



High Tunnel Production and Marketing Survey: Data Summary¹

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Executive Summary

Producers using high tunnels were surveyed in 2019 to identify high tunnel practices and use on farms in Kentucky and surrounding states. Survey responses collected online (Survey Monkey) and from print surveys collected from Kentucky growers without internet access provide a snapshot of 106 producers using high tunnels. This includes high tunnel production practices and channels used to market products grown in high tunnels. Producers have used high tunnels to lengthen their season and expand farm production for established markets, at the same time entering smaller-volume wholesale markets with high tunnel products. Pest control and soil health remain challenges for many producers, who rank online tools and demonstrations by other growers as useful sources of information for solving challenges. Many farms use one high tunnel to complement other production, and producers indicated they continue to explore ways to realize more production efficiencies for utilizing the high tunnel space to its greatest potential.

High Tunnel Production Systems Background

High tunnels have been utilized by growers for many years to facilitate season extension and have been a valuable tool to supplement field production for many small-scale growers. The Natural Resources Conservation Service EQIP program introduced a cost share program approximately 10 years ago. At that time, fewer than 400 high tunnel operations were in place across the Southern U.S., and Kentucky was not an active participant. But rapid expansion and adoption of the NRCS EQIP program has led to more than 7,000 high tunnels across this southern

region (see table, Page 2), and Kentucky has been by far the most active adopter, with more than 1,200 tunnels and over 2.8 million ft² of production capacity³. NRCS program tunnels in the South have expanded by more than 30 percent in the last two years, adding over 40 percent additional square footage.

High tunnels have proven to be a good fit in Kentucky, given the combination of relatively moderate winters that are buffered by the strong season extension benefits of the structures, combined with a heavy reliance of many producers on direct to con-



¹This survey was conducted in part through the USDA SSARE Project 'Cover Crops Under Cover: Evaluating Costs, Benefits, and Ecosystem Services of Cover Crops in Year-Round High Tunnel Production Systems' (SSARE LS-16-272). Significant contributions to the survey design and implementation were provided by grant project partners, including Krista Jacobsen, Annette Wszelaki, Erin Haramoto, and Brett Wolff. Producers received a \$20 payment for research participation in this study. The survey instrument is available from the authors upon request.

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³Extensive compilation of the national data of the NRCS EQIP program was provided by Matt Kleinhenz from The Ohio State University. The data presented here for the Southern U.S. states is adapted from his compilation.

Center for Crop Diversification (CCD) newsletter and at state and regional producer meetings.

Respondent Demographics

Farm Location

Nearly three-fourths of responding producers operated high tunnels in Kentucky. Illinois accounted for 10 percent of respondents and other states (Ohio, Indiana, West Virginia, Georgia, Tennessee and Alabama) accounted for 17 percent.

More than half (55 percent) of respondents indicated their high tunnels were located in a small town or countryside. High tunnels within 50 miles of a city with population 250,000 to 1 million accounted for 32 percent, and high tunnels within 50 miles of a city with population of 1 million or more accounted for 13 percent.

Gender, Age, Education, High Tunnel Experience

Males accounted for 59 percent and females for 41 percent of high tunnel operators. One-fourth of respondents were in the 35- to 44-year age range, and 19 percent were under 35; only one operator reported being less than 25 years old. More than one-third (37 percent) of operators were 55 or older.

Grower respondents were generally experienced with high tunnels, with half of the growers indicating they have grown specialty crops and/or used high tunnels for 10 or more seasons.

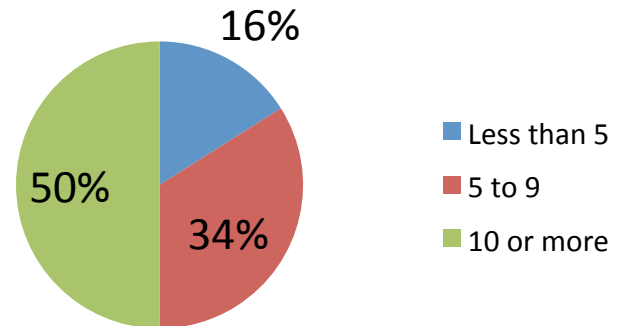
High tunnel operators tended toward higher educational attainments. Only 18 percent of respondents said they had attained the educational equivalent of a high school degree or less. There were 24 percent of respondents indicating some college or an associate's degree. One-third held a bachelor's degree; and 26 percent said they had a graduate or professional degree.

Characteristics of Farms and High Tunnels

Survey respondents indicated a mix of conventional and organic growing practices in their high tunnels.

Primary Producer Age	n=93
18-34	19%
35-44	25%
45-54	19%
55-64	26%
65 or older	11%

Years Growing Specialty Crops



One-fifth said they used primarily conventional growing techniques, with an additional one-third incorporating some organic along with conventional methods. The most common response (36 percent) was that high tunnel production was according to organic standards, but not certified. Ten percent of respondents indicated their high tunnels were certified organic.

More than half of high tunnel operators said they used high tunnels for year-round production always or sometimes.

High Tunnel Production Practices	n=106
I use primarily conventional growing techniques	21%
I incorporate some organic along with conventional methods	33%
I produce according to organic standards, but I'm not certified	36%
My high tunnel operation is certified organic	10%

Do you use your high tunnels for year-round production?	
Yes	43%
No	33%
Sometimes	24%

A slight majority of respondents (51 percent) indicated having one high tunnel in production with 24 percent saying they had two high tunnels. Three high tunnels

were reported by 14 percent of high tunnel operators with 11 percent operating four or more high tunnels.

High Tunnel Characteristics

Most of the high tunnels were not designed to be moved. There were 85 percent of the tunnels that never moved. An additional 6 percent were not designed to be moved, but had been. Only 9 percent of the high tunnels were movable by design.

The single most common high tunnel size was 30' x 72', which accounted for 29 percent of the high tunnels where size was reported. High tunnels of various sizes larger than 30' x 72' made up 42 percent of all high tunnels. The most common smaller high tunnel size was 30' x 50' (18 percent), and 11 percent were smaller than 20' x 40'.

Most operators indicated their structures utilized roll up side curtains, with 76 percent of all high tunnels classified by type. Gothic-style (raised or peaked hoop) tunnels were 14 percent, quonset (rounded top)-type tunnels were 4 percent, and other types were 6 percent.

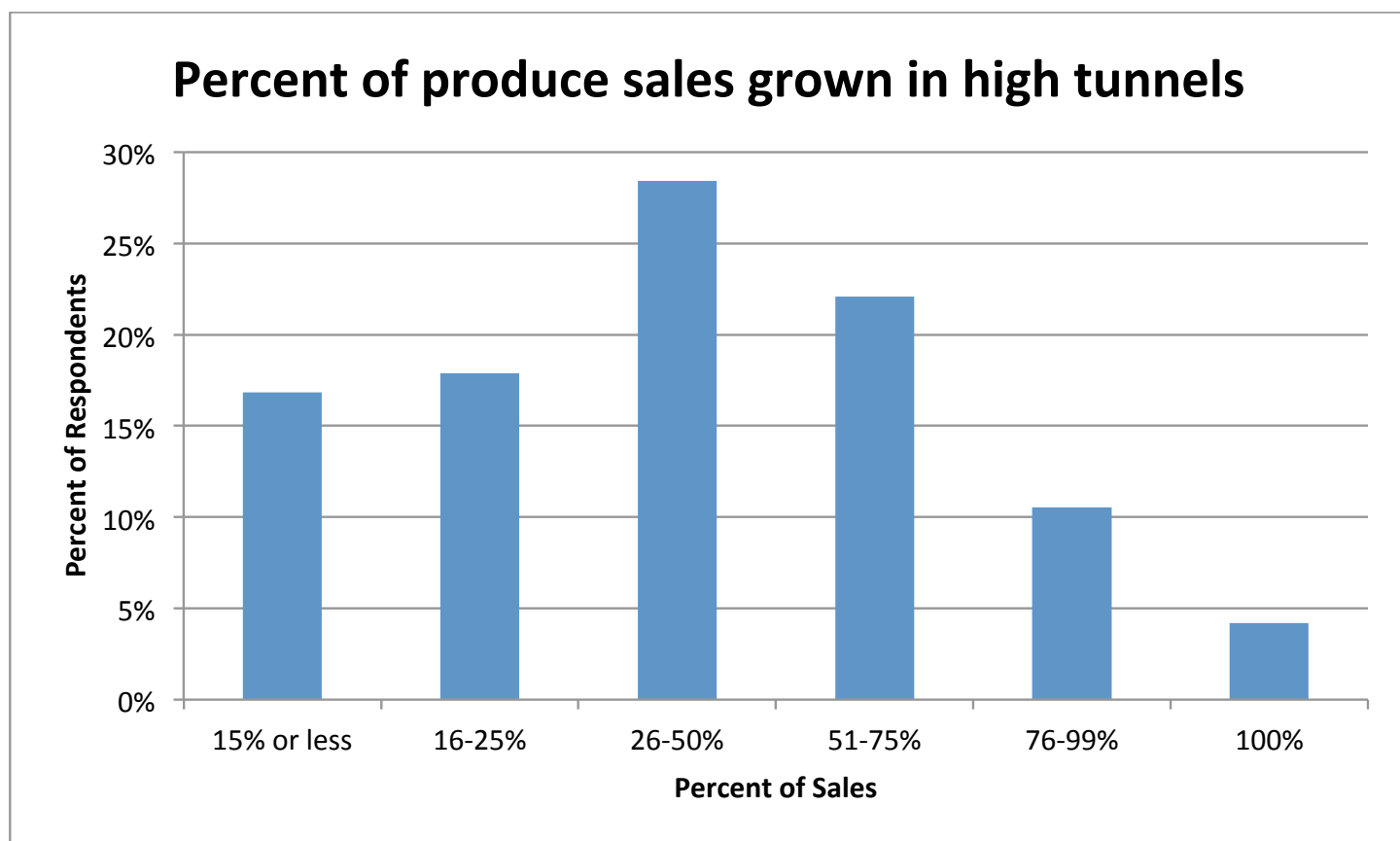
Respondents were asked to estimate the percentage of

their produce sales originating in the high tunnel. The average response was 46 percent of produce sold from the farm is grown in the high tunnel(s).

Marketing Channels

High tunnels have the potential to change the marketing focus of producers through their season extension, intensive production, and quality assurance capabilities relative to traditional field production. Producers provided an assessment of observed changes to their markets following high tunnel adoption. Their responses provide insight into both the primary marketing channels of the responding producers and the expected impact of high tunnels upon their farm sales.

Replies to questions regarding produce marketing channels, and how they have changed before and after high tunnel adoption, indicate that producers tend to diversify market channels after installing high tunnels. The rates of respondents using community supported agriculture (CSA) and community farmers markets remained about the same after installing the high tunnels. Other market channels increased after high tunnel installation. The largest increase, by percentage of use, came in those selling produce at an on-farm retail



Use of Specific Market Channels, Before and After High Tunnels

	% before installing	% after installing high tunnel	% expecting sales to increase
CSA	25%	30%	86%
Community Farmers Market	70%	71%	82%
On-farm retail market	34%	52%	80%
Wholesale to grocery	9%	17%	75%
Wholesale to restaurants	26%	34%	76%
Wholesale to schools or other institutions	7%	17%	94%
Auction sales	10%	15%	71%
Contract production to processors	1%	4%	100%
Other (please specify)	16%	7%	71%

market. This may indicate producers preferring to pursue a market channel with fewer transaction costs, like transportation and packing.

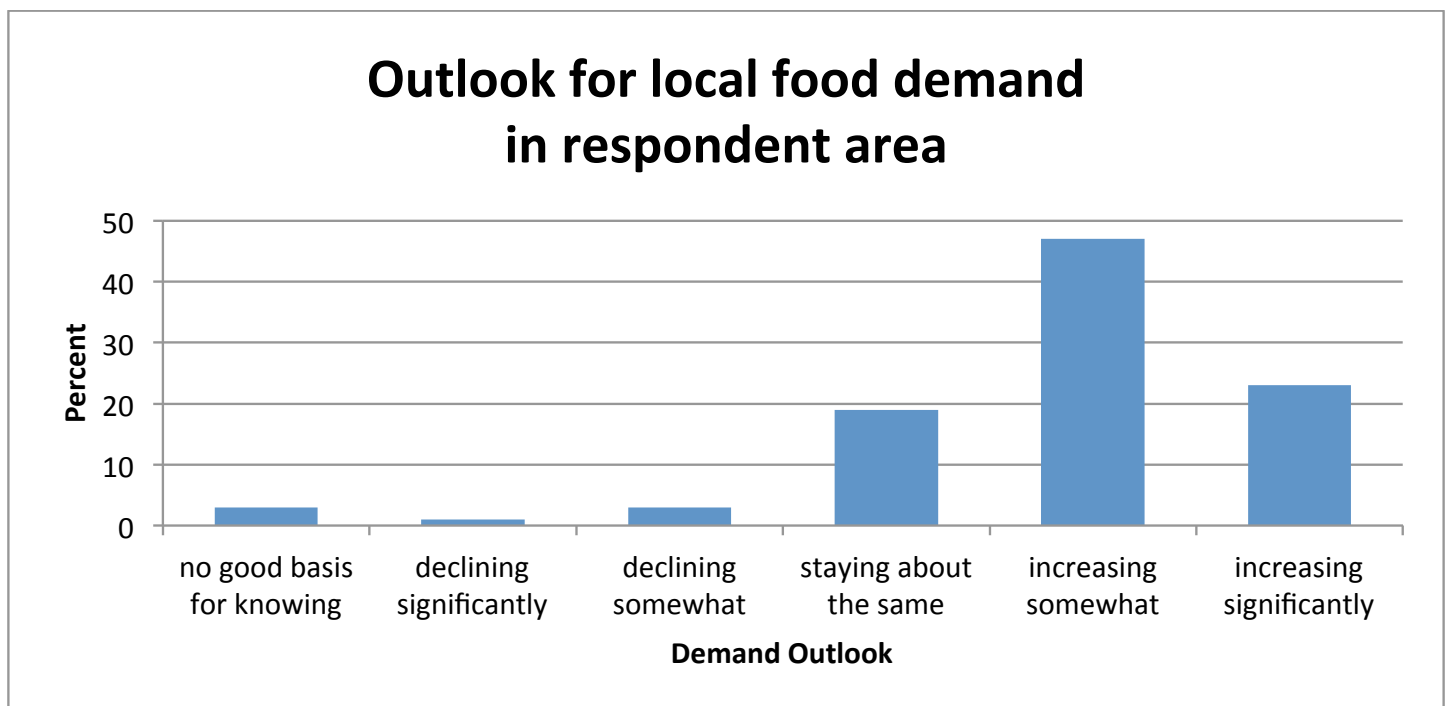
Those installing high tunnels also increased marketing to wholesale channels: groceries, restaurants, schools and other institutions, and auctions. The increase in serving schools and institutions is noteworthy, as an additional 10 percent of producers sold through those channels after installing their high tunnels. Producers were very optimistic about the school/institution market, with 94 percent of producers selling to schools expecting those sales volumes to increase.

Producers often expected sales to increase in the three most utilized channels: CSA, farmers market, and on-

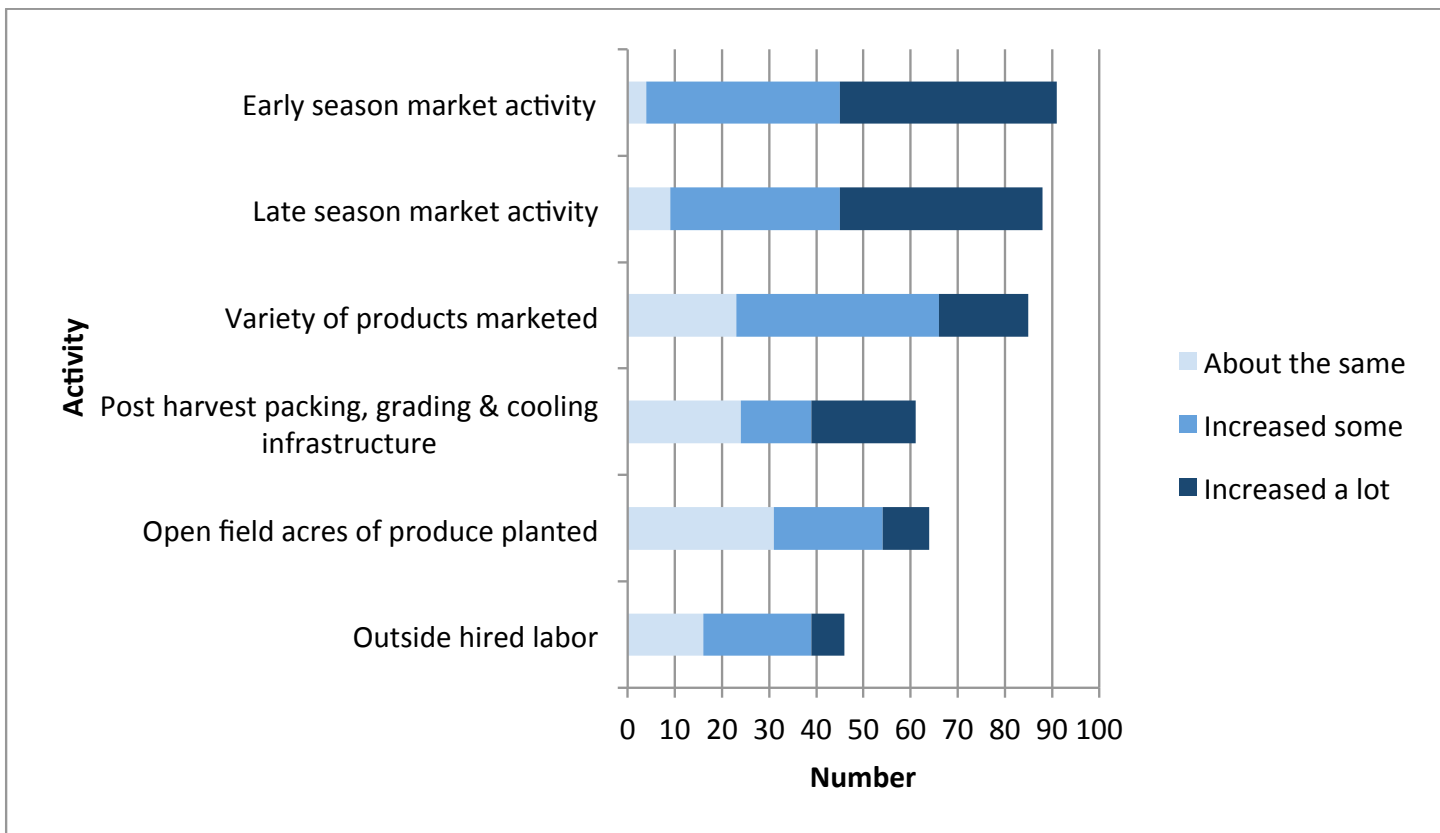
farm retail. These are reported in the last column of the table above.

Outlook for Local Food Demand

Producers using high tunnels also indicated optimism about the demand for local food in their area, with 70% indicating future demand would increase at least somewhat and 24% indicating it would significantly increase. Less than 10 percent said they expected any sort of decrease or had no good basis for knowing. Although producers with high tunnels indicated a positive outlook for local food demand in their markets, it is conceivable that there is a slight bias of response from those who have a positive marketing outlook. However, local markets are extremely important for these intensive production systems and such demand



Marketing and Production Activity Changes from High Tunnel Adoption



Note: The question also allowed for indication of ‘decreases’ and ‘decreases a lot’. The only category where significant decreases were reported was among 21 producers indicating at least some decrease in open field planting – about equal to those that indicated expansion of that activity.

would contribute to perceived feasibility for integrating these structures. Further, it would seem that in spite of the widespread adoption, there does not seem to be a market saturation for local products in the region surveyed.

High Tunnel Production Practices

High tunnels have helped respondents extend their produce growing and marketing season while diversifying the number of products offered. More than 90 percent of respondents said early and late-season market activity “increased a lot” or “increased some” after installing their high tunnel. High tunnels also diversified product offerings, with 45 percent of respondents saying their variety of products marketed increased “some” after high tunnel installation and an additional 20 percent saying the variety increased “a lot.”

Many of these operations have remained small, although some have found the need to expand post-harvest infrastructure, such as a cooler and washing and packing infrastructure, along with the addition of their

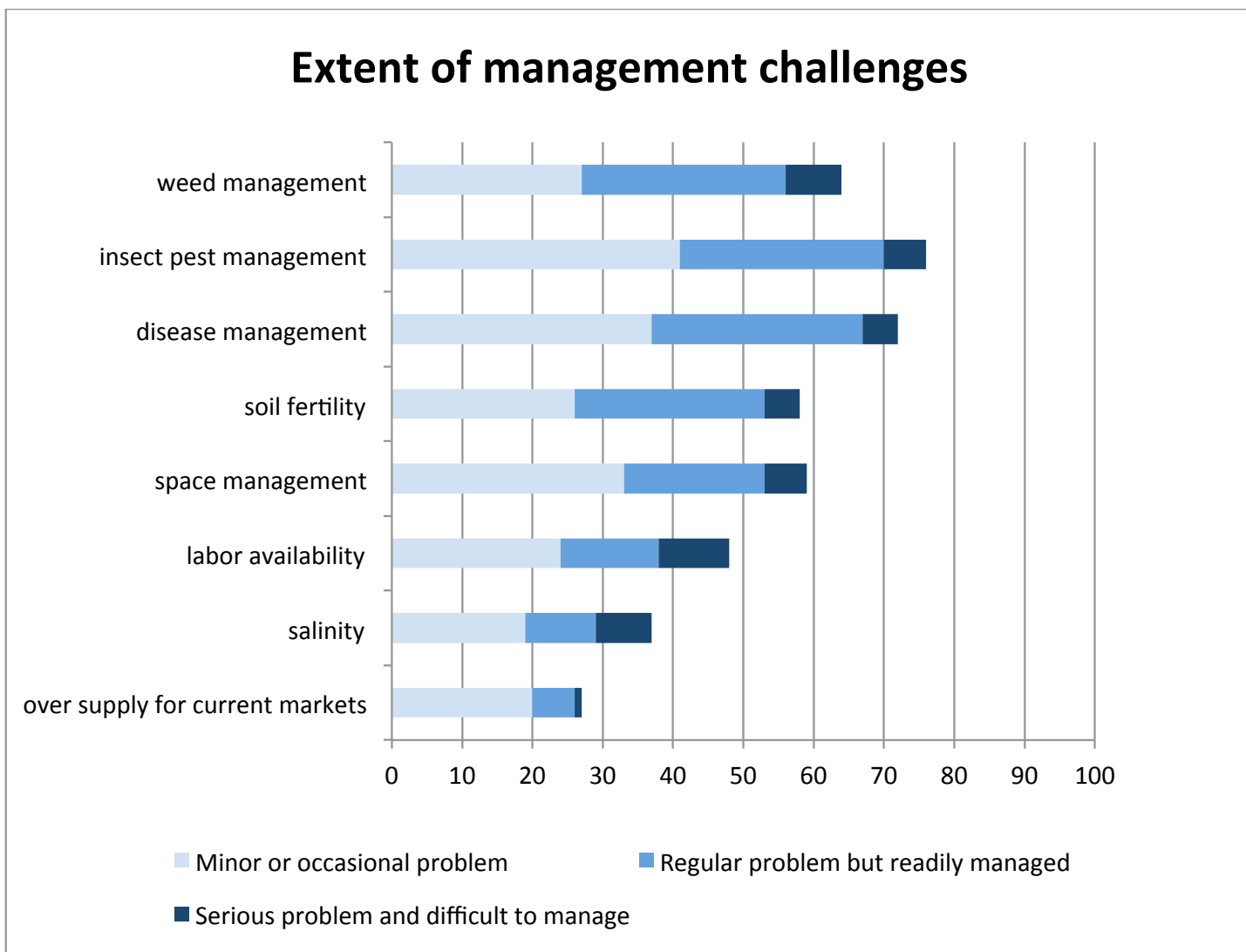
high tunnels. Approximately 30% have had to hire additional outside labor.

Production Challenges and Frequency of Management Practices

High tunnels are complex systems for management. Weed, insect, and disease management were ranked as the most challenging production situations among a list of eight common management challenges. Soil fertility and space management were the next most challenging, as evidenced by responses of “serious problem and difficult to manage” or “regular problem but readily managed.”

Along with weed management, labor availability and soil salinity were most frequently ranked as serious problems that are difficult to manage. The least challenging area among this list was the oversupply for current markets, consistent with indications of relatively strong demand for these primarily locally marketed products.

High Tunnel Management Challenges



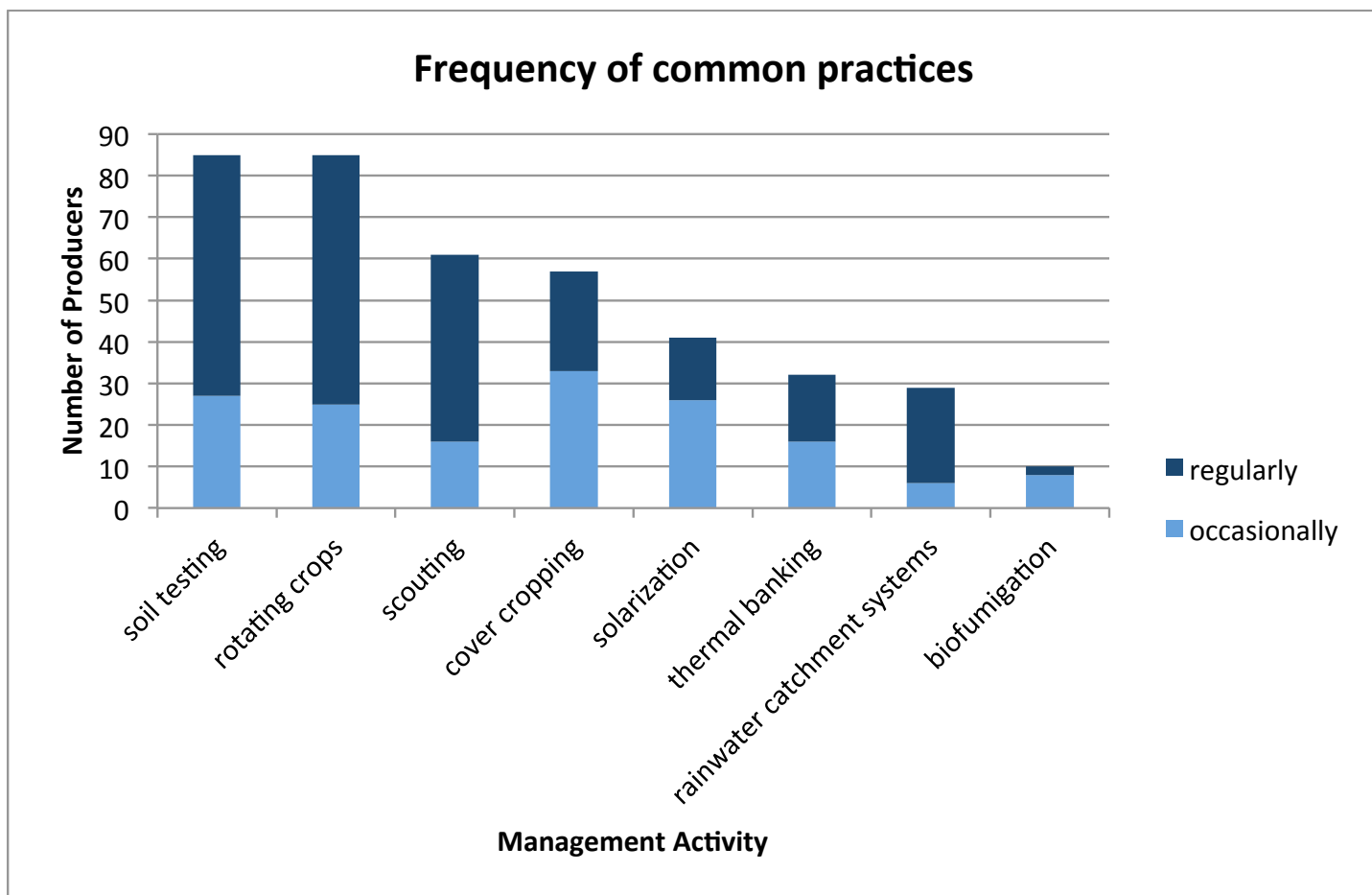
Management Activity	In good shape	4	Making some progress	2	Needs lots of help
disease management	25	12	41	9	6
insect pest management	27	12	44	5	4
soil fertility management	31	10	34	7	9
space utilization	40	12	29	3	6
weed management	41	10	25	5	10
crop marketing	43	8	27	5	9
cover crop options	29	7	16	12	7
crop selection	53	6	20	4	7

Note: A 5-point Likert scale was used to categorize need for assistance by activity: 1 = 'Needs lots of help' to 5 = 'in good shape'. A 'does not apply' option was provided but those responses are omitted here.

Testing soil, rotating crops, and scouting are the most regular production practices reported by high tunnel operators. Cover cropping, followed by solarization and thermal banking, were the next most frequent practices reported. Rainwater catchment systems were

less frequent overall, but those using rainwater catchment were more likely to report regular use of rainwater catchment as a practice. Biofumigation was ranked as the least likely management practice by those surveyed.

Management Practices Reported for High Tunnels



Note: N=91-93. Producers also had the option of 'none'.

Information Resources Used by High Tunnel Producers

Information Resource	Have not used	2	Somewhat helpful	4	Extremely helpful
Trade association workshops	49	5	16	7	12
Other agency high tunnel programs	42	1	27	8	14
NRCS programs	32	11	18	9	23
Research farm demonstrations	25	7	30	16	14
YouTube or online video resources	20	7	32	9	24
Online publications	18	1	36	13	24
Cooperative Extension programs	15	7	34	10	24
Peer-farm high tunnel demonstrations	25	2	23	11	31

It remains likely that a relatively larger share of those responding to the survey were more experienced producers, and it's reasonable to expect the severity of some of these issues is more pronounced for newer producers.

Areas of Biggest Management Need

When asked to rank areas in which they had questions, more high tunnel operators said they were "in good shape" for crop selection than any other area. Cover

crops were most likely to be rated as "not applicable" because of a significant number of high tunnel operators not using cover crops.

High tunnel operators were slightly more likely to say they "need lots of help" in the areas of marketing, weed management, and soil fertility management. Insect pest management and disease management were most likely to be ranked as "making some progress."

The high tunnel producer community is fairly diverse in terms of what kinds of resources and agencies they are likely to use, so having some variety is helpful. More high tunnel operators said peer-farm high tunnel demonstrations were “extremely helpful” than any other information source. Cooperative Extension programs were indicated as the resource most frequently used, also receiving favorable ratings. High tunnel operators also showed a penchant for accessing online resources and ranked online publications and YouTube or online videos as useful. NRCS programs received high marks for being “extremely helpful,” likely reflecting resources available through cost share programs in Kentucky and other states. Other agency programs and trade association workshops were the resources respondents were least likely to draw upon for information about high tunnel production.

Summary Points

High tunnel production has played an extremely important role in the Southern U.S. and in Kentucky particularly. The rapid growth in adoption has created both opportunities and challenges. This survey of around 100 high tunnel producers highlights the production advantages pursued and a positive outlook on local market potential. Production challenges in a complex and intensive management system can be significant and the science and best practices are constantly evolving. Producers look widely for technical assistance from their peers, the research and extension

community, and agency partners.

Additional research on high tunnel adoption and technical assistance needs will be beneficial. This particular survey was conducted prior to the recent Covid-19 disruptions that significantly impacted local market demand and distribution, but also producer access to production resources and technical assistance. Future methods of delivery will need to be a consideration.

Management challenges relating to soil health tend to develop over time. Such considerations and best management practices will very likely grow in importance. A similar consideration must be made toward markets as more producers and volume from these systems move toward local distribution outlets.

This survey represents a sample of producers heavily weighted to those with more experience – 84% have 5 years or more experience. Management and marketing experience are valuable assets with these systems, and technical assistance questions between new and experienced growers are surely different.

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