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Burundi, Factor 6: Sustainable Farming

Bringing Kernza to Burundi

Many people in the United States today enjoy a large varieties of foods for breakfast. Including eggs, bacon, pancakes, and the like. One specific item that comes to mind however is the breakfast cereal. The first ever "cereal" was invented by James Caleb Jackson in 1863. It was called granula and was made from graham flour dough that was dried and then broken into shapes which had to be soaked in milk overnight, because they were so hard. John Harvey Kellogg, a surgeon who at the time ran a health spa, went on to make a different version later, calling it granola. Since then, cereal has skyrocketed with multiple companies making hundreds to thousands of different types of cereal. Including, but not limited to; Cinnamon Toast Crunch, Fruity Pebbles, Cheerios, etc.

One of the top selling cereal brands of today is General Mills. Recently, General Mills has partnered with the University of Minnesota and the Kansas-based Land Institute in order to work towards commercializing Kernza, which is a wild relative of wheat. General Mills is hoping to incorporate into its snacks and cereals under its organic brand; Cascadian Farm, and in doing so has donated $500,000 to both the Land Institute and the University of Minnesota to find ways to make Kernza better and ways to commercialize it better

Kernza, as stated before, is a wild relative of wheat; and was developed by Dr. Lee DeHaan, a member of the Land Institute in Kansas. Unlike regular wheat, Kernza is a perennial plant, meaning that it does not need to be replanted every single year. Which also means that there would be less soil damage along with more retention of water. The roots of the intermediate wheatgrass (Kernza) are able to extend downwards of more than 10 feet, meaning that it is more than two times that the length and density of regular wheat. In ideal conditions, the seed heads may contain even more seeds than the regular wheat, however, as of now, Kernza seeds are only 1/5th that the size of regular wheat, and contains less gluten, meaning that turning it into bread, or any item of the sort, would be a present a challenge.

Currently, many countries in Northern Africa are growing wheat or sorghum as food and a source of income. 12 countries that currently grow wheat are Angola, Burundi, Democratic Republic of the Congo, Ethiopia, Kenya, Madagascar, Mozambique, Rwanda, Tanzania, Uganda, Zambia, and Zimbabwe. Although, each respective country does have certain areas which could potentially be profitable for competitive domestic production. It would seem that the countries that have the highest simulated yields are ones of eastern and Central Africa. Those countries include; Rwanda, Ethiopia, Kenya, Madagascar, Tanzania, Uganda, and Burundi.

In Burundi, the economy is solely based on agriculture which employs over 90% of the population and accounts for more than 40% of Burundi's GDP. In 2014, foreign aid accounted for 42% Burundi's national income. The civil war that ended 2005 caused an upward of more than 200,000 deaths, displaced up 140,000 internally, and compelled over 48,000 to take refuge in Tanzania. The flow of agricultural goods had been disrupted as transportation routes got blocked. The economy suffered political disruption in 2015 as a result of President NKURUNZIZA's controversial third-term. Some even accusing him as a dictator who refuses to give up power. Donors withdrew aid, and Burundi's budget deficit increased.

The three main ethnic groups that live in Burundi are the Hutus, Tutsis, and Twas. The Hutus, who make up about 85% of the population, are mainly the farming families. The Tutsis make up a smaller 14% of the population, but are in control of the countries government and military, however those who are not

involved in the government, tend to raise cattle. The Twas were some of the earliest known inhabitants of the region, but currently only constitute approximately 1% of the population and are not actively involved in national economy. Other ethnic groups include immigrant Africans which totals to 82,000 and Europeans and Asians consist of about 5,000.

Approximately 90% of the population depends on farming in order to survive. And because much of the land is being redistributed to sons or to returning refugees, the land plots end up being quite small and overworked, which results in less productivity. More than half a million of Burundian refugees returned from other countries, mainly Tanzania, within the last decade! A lack of food, clean water, and poverty contributes to 60% of chronic malnutrition in children. Along with two-thirds of the population being below the age of 25 and a birth rate of approximately six children per woman, the population in Burundi is continuing to expand, which ends up putting even more strain on the already poor country.

The typical farm family unit consists of one Hutu male, who leads the household, one wife, and maybe four to six children. Usually farm families are extremely poor, malnourished, and are constantly struggling to simply make enough food for their own family to survive. Typically a farm will grow beans, sweet potatoes, corn, sorghum, bananas, and manioc in order to support themselves. Other families may also be able to afford livestock, such as a herd of cattle, but only those in the upper class, such as the Tutsis.

An average family farm plot is 0.8 hectares, or two acres, and grows mainly beans, bananas, sweet potatoes, corn, sorghum, and manioc for local consumption. Other crops, such as coffee, cotton, or tea are grown for marketing. Coffee and tea make up the majority of the foreign income, but the primary export of Burundi is coffee, where in 2001/2002 the coffee production was 13,020 tons. Tobacco and wheat are also grown to make income. A large amount of the land has lost fertility as a result of soil erosion from lack of fertilizer, shortened fallow periods, irregular rainfall, and poor agricultural practices.

If it continues along this path, a good majority of the land will no longer be usable for farming, at least not for a couple years. Many of the farming families do not understand or simply have the knowledge of good agricultural practices. Because of this, only about 43% or approximately 1,100,000 hectares (2,781,000 acres) is usable for agricultural purposes, where as 5.5% of the land is being irrigated. Staying the way it is, the supply from the family farms is barely enough to feed an entire family.

One way to solve this problem is to educate the family farmers about effective farming methods and ways to fertilize the land as well as maintaining topsoil. If the locals are able to learn and implement the methods taught, the land that is considered as not suitable for farming will be able to come back to life, and hopefully once again be used for farming. This would lead to family farms having more land to grow crops on, meaning that they would gain larger, more nutrient rich foods for them to eat. A larger yield also means that a farm family would also have more crops to import for income. And with that higher income, that farm family would then be able to much higher quality crops in higher quantities. As well as gaining the ability to get technology and more knowledge about farming. Simply teaching a community about effective agricultural practices could lead to massive improvements in both land and economy, but only if they are willing to learn.

A simple thing that could be done would be to give each community a small tractor or something along those lines so that they wouldn't have to do so much manual labor. Having a tractor could help them with farming, or carrying things long distances such as water. Though that does some problems with it. Such as what to do if it were to suddenly break down one day? A way to ease that process would be to have someone stay and teach them how to fix it if anything were to ever go wrong. And once that person

learns, they could pass that knowledge onto the next generation, making sure that there will always be someone to fix anything that may go wrong.

Another way is to teach farming at a much younger age. Research has shown that children do in fact learn faster than adults, and are more flexible when it comes to learn new things. A way to teach children about farming would be to have each school do something small like a garden, possibly with crops such as bananas, sweet potatoes, or corn that they could take home with them to eat. By teaching the children about farming, they are able to talk to their parents and in turn inadvertently also teaching their parents about it. After visiting a farm, a parent said that, "he wouldn't stop talking about it." And 54% of parents ended up saying that they themselves learned something from the trip. By teaching the children of farmers, assuming that they are going to be farmers also, they will be much more equipped with adequate knowledge in order to instantly take off where their parents had left off, and possibly even surpassing their parents, as opposed to having little to no idea what to do once it is their responsibility to take over or start a new farm.

Finally, another solution is to possibly introduce a new crop to their farms. Even though Kernza is relatively new, it is able to do things that regular wheat is simply not able to do. As Kernza is a perennial plant, the famers in Burundi would not have to replant it each year. Which could give them more time to plant other crops or deal with any other issues that they may have. The roots of this intermediate wheatgrass are able to go possibly more than 10 feet underground, which in turn holds the soil in place, preventing soil erosion. Kernza can also quickly absorb water and nutrients, as well as reducing soil moisture (second year Kernza) and reducing nitrate leaching. Burundian farmers grow wheat, and by introducing this new crop to their farms, they wouldn't be that unfamiliar with it. Taking in consideration that Kernza has only been around for about 13 years or so, there are some issues. Mainly being that the seeds or only about one-fifth that of conventional wheat. Also Kernza has less gluten, ergo making a challenging ingredient to put into bread products. Meaning that it would take a bit or work in order to Kernza into something that they, the farmers, could eat. But, people have done it. Birchwood café in Minneapolis has already implemented Kernza pancakes onto its menu.

An institution that could possibly funded by could be the Land Institute, which is a non-profit agricultural research organization, and the institute that patented Kernza. Not to mention, General Mills has partnered with the Land Institute in order to make sure the Kernza is a success. But ultimately in the end, it is up to the residents of Burundi in order for this plan to work. Teaching adults may be a challenge or downright pointless, and children may or may not want to engage in taking care of a garden at school. The teachers may potentially find it not worth their while to have a garden or farm at school. More importantly, they might not accept any potential new crops that are introduced to them, because it is different and not what they are used to. People are unpredictable, but nonetheless there's no point unless someone tries.

In conclusion, Burundi is an incredibly densely populated country where 90% of the population relies on farming in order to survive. Nonetheless, it has great potential. By teaching the adults, or attempting to teach them, about good agricultural practices, the family farms could potentially have a greater yield as well as helping to increase their annual income. Which would then aid them in attaining farming technology or new methods of farming. Having a garden or a farm at each school and having the children take care of it, the children learn about farming which they will hopefully take into their adulthood, and will theoretically also teach the adults when their children talk to them about the garden. Finally, by introducing a crop (Kernza) that would help them maintain their farmland as well as reduce their worrying about planting again the following year, could potentially give them more time to deal with other issues that they may have.

But, as stated before, it is ultimately up to the residents of Burundi. Whether or not they accept these new methods and ideas. In the end, they are the final deciding factor of whether their country stays where it is,

or if it moves forward. As well as how far it will end up going. The most important thing to focus on would likely be the education of the children, as they themselves are the future of Burundi and it is far more likely that they will learn and accept these strange, new ideas as opposed to the adults. Although the children will probably end up learning more about mathematics and literacy, introducing them to something that could potentially one day be their way of life would help them out immensely. Preparing them for a future where they won't have to worry about whether or not they will get their next meal.

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