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Nebraska Conventional Farmers' Perspectives Toward Agricultural Hemp: A Qualitative Insight Guided by the Diffusion of Innovations Theory

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Abstract. The legalization of hemp cultivation in the United States has provided opportunities for farmers to grow a new crop. Despite these opportunities, significant social, economical, and technical challenges to growing hemp have been well documented. The purpose of this research was to explore Nebraska conventional farmers' perceptions toward hemp cultivation. Using the diffusion of innovations theory as a framework, one-on-one interviews were conducted with seven conventional farmers in Nebraska. Data were analyzed using deductive coding methods. Results are presented in four emergent themes describing farmer perceptions: 1) limited prior exposure; 2) perceived technical challenges; 3) advantages; and, 4) impartial feelings.

INTRODUCTION

As one of the world's oldest cultivated crops, cannabis has a long and unique history, ranging from being a cultural and economic powerhouse to a plant feared and restricted by governments. Cannabis cultivation first began in the United States when European immigrants planted hemp in the early 1600s (Jenkins & Orsag, 2021). Hemp, a fast-growing, non-euphoric, and environmentally resilient form of cannabis, produced superior fibers useful for the textiles, paper, and rope important to early settlers (Das et al., 2020; Jenkins, 2016). Hemp served as an important domestic crop until the mid–19th century, when technical advancements (e.g., steamships replacing the need for sails made from hemp fiber) and competing crops (e.g., cotton, tobacco) flourished, leaving a dwindling hemp industry.

Marijuana, an evolved version of cannabis containing a high level of the psychoactive chemical compound delta-9-tetrahydrocannabinol (THC), was first introduced to the United States by refugees fleeing the violence of the 1910 Mexican Revolution (Jenkins & Orsag, 2021). The unfortunate association between hemp and its psychoactive cannabis counterpart, marijuana, became catastrophic to the U.S. hemp industry (Cherney & Small, 2016). Despite the differences in chemical composition, genetics, and end use (Adesina et al., 2020), hemp and marijuana share the same scientific name and general appearance, and therefore the names *hemp* and *marijuana* are sometimes mistakenly used interchangeably. The Marihuana Tax Act of 1937 aimed to minimize the production and possession of psychoactive cannabis, but it did not differentiate *hemp* from the newly coined term *marijuana*. Although the fiber hemp industry had spurts of regrowth in the next decade, the industry never established. The Controlled Substance Act of 1970 undermined the potential for an established fiber hemp industry by classifying all forms of cannabis as a Schedule 1 Controlled Substance (Duppong, 2009). Hemp remained a controlled substance in the United States for nearly the next half-century, even though the properties of hemp were not psychoactive.

The global presence of hemp as an economical and sustainable crop to produce fiber, grain, and an emerging medical cannabinoid (e.g., CBD) market (Jeliazkov et al., 2019) influenced federal lawmakers to reconsider the classification of hemp as a controlled substance. The 2014 Farm Bill permitted institutions and state agriculture departments to pilot hemp research programs (Johnson, 2018). The 2018 Farm Bill declassified hemp as a controlled substance, allowing its cultivation and processing on the federal level. The classification of hemp was then defined as cannabis with a THC content of no more than 0.3% on a dry-weight basis (Johnson, 2018). Soon after passage of the 2018 Farm Bill, many states legalized hemp cultivation at the state level (e.g., Nebraska Department of Agriculture, 2022) and granted permits to farmers who sought to grow it.

The expanding hemp industry has catalyzed excitement for the re-legalized crop, which in recent years U.S. markets have largely depended upon imports for (Johnson, 2018).

According to the National Hemp Report (U.S. Department of Agriculture, 2022), industrial hemp was valued at $824 million in 2021. In addition to economic opportunities, emerging research has shown the potential for hemp to contribute to sustainable agricultural systems. Hemp can be incorporated into crop rotations, increasing crop diversity, adding organic matter, and improving soil quality (Jenkins, 2016; Rehman et al., 2021). Additionally, hemp has been used for phytoremediation (Canu et al., 2022; Cleophas et al., 2023; Rheay et al., 2020; Wu et al., 2021), has a large potential for carbon sequestration (Ahmed et al., 2022; Pervaiz & Sain, 2003; Shiels et al., 2022), and is used to produce a variety of environmentally friendly products (Ahmed et al., 2022; Gedik & Avinc, 2020; Jami et al., 2019).

Despite hedged optimism that hemp could be capable of transforming the U.S. agricultural economy (Cherney & Small, 2016), many significant challenges continue to threaten its ability to become a mainstream agricultural crop. Johnson (2018) and Stevenson (2017) described a severe lack of infrastructure and processing facilities required for large-scale production. Further, ambiguity in laws and financial lending risks from banking institutions add further complications (Barker, 2020; Dingha et al., 2019). Due to hemp research being essentially nonexistent in the United States in the half-century prior to the passage of the 2014 Farm Bill, there is a significant lack of knowledge, resources, and guidance on hemp cultivation from public and private service providers (Adesina et al., 2020). Other challenges include the lack of approved pesticides for hemp cultivation and an unstable market (Wortman & Dweikat, 2020). Lastly, the confusion and association between hemp and marijuana (Colclasure et al., 2021; Rampold et al., 2021), likely catalyzed by years of hemp being labeled as a controlled substance, may deter public acceptance (Luginbuhl, 2001). The future of the industry is unknown and will be influenced by the willingness of farmers to cultivate hemp.

THEORETICAL FRAMEWORK

Huyghe et al. (2016) described the importance of social science research to catalyze the diffusion of innovation and knowledge in agriculture to improve the sustainability of the industry. The theoretical framework used to guide this study was the diffusion of innovations theory (Rogers, 2003). *Diffusion of innovations* describes how a new product, service, or innovation transfers through an industry. The theory has previously been used to describe technology adoption in industry and agricultural applications (Grover et al., 2019; Hubbard & Sandmann, 2007; Montes de Oca Munguia et al., 2021) and is well suited as a framework to examine the adoption of hemp as a newly legalized crop in the United States. The population adopting the innovation are characterized as innovators (the first 2.5% of a population), followed by early adopters (13.5%), early majority (34%), and late majority (34%). The last 16% of the population adopting the innovation are characterized as laggards. Because the adoption of hemp is relatively new, our study focused on those who have not adopted hemp (i.e., all but the earliest of "innovators"). Furthermore, the speed of adoption of a new innovation can also be linked to its perceived attributes. Rogers (2003) described these attributes as (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability.

PURPOSE AND RESEARCH QUESTIONS

The Nebraska Department of Agriculture issued trial permits to hemp cultivators in 2019 (Nebraska Department of Agriculture, 2019), followed by an open application process to hemp cultivators in 2020. During the 2020 growing season, approximately 84 hemp cultivators were licensed by the state (Nebraska Department of Agriculture, 2020). According to the diffusion of innovations theory (Rogers, 2003), these cultivators would be considered early adopters of the new crop, consisting of less than 2.5% of the state's farming population. If hemp cultivation were integrated as a mainstream agricultural commodity in Nebraska, farmers who were not currently growing hemp would need to make the decision to grow it in the future. The purpose of this research was to investigate perceived challenges and benefits of hemp cultivation among farmers who were not currently growing hemp but fell within the population that could potentially do so in the future. The research questions that guided this study were as follows:

1. How do conventional farmers perceive hemp in relation to the characteristics of innovations?
2. What advantages and disadvantages do conventional farmers perceive toward hemp cultivation?
3. What are conventional farmers' current attitudes toward hemp cultivation, and do they plan to grow hemp in the future?

METHODS

Purposive sampling, a broad method used to identify and select individuals connected to the phenomenon under investigation (Frey, 2018; Palinkas, 2015), was used for this study. The specific technique of purposive sampling used was typical case, where individuals are identified based on their characteristics perceived by the researchers as being typical or normal of the population under interest. The population of interest for this study was conventional farmers in Nebraska who did not grow hemp in the 2020 season. We defined *conventional farmers* as those whose operations consisted of using synthetic fertilizers, pesticides,

and genetically engineered crops for large-scale corn and soybean production typical of the state.

As Nebraska has more than 21,000 corn farmers alone (Nebraska Department of Agriculture, n.d.), and most are believed to be conventional, it is important to note that the research method used in this study was non-probable sampling and that results are not intended to be generalized to the entire population. However, the information gleaned from information-rich cases can provide in-depth understanding of new phenomena and exploratory research. Although there are no finite rules to the number of participants required for a sample size in qualitative research, a large body of research has suggested between 5 and 50 participants as an adequate number (Dworkin, 2012). Qualitative researchers often refer to data saturation as a lens to determine an adequate sample size. *Data saturation* refers to a point at which additional data collection yields limited new information related to the study (Fusch & Ness, 2015). As our study was limited by time and space, in addition to achieving data saturation, our sample consisted of seven conventional farmers who we believed were typical of the region.

We conducted a series of one-on-one interviews, using a semistructured interview guide to obtain data related to our research questions. The interview guide consisted of four areas and 13 questions, mainly constructed in alignment with the five attributes to an innovation as described by Rogers (2003). Questions were open-ended and designed to elicit thick and rich data (Morse, 2015), while also allowing the researchers the flexibility to ask appropriate probing questions to validate the meaning of responses (Barriball & While, 1994). Interviews were completed in a span of 2 weeks during the fall of 2020. Due to the COVID-19 pandemic during this time, each interview was conducted remotely via telephone. Phone interviews are considered effective and appropriate for the administration of semistructured interviews (Cachia & Millward, 2011). Member checking was used to improve the accuracy and completeness of the information and to account for credibility (Lincoln & Guba, 1985). *Member checking* is a process wherein the researcher summarizes their findings with the research participants and asks them to confirm their accuracy (Creswell, 2005). Prior to the interviews, each participant provided their informed consent to participate in the research and for the interview to be recorded.

Each interview was transcribed, and transcriptions were checked for accuracy and completeness. A codebook containing nine codes based on prior research and theory, including diffusion of innovations, was established prior to the interviews being conducting. Using deductive coding methods (Bingham & Witkowky, 2022), the two researchers coded each transcript with MAXQDA coding software. After each transcript was coded, the two researchers compared notes and discussed findings to reach agreement, including adding and revising codes and the codebook as needed. After all transcripts were coded, the researchers worked together to analyze, discuss, and reorganize coded data to identify emerging themes. This study was approved by the Doane University Institutional Review Board (#F20 017 DC IRB HS), and pseudonyms have been used in reporting to maintain participant anonymity.

All seven participants in the study were farmers in Nebraska who practiced conventional row-crop production (e.g., corn, soybeans) typical of the state. Participants ranged from 25 to 69 years of age, and all but one were male. A majority of the participants were a part of multigeneration farms and had been farming "all their life." The size of farmers' operations generally mirrored the average Nebraska farm size and varied between 700 and 3,000 acres. Table 1 illustrates participant characteristics and their corresponding pseudonyms.

FINDINGS

THEME 1: LIMITED PRIOR EXPOSURE

Participants revealed a significant lack of exposure to and knowledge of hemp. Only three participants (Rick, Sam, and Zach) described previous observations of hemp actively growing in a field, and those observations were limited to feral hemp and identified as a nuisance. Sam described

Table 1. Participant Characteristics

Participant	Age	Gender	Farm size	Crops currently grown	Farming experience
Brandon	68	Male	1,200	Corn, soybeans	45–50 years
Dan	50	Male	3,000	Corn, soybeans	3rd generation
Darlene	69	Female	950	Corn, soybeans	3rd generation
Rick	59	Male	700	Corn, soybeans, hay	3rd generation
Sam	56	Male	1,400	Corn, soybeans	4th generation
William	34	Male	1,200	Corn, soybeans	4th generation
Zach	25	Male	800	Corn, soybeans	2 years

Note. Farm size is reported in acres.

his observation of hemp as an agricultural pest: "I know they're the old-style hemp weeds. . . . [W]e've fought them forever, trying to get rid of them . . . the old ditch weed." Most participants did not know of anyone growing hemp as an agricultural crop, but three participants (Dan, Rick, and Sam) knew of a friend or neighbor who had looked into it. Sam mentioned a friend who had tried growing hemp:

> We have had friends try it, and they said it is not really a real proposition to get into. . . . [W]ell, there's only been two different guys down here that have tried it and [they were] not successful the first time [they grew hemp]. For one guy, it got too cold on him or something, and then for the second [farmer], it didn't mature like they wanted. You only get kicked so many times [before] you just stay away from it, because it is time-intensive.

Knowledge about hemp was very low for a majority of our participants. Three of the participants (Dan, William, and Zach) were familiar with hemp but described not knowing much about the crop. Dan mentioned, "I don't know much about the harvesting part and the equipment it entails, but the articles I have read, it seems to be fairly cost-productive, and that is what is turning some heads right now in the ag industry as far as people's interests." Zach was familiar with some of the laws pertaining to hemp. He stated, "I think it's legal, but you have to get certain permits and then, um, if the THC is too high, you have to destroy your crop." Brandon stated, "It's not something that's really been discussed throughout [the] area FSA [Farm Service Agency] and places like that, so I don't know about the ramifications or the financial ramifications, so I really can't say a whole lot about it cuz [*sic*] I haven't really studied it. . . . It's just a lot of unknowns for me because I don't have a whole lot of information about it, so it's something that a guy would have to look into and study."

THEME 2: PERCEIVED TECHNICAL CHALLENGES

All participants believed that growing hemp would be challenging, and many described specific technical challenges. Zach stated, "It seems decently complex. Just the new thing to learn and then probably different equipment to grow it." Two of the participants (Brandon and William) claimed that they didn't know enough about hemp to determine how complex cultivating hemp would be. However, Brandon stated, "We didn't know how complex it was going to [be to] grow soybeans the first time I planted them. It was just trial and error and a time-consuming project to at least get the right equipment to do it, I guess," indicating that complexity exists for learning how to navigate the cultivation of any new crop.

Four of the participants (Rick, Zach, Brandon, and Sam) were either unsure about the compatibility of hemp or did not believe that it would be compatible with their farm at all. Brandon said, "If it's totally something different so a guy has to go with a completely different set of harvesting and planting equipment, then that would add a little expense to growing it. Would 5 or 10 acres justify getting a new line of equipment to grow the crop?" Rick also suggested that the equipment needed for hemp cultivation would be a disadvantage. He stated, "I would say the main challenge is the equipment, knowing what and how to do it." Rick and Sam stated that the lack of chemicals used for pesticides would be a major disadvantage.

Only one participant, William, believed that hemp would be somewhat compatible with his current corn operation. He stated, "I suppose it probably takes fertilizer like corn does. You know the irrigation, I bet it would fit. . . . [I]t's probably somewhat similar."

THEME 3: ADVANTAGES

Overall, our participants agreed that growing hemp could have advantages and that testing a hemp crop on a small plot would not be difficult. Dan said, "I don't think an acre or two would be an issue at all. It would actually be kind of exciting to try something new." Brandon stated:

> Well, a test plot, I guess you're just talking about maybe just a small area of [a] half acre or something like that. If a guy could get the seed and the know-how or at least somebody [who] knows what they're doing with hemp to get some information from them. If there is talking about [it] with the FSA or other farm groups that are trying to get this thing going, then the guy needs to have a little information to be able to plant even just a small area.

All participants agreed that if hemp were a marketable crop and capable of making money, then that would be an advantage. Brandon said, "Well, I guess if it is a money-making crop, that would be an advantage, and not too time-consuming for you to [learn how to] grow [it]." Two participants (Dan and William) agreed that hemp would be good for crop diversification. Dan claimed, "I think the diversification might become more appealing to some people. Probably not so much for us, where most of our corn goes to our beef cattle, but for the people who are trying to diversify and implement crop rotations." William believed that an expanding hemp market may reduce corn supply, therefore increasing corn prices. He was in favor of other people diversifying their farming operations with hemp so he could get better prices for his corn.

THEME 4: IMPARTIAL FEELINGS

The participants of this study had impartial feelings toward hemp and were neither in full support of nor against hemp cultivation. Dan stated, "Personally, I do not have a problem with it. I figured it has to be grown somewhere anyway in the U.S., and if the climate, water, soil, and usage—or if it can be

grown here, I do not have any problem with it at all." Three of the participants (Brandon, Dan, and Sam) believed that if it worked for someone, then it was fine for that person to grow it. Brandon said, "There is a niche that is available. If it works for a person, I guess then that's great." However, he continued by saying that he would never grow hemp himself. In fact, all but one participant (Zach) stated that they had not considered growing hemp in the past and would not consider growing hemp in the future. Zach stated, "Well, everything's a gamble, but I gambled to make money, but if there is an opportunity to make money, then I'd be interested as long as [specialized] equipment wasn't needed."

Three participants (Brandon, Rick, and William) did not believe that they would grow hemp in the future specifically because of their own lack of knowledge. William mentioned, "I don't plan on it, and I will tell you just not because it's nothing against it, [it] is just I don't know anything about it, and I have no background to . . . and, you know, more information may change my mind, but at this point, I have no interest because of the lack of information I have on it."

Several farmers (Darlene, Rick, Sam) expressed concern about the optics of growing hemp. Darlene claimed, "I probably would not [grow hemp in the future]; I don't know how the community and the people around here would [re] act to it. I don't know that they would be too in favor of it." Interestingly, a few farmers demonstrated confusion between hemp and marijuana, even mistakenly considering hemp to be illegal. Nonetheless, they still held impartial feelings regarding the crop. Darlene continued by saying, "I just feel if we were to legalize [hemp], it would create more problems with the law and people abusing it." However, Darlene believed that if hemp "isn't for recreational use, then it's fine." Sam also mentioned being okay with hemp for anything other than recreational use. Rick stated, "I would say it'd be okay for anything other than getting 'high.' I support it for fiber and all that stuff, not just for recreational purposes."

LIMITATIONS, CONCLUSIONS, AND RECOMMENDATIONS

Several limitations of this study should be acknowledged prior to sharing conclusions and recommendations. This was a qualitative study based on purposive sampling and therefore was not intended to be generalized to the larger population. Follow-up studies using quantitative methods are recommended to provide generalizable results to our population. However, results of our study provide in-depth insight into selected conventional farmers' perspectives toward agricultural hemp. These findings could be used to elicit recommendations for practice in agricultural education and extension. Additional research should target farmers who are current adopters of hemp, which could provide useful information about the needs of these individuals.

Based on the findings of our study on non-adopters, and in conjunction with findings of similar studies, we came to three overarching conclusions. Following these conclusions, we present recommendations for hemp education program design for conventional farmers, guided by the diffusion of innovations theory.

1. There is a need for educational programs on hemp to improve farmers' knowledge and observability of the crop. Throughout this study, our participants referred to themselves as having limited knowledge about hemp, and therefore they were unable to form and share strong opinions about hemp cultivation. Farmers expressed a desire to learn more about hemp and believed that it was not really being discussed in the programs they attended to inform their farm management decisions (e.g., FSA). These findings confirm the suggestion by Adesina et al. (2020) that there is a significant lack of knowledge, resources, and guidance on hemp cultivation. Furthermore, there was a low observability of hemp cultivation in the farming communities these individuals were a part of. Farmers' previous observations of hemp were mostly limited to seeing the crop as an agricultural pest. A few farmers did know of friends who had tried cultivating hemp, but those individuals had been unsuccessful in their operations. The combination of limited opportunities to learn about hemp cultivation and the low observability of hemp being grown successfully would likely slow its adoption as an agricultural crop by conventional farmers in the Midwest. To increase adoption, targeted educational programs could be employed by public and private support services that are already used within these communities, such as the FSA and Extension. Educational hemp plots could also be used by these organizations as tools to increase the observability of hemp.

2. Farmers perceived opportunities and benefits toward growing hemp, but they believed that the technical challenges outweighed those benefits, leaving them to think that they would never grow hemp themselves. Despite our participants indicating that they had low knowledge of hemp, they were able to identify some advantages of its cultivation, most of which had to do with economic opportunities. Farmers believed that money could be made if individuals had the knowledge and equipment necessary for hemp cultivation. Interestingly, farmers did not discuss the environmental benefits of hemp, other than using it as a way to diversify an operation through crop rotations.

It is highly evident that the hemp industry will continue to face significant challenges in the future that will slow the adoption of the crop. Even with limited knowledge on hemp cultivation, farmers were aware of many of these challenges. They accurately described the lack of existing infrastructure and equipment needs (Johnson, 2018; Stevenson, 2017), legal barriers (Dingha et al., 2019), and the lack of approved pesticides and an unstable market (Wortman & Dweikat,

2020). Government support through grants, subsidies, and loans to reduce costs and improve infrastructure, as well as investment in research and development (e.g., pesticide use, improved genetics and cultivation strategies), would be helpful to reduce significant barriers facing the hemp industry.

3. Future research is needed to better understand and address the misconceptions surrounding hemp and marijuana that are present even in our farming communities.

Cherney and Small (2016) described the impact of marijuana on the hemp industry as "catastrophic." Prior studies have found that consumers often confuse the properties of hemp and marijuana (Colclasure et al., 2021; Rampold et al., 2021). Several farmer-participants in our study also conflated hemp and marijuana. Although none of our participants was against other farmers growing hemp, some expressed that hemp should not be grown for recreational purposes or to get "high." This comment exemplified the misconceptions that exist about the end product of hemp. Farmers also mentioned concern about the poor response that may come from their community if they were to grow hemp. Public misconceptions about hemp are evident and can lead to low acceptance and mistrust of the hemp industry (Luginbuhl, 2001). Educational programs designed for consumers could be used to inform the public's understanding of hemp, reduce misconceptions, and improve favorable attitudes toward this crop (Colclasure et al., 2021; Rampold et al., 2021).

BRINGING THEORY TO PRACTICE

The farmer-participants in our study were selected as non-adopters of hemp at the time of the study and represented all but the earliest of innovators, as described by the diffusion of innovations theory (Rogers, 2003). Their insights and perspectives toward hemp cultivation could be used to inform programs designed to increase hemp adoption. According to Rogers (2003), the speed of adoption of a new practice or invention can be linked to its perceived attributes: (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability. Hubbard and Sandmann (2007) suggested that Extension program planners, evaluators, and researchers use the diffusion of innovations framework to guide educational program development and evaluation for programs intended to promote participants' adoption of a practice. Based upon the results of our study, we provide recommendations for hemp education program development in relation to the perceived attributes described by the diffusion of innovations theory (Rogers, 2003).

RELATIVE ADVANTAGE

Farmers perceived advantages of hemp cultivation, mainly in terms of economic potential, but this advantage did not appear to outweigh their perception of technical challenges around hemp cultivation or the economic potential of the crops grown in their current operations. A relative advantage of hemp not described by our participants is environmental sustainability; emerging research has shown that hemp has the potential to offer environmentally sustainable characteristics, yet more research is needed to confirm these attributes. Educational programs that describe potential benefits of hemp, such as improving soil quality (Jenkins, 2016; Rehman et al., 2021) and removing toxins from soils (Canu et al., 2022; Cleophas et al., 2023; Rheay et al., 2020; Wu et al., 2021) could be beneficial to farmers interested in improving the sustainability of their farming operations. Due to the capacity of hemp for carbon sequestration (Adesina et al. 2020; Ahmed et al., 2022; Pervaiz & Sain, 2003; Shiels et al., 2022), hemp could also be discussed in carbon farming programs (Tang et al., 2016).

COMPATIBILITY

In Nebraska, hemp grown for fiber and grain, as opposed to hemp grown for cannabinoids, would be most compatible with current conventional farming operations. Hemp grown for fiber is similar to other conventional hay and forage crops, and hemp grown for grain is similar to other small grains (Adesina et al., 2020; Parr, 2019). Farmers are largely familiar with the large-scale practices associated with these conventional crops. Educational programs targeting conventional farmers could describe hemp cultivation for fiber or grain over hemp cultivation for cannabinoids, which are more fitting for niche, horticultural, or specialty crop operations, often in controlled environments (Owen & Behe, 2020).

COMPLEXITY

Farmers perceived hemp cultivation as being highly complex and therefore believed that growing hemp was not for them. An increased level of support services for farmers could aid in the complexity associated with learning practices to grow a new crop. As one of our participants indicated, any time a new crop is incorporated in an operation, it can be complex at first. Perceived complexity could also be reduced by highlighting the similarities of hemp grown for grain or fiber to conventional row crops grown in the region.

TRIALABILITY

Interestingly, farmers believed that incorporating a test plot of hemp in their current operations would not be difficult. In fact, "starting small" is consistent advice given to farmers growing hemp for the first time (OGRAIN, 2020). Given farmers' beliefs that testing a few acres of hemp would not be difficult, programs to encourage farmers to pursue testing hemp within their operation could be a gateway to increased adoption.

OBSERVABILITY

The observability of successful hemp operations is extremely low. Few of our participants had observed hemp being grown,

and those who had observed the plant as an agricultural weed or pest. To improve the observability of hemp operations, educational plots and field days targeted toward conventional farmers are encouraged.

The future of the hemp industry in the United States has many uncertainties. The industry will undoubtedly continue to face significant challenges in the years ahead, as the significant gaps in infrastructure, knowledge, and laws, among other areas, will take time to fill. Educators, researchers, and other support providers must be transparent about the challenges and opportunities of hemp cultivation. The revitalization of the hemp industry may not be well suited to all conventional farmers, but nevertheless, the industry has he potential to contribute to the U.S. agricultural economy and to improve agricultural sustainability efforts.

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