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## The Support Beginning Farmers Need for Adopting New Technologies

*This publication illustrates the findings from a study conducted by the author titled [Exploring the adoption of technologies among beginning farmers in the specialty crops industry](#), published in the *Journal of Agricultural Finance Review* in 2022.*

The USDA defined beginning farmers as principal operators who have been farming 10 or fewer years. The most recent Census of Agriculture reports that 908,274 beginning farmers operated 27% of U.S. farms and generated \$88 billion in sales in 2017. Beginning farmers play an important role in U.S. agriculture, a trend that is expected to rise as the number of beginning farmers, especially those with less than 5 years of experience, is driving most of the growth in the farming population.



Beginning Farmers  
Source: Stock Images Microsoft

Beginning farmers tend to differ greatly in terms of demographic characteristics, farming systems, and market access, relative to more experienced operators. For example, beginning farmers have been characterized by being younger, more ethnically diverse, and having more part-time operations than their counterparts. The 2013 National Food Hub Survey, Fischer et al. (2015) report that over three-quarters of food hubs in the U.S. work with smaller farms, which tend to be operated by beginning farmers. Moreover, most beginning farmers prefer to sell directly to consumers and build trust relationships at local markets.

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The aging of the farming population and potential succession of agribusinesses from older to younger operators makes the heterogeneity of beginning farmers an important target of research and policy efforts. To ensure adequate sustainability of beginning farmers, federal and local agencies have created policies and incentives that support the infrastructure and market access of beginning farmers. For example, the USDA recently announced the Value-Added and Local Food Project grants that provide funding to support the adoption of VA technologies, with priority given to beginning farmers or ranchers and minority operators.

Beyond concerns regarding the aging population, technological innovations and market opportunities in local food systems seem to have spurred the interest of beginning farmers. This is especially true as many beginning farmers focus on selling their products directly to consumers. Yet, beginning farmers require not only access to incentives and training programs to ensure their financial viability but also access to networks and technologies that help them differentiate their products and meet consumer demand. It is expected that the population growth of beginning farmers, coupled with the emergence of new business models related to the production of VA products and specialized foods, can foster rural development, preservation of farmland, and development of regional food networks.

One would hypothesize that beginning farmers are different than experienced growers; thus, programs, incentives, and policies prioritizing beginning farmers in terms of access to financing, land, and markets can effectively build capacity and create and sustain economically viable beginning farmers enterprises. Yet, there is no empirical evidence for the assumption that specialty crop beginning farmers may be more innovative and likely to adopt more technologies than more experienced growers.



Specialty crops sold at farmers markets.  
Source: Stock Images Microsoft



Specialty crops sold at farmers markets.  
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Farmer harvesting leafy greens.  
Source: Stock Images Microsoft





Crops produced under high tunnels.  
Source: Stock Images Microsoft



Canning specialty crops to add value.  
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### Agricultural Technologies for Specialty Crops Operations

Recent developments in farming systems provide farmers with more possibilities to control the environment where specialty crops are produced while reducing the use of inputs including water, nutrients, and pesticides. For example, hydroponics are soilless systems that utilize nutrient-rich water circulating between plants while closely monitoring and adjusting nutrient concentration and delivery. Hydroponic systems typically rely on energy to recirculate the water-nutrient mix, provide artificial lighting, and occasionally heat the environment where plants grow. These systems use close to just 5% of water resources when compared to conventional soil-based agriculture production. The popularity of hydroponic systems among growers follows innovations such as lighting, plastics, and plant genome.

Hoop houses (i.e., high tunnels) are another common agricultural technology helping specialty crops farmers control and extend the growing season of specialty crops. Hoop houses are temporary, typically unheated structures planted over crops directly in the soil that provide control over environmental conditions. By using hoop houses, farmers can grow specialty crops faster, increase yield and quality, lower environmental damage, and potentially reduce weed and pest pressure. Extending the length of the growing and marketing season, especially in colder months, can increase farmers' ability to harvest earlier and later in season, utilize labor in otherwise slow times, and increase off-season revenue.

Value-added (VA) agriculture has been promoted as a strategy to support both rural development and agricultural entrepreneurship. VA practices included drying and cutting of specialty crops into customer-ready portions. To encourage the adoption of agricultural innovations and entrepreneurship, the Value-Added Producer Grant (VAPG) program was created by the USDA in 2000 to provide funding support to farmers adopting VA technologies (National Commission on Small Farms, 1998). The VAPG program aims to support farmers adopting VA technologies to generate new products, increase off-season income, expand marketing opportunities, and improve overall sustainability.

### Take-Home Message

One method of increasing farm financial viability is to encourage the use of agricultural technologies that help increase revenue, improve market access, and lower demand of land and production inputs. Data for this study came from a 2019 web-based survey of 541 specialty crops farmers growing fruits, vegetables, and culinary herbs in 2018. Farming experience ranged from 1 to 60 years, with an average of 23 years and a median of 20 years' farming.

Beginning farmers reported more positive perceptions towards being successful and sales growth than their counterparts. The need for financial assistance was more common among beginning farmers than experienced operators. The farmers' characterization findings shed light on the main characteristics of beginning farmers operating in the specialty crops industry and can help Extension personnel target beginning farmers when designing and delivering incentives and programs to assist their financial viability.

Beginning farmers were more likely to adopt VA technologies when compared to experienced operators. This result is consistent with the beginning farmer literature that showed that beginning farmers tend to be motivated to replace traditional agricultural processes with new technologies. One explanation may be that the adoption of VA technologies among beginning farmers may be seen as an optimization strategy to address limited access to land, while experienced farmers may have already reached optimized economies of scale and land access (. Another explanation may be that VA technologies may help beginning farmers obtain a market differentiation to increase access to new markets, which may not be as relevant for experienced farmers who have forged relationships with buyers to assure market access.

Regardless of the number of years farming, the adoption of growing and VA technologies is primarily driven by access to local markets and support networks, crop diversification, and positive experiences with agricultural technologies. These findings suggest that policies and incentives targeted to increase technology adoption, should consider the market choices access to credit available to specialty crops producers. In other words, farmers who lack access to local markets may be deterred from investing in technologies. Additionally, since access to markets tends to be local and regional-specific, rather than national, programs that aim to enhance market access of farmers should support the development of networks with local and regional buyers.

Policies and training programs, such as farm incubators and small-scale farming innovations, should include market-based training components that offer farmers with information related to market-specific quality standards, strategic marketing and business practices, networking with buyers, and risk management. Beyond market-based policies, facilitating the access of agricultural innovations can help farmers facing limited access to credit for buying or renting land. This is especially true as VA technologies can help farmers address lack of land availability by diversifying income streams and adding new enterprises to the farm operation. Future studies should look into the adoption of specific VA and agricultural technologies among beginning farmers, as well as quantify the impact of growing and VA technologies in the beginning farmer population.





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