

**Poisoned Apples?: Examining the Environmental and Trade Justice of the  
Chile - United States Apple Trade**

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## **Introduction**

Chile is among the world's leading producers of apples and is the producer of about one half of the southern hemisphere's fresh fruit.<sup>1</sup> Chilean apples destined for export make up a large part of Chile's agricultural exports, with agriculture accounting for around eight percent of Chile's gross domestic product (GDP).<sup>2</sup> An analysis of the relationship between the United States' apples and Chile's apples through their trade presents a particularly interesting case study in trade and environmental justice analysis, especially with regard to the natural environment of Chile. The apple industries in Chile and the US are intricately interwoven. Chile's exports of apples to the US in 2008 totaled 770,708.2 tons and were worth \$670,625,900.<sup>3</sup> The United States relies on Chilean apples to support its population's "healthy" eating trends (the average U.S. citizen consumes about fifty pounds per year of apples<sup>4</sup>), and Chile has come to rely on the U.S. for much of its income from apples. In comparison with the United States, the world's largest importer of fresh fruit,<sup>5</sup> Chile imports none of its apples, and hardly any of its fresh fruit, a practice which can support local growers and fair labor practices, contribute to balanced trade, allow for consumption of fresher, more natural fruit, use less fossil fuel in transportation of perishable goods, and allows for a deeper, closer relationship with the natural environment for the consumers of apples. The reasons behind this relationship require an analysis and synthesis of history, trade theory, agricultural practices, and environmental science.

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<sup>1</sup> Chilean Fresh Fruit Association. "Chile and Its Fruit Industry." <http://chileanfreshfruit.com>. Santiago, Chile: 2009.

<sup>2</sup> "Producto Interno Bruto por Clase de Actividad Económica (cifras sobre año base 2003) [spreadsheet]." Oficina de Estudios y Políticas Agrarias y Banco de Chile. Accessed 2009.

<sup>3</sup> Oficina de estudios politicas agrarias

<sup>4</sup> United States Department of Agriculture (USDA). <http://www.usda.gov/> (See Table.)

<sup>5</sup> Chilean Fresh Fruit Association, 2009. (See Figure.)

This work will examine the relationship between U.S. and Chile, focusing on apples as a way to examine not only trade justice as it relates to aesthetic requirements, unbalanced use of pesticides and inorganic fertilizers, and favorability toward owners of larger plots of land, but also environmental justice as it relates to transport of goods, environmental law and standards, exposure of land and people to harmful chemicals, and food sovereignty.

Beginning by examining the current state of the U.S. – Chile apple trade and its implications for environmental harm and trade injustice, this paper will delve deeper into the U.S. – Chile relationship by covering the history of trade relations and land use in Chile, showing the evolution of the Chilean apple trade and its implications for the environment and the farmers in Chile, and exploring solutions for the reorganization of the Chilean apple industry to take into account Chilean and U.S. agricultural producers, the natural environment, and fair trade balances between countries whose free trade agreement suggests the desire for trade equity.

Overall, this paper will trace how the apple export industry has grown along with the Chilean economy in the past few decades, subject to larger agricultural policies which lack attention to the specific needs of the industry, its workers, and the environment. The main argument of this paper will show that the U.S. bilateral FTA with Chile, signed in 2003, only furthered the difficulties experienced by small farmers in their sudden thrust into international markets; while the politics of the US Chile agricultural trade have been the subject of much discussion, environmental justice to the workers, farmers, and consumers of Chilean apples has been ignored, even though models of fair trade, producer cooperative agreements, and organic production both from Chile and other developing nations show possible positive, environmentally just outcomes.

Establishing the significance of environmental justice will be key to the concept development of this paper. A topic first breached in October of 1991 at the First National People of Color Environmental Leadership Summit in Washington, DC, environmental justice seeks not only to protect the environment, but also the people who may be unequally and unfairly affected by its degradation.<sup>6</sup> Proponents of environmental justice oppose the destruction of native and original communities and communities of color, the unequal distribution of land, military occupation of native lands, experimental medical treatments on native people and people of color, and demand respect for all peoples and the land they inhabit in the interest of providing for mankind today and in generations.<sup>7</sup> In terms of the Chile – U.S. apple trade, environmental justice refers to: the unequal application of pesticides and fertilizers in Chile versus in the United States; the implications for land ownership, especially for small and traditional farmers, of neoliberal trade agreements.

### **Current State of Chile-U.S. Apple Trade**

#### **Statistics and facts about US and Chile apple industries**

While Chile and U.S. apple exports are comparable in terms of volume (See Attachment 1, Chile and U.S. Apples Spreadsheet), Chile exports about half of the apples it produces, while the United States exports only about one quarter of its domestically produced apples. Around one fourth of the fruit Chile exported in 2007 was destined for the U.S. (See figure)

Growing conditions are best for apples in the U.S. states of Washington, New York, Michigan, Pennsylvania, California and Virginia<sup>8</sup> and primarily from the fifth to the eighth regions of Chile (respectively the regions of Valparaíso, Rancagua, Maule, Bío Bío) and the

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<sup>6</sup> First National People of Color Environmental Leadership Summit. “Principles of Environmental Justice.” Washington, DC: Oct. 2001.

<sup>7</sup> “Principles of Environmental Justice.” 2001.

<sup>8</sup> United States Apple Association. “Industry Profile.” Vienna, VA: 2009. <http://www.usapple.org>

Metropolitan Region (RM) around Santiago.(See Attachment 2: Map of Chile) Many more varieties of apples are grown in the U.S. (about 100) as compared with Chile, whose main apple production is comprised of about 7 varieties of apples.<sup>9</sup> The most produced varieties in the U.S. are Red Delicious, Golden Delicious, Gala, and Fuji, with new varieties such as the Honeycrisp gaining popularity among U.S. consumers.<sup>10</sup> Similarly, the varieties with greatest production in Chile are the Fuji, Royal Gala, Granny Smith, “Red Chief,” Braeburn, Red Delicious, and Red Starking varieties.<sup>11</sup> (See Figure: Chilean Growing Season)<sup>12</sup> While the large range of latitudes in Chile allows apples to be available for consumption from February to December (all but the hottest, driest summer months),<sup>13</sup> apple availability in the United States is much more limited to the fall months of August through September.<sup>14</sup> Apples can be produced in the United States at other times of the year, but not on such a large scale.

The counterseasonality that results from the opposite season cycle in the northern and southern hemisphere, along with the promotion of trade policies that ease restrictions between Chile and the United States have allowed for increased imports of Chilean apples into the U.S. (See Attachment 1.), and Chilean agricultural GDP is expected to increase between one and two percent this year, with fruit projected to rise three to four percent.<sup>15</sup>

### **U.S. Chile Apple Trade Relationship (2003-Present)**

The statistics of apple production, importation and exportation in Chile and the U.S. fit within the wider framework of trade relations between the two countries. The most recent and

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<sup>9</sup> Oficina de Estudios y Políticas Agrarias (ODEPA). Various Publications. Gobierno de Chile: Ministerio de Agricultura. Santiago, Chile: 2009. <http://www.odepa.gob.cl>

<sup>10</sup> United States Apple Association, 2009.

<sup>11</sup> ODEPA, 2009.

<sup>12</sup> Chilean Fresh Fruit Association, 2009.

<sup>13</sup> Chilean Fresh Fruit Association, 2009.

<sup>14</sup> NY-NE Apple Institute. “Seasons of Apple Growing.” Wisconsin Apple Growers Association. Oregon, WI. [www.waga.org/pdf\\_files/seasons.pdf](http://www.waga.org/pdf_files/seasons.pdf).

<sup>15</sup> Martínez, Rodrigo & Morales, Magdalena. “Producción agrícola Chile crecería entre 1 y 2 pct 2009: gremio.” Reuters: Mar. 24, 2009.

relevant aspect of these relations is the signature of a major trade agreement in 2003. Just as U.S. apple producers were recovering from a downturn lasting from 1996 to 2001, the U.S. and Chile entered preliminary negotiations for a bilateral free trade agreement (FTA).<sup>16</sup> The U.S. apple industry received help from the federal government in 2001 and 2002<sup>17</sup>, and the Chile – U.S. FTA was signed by the respective administrations of Ricardo Lagos and George W. Bush, in 2003. While the FTA was not centered on the apple trade between the two countries, it certainly affected this aspect of their trade relationship.

### **Chile – U.S. Free Trade Agreement, 2003**

A general explanation of the agricultural tenets of the 2003 Chile – U.S. FTA is warranted to provide a background for the subsequent labor and environmental effects on the Chilean and U.S. apple industries. Major pressure was put on Chile by the U.S. to sign an agreement of the sort they had already negotiated with the European Union (EU) and Canada, and pressure from within Chile came from the current president's desire to negotiate an agreement his predecessors could not.<sup>18</sup> Since it was signed, both Chile and the U.S. have trumpeted the agreement as great progress for bilateral diplomacy,<sup>19</sup> but by examining the specifics of the agreement, portions can be identified which show a clear U.S. advantage. The main points in the FTA that were more beneficial to the U.S. than Chile were the removal of Chilean price bands and other protections for local Chilean products, allowance of continued protectionist policies by the U.S., and the promotion of uneven labor and environmental policies.

### **Price Bands and Other Chilean Product Protections**

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<sup>16</sup> United States Apple Association, 2009.

<sup>17</sup> United States Apple Association, 2009.

<sup>18</sup> Leight, Jessica. "The Political Dynamics of Agricultural Liberalisation in the US-Chile Free Trade Agreement." *Journal of Latin American Studies*. No. 40, p. 225. Cambridge, UK: 2008.

<sup>19</sup> Mulligan, Mark. "Chile hails trade deal as finest moment: A bilateral agreement with the US should spur much-needed foreign investment and modernisation." *Financial Times*. London (UK): Dec. 17, 2002. pg. 8.

Before the 2003 FTA, many export-destined commodities in Chile were stabilized against sometimes volatile world market prices by Chilean price bands. The price band system, used in Chile since the economic crisis of the early 1980s, established annually determined price floors and ceilings equal to the average international price from the previous five years, and adjusted for tariffs.<sup>20</sup> The bands were kept in place in the Chilean FTAs with Canada and the EU,<sup>21</sup> and had long been a source of contention with Chile's Latin American neighbors, especially Argentina.<sup>22</sup> Elimination of Chile's price bands in the U.S. FTA was a concession to the U.S. government and to large southern Chile landowners (producers mainly of grain, animal, and forest products) who wanted to decrease their prices in the U.S. market. On the other hand, the price band concession hurt small farmers all over Chile, since they could no longer depend on the price floors which protected them from sudden drops in market prices for their commodities.<sup>23</sup> Although the FTA allowed for a phasing out of the bands, this provision only slowed the blow to small agriculturalists. The bands were to begin the phase-out in 2008 and be completely gone by 2014. This timeline makes the present a particularly key time for examining the effects of the FTA on Chile's apple trade.

In addition to the price band concession made by Lagos' government, the Chile – U.S. FTA specified that the existing price bands could not legally result in the less favorable treatment of U.S. products or producers. Furthermore, the agreement undermined protection for Chilean products that required U.S. investors to purchase Chilean rather than U.S. goods.<sup>24</sup>

## **U.S Protectionist Policies**

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<sup>20</sup> Leight, 2008.

<sup>21</sup> Office of the United States Trade Representative. "Free Trade with Chile: Summary of the U.S.-Chile Free Trade Agreement." United States Department of Agriculture: Foreign Agricultural Service. Dec., 11, 2002.

<sup>22</sup> Leight, 2008.

<sup>23</sup> Leight, 2008.

<sup>24</sup> U.S. Trade Representative, 2002.

In addition to removing Chilean safeguards put in place to help domestic products compete in the global marketplace, the FTA included provisions which enhanced the competitiveness of U.S. products. A “safeguard” provision was added to protect U.S. goods against market prices lowered by increases in Chilean imports.<sup>25</sup> While subsidies between the two countries were eliminated, the U.S. was entitled to “the right to respond if third countries use export subsidies to displace U.S. products in the Chilean market.”<sup>26</sup> These parts of the FTA were rights awarded to the U.S., but not to Chile.

### **Uneven Labor and Environmental Policies**

The Chile – U.S. FTA maintained that the labor and environmental laws of each respective country be upheld and enforced.<sup>27</sup> On the surface, this tenet appears to benefit the population of Chile. However, the labor and environmental laws in Chile are more lenient and less enforced than those of the U.S., and instead of holding Chile to the higher, U.S. standard, the U.S. – Chile FTA allowed for the continuation of weaker laws that lack viable protections for women and minorities. Also, with some estimates of Chile’s informal economy at up to 20% of the total economy<sup>28</sup>, a provision in an international agreement fails to reach much of the working population.

The Environmental Impact report performed by the Office of the U.S. Trade Representative detailed further the requirements for environmental protection in the agreement, but was largely a formality with little real force. The report acknowledged the some of the dangers of pesticide use in an increase in agriculture exports, but concluded that damage would be “minimal.” Enforcement of environmental laws in each country remained a core requirement,

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<sup>25</sup> U.S. Trade Representative, 2002.

<sup>26</sup> U.S. Trade Representative, 2002.

<sup>27</sup> U.S. Trade Representative, 2002.

<sup>28</sup> Schneider, Friedrich. “Te Size of Shadow Economies in 145 Countries from 1999 to 2003.” Johannes Kepler University of Linz. Linz-Auhof, Austria: Dec., 2004.



but the report did not outline a plan for monitoring these laws. The report focused more heavily on the possible impact of technology transfers of “environmental technologies (goods and services)” and the eight “initial environmental cooperation projects” intended to improve the state of the natural environment in Chile.<sup>29</sup> These parts of the agreement, while posed in a beneficial light, did nothing to improve the environment in Chile, but rather required the enforcement that, in theory, was already taking place.

Despite many negative implications for Chile and its environment, the Lagos administration hailed the Chile – U.S. FTA one of its “finest moment[s],” with only thirteen of 168 members of the Chilean congress voting against its ratification. The government knew that the “productive investments” that the deal would bring would largely benefit already well-established corporate players, and that “small and medium sized businesses would need foreign investment before they could modernize enough to be competitive” in new markets.<sup>30</sup> In an attempt to quiet the doubts of agricultural critics, the government commissioned an inter-ministerial commission was formed “to examine how to strengthen agricultural competitiveness in the face of the free trade agreements.”<sup>31</sup> Outspoken advocates of farmers, however, continued their criticisms of the agreement.

Even though agriculture in general was projected to benefit from the FTA,<sup>32</sup> critics of the agreement said that the traditional agricultural system would prove to be weak in comparison with that of the U.S.<sup>33</sup> Already perceived by many as an imperialist intervention, the FTA eliminated the last government aid to small farmers (the price bands) and resulted in “large

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<sup>29</sup> “Final Environmental Review of the U.S.-Chile Free Trade Agreement.” Office of the U.S. Trade Representative. Jun., 2003.

<sup>30</sup> Mulligan, 2002.

<sup>31</sup> Leight, 2008.

<sup>32</sup> Mulligan, 2002.

<sup>33</sup> Leight, 2008.

numbers abandoning the sector entirely.”<sup>34</sup> Various spokespeople for small agricultural producers criticized what they viewed as the government’s concession to the U.S. through the FTA, issuing statements condemning the government’s “lack of a ‘specific and focused’ policy for small producers” and even accusing the national government of intentionally “destroying small agricultural production and forcing its producers into the salaried workforce,” of poor, temporary workers constituting the “semi-urban poor.”<sup>35</sup>

### **Current Context**

Since the enactment of the Chile – U.S. FTA in 2003, apple exports from Chile to the U.S. have become more volatile, varying more widely from year to year than they previously had.<sup>36</sup> This unpredictability has caused more difficulty for small farmers, who depend more heavily on a steady market than larger producers do.<sup>37</sup> Even though the Chilean fruit industry is projected to grow, financing difficulties and climate risks are forecasted difficulties facing the industry, and Chile’s economy in general, in the coming year. While trade negotiations continue to develop, the leftist government of Chile, dubbed “socialist” by many outsiders, struggles to merge its economic desire to continue trade liberalization with its political need to uphold its “reputation as supporter of the poor and disadvantaged,”<sup>38</sup> especially during a global economic crisis. Some scholars argue that the crisis we face now can be described as “a lose-lose situation, in which all countries suffer but where the poorest will suffer most.”<sup>39</sup> Although a restructuring of the Chile – U.S. FTA, since it is a bilateral agreement between countries highly unequal in terms of global economic and political influence, Chile’s citizens and natural environment stand

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<sup>34</sup> Leight, 2008.

<sup>35</sup> Leight, 2008.

<sup>36</sup> ODEPA, 2009. (see attachment 1)

<sup>37</sup> Casaburi, Gabriel G. Dynamic Agroindustrial Clusters: The Political Economy of Competitive Sectors in Argentina and Chile. St. Martin’s Press: 1999.

<sup>38</sup> Leight, 2008.

<sup>39</sup> Gurría, Angel. “Doha: The Low Hanging Fruit.” OECD Observer. No. 257. Oct. 2006.

to benefit from the addition of policies which promote infrastructure and general development projects for Chile.<sup>40</sup> A brief history of the Chile's political and trade relationships with regard to agriculture provides specific suggestions for such projects and policies to benefit Chile's environment through application of social justice policies.

### **Apples and Chilean Economic Growth; Implications for Environmental Justice**

#### **Origins**

From the colonial era and onward, Chile, especially its fertile central valleys, represented a haven from the dangerous and difficult tropical jungles of much of the new world. Spanish conquistadors struggled to establish themselves in the region of Santiago, the outer limits of the Inca Empire, due to the fiercely territorial natives in the south, the Mapuche. Once stably founded, however, the Spanish proceeded to set up a colonial system similar to much of the rest of Latin America. This system divided the land (the most valuable resource to the Spaniards, once they gave up their futile search for Chilean gold) into large tracts owned by rich overlords. This patriarchal system of elites endured until the 1960s, when changes in Chile's political landscape began to take place.<sup>41</sup> These changes led to a "boom" in the production of fresh fruits. The main factors that contributed to this surge in fruit production and exportation were: "a far reaching agrarian reform process, a state-led programme to promote fruit-growing for world markets, and a radical liberalization of the economy."<sup>42</sup>

Agricultural reform in Chile has a long legacy of class struggle and civil rights. In response to a decade of increasingly radical socialist policies designed to redistribute the large portions of land owned by absentee landowners, Augusto Pinochet's newly self-empowered

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<sup>40</sup> Gurría, 2006.

<sup>41</sup> Villalobos, Sergio. Breve historia de Chile. Editorial Universitaria, S.A. Santiago, Chile: 1998.

<sup>42</sup> Casaburi, 1999.

military regime enforced a brutal and violent dissolution of new cooperatives and networks.<sup>43</sup> Cutting off “virtually all forms of government assistance to small farmers,” Pinochet’s agricultural agenda reflected the influence of northern neoliberal ideals and a “limitless affinity for free markets.”<sup>44</sup> This stagnation of what could have turned out to be a beneficial, functioning and just agricultural economy “triggered a process of technological decline, lower yields and increasing indebtedness among small producers that rendered their accession to the export market largely impossible and drove many [small landowners] into bankruptcy.”<sup>45</sup> This evolution led to buy-outs by large investors who turned their productive capacities to fruit exportation, while small landowners were left out of the export crop industry.

Until an acute economic recession struck Chile in the early 1980s, the dictatorship saw no reason to reevaluate these agricultural policies. Increasing unrest in the agricultural sector divested by the recession, however, led to an uncharacteristic move by Pinochet to create state support programs for agricultural credit lines, technological transfer and, most significantly, stabilization of agricultural prices. At this time, the price band system was created, and a policy of export diversification allowed for fruit production to grow.<sup>46</sup> These policies, while unexpected from a neoliberal dictator, did little to upset the newly reinforced traditional system in which large landowners profited most.

Due to structural adjustment policies mandated by global financial institutions in return for a restructuring of Chile’s post-dictatorship debt, pressure was placed on Chile to further increase production of commodities, like agriculture.<sup>47</sup> These intentions stimulated the apple

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<sup>43</sup> Leight, 2008.

<sup>44</sup> Leight, 2008.

<sup>45</sup> Leight, 2008.

<sup>46</sup> Russi, Daniela et al. “Material Flows in Latin America: A Comparative Analysis of Chile, Ecuador, Mexico, and Peru, 1980–2000.” *Journal of Industrial Ecology*. 2008: Vol. 12; Iss. 5-6.

<sup>47</sup> Mendis, Asoka & Van Burs, Caroline. “Bitter Fruit: Attractive Supermarket Displays of Tropical Fruit Conceal Ugly Environmental and Social Costs.” *Alternatives Journal*. Waterloo: [Fall 1998](#). Vol. 24, Iss. 4; pg. 18.

industry by promoting new investment. With investment increasing in the early nineties, “medium sized” farms of 10-500 hectares became the most prevalent in fruit production.<sup>48</sup> These were the most productive model for fruit production because small farmers could not profit in the liberalized and largely uncontrolled market, and the largest producers could not ensure the quality needed over the expanse of their land.<sup>49</sup>

The democratically elected administrations that have governed Chile since the fall of the dictatorship in 1989 “have repeatedly sought to emphasize their commitment to the free market economic model implemented by the military regime in an attempt to demonstrate their economic credentials to both the domestic business elite and international investors.”<sup>50</sup> Although the size of apple production operations is not as large as for other crops like grains and dairy, the top-down system of decision making in Chilean business prevents the farmers themselves from having significant power over their business decisions. Since there are no incentives for smaller entrepreneurial creation, the revival of smaller farms seems unlikely without further policy initiatives.<sup>51</sup>

Even after many agriculturalists have voiced their disappointment with the MERCOSUR South American trade agreement signed in 1996, Chile’s government fears that any major restructuring of agricultural practices could jeopardize their position as one of the “largest economies in the subcontinent and part of the group of upper-middle income developing countries.”<sup>52</sup> This hesitation on the part of the Chilean government leads to many undesirable social and environmental outcomes, which degrade the human and natural resources of Chile.

## **Environmental Effects**

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<sup>48</sup> Casaburi, 1999.

<sup>49</sup> Casaburi, 1999.

<sup>50</sup> Leight, 2008.

<sup>51</sup> Casaburi, 1999.

<sup>52</sup> Russi et al, 2008.

The environmental effects of any large agricultural industry can add up to a considerable effect on the natural environment, but the specific nature of the production of apples for exportation signifies a greatly negative impact on the environments in which they are produced. Additionally, the storage and transport of these apples releases greenhouse gases like carbon dioxide (CO<sub>2</sub>) in the world's atmosphere.

The modern structure of most agricultural systems is linear rather than cyclical. Many inputs are needed to produce crops, and many outputs are created during their production. The “Green Revolution” of the post-WWII era attempted to address a growing global population by increasing food production using concentrated inputs of petroleum based fertilizers, irrigation, and chemical pesticides.<sup>53</sup> As some scholars point out, the Green Revolution's short term increases in food production “worked [economically] only as long as fuel was cheap and water was abundant.”<sup>54</sup> This economic argument makes sense, in that fuel prices have risen, but is not the underlying cause of the Green Revolution's harm to the environment.

Excitement over the Green Revolution's gains simply hid the truth that a linear system with so many unnatural chemical inputs must inevitably discharge them as outputs. As a study of material flows points out, every economic action contributes to a social metabolism whose efficiency dictates the sustainability of an economic practice: “an economy in a biophysical sense is seen in analogy to an organism, which extracts high-quality materials and energy from the environment, processes them, and then returns them to the environment as low-quality residues.”<sup>55</sup> These residues can manifest locally, regionally, and globally. Environmental degradation caused by the Chilean apple industry shows an integration of these consequences:

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<sup>53</sup> Pollan, Michael. The Omnivore's Dilemma: A Natural History of Four Meals. Penguin Press. New York, NY: 2006.

<sup>54</sup> LaSalle, Tim; Hepperly, Paul; & Diop, Amadou. “The Organic Green Revolution.” Rodale Institute. 2008.

<sup>55</sup> Russi et al, 2008.

the local ecosystems of Chile are disrupted by pesticide use and soil degradation, while the greenhouse gases emitted through the storage and transportation of apples contribute to global climate change.

Chile's economic and social histories have transformed the country's agriculture from subsistence farming to production largely for export. These sudden changes which occurred in the second half of the twentieth century have, in conjunction, constructed a system which profits from environmental degradation and makes sustainable agriculture difficult. As exporters, Chilean apple producers must comply with the requirements of those who are importing their product. The United States, an importer of about one fourth of Chilean apples, has very strict regulations in terms of size, firmness, color, and qualification of apples. For example, apples must meet color requirements measured in percentages of 25, 33, 40, 50, and 66 depending on the variety of apple. Apples also must meet specific size requirements, measured in diameter and grams (See Table). U.S. inspectors can lower the grade of a product (and thus its market value) by classifying apples as "injured," which can be defined as anything from a "discolored area [that] does not blend into the normal color of the fruit" to "hail marks, drought spots, [and] other similar depressions and scars."<sup>56</sup> The most telling regulation, however, defines the term "fairly well formed" to allow that "the apple may be slightly abnormal in shape but not to an extent which detracts materially from its appearance." While U.S. consumers have the choice of the most beautiful fruits in the supermarket, Chilean producers are faced with the decision of how best to meet the apple cosmetic requirements. Most Chilean agriculturalists conclude that the cost (economic and environmental) of synthetic pesticides and fertilizers outweighs the risk of having their apples excluded or downgraded upon their import to the U.S.

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<sup>56</sup> USDA, 2009.

Heavy pesticide and fertilizer use allows chemicals to seep into water supply, leaves residue on produce, and creates a wide array of health problems for those exposed, directly and indirectly. U.S. produce grown with pesticides has been shown to have two thirds more pesticide residue than organically grown produce.<sup>57</sup> In developing countries like Chile, “with little or no regulatory enforcement,” food contaminated with toxic pesticide residue can persist on a much greater scale.<sup>58</sup> The effects of these pesticides on wildlife were made famous in the U.S. by Rachel Carson’s *Silent Spring*, but people consuming produce from or being directly exposed to pesticides in apple orchards experience “immediate, acute, and often long-term health effects.”<sup>59</sup> Short term effects include “poisoning (resulting in vomiting, fever, vertigo and other symptoms), skin burns and rashes, and eye injuries,” while chronic illnesses include “cancer, birth defects, nervous system damage and sterilization” and death.<sup>60</sup> Such occurrences are common across the fruit growing regions of Latin America,<sup>61</sup> and while mass poisonings make big headlines, less research has been focused on the records of long-term effects. In countries with the resources and capacity to regulate pesticide use, many studies have shown some degree of adverse health effects among populations, but developing countries lack “established infrastructure for collecting and collating data [with] numerous confounding factors and [have only] limited trained personnel to conduct the studies,” the results of which might show immense health effects from lack of regulation.<sup>62</sup> Some producers are forced to rely on the safety information of chemical production companies whose products they are being sold, which often are exported

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<sup>57</sup> LaSalle et al. 2008.

<sup>58</sup> LaSalle et al. 2008.

<sup>59</sup> Mendis & Van Burs, 1998.

<sup>60</sup> Mendis & Van Burs, 1998.

<sup>61</sup> Mendis & Van Burs, 1998.

<sup>62</sup> Ecobichon, D.J. “Pesticide Use In Developing Countries.” Toxicology. Dept. of Pharmacology and Toxicology. Queen’s University, Kingston, Ont. Canada: 2001.



due to increased safety regulations in their (developed) nations of origin.<sup>63</sup> When pesticide use continues season after season, efficacy declines as pest populations evolve, forcing farmers to depend on greater and greater amounts of toxic chemicals<sup>64</sup> and resulting in an ironic cycle of degradation for the sake of livelihood.

A 2005 poisoning incident in the Chilean apple industry gives strength to scholarly arguments against the use of pesticides. At the start of the 2005-2006 growing season about 600 km south of Santiago, dozens of seasonal workers fell ill after being poisoned with what were later determined to be “the insecticide chlorpyrifos and a foliar fertiliser” in the apple orchard of the company Agrícola y Comercial Santa Elena.<sup>65</sup> One of the largest mass poisoning events in Chile’s history, the incident spurred public outcry and disbelief at the lack of regulation and degree of toxicity in a pesticide severely restricted by the U.S. Environmental Protection Agency (EPA) due to its likely effects on the human nervous system, especially in children. This incident proves not only the harms of pesticides, but the relative inadequacy of Environmental Impact Reports and free trade provisions (like the one signed enacted two years prior by the U.S and Chile) that require nothing but vague continuance of current environmental laws.

Even less regulated are the effects on soil and land fertility which arise from lack of crop diversity and reliance on chemical fertilizers. Despite the current Chilean government’s promise to promote class equality, a large number of Chile’s farms are those of small peasants squeezed onto “marginal lands where erosion and deforestation are inevitable.” Meanwhile, on the approximately four percent of all Chilean farms 40 hectares or greater, fertilizers and pesticides

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<sup>63</sup> Ecobichon, 2001.

<sup>64</sup> LaSalle et al. 2008.

<sup>65</sup> Rozas, Maria Elena. “Chilean Farmworker Poisonings.” *Pesticides News*. Mar. 2006. <http://www.pan-uk.org/pestnews/>.

are used to ensure yields on the most fertile lands.<sup>66</sup> The poorer small farmers left with the eroded, deforested and nutritionally inferior land (often originally owned and later deserted by the larger agricultural businesses) also use chemicals to try grow their crops, but they attain lower yields.<sup>67</sup>

The nature of apple production and the current market requirements for price, size, durability and appearance have favored farms between 50 and 100 hectares. These orchards are compact enough for management of quality and large enough to produce profit. They are also large enough to be able to selectively employ only seasonal workers. Apple orchards like these, however, are too small to be able to take a risk in unconventional agriculture that would be less harmful to the soil, the ecosystems, and their inhabitants. They depend on industrial chemicals in a “cycle of dependency” in which “agricultural erosion through overuse, undernourishment, and chemical inputs that damage the natural, healthy and helpful biological activity in the soil” has compromised natural productive capacities, resulting in a depletion of the “global soil resource base.”<sup>68</sup>

These recent examples of the systematic application of pesticides and fertilizers both in large and small land ownership outline the effects that an export-based produce commodity like Chilean apples has on its local environment and those who live, work, and reproduce there. Still, the Chilean apple industry, especially as tailored to U.S. consumers, has farther reaching environmental effects than just those felt directly in Chile.

### **Social Justice Effects**

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<sup>66</sup> Faeth, Paul & Crosson, Pierre. “Building the Case for Sustainable Agriculture: Policy Lessons from India, Chile, and the Philippines.” Environment. Washington: Jan. 1994. Vol. 36, Iss. 1; pg. 16.

<sup>67</sup> Faeth & Crosson, 1994.

<sup>68</sup> LaSalle et al. 2008.

Environmental and health effects make up a large part of those felt by the Chile – US apple trade, but small apple farmers also experience social difficulties due to increased dependence on the volatile global economy, decreased food sovereignty and security, increased land scarcity, and even displacement from their original lands.

As shown by tracing trade statistics over the past few years<sup>69</sup>, the Chilean apple market has become much more volatile since 2003, when the Chile – U.S. FTA was signed. Even before 2003, however, Chilean apple farmers experienced difficulty in “adjusting to newly dynamic market sell out” brought on by the abrupt changes in agricultural policy under the military regime.<sup>70</sup> While large investors added value to their apples through technology, small farmers were less dynamic.<sup>71</sup> Additionally, this market change brought apple prices down through monopolistic buying by global corporations, disproportionately hurting small farmers.<sup>72</sup> Even if the Chilean apple industry did not represent a true monopoly, the social power exercised by corporate agricultural operations displaced the poor living on those lands and transformed “farmers [into] workers on corporate farms, instead of being sovereign producers on their own land.”<sup>73</sup> Not only did many farmers lose the ability to farm independently, but the corporate focus on monoculture practices decreased the production of staples, leading to a greater dependence on fluctuating world prices not only for the income from apples, but also for the imports now necessary to sustain local diets.<sup>74</sup> This decrease in food sovereignty<sup>75</sup> and food

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<sup>69</sup> ODEPA, 2009. (See graph)

<sup>70</sup> Casaburi, 1999.

<sup>71</sup> Casaburi, 1999.

<sup>72</sup> Shiva, Vandana. “How to Grow Poverty.” The Ecologist. Sturminster Newton: Mar. 2008. Vol. 38, Iss. 2; pg. 49.

<sup>73</sup> Shiva, 2008.

<sup>74</sup> Mendis & Van Burs, 1998.

<sup>75</sup> Food Sovereignty: “the right to safe, nutritious and culturally appropriate food and to food-producing resources and the ability to sustain themselves and their societies...ecologically, socially, economically and culturally”) “Food Sovereignty: A Right For All.” NGO/CSO Forum for Food Sovereignty. Jun., 2003.

security<sup>76</sup> shows the unjust effects of a system like the Chile – U.S. apple trade, and the inability of law enforcement entities to understand or change this system.

The economic injustice brought about by the Chile – U.S. apple trade extends to a more general danger of land scarcity that threatens the ability of future generations in Chile to be sovereign food producers. Global and regional trends show that “farmland is disappearing at an alarming rate...to urbanization, population growth, and economic and industrial development,” and with Chile expected to experience increased desertification due to climate change, future crop production is certainly in jeopardy.<sup>77</sup>

## **Conclusions and Solutions**

### **Sustainable, Organic Agriculture**

The natural and human resources of Chile are being directly threatened by the Chile – U.S. apple trade. Looking purely at farm revenues and agricultural yields, as do typical government studies and international trading agreements, “ignores the impacts of agriculture on the productivity of the natural resource base --the maintenance of which is the very essence of sustainability.”<sup>78</sup> Even though many tout the Chilean apple industry as healthy, its effects on the environment are not. The current situation in the apple industry of being devoted largely to trade and subject to many foreign interests and regulations is bringing “increasing long-term costs...that degrade or deplete natural resources.”<sup>79</sup>

Many scholars have investigated alternatives to this cycle of environmental degradation and toxification, and various sources point to a system of organic and sustainable agriculture as a solution. LaSalle et al have set forth a pair of principles for “regenerative farming practices” that

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<sup>76</sup> “physical and economic access to food” “Food Security,” World Health Organization, 2009.

<sup>77</sup> Garber, Kent. “Wanted: Farmland for Rent: Running out of their own, countries eye land in other nations.” U.S. News & World Report, Washington: Jun. 23, 2008. Vol. 144, Iss. 18; pg. 25.

<sup>78</sup> Faeth & Crosson, 1994.

<sup>79</sup> Faeth & Crosson, 1994.

are meant to harmonize agricultural and biological processes: (1) “build soil organic matter through the use of cover crops, crop rotation, and compost,” and (2) “improve ecosystem health and human nutrition through plant and animal biodiversity.”<sup>80</sup> Studies in other parts of the world have shown that processes that subscribe to this sustainable ideology result in “improvement in quality,” which “will spur demand for farm produce, increasing incomes in the countryside.”<sup>81</sup> In addition to increasing rural incomes, sustainably grown agriculture can allow access to higher quality food and thus, better health.<sup>82</sup>

Organic agriculture provides a solution for agriculture, especially in developing countries like Chile, because it can be more productive than conventional agriculture when grown in concordance with local conditions. Since Chile already has ideal conditions for growing apples, estimates suggest that yields could be increased by a ratio of 1 to 3. Especially among small farmers, crop yields were shown to increase by an average of 79% when “environmentally sustainable techniques including organic farming and crop rotation” were used instead of pesticides and synthetic fertilizers.<sup>83</sup>

Not only does organic farming stand to increase rural health, yields, and income in Chile, but it also could provide access to a share of the organic market, which has largely been cornered by farmers in the global north. With the market for organically produced agriculture expected to grow up to thirty percent over the next five to ten years, organic agriculture could also serve as an empowering solution to rural poverty and inequality.<sup>84</sup>

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<sup>80</sup> LaSalle et al. 2008.

<sup>81</sup> Ning, Cui. “Pollution-free produce key to raising rural incomes.” China Daily (North American ed.). New York, NY: Apr 8, 2003.

<sup>82</sup> LaSalle et al. 2008.

<sup>83</sup> LaSalle et al. 2008.

<sup>84</sup> “UN: New UNCTAD publication reviews marketing potential for organic produce from tropical countries.” M2 Presswire. Coventry: Nov 3, 2003.

Unlike conventional farming, organic sustainable farming practices take into account the local environment, rejecting a one-size-fits-all approach to cultivation of lands. A new organic model for Chilean apple production would require a localized approach, respecting farmers' educational levels, the quality and reach of extension services, the accessibility of appropriate research findings, and local traditions and patterns of access to such key resources as land and water.”<sup>85</sup> Creating a new system would require a “gestation period” in which “capital investments” would be necessary to support small farmers during restructuring.<sup>86</sup> Similarly, information technology merits dissemination during this process, in order to make organic farms more competitive, and to help them meet the challenges of the requirements of importing countries.<sup>87</sup> The last step for implementing an organic apple production system in Chile would be to establish a body in charge of research collection to monitor the progress of organic agriculture over time in Chile, “so that wise decisions regarding resource management can be made.”<sup>88</sup> This series of steps will lead to a “greater adaptability to climate change and natural disasters,” allowing Chile’s economy and environment to remain sustainable over many years.

Examples of successful organic agriculture programs are widespread. In China, researchers found that organic agriculture programs benefitted eighty five percent of rural counties whose farmers received new skills. Chile has taken the first steps toward success like this, enacting the first law to certify organic products in 2006. Chile now recognizes organically grown food as that which is grown using “holistic management systems of production...that promotes and improves the agroecosystem health and in particular, biodiversity, the biological

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<sup>85</sup> Faeth & Crosson, 1994.

<sup>86</sup> Leight, 2008.

<sup>87</sup> M2 Presswire, 2003.

<sup>88</sup> Faeth & Crosson, 1994.

cycles and the biological activity of soil.”<sup>89</sup> With agricultural practices focusing on the good of the environment, Chile’s apple industry could be a model for developing nations.

### **Fair trade/new policies**

Organic agriculture provides an ecological framework for making the Chilean apple industry better for the environment, but many of the faults of the Chile – US apple trade come from the inequality in land distribution and incomes among independent, small farmers and agricultural corporations. Many small producers have been shut out from the benefits that trade has brought to larger organizations, and have “suffered a widening gap in technology and productivity vis-à-vis larger scale farming.”<sup>90</sup> With the boom in fruit exports in the second half of the twentieth century and the parallel neoliberalization of markets, a demand for land forced small farmers off their land or onto marginalized lands. Fair trade and new social policies represent a viable solution to these problems.

Fair trade policies refer to those which allow for “a fair proportion of the retail price of any given product or service [to be] returned to the person whose labour has created the commodity in the first place.”<sup>91</sup> In the case of Chilean apples, this means that the farmers who actually work their fields and have the local expertise should benefit most from apple sales. Solving the unequal balance of power that benefits larger farmers could include technological and informational transfer, credit assistance, and incentives for cooperative agreements among small farmers.<sup>92</sup> Public institutional cooperative agreements could allow small farmers to

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<sup>89</sup> “Ley Numero 20.089: Crea Sisistema Nacional de Certificación de Productos Orgánicos Agrícolas.” Biblioteca del Congreso Nacional. Santiago, Chile: Jan. 17, 2006.

<sup>90</sup> Leight, 2008.

<sup>91</sup> Ford, Neil. “Fair Trade Movement Gathers Strength.” African Business. Jun. 1, 2007.

<sup>92</sup> Leight, 2008.

participate in joint sharing of farm tasks and education in terms of technological and managerial experience from agronomists.<sup>93</sup>

Apple farmers should join together to create a “regional self reliance,” diversifying small portions of their land to allow for crops like grains, tubers, and vegetables which can allow for a more diverse soil base and can make them more independent from fluctuating market prices.<sup>94</sup>

Foreign consumers of Chilean apples play a most important part in rejecting unfair trade relationships, as their purchasing habits often can decrease demand for an unfairly traded product faster than regulations can be enacted. The same scheme can apply to the cosmetic standards applied to apple imports: if consumers become open to purchasing apples slightly larger, smaller, or of different colors, for example, Chilean apple producers will no longer have to cater to frivolous U.S. demand requirements, eliminating the advantage of large over small produce operations.<sup>95</sup>

Fair trade goods have become increasingly sought after in recent years. In Europe alone, the market for fair trade fruits and vegetables grew about 200% in 2007, and other developed nations like Japan and the U.S. also show large potential for growth in fair trade markets.<sup>96</sup> Consumers are beginning to realize that even when some developing nations cannot ensure exact phytochemical characteristics to comply with organics standards, “the emphasis on worker protection as a consequence of fairly traded production criteria leads to a less intense application of pesticides and fertilizers.”<sup>97</sup> Business leaders note the environmental association with fair trade, saying that with the environment as the “most important issue in ethical consumption

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<sup>93</sup> Casaburi, 1999.

<sup>94</sup> Mendis & Van Burs, 1998.

<sup>95</sup> Mendis & Van Burs, 1998.

<sup>96</sup> “European Sales of Fairtrade Fruit & Vegetables Almost Doubles in 2007 as Consumers Become More Aware of Fairtrade Labels.” Business Wire. New York: Jun. 24, 2008.

<sup>97</sup> Mendis & Van Burs, 1998.



today,” the demand sustainably produced goods is “helping to drive the growth of ethical markets such as fair-trade.”<sup>98</sup> With “the perceived authenticity, detail and overall sense of provenance” also an important issue for consumers,<sup>99</sup> fair trade is becoming more recognized through the harmonization of standards in organizations such as Fairtrade Labelling Organisations International (FLO).<sup>100</sup>

Opportunities for two important varieties of fair trade exist in Chile. In farms owned by large national or multinational agricultural firms, worker wages and union rights are the main issues that need to be addressed. In situations with small-scale production, fair trade means giving the small farmers access to marketing board input and foreign partners.<sup>101</sup> Policies that promote giving technical and institutional expertise to these farmers should also allow them greater access to banks and export firms, a practice that can help establish fair trade relationships.<sup>102</sup>

Necessary first steps in this process include the establishment of rural networks and cooperatives. The NGO expertise available in the U.S. and in Chile can lend knowledge to the process of establishing fair trade relationships and cooperative agreements among Chilean apple producers and consumers.<sup>103</sup> Demonstrating the benefits of new systems will be more important than price fixing for fair trade products (as well as organic ones), and efforts should be made to measure success and constantly explore improvements.<sup>104</sup>

A farmer’s market program in the United States shows an example for creating regional cooperative agreements between “agricultural cooperatives, producer networks, producer

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<sup>98</sup> “Global Ethical Revolution is Driving Growth in Fair-Trade Sales.” Drinks Business Review, Mar. 12, 2008.

<sup>99</sup> Drinks Business Review, 2008.

<sup>100</sup> Ford, 2009.

<sup>101</sup> Ford, 2009.

<sup>102</sup> Leight, 2008.

<sup>103</sup> Faeth & Crosson, 1994.

<sup>104</sup> Faeth & Crosson, 1994.

associations, local governments, nonprofit corporations, public benefit corporations, economic development corporations, regional farmer's market authorities and Tribal governments.”<sup>105</sup>

Practices such as internet marketing and community supported agriculture can be implemented in Chile to help farmers grow their fruit more sustainably and fairly.

### **Limitations and Implications for Further Study**

Several limitations in academic research restricted the scope of this paper, most notably the lack of information in Chile's apple production industry and the inability to reconcile the inherent carbon dioxide emissions used in storage and transport of Chilean apples to the United States.

In Chile, as in many developing countries, many regions lack scientific expertise and resources to be able to carry out a significant academic study on the erosion and pesticide metrics needed for hard data reference. Although general conclusions can be made about the soil degradation and toxification of the environment from data that point to decreasing crop yields and farmworker poisonings, ecological agricultural studies simply are not carried out with the scale and intensity of those in developed nations like the United States.

Another limitation to this research was the issue of apple transport and storage. The implications for greenhouse gas production from these activities is enormous, and contribute directly to global warming. Most Chilean apples are transported to the United States via ship, and then transported mainly by truck once inside the United States. One can argue that this practice should be immediately discontinued, but the implication of its discontinuation would cripple the Chilean economy and many workers therein. The inherent problem, in this case, is that developed nations in the global North often rely on counterseasonality (due to the

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<sup>105</sup> United States Department of Agriculture: Agricultural Marketing Service. “Farmers Market Promotion Program.” 2009.

hemispherical season differences) to provide themselves with fresh fruit, even at the cost of contributing greatly to climate change. This system, which echoes an imperialist structure, makes the poorer, less developed nation pollute in order to create income for their citizens. Without a great restructuring of the global economy (and a likely period of depression), this problem will not be solved, due to each country's economic interest (as the structure shows it today) in continuing the cycle of pollution. The inability to solve this problem lessens the promise for the survival of future generations on this planet.

## **Conclusion**

Chilean apples comprise not only a large part of the U.S. apple import market, but also a large part of the world apple market. Since the U.S. and its consumers are those for whom many of Chile's apples are grown, the U.S. has a responsibility to the apple producers, agricultural workers, and citizens of Chile and its natural environment. The current trade agreements between the U.S. and Chile unfairly disadvantage small and sustainable apple producers through their favor of large production firms. Furthermore, the U.S. enforcement of overly strenuous cosmetic and size import standards leads Chilean producers to apply large amounts of pesticides and fertilizers to avoid even small blemishes, damaging the health of the environment in Chile and those who live there.

The United States citizens who contribute to these wrongs in Chile, essentially exporting pollution in the process, are supporting a cycle of environmental injustice, in which international trade agreements and laws disadvantage the people and environment of a lesser developed nation. As consumers of these apples, U.S. citizens have a responsibility to fight for the creation and enforcement of more strenuous environmental laws in Chile, either directly or through support for independent Chilean organizations. U.S. citizens and lawmakers can also help avoid

environmental degradation by supporting and purchasing fairly traded and organically produced apples, from Chile and in general. If fair trade organic produce becomes the norm, Chilean producers will have to modify their production cycles to compete in the international marketplace. Furthermore, these higher quality apples will bring higher incomes to small producers in Chile.

Further research is needed to identify ways to reduce, mitigate, or eliminate the carbon emissions that result from the transport of Chilean apples to the United States. Additionally, specific mechanisms for introducing organic agricultural systems into the remote Chilean countryside should be investigated in order to advance a successful implementation strategy. Overall, however, actors in the United States and in Chile should work together to promote a more environmentally just production and consumption of apples. Having a truly sustainable and just system for apple trading between Chile and the United States can be something enjoyable for all.

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Figure: Principal Importers of Fresh Fruit<sup>106</sup> (Chileanfreshfruit.com)

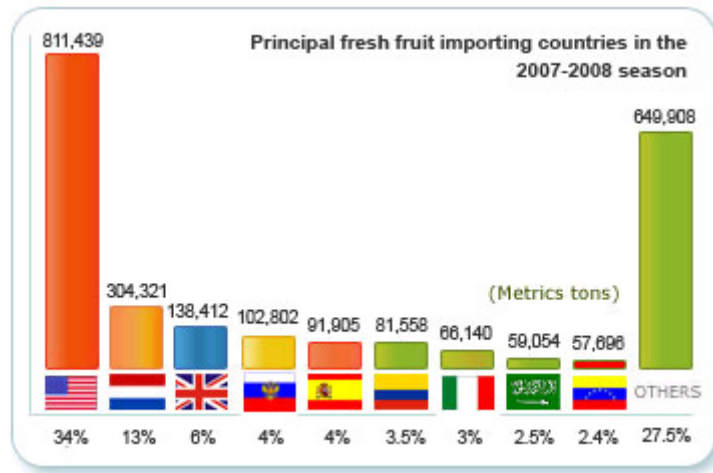
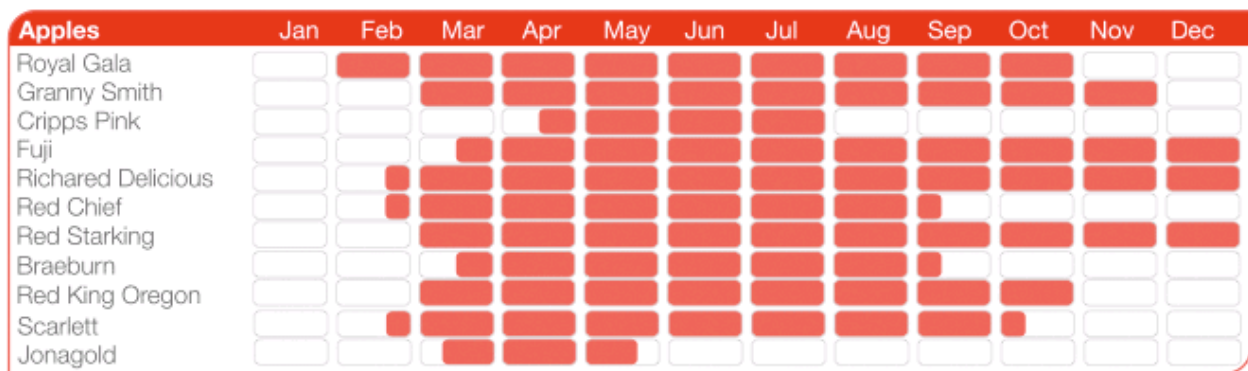


Figure: Chilean growing season for various apple varieties<sup>107</sup>



<sup>106</sup> Chilean Fresh Fruit Association. "Chile and Its Fruit Industry." <http://chileanfreshfruit.com>. Santiago, Chile: 2009.

<sup>107</sup> Chilean Fresh Fruit Association. "Chile and Its Fruit Industry." <http://chileanfreshfruit.com>. Santiago, Chile: 2009.



Chile Exported Agricultural and Forest Product Destinations, 2007 (ODEPA)<sup>108</sup>

Principales países de destino  
US\$ 10.840.677 miles (año 2007)

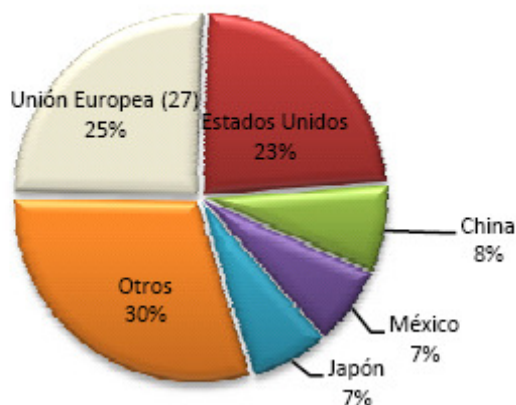


Figure: Size Requirements for Apples Sold in the U.S.<sup>109</sup>

**Table II**

Red Delicious	Golden Delicious
2 1/8 inches or 65 grams	63 grams
2 1/4 inches or 75 grams	70 grams
2 3/8 inches or 84 grams	82 grams
2 1/2 inches or 100 grams	95 grams
2 5/8 inches or 115 grams	109 grams
2 3/4 inches or 139 grams	134 grams

<sup>108</sup> Oficina de Estudios y Políticas Agrarias. "Chile: Estadísticas de Exportaciones Regionales con Socios Comerciales." Gobierno de Chile: Ministerio de Agricultura. Jul., 2008.

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<sup>109</sup> Fruit and Vegetable Programs: Fresh Products Branch. "United States Standards for Grades of Apples." United States Department of Agriculture: Agricultural Marketing Service. Dec. 19, 2002. [www.pma.com/producedb/pdf/apples.pdf](http://www.pma.com/producedb/pdf/apples.pdf)

Year	US Total Utilized Apple Production (tons)	US Apple Production for Export (tons)	US Apple Imports(thousands of lbs)	Estimated Total Chilean Apple Production (tons)	Total Chilean Apple Exports (tons)	Chilean Apple Exports to US (tons)	Percent of Total Chilean Apple Exports Represented by Chilean Apple Exports to US	Percent of Total US Apple Imports Represented by Chilean Apples	Percent of Total Chilean Apple Production Represented by Apples Exported to the US	Total Value of Chilean Apples Exported to US(thousands USD)
1990	4809100				314,304.70	21,945.10	6.98%			6,617.60
1991	4818400				392,157.20	26,197.90	6.68%			11,215.60
1992	5231700				417,526.00	24,069.20	5.76%			14,690.30
1993	5287200				361,281.10	22,985.40	6.36%			7,144.80
1994	5666400				346,948.70	20,974.10	6.05%			10,389.00
1995	5192000				419,971.10	21,955.10	5.23%			12,412.60
1996	5165000				433,675.30	30,601.60	7.06%			20,553.90
1997	5127200				386,839.70	27,275.10	7.05%			14,515.50
1998	5381300			975,000	538,734.80	38,532.60	7.15%		3.95%	27,686.50
1999	5223700	667,654	180,963	1,175,000	521,736.20	44,099.50	8.45%	24.37%	3.75%	25,018.50
2000	5159900	703,916	180,662	805,000	387,714.10	43,630.60	11.25%	24.15%	5.42%	25,182.90
2001	4604600	762,655	173,195	1,135,000	540,704.90	61,422.40	11.36%	35.46%	5.41%	27,339.90
2002	4,187,100	630,807	187,783	1,050,000	548,194.20	63,117.10	11.51%	33.61%	6.01%	38,420.00
2003	4,346,000	582,361	205,715	1,150,000	596,407.90	92,550.80	15.52%	44.99%	8.05%	66,504.30
2004	5,166,400	523,022	228,596	1,250,000	739,048.40	118,372.20	16.02%	51.78%	9.47%	70,582.60
2005	4,783,600	753,815	135,334	1,300,000	639,371.20	57,200.70	8.95%	42.27%	4.40%	37,829.00
2006	4,865,100	704,429	172,720		725,107.90	84,082.70	11.60%	48.68%		64,778.60
2007	4,522,700	719,263	227,696		774,634.40	124,711	16.10%	54.77%		102,513.60
2008					770,708.20	93,783.60	12.17%			96,616.30
2009 (Q1)					111,630.20	10,083.20	9.03%			5,529.10

Sources:

“Estadísticas y precios: económicas.”Oficina de Estudios y Políticas Agrarias (ODEPA). 2009.

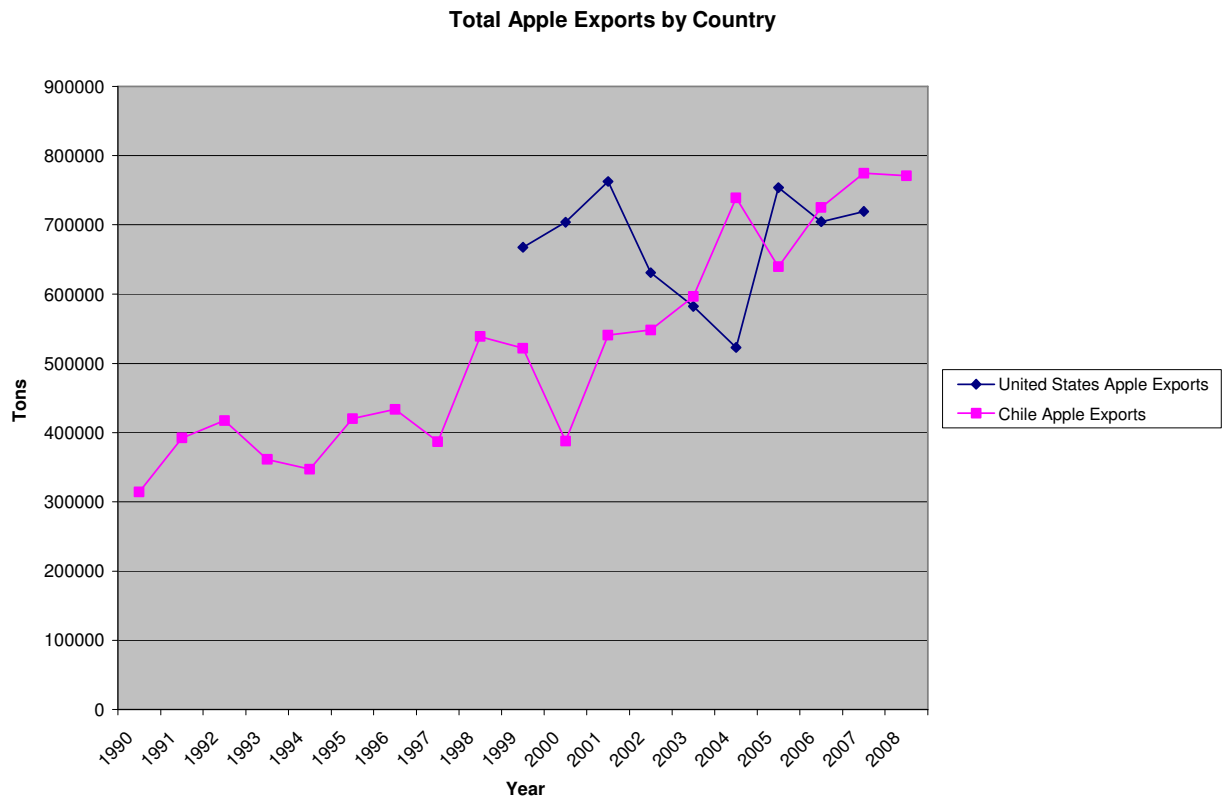
<http://www.odepa.gob.cl/odepaweb/jsp/estadisticas/economicas.jsp;jsessionid=4FEE4A1CEE740E304D283245012D9979>

National Agriculture Statistics Service. "Noncitrus Fruits and Nuts Final Estimates (1987-1992, 1992-1997, 1997-2002, 2002-2007)."

United States Department of Agriculture.

<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1511>

Attachment One: Chile US Apples Spreadsheet



Sources:

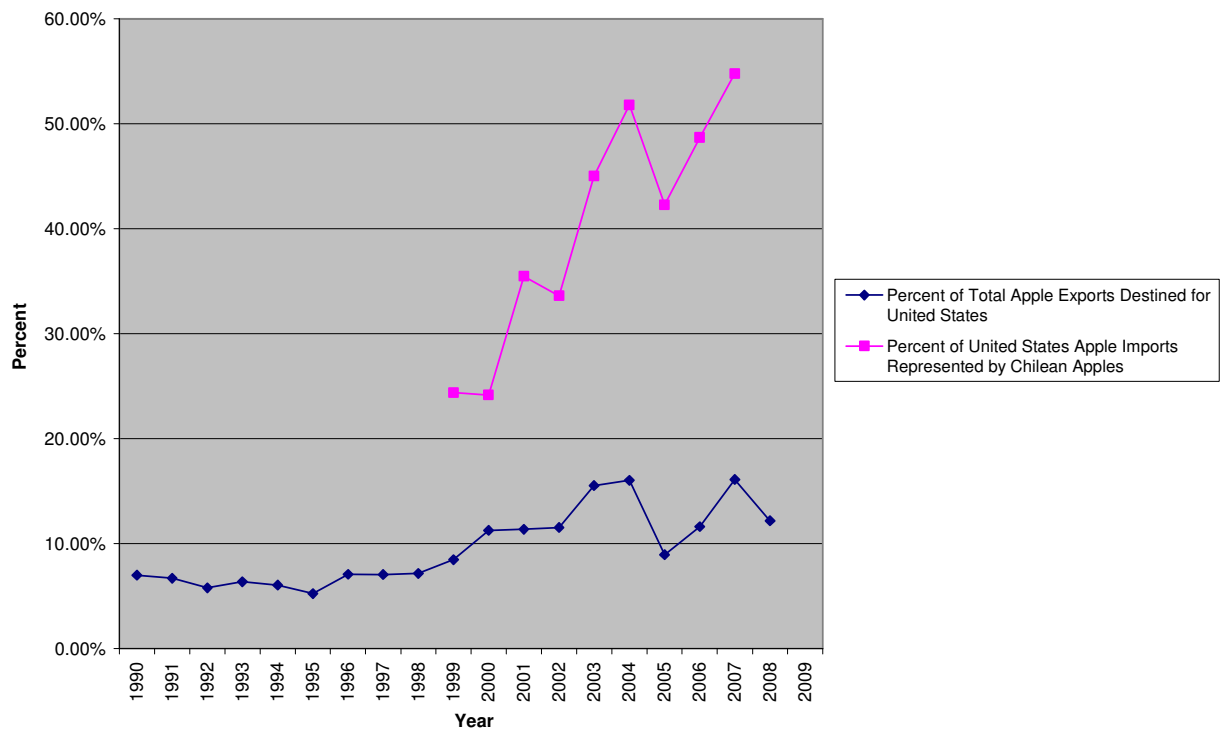
1. "Estadísticas y precios: económicas." Oficina de Estudios y Políticas Agrarias (ODEPA). 2009.

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2. National Agriculture Statistics Service. "Noncitrus Fruits and Nuts Final Estimates (1987-1992, 1992-1997, 1997-2002, 2002-2007)." United States Department of Agriculture.

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Import and Export Percentages: Chile US apple trade



Sources:

1. "Estadísticas y precios: económicas." Oficina de Estudios y Políticas Agrarias (ODEPA). 2009.

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2. National Agriculture Statistics Service. "Noncitrus Fruits and Nuts Final Estimates (1987-1992, 1992-1997, 1997-2002, 2002-2007)." United States Department of Agriculture.

<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1511>

### Per Capita Consumption of Various Fruits

	US Per Capita Apple Consumption (lbs)	[Compare with] US Per Capita Grape Consumption (lbs)	[Compare with]US Per Capita Orange and Temples Consumption (lbs)
1990	48.02	43.22	67.05
1991	43.69	42.92	81.95
1992	46.43	45.39	76.00
1993	48.30	44.38	88.19
1994	49.17	40.94	84.76
1995	45.11	45.70	81.29
1996	46.36	43.09	90.09
1997	45.03	52.02	88.03
1998	47.34	44.49	96.51
1999	47.07	45.69	85.00
2000	45.04	49.89	90.47
2001	43.41	45.02	93.09
2002	43.08	50.84	77.39
2003	46.51	46.82	82.96
2004	50.59	47.58	83.41
2005	45.13	56.46	80.09
2006	50.90	49.77	72.55
2007	49.85	52.32	65.03

Source: United States Department of Agriculture (USDA). <http://www.usda.gov/>

Attachment Two: Map of Chile



Source: [http://www.losmejoresdestinos.com/destinos/chile/mapa\\_regiones\\_chile.gif](http://www.losmejoresdestinos.com/destinos/chile/mapa_regiones_chile.gif)