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India: Enabling a Country to Feed Herself

When you live in the United States of America, starvation and a poor quality of food is not the first worry that comes to mind. But in the country of India, the chance of seeing people of any age without adequate food and proper nutrition may be seen around every corner. India's food production is most known for her high production in wheat and rice. With India annually producing 12-16 million metric tons of food grain each year and leading the world's production of rice, one might believe that Indians would have enough food to feed their country. However, India has over 25% of her people under the poverty level.

The people of India literally live off the land, with farmers feeding their families and earning a living through selling their commodities in local markets or to the government. Often times in the history of our world a correlation can be made between war and famine. India has not had a major war in over 400 years. Although unpredictable, it would appear unlikely for conflict in the near future with countries bordering India, since India's populous is known for being a peaceful country many people have flocked to become part of the Indian nation. The population of India has more than tripled in the past fifty years. The world's population is expected to exceed 9 billion people by the year 2050, and India, with the second highest population count on earth, catastrophic hunger could become a defining issue for this country. With high populations, nutrition quality has become a top priority in feeding all of India, especially those who cannot afford it.

India has need for improvement with their education in both fundamental and technical agriculture. This includes the equipment that is being used for growing and raising commodities, safe conditions in which the food is being handled, increased knowledge of crop hybrids being grown, and the procedures that occur after the food has been harvested continuing through storage. These practices may be improved with interaction from other countries and their knowledge, proper technology updates in genetics and equipment, and having the government further involved in creating programs and listening to the people of their country. Individual and combinations of these improvements may help India find relief for the current as well as future populations.

India:

India has a total area of about 1,269,346 square miles, making it the seventh largest country by landmass in the world. India is divided into seven districts and twenty-eight states. India is a peninsula, with the Arabian Sea on the west, the Bay of Bengal, and the Indian Ocean on the south, making it a major trading port. The Himalayan Mountains separate India from the majority of the rest of Asia and China. Perhaps this is what has helped India with avoiding large-scale war with neighboring countries for almost four centuries.

The current population of India has reached 1.2 billion people, making it the second largest country by population in the world. Currently, and for the foreseeable future, China maintains the largest population on earth. The fertility rate per household as of 1950 was six children. The government has made many policy changes in an attempt to control population by only allowing a household to have two children. With the population of India expected to reach between 2.5 and 2.8 billion by 2050, this policy would seem to have little impact. These population numbers are increasing the likelihood that more Indians will be entering poverty levels while their demand for food will continue. Coupled with higher food prices,

current practices will make it nearly impossible for parents and their children to be on a well balanced diet.

Religion in India has a major influence on their people's lives. Religious views have an even larger affect on their consumption of vegetables and meats. With over 80% of the population belonging to Hinduism, protein production in the form of meat is unique in comparison to western cultures. India ranks eight in the world for beef exports. Recent concerns with foot and mouth disease have hampered the small-scale producers in those states that export beef. Hinduism believes that all bovine are sacred and never to be consumed. Because of the Hindu religious beliefs, most nutrition is gained through vegetable and fruit consumption. Ample protein due to the absence of meat places concerns for a lack of protein in children and adults. Another religion in India that affects food consumption is Jain. Jainism believes that every living creature has a soul, even those of plants. They only eat food that has come from trees and animals that have died from either natural causes or diseases, many of which may cause sickness to humans.

Food Security:

India's has many problems when it comes to the production of their main exports and food for their own people. India has been working on plant breeding for the quality of their food and vegetables' but may be concentrating with the wrong focus. The current goal for India is higher yield, drought, and salinity tolerance. Through genetics and plant breeding, Indian agriculturalists have made their fruits and vegetables physically appealing with better shape, texture, and color. These aesthetic improvements have done very little for the improvement of India's need for increased food production and income. Protein, vitamins, sugar, flavor, and alkaloids should be areas of concentration for improving the nutrition of food and its ability for longer storage. Improving the characteristics of produce that enhance shelf life will help India gain a balance of nutrients that will decrease malnutrition.

Pesticides on vegetables and fruits have become a large problem for food safety in India and are widely ignored by the government. The pesticide *Endosulfan* is being used on vegetables and fruits in India. It is known to be an extremely deadly pesticide that belongs to the organochlorine family. This chemical is banned in 62 countries but India refuses to ban it from their own use. A common practice would be like this: A farmer sprays Endosulfan in the air over his vegetables farm. The neighboring farmers and their families would be at high risk of developing both physical and mental disorders. A milder affect can happen to people who have eaten food that has been contaminated or even became in contact with the pesticide. With India exporting their food to over 70 countries, Endosulfan can have a worldwide affect on food security through safe practices, as well as possible embargos that Indian farmers may have placed upon them.

Farmers have also had difficulty bargaining value with the government when they market their crops. The Indian government buys crops at established prices and then gives them out to the poor through ration programs. These programs require the involvement of a number of government agencies and intermediaries. Cases have been filed claiming that corrupt officials that run storage facilities have rigged the scales where the food is weighed to suggest they have brought less grain than what is really on the scale. The excess grain not been properly reported has supposedly been sold to the black market for illegal personal gain. Some food in transportation has been listed simply as gone missing. Accurately accounting for commodities raised in India will improve the ability to know exactly what the country is capable of producing herself.

Post Harvest Losses:

One of the main reasons that cause spoiled food during post harvest periods is the lack of proper cold storage for perishable commodities. The cold storage industry in India lacks modern technology and monitoring. Both large scale and personal cold storage requires money. Most citizens are simply unable to afford or operate adequate cold storage. Therefore, the ability for families to purchase quantities at discounts and store them over time is rare. A majority of the storage facilities are over 100 years old, and can hold only up to 18.21 million tons of food. This is only 12.49% of the total production, of 145.78 million tons of food needing this type of storage. Potatoes are one of India's staple crops. They, alone, occupy 81% of needed storage while fruits and other vegetables occupy only .21% of the existing capacity. Due to the rising cost of land, building materials, and labor, it has become increasingly difficult to add facilities to keep up with the demand for storage of commodities for both exports and imports. Electricity tariff prices have also risen and have made the desire of operating storages less appealing from the profit point of view.

Proper, modern grain storage is another major issue in post-harvest losses. India does not have grain bins like we do in the United States. Grains, rice, and cereals are most commonly stored on platforms covered with large plastic tarps. The plastic tarps may be ripped or have massive holes allowing rain and wind in to damage crops. This can also lead to easy access for pests and humidity to reach the crops. In results, the grains are often spoiled at rates of up to 50% damage and are not able to be transported to other parts of the country for distribution. Spoilage by rodents also poses real health concerns for both humans and livestock.

Transportation is another huge concern, and money is being lost because of it. For those farmers not living close to the city this creates a special dilemma. With the disadvantages of not having tractors or combines, combined with roads that are in very poor condition, food may be left to the stress of heat and humidity rather than proper storage. Loss may be found in crops even prior to leaving points of production. By the time farmers get to the markets, some of their crops may be spoiled and lead to smaller selling prices and a loss of trade. The high cost of fuel to transport and the lack of modern economical transportation are responsible for food loss on sight, as well. The rail and road system in the United States and the cooperative market place may be models to install amongst production land in India.

Possible Solutions:

As over 80% of the Indian population is employed in the agriculture field, education is needed for the job to be done correctly and efficiently. If instruction and practices were taught in school and communities, India could be well educated on modern food production and harvest. Instruction also needs to be gained in the proper safety that is needed to handle export commodities. The ability to identify and spot disease and spoilage in food, including fruit, vegetables, and livestock would improve trade with other countries and identify India as a viable partner in safe food production.

Maintaining updated farming technology would help increase farmer income and lower the prices of food to the people of India. A vast reduction in food spoilage problems would be a great place to start. If India could reduce grain spoilage completely, it would lead to a doubling of available grain for food and export. A popular product that has been tested in India is a Solar Dryer. Solar Dryers are a chamber with four metal walls and a glass top angled towards the direction of the sun. A small solar cell powers a small fan helping air to circulate through grain to maintain proper moisture levels. It also charges a battery for use when there are non-sunny days. Solar Dryers can protect a variety of foods within a mere hour. Fruits and vegetables can be dried and stored away for a family to feed themselves or sold to packaging plants

for distribution. Solar Dryers can be very expensive but studies have shown they pay for themselves within ten years.

A way to store a large amount of grain and prevent spoilage would be to increase the availability and the quality of the food currently being raised in India. Metal silos have been shown to protect food for long periods of time in many countries. This allows producers to sell grain at the right price for higher income. Metal silos have a lifetime of around 20 years. If taken care of properly they can last for over 30 years, increasing the profitability of construction by 50%. Storage facilities like this have many advantages to the tarp methods being used currently. The price is much higher, however cooperative purchasing would allow for many producers to enjoy the benefit of less risk to spoilage from rodents, insects, and moisture. Fans provide air through the bins preventing water and humidity from damaging the grains. Since the silos are placed on concrete bases rodents would be unable to dig underneath.

Communication and education are two keys to improvement. Sharing information to both producers in India and government stakeholders would be crucial. An awareness of possible technologies, including but not limited to those covered in my research, may be gained through exposure at trade shows, land grant universities, and extension programs. Partnerships between Indian producers and United States producers would seem to be most logical. Pairing producers through oversea trips, sponsored invitations, and good will could provide the vehicle for education and communication to take place. The methods researched in this paper are some of the least cost prohibitive that I found, yet there is still expense. Some expense may also be incurred in both construction and maintenance of facilities and support systems. My strongest belief is that sponsorship through United States private industry and non-profits are the soundest means to provide information and finance.

Summary and Conclusion:

“Food is a common ground, a universal experience”. This quote, from James Beard, shows that no matter where you are from, or what your background, food should be considered a human right. Food is a necessity to everyone, no matter their belief or financial situation. If someone is in need, then we should all make ourselves willing and able to provide assistance. The United States can offer many opportunities for improving India’s agricultural lifestyle, including informing other people in the world of the crisis that is happening in India and how it will continue. This change can start with the people of Iowa. Iowans have been leaders in agriculture stewardship, education, technology, and work ethic for over 100 years. Rather than trying to find solutions for all of India’s food security problems all at once, we could make specific and attainable goals to reach out with our good fortune in agriculture. Simply taking steps to assure the quality of life through adequate quality food for one family in India would be a step in the right direction for every Iowa farm to take on.

India has had major trials in the past with food security. These are not all new tendencies. India is at the chance of luck everyday with unpredictable weather and prices. What is going on now in India is unbelievable to most of us in the United States that never have to worry about when and where our next meal will come from. If we can help India to feed herself through respectful, acceptable practices that consider the diverse religious and resources available to her, then much will be accomplished. Education, government policy, and proper techniques in agriculture will help this amazing country be an ideal host for families to live in and successfully grow food off the land.

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