



An analysis of the recent trends in U.S. chile pepper production, consumption and imports

J. M. Gandonou and T. M. Waliczek

Department of Agriculture, Texas State University, San Marcos, 601 University Dr. San Marcos, TX 78666, USA.

*e-mail: gandonou@txstate.edu

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Abstract

Fueled by the changing American diet and a growing influence of a diverse immigrant population, the demand for chile peppers over the past three decades has substantially increased and become very diverse. As demand increased, the United States production increased in response from 1980 to 1992, but then decreased. U.S. chile pepper production increased by 116% from 1980 to 1992 but then dropped by more than 50% from 1992 to 2007. The changes that occurred in aggregate U.S. production and also import patterns coincide with the implementation of the North American Free Trade Agreement (NAFTA). The implementation of NAFTA also affected the competitive advantages and disadvantages of individual chile peppers producing states. The primary objective of this paper is to illustrate the dichotomy between the increase in demand for chile peppers and the simultaneous decrease in the domestic production. Recent trends (1980-2009) in the production and imports of chile pepper were analyzed for both the fresh and the processed market. The geographic shifts in the domestic production were evaluated considering the impact of trade policies. A dummy variable model was developed to determine the significance of the impact of NAFTA on production and import trends as well as its role in the redefinition of the competitive advantages and disadvantages among major producing states. Results showed that mean U.S. chile pepper production after 1994 was statistically significantly lower than the mean production before 1994 by approximately 70.3 million kg. Similarly, the average import of chile peppers after 1994 was almost twice the average import prior to that date.

Key words: Chile pepper, specialty crops, *Capsicum* spp., ethnic crops.

Introduction

American demand for vegetables (fresh and processed) has been continually increasing. Over the past 30 years per capita consumption of vegetables has increased by more than 80 pounds, a 23% increase in 20 years. After 2000, per capita "disappearance" or consumption of all vegetables has fluctuated around 199.6 kg per year¹⁸. The growth in consumption was not, however, equally distributed between the fresh and processed vegetable market. With largest market share (62% of the total crop value), the fresh vegetable market accounted for most of the growth, which was caused in part by a rapid increase in the immigrant population, consumer interest for healthy food and government programs promoting fresh food. Consumption of fresh vegetables grew by 34% from 1982 to 1998 and by 14% from 1999 to 2008. During the same periods, per capita consumption of canned vegetables increased by only 12% and then decreased by almost 5%, respectively¹⁸.

To satisfy the rapid growth in year round demand especially in the fresh market, the U.S. increasingly relied on imports. Long a net exporter of fruits and vegetables, the U.S. became a major net importer in less than a decade. Between 1994 and 2004, import of fruit and vegetables more than doubled to reach 12.7 \$ billion in 2004⁹. During that period, import of fresh vegetables alone rose 10% to 4.0 \$ billion, including fresh dry-bulb onion (up 40%), greenhouse tomatoes (up 15%) and chile peppers (up 11%).

Among all vegetables, the consumption of ethnic vegetables

has been growing fast. This is due in part to the rapid increase in the Asian and Hispanic immigrant population (36% growth for the Hispanics population and 28% for the Asians population between 1990 and 2000), major consumers of ethnic vegetables such as chile peppers¹⁵. The craving for adventure and intense flavors is also pushing mainstream consumers to explore ethnic cuisines, especially hot foods¹. As a result, consumption of new and spicy foods such as Indian, Moroccan, Thai and South Korean food, which use a large variety of chile peppers is rapidly increasing¹.

To satisfy the growing demand, both domestic production and import of chile peppers increased during the first part of the period analyzed. From 1980 to 1991, domestic production increased by 4% on average per year while import increased by 6% on average per year. In 1992, however, a year before the North American Free Trade Agreement (NAFTA) treaty was signed, U.S. chile pepper production started to decrease. From 1994 to 2009, U.S. chile pepper production decreased on average by 3.3% annually, while import increased by 5.5% on average annually during the same period. The implementation of NAFTA also resulted in a changed dynamic between major producing states.

The primary purpose of the paper was to analyze the changing dynamics in the supply and demand for chile peppers in the U.S. This analysis adds to the body of literature on chile peppers because there is currently no comprehensive analysis on the impact of NAFTA on U.S. chile peppers production, import, or export. Specifically, recent trends (1980-2009) in domestic chile pepper production and imports were analyzed, as well as historical

J. M. Gandonou is assistant professor of agribusiness and T. M. Waliczek professor of horticulture in Department of Agriculture, Texas State University.

demand and supply trends. The geographic shifts and changes in domestic production and the impact of NAFTA on chile pepper production and import were also evaluated.

Background

U.S. chile pepper production, consumption and imports - general trends: Data showed that U.S. demand for chile peppers has been steadily increasing over the past three decades. From 1980 to 2008, per capita disappearance for fresh-weight chile peppers more than doubled, increasing from 1.38 to 2.94 kg. During that period, production increased by only 18% and imports rose six fold (Fig. 1). Today, per capita consumption of chile peppers is higher than that of traditional crops such as asparagus, cauliflower, or green peas¹⁰.

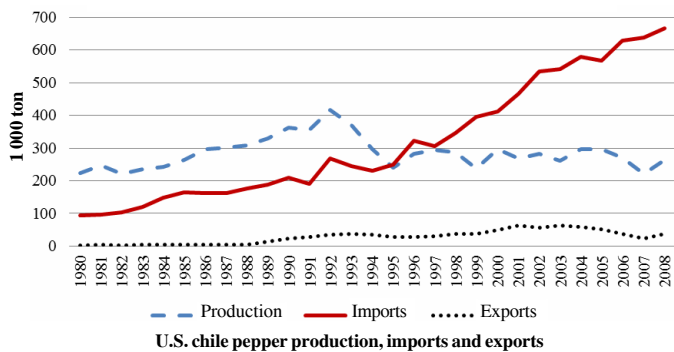


Figure 1. U.S. chile pepper production, imports and exports from 1980 to 2008 in the study of recent trends in U.S. chile pepper production, consumption and import and the potential market for Texas.

Trends in chile pepper production during the period of study, 1980 to 2009, have been uneven, with periods of growth and decline. From 1980 to 1992, domestic production covered about two-thirds of the demand. To respond to the rapid growth in demand (116% from 1980 to 1992), production grew by 87% (Table 1). Though lower than demand, the growth trend of the domestic supply almost paralleled that of the demand, suggesting that the supply was effectively responding to demand (Fig. 2). The coefficient of correlation between demand and production of chile peppers was 98%, and that of demand and import 99% from 1980 to 1992. Imported chile peppers primarily consisted of seasonal and exotic varieties⁵. The level of imported chile peppers was also growing faster than domestic supply, and likely driven by the consumption for exotic chile peppers (not produced domestically) by growing immigrant population.

From 1980 to 1992, chile pepper imports increased by 183%. In spite of the increased penetration of imported chile peppers into the domestic market, production remained strong. An increasing share of the U.S. production was destined for the export market. U.S. producers quadrupled their exports from 2.7 million kg in 1980 to 12.7 million in 1992 (Table 1). U.S. exports continued to increase as imports and domestic production begin to increase at a faster pace in the late 1980s and early 1990s (Table 1, Fig. 2). After 1992, however, U.S. chile pepper production experienced an abrupt decline and stalled. The announcement of the NAFTA treaty in 1992 had shock effect on the chile pepper market.

The implementation of NAFTA in 1994 had the biggest impact on the competitiveness of domestic chile pepper production. After 1994, the share of domestic production in total supply continued

Table 1. Chile pepper supply and disappearance in the U.S., 1980 to 2009 in the study of recent trends in U.S. chile pepper production, consumption and imports.

Year	Supply			Disappearance			
	Production	Imports	Total	Exports	Total	Per capita use	
	z/ 1,000 ton	y/ 1,000 ton		y/ 1,000 ton		Fresh-weight	Dry-weight
1980	223	95	318	3	315	1.38	0.28
1981	247	97	344	3	341	1.48	0.30
1982	221	104	325	3	322	1.39	0.28
1983	235	121	355	4	352	1.50	0.30
1984	243	148	391	3	387	1.64	0.33
1985	262	164	426	3	423	1.77	0.35
1986	296	163	459	4	456	1.89	0.38
1987	300	162	462	3	459	1.89	0.38
1988	307	176	483	4	480	1.96	0.39
1989	329	189	518	13	505	2.04	0.26
1990	362	210	572	24	548	2.19	0.27
1991	356	191	547	28	519	2.05	0.26
1992	417	269	685	35	650	2.53	0.32
1993	369	246	615	37	578	2.22	0.28
1994	296	230	526	35	490	1.86	0.23
1995	240	250	491	27	464	1.74	0.22
1996	283	323	607	28	579	2.15	0.27
1997	293	305	599	31	568	2.08	0.26
1998	287	347	634	38	596	2.16	0.27
1999	237	397	634	38	596	2.13	0.27
2000	297	413	710	49	660	2.34	0.29
2001	268	467	735	64	670	2.35	0.29
2002	283	534	817	56	761	2.64	0.33
2003	262	542	804	64	740	2.54	0.32
2004	295	579	874	59	815	2.78	0.35
2005	297	567	864	51	813	2.74	0.34
2006	271	629	900	36	864	2.88	0.36
2007	220	637	857	23	834	2.76	0.34
2008	263	665	928	37	891	2.92	0.37

⁴ERS estimates based on published and unpublished state data and AMS fresh shipments. California production includes pimientos through 1999.

⁵Bureau of the Census, U.S. Dept. of Commerce except imports for 1980-88 were estimated by ERS. Imports include fresh chiles and canned (conversion factor = 2.41) and dehydrated products on a fresh-weight basis (factor = 8.0). Imports exclude pimientos and paprika powder. Exports consist of dehydrated product converted to a fresh-weight basis, plus 10% of the fresh pepper/pimiento export category since chile exports are combined with bell peppers in Census export statistics.

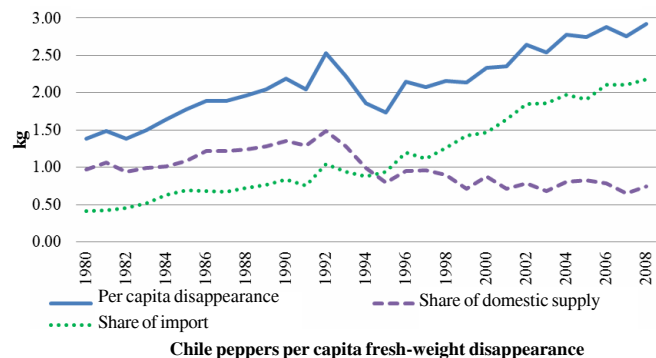


Figure 2. Chile peppers per capita fresh-weight average consumption and source (from domestic consumption or import) in pounds from 1980 to 2008 in the study of recent trends in U.S. chile pepper production, consumption and import and the potential market for Texas.

to decrease from 58% in 1994 to its lowest level of 25% in 2008 (Table 1). From 1994 to 2008, there was a negative correlation (-21%) between domestic production and consumption, and a positive one between demand and imports (96%). From 1980 to 1991, U.S. chile production increased by 46% to reach a peak production of 417 million kg in 1992. Production then sharply decreased from 1992 to 1994 between the announcement and implementation of NAFTA. Since 1995, it fluctuated around 272 million kg.

Characteristics of U.S. chile pepper production: U.S. chile production is characterized by a multitude of small producers dispersed across almost all states with a large producers concentrated in just a few states. In 2006 every state except Alaska reported having at least one farm producing chile peppers¹⁸. In most states, the production is carried out by small producers because chile peppers lend themselves to small-scale and part-time farming operations. The vast majority of U.S. farms produce for the fresh-market, which is labor intensive and requires the fruits to be handpicked four to five times during the harvesting season³. Except for chile peppers harvested to be processed, the plants are started in greenhouses and then manually transplanted in the field³. In the U.S., 94% of chile peppers are produced for the fresh market (Table 2) and their production has been rapidly growing to respond the sharp increase in demand.

Table 2. U.S. chile peppers harvested for sale during 2007^z and 2002^y in the study of recent trends in U.S. chile pepper production, consumption and imports.

Geographic area	2007					
	Harvested		Harvested for		Harvested	
	Farms	Ha	Farms	Ha	Farms	Ha
United States	6,124	15,124	466	9,421	5,780	5703
Pennsylvania	500	94	22	2	483	92.27
New York	472	132	28	6	458	126.3
Ohio	463	300	32	187	437	113.3
New Mexico	330	4,324	115	3,673	244	650.8
California	385	2,273	33	721	362	1552
Texas	177	2,435	29	1,925	150	510.7
Arizona	155	1,468	13	(D)	146	(D)

Geographic area	2002					
	Harvested		Harvested for		Harvested	
	Farms	Ha	Farms	Ha	Farms	Ha
United States	4,748	17,267	344	9,404	-	-
Pennsylvania	398	82	26	6	372	76.08
New York	358	90	11	6	347	84.18
Ohio	351	423	24	196	327	227.4
New Mexico	282	6,705	123	4,731	159	1975
California	396	2,108	19	554	377	1555
Texas	459	1,760	40	1,202	419	558.1
Arizona	58	2,005	12	1,503	46	502.2

^z USDA National Agricultural Statistics Service ¹⁷ Census of Agriculture Vol.1 Chap.2.

According to the Census of Agriculture¹⁶, 4,758 farms produced chile peppers on 42,666 acres during in 2002 (Table 2). In 2007, the reported number of farms was 6,124, a 30% increase in five years. Though the number of producers increased during the 2002-2007 period, the number of acres harvested decreased. In 2007, only 15,124 ha were harvested, a 12% reduction compared to 2002. In the majority of states, the number of producers increased in response to the increased demand for fresh market chile peppers.

With regard to the number of producers, Pennsylvania, New York and Ohio were the three states with the largest numbers in 2007. From 2002 to 2007, the number of chile peppers producers has increased in the three states. In 2002, the three states accounted for less than 1% of total acres harvested and 16% of the farms producing chile peppers. In 2007, however, they accounted for 3% of the acreage and 23% of the farms. These three states are dominated by small-scale farms producing an average of one acre of chile peppers primarily for the fresh market. Out of the 500 Pennsylvania farms producing chile peppers in 2007, 483 produced for the fresh market (Table 2). In New York and Ohio, farmers producing for the fresh market accounted for 98% and 94% of all the farms, respectively.

In contrast with states where small farms produce chile peppers for the fresh market, major chile pepper states produce primarily for the processed market. The four major producer states for the processed market are New Mexico, California, Arizona and Texas. Together, these four states account for 70% of the U.S. chile pepper acreage but only 17% of the farms (Table 2). These four states have very different production trends and specializations. While New Mexico leads the country in volume of production, California leads in value of production. These two states have adopted a new strategy in response to the new competitive environment created by NAFTA. For the remaining of this paper, chile pepper production trends in New Mexico and California, the major producing states will be discussed. The impact of NAFTA on U.S. chile pepper production and import will be analyzed.

Materials and Methods

Data collection: As shown in Table 1 chile pepper production and import data were collected to analyze the general trends in supply and demand, production, imports, exports and consumption⁵. Chile pepper production data for states that had the largest number of producers and/or the greatest volumes of production (number of farms, acres harvested, production, yield and fresh vs. processed markets) were also collected from the U.S. Department of Agriculture (USDA), Economic Research Service of the USDA (ERS), U.S. Department of Commerce and the U.S. Census Bureau (Table 2.). Additionally, import data from the main chile pepper exporter countries was collected, analyzed and sorted by the types of chile peppers imported (fresh vs. processed).

Regression analysis: To better understand the impact of the North American Free Trade Agreement (NAFTA) treaty on U.S. production and imports, four dummy variable models were developed: one for total U.S. domestic production, one for U.S. imports and one for each of the two largest producer states: New Mexico and California. The dummy variable (D) takes the value of "0" for the pre NAFTA years and value of "1" for the post-NAFTA years (1994). In equation 1, chile pepper production on the dummy variable:

$$Y_t = \beta_0 + \beta_1 D + \epsilon_t \quad (1)$$

where Y_t = U.S. chile pepper production in year t. The dummy variable D takes the value of 0 when the production or import year are between 1980 and 1993 and the value of 1 when the production or import year is between 1994 and 2008.

Results and Discussion

NAFTA and U.S. chile pepper production: Results of the dummy variable regression model showed that from 1980 to 1993, the average U.S. chile pepper production was 297,738 ton (Table 3). The estimated slope for post-NAFTA production was -70,307 ton. Therefore, mean U.S. chile pepper production after 1994 was significantly lower by approximately 70,307 ton than the mean production before 1994.

Table 3. Dummy variable regression models parameter estimates and standard errors in the study of recent trends in U.S. chile pepper production, consumption and import.

Region	Parameter Estimate (Standard Error)	
	Intercept β_0	Dummy β_1
U.S. Productio	297,738** (15,150)	-70,275** (21,410)
U.S. Import	16,674** (2,976)	29,229** (4,137)
New Mexico	257,427** (19,477)	-104,363** (27,084)
California	12,138** (4,772)	28,703** (6,632)

**Statistically significant at $p < 0.01$.

U.S. chile pepper imports before and after NAFTA: Chile peppers were one of the fastest growing specialty produce items in the 1980s and early 1990's¹⁰. While accounting for only 4% of the total per capita vegetable consumption in the U.S., chile peppers rank sixth in volume of vegetable imports after tomatoes, cucumbers, onions, bell peppers and squash. From 1992 to 1994, domestic production dropped by 29% and imports by 14%. Chile pepper imports exceeded domestic production in 1995, just a year after NAFTA was implemented. Domestic production continued to drop, reaching its lowest level of 624 million pounds in 1996, then, slightly recovered to stabilize around 600 million pounds (Fig. 1). Meanwhile, imports started to increase again and at a faster rate than pre-NAFTA rates. The estimated slope for U.S. imports shows that there was a significant increase in imports after 1994. The average import of chile peppers after 1994 was almost twice the average prior to that date. Twenty nine thousand tons were imported on average after 1994 compared to 16,783 from 1980 to 1994.

Fresh market chile peppers represent the vast majority of U.S. imports both in term of volume and value, with Mexico playing a dominant role (Table 4). Prior to NAFTA, the top exporters in volume of fresh market chile peppers to the U.S. in volumes after Mexico were non-NAFTA countries China, Pakistan, India, Netherlands, Thailand and Jamaica (Table 4). In 1990, Mexico was the top exporter to the U.S. with 64 million pounds, followed by China (624,467 pounds), Pakistan (61.3 tons), Jamaica (33.9 tons) and Thailand (29.6 tons). Fresh market chile peppers import represented 83% of the total volume of chile pepper imports with Mexico accounting for 97% of the total fresh market imports (Table 4).

In 2008, Mexico increased its dominance in fresh market exports to the U.S. by capturing more than 99% of the market compared to 98% in 1992, with the volume of exports increasing by nearly eight-fold during that period (Table 4). During the same period, the Dominican Republic emerged as the second largest exporter, followed by Canada and China. The Dominican Republic started

increasing its exports to the U.S. after it joined the Dominican Republic-Central American Free Trade Agreement (DR-CAFTA) in 2004. Trade agreements and geography appear to be the primary factor that determine competitiveness in U.S. chile pepper imports.

The factor defining competitiveness after geography and trade agreements in the fresh chile pepper market appears to be cost. A few years after NAFTA, non-member countries were still major exporters to the U.S. In 1996, when imports started to increase at a faster pace, India, China and the Netherlands were among the top five exporters of chile peppers to the U.S. In spite of its geography and the non-existence of trade agreements for vegetable exports to the U.S., China remains the fourth largest exporter, primarily because of its low production costs, which are by far the lowest of all top exporters to the U.S.⁶. In 2007, Chinese chile pepper producers cost was just 4% (1/23) that of Canadian producers, 22% of Mexican producers and 28% of Dominican producers, respectively⁶.

Lower production costs also kept Mexico competitive in the fresh chile market. Over the past five years, prices paid for Mexican chile peppers on average have fluctuated between 30% to 50% of those paid for American peppers⁶. Also, the Mexican government has heavily invested in the development of a new and vibrant Mexican vegetable export sector oriented to the United States. Canadians have also relied on lower cost to be competitive. Lower energy costs enabled them to produce high value, off-season crops in greenhouses.

NAFTA and DR-CAFTA countries competitive edge in exports to the U.S. was, however, limited to fresh produce. Different factors affect the processed chile pepper market (data reported are limited to canned chile pepper imports; dried chile pepper data are not reported). In the processed market, geography no longer determines competitive edge in the U.S. market. Once an important player in the canned chile pepper export market, Mexico has become a minor player. In 1992, Mexico exports represented 48% of total exports to the U.S., but dropped to only 12% in 2007 (Table 4). Turkey, the third largest producer of chile peppers in the world after China and Mexico, has become the primary exporter of canned chile peppers, accounting for 46% of all U.S. imports in 2006 but only 29% in 2007 (Table 4). The top five exporters of canned chile peppers to the U.S. were Mexico, Columbia, Israel, Honduras, and Greece in 1992. In 2007, Mexico's position dropped to fourth after Turkey, Peru and Greece.

New Mexico production: New Mexico has long been the most dominant chile pepper producing state in the United States. The states share (in volume) of the total U.S. production rose from 76% in 1980 to 95% in 1991 (Fig. 3). After NAFTA, that share progressively decreased to 55% in 2002 and 46% in 2007. Results from the dummy regression shows that the reduction in production by 104,363 tons after NAFTA (from 1994 to 2008) was statistically significant at the 1% level of significance.

The progressive decline in the states competitiveness in the chile market is largely explained by New Mexico's proximity to Mexico. It has the same climate as Mexico, so it produces the same types of peppers and harvests them at the same time of the year. However, its production costs are much higher than that of Mexico, mostly due to higher labor costs.

To compete with Mexico, New Mexico State University formed a chile task force to identify and implement ways to keep chile

Table 4. U.S. fresh and canned chile peppers imports from 1990-2007 ² in the study of recent trends in U.S. chile pepper production, consumption and import.

Country	Canada	China	Dominican Rep.	India	Jamaica	Mexico	Netherlands	Thailand	
Years	Fresh (ton)								
1990	18	283	28	14	34	29,157	23	28,933	
1991	-	164	28	169	42	35,440	71	42,480	
1992	-	80	161	200	38	35,088	726	--	
1993	-	12	80	6	23	36,893	936	--	
1994	4	-	75	46	14	34,079	1,177	--	
1995	-	56	32	12	1	48,153	234	--	
1996	221	32	99	405	15	87,797	27	--	
1997	108	-	112	211	27	105,672	44	--	
1998	349	2	106	381	8	110,283	38	--	
1999	976	9	77	125	8	128,920	27	1,474	
2000	5	-	6	73	-	135,462	22	--	
2001	56	55	3	65	1	148,240	12	--	
2002	5	67	88	122	24	150,278	263	--	
2003	169	48	47	-	-	158,090	91	--	
2004	0	67	180	3	1	175,970	293	--	
2005	0	238	154	1	-	182,813	207	--	
2006	215	268	269	1	7	191,990	59	--	
2007	418	242	838	2	21	228,917	62	--	

Country	Chile	Colombia	Greece	Honduras	Israel	Mexico	Peru	Thailand	Turkey
Years	Canned (ton)								
1990	36	1,622	285	423	505	2,624	34	66	-
1991	29	779	345	414	644	2,850	14	7	-
1992	183	1,020	249	569	693	3,177	6	5	58
1993	252	3,043	1,293	825	484	2,717	6	6	159
1994	227	1,588	1,250	480	14	2,996	14	39	91
1995	374	1,624	931	533	94	3,086	63	26	374
1996	145	1,353	586	559	54	3,143	56	30	521
1997	90	824	282	519	43	3,195	62	36	609
1998		1,468	787	563	20	3,119	69	28	1,442
1999	51	2,677	682	308	35	4,999	70	30	1,520
2000	272	1,283	596	713	57	3,823	72	51	1,735
2001	568	2,267	455	507	53	5,017	118	79	1,369
2002	1,486	166	383		46	5,602	131	59	1,372
2003	3,337	-	223	-	65	4,677	190	47	2,445
2004	2,673	-	174	-	56	5,096	1,640	44	4,535
2005	2,795	-	92	-	56	6,979	3,694	25	6,747
2006	2,827	62	986	-	82	6,094	2,574	30	12,683
2007	2,424	17	4,048	-	93	3,194	5,119	24	7,797

Source: Compiled by USDA, ERS from data of U.S. Dept. of Commerce, U.S. Census.
² USDA, ERS data from U.S. Dept. of Commerce and U.S. Census Bureau.

pepper production profitable in New Mexico ⁸. Efforts by the industry and state have developed chile harvesting equipment that will improve efficiency. After a sharp decline from 1998 to 2001, New Mexico's chile pepper production increased again but only for a few years. This jump in yield was due in part to the introduction of new high yield cultivars ¹³. In 2005, the states production decreased again. Overall, production has increasingly shifted from the more profitable, but labor intensive fresh-market,

to producing chile peppers for processing that can be mechanically harvested. In 2002, New Mexico harvested 6,705 ha acres of chile peppers, 70% of which were for processing. In 2007, out of the 4,324 acres harvested, 85% were dedicated for the processing industry (Table 2). Yields in 2007 were 30% lower when compared to their 1992 levels (Fig. 4). To support its existing chile pepper processing industry, New Mexico had to also import an unspecified amount of fresh chile peppers from Mexico ⁴.

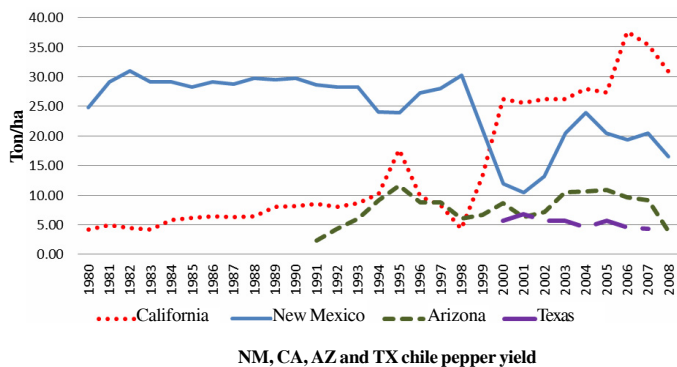


Figure 3. U.S., New Mexico, California, Arizona and Texas chile pepper production^{2,y} from 1980 to 2007 in the study of recent trends in U.S. chile pepper production, consumption and import and the potential market for Texas.

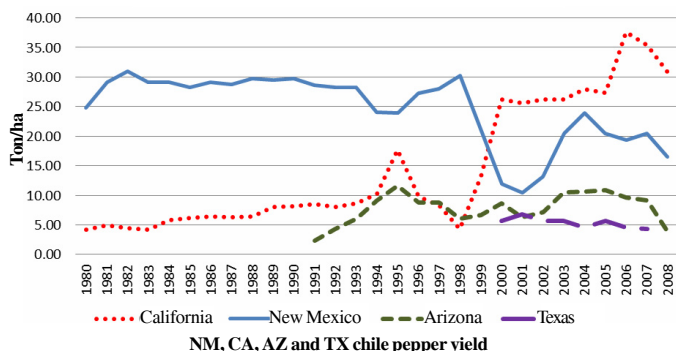


Figure 4. Comparisons of California, New Mexico and Texas chile pepper yields^{2,y} from 1980 through 2007 in the study of recent trends in U.S. chile pepper production, consumption and imports and the potential market for Texas.

California production: Contrary to New Mexico, California continued to increase its chile pepper production over the past 15 years, especially for the fresh market. Prior to NAFTA, California contributed only 5% of the total U.S. chile pepper production, but that figure progressively rose to 10% in 1996 and to 30% in 2002. In 2007, California production accounted for 38% of the U.S. production and 52% of its overall value⁵, essentially due to increase in yield. In 1980, the average yield obtained on a one hectare field was 4.16 to compared to 24.79 for New Mexico (Figs 3 and 4). From 1980 to 1990, California chile crop yields increased by 93% to reach 8.11 ton/ha while they 29.7 ton/ha for New Mexico. As yields in California rose from 26.2 ton/ha in 2000 to 37.6 in 2006, New Mexico's yield decreased to stabilize around 20 ton/ha. From 2002 to 2007, the number of acres harvested in California only increased by 8% while production increased by 40%. The rapid increase in California's share of the U.S. total value of production is due its continued concentration on the fresh market. A survey of Mexican and Asian restaurants conducted in the Austin and San Antonio areas demonstrated the importance of California fresh market chile pepper production in the U.S. supply chain. All survey respondents indicated that they received their shipments of chile peppers from either California or Mexico⁷.

One important factor responsible for California's success in fresh market chile production is a less variable climate, which reduces the risk of crop damage¹².

Texas production: Risk of weather damage is higher in climates that experience dramatic changes like those of New Mexico and Texas¹⁴. Like New Mexico, Texas had to face the new competitive environment created by NAFTA.

In 2009, Texas was the third largest producer of chile peppers with 2,145 ha grown in the El Paso and Dell valleys². New Mexico grew 4,978 ha, California produced 2,307 ha and Arizona grew 3,500 acres of chiles². While jalapenos are produced throughout Texas, other specialty Asian and Mexican varieties are grown in the Rio Grande Valley, the El Paso area and in the High Plains¹⁴. However, over the past decade, Texas has seen a progressive decline in overall chile pepper production.

Chile production is a costly crop in Texas because of high labor costs, which makes competition with Mexico difficult. Similar to New Mexico, developing better equipment for the pepper industry has allowed more production to occur in Texas¹⁴. However, the number of producers is declining (Table 2 and Fig. 3).

Additionally, nematodes and fungus pathogens are prominent pest problems, while drought is a restricting environmental variable. However, new cultivars of several chile peppers created by breeding are better adapted to the climate and problems specific to Texas¹¹.

Conclusions

This study found that U.S. demand for chile peppers has been growing at a fast pace over the past two decades, driven by the rapid increase in the ethnic population and changing consumers tastes. As U.S. chile pepper farmers were expanding production in response to the increased demand, the positive production trend came to a sudden end with the implementation of NAFTA. With the removal of all barriers to the trade of fruits and vegetables across U.S., Mexican and Canadian borders, NAFTA member countries used their competitive advantage to dominate the U.S. chile pepper market. Domestically, the major producer states further specialized in the production of chile peppers for the fresh market in California, and for the processed market in New Mexico.

For local farmers looking to diversify their production, chile peppers represent a good alternative, as demand for locally and organically produced food has increased. It is a high value and labor intensive crop conducive to small and medium-sized farms. More pepper production occurring in Texas will enhance consumers feelings of product safety and will allow for consumers to support regional and local economies¹¹. Given the competitive environment on the fresh market, producers will have to target niche markets with new varieties.

Due to the relatively small size of the industry, there was no data available related to the proportion of processed and fresh market chile peppers. Most farms produce for both the fresh and processed industries given that less than half of the fresh market production will be acceptable quality, with the remaining acreage used for the processed market. There is no data for the price paid by processors. The difficulty of obtaining quality data is further complicated by the proportion of chile peppers for processing imported from Mexico. U.S. processors increasingly import chile peppers for processing in undisclosed quantities.

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