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China: The Value of Agriculture Education

For the modern era, China has been called one of the most advanced and urban countries in the world. With a population growth rate of 11.7% in the 1990s, China has been on the forefront of economic reforms and urbanization. This population growth however has widen the gap between the rich, metropolitan people and those that still rely on subsistence farming in the extreme rural areas of China. The increasing population has strained the already dire need for crops such as rice in the Chinese economy. Furthermore, the recent push to eliminate dependence on foreign fossil fuels such as oil has severely affected the status of the subsistence farmer in China. While the Chinese government has recognized this vital issue, their current policies lack a key area: education and research into the implementation of agricultural practices that will increase crop yields and alleviate the stress felt by Chinese subsistence farmers.

For thousands of years, the typical subsistence farming family in China has remained virtually the same. While urbanization and the movement toward single-child families has lowered the national average of people per family to 3.63, subsistence families have three or more generations living in one home, all needing the necessities of life. Among this is the need for proper nutrition and a steady amount of food in the home. In 1990, the United Nations estimated that among the most impoverished families in China, more than ¼ of families were receiving less than a minimum level of calorie intake. By definition, subsistence farming is the production of a meager crop to support one's family with little surplus left for marketing. One must then question if one-fourth of impoverished families are not receiving adequate nutrition, how they continue with their livelihood and crop production. The lack of education both in standard subjects and in agricultural practices is astonishing with 6.72% of Chinese people, primarily those that fall below the poverty line, being illiterate. When this figure is calculated with China's constantly increasing population, the number of people with no formal education reaches 188,988,095 people. The lack of education can also be linked to the poor income of subsistence farmers. On average, a Chinese person will make around 18,000 Yuan ($2,250 U.S.) per year. In comparison, the average subsistence farmer in rural China will struggle to make 450 Yuan ($50) per year. This fact paired with the statistics related to subsistence farm sizes, crops, and incomes provides light to the widening gap between the rich and the poor and the instability of the agricultural industry in China.

Subsistence farmers in China generally manage about one to three acres of land in Eastern China where crops are grown, while in the northern and western areas, livestock production can be found. Though the popular crops of rice, wheat, potatoes, corn, peanuts, tea, millet (a cereal grass), barley, apples, cotton, and oilseed are grown, the exports of these products are non-existent because the yields of crops are not substantial enough to support a farmer, let alone an entire country's economy. Farming practices in China have not evolved; they have remained the same for centuries. Compost and human waste are the most common fertilizers as opposed to the 57.8 million total tons used in United States agriculture in 2004. Most farmers do not own a tractor and have no means to access use of such equipment to till the soil and promote soil quality. The Chinese government recognizes poor soil quality as a contributing factor to decreasing and unstable yields. In one instance, it was described that "some fields they plant corn seed directly into the wheat stubble or the wheat stubble is burned, and they transplant cotton from nurseries after harvesting a garlic crop" (Texas). Such lack of tilling and proper crop rotation takes a toll on the soil nutrients and quality, which deeply affects the yields of subsistence farmers. By having a lack-luster yield, the farmers have weakened the agricultural market in China to the point that government action and policies are necessary and currently put into place to redeem the

infrastructure of the agriculture market. The Chinese government has taken steps to repair the strain on the markets. Large public investments in the market system, preventing loss of land to urban development, and the encouragement of loans to subsistence farmers are policies that have found merit and implementation by the Chinese government in effort to stabilize the market. In the late 1990s, the suspension of futures trading on grain confined the market to one that did not benefit the common Chinese farmer. However, in 2004, the selling of crop futures once again liberated the market in addition to the reduction of government-sponsored corporations monopolizing the market flow. While these factors of the common subsistence farm seem to provide enough limits on the overall production and success of Chinese farmers, further barriers include lack of adequate water supplies, the degrading environment in rural areas, and the overall lack of government- and organization-sponsored education programs.

With the knowledge of China's growing name as a quickly developing modern country and its situation with the poverty and lack of educational support for rural subsistence farmers, one much determine the key factor. Such a factor lies in increasing China's productivity in agriculture with the intent to promote biofuels and stabilize food security needed for the education of family farmers in areas such as yield and sustainability research and the overall implementation of such research. By providing programs that educate farmers on yield increasing activities such as fertilizer, proper crop rotations, tilling, and drought prevention and resistance, subsistence farmers will be able to apply the knowledge gained. From this gained knowledge, the conclusion becomes that yields will increase; farming families will have a more secure food source and will be able to have a large surplus to sell in markets and to the biofuels plants. By addressing the agricultural education of Chinese subsistence farmers, the source of the matter is resolved and allows China to ultimately reduce their dependence on foreign fuels and begin to produce substantial amounts of biofuels.

Presently, little is being done to educate farmers in China. The education of these farmers directly and significantly affects the whole of China's population. The lack of education in areas of farming practices restricts the yields achieved by the farmers and highlights the true affect of this factor. Through reduced yields that do not reach their full potential, farmers cannot produce enough food to support their families and furthermore cannot meet the demand necessary to reduce China's dependence on foreign means of energy. The status of this factor is at a standstill. The Chinese government does not include any dramatic or current action towards the education of their farmers. Seen in the use of century-old practices, the situation has the potential to diminish and become severe if not addressed quickly and effectively. According to national standards, less than 2.5% of family farmers receive the necessary amount of food and income each year. Without drastic and immediate action, this statistic with continue to climb as China increases its need for crops to provide for its rapidly expanding population and its desire to become self-sufficient in the area of fuel. The degradation of the soil and the constant fear of eroded land also play a role in the need for a public and national policy that prioritizes the proper education of farmers. Many techniques to prevent wind erosion and the infertility of soil contribute to the increasing yields of farmers worldwide. Furthermore, this may seem to be a non-gender related issue; women in China remain at a disadvantage even in subsistence farming. By Chinese standards, women do not have the opportunity to receive the same education and employment options as men. This factor contributes to the increase in the number of Chinese women applying for welfare to 40% between 1999 and 2003. Many of these women live in homes where the practice of subsistence farming feeds the family. By making the agricultural education opportunities available to men and women in equal parts, China can further their production targets exponentially.

Observations of the trends of the agricultural education of subsistence farmers demonstrate that any policies and measures taken show limited progress. Many rural farmers in China remain without necessary equipment to produce adequate crop yields such a tractor. The recently released Chinese policy on agriculture does not allude to any current measures to ensure that the farmers of China receive an

education to better their livelihood. Due to this fact, the situation of China's farmers remains idle. If left unattended for much longer, the situation will rapidly begin to spiral downward, feeding upon the increasing debt of subsistence farmers and their lack of necessities. If China continues to ignore this lack of agriculture education, few options in the world of biofuels will remain available to them. However, the improvement and immediate action in the area of agricultural instruction for subsistence farmers will trigger a chain reaction. The execution of the learned practices promotes better production methods of crops. Better production methods of crops then lead to increased yields over the course of several years. An increase in crop yields then stabilizes the Chinese agriculture market providing essential funding for the development and implementation of effective biofuels use in China.

Worldwide, countries are feeling the need to become energy-efficient. China itself consumes 3.534 million barrels per day according to a 2005 estimate. Paired with her growing population, China must quickly develop means to decrease their dependency on foreign oil. Chinese and international scientists have determined that dependency on fossil fuels cannot last forever and environmental groups have begun research and technology development of biofuels such as those derived from cellulose and plant material. China as well has begun to provide means for their future by developing biofuels that depend on cellulose, rice in particular. The residue found in rice hulls is one form of cellulose that remains relatively cheap in China despite the unstable market. Due to this, the demand of rice will grow within the next ten years as China continues to progress in its development and construction of biofuel plants. This need for an increase in rice production remains directly linked to the need for higher crop yields. This need will place more stress on an already delicate situation unless measures find immediate action to guard against a dramatic inflation in the need for rice and other key biofuel crops.

For China to become truly energy-efficient, the education of its subsistence farmers must become a priority. Education on various agricultural practices such as proper fertilizer methods, drought resistance, and tilling processes will boost crop yields and stabilize the farming infrastructure, which sets the stage for the biofuels industry to develop. To increase the demand on an already fragile market would undermine the position of the Chinese government and damage the subsistence farmer's way of life. Though the implementation of biofuels could not be an extremely rapid one, China must allow time for the subsistence farmers to adapt to new practices and new lives. With the foundation of a stable and well-rounded agricultural education, yields of vital biofuel corps would increase and therefore allow the demand to increase and the Chinese government's plans regarding biofuel implementation could receive success and leave a lasting impression on China and the world in a global economy.

Foremost, the education of subsistence farmers in China is a job left to the government and its resources. Funding for resources provided by the Chinese government would make it possible for agricultural employees to go out into rural China communities dominated by subsistence farmers and provide hands-on experience and demonstrations with agricultural practices. Such hands-on experience would prove to be more effective and even with the current understanding of the Chinese farmers. In addition, organizations such as the World Bank could potentially provide loans to farmers for necessary equipment such tractors, fertilizers, pesticides, and other items. Other private farm-oriented organizations could provide and assist with educational visits and the loaning of agriculture equipment. Ultimately, however, the first step remains the recognition of the issue by the Chinese government and the instigation of immediate and productive actions. Only with decisive action can the dependence on foreign fuel and development of biofuels take place.

The vitality of education to Chinese subsistence farmers remains directly correlated with the need for biofuel development and production in China. Without the education of these farmers, China will not have adequate means and yields to support the implementation of biofuels within its country. With the education of subsistence farmers comes the execution of enhanced agriculture practices and increased yield numbers during harvests. In turn, increased yield numbers stabilizes the agriculture market in

China. A stable market then can allow the subsistence farmers to better provide for their families and better meet new demands associated with the development and construction of a biofuel industry in China. This an upward spiraling circle that relays itself back to the education of Chinese subsistence farmers. With their education comes the hope for China and its need for a fuel-efficient tomorrow.

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