Thoughts on the Green Famine

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Roger Sharland, working with Rural Extension for Africa's Poor (REAP) in Nairobi, Kenya, shared the following. "In 2002, I spent two weeks in Ethiopia, about 400 km south of Addis Ababa. Shortly before leaving for Ethiopia I had read Tony Rinaudo's article on "The Green Famine." The BBC news was announcing that 40 million people were likely to be in need of food aid, but as we drove from Addis Ababa to Soddo there seemed to be a reasonable harvest [of crops other than maize]. In Soddo the place was green and again appeared to have no problems. However, in our discussions there was a major focus on being ready for major relief efforts in early 2003.

"Having visited five project sites in the zone, the project staff had tried to show me the real situation and yet I was still confused. What met the eye did not match with what people were saying. Things appeared normal. The concept of a green famine was very close to the surface in my thinking, and as I observed, maize seemed to be the main culprit. There were indeed clear signs of dried-up non-producing maize, though I understood most of the failed crops had already been ploughed in with little or no yield.

"After the visits to the project sites, we had three days of discussion with the development team. Using popcorn seeds, I asked the participants to try and represent the relative amount of rain, two seasons a year, for the last ten years, based on their memories rather than available statistics. The results were striking, with a clear difference between two good years (1997 and 2000) that had many seeds and the rest with a varying number of only a few seeds (see Table 1).

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
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Table 1: Trend analysis of rainfall in Wolaitta over the last ten years from workshop with Terepeza development team.

"Based on what we saw, I asked the team which were the normal years. Immediately they identified 1997 and 2000. I responded that perhaps they had not understood, from the trend analysis, which was the normal year? Thinking that I did not want two years they decided it was 2000. I repeated the question stressing the word normal and asked what normal meant. The reaction then was fascinating as they all realized

what I had noticed, and responded that perhaps this year with a low rainfall is indeed the normal year. In fact rather than terming this year a drought year shouldn't we be terming it a normal year?

"This revelation then enabled us to think creatively about a strategy. Aren't farmers using the wrong indicators? They are planning not for the expected rainfall, which is low and unreliable, but the Utopian ideal rainfall that is heavy and regular. Only two years in the last ten have been good years and yet everyone plans for the good year. In order to work towards household food security the farmer needs to plan for a year of unreliable rainfall, while also being able to benefit from greater rainfall in those few years when the blessing comes. The opposite is happening.

"We concluded that, far from being the crop to save the family from famine, maize is indeed the problem. Not only is maize sensitive to drought stress, particularly at the time of tasseling, it does not recover from this drought as do crops like sorghum (which sends up side shoots called "tillers") or cassava (which just goes dormant). Diversification seems to be the message that comes through very strongly. On top of this is the problem of a high external input system of production. Landrace varieties of maize are just not available because the whole market is swamped with hybrid seeds. Because farmers have to wait for the seed to be available, they often miss the early planting, and they have to borrow heavily to buy the seed and fertilizer. At harvest time they have to sell the crop at the lowest price in order to pay back the loan. If the year is poor there is very little harvest, so very little income, and often nothing to pay back the loan. In a good year the price is so low that most of the crop still has to be sold in order to cover the loans. It is a no-win situation for farmers, but they know no other.

"The present famine is almost certainly caused by an over reliance on high input dependent varieties of one crop, maize."

Howard Gibson with Farmhands Ltd in Mbale, Uganda, wrote about the "green" Ethiopian famine in light of Tony Rinaudo's observation that though the maize crop had failed, the weeds were doing OK.

"As a result of Tony's article, we commenced our own enquiries. Two years later, we have reached a conclusion that, if substantiated by further academic research, could fundamentally change the African perspective forever.

"Our investigation was conducted in Uganda where one can readily observe the same phenomena of "green famine" as observed in Ethiopia. Thus, we believe our conclusions to be relevant to "green famine" as conceptualized by Tony Rinaudo.

"Initial research consisted of conversations with farmers as to their experiences with maize. Overwhelmingly, farmers pointed out that, when they grew maize, they either got good harvests or complete crop failure.

"We had witnessed, close to the time of these inquiries, a bumper harvest of maize that resulted in the price of maize falling so low as to not even cover the cost of growing it. While our people had food enough for their families for the next year, it was impossible to generate significant amounts of cash with the sale of the enormous surpluses. With either too much or too little rain, however, maize crop failures were not uncommon.

“Was this “feast or famine” with maize a clue? Maize is an import from South America, so it is not a “child of the soil” of Africa. We talked to some of the older members of the community who commented that, when they were young, they never had maize as a food and dearly missed the “old” foods of their youth, the principal among them being millet bread!

“We then decided to ask farmers about these “old” foods, millet and sorghum. Immediately upon mentioning these crops in conversations with farmers, the almost universal response was “Ah! Those are “stubborn” ones!! Even during two or more seasons after harvest, those ones STILL KEEP ON GROWING!!!!!” The second response was nearly always “With these crops, no matter what the weather, you always get something.”—In other words NEVER A TOTAL CROP FAILURE. Whatever the extremes of weather, millet and sorghum produce a family sustaining harvest even when the worst weather conditions cause a reduction in yield.

“We wanted to find out why food production was so much more dependable with millet and sorghum than with maize. It seemed to us that the answer was more likely related to water than sunlight. This was consistent with the observation that, while Ethiopia’s maize had failed, we in Uganda were having a bumper harvest. Assuming the answer was water related, why did maize fail to produce a crop with the same amount of water sufficient for the growth of local weeds, millet, and sorghum?

“Being agricultural engineers, we approached the question based on our knowledge of soil mechanics and soil reaction to varying conditions. We noticed that, while the plant itself is very tall above ground, the root system of maize is very shallow. The majority of the root is spread close to the surface.

We also noted that, even though the rainfall amount in East Africa is comparable to that in South America (the origin of maize), there were some interesting differences in the actual rainfall pattern. When it rains here in Uganda, the rain comes all at once as a solid downpour of water hitting the ground with the power of a steam hammer. In half an hour, we can get a week’s worth of rain in the locations where corn originates in South America.

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“Our poor maize plant roots have about half an hour to take up as much of this rainfall as possible before the sun returns with all its potential to dry out the crop.

“However, our “old timer” crops thrive in this situation by way of their “secret weapon”—the taproot!

“Most of the plant-available water in Africa comes from ground water that is moved upwards to plant root zones by capillary action. Only when this moisture is brought to within a few inches of the surface is it subject to evaporation loss by the intense sun. These top few inches of soil are precisely where the vast majority of maize plant

roots are found. Thus, the roots are not only in the driest but also the hardest, sun-baked portion of the soil profile! Intense solar radiation also results in the absence of bacteria and microbes. Our maize visitor is not a very well adapted resident, yet 65% of agricultural effort is expended in trying to force a means of survival from this plant.

"An example of the inappropriateness of maize as a crop can be seen within 100 yards of our workshop where a large maize plot is "infested" by a strange plant that has persisted there despite the best efforts of the landowner to eradicate it. For years this plant has kept coming back. The landowner thought it was some kind of wild cassava. We discovered that the "offending" plant was in fact Castor! It was the remains of a defunct project from the early 1970's! This crop had "selfpropagated" for over 40 years and still managed to thrive despite the best efforts of the present landowner who had no idea as to the history of his land!! Anyone know where we can find a market for Castor oil?

"How many other local crops might there be that could be grown instead of or in addition to maize?

"The above observations bring us to our aforementioned "catastrophic conclusion": the introduction of maize into African agriculture to the exclusion of local crops could be the principal cause of food insecurity on the continent."

Danny Blank read Gibson's comments and shared some of his thoughts based on his experience growing maize at ECHO.

"In my experience with maize on the marginal soils of SW Florida, I have found that: 1) maize demands far more nutrients (principally nitrogen) and water than other grain crops such as amaranth, sorghum, and millet; 2) we have a similar experience of either complete crop failure or mild success.

"When interns plant maize, I tell them they need to commit to using irrigation and a fairly regimented fertilizer schedule. Without both of those, we nearly always fail with maize at ECHO, whereas we still get a harvest with millet or sorghum.

"So in light of [Gibson's] statements, I can see how dependence on maize could be devastating, because it is such a demanding crop. With fertile soil and plenty of soil moisture, though, I have seen corn flourish even in very poor regions of Haiti. The problem that he alludes to seems to be a matter of mismatching a crop with the soil and climatic conditions. He speaks in rather sweeping terms about maize being a poor crop choice in Africa, but there are obviously places in Africa where it consistently flourishes.

"I recall conversations with Lance Edwards (former ECHO staff member) about his father's ranch in Zimbabwe. Lance told me that his dad tried to convince his ranch workers to grow sorghum or millet in their fields. But even though they would succeed in only one in ten years, they stayed with maize because they preferred it.

"It is my understanding (as a "rule of thumb") that most people prefer maize when given the choice between it and other grains (excluding rice). Maize is easy to harvest, clean, store and prepare; has wide appeal; and has potential for incredible

yields. I agree that maize is often a poor choice, but maize is not the great evil in Africa; maize is a great gift from God. Many plants, not just maize, result in failure when mismanaged or mismatched with the soils and climate.

“The point I think is well-made by the author is that maize is a very demanding crop that, from an agricultural perspective, is a poor choice under marginal conditions.

“Getting people to try alternatives is wise but obviously challenging. I certainly would encourage promotion of other crops; however, I think it wise to experiment with more sustainable maize production systems. I recently returned from a 10-week trip, mainly to southern Africa where maize is the staple. One maize system having great success is a method of conservation farming called “Farming God’s Way,” pioneered by Brian Oldreive, from Zimbabwe. Of all the systems I observed being promoted by research stations and NGOs, I thought this by far had the most promise for farmers.

“Obviously, there are some places where maize cultivation should be discouraged. Yet entire cultures have come to know and depend upon this crop, so I think encouraging more sustainable systems of maize cultivation in the tropics is of great priority.”

Martin Price wrote back to Howard Gibson with a few questions: “My post-doctoral research was on grain sorghum, so I have been aware that where maize often fails due to dry weather, one should consider sorghum. Where sorghum often fails due to dry weather, one should consider millet.

“The thing you did not address (except that old men missed eating the old crop) is whether tastes have changed so much that there is now little desire or market for sorghum in the younger generations. I wonder the same thing about millet.

“A second question is, how serious is damage by birds to sorghum and millet in this area? I know that in some east African countries, the quelea finch can come in by the hundreds and cause extremely heavy damage to sorghum because the grains are sitting unprotected on top of the plant like “bird candy.” Do the older people recall this being a problem?”

Gibson replied, “Have tastes changed? In essence no! What has happened is that, because of 25 years of absolute terror, they have actually LOST the knowledge of how to prepare and process millet and sorghum into food. They have even lost the knowledge that it CAN be processed into food.

”Birds can be a bit of a problem, but not as big of a problem as losing all of a maize crop. In fact they are not much of a problem at all here, though maybe a bit of a problem in Karamoja.”

Unaware of these exchanges regarding maize, **Stacia Nordi**n, Registered Dietition, sent us a document called “Improving Nutrition through Permaculture in Malawi.” It contained some interesting comments about maize, excerpted below.

“In Malawi we began to notice a relationship between the emphasis on maize, activities that are leading to environmental degradation, and the resulting nutritional problems we are currently seeing. The agricultural systems that are being

promoted now involve planting solely maize in combination with fertilizers and chemicals to control insects and other plants that may interfere with maize growth. This system is unhealthy for both the human body and for the environment....

"In the past, Malawi's environment and diet revolved around a wide variety of local fruits, vegetables, nuts, seeds, millets, sorghums, roots, and various animal foods. Although many of these foods are still available, they are vanishing quickly because of the push to supply maize year-round either by forcing the land to produce it or by bringing in maize aid when the environment is unable to meet our maize demands.

"Maize is not the only culprit; people are becoming more interested in obtaining foods of the west than in giving attention to the abundance of foods right around them. Expatriates who come in to 'help' often do not take the time to learn about these valuable food resources. These local foods that are being crowded out by maize and western foods are often higher in nutrients than similar types of western foods, are available with no work or money, and are delicious!

"Our project has categorized over 500 plant foods that are available in Malawi and are able to meet all the nutritional needs of people living here. We are trying to revive the knowledge of these plants. We have gradually been collecting these food plants, sharing the seeds, teaching about their importance in nutrition and the environment, using them in our own meals, and encouraging their use for anyone living in Malawi. In two years, we have established over 150 different local foods just in one small half-acre plot."

Another Green Revolution

Tony Rinaudo sent a comment about the article about a recent workshop on "Resilient Crops for Water-Limited Environments" (EDN 90-5). In particular, he referred to the statements:

The meeting looked mainly at maize, rice, and wheat, which account for more than half of the calories consumed by people in the developing world. What is needed now is a Doubly Green Revolution to lift up the African and Asian smallholders left behind.

Tony shared a quote from a paper he co-wrote: "The green revolution that dramatically increased grain crop yields in the tropics and subtropics bypassed Africa (Vietmeyer, 1996). If there is to be a "green revolution"™ for the arid and semi-arid subtropics, it will have to be through plants that thrive under such conditions, yield well and require minimal inputs. Millions of third world farmers have no access to the usual green revolution inputs. Increasingly they are farming on exhausted, marginal lands under adverse climatic conditions that are unsuitable for conventional crops. For them, a biological revolution is needed, in which plants are selected and bred to suit the prevailing environmental conditions, rather than a green revolution to suit the plants, in which the crop environment is modified (through irrigation, fertilizers and pesticides)." Tony concluded, "There are many drought resistant food plants—both domesticated and not— which already have what it takes to meet food needs under various degrees of drought conditions." (Quote from Conservation Science W. Australia 4(1):161-169 (2002))

Cite as:

ECHO Staff 2006. Thoughts on the Green Famine. *ECHO Development Notes* no. 91

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