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## The Business of Hemp in North Carolina: Where the Rubber Meets the Road

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## **Introduction**

Maintaining farm viability, especially during the post tobacco era, has been very challenging for North Carolina farmers experiencing market failure for their produce. Farmers in North Carolina are searching and willing to try new crops that have the potential to keep their farms in business and remain profitable. Industrial hemp seems to check all the boxes that farmers in North Carolina are looking for as an alternative of new crop to grow and turn a good profit on their investment. But is hemp the new crop needed to transform agriculture for farmers in North Carolina? We do not know yet.

A study by Dingha et al. (2019) on interest in industrial hemp among North Carolina organic farmers shows that majority (65.7%) of the interested farmers are large farmers, operating on more than 30 acres of land and generating gross annual incomes more than \$100,000. About 11% of the interested farmers are smallholder farmers who operate less than 5 acres of land with an annual gross income of \$10,000 to \$25,000. From a resource-based perspective, medium to large-scale farmers in North Carolina may be well positioned to be profitable at hemp compared to smallholder farmers. The question then is: How well are farmers in North Carolina prepared to benefit from the industrial hemp industry?

Industrial hemp research in the United States as a whole has been very limited; more so in North Carolina where the hemp industry is still emerging. This paper seeks to review and provide information about the economic indices and the potential risks associated with hemp production for North Carolina stakeholders, interested mainly in the cannabidiol (CBD) market. The majority of hemp production (95% or more) in North Carolina is currently focused on hemp for CBD oil extraction (Mann, 2019), possibly due to the growing demand for hemp extracts, including CBD oil (Mark et al., 2020). But if CBD supply exceeds its demand in the foreseeable

future and forces market prices to plummet accordingly, many growers for the CBD market may be forced to exit the industry (Mark et al., 2020). This paper is aimed at providing baseline information that will be useful in identifying the opportunities and challenges likely to confront commercial hemp production and help growers to know why they should exercise caution before getting into hemp production.

### **The Hemp Industry in North Carolina**

North Carolina is one of the states that has gone all out to embrace industrial hemp production. Hemp production in the State was authorized in 2016/2017 and currently operates under the North Carolina Industrial Hemp Pilot Program in conjunction with the Land-grant institutions (NC Department of Agriculture & Consumer Services, 2020). North Carolina can elect to operate under current pilot programs through October 2020; however, what happens after October 2020 is very uncertain (NC Department of Agriculture & Consumer Services, 2020). Over 100 growers participated in the hemp pilot research program during the first year alone, and the numbers are expected to grow over time despite barriers to entry<sup>1</sup>.

North Carolina was the sixth largest producer of hemp in the US in 2018 (Table 1). Since then, hemp production levels in the State have continued to rise steadily with staggering numbers in 2019. As of July 2019, North Carolina had cultivated 11,572 acres of hemp; which is more than triple the total acreage it cultivated in 2018 (Table 1). By September 2019, North Carolina had recorded 1,324 licensed industrial hemp growers; 16,466.33 licensed acres; 6,139,927.6 square feet of licensed greenhouse production; and 837 registered processors (North Carolina Department of Agriculture & Consumer Services, 2020).

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<sup>1</sup> Barriers to entry vary widely between States. In North Carolina, interested growers incur a range of fees including a \$250 application fee; \$250 grower participation fee; \$59 for 1<sup>st</sup> inspection and \$150 for 2<sup>nd</sup> inspection; plus \$2/acre for 49-500 acres and/or \$2/1,000 sq ft (Mark et al., 2020).

**Table 1. Licensed Acreage Under Industrial Hemp Cultivation**

<b>State</b>	<b>2017</b>	<b>2018</b>	<b>2019<sup>a</sup></b>
Colorado	12,042	21,578	80,000
Kentucky	12,800	16,100	58,000
Montana	524	22,000	40,000
Nevada	490	1,881	9,145
New York	2,000	2,240	5,000
North Carolina	1,930	3,184	11,572
North Dakota	3,100	2,778	2,175
Oregon	3,500	7,808	51,313
Tennessee	718	3,338	37,416
Wisconsin	0	1,850	16,100

*Source: Sterns (2019). 2019<sup>a</sup> data are estimates, as of July 2, 2019*

Hemp is perceived to be the new crop for farmers and a reasonable fit for the economy of North Carolina, because of the potential revenue the crop could generate. The potential to turn profit has heightened excitement and interest among existing farmers and new farmers alike, who are willing to take a chance at this newly found opportunity. Dingha et al. (2019) indicate that the majority (84.8%) of organic farmers in North Carolina are open to trying hemp production on their farm, whereas 75% of them are interested in obtaining a certificate to grow hemp. But to what extent might industrial hemp be lucrative and profitable for North Carolina growers? No one knows. There is currently not enough data and statistics on hemp to determine the success and profitability among growers in North Carolina and many states across the nation. Most of the claims about the potential profitability of hemp in the state are speculative at best and anecdotal in most cases.

The problem North Carolina faces is that farmers are getting into something new (hemp production) without having an understanding of the economic indices and the risks associated with hemp production. In the early 1800s, there was a desire by farmers to grow mulberries to enhance the US silk industry. Unfortunately, the industry collapsed due to a lack of market for mulberries, and several growers lost fortunes (Small & Marcus, 2002). The level of “hype” and attention industrial hemp is getting perhaps far exceeds what has been historically observed as

far as other new crops are concerned (Small & Marcus, 2002). It is, therefore, important for farmers to understand the economics of hemp production and ways to reduce risks. As a State, we need to thoroughly understand the level of industrial hemp production that would be sustainable, given the expected market demand for CBD-derived products. So far, most of the research studies on industrial hemp have focused on analyzing the chemical and intrinsic properties of the plant, while similar research on economics and value chain management lags. Although researchers acknowledge the potential profitability of industrial hemp, there are several unknowns and potential obstacles to its market development in the near future (Johnson, 2018, Lane et al., 2016).

### **Profitability of Hemp Production**

Research on the profitability of hemp production is very limited (Mark, 2020; Sterns, 2019; Lane et al., 2016, Fortenbery & Bennett, 2004; Cochran, Windham, & Moore, 2000; USDA, 2000). Profitability of hemp production in North Carolina remains difficult to ascertain due to lack of publicly available data such as pricing and sales information. The lack of consistent and reliable data can significantly impede the decision-making processes of farmers and increase their level of risk (Mark, 2020). Although hemp is potentially profitable than some traditional row crops, it is also less profitable than some other specialty crops (Fortenbery & Bennett, 2004). As a result, some farmers may not be willing to grow hemp if there are more profitable options available.

Regardless of the potential profitability of hemp production, there is also an immense uncertainty about the economics of expanding hemp production (Cochran, Windham, & Moore, 2000). In North Carolina, very little information exists on the potential market opportunities and profitability of hemp. Despite the lack of state-level data, North Carolina Department of

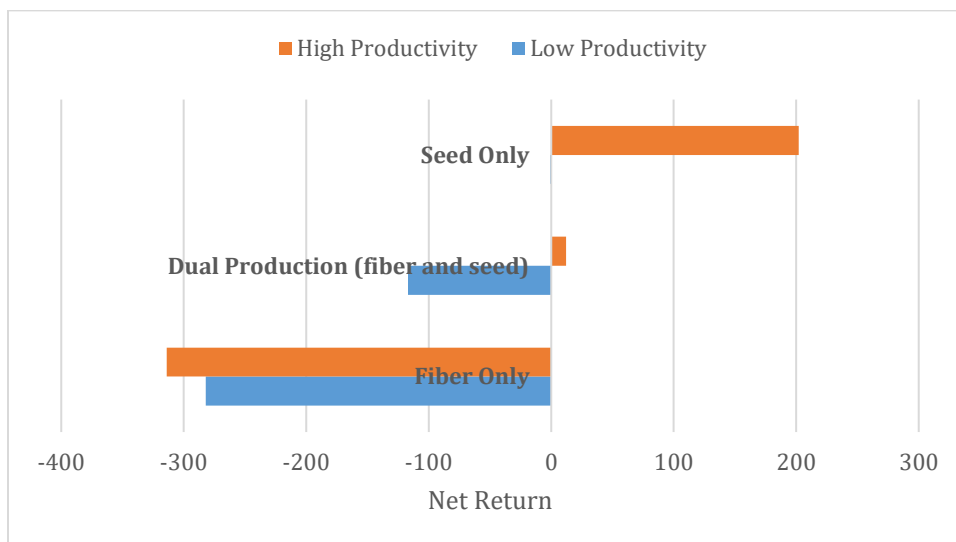
Agriculture predicts that production costs for growing hemp for CBD oils could range from \$13,000 to \$15,000 per acre with expected potential gross profit ranging from \$15,000 to \$35,000 per acre. However, there are still a lot of unknowns; an assessment of the potential profitability and business risks associated with hemp is therefore needed to help farmers in their decision making. It is important to evaluate the returns and opportunity costs of producing hemp along with the potential yields and processing methods (USDA, 2000).

To begin with, North Carolina can draw some inferences from other states in the US such as Kentucky, Tennessee, Pennsylvania, Montana, Colorado, and Oregon to have some baseline data and statistics from pursuing industrial hemp production. For example, Shepherd and Mark (2019) used hemp production budgets from the University of Kentucky to show negative returns for fiber and substantial positive returns for CBD oil. Robbins et al., (2013) also used a wide range of prices consistent with other studies (Mooleki et al., 2013 and Dietz J., 2013) to measure potential profitability for hemp growers in Kentucky. They used a low price scenario (fiber price of \$50 per ton, and seed price of \$0.50 per pound) and a high price scenario (\$100 per ton of fiber and seed price of \$0.90 per pound). Their results indicated that at the lowest price scenario, the expected profitability for hemp grown for seeds is only on highly productive lands (Figure 1). While at a higher price scenario, results indicated higher expected profitability for hemp grown for both seeds and fiber (Figure 2).

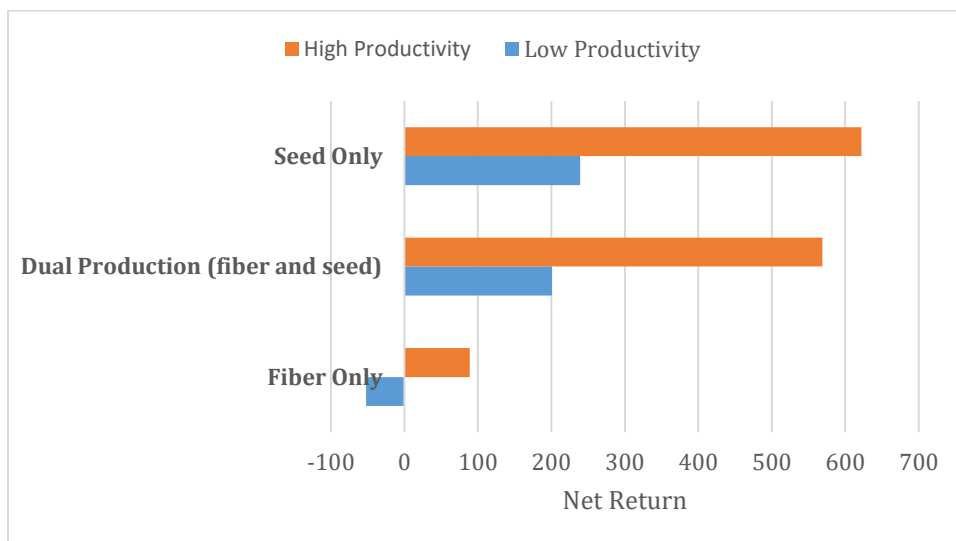
Similarly, Cui and Smith (2019) show a positive return for CBD oil per acre assuming that growers received a price of \$1.50 per percent CBD per pound of material based on production budgets from the University of Tennessee. Harper et al. (2019) on the other hand show modest returns for grain and fiber per acre compared with other conventional crops based on enterprise budgets from Pennsylvania State University. Heisters-Smith (2008) and Mann

(2019) believe that some states in the US such as North Carolina (given its history of textile production) have a future with hemp fiber simply because it is a potential market yet to be tapped and it also has environmental advantages that compensate for its low profitability.

**Figure 1. Net returns on hemp production in Kentucky based on lower prices<sup>2</sup>**



**Figure 2. Net returns on hemp production in Kentucky based on higher prices**



<sup>2</sup>Reproduced from: *Economic Considerations for Growing Industrial Hemp: Implications for Kentucky's Farmers and Agricultural Economy* by Robbins, Snell, Halich, Maynard, Dillon, and Spalding (2013) in Fortenbery (2014). Note: Costs include labor and depreciation/overhead but not land costs. Costs assume \$3.50 per gallon for fuel; N, P, and K at \$0.50 per unit; and 50 miles one way to the sales point (Fortenbery, 2014).

The inference for North Carolina could mean that profit opportunities for growers align with markets that utilize hemp for CBD oil extraction. Thus, higher application and licensing fees required for entry into North Carolina's hemp industry, may not be burdensome for CBD producers given its potential to turn profit compared to grain and fiber producers whose tight margins could be wiped out by these fees and threaten their profitability (Mark et al., 2020). Although CBD offers an opportunity for higher profits, it also "possesses more volatile financial and regulatory risk than markets for hemp fiber and grain" (Mark et al., 2020). These outcomes also imply that the end-market primarily determines the variety of industrial hemp to grow and how to grow it. Therefore, it will be beneficial for growers in North Carolina to first identify and contact existing processors or markets to find out about the kind of industrial hemp they are interested in processing so that they can produce accordingly, and then take advantage of the available market.

### **Risks Associated with Hemp Production**

Despite the projected benefits of the hemp industry, the crop still faces a lot of hurdles, ranging from production to market development (Small & Marcus, 2002; Fortenbery, 2014; Kaiser, Cassady, & Ernst, 2015; Stern, 2019; Vote Hemp, 2019). The uses of industrial hemp (food, edible oil, personal care products, industrial fluids medicine, essential oil, textiles, paper, building construction products, livestock feed) are well documented (Sterns, 2019; Small & Marcus, 2002). What is less understood is the risk involved in growing hemp and the attitude of growers towards managing the risks. Hemp is presently not classified as a standard crop, and it is subject to various levels of risks emanating from changing weather patterns, diseases and pests, volatile market prices on inputs and products, as well as legal uncertainties (Small & Marcus, 2002; Fortenbery, 2014; Sandija & Adamovič, 2015). These risks, especially personnel,



production, marketing, and legal/policy risks, are likely to continue for some time since the hemp industry is still developing in North Carolina.

*Personnel Risk.* Hemp production requires knowledgeable and experienced personnel. Hemp is relatively new in North Carolina, with limited research and grower experience. It is wrong to assume that being a farmer qualifies you to produce any crop. Attempt at truffle production in North Carolina is a good example. A lot of money was sunk into it by agencies and individuals in North Carolina; the aim was to get about 50 farmers into profitable production of truffle in North Carolina. Availability of research-based science data and technical know-how were not taken into consideration, and as of today, truffle production in those farms never happened, at least to the extent that they can sell truffles to the markets. The only truffle production that is successful and starting to grow in North Carolina is born out of over 14 years of research at NC A&T State University, Mycorrhiza Biotech LLC, and Burwell Farms (Buckley Report, 2019). We do not have such a situation with hemp in North Carolina. The hype and unfounded predictions about profitability have overtaken the usual approach of research and extensive testing over many years to develop good production practices that farmers can follow to make it a profitable agribusiness. Farmers can benefit from hemp production only if they are trained to produce the crop the right way. New growers must gain experience and know the agronomic requirements of hemp to avoid costly production mistakes.

The danger North Carolina faces is growers jumping in the deep end without having any clue about what they are doing for fear of losing out if they do not join at the onset. It has been reported that the majority of North Carolina organic farmers want to be one of the first farmers in their area to grow and sell hemp and the authors indicated the need for farmers to be adequately educated on production and marketing challenges to prevent failures that can cause farmers high

economic losses in the future (Dingha et al., 2019). The Land-grant institutions in the state have not accumulated locality specific research data on production tests in North Carolina. Therefore, it is not possible to generate scientific data supported production practices that farmers should use in the various parts of North Carolina and across most of the southeast US.

*Production Risk.* Industrial hemp introduces a wide range of production risks, from seeding to harvesting. For instance, increasing the seeding depth beyond the recommended depth can lead to poorer stands and low-quality fiber (Manitoba Agriculture, 2019). Hemp has over 300 identified pests and about 100 diseases that can cause considerable damages to hemp plants and result in significant economic losses (Merfield, 1999; Cranshaw et al., 2019). However, "there are presently no Environmental Protection Agency (EPA) approved pesticides, herbicides or insecticides labeled explicitly for use on hemp in North Carolina and several other States (NCSU, Extension 2017; Thiessen, 2019). Though hemp production is in its infancy in North Carolina, farms are already plagued by diseases caused by pathogens like *Fusarium* and *Pythium* species. Root, crown, and stem rots are also reported to be prevalent on hemp farms in North Carolina (Thiessen, 2019). Unlike hemp for fiber that is planted densely and could potentially cover and kill the weeds, hemp grown for CBD oil extraction are typically planted in widely spaced rows where weeds can become a nuisance.

Currently, no known economic loss due to pests and diseases are documented. However, yield losses to pests and diseases in the State have been as high as 30% and the extent of damage and yield loss on average is yet to be determined (Cranshaw et al., 2019). Furthermore, as high as 10% loss in plant stand due to disease caused by *Botritis* spp.; 15-20% during regular season, and even 60-70% losses during plants' long stay in the field, caused by stem blight (*Sclerotium roflsii*), have been observed in research plots at North Carolina A&T State University farm

(Personal communications: John Ivey and Dr. Arnab Bohwmik). In Colorado, one grower estimated a loss of over \$500,000 in hemp production, due to corn earworm infestation, and fundamental information is almost completely lacking on the life history of some pests such as hemp russet mite (Cranshaw et al., 2019).

Though bad agricultural practices such as over-irrigation and mechanical injuries to the root and stem predispose hemp plants to the diseases (NCSU, Extension 2017; Thiessen,2019), not many farmers are aware of the measures to take when there are diseases incidence and how to manage their farms and reduce these diseases incidents. To better understand the significance of pests and diseases on hemp, scientific research and experiments are needed to clearly define the relationship of these pests and diseases to hemp growth and yield in North Carolina.

Essentially, comprehensive and effective pest and disease management plans for farms in North Carolina do not exist. Research data and information gaps regarding some of these known pests and diseases as well as the adaptation and use of current pesticides in hemp production is needed in North Carolina. Another issue not addressed is the residual effect that any known pesticide might have on the hemp plants and their consumers. As production systems for hemp evolve, there will also be changes in pest problems (Cranshaw et al., 2019). Quarantine and disease monitoring system for hemp production does not exist in North Carolina. Farmers across North Carolina are vulnerable and do not have ways to prevent economic losses, should there be any disease outbreak. Therefore, a robust plant disease monitor and control system is critical for North Carolina to help growers mitigate their risks to diseases outbreak.

The most dreadful part of growing industrial hemp is that tissue samples must not exceed a certain level of THC (tetrahydrocannabinol). Thus, even if a grower does everything correctly by employing the best production and management practices and the plants test above the 0.3%

THC threshold, the plants must be destroyed or at worst the grower can face prosecution. Out of about 125 North Carolina growers in 2017, approximately 10 had their farms burnt and destroyed because they exceeded the 0.3% THC level (NC State Extension, 2019). Nobody knows what causes the spikes in THC level in North Carolina. Research is still on-going to learn about the causes of THC spikes in the State. Some researchers such as Cranshaw et al. (2019) indicate more studies are needed to determine whether certain pests and diseases are likely to cause changes in hemp production for THC.

*Marketing Risk.* There are concerns about the long term market demand for hemp products despite the trending popularity of the hemp plant (Sterns, 2019). Will market demand for hemp be strong enough to take the increasing production capacity in the near future without reducing or potentially wiping out the positive margins for farmers? That is an economic question that needs to be addressed for states with emerging hemp industry such as North Carolina. Research is needed to provide reliable economic and market information for decision-making purposes. This is because the lack of reliable market information can create risks for farmers who are thinking about making these investments (Sterns, 2019; Mark, 2020).

Markets are still developing around industrial hemp in North Carolina. According to Small & Marcus (2002), it takes 10 to 15 years for an industry associated with a new agricultural crop to mature. Although markets are developing, the size of potential markets for hemp-based products is not clear (Fortenbery, 2014). The level of production that would be sustainable for the market is also unknown. There could be potential marketing risks resulting from shortages and oversupply. Unfortunately, the growing of hemp, has a magnetic attraction to many, so there is a danger of overproduction and oversupply (Small & Marcus, 2002).

Oversupply for instance, could result in growers storing their product for a longer period than expected. According to the Chairman for North Carolina Industrial Hemp Commission (Tom Melting), “the market may be declining and that a lot of raw and CBD hemp remains unsold to the extent that some growers in North Carolina are electing not to grow as much this year (2020)” (North Carolina Industrial Hemp Commission, 2020). A long storage period can potentially impact the quality of the grain and perhaps increase the risk of no market availability or marketing the grain into a lower-priced end-use (Manitoba Agriculture, 2019). For example, in 1999, several Canadian farmers were contracted to grow hemp for the American-based Consolidated Growers and Processors. However, the firm collapsed, and farmers were holding very large amounts of grains and hemp straw that they could not sell to recover their investments (Small & Marcus, 2002). A USDA report on the status and market potential for industrial hemp concludes that "US markets for hemp fiber and seed are, and will likely remain small and thin. Uncertainty about the long-run demand for hemp products and the potential for oversupply discounts the prospects for hemp as an economically viable alternative crop for American farmers" (Small & Marcus, 2002).

In North Carolina, there are more actual and potential hemp growers, but relatively fewer end processors. This can result in an unfair pricing to the disadvantage of farmers if the end markets for their products are thin and limited. There is no distinct supply chain map at this moment. Currently, growers in North Carolina have to (on their own) identify markets or processors who will be willing to take their produce. As indicated in Dingha et al. (2019), 93% of North Carolina organic growers indicate that knowing there are markets for certified organic hemp seeds and hemp fiber would strongly influence their willingness to grow hemp. North Carolina needs both growers and end-processors to grow the hemp industry. It will be financially

risky for hundreds of farmers in North Carolina to grow hemp if there is no end market available to absorb the output.

*Legal and Policy Risk.* Apart from the production and marketing hurdles, hemp also faces some legal uncertainties and societal pressure due to its close association with recreational marijuana (Small & Marcus, 2002; Fortenbery, 2014; Kaiser, Cassady, & Ernst, 2015; Lynn Robbins et. al, 2013). The commercial production of industrial hemp in North Carolina and the US as a whole is highly controlled. Thus, one cannot produce the plant for either research or commercial purposes without a legalized permit issued under the Controlled Substances Act (Renée Johnson, 2018). For instance, growers in North Carolina are required to obtain a North Carolina growers' license to participate in the hemp pilot program, provide GPS coordinates of the farm, and also be subject to unexpected farm inspections to check the THC content. Despite the legal barrier, farmers are not deterred from exploring the opportunities in hemp production provided they understand the legal and political landscape surrounding the crop. For example, less than half (46.9%) of organic growers in North Carolina indicate that unclear legal regulations associated with industrial hemp production would negatively influence their willingness to grow the crop while 85% indicate that they are interested in learning more about the legality of growing hemp (Dingha et al, 2019). However, there is no organized extension and outreach education system to bring this knowledge to the farmers in North Carolina.

Although, North Carolina Department of Agriculture and Consumer Services support hemp production in the State, there are still significant legal barriers and grey areas to navigate; including interstate trade and importation procedures and protocols for acquiring seeds outside the US (NC Department of Agriculture & Consumer Services, 2020). There is no legal pathway for CBD derived products to the marketplace as Food and Drug Administration (FDA) continues

to evaluate what CBD-related products can be approved (NC Department of Agriculture & Consumer Services, 2020). “Therefore, while cultivation of hemp is legal, the law is not completely set regarding end products” (North Carolina Department of Agriculture & Consumer Services, 2020).

## **Conclusion**

The business of hemp involves a lot of dynamics that must be well understood. In as much as there are potential prospects and opportunities for growing hemp, there are also risks for profitability. In this paper, we sought to review the economic feasibility and challenges of hemp production in North Carolina. As the hemp industry emerges in North Carolina, farmers need to exercise caution by understanding the economics of hemp production. Though there is a lot of hype and excitement about hemp production in North Carolina, there has not been any clear economic analysis to justify the hype due to the lack of data. It will be unfortunate for farmers to invest in hemp production based on short-term market potential, only to discover later that this is another long-term economic burst.

Although there is no available data to examine and quantify the economic indices of hemp production in North Carolina, this review paper, based on the experiences of others, contains important cautionary information that serves as a guide for farmers and other stakeholders interested in the business of hemp. Our review reveals both the market potential as well as the threats and risks associated with hemp production. This review paper exposes the existence of knowledge gaps between the 'promised' benefits (financial incentives) of hemp and what it actually will take for farmers to reap the benefits thereof. The over-hyped financial incentives hemp promises to growers are based on the assumption that market conditions will most likely generate sufficient returns to recover the expensive investments (Sterns, 2019).

Therefore, more scientific research is needed to collect data specific to the hemp industry in North Carolina to access the economic potential as well as plan and implement mitigation measures to the threats facing this emerging industry.



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### **Appendix: Lessons Learned from Experienced Growers**

Dingha et al. (2019) indicate farmers in North Carolina are more likely to adopt industrial hemp. But they also admit that there is a huge knowledge gap on hemp in North Carolina. Since North Carolina is relatively an infant in hemp production and still trying to figure out what to do to be successful, the experiences from other vested countries like Canada and other European countries such as France can be very insightful. Unlike North Carolina, which faces a steep learning curve, Canada and other European countries have experienced growers (Small & Marcus, 2002). Obtaining knowledge from these experienced growers will be very beneficial for new growers to gain the experience needed. It might even be necessary to allow immigration of experienced hemp growers to help the teething industry in North Carolina, in particular, and the entire US at large. Commercial production of hemp in Canada was legalized in 1996 whereas other European countries have been cultivating the plant for centuries. The industry has grown significantly and has been profitable especially for Canadian farmers. Canada has several certified and field-tested seeds and varieties that growers can cultivate (Manitoba 2014). Understanding how the Canadian varieties perform is critical for starting a successful commercial hemp industry in North Carolina.

One major reason for Canada's hemp success is that most of their production is grown under contract (Dietz J., 2013). About a third of their total production is contracted through a major Canadian food manufacturer (Manitoba Harvest Hemp Foods). Some several other companies and co-ops undertake contractual hemp production with farmers (Dietz J., 2013). On the contrary, North Carolina is caught up in the "chicken and the egg" scenario. Big industry players want to make sure there are sufficient growers to meet their industrial demands before they build industrial plants. They do not want to be constrained by a scarcity of hemp seeds or fiber in the market place. Likewise, risks averse growers are sticking to the old adage "*find your*

*market before you plant your seed*". They want to be sure of the market before they commit. North Carolina cannot progress in its hemp industry with this "chicken and the egg" dilemma. The state needs farmers to grow the plant and end-processors to open up the market. This situation calls for the dissemination of relevant information stemming from multidisciplinary science-based research on hemp for the benefit of farmers, businesses, and other stakeholders.

Unlike North Carolina which currently has no crop insurance to reduce risks due to crop failure and non-compliance, Canada at least mitigates production risks for their growers by providing full crop insurance coverage for hemp grain production. Canadian growers are also offered reduced extended insurance coverage as well as additional hail insurance (Manitoba Agriculture, 2019). In North Carolina, there is no specific insurance for farms that will be burnt or destroyed if high than the legal limits of THC are found. Bigger farms might be able to deal with loss due to the unallowed THC levels in their hemp. However, some farmers have very limited money and resources in their farming operations. So how are small and limited resources farmers, going to recover their investment when their hemp farms are destroyed when their plants may show higher than legal limits of THC?

Although the USDA Risk Management Agency (USDA RMA) has promised to make Whole-Farm Revenue Protection (WFRP) coverage available for hemp for the 2020 crop year (NC State Extension, 2019), there are potential barriers to procuring crop insurance for hemp. To be eligible for hemp insurance, the farmer has to be a participant and also be in compliance with the rules of a valid industrial hemp pilot research program (NC State Extension, 2019). Growers in North Carolina will also need to have a legitimate contract for coverage (NC Department Agriculture and Consumer Services, 2020). In addition, hemp will not qualify for replant payments under the Whole Farm Revenue Protection policy (Mark et al., 2020). Hemp crop



insurance is a must for hemp growers in North Carolina. This will empower farmers to make rational and informed choices. Otherwise, farmers stand the risk of losing their investment, and small farms will be hit the hardest due to their limited resources and struggle to break even in their farming operations.

Unlike some European Union (EU) member countries, there are no known US government subsidies or monetary incentives that support hemp growers and processors to mitigate their risks. In the mid-1990s, the EU provided some form of subsidization (\$1,050/ha) to incentivize hemp growers (Small & Marcus, 2002). This support was very instrumental in developing a hemp industry in western Europe. Subsidies of that nature will be very helpful for starter growers in North Carolina.