

Implications of Changing Supply Chain Dynamics of Global Ginseng Trade: A Pilot Study

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The strong overseas demand for American ginseng has led to both price increases and supply chain consolidation overseas, where most value creation takes place. This paper shows that, given price and volume dynamics for American ginseng in its journey from U.S. growers to Asian consumers, U.S. growers of wild simulated American ginseng have an opportunity to domestically capture at least part of those value-creating activities. Using a pilot study of potential ginseng growers in Tennessee, we show the economic impacts of capturing the wholesale and retail values of wild simulated American ginseng.

Keywords: supply chain, wild american ginseng, global trade, price dynamics, pilot study

INTRODUCTION

Ginseng, an energy-boosting plant with a root visually similar to ginger, is the subject of much research and attention, from medical researchers to local environmentalists. Ginseng can be categorized into a few distinct species. The species central to this study is American ginseng (*Panax quinquefolius*), which can be found growing naturally in the eastern United States and parts of eastern Canada. The end retail prices for wild American ginseng in Asian markets have reached as high as \$8,090 per pound, with U.S. wholesalers receiving only \$1,633 per pound and U.S. harvesters receiving even less (IPSOS, 2014).

The striking disparities in supply chain price points motivate this study of the global market dynamics of American ginseng. Information on global ginseng price dynamics is difficult to find, as many supply chain operations take place outside the U.S. and are concentrated in the hands of very few wholesalers and retailers. As more information on global ginseng supply chain activities becomes available, U.S. growers will be able to gain ground in the American ginseng market by domestically capturing supply chain value.

In a practical application of the new information about American ginseng market, our pilot study shows the impacts of capturing more components of the American ginseng supply chain by growing and exporting wild simulated American ginseng. To realize export prices closer to those of wild American

ginseng (versus the less valuable cultivated ginseng), our pilot study for U.S. growers constructs various market scenarios using growing assumptions for wild simulated American ginseng (e.g. its growing timeline). Thus, with wild simulated American ginseng, we show both the associated grower returns per pound and local impacts for the various market scenarios.

This study adds to the literature on American ginseng by presenting a comprehensive review of current market prices and volumes for both wild and cultivated types of American ginseng. Additionally, this study characterizes the supply chain activities of wild simulated American ginseng, highlighting areas of the supply chain U.S. growers could capture. For example, we find the lack of standardized quality-sorting by U.S. wholesalers allows for disproportionate value creation to take place in Hong Kong. Finally, this study pulls the information on prices and supply chain activities together to provide a basis for wild simulated American ginseng growers in the U.S. as they look to enter the global ginseng market, emphasizing the local contributions and impacts of ginseng growers as they capture more supply chain value-creating activities.

The rest of the study is as follows: Section 2 reviews previous literature on the value of American ginseng, giving an overview of ginseng demand and its effects on wild American ginseng populations in the U.S. Section 3 outlines the methods and data used in this study. Section 4 begins the study of agricultural supply chain activities. In Section 5, we summarize the ginseng market dynamics by type of ginseng. Section 6 estimates American ginseng prices, and Section 7 explores the journey of American ginseng as it is traded in the global market. In Section 8, we outline and discuss the pilot study results for U.S. growers of wild simulated American ginseng. Section 9 concludes.

BACKGROUND

Ginseng trade has been a part of U.S. markets almost since the first Europeans explored the Americas, and early public interest in ginseng has been documented in a myriad of sources, from a letter to the editor in *Boy's Life* (1926) to mentions in *The Scientific American* (1908) and *The Pharmaceutical Era* (1898). Even from centuries ago, ginseng harvesting in the U.S. has been driven by the nearly insatiable demand for American ginseng (specifically *wild* American ginseng) in Asia, namely from China and Korea. The strength of Asian demand is motivated by the health benefits of ginseng, the use of ginseng in Traditional Chinese Medicine, and the use of ginseng in medical research (Shahrajabian et al., 2019). Much scientific research is devoted to understanding how to use ginseng in medicine (see the Korean Society of Ginseng's *Journal of Ginseng Research*).

Research has proven that American ginseng (*Panax quinquefolius*) and Asian ginseng (*Panax ginseng*) are different on the molecular level, namely in the type and concentration of ginsenosides (Boehm et al., 1999). Differences between Asian and American ginseng lead both researchers and consumers alike to value the effects of American ginseng separately from Asian ginseng. In the rest of this section, we will further explore the values associated with different types of American ginseng and the challenges that arise from strong market demands for wild American ginseng. We then present one explanation of persistent Asian demand for global ginseng imports.

The Value in Wild American Ginseng

Found in the eastern United States and parts of eastern Canada, American ginseng is a slow-growing plant that requires cool growing temperatures and a shaded understory. Efforts to produce American ginseng on a commercial scale using field-modifying techniques have resulted in a dynamically different type of American ginseng with less concentrations of medically relevant ginsenosides (Choi et al., 2007). Most, if not all, of this type of American ginseng cultivation in the U.S. occurs in Wisconsin (Adams, 2015). While field-cultivated American ginseng is still demanded by the world market, Asian markets are willing to pay higher prices for wild and wild simulated American ginseng based on the belief that woods-grown ginseng has more powerful positive health effects. Anecdotally, buyers of ginseng can recognize on sight the difference between field-grown and wild ginseng, but even the most experienced buyers hesitate before differentiating wild simulated (or woods-grown) from wild ginseng, making wild

simulated the next most valuable type of American ginseng (Dewitt and Chang, 2018 [radio show transcription]). Scientifically, the U.S. does not have a standard for American ginseng quality, leaving quality sorting to take place in overseas locations.

There is no question that wild American ginseng brings the highest price when compared to the prices for wild simulated and field-cultivated American ginseng. “Sangers” (a term for those who search for and harvest wild American ginseng) in the eastern U.S., encouraged by the high price of wild American ginseng, search the wooded areas of their states to harvest and sell wild American ginseng. Though states such as North Carolina and Wisconsin have ginseng weight and harvest season restrictions in place, the demand for ginseng remains steady despite efforts for state limitations, and the U.S. federal government has flagged wild American ginseng as in danger of extinction (Snow and Snow, 2009). Some state restrictions on buying and selling include propagation requirements, such as replanting ginseng seeds in the same general forest area where the parent plant was harvested. An unfortunate part of these state regulations is their lack of scope and oversight which makes the enforcement difficult, and research has gone into ways to alleviate overharvesting in the eastern states through regulatory efforts and cultivation (Burkhart and Jacobson, 2009).

While small-scale production is undertaken by individuals in the U.S., large commercial production of wild simulated ginseng is not common in the U.S. Many of the barriers for this type of production lie in the way ginseng is exported to world markets, as further explained in Section 4. Namely, the barriers have to do with how ginseng is graded and separated in overseas markets. Some manuals and amateur quality sorting information for wild American ginseng is available in the U.S. (Fritsch and Bamford, 2012; Grades of Wild American Ginseng), but, currently, wild American ginseng in the U.S. does not have a scientific approach to determine ginseng value or any type of quality control. In fact, since the first exports of ginseng centuries ago, “economic adulterers” have taken advantage of the poor standardized knowledge of ginseng by buying at low prices or selling a different plant entirely under the ginseng label (Foster, 2016). The lack of market regulation in the states and high demand has concentrated ginseng operations to a few large companies.

The largest exporter of American ginseng is Canada. As the largest exporter, Canada’s regulatory and market systems for ginseng are more established than those in the U.S. While ginseng prices in the U.S. are often spread by word-of-mouth or online message boards by dealers, Canadian prices are more publically available (Liu, 2017). Ideally, the U.S. would more closely monitor ginseng exports and make greater efforts to protect both wild ginseng populations and ginseng cultivators.

The Current Market for American Ginseng

With ginseng’s historical importance in traditional Chinese medicine, China represents a strong consumer base for ginseng purchase and consumption—specifically China’s upper and middle classes. China’s middle-class market emerged with the opening of China’s trade and political borders, and “since the early 2000s, China’s middle class has been among the fastest growing in the world” (China Power Team, 2019). With entry into middle-class comes increases in income, implying that Chinese consumers already demanding American ginseng will remain constant in their demand or increase it (China Power Team). As further confirmation, Senauer and Goetz (2003) show a correlation between the growth of a country’s middle class and increase in demand for high-value food products, which is good news for the American ginseng market.

The demand for American ginseng has remained steady, and with the rise in China’s middle class consumption, demand does not look to decrease in the near future. To protect the wild American ginseng populations from overharvesting and extinction, efforts need to be made to alleviate pressures in market demand by investment in the exploration of ways to produce quality ginseng on a commercial scale, while providing local growers the opportunity to continue to view ginseng as a lucrative and worthwhile investment. In the next sections, we discuss the current price dynamics that characterize the ginseng market, historical market volumes, and ways ginseng growers can capture more of the total ginseng export value.

In this section, we have highlighted the value found in wild American ginseng and the way the increase in demand has led to the overharvesting of wild American ginseng, mentioning the lack of regulation that exacerbates the decline of wild ginseng populations. While strong Asian demand for wild ginseng keeps prices high, information on supply chain activities is lacking. This study hopes to provide a clearer basis for wild simulated ginseng prices and supply chain activities, using a ginseng pilot study to show the value of capturing elements in that supply chain.

METHODOLOGY

American ginseng global market dynamics are difficult to characterize. The aim of this study is to provide an overview of wild American ginseng market dynamics to find areas of value-creation that could be captured by U.S. wild simulated American ginseng growers. To achieve this, we investigate the global market dynamics for American ginseng, the path from the U.S. to overseas markets, and the points of exploitation in the American ginseng supply chain. Below, we explain each of these research questions, the methodology we apply to answer them, and the data sources we used.

R1: What are the global market dynamics for American ginseng?

The nature of American ginseng markets leads us to look first at agricultural supply chain activities to determine the outline of supply chain activities relevant to the American ginseng market. Country-level trade volumes and values for American ginseng are unavailable, so to fill in the supply chain actors for American ginseng, we use global ginseng trade (aggregate of all types) information paired with what information we do have on American ginseng trade. The result is a picture of the key countries (based on general ginseng trade), the general trends in the ginseng market, and the demand and trade value specific to American ginseng.

As we base U.S. grower market entry on a product closer to wild than cultivated American ginseng, information on wild American ginseng pricing dynamics is critical in constructing U.S. grower market scenarios (outlined in Section 8). Thus, identifying the retail price gap between wild and cultivated American ginseng is our next step. From the end-consumer retail prices, we work backwards through the supply chain, filling in the prices for wholesalers and retailers.

R2: What is the journey of American ginseng from U.S. growers to Asian consumers?

Using the supply chain value information and the key countries, we construct a map of the journey taken by American ginseng from the U.S. to end retail consumers in Asia. This allows us to pinpoint the locations of the value-creating supply chain activities, providing more information into the value-capturing opportunities for U.S. growers.

R3: How can U.S. growers exploit American ginseng market inefficiencies to capture more value in supply chain activities?

Using information from a Tennessee wild simulated ginseng grower survey in combination with the price and market structure found through our investigation into American ginseng market dynamics, we show the impact of growing wild simulated American ginseng in the U.S. The pilot study's three scenarios highlight the different returns to growers, contingent on which value-creating activities U.S. growers are able to capture.

In this pilot study, U.S. grower impacts are calculated using IMPLAN software, which estimates indirect and induced effects of economic activities. IMPLAN is a nationally recognized input-output model commonly used to measure the economic and fiscal effects of economic development projects.

Data

Due to the absence of a single source of complete ginseng market data, this study uses many sources to describe both price and volume dynamics for global American ginseng markets. Data sources are listed in Table 1.

**TABLE 1
DATA SOURCES**

Data	Source
Agriculture supply chain	United States Department of Agriculture Economic Research Service
Ginseng Aggregated Market Dynamics	
Trade Prices and Volume	Wiser World Database, World Trade Organization
Key Players	
American Ginseng	
Trade Prices and Volume	IPSOS Industry Overview Research Report (2014)
Wild and Cultivated Retail Value	
Wild and Cultivated Wholesale Price	
Wild and Cultivated Retailers' Price	
Market Journey Price Points	
Wild and Cultivated Price Ratio	Mitchell and Cheng (2009)
U.S. Wild American Ginseng Exports	Division of Management Authority U.S. Fish and Wildlife Service (2016)
U.S. American Ginseng Export Prices	Wiser World Database, IPSOS Industry Research Report (2014)
Pilot study	Ginseng Growers Interest Survey (2018)

Note: Sources which contribute to multiple data categories are shaded in grey

General ginseng trade value and volume data come from the Wiser Trade database and the World Trade Organization. The most valuable source of American ginseng pricing information is an IPSOS Industry Report (2014), which reports prices for both wild and cultivated American ginseng. Using these prices and volume data for wild and cultivated American ginseng, we then calculate price estimations for wild simulated American ginseng.

Our methodology and our data sources involve using multiple sources both to answer the research questions and show the impact that growing ginseng can have on both the growers and their local areas. Our exploration begins with the breakdown of value-chain activities.

MARGINS AND PRICING DYNAMICS FROM FARMERS TO CONSUMERS IN AGRICULTURE: A BRIEF BACKGROUND

Before discussing the market dynamics of American ginseng, it is important to highlight the value-chain activities associated with agricultural products. Information in this section primarily relies on data supplied by the USDA Economic Research Service (ERS) Food Dollar Series.

For 2016, the share of farm production is estimated at around 7.8 percent of the total consumer price of an agricultural product. In the journey from farm to consumers, many other industries benefit significantly from agricultural products. Figure 1 illustrates the complete breakdown by industry (ERS, USDA, 2016): Farm Production (7.8%), Food Processing (15.2%), Packaging (2.4%), Transportation (3.6%), Wholesale Trade (9.1%), Retail Trade (12.4%), Food Services (36.3%), Energy (3.9%), Finance and Insurance (3.3%), Advertising (2.6%), Other (3.5%). However, when an agricultural product is exported to consumers in other countries, these industry breakdowns are likely to change due to the cost of international shipping and other trade-related costs.

How does this average value-chain industry breakdown apply to American ginseng? American ginseng's journey to Asian consumers in root form skips several steps in the process. For example, the 36.3 percent segment associated with food services does not apply to wild American ginseng. To simplify, wild American ginseng's journey involves the following industries: Farmers (Growers),

Authorized Dealers (or Direct Wholesalers), Wholesalers, Processing (Grading and Packaging), Transportation, Retailers, and Other.

Since this study primarily deals with wild American ginseng in root form, only a few major sectors are involved in the process, as wholesalers and major retailers internally handle (in some cases) the majority of market operations associated with wild American ginseng's journey from growers to consumers. What is the share of growers of wild American ginseng in the U.S.? How is the price for wild American ginseng determined in global markets? Who are the major players in the market? The next section deals with some of these questions. It is important to note that American ginseng (both cultivated and wild) is produced in China, Canada, and the U.S.

FIGURE 1
FOOD DOLLAR: FARM TO CONSUMER PRICE DYNAMICS (2016)



AMERICAN GINSENG IN GLOBAL MARKETS (CULTIVATED AND WILD): TRADE VOLUME AND PRICE

As mentioned earlier, the demand for American ginseng has been on the rise. In this section, we differentiate between general ginseng trade and American ginseng trade, and we also compare prices between wild and cultivated American ginseng. Due to differences in value, wild and cultivated American ginseng face different demands. For example, the wholesale price of wild American ginseng has been historically more than four times higher than that of cultivated American ginseng in the U.S. (Len and Mitchell, 2009).

In assessing the global market dynamics of American ginseng, this study relies on multiple sources of data using different types of ginseng classification. Specific information about wild American ginseng is difficult to find, and this study represents a best effort to accurately trace the journey of wild American ginseng from the U.S. In this section, we begin by broadly describing key countries, volumes, and values in the general ginseng trade. We discuss market dynamics and changes over time for major importing and exporting countries. Finally, we highlight the difference in price dynamics for wild American ginseng versus cultivated American ginseng.

Total Ginseng Trade Value (\$) and Volume (lb.)

In 2016, global ginseng exports and imports totaled \$526.4 million and \$560.0 million, respectively. Data suggests that global ginseng imports continue to increase. Value growth has especially accelerated since 2009. Although value of both exports and imports is growing in nominal dollars, trade volume is actually declining. In 2016, total trade volume (exports plus imports) totaled 38.8 million pounds, declining from 56.2 million pounds in 1999. Figure 2 and Table 2 present the historical trade dynamics of

ginseng in world markets. From the figures, one can tell that while trade volumes are generally declining, trade value is increasing over the same period, meaning ginseng's value in the world market is increasing. Total ginseng trade reached a value of over a billion U.S. dollars in 2013, and in 2016, ginseng trade was valued at \$1.1 billion, with a total trade volume of 38 million pounds.

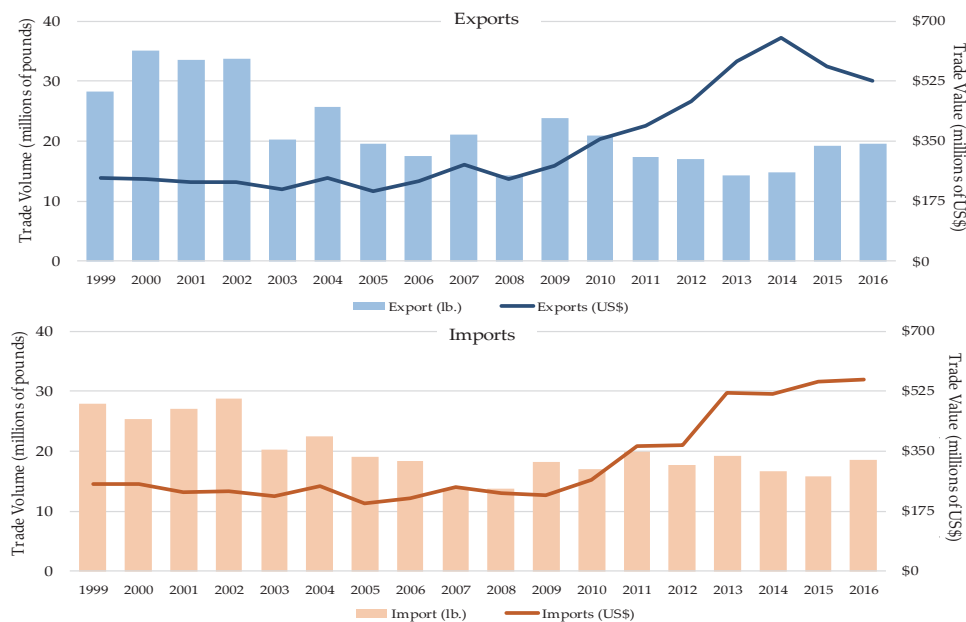
TABLE 2
GLOBAL GINSENG TRADE VOLUME

Year	Export (lb)	Exports (US\$)	Import (lb)	Imports (US\$)	Total Volume (lb)	Total Value (US\$)
1999	28,322,566	\$242,500,430	27,833,958	\$255,730,211	56,156,524	\$498,230,641
2000	35,079,307	\$239,018,093	25,294,024	\$253,481,999	60,373,331	\$492,500,092
2001	33,456,548	\$229,517,178	27,033,718	\$231,360,908	60,490,267	\$460,878,086
2002	33,654,882	\$229,050,999	28,684,604	\$233,683,833	62,339,486	\$462,734,832
2003	20,205,444	\$208,679,906	20,157,577	\$219,419,265	40,363,021	\$428,099,171
2004	25,694,970	\$243,532,850	22,477,926	\$247,390,957	48,172,896	\$490,923,807
2005	19,560,215	\$202,693,706	19,058,783	\$198,676,109	38,618,999	\$401,369,815
2006	17,536,562	\$233,164,087	18,442,358	\$211,378,416	35,978,920	\$444,542,503
2007	21,123,769	\$280,768,984	13,684,667	\$244,568,138	34,808,437	\$525,337,122
2008	14,196,476	\$239,527,554	13,826,349	\$228,347,159	28,022,826	\$467,874,713
2009	23,761,247	\$277,604,075	18,155,185	\$221,856,179	41,916,431	\$499,460,254
2010	20,934,584	\$355,293,517	16,960,927	\$266,525,316	37,895,511	\$621,818,833
2011	17,314,263	\$394,049,794	19,875,943	\$363,764,245	37,190,207	\$757,814,039
2012	16,968,305	\$465,250,151	17,701,655	\$368,022,364	34,669,960	\$833,272,515
2013	14,239,226	\$583,834,186	19,265,409	\$518,509,199	33,504,635	\$1,102,343,385
2014	14,747,197	\$651,067,091	16,651,173	\$516,622,677	31,398,370	\$1,167,689,768
2015	19,179,894	\$568,799,035	15,824,138	\$553,040,483	35,004,033	\$1,121,839,518
2016	19,509,652	\$526,413,894	18,546,200	\$560,026,643	38,055,853	\$1,086,440,537

Source: *Wiser World Database*

Note: Database searched using HS 121120

FIGURE 2
GLOBAL GINSENG EXPORT AND IMPORT VOLUME AND VALUE



Source: *Wiser World Database*

Top Five Countries in Ginseng Trade: Import and Export Volume, Value, and Unit Price

Five countries (Hong Kong, Canada, China, South Korea, and the U.S.) essentially dominate world trade in ginseng, accounting for about 95 percent of ginseng exports (shown in Table 3).

TABLE 3
WORLD TRADE RANKINGS FOR GINSENG ROOTS FOR 2016

Rank	Code	Country	2016	% of Total
Exports				
TOTAL ALL REPORTING COUNTRIES			\$526,413,894	100.00%
1	CAN	Canada	\$181,009,718	32.32%
2	CHN	China	\$165,791,358	29.60%
4	HKG	Hong Kong	\$58,276,484	10.41%
3	KOR	Republic Of Korea	\$51,225,885	9.15%
5	USA	USA	\$43,377,291	7.75%
All other countries			\$26,733,158	5.08%
Imports				
TOTAL ALL REPORTING COUNTRIES			\$560,026,643	100.00%
1	HKG	Hong Kong	\$262,437,085	46.86%
2	JPN	Japan	\$106,705,906	19.05%
3	USA	USA	\$50,826,822	9.08%
4	CHN	China	\$38,147,499	6.81%
5	TWN	Taiwan	\$26,740,347	4.77%
All other countries			\$75,168,984	13.42%

Source: Wisser and Author's calculations

Note: Rank column based on 2016 Annual Value (US \$). Wisser product code based on HS6 code 121120: "Ginseng roots, fresh or dried"

Hong Kong, Japan, the U.S., China, and Taiwan account for 87 percent of total ginseng imports in the world, with Hong Kong alone importing nearly 50 percent of the world's ginseng imports (shown in Table 3). Because of the dominance of Hong Kong in ginseng trade, the rest of the study focuses on American ginseng in the Hong Kong market.

Similar to the broad ginseng trade, only a few countries in the world dominate the production of American ginseng: China, Canada, South Korea, and the U.S. Only China, Canada, and the U.S. are the largest producers of American ginseng (cultivated and wild). Although Hong Kong does not produce American ginseng, it is a major player in the international trade of American ginseng, as it is in the general ginseng market.

How Have Ginseng Imports and Exports Evolved Over the Years by Country?

In the past decade, the unit import price of ginseng increased nearly 65 percent in Hong Kong, from \$19.81 in 2006 (in 2016 \$) to \$32.69 in 2016 (shown in Table 4). The largest increase in import unit price was in South Korea. However, South Korea is not a big ginseng importer in terms of either volume or price. The U.S. import unit price also increased in real terms, suggesting increasing demand for ginseng in the U.S. market.

What is the export unit price by country? It is interesting to note the U.S. export price per unit decreased nearly 10 percent from \$57.94 in 2006 to \$52.36 in 2016 (Table 5). On the other hand, two major export countries (China and Canada) experienced a significant increase in export unit price (303% and 120%, respectively, in the same period). Although these two countries saw significant price increases, their export unit prices in 2016 were significantly lower than the export unit price for U.S. ginseng exports.

TABLE 4
COMPARING GINSENG IMPORTS BY COUNTRY OVER THE YEARS 2006 TO 2016

Year	Trade Flow	Reporter	Partner	Commodity	Net Weight (lb.)	Trade Value (US\$)	Unit Price in 2016 Dollar (\$/lb.)	
2006	Import	Canada	World	Ginseng roots	602,906	\$11,588,645	\$22.48	
2006	Import	China	World	Ginseng roots	372,083	\$5,940,476	\$18.67	
2006	Import	Hong Kong, SAR	World	Ginseng roots	6,084,853	\$103,081,207	\$19.81	
2006	Import	USA	World	Ginseng roots	1,977,088	\$32,685,692	\$19.34	
2006	Import	Rep. of Korea	World	Ginseng roots	549,693	\$1,853,323	\$3.94	

Year	Trade Flow	Reporter	Partner	Commodity	Net Weight (lb.)	Trade Value (US\$)	Unit Price in 2016 Dollar (\$/lb.)	Percent Change from 2006
2016	Import	Canada	World	Ginseng roots	417,914	\$19,230,189	\$46.01	104.69%
2016	Import	China	World	Ginseng roots	1,479,390	\$38,147,499	\$25.79	38.10%
2016	Import	Hong Kong, SAR	World	Ginseng roots	8,028,571	\$262,437,085	\$32.69	64.98%
2016	Import	USA	World	Ginseng roots	1,146,047	\$50,826,822	\$44.35	129.37%
2016	Import	Rep. of Korea	World	Ginseng roots	15,133	\$312,214	\$20.63	423.24%

Source: World Trade Organization, Wisser, and Author's calculations

Note: Wisser information for ginseng in 2006 uses H2 classification and in 2016 uses H4 classification, and the commodity code is 121120

TABLE 5
COMPARING GINSENG EXPORTS BY COUNTRY OVER THE YEARS 2006 TO 2016

Year	Trade Flow	Reporter	Partner	Commodity	Net Weight (kg)	Trade Value (US\$)	Unit Price in 2016 Dollar (\$/lb.)	
2006	Export	Canada	World	Ginseng roots	6,112,792	\$74,123,162	\$14.18	
2006	Export	China	World	Ginseng roots	5,930,148	\$36,903,588	\$7.28	
2006	Export	Hong Kong, SAR	World	Ginseng roots	1,767,984	\$22,365,937	\$14.80	
2006	Export	USA	World	Ginseng roots	713,569	\$35,348,072	\$57.94	
2006	Export	Rep. of Korea	World	Ginseng roots	533,179	\$46,184,683	\$101.31	

Year	Trade Flow	Reporter	Partner	Commodity	Net Weight (kg)	Trade Value (US\$)	Unit Price in 2016 Dollar (\$/lb.)	Percent Change from 2006
2016	Export	Canada	World	Ginseng roots	5,807,533	\$181,009,718	\$31.17	119.78%
2016	Export	China	World	Ginseng roots	5,651,277	\$165,791,358	\$29.34	303.09%
2016	Export	Hong Kong, SAR	World	Ginseng roots	2,198,401	\$58,276,484	\$26.51	79.17%
2016	Export	USA	World	Ginseng roots	828,371	\$43,377,291	\$52.36	-9.62%
2016	Export	Rep. of Korea	World	Ginseng roots	728,320	\$51,225,885	\$70.33	-30.57%

Source: World Trade Organization, Wisser, and Author's calculations

Note: Wisser information for ginseng in 2006 uses H2 classification and in 2016 uses H4 classification, and the commodity code is 121120

Key Players in the American Ginseng Trade

This study investigated the key market players that significantly influence the North American ginseng market. Our review of key market players suggests a handful of wholesalers/retailers control a significant segment of ginseng wholesale and retail operations. For example, Beijing Tong Ren Tang (TRT) is the largest producer of traditional Chinese medicine in China and purchases both cultivated and

wild American ginseng from North America. As the only partner of the Ginseng Board of Wisconsin in the China market, TRT purchases all cultivated ginseng from Wisconsin. Based in Hong Kong, Prince of Peace and Yuwei Ginseng are also partners of the Ginseng Board of Wisconsin. Shanghai Leiyunshang Pharmaceutical is an example of a manufacturer and retailer that imports American ginseng from Canada.

Hang Fat Ginseng is the largest broker from Hong Kong. It was purchased by Qianhai Health in 2016 due to company's financial crisis. This crisis also affected more than a hundred ginseng farmers from Ontario, because Hang Fat was the biggest buyer of Canada's American ginseng, buying an estimated 70 percent of Canada-grown American ginseng. Hsu's Ginseng is the largest broker in the U.S., with a global supply chain and multiple local retail stores. Some other large companies also play an important role in the international ginseng market and influence ginseng prices, such as China Meheco Group and Gaungdong Letaotao Pharmaceutical that cultivate American ginseng in China.

Global Demand for American Ginseng

According to research conducted by IPSOS in 2014, global demand for American ginseng (cultivated and wild) is growing and expected to reach a value of around \$4.4 billion with a unit price of \$380 per pound (shown in Table 6).

TABLE 6
GLOBAL MARKET VALUE AND DEMAND FOR AMERICAN GINSENG
(WILD AND CULTIVATED)

Year	Value (retail)	Volume (lb.)	Average Retail Price (\$/lb.)
2008	\$378,900,000	7,306,111	\$52
2009	\$448,500,000	6,885,469	\$65
2010	\$737,000,000	8,620,726	\$85
2011	\$849,300,000	8,784,529	\$97
2012	\$1,177,900,000	9,021,746	\$131
2013	\$2,048,200,000	9,884,193	\$207
2014F	\$2,573,400,000	10,527,942	\$244
2015F	\$3,517,500,000	11,124,513	\$316
2016F	\$4,395,100,000	11,555,736	\$380

Source: Author's calculations using IPSOS Industry Overview

Note: Numbers represent American Ginseng produced in USA, Canada, and China. F represents forecasted years.

Global Retail Price for Wild Versus Cultivated American Ginseng

The retail price difference between wild American ginseng and cultivated American ginseng is phenomenal. In 2016, the per unit (lb.) price for wild American ginseng was expected to be \$8,090 per pound, versus an expected \$254 for cultivated American ginseng (shown in Table 7 and Figure 3).

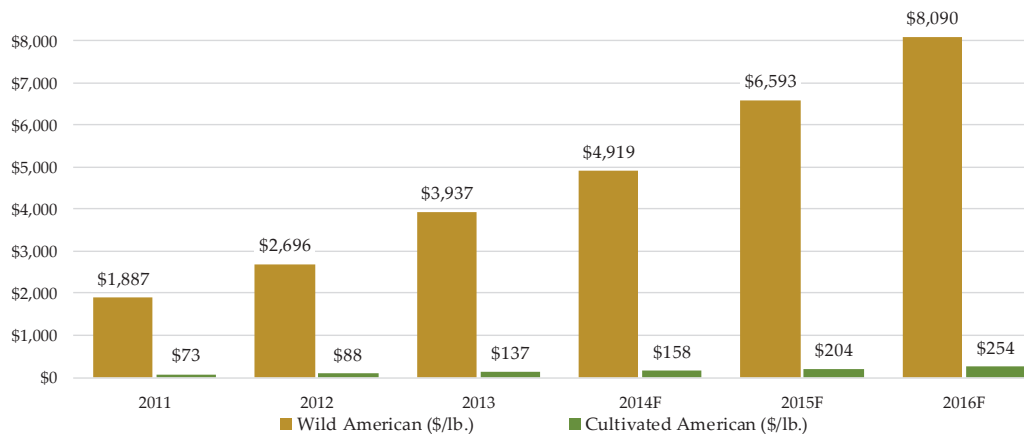
TABLE 7
GLOBAL RETAIL MARKET FOR AMERICAN GINSENG

Year	Wild American Ginseng (USA, Canada & China)			Cultivated American Ginseng		
	Retail Value (US \$)	Volume (lb.)	Retail Value per lb. (US\$)	Retail Value (US \$)	Volume (lb.)	Retail Value per lb. (US\$)
2011	\$217,600,000	115,302	\$1,887	\$631,700,000	8,669,227	\$73
2012	\$401,200,000	148,812	\$2,696	\$776,700,000	8,872,934	\$88
2013	\$723,000,000	183,645	\$3,937	\$1,325,200,000	9,700,548	\$137
2014F	\$935,900,000	190,259	\$4,919	\$1,637,500,000	10,337,684	\$158
2015F	\$1,292,200,000	195,991	\$6,593	\$2,225,300,000	10,928,522	\$204
2016F	\$1,501,700,000	185,629	\$8,090	\$2,893,400,000	11,370,107	\$254

Source: Author's calculations from IPSOS Industry Overview

Note: F represents forecasted years

FIGURE 3
RETAIL VALUE PER POUND IN THE GLOBAL MARKET FOR AMERICAN GINSENG



Source: Author's calculations from IPSOS Industry Overview

Note: F represents forecasted years

Although the volume of wild American ginseng represents about 1.61 percent of total ginseng sold in the world, the retail value of wild American ginseng represents 34.17 percent of total ginseng retail sales. In terms of the retail price ratio, the price of wild American ginseng was 32 times higher than cultivated American ginseng in 2016. We will revisit this ratio when we discuss wild American ginseng exports from the U.S.

Given the large share of ginseng imports to Hong Kong (nearly 50 percent of American ginseng exports are bound for Hong Kong), it is important to look at average retail and wholesale prices in Hong Kong for wild and cultivated American ginseng. In 2015, the average estimated wholesale price of wild American ginseng was \$1,633/lb. in Hong Kong versus \$64/lb. for cultivated American ginseng (shown in Table 8), a price ratio of 25.33.

TABLE 8
WHOLESALE AND RETAIL PRICES OF WILD AND CULTIVATED AMERICAN GINSENG IN HONG KONG

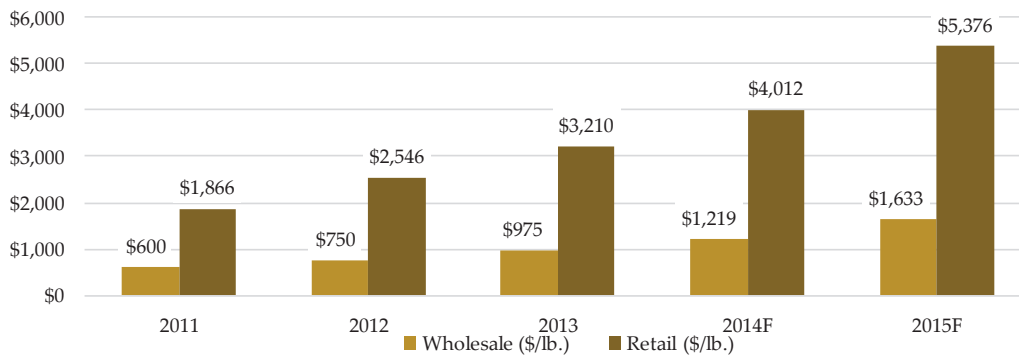
Year	Cultivated (US \$/lb.)	Wild (US \$/lb.)	Price Ratio (wild:cultivated)
Average Wholesale Price			
2011	\$23	\$600	26
2012	\$36	\$750	21
2013	\$43	\$975	23
2014F	\$50	\$1,219	24
2015F	\$64	\$1,633	25
Average Retail Price			
2011	\$69	\$1,866	27
2012	\$88	\$2,546	29
2013	\$116	\$3,210	28
2014F	\$134	\$4,012	30
2015F	\$173	\$5,376	31

Source: Author's calculations from IPSOS Industry Overview

In 2015, the expected unit retail price of wild American ginseng was \$5,376/lb., compared with \$173 for cultivated American ginseng (shown in Table 8). The retail price of wild American ginseng was 31.01 times higher than that of cultivated American ginseng. In the same year, the retail price of wild American ginseng was 229 percent higher than the wholesale value of wild American ginseng (shown in Figure 4). Similarly, the retail value of cultivated American ginseng was 168 percent higher than its wholesale price.

The ginseng market rests in the hands of a few countries, and a handful of companies similarly determine American ginseng market dynamics. American ginseng trade volumes, like general ginseng trade, are decreasing, while trade value is increasing. However, there is a huge value gap between U.S. export prices and Asian retail prices for American ginseng, implying major value creation in overseas supply chain activities. In the next section, we further delve into American ginseng price dynamics to develop a market calculation for price that U.S. growers can expect in the global ginseng market.

FIGURE 4
PRICES OF WILD AMERICAN GINSENG IN HONG KONG



Source: Author's calculations from IPSOS Industry Overview

ESTIMATING AMERICAN GINSENG PRICE DYNAMICS

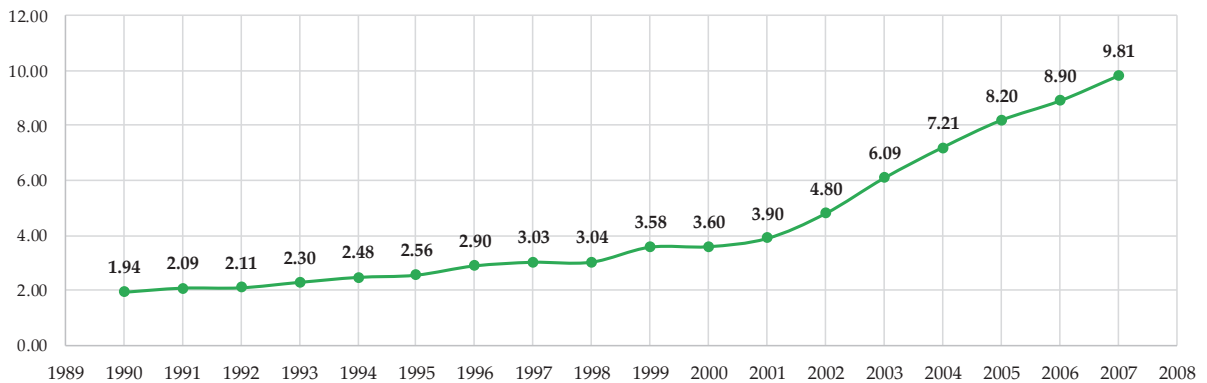
It is difficult to determine both the price and volume of wild American ginseng produced and exported by the U.S., but understanding market dynamics is critical in determining both the opportunities for value-creating activities and the profitability of American ginseng to U.S. growers. As shown in the previous section, the wholesale and the retail price differences between both wild and cultivated American ginseng are substantial. In this section, we will provide support for our estimates for the wild simulated American ginseng prices U.S. growers can expect in the global ginseng market, and we will use the calculations from this section to construct market scenarios for ginseng impacts in the pilot study.

In order to calculate the price per unit of wild American ginseng exports, this study carefully used several previously published studies. According to a 2009 study that assesses the ginseng industry in Wisconsin, the average per unit export price ratio of wild/cultivated ginseng was anywhere between 2 and 10 between 1999 and 2007. However, as Figure 5 below shows, the ratio began increasing dramatically between 2002 and 2007. In order to calculate the export unit price of wild American ginseng exports from the U.S., this study used the average wild/cultivated ratio between 2002 and 2017, which is 8.04.

Given the wholesale price ratio between wild and cultivated ginseng in Hong Kong (about 22), this ratio is a conservative estimate of the export unit value of wild American ginseng from the U.S.

The total volume of wild American ginseng exports from the U.S. has been stable from 1998 to 2015 with an average volume of about 64,000 pounds, shown in Table 9 and Figure 6. Using the wild/cultivated ratio and total volume of wild American ginseng exports, this study calculates the average export unit price at \$270 per pound in 2015 (shown in Table 9). Since many factors are involved in the pricing of wild American ginseng, determining the exact price is difficult. A unit export price of \$270 will be used as a baseline in the next sections of this study.

FIGURE 5
WILD/CULTIVATED EXPORT PRICE RATIO: U.S. AMERICAN GINSENG



Source: Lan and Mitchell (2009) and Author's calculations

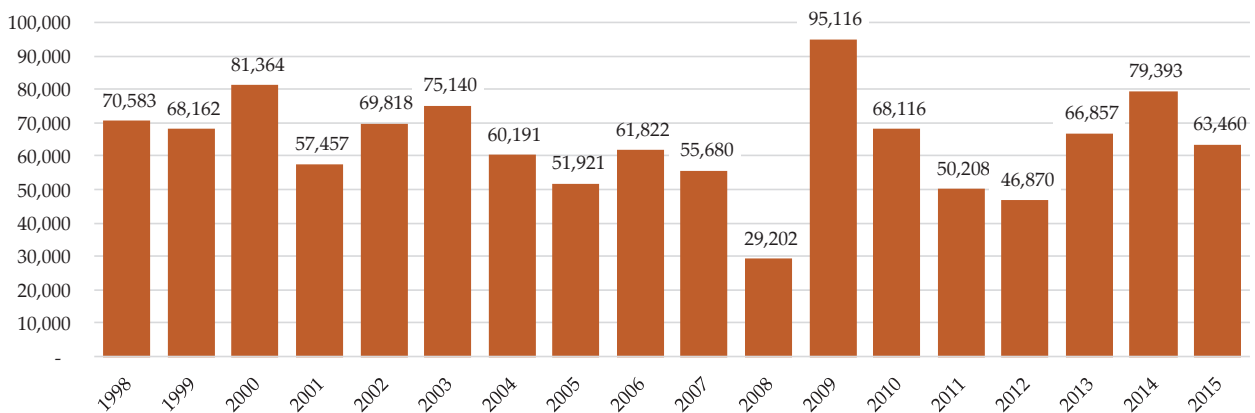
TABLE 9
U.S. GINSENG EXPORT VOLUME AND VALUE: WILD AND CULTIVATED GINSENG

Year	Total Quantity (lb.)	Total Export Value (US\$)	Wild Ginseng Quantity (lb.)	Ginseng Cultivated (lb.)	Wild Price per lb. (\$)	Cultivated Price per lb. (\$)
2011	579,345	\$51,161,459	50,208	529,137	\$441	\$55
2012	1,000,860	\$90,558,382	46,870	953,990	\$547	\$68
2013	805,775	\$77,301,151	66,857	738,918	\$487	\$61
2014	729,588	\$55,949,624	79,393	650,195	\$349	\$43
2015	960,068	\$47,227,324	63,460	896,608	\$270	\$34

Source: Author's calculations based on Wisser database and IPSOS Industry Overview

Note: Using the historical data we calculated an average price ratio of 8.04 between 2002 and 2007 for Wild Ginseng/Cultivated Ginseng. Historical ratios range from about 2 to 10 between 1990 and 2007, showing an upward trend between 2002 and 2007.

FIGURE 6
U.S. WILD AMERICAN GINSENG EXPORTS (LBS.)



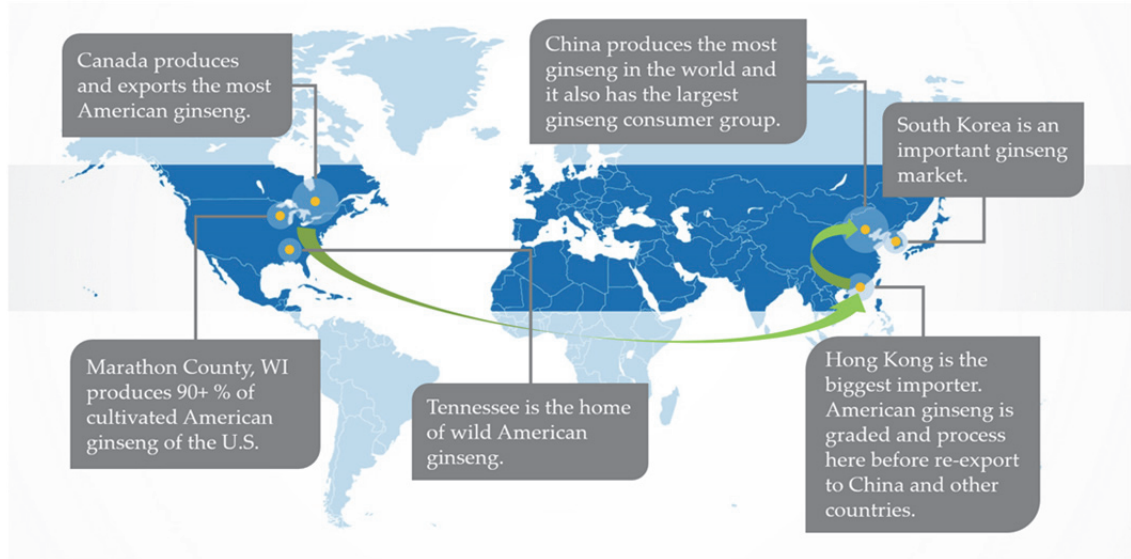
Source: Division of Management Authority U.S. Fish and Wildlife Service Department of the Interior

Note: Amounts originally reported in kilograms and converted to pounds using 1kg to 2.20462 lbs.

JOURNEY OF WILD AMERICAN GINSENG TO ASIAN CONSUMERS FROM THE U.S.

In this section, we follow American ginseng as it is exported from the U.S. and eventually is bought by Asian consumers. We emphasize the difference in prices as American ginseng passes into the hands of different value-chain actors. As the map below shows (Figure 7), the destinations for wild American ginseng are primarily Hong Kong and China. When dealing with wild American ginseng, few industries or individuals are involved in U.S. farm value-chain activities.

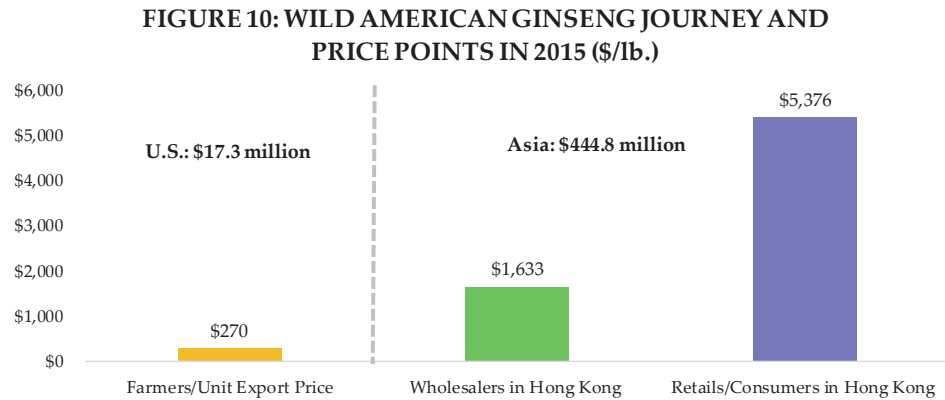
**FIGURE 7
AMERICAN GINSENG MARKET JOURNEY**



Source: Author

The current path (shown in Figure 7) seems to be the common practice for many small growers of wild American ginseng in the U.S. A different variation of the current path can be seen in cases where a large grower negotiates with wholesalers with a network in Asia, skipping Step 2. The current path as a business practice produced a total export value of an estimated \$17.13 million in the wild ginseng trade in the U.S. in 2015. Figure 8 shows the value-added created in the U.S. versus that in Asia (grey line separates U.S. value-creation from Asian value-creation).

**FIGURE 8
WILD AMERICAN GINSENG JOURNEY AND PRICE POINTS IN 2015 (\$/LB.)**

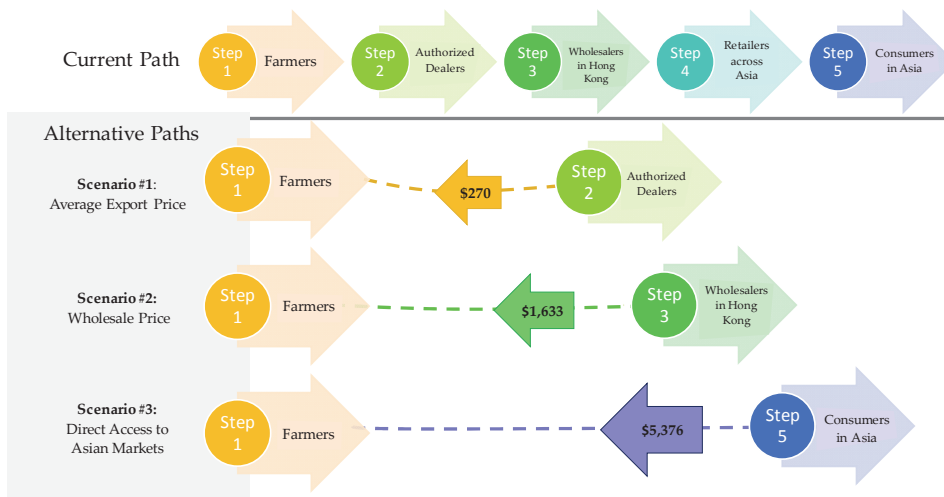


Source: Author's calculations using IPSOS Industry Overview

If we use the export unit price as a proxy for the farmers' share, their overall share in the retail price is about 55 percent, much lower than expected for a product that does not require more than 30 percent of food service industry effort. Figure 9 illustrates alternate paths from the U.S. ginseng farmer to the end consumer in Asia using Figure 8's price points per pound of dried wild American ginseng. Notice that as U.S. growers are able to take on supply chain activities, their returns increase, even using our

conservative price estimates. The next section expounds more on the impacts of capturing American ginseng supply chain activities.

FIGURE 9
CURRENT AND ALTERNATIVE PATHS FOR VALUE CHAIN ACTIVITIES:
U.S. WILD AMERICAN GINSENG



Source: Author's calculations using IPSOS Industry Overview

EMERGING INDUSTRY AND ENTREPRENEURIAL DRIVE: A PILOT STUDY

In the previous section, we outlined broad ginseng market dynamics for potential U.S. wild simulated ginseng farmers as they begin large market operations. In this section, we explore the growing potential for farmers in Tennessee, using the price dynamics outlined above. While peripheral ginseng operations are undertaken in Tennessee as in other eastern states, Tennessee has yet to implement large agricultural ginseng market operations. In the following sections, we will review the Ginseng Interest Survey, outline our scenario assumptions, and present the wild simulated ginseng scenarios and their implications and limitations.

Survey Overview

The Ginseng Growers Interest Survey (2018) included 22 questions and 34 survey respondents; most questions have a less than 100 percent response rate. The most important topics to this section are those dealing with what growers cite as integral to their success and what future topics received the most interest. Together these two questions give us a picture of what is most relevant to the future success of Tennessee wild simulated ginseng growers. Survey responses indicate that the success for many of the interested growers will stem from their long-term investment mindset and institutional and regulatory support. With respect to questions on future topics, the majority of interest is in the ginseng growing process itself; less interest is in marketing, costs, and trade. The strong interest in growing quality ginseng, paired with the long-term investment cited in the previous table, outlines a ginseng grower base ready to move in a commercial agriculture direction.

Assumptions

From the 2018 Grower's Interest Survey, we were able to confirm price points for wild simulated ginseng, which we use in conjunction with the broader market construction in the previous section to construct scenarios for growing and exporting wild simulated ginseng in Middle Tennessee. Given the proximity to the source of seedlings, combined with the acreage determined from the survey, we use

Cannon, Coffee, Davidson, DeKalb, Rutherford, and Wilson counties as the basis for number of potential acres in constructing the following scenarios. Responses from the survey indicate that current ginseng growers use about ten percent of their available land for ginseng.

Other market assumptions have been taken from previous sections of this report, namely the export and price structure ginseng growers in the U.S. can expect to see in the world market. For clarity, we will restate the growing and market assumptions here. We assume the average harvest time for wild simulated American ginseng is five years. We use the published studies to determine the average cost of planting, maintaining, and harvesting wild simulated American ginseng to be \$3,277 per acre. We assume the average yield over the 5-year cycle is 156 lbs. of dry roots. We conservatively assume the wild simulated ginseng land conversion at 1 percent. With this conversion rate, the land suitable for ginseng in the selected counties is 6,320 acres. The scenarios outlined below correspond with the scenario outlines in Figure 8.

Scenarios and Economic Impacts

We separate the scenarios by the captured price to Tennessee wild simulated American ginseng growers. As ginseng growers are able to operate without market intermediaries (i.e. dealers and wholesalers), they are able to capture an effectual higher dollar price per pound. Table 10 provides an overview of each scenario's components.

Scenario 1: Average Export Price

In this scenario, Tennessee growers sell wild simulated American ginseng at the current average price of \$270 per pound. Calculated using IMPLAN software, the local economic net annual contribution of this scenario is \$32.5 million. The total economic impact of business revenues from this scenario is \$87.3 million. Scenario 1 serves to provide a baseline for our more invested scenarios.

Scenario 2: Wholesale Price

Overcoming the inefficacy of dealers as intermediaries, growers can capture the Hong Kong wholesale price of \$1,633 per pound in this scenario. In order to realize this price, growers need to operate as their own dealers in the world ginseng market. This requires scientific verification of ginseng quality. Local economies receive \$301.3 million in net annual contributions from this scenario, nearly ten times the economic contribution from Scenario 1. The total economic impact of business revenues from this scenario is \$527.9 million, six times the amount of Scenario 1.

Scenario 3: Direct Access to Consumers

Greater levels of partnerships and retail investments allow growers to have direct access to Asian consumers by circumventing outside ginseng dealers and wholesalers. This direct access translates to a \$5,376 price point per pound for Scenario 3. The local economic net annual contribution is \$1,039.3 million, more than 50 times the baseline contribution from Scenario 1 and 5 times the amount from Scenario 2. The total economic impact of business revenues from this scenario is \$1,737.8 million.

For all scenarios, the success of Tennessee wild simulated ginseng growers depends largely on the willing participation and long-term investment of the growers. Individual characteristics from survey respondents point to growers with marginal ginseng growing experience, with a few growers with strong farming backgrounds. This means access to resources and training is even more critical. Open communication, training, and resources will benefit and support the success of ginseng market operations in Tennessee.

TABLE 10
TENNESSEE WILD SIMULATED GROWER SCENARIOS

	Scenario 1	Scenario 2	Scenario 3
5-year growing cycle	Yes	Yes	Yes
Cost of growing and harvesting per acre: \$3,277	Yes	Yes	Yes
Per acre yield: 156 lbs. dried root	Yes	Yes	Yes
One percent land conversion: 6,320 acres	Yes	Yes	Yes
Investment in scientific quality sorting system		Yes	Yes
Investment in retail distribution system			Yes
Price point per pound	\$270/lb.	\$1633/lb.	\$5376/lb.
Net annual contribution to local economies (millions)	\$32.5	\$301.3	\$1,039.3
Total economic impact to business revenues (millions)	\$87.3	\$527.9	\$1,737.8

Source: Author's calculations

Study Implications and Limitations

Wild American ginseng growers in the U.S. receive about five percent of the price retailers pay in Hong Kong. Creating and using a scientific grading system will allow U.S. growers to capture at least the Hong Kong wholesale value of \$1,633 per pound. This implies that investment in a grading system, as well as in ginseng growers, could give a region an advantage over cultivated American ginseng growers.

This study is limited by the availability of current pricing data for American ginseng, though we do our best to overcome this limitation by using multiple sources to verify prices. Our pilot study is limited by the small sample size of survey respondents, i.e. these potential ginseng growers' interests may not be representative of all ginseng growers in Tennessee. Additional surveys will be able to shed more light on the motivations of potential U.S. American ginseng growers. The second limitation is market fluctuations. However, we provide a case for steady (or even increased) demand for American ginseng, using in some cases fifteen years of ginseng trade information, and we conclude that demand for American ginseng will remain strong.

CONCLUSION

As this study has found, wild American ginseng is in high demand in the world market, primarily from Asian countries such as China and Korea. Presently, the market for American ginseng depends largely on a handful of wholesalers and retailers, and this study has determined most value creation occurs during quality sorting in Hong Kong.

The price difference between what U.S. farmers currently receive and what Asian consumers currently pay for wild simulated American ginseng is substantial. As mentioned above, this difference emerges from the fact that wild simulated American ginseng is traded in bulk and shipped overseas for grading and quality control. Instead of shipping in bulk, a reliable system is necessary in the U.S. for grading and processing to capture additional value. Furthermore, with respect to the cited pilot study, reducing the harvesting time from five to three years would provide substantial additional benefits to growers across Tennessee.

This study suggests that if investments and partnerships are made, significant value can be captured in international wild simulated ginseng trade for Tennessee growers. Given the baseline estimate of \$270 per pound for wild simulated ginseng, we estimate that investments in a scientific quality sorting system and acting as their own dealers could lead to revenues of \$1,633 per pound for Tennessee growers.

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