

Nina Earnest, Student Participant
Mediapolis Community High School
Mediapolis, IA

Finding Stability Through Agricultural Research and Native Crops in Ethiopia Looking Ahead: Sustainable Paths toward Food and Nutrition Security

INTRODUCTION

A country in the eastern region of Africa, that of the Federal Democratic Republic of Ethiopia, has been ranked 170th out of 177 countries, as one of the least developed in the world. The eastern African country has a population of upwards of 77 million people ("Overview" n.p.). Obviously, on such a scale, it is clear that something must be done to bring this country out of its present state. Ethiopia is a land plagued by misfortune, in the form of political instability, climatic difficulties such as droughts, poor soil, the AIDS pandemic, famines and food insecurity. According to the United Nations' World Food Programme, the nation not only has one of the highest incidences of malnutrition, it also shares the unfortunate fact of having one of the lowest primary education enrollment ratios ("Ethiopia" n.p.). Many of the country's problems lie at the root of their government issues. Up until 1974, the country had been ruled by an emperor and the country's last emperor was Haile Selassie I. At this time, the "Derg," a type of Marxist regime, took over the country and led the nation into a long time of political turmoil. Many coups and wars later, the country has come to its present state. Ethiopia is a country in desperate need of reform and to do so, the country in question must be introduced and understood, a clear view of the impact of the food and nutrition insecurity of the region must be seen, and the possibilities of improvements in the future considered.

SUBSISTENCE FARMING OF ETHIOPIA

First, to understand subsistence farming and a typical family in Ethiopia, one must take a detailed look at the family composition of the typical family, as well as diet, education, and income. Agriculturally, the farm size, the crops grown, agricultural practices and marketing must be viewed and finally, what the major barriers are to forming security in nutrition and food are also important.

Family Composition and Diet

To begin, the average family size in Ethiopia is around six children (USAID, n.p.). Women who are the heads of households usually have the poorest families. Religion often affects the diet of an Ethiopian. Root crops are important to the Ethiopian diet, including that of enset-the most important root crop (Institute, n.p.). Not only is there enset, there is teff. Teff is a grain native to Ethiopia with impressive nutritional value used to make *engera*, a sort of fermented pancake eaten with "wot" a kind of stew with lentil, beans, spices, and meats, among other things (Piccinin, n.p.). Pulses are a main protein source for the diet. Fruits and vegetables are continually becoming more of an important part in the Ethiopian diet ("Feed" n.p.).

Education

Next, during the time of the regime that overthrew the monarchy, they had embarked on a campaign for literacy. During the time of the empire, the literacy rate was purportedly at ten percent and after the revolution overthrowing the empire, it grew to 63% by 1984. However, one must remember that the figures may not be accurate because of the military regime's desire to make the numbers as high as possible (Reference, n.p.). The real numbers could have been lower than forty percent. Women are less likely to receive an education in Ethiopia ("Rural" n.p.). 1985/1986 was the last year that government statistics were available, and those lie at 2.5 million primary school age children were enrolled in school

that year. The junior secondary schools only numbered in at 363,000 students and secondary school level, such as high school, had fewer with 292,385. In percentages, primary school students were 42% of the age group and only 5.3% at the secondary level ("Country" n.p.). Low enrollment could be contributed to many things, however, crowding in schools and the lack of availability of schools may be the major inhibiting factors. Due to the lack of education, more and more Ethiopians would have to go to work were there would be no promising jobs without the education ("Country" n.p.).

Income and Farm Size

The average income in Ethiopia is \$108, but, twenty years ago, in 1984, the same figure was \$190 (Buerk, n.p.). To worsen matters, in 1984 there was a time of massive famine enveloping the nation. Another estimate states the average income was at \$100. When it comes to grain, the crops bring in about one ton per hectare throughout the country. This number, due to Ethiopia's climate, can easily move down during the time of droughts. Among the people, average land holdings are less than one ha. (Rural n.p.) A ha or hectare is equal to 2.47110 acres ("IFP" n.p.).

Crops Grown

Food production in Ethiopia includes cereals, pulses, oilseed, sugar cane, potatoes, and most importantly, coffee ("Overview" n.p.). Ethiopia is the world renowned birthplace of coffee. On top of that, nearly one quarter of the people of Ethiopia-roughly 15 million- rely on coffee as their livelihood. ("Economy" n.p.). Another crop is cotton as well as *khat* or *qat*, a shrub that has psychotropic qualities which is grown for export. Other grains grown are corn, barley, sorghum, wheat, and millet ("Political" n.p.).

Agricultural Practices

Next, agricultural practices aren't what they should be in Ethiopia. Farming has been done on steep and fragile land that leads to soil degradation ("Ending" n.p.). As of 2003, 2,900 square kilometers of land was used for irrigation, while there is a total of 1,127,127 square kilometers of land in the country ("Ethiopia" n.p.). In other terms, in the 1970s, irrigated land only made up five percent of the total land that was cultivated ("Political" n.p.). Reusing organic materials, such as manure is not a method used often, either ("Ending" n.p.).

Marketing

Marketing has been a major problem for the Ethiopians. While the growing of the crops has been problem enough due to certain causes, actually getting the crops to markets to distribute to the people is also an issue. According to Science in Africa, the poor distribution practices are a major cause of the current crisis the country faces. For example, in 2001 and 2002, some farmers actually had really good harvests with high yielding seeds and fertilizers ("Ending" n.p.). Unfortunately, farmers haven't access to get to markets, due to poor roads, lack of information, and there is no credit. In fact, of all the food produced, only a quarter of it is actually taken to market ("Ending" n.p.).

Major Barriers to Improvement

There are several things that are barring the growth process in this country. Both the climate of Ethiopia and the society (among war and other conflicts) lead to harsh conditions for agriculture ("Rural" n.p.). For example, in 1984, Ethiopia experienced a horrific famine brought on by natural occurrences and the instability of the government. Primarily, there was a drought in the north but also, due to fighting with the country of Eritrea, there was no security and no means to assisting those who were dying. ("1984" n.p.).

Droughts, in particular, are far too common in Ethiopia which subsequently can lead to famine. Dr. Denise Ward, a veterinary missionary in Ethiopia, has seen her share of the trials of the Ethiopian people, particularly in that of the climate and shares in a newsletter: "There is currently a drought. Water

is being rationed in many of the towns, and we saw many long lines for water. In one area the people told us for one year they have had no rain, and now it is dry season for another couple months. Their cattle are getting water every three-four days. (The Borana cattle can go three days without water, but four-five days between watering really pushes their limits.) The people are currently getting water from a pond that is 70-80 km away, but even now that pond is drying up" (Ward n.p.).

The condition of the land and the soil also are barriers to crop production. There is poor water and soil conservation that has eventually led to erosion. Soil, therefore, cannot hold moisture and, due to the fact that droughts are common in Ethiopia, this leads to even more crop insecurity. Farmers who have problems with living in an area where droughts are common tend to be wary of using products that could help, such as fertilizers and improved seeds ("Ending" n.p.).

The government of Ethiopia has gone through some turbulent times throughout the last thirty years. Due to the political instability, there is bound to be problems with the economy and therefore the food people ought to be getting. During the famine in 1984, the regime kept a policy of not sending food shipments to rebel areas where the most aid was needed. This didn't endear the government to the international community. ("1984" n.p.).

FOOD AND NUTRITION INSECURITY

In 1995, a study was performed by Dr. Tewolde Egziabher, with the Institute of Sustainable Agriculture. In four communities, they used composting compared to chemical fertilizers. Both did remarkably well and in the case of the finger millet crop, compost actually performed better for food production ("Feed" n.p.). This experiment shows how, through experimentation and research, new doors can open. Agricultural research may be the key to identifying ways to further enhance agricultural practices and hopefully, crop yields, in the future of this country.

Agricultural Research

Insufficient agricultural practices, land degradation and marketing are major factors that would keep an Ethiopian family from gaining a sufficient income or keeping enough food. Though agricultural research has been done, the trends have shown that so far, it is flat.

Women, who often are disadvantaged in many parts of the world, are no exception in Ethiopia, even specifically in agricultural research. Dr. Ward, in another letter stated, "I was told by another individual about a group who trained selected herders to treat animals. They thought through many things-what to teach and how to teach it, but they failed to think through all the details (they forgot to think about where to teach). The result was men and women qualified and trained to treat animals, but also women in the training had been raped, obtained sexually transmitted diseases and one has subsequently died. Unfortunately these country women did not know how to survive in the city. Those that held the training did not take this into consideration. Now the diseases these women have contracted will likely be spread throughout their communities." Through no fault of their own, these women have been subjected to diseases out of their control even though they are trying to learn by going through proper training.

Presently, there is agricultural research underway in Ethiopia. For example, when Dr. Ward was traveling through the country, she wrote: "While I was up north I was able to visit Debbie and Virginia, short-termers in SIM working with an agriculture project and doing sheep trials with various forages. As we visited with the workers and treated the sheep we got to see the impact the project has had amongst the community. They've introduced vegetables, fruit and indigenous trees to the farmers to improve the diets of the local farm families, to help with erosion control and to improve the food availability for the animals" (Ward n.p.).

When evaluating trends through agricultural research, one would say that the best way to measure trends is through the improvement of crops (through seeds and enhanced practices) by looking at the crop yields. Agricultural research continues to become more promising in the country, but one can just look at some of the crop yields to see that the trend is not progressing as one would hope it to. In the case of the grain *teff*, the average yield has barely exceeded ten quintals through the decade, showing the trend is flat. Another example is that of wheat. Agricultural research in Ethiopia had focused on wheat with improved seeds, but the wheat yield is not showing improvement; another flat trend. These yields are fluctuating between ten and thirteen quintals per hectare ("Agricultural" n.p.). These trends indicate that the situation has not readily been improving. With these statistics, the conclusion is that the situation of a subsistence agriculture family's situation would be staying the same. However, in 2002, Ethiopia's low prices for food indicated that food is readily available ("Feed" n.p.).

More agricultural research, better improvement of seeds and erosion control, would logically produce higher yields of food, providing nutrition, food, and eventually income to the average subsistence family. Biodiversity would not necessarily be hard to maintain in Ethiopia; already 100 crop species are cultivated ("Feed" n.p.). Once further research has been done preserving the environment would be of the utmost importance.

POSSIBILITIES AND SUGGESTIONS

Ethiopia could quite possibly have a certain grain that could pose an answer to finding something of excellent nutritional value and a way to form an income. The aforementioned *teff*, (*Eragrostis tef*) has potential to fill the people of Ethiopia in terms of both finances and nutrition. However, the further production of this crop would not nearly be enough; other changes would also have to be made.

Possibilities: Teff

Eragrostis tef is a form of lovegrass that is an important food grain to Ethiopia and its neighbor, Eritrea. The *teff* seeds are so small that enough to sow an entire field can be held in one hand ("Teff" n.p.). The major areas of production for the grain are in the central and highland areas. In the highlands, most other grains are not grown well. The preferable altitudes to grow this crop are between 1700-2200 meters. The nutritional value of the grain is appealing as its high in iron, dietary fiber, and provides calcium and protein ("Teff" n.p.) In further detail, according to Doris Piccinin, M.S. R.D., *teff* includes 11% iron, 80% complex carbohydrates, and three percent fat. The grain is nearly gluten-free, which provides that it would be good for other health issues as well (Piccinin, n.p.). It already produces up to two thirds of the food provision in Ethiopia ("Teff" n.p.).

Teff, besides its apparently excellent nutritional value, also has practical means to which it can be applied. It can be used for architectural purposes, such as those of reinforcing thatched roofs and mud bricks. One benefit that could be particularly important to the people of Ethiopia is that, universally, the grain is used as animal feed (Piccinin, n.p.). As livestock is also important to the Ethiopian economy, this could be a boon in that area as well. As a product for export, *teff* has the potential to profit from the growing demand for the grain in other countries. The Dutch are becoming interested in cultivating the crop themselves ("Teff" n.p.). In the United States, Australia, Uganda, and Canada are all recognizing its use as livestock feed. Not only as it being seen as animal feed, its also being noticed as an alternative grain in America (Puccinin, n.p.).

Though the grain has the appearance of being a form of wonder product, there are other drawbacks to the crop that would need adjustment. Reportedly, *teff* covers the most land space in the country but it also has the lowest yield per hectare. The grain is the most expensive to buy in Ethiopia and requires labor-intensive harvesting and processing techniques (Piccinin, n.p.). Another point to be

careful of is the fact that during initial germination, the seed needs to be watched as to prevent seed rot in the ground (Puccinin, n.p.).

There are a few things that could be done to improve the use of this grain. One is the use of genetic research to further the reliability of this grain. Also, certain modern agricultural practices could be adapted and developed that would conserve the environment of the country while increasing crop yields and profit for the average subsistence family. For example, in the United States, a common method used to conserve the soil and produce higher yields, is through corn-soybean rotation. Every other year, the crops are rotated in a field from either corn or soybeans. Each crop brings its own benefits to this arrangement. In the case of erosion, corn stalks keep the ground in place when used with proper conservation technique. Conservation of tillage would also lead to fewer disturbances to the soil and preserve more amounts of topsoil.

Suggestions: Improving the Situation

One thing that in particular the Ethiopian government needs to improve is marketing, food distribution, and overall economic value of their people is to invest in the availability of decent roads. In northern Ethiopia, the average distance to a market town is 40 kilometers ("Ending" n.p.). If these roads were created, providing far easier accessibility to markets and if the people were educated and made aware of the benefits of this type of economy rather than simply living to get by, Ethiopia would be on a different track than it is now. Infrastructure is an absolute necessity to connecting Ethiopia and provides a more stable economic base.

If the *teff* grain were to be used more than it already is in Ethiopia, despite the setbacks, it could lead to a new age for Ethiopians. It's true that the grain is expensive but with the help of NGOs and nonprofit organizations that are willing to help contribute financial means to the purchase of seeds it would be possible to supply the grain to the Ethiopian people. Obviously, due to poor marketing, the distribution of all of Ethiopia's products has always been an issue. People, such as those from voluntary organizations, could help to distribute the miniscule seeds to the people or even assist in the construction of decent roads to aid in this distribution. When these roads would be constructed, not only would it help the food supply of the people and nutritional needs, it also would readily help their economy. Once there was easier access to the markets, other crops such as coffee could be distributed and be sold for profit, with better financial intake for an agricultural family.

Also important is that the people continue to be diligently educated. The government should try to take initiative in forming public schools. The availability of an efficient school would be necessary to bring learning to the people. In 1986, there was only one junior secondary school for every eight primary schools and only one senior secondary school for every four junior secondary schools ("Country" n.p.). Since education may not have been properly provided to individuals who are already past high school age, another project to undergo would be to find a means of educating adults when their time is not drawn elsewhere, such as to agriculture. Once a continued pattern of education begins in Ethiopia, it would continue and prosper in the years to come.

CONCLUSION

To conclude, Dr. Norman Borlaug, Nobel Prize recipient, is the model that a project of this undertaking might follow. "It was on research stations and farmers' fields in Mexico that Dr. Borlaug developed successive generations of wheat varieties with broad and stable disease resistance and broad adaptation to growing conditions across many degrees of altitude. These wheat varieties and improved crop management practices transformed agricultural production in Mexico during the 1940s and 1950s and later in Asia and Latin America, sparking what today is known as the Green Revolution" ("Borlaug" n.p.). Looking ahead, if people such as he could go to Ethiopia, work with the *teff* crop to try to develop

better seeds, varieties and means for agricultural practices to change, the future of the country could change. If roads were built to provide infrastructure to the country, to connect the country, it would serve as a base for better distribution of crops, communication, and traveling throughout Ethiopia. Though the problems of Ethiopia cannot be easily mended, after time, the trend lines of crop production could improve. If everything goes as it should, Ethiopia and other African countries could have a different world ahead of them. Once sustainable paths towards food and nutrition security have been implemented at all levels of the Ethiopian culture, the prospects of economic prosperity for future generations would no longer be a distant dream.

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