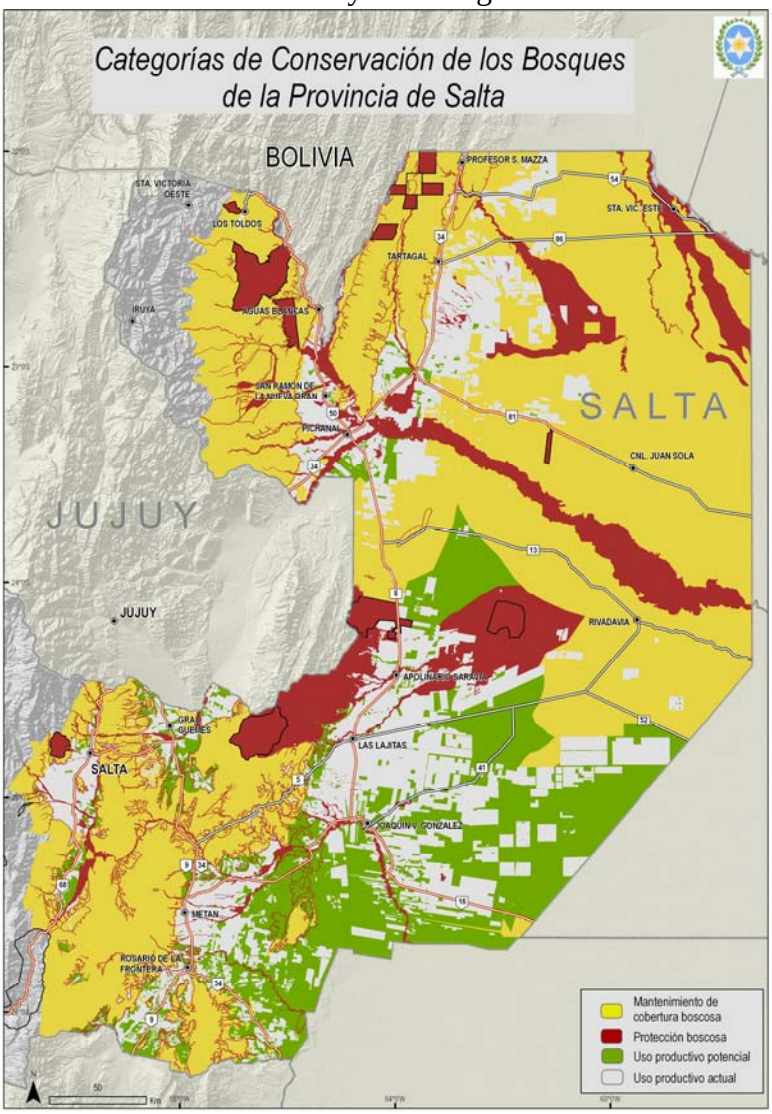
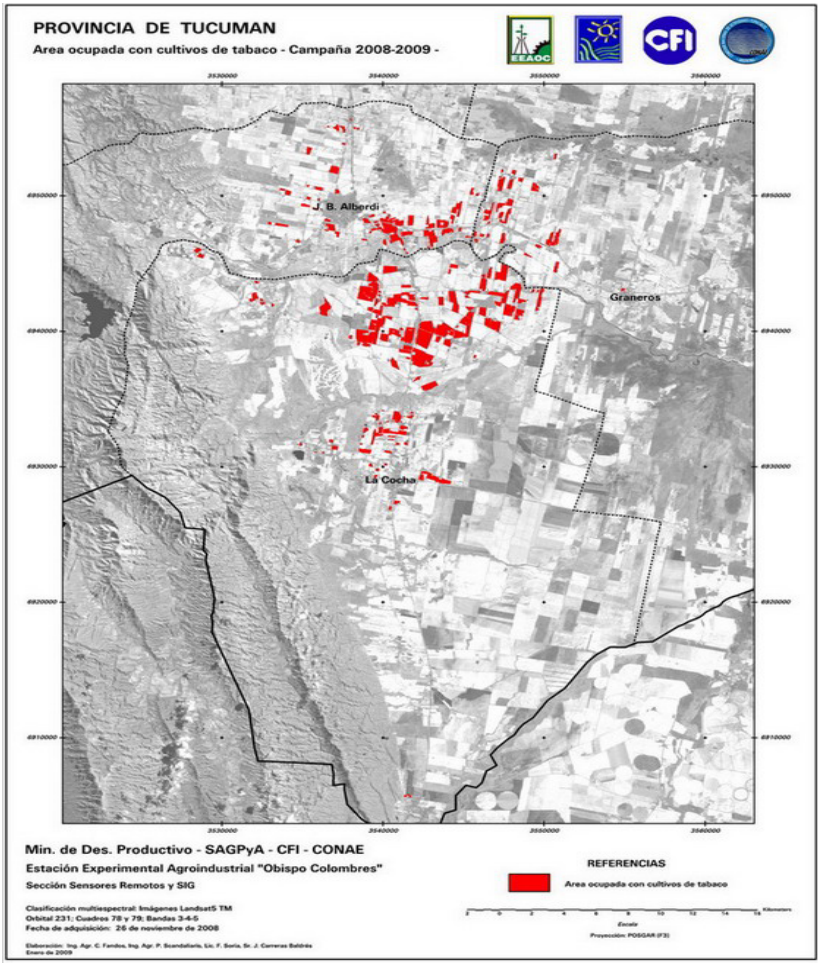
Northern Argentina Production Potential Continues to Grow

The provinces of Northern Argentina include Salta, Santiago del Estero, Jujuy and Tucumán. Three of these provinces offer cropland expansion possibilities. Potential growth of cropland in Northern Argentina is estimated at over one million hectares in the province of Salta and another half a million hectares in Santiago del Estero and in Jujuy. Within the province of Tucumán, most of the cropland available is already developed. Northern Argentina, discussed here, extends a little north of the Tropic of Capricorn and south to the 30th parallel. This semi-tropical to arid region offers growers multiple cropping options with a potential two-million-hectare expansion. A sugarcane crop can be next to a soybean field and even in a rotation with soy in the region. Unlike the standard rotations utilized in the United States, a five- or six-year-rotation with different crops is often utilized in some of the northern regions of Argentina. With a long growing season, crops can be in different stages of development or have two crops during the growing season. Limited only by soil type and irrigation availability, fields have had an expanded array of annual and perennial crops over the years including citrus, especially the lemon and lime tree orchards seen commonly throughout Tucumán. There is still room for expansion (in Salta, Jujuy and Santiago del Estero) and rotation of varied crops (in Tucumán as well as the other three provinces). Land continues to be placed into production with such diverse crops as soybeans, corn, sugarcane, tobacco,



Areas for forest conservation in the province of Salta are marked in yellow and red. Areas of production potential and crop areas are marked in green and white.

citrus, potatoes and tomatoes. Fruits (including kiwis) and vegetables are also occasionally grown in greenhouses. Within the developed province of Tucumán alone, soybeans and corn have found a niche alongside fields of dry beans, tobacco, sugarcane and sweet sorghum. The relatively long seven- to eight-month-growing-season in this region allows diverse cropping regimes and increased returns per hectare. Many of the large farming operations are establishing and expanding into export markets to the North and West in South America. Hosting a variety of soils and rainfall patterns, water work projects built in the 1970s and earlier provide supplemental irrigation to some drier areas and split up the landscape between wetter and drier (irrigated or non-irrigated) regions in the northern provinces of Argentina. The very dry, non-irrigated lands in western areas are not currently being considered as expansion lands. Even without this drier territory, cropland development continues.



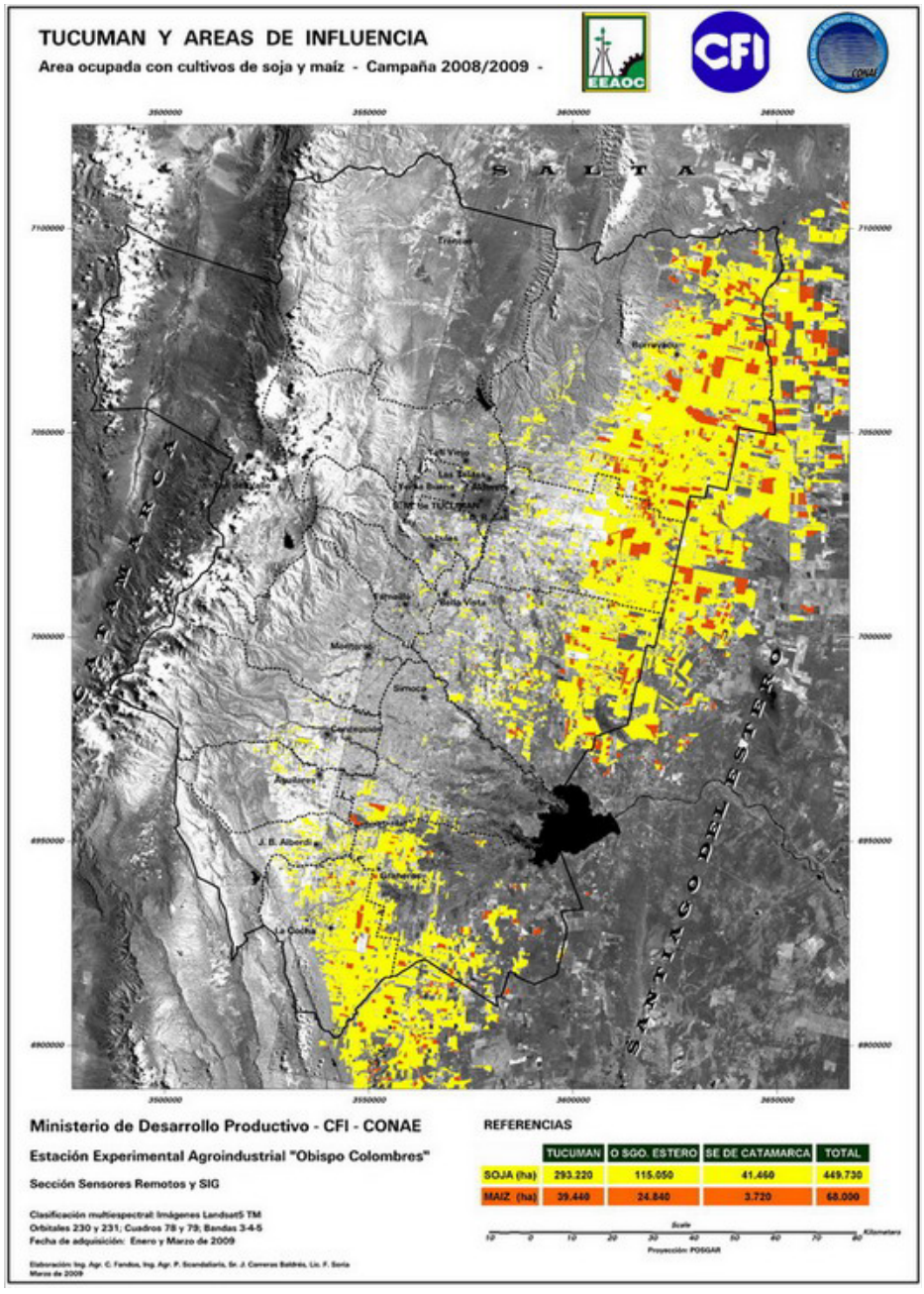
A portion of Tucumán province's crop land is in tobacco production. Larger expansion is going into soy and sugarcane.

Problems do exist for the farmers of Northern Argentina. Land use agreements require compromise. Soy farmers breaking out old scrub forest regions to create cropland must leave a margin of native forest around the perimeter of each field. Even with this restriction, expansion of cropland is slowly continuing in Northern Argentina and is expected to progress as the economy improves; crops maintain profit margins; and, farmers clear this approved, new cropland in Argentina.

A second problem is transportation. Rail transport is limited. Navigable rivers do not flow directly into lower Argentina from these Northern provinces. Instead, trucks

continue to be the main mode of soy transport south to the major crushing plants. All commodities must be trucked over roads that can vary from highways to roads similar to farm-to-market roads in the United States.

This transportation limitation has encouraged some in the northern region to consider a domestic biodiesel and ethanol market.



Corn and soybean within Tucumán remain within a tight crop rotation due to little remaining crop land expansion in this province.

Global demand, particularly from the European Union (EU) and China, is increasing biofuel production in Argentina due to the efficiency and innovation that exists in the industry. Biodiesel facilities in the province of Buenos Aires now have an installed capacity to produce 2.5 million tons, approximately 750.5 million gallons of biodiesel annually. Now, more than a dozen firms (around 19) are involved in biofuel production in

Argentina.

One of the largest oil crushers is Renova SA, a joint venture between the Argentine processing company of Vicentin and a Swiss commodities group known as Glencore. This group alone has an installed capacity of more than 850,000 tons annually and is working at full capacity.

Several independent companies in Argentina have also taken up the gauntlet of biofuel production, including looking to different soy sources throughout the country. Another of the southern success stories is Rosario Bioenergy, located in the heart of Argentina's main soybean-growing region and in the center of the concentrated 200-kilometer-radius of the port of Rosario in Santa Fe province. With a recently new, state-of-the-art facility in Roldán, just on the outskirts of Rosario, this new biodiesel facility is internationally financed from Argentine, Irish, Swedish, French and Italian capital. While Northern Argentina can not supply feedstock for as large a biofuel industry as Southern Argentina, there is growth potential for the use of soy in a smaller biodiesel plant and for the use of sugarcane in ethanol production. The increasing demand for biodiesel and ethanol is high currently, and rapid development of the industries in Northern Argentina is possible.

While the Argentine industry is efficient and innovative, the government uses a Differential Export Tax to spur even more biofuel development. Unprocessed soybean exports are currently taxed at 35 percent of their free-on-board (FOB) price compared to a rate of 17.5 percent for soy-based biodiesel. The continued demand for more renewable fuel from the EU has the Argentines excited over possible release of Argentine exports of biodiesel to the EU through a current campaign to the European Biodiesel Board and its members. The EU considers the import of cheaper Argentine fuel to be distorting and decreasing incentive for more production at the local EU level. The EU has asked for regulation on imports from Argentina. Demand, however, may sweep aside some constraints now being leveraged against Argentina. With time and agreements, Argentina hopes to provide even more biodiesel and ethanol biofuel to the EU.

On the domestic side, a huge demand for biofuel is also in place in Argentina. In February 2010, the Argentine federal government awarded production quotas of 860,000 tons, about 35.7 percent of the installed capacity, to 19 companies to implement the B5 requirement. Four of these companies, UnitedBio, Viluco, Explora and Diaser, were given 45 percent of the internal quota of biodiesel. The remaining 55 percent went to the other 15 companies which included such large independents as Rosario Bioenergy, Biomadero and AOM. Over the next four years, this mandatory biodiesel requirement in Argentina will increase incrementally to 20 percent by 2014—plenty of room for more players in the field, including Northern Argentina.

Currently, government officials in Argentina are considering a proposal to increase the compulsory mix requirement from 5 percent to 10 percent in an effort to reduce rising diesel imports. In talks with ADEFA, the association of car makers, many expect the change to the biodiesel mix to be 7 percent rather than 10. It is expected that this

proposed 7 percent may come into effect by January 2011 and at a later date perhaps move up to 10 percent. The current 5-percent-blend law represents a production of about 800,000 metric tons, according to the Carbio industry group that works with biodiesel producers out of Argentina. Even with this domestic use for 2010, the Carbio executive director, Victor Castro, expects exports this year to exceed the 1.15 million-metric-tons shipped last year. Argentina is keen on reducing imports in order to protect a trade surplus that declined sharply to 77 percent in March of 2010. Argentina imported 1.8 billion-metric-tons of diesel worth $1.9 billion in 2008, up from less than 500,000 metric tons only two years earlier according to official data. Oilseed production will remain essential in Argentina for biodiesel development to continue to expand.

Besides soy growth in Northern Argentina, the areas not currently suited due to drier soils have on-going trials of alternative biofuel crops--such as jatropha and sugarcane. Trials have been conducted in the Salta, Misiones and Formosa provinces through the Instituto Nacional de Tecnología Agropecuaria, a government agency.

Prior to 2007, soy expansion throughout Argentina has been increasing from half a percent up to about 3.5 percent each year. However, drought in 2007 and 2008 hampered increases. In Northern Argentina, slow and small but progressive growth in tobacco and sugarcane land prior to 2007 had competed for land with soy expansion. Outlook for continued incremental but gradual expansion of tobacco and sugarcane is expected to continue in the future if severe drought, government regulation or world markets do not further hamper farm businesses. Soy, however, is expected to continue to expand more than tobacco or sugarcane. Though limited, the citrus association continues to encourage the planting of lemons and limes. Long-term rotation of citrus is necessary after 15 to 20 years of production, however, the land area in total for citrus crops remains fairly stable. Potatoes also have rotation requirements. Other specialty crops remain limited. Depending on support for

Expansive soybean fields can be found in Northern Argentina. Some fields are bordered with required scrub brush areas where cropland has been taken from existing, secondary forest land.

new, efficient, hot-water processing of ethanol and return to sugarcane farmers, sugarcane and soy for biodiesel should remain the strongest crops in competition for new cropland.

The Soy Industry in Northern Argentina

Soybeans are benefiting from improvements in variety selection, an assortment of research developments coming from the experiment station located in Salta, and from the new storage alternative in silo bags. The biofuel mandate further pushes the demand for the crop.

Throughout Argentina, total cropland for all grains and oilseeds is estimated currently at about 32 million hectares. Argentina is the top exporter of soybean oil and soybean meal with about 46.9 percent and 36.1 percent of the world's export market. Argentina is also the third largest exporter of soybeans. Totaling all three soy products, Argentina is third among all world producers, with almost one-fifth of the world output. One of the reasons Argentina can compete so well in the world soy market is that yield for soy compares well with that of most of the world's competitors, including the United States. Soy yield in Argentina is almost the same as in the United States and more than 20 percent higher than the average for the other top five exporters. With new cropland available, soy can continue to expand, pushing up total cropland in Argentina. Used also as a rotation with sugarcane on some soils, soybeans will remain a major crop in Argentina.

Table 1. The Argentine soy production ranking global from 2005 to 2007 (from the 2010 *The Shifting Patterns of Agricultural Production and Productivity Worldwide* from the Midwest Agribusiness Trade Research and Information Center, Iowa State University, Ames, Iowa, from Sergio H. Lance, a native Argentine and professor of economics and the Marlin Cole Chair of International Agricultural Economics at Iowa State University).

Crop	Production		Exports	
	World share (%)	World rank	World share (%)	World rank
Soybeans	19.3	3	13.7	3
Soybean meal	17.4	3	36.1	1
Soybean oil	17.4	3	46.9	1

Argentina can obtain this good production record due to a large area of arable land that has a temperate climate and adequate rainfall. Also, much of the production is in close proximity to easily accessible ports or can be trucked to the ports. Recent export taxes as well as other events—such as disease that may come with continued cropping of soy--may slow soy success in Argentina. Barely consumed in the domestic market, soy has had a succession of increases to export taxes from 13 percent to a proposed 45 percent from 2007 to the present 35 percent. Taxes were raised from 13 percent to 23.5 and up again to 27.5 in early 2007. In mid-2007, soy tax was again raised to 37.5 percent. In

2008, the Argentine government decided to raise the export taxes further to 45 percent and allow world price increases to trigger tax increases above 45 percent incrementally. However, a series of farm stikes and the Argentine Congress defeated the passage of the tax scheme by a narrow margin. Soy expansion has taken on even more economic and political importance during the last five years, including in Northern Argentina.

Since 1991, total soy area has undergone a greater expansion than grains. Over the three previous decades, modernization of agricultural technologies (including better use of fertilizers and agrichemicals as well as increases in permanent soy storage facilities and disposable bag storage and use of biotech seed such as glyphosate-resistant soybeans starting in 1996 to almost 100 percent by 2004), expansion of the crop frontier, especially to the North and West, the greater intensity in the usage of farmland in the Pampean region (including the use of zero tillage in soy that now has over 75 percent of first-crop soy and 83 percent of second-crop soy in this system since 2007), and, the development of planting pools or farmer groups has hastened expansion of soy. Irrigation expansion has also furthered soy production onto previous pastures and forest lands.

Estación Experimental Agroindustrial “Obispo Colombres” in Salta is working with biotech soy development and improved production practices for farmers in the Northern region. Improved facilities and laboratory equipment to analyze oil content, gene transfer and insect tolerance as well as disease prevention has helped in selecting out improved soy varieties. Farmers in the Northern region of Argentina have made use of the production information and expanded soy. Improved yields in the region are the result of this new information and technology. Soil and plant testing is available through the experiment station in Salta. With these resources available, farmers in the northern region of Argentina have had better plant response to fertilizers and pest control than in the past. Pest management scouting services have been made available for soybeans as well as other crops such as tobacco, and they allow fine-tuning of field operations. These services are available from farming group agronomists as well as experiment stations.

Development of newer irrigation systems are occurring in Northern Argentina. Where water supplies from rivers or through reservoirs are accessible, center pivots or drip irrigation are replacing old ditch systems or are coming onto new cropland. Initial pivots in Argentina often have been on land where crops are grown for seed production for planting the next year through farmer groups developing varieties in coordination with seed companies. Some of the larger farm groups have invested in irrigation equipment on better cropland. Some of the very early foundations for irrigation in Argentina were back in 1909 when the government enacted the national law of irrigation, number 6546 that created a large number of hydraulic works projects, including some in Northern Argentina. The expansion of irrigation in the country has grown in spurts, when investment could be recovered when crops provided high profitability. In 1970, only about 1.0 million hectares in Argentina were irrigated. By 1988, 1.2 million hectares had irrigation across Argentina. In 2001, 1.4 million hectares were reported as irrigated (INDEC, 2006). Only 125,137 hectares have drip irrigation, largely on higher profit crops such as vegetables and grapes (data obtained through interviews with farm

managers in 2001 through INTA, Miranda, O., 2009, Trayectoria Tecnológica y Uso del Agua en La Agricultura Argentina Bajo Riego in Agricultura, Sociedad y Desarrollo, Sept-Dec).

If irrigation efficiency was improved and basic infrastructure for use of water was managed, the surface area which could be irrigated in all of Argentina could reach 1.923 million hectares according to research published in 2009. Eventually, even more could be added by using underground water resources where potentially arable surface is available, according to a 1986 report from INTA (INTA. 1986. Documento básico para el Programa de Riego y Drenaje, Vol.1, INTA, EEA Mendoza, Mendoza, p. 95). An estimated 2.5 million hectares could be equipped with more efficient, integrated irrigation; and, additional land could be equipped for irrigation (GWP, Global Water Partnership, 2000, República Argentina, Informe sobre la gestión del agua, documento electrónico, Editado por Módulo 3, Buenos Aires, p. 146). Although this indicates that there is a great potential for expansion for irrigation and cropping, large investments are required in order to deliver water to many areas. Salta, Jujuy, Santiago del Estero as well as Tucumán in Northern Argentina are semiarid with precipitation between 400 and 1000 mm. Even though extensive seasonal crop cultivation is possible, occasional droughts limit continuous, good cropping year after year. In this Northwestern, semiarid region, only about 25 percent of the agricultural land is now irrigated. Much of this irrigation is used for sugarcane, tobacco, cotton and some vegetables. A small portion of soybeans are irrigated, particularly on land that might also rotate to corn or back into sugarcane. The estimated two million hectares of expansion land not yet cropped in this northern territory could be better developed if supplementary irrigation infrastructure were made available. Even more expansion to the West could be possible in these provinces if deep water wells (water depth more than 600 feet or 183 meters or more) were economical.

Soybean production was hindered earlier due to storage facility limitations, but soy is now stored in the North as in the South of Argentina in silo bags. The availability of seed adapted to specific areas has hastened the expansion of this crop. Economics of return from the portable storage has promoted soy expansion, particularly after the last two drought years of 2008 and 2009 as farmers have limited working capital. Farmers have sought cheaper seed pricing, and storing on the farm allows retention of seed for planting. Soy seed either saved or cheaply obtained has allowed farmers to expand even more area into soy and gain the benefit from a nitrogen fixing crop that lowers fertilizer expense.

Being able to store the harvested beans quickly and easily through the use of very economical silo bags (each bag has about a 250 metric-ton capacity) has pushed soy throughout the country, even into land taken out of scrub forest regions. Storage of soy in silo bags has increased dramatically due to the economical, cheap cost. This last season (2009/2010), the sales of polyethylene bags increased 60 percent. Equal to 320,000 bags purchased, this quantity is enough to store 64 million tons of grain. Besides soy, corn, wheat and sunflowers are also often stored in the silo bags rather than building permanent, expensive storage facilities. Even during 2008--a drought year--Argentina

had a 30 percent increase in silo bag sales. With economical storage, soy can be easily held by farmers until pricing or opportunity allows the farmer to sell.

Having storage also allowed Argentine farmers to seek alternative ways of marketing soy. The Argentine crushing industry, with a capacity of more than 160,000 metric tons per day, once could control the crop's pricing. A few years ago, soy had to immediately be moved from the field to the export or crushing plants. Now, farmers follow the stocks and the need of the industry at any given moment relative to its crushing capacity. In past years, the crushers would have stocks on hand of about 60 days of full-capacity-crush. Now, most crushers only have stocks available for 20 days of crush. The ability of farmers to store soy and time sales has insured more aggressive buying by the crushers and better prices for farmers. Storing soy easily up North also insures more latitude for these regional farmers who may have to transport soy longer distances. With storage they have been able to time the sales of the crop and utilize timing of freight charges to when they are less expensive. Storage allows some stock piling of soy for biofuel businesses.

With biofuel production in Argentina tripling in the last 10 years, the market growth is expected to be at 12 percent per year for the coming decade. Argentina is the fourth largest producer of biodiesel after the EU, the United States and Brazil. The first industrial-sized biofuel plant in Argentina started in 2006. The first six diesel plants were built in the province of Buenos Aires producing a joint capacity of 155,000 tons. In 2007, the joint-ventures Renova (Vicentin and Glencore) and Ecofuel (Bunge and Aceitera General Dehesa) built factories with the capacity of about 200,000 tons per year along the Paraná River near Rosario. An export tax differential of 20 percent between soy oil and biodiesel has made putting money into biodiesel an excellent investment. In 2008, the difference was even higher at 27 percent and yet higher after March 2008 when a sliding tax scale was introduced for soy oil. Argentina took advantage of a U.S. tax policy sometimes referred to as "splash and dash" which subsidized blending of biodiesel with diesel whether the biodiesel was produced in the United States or imported into the United States. When "splash and dash" ended in December of 2008, Argentine capacity had expanded to 1.4 million tons with 18 production plants. The expansion included a new producer, LDC Argentina (Louis Dreyfus), with a plant capable of producing 300,000 tons annually. At the end of 2009 the Argentine capacity had yet again expanded, to 2.4 million tons. Most estimates suggest a total production capacity of 3.7 million tons by the end of 2010.

Much of the biofuel made in Argentina is destined for foreign markets and the production capacity is expected to increase 300 percent in the next three years. Not only does Argentina have a vast expanse of suitable land for soy production but in the Northern Argentina area, soy is the crop that often is planted when revitalizing scrub forest or pastureland to cropland. While some expect more livestock to move into the northern areas, new cropland is expanding rapidly enough so that soy is growing in importance in the territory.

Although soy has not reached sufficient importance in Northern Argentina to warrant a large crushing plant yet, exports to the countries in the North and West of Argentina have encouraged farmers in the region to produce soy for export. Much of the 0.5 to 3.5 percent increase in cropland annually seen up until the devastating drought of 2007 and 2008 was soy expansion in the North along with the more intense utilization of cropland in the Pampean region of Argentina. With scrub land already ear-marked for slow cropland expansion through current permits and mapping through the Ministry of Agriculture in the regions of Salta, Santiago del Estero and Jujuy, further progress of soy into the region should be seen. More rapid conversion to cropland has only been slowed by a November 2007 Forests Law that protects some of the native forest and requires specified forest borders around permitted areas. Permits already in hand will allow land to continue to be developed for cropland. In 2008, around 137,000 hectares in the north of Argentina had been cleared from native forest. In 2009, the province of Salta approved the conversion of unimproved land to soy production over 1,670 hectares of the Yungas, a reserve in Argentina. These areas will have access to supplemental irrigation. Further West, additional irrigation may be required to push the expansion. Biofuel is needed to supply these areas with fuel and to boost economic development. More soy could be seen as irrigation infrastructure can be built, rotation can prevent disease problems and as crop prices allow a return from the land. (For additional information, contact Dr. Denise McWilliams, Denise.McWilliams@fas.usda.gov, Crop Analyst for South America.)