Testing BioEnsure™ fungal seed treatment on cereals in Somalia.

Salma A Farah
University of Minnesota, College of Food Agriculture and Natural Resources (CFANS)

Abstract

Drought is a major issue that affects the globe. One of the most vulnerable areas in the world is the horn of Africa. As the climate continues to change, the severity of droughts is sure to worsen, and as a result, food production is sure to decrease unless we find ways to engineer drought-resistant food crops. The product BioEnsure™, a fungal seed treatment was one potential candidate for transforming regular food crops into drought-tolerant crops

Introduction

BioEnsure™ is a particular fungus that supposedly increases the stress tolerance of regular plants due to its symbiotic relationship with plants, making them more resistant to temperature changes and thrive with less water and nutrients. The product has shown promising results in other areas of the world including India

I worked with Dr. Paul Porter from the Agronomy department here at the University of Minnesota, and SATG/Filsan, a non-profit organization situated in Somalia that focuses on agricultural research and development. We designed an experiment that allowed us to look at the yield effects of BioEnsure™ in cropping systems under different levels of nutrient and water stress, which allowed us to evaluate the effects of BioEnsure™ in the different agricultural contexts that Somali farmers experience in real-world settings.

Figure 1: Seed planting in Somalia.

Methods and Materials

This research project focused on the four most harvested crops in Somalia, cowpea, maize, sorghum, and mung bean.

The Maize trial was split into; 2 irrigation, 2 fertility, and 2 seed treatments - for 8 total treatments (2x2x2) - each replicated 4 times for a total of 32 plots.

The Cowpea, Mung bean, and Sorghum trials each have 2 seed treatments, replicated 4 times for a total of 8 plots each.

SATG members and farmers managed the planting, fieldwork and data collection process of the experiment during the growing and harvesting season.

After the growing season, I processed the data using the "Agricolae" package in the statistical software R.

Results

Based on the data collected from Somalia, BioEnsure™ does not improve the yield or stress tolerance of crops. There was a wider variation in the performance of BioEnsure™ treated crops with some crops doing better than none treated crops and others doing worse than non treated crops. Majority of BioEnsure™ treated crops had similar yield, and stress tolerant levels compared to non treated crops.

Figure 2: Seeds being treated with BioEnsure.

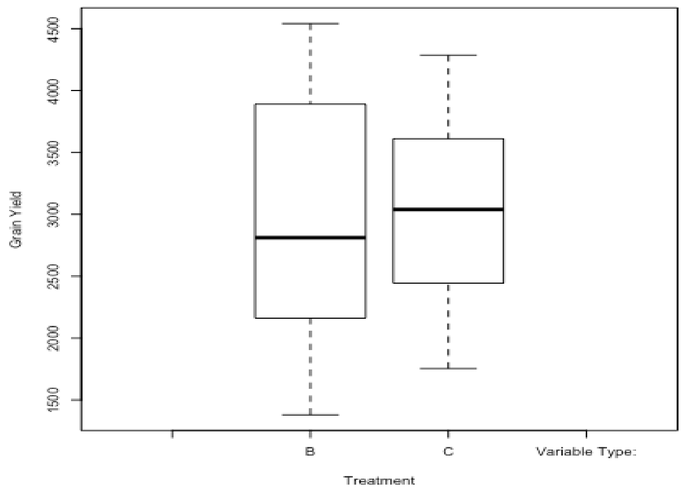

Chart 1. Yield comparison between BioEnsure treated crops and untreated crops..

Discussion

One reason for the lack of significant improvements by BioEnsure™ on crops might be due to the fact that Somalia had an above average rainfall during the months of April 197.0 mm, May 115.5 mm and June 77.5 mm for a total of 390.6 mm of rainfall during the entire growing season. According to Dr. Rusty Rodrigues Rodriguez who developed BioEnsure™, the seed treatment only has better yields than non treated crops when the crops under stressful situations.

Conclusions

Although we were not able to find ways to engineer drought-resistant food crops. This was a generally positive project. I learned a lot by working with different people with various skills to try and find a solution to one of the major world problems. This project served a basis for future research projects. All the skills acquired through this UROP project will be incredibly valuable and would not have been developed through regular coursework. The hunt for developing drought-resistant crops shall continue.

Contact

Salma A Farah
University of Minnesota, SATG/Filsan
farah145@umn.edu
Website: ugresearch.umn.edu

References

1. Alston, J. M., Marra, M. C., Pardey, P. G., & Wyatt, T. J. (2000). Research returns redux: a
2. meta-analysis of the returns to agricultural R&D. Australian Journal of Agricultural and
3. Resource Economics, 44(2), 185-215.
4. Checchi, F., & Robinson, W. C. (2013). Mortality among populations of southern and central
5. Somalia affected by severe food insecurity and famine during 2010-2012. Food and Agriculture
6. Organization of the United Nations.
7. Food and Agriculture Organization of the United Nations (FAO). (2012). Somali agriculture
8. building drought resilience. Somalia Agriculture Issue N°001.
9. Ó Gráda, C (2009). Famine: a short history. Princeton University Press. p. 24. ISBN 978-0-691-
10. 12237-3
11. R Core Team. (2016). R: A language and environment for statistical computing. R Foundation
12. for Statistical Computing, Vienna, Austria. http://www.R-project.org/.
13. Rodriguez, Rusty. "Unlocking the power of symbiosis in a warming world." TEDxSeattle,
14. tedxseattle.com/talks/unlocking-power-symbiosis-warming-world/.