment has been echoed in other regions of the country, where more than 20% of respondents to an organic barley survey in the West Coast of the United States identified "limited markets" and "price" as obstacles to growing organic barley. Finally, in a free response section, two growers wrote that missing infrastructure in the value chain was a significant challenge, including lack of cleaning equipment and lack of local millers.

Takeaways

- Organic grain growers, and conventional grain growers selling to local markets, would benefit from prioritizing consumer education about local grain production and availability.
- Education and community-building efforts toward building local organic grain value chains would contribute to the long-term economic sustainability of growing organic grains.

Challenge	Major Obstacle	Minor Obstacle	Not an Obstacle	Unsure	
Seed emergence	1	11	6	1	
Weed pressure	6	11	1	1	
Disease pressure	3	10	5	1	
Insect pressure	2	9	7	1	
Bird, deer, animal damage	6	11	2	0	
Drought or heat stress	2	15	1	1	
Cold or winter stress	1	12	5	1	
Plant lodging	3	9	4	3	
Plant maturation timing	2	8	7	2	
Grain quality/moisture	7	8	1	3	

Table 4. Grain growers' challenges in managing and harvesting organic small grains.*

*based on 19 survey responses from current small grains growers

Table 5. Growers' challenges in marketing organic small grains for human consumption.*

Challenge	Major Obstacle	Minor Obstacle	Not an Obstacle	Unsure
Size/demand of local grain market	2	6	0	2
Size/demand of local organic grain market	2	4	2	2
Low prices for grains	4	3	1	2
Lack of price incentive for organic grains	4	1	2	3
Consumer awareness of local grains	6	1	0	3
Quality	1	5	0	4
Other	getting grain clean enough for human consumption, lack of milling infrastructure, have growers and bakers but not millers			

*based on 9 responses from current growers marketing grains for human consumption (one farmer did not respond to this question)

7. Access to harvest and processing equipment is a more significant challenge than access to planting or management equipment.

Access to land was not an obstacle for 11 of the 19 current growers, but 2 and 6 ranked land access as a major or minor obstacle, respectively. Similarly, access to equipment and labor for planting and management was not an obstacle for over half of the current growers. However, growers ranked challenges with access to equipment and labor more severely at harvest than at planting or during the growing season (Table 6). Similarly, access to equipment was the only challenge to be ranked as a major or minor obstacle for all aspiring growers. In a free response, one grower underscored an interest in equipment sharing, writing "Would love to hear of any small equipment cooperatives forming in the region to share harvest/processing equipment!"

Infrastructure for grain storage and transport was relatively uncommon. Half of the growers (10 of 19) did not have access to storage facilities, and 10 of 19 growers did not have access to transportation equipment for grain or forage. Eight of 19 growers did not have access to either. Growers with larger farms (greater than 200 acres) had a higher frequency of access to storage (5 of 7) and transport (6 of 7). This may be related to the high frequency of on-farm use of grain, rather than selling off-farm. Similarly, 4 of 6 aspiring growers did not have access to storage facilities or transportation.

Takeaways

- Supporting efforts to develop cooperative equipment sharing or seed processing equipment hubs would benefit organic producers.
- Educational material and events for organic small grain growers should include information on harvesting and processing equipment.

8. Education about growing organic grains is needed.

Growers emphasized that education on organic grain production, and especially equipment, was a critical need (Table 7). The interest in educational opportunities is further demonstrated by high participation (more than 50 attendees) at each of the OAK meeting grain-specific sessions in 2023 and 2024.

Takeaways

- Education on organic grain production, including presentations, videos, and documents, as well as Extension agent and farmer-to-farmer peer education, are important for supporting organic grain production.
- Education on equipment is as critical as education on growing grains.

Time	Challenge	Major Obstacle	Minor Obstacle	Not an Obstacle	Unsure
Planting	Equipment access	4	2	13	0
Flaming	Labor availability	3	8	7	1
Growing	Equipment access	4	4	11	0
season Labor availability	2	8	9	0	
Harvest Equipment access Labor availability	Equipment access	6	5	7	1
	Labor availability	6	7	5	1

 Table 6. Growers' challenges in planting, managing, and harvesting organic grains.*

*based on 19 survey responses from current growers

Table 7. Growers' priorities for education, based on replies to free-response survey question.

Keep doing presentations!

More guides for farmers on variety selection, how to integrate with other crops, small scale management options, etc.

Educate Extension agents.

Offer incentives for small growers to do documentary growing for educational purposes.

Summarv

The purpose of the survey was to identify gaps in research and education needs for organic small grain production in Kentucky. We found that promoting soil health and sustaining organic animal operations were key motivators for organic small grain production in the region, but that availability of locally adapted varieties, educational opportunities for organic management, and growth of local value chains would expand opportunities for organic small grain production.

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