

Distribution and Use of Various Forages in Ethiopia



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Background Information

My name is Hannah Elizabeth Hix, and I attended the World Food Prize Youth Institute in both my junior and senior years (2006 and 2007) of high school as the participant from Union High School in La Porte City, Iowa. I am currently a freshman at Iowa State University majoring in Animal Science.

I became interested in the Borlaug – Ruan internship program after listening to the presentations given by the interns during the years I participated in the Youth Institute. I became extremely interested in the International Livestock Research Institute (ILRI) because of my passion for agriculture, most specifically with the livestock industry. As I was already certain I was going to major in animal science, I thought an internship at ILRI would be a wonderful opportunity to help people and expand my views of agriculture. This outlook helped me decide to apply for the Borlaug – Ruan internship.

In the summer of 2008, I spent eight weeks in Addis Ababa, Ethiopia, working at the International Livestock Research Institute (ILRI). ILRI is a member of the Consultative Group for International Agriculture Research (CGIAR). The ultimate goal of all the research centers involved in CGIAR is to reduce poverty through sustainable agriculture methods. In turn, this will allow people to improve their livelihoods by raising or purchasing better food. ILRI specifically aims to develop sustainable technologies directed at smallholder livestock and crop operations in developing nations.

After being accepted for the internship, I was given the choice of working with either livestock genetics or forages. Although I was extremely interested in studying

animal genetics, I chose to work in the Forage Diversity department in hopes that I would gain a new appreciation for other aspects of agriculture.

While at ILRI, I worked with the Forage Diversity Department under the direction of Dr. Jean Hanson. Dr. Hanson was my main supervisor throughout the duration of my project. I also worked with Fikirte Neway, who was a tremendous help with the creation of the GIS (geographic information system, similar to GPS technology) maps and distribution statistics.

I had many responsibilities while working at ILRI. In order to complete my project, it was first necessary to correct all the errors in the computerized version of the seed request database. This entailed checking each entry against the paper records in the books. After this was completed, I compiled various statistics concerning the popularity of various forages and used GIS technology to plot the distribution of the forages I studied. I then created a survey directed toward local farmers regarding their land use, livestock inventory, and feeding program. I cataloged all of the responses and was able to generate many statistics regarding the forage crops and their use. All of this data would eventually be formatted into a report to present my findings.

Introduction

While the true definition of a forage is any plant or part of a plant that can be eaten by animals, the term is usually further defined as a crop grown mainly for livestock feed. Forages can help increase soil stability and fertility by adding more organic matter content, reduce erosion and fertilizer application by providing

groundcover, and improve agricultural profitability. There are three categories of forages: legumes, grasses, and multipurpose browses (fodder trees). Forages have much potential in agricultural systems in Ethiopia, as well as all of Africa.

The agricultural regions in Ethiopia can be split into two distinct sectors: the highlands and the lowlands. The highlands, classified as any land that is 1,500 meters or more above sea level, consist of only 40 percent of Ethiopia's total landmass, but are home to over 80 percent of the human population. Therefore, the highlands are also home to 90 percent of the livestock in Ethiopia, including 75percent of the cattle and sheep. The annual rainfall, number of growing days, and average temperature in the highlands varies from area to area. The major commodities grown in the highlands include coffee, barley, teff (a product similar to hay, only part of it can be eaten by humans and the remains fed to livestock), wheat, cattle, sheep, and poultry. Because of the steepness of the land, oxen are commonly used in the highlands for farm work. The lowlands, any land under 1,500 meters above sea level, consist of 60 percent of Ethiopia's total land mass, and home to only around 20 percent of the country's total population. The lowlands are home to only 10 percent of the livestock, including 70 percent of the goats and 100 percent of the camels. The lowlands are characterized as being drier and warmer than the highlands, but also having fewer growing days.

The International Livestock Research Institute in Addis Ababa, Ethiopia, has established a forage genebank (storage area for certain products for sustainable use) through the Forage Diversity department. This genebank allows for the preservation of plant genetic resources. It also allows scientists to identify genotypes of various forages

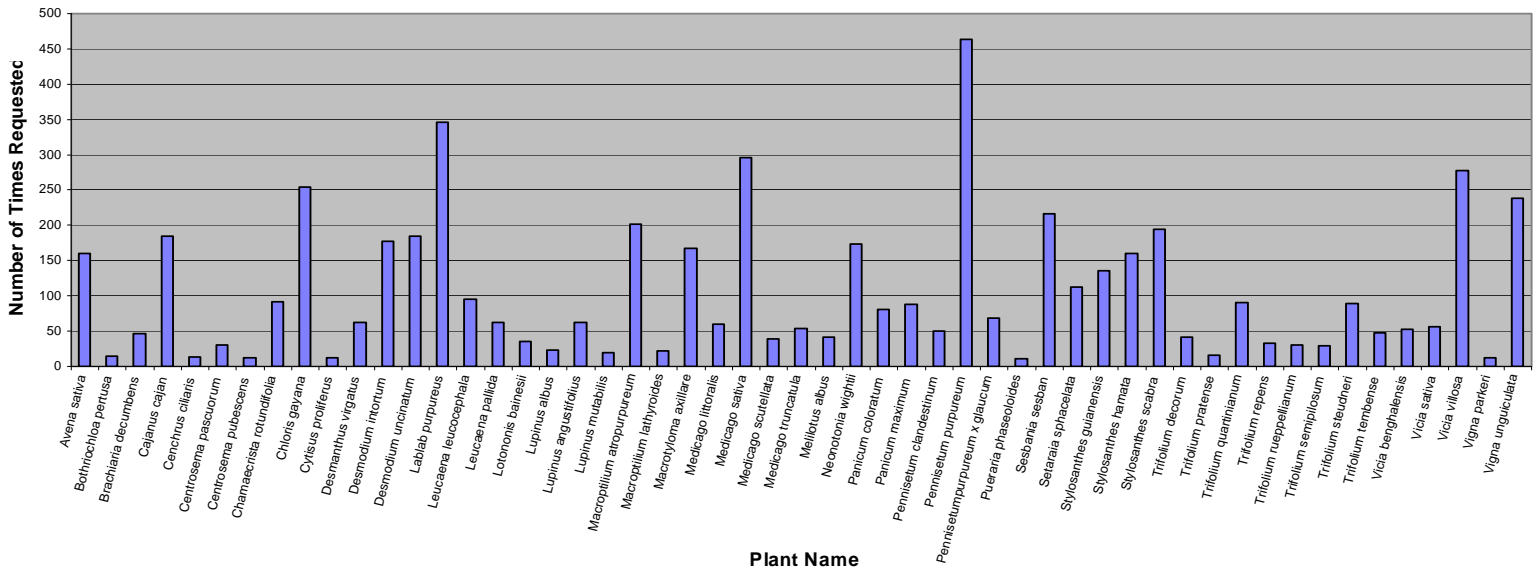
that have potential as livestock feed for both highland and lowland areas. This genebank consists of over 18,000 accessions from over 1,000 forage plant species. The genebank provides storage for sustainable use of these genetic resources. As part of its genebank, the forage diversity department is also engaged in forage seed production. ILRI regularly distributes small amounts of forages from its genebank to farmers and other organizations. The seeds are produced in large plots at the Debre Zeit Field Station. As requests come in from April to July, the necessary seeds are harvested, prepared, and packaged. The seeds are then either sent to Addis Ababa or kept at the field site for pick up by the purchaser. ILRI provides these seeds to people all around the world, but this study was focused in Ethiopia.

Popularity of Various Forages

A large portion of this study was dedicated to the popularity of various forage species. This was done through analyzing the data in the seed request database using Microsoft Excel. Many statistics concerning the popularity of various forages were created.

This map shows the number of requests for each forage species, but includes only those species that had 10 or more requests. The most popular species were *Pennisetum purpureum* (465 requests), *Lablab purpureus* (420 requests), *Chloris gayana* (330 requests), *Medicago sativa* (324 requests), and *Vicia villiosa* (315 requests).

Plant Popularity - Ethiopia

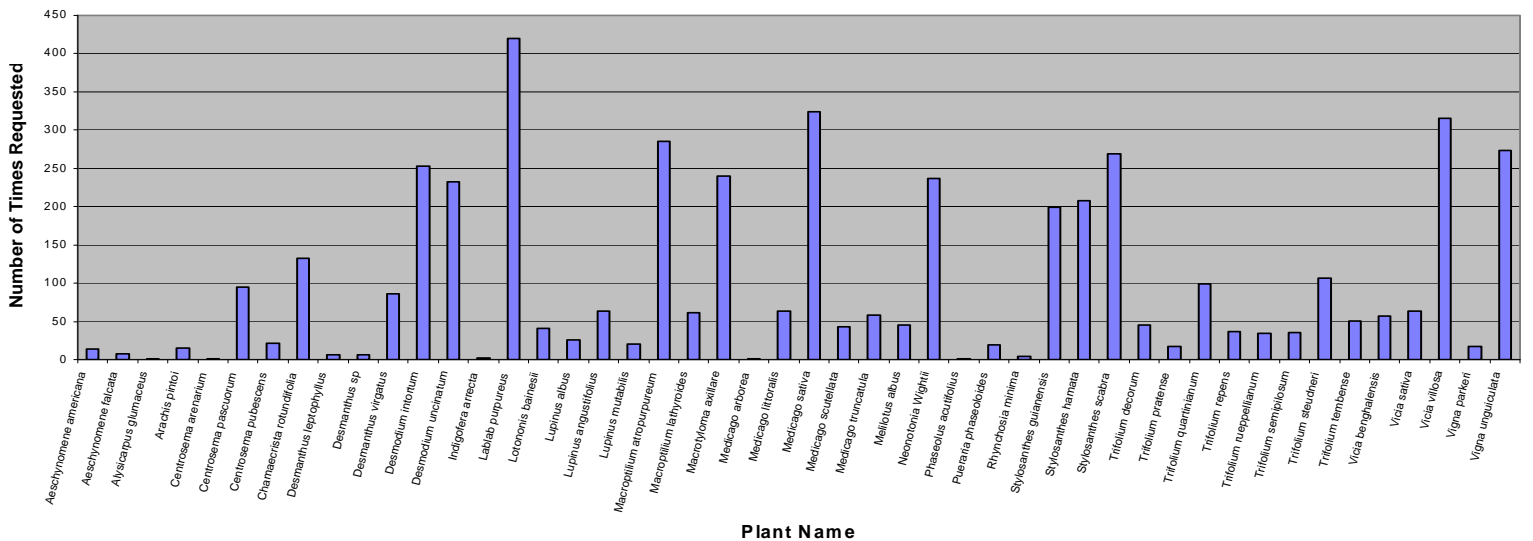


Plant varieties requested less than 10 times not included

These maps show the number of requests for each forage species, but are broken down into categories: legumes (plants from the pea or bean family), grasses (family of plants grown for pasture, feed, or turf), and browses (plants belonging to the multipurpose tree family).

The most popular legumes are *Lablab purpureus* (420 requests), *Medicago sativa* (324 requests), *Vicia villosa* (315 requests), *Macroptilium atropurpureum* (285 requests), and *Vigna unguiculata* (273 requests).

Legume Popularity



Ada'a Liben Wereda

The survey interviews were conducted with farmers who reside in the Ada'a Liben Wereda, a highland region in southern Ethiopia. The total land area of Ada'a Liben Wereda is 1635.2 km² (around 1016 miles). The total population is 332,917 people, giving the region a population density of 203 people per kilometer (327 people per mile). 51 percent of the total population is male, while 49 percent of the population is female. Land classified as "rural" makes up 75 percent of the area, leaving the other 25 percent to be classified as urban. There are a total of 41,474 rural households in the region. There are several types of livestock raised in Ada'a Liben Wereda, with the most popular being cattle (160,697 head), donkeys (38,726 head), goats (37,510 head), and sheep (22,181 head). There are several different soil types in the area, making it hard to find one crop species that is easily grown throughout the whole region. These soil types include, but are not limited to Koticha (black clay), Gombore (light sand), Abolse (red and black light soil), and Cheri (stony soil). The average altitude in the area is anywhere from 1,592 to 2,937 meters (5,223 to 9,635 feet). The average yearly rainfall ranges from 854 to 1,130 mm (33 to 44 inches). The temperature in Ada'a Liben Wereda can range from 13 to 20 °C (55 – 68 °F). The most common crop commodities grown in the region include teff, wheat, chickpea, maize, and sorghum. The most commonly produced livestock commodities are milk, butter, eggs, meat, and honey (apiculture).

Farmer Interviews

The farmers I interviewed had been working in conjunction with ILRI for a variety of years, usually anywhere from one to five. I interviewed 36 farmers total, 26 of which were men, and 10 were women. These farmers all came from villages within the Ada'a Liben Wereda, including Genda Gorba (24 farmers), Babogaya (7 farmers), Godeti (2 farmers), Buti (2 farmers), and Mekana (1 farmer). My surveys consisted of 15 questions, asking primarily about land use, livestock inventory, and feeding and forages. The interviews were completed with the help of translators. On average, each survey took about 20 minutes to complete. I spent three days of my total time in Ethiopia working on interviewing local farmers. A copy of the survey is provided as an attachment to the report.

Summary of Survey Results

Through my interviews, I discovered that the average farmer residing in Ada'a Liben Wereda farms three hectares (ha) of land. (One hectare is about 2.7 acres.) 2.5 ha are used for growing food crops, while .3 ha are used as pastureland for livestock. The remaining .2 ha are used up by the farmer's home and other farm structures. Only three out of the 36 (eight percent) farmers that I interviewed were even remotely interested in increasing available grazing, but none were willing to give up cropland to be converted into pastureland.

I also discovered that every farmer owned somewhere between one and 56 animals. The average numbers for livestock are as follows: three oxen, three cattle, two donkeys, one goat, two sheep, and four poultry, leading to a total of 16 animals.

In terms of feed and forages, the most common sources of livestock feed are own pasture grazing, rented pasture grazing, teff straw, wheat straw, wheat bran, nougcake, and linseed. A majority of farmers – 21 out of 36 (58 percent) – farmers reported having shortages of feed, and 32 (89 percent) farmers buy feed from either their neighbors or from the factory. Many farmers favor their livestock with either more or better feed. Several farmers – 13 (36 percent) – favored their dairy livestock, nine (25 percent) favored their draft animals, for a total of 22 farmers (61 percent) who favor some type of livestock. This leaves 14 (39 percent) farmers who do not favor any livestock. Only two of the 36 (5 percent) of farmers have enough feed leftover to sell. A small majority of the farmers – 19 out of 36 (53 percent) – still have forages they received from ILRI. Of these farmers, 37 percent planted forages in the back yard behind the house, while 63 percent plant the forages in a completely separate field. Out of the original 36 farmers, 11 of them (31 percent) produce their own seeds from year to year. The majority of farmers had been working with ILRI for four years. I found no correlations between different types of data (i.e. number of livestock raised and the amount of pastureland owned). Therefore, I was unable to create any statistics showing relationships between the various factors of wealth.

Conclusions

From my data, I concluded that the popularity of forages is hard to predict. The more popular the forage, the more the farmers value it. I noticed that the most commonly requested forages were the same ones most commonly mentioned during the interviews. Farmers must feel that food crops are more important than forages, because none of the farmers were willing to give up cropland for pastureland. Pasture grazing and cut/carry grasses are the most popular forms of livestock feed. Almost all farmers have shortages of feed, which causes farmer to favor the livestock that they deem is more important. Although slightly over half of the interviewed farmers still raise forages from ILRI, they may need more training in keeping forages alive and producing their own seed from parent plants.

Effects on Food Security

I feel that the work I completed at ILRI will have lasting effects on food security. My work has helped add to ILRI's understanding about why some forages remain popular and others do not. This demand and market intelligence will help ILRI produce the types of seed that farmers need and want, while insuring forage seed availability into the future. My study will be analyzed to help determine a need to educate farmers about new seeds or forage crops. My work will also help with continuing research in the forage diversity area, both as resource to be referred to and as a model to encourage and guide other similar projects.

Experience

The many things I experienced while at ILRI will remain with me for a lifetime. This experience had and will continue to have a great impact on my life. Traveling through and living in a foreign culture is an experience that everyone should have the opportunity to do. An experience abroad gives a person a greater appreciation for the luxuries he or she has back home. It also helps one better view the dynamics of his or her culture from another point of view. My internship experience has not only affected the way I view the “American Dream” and materialism, but also my future career plans.

Because of this internship, I hope to obtain a degree in Veterinary Medicine and return to Ethiopia to work with livestock genetics, rather than simply work as a small town veterinarian in rural Iowa. This overseas experience was a real eye-opener for me, and helped me see there is more to the world than just what is good for the Americans. The experience also expanded my views of agriculture. Growing up in rural Iowa, I saw agriculture merely as cows and cornfields, with occasional other crops and livestock thrown in as well. While in Ethiopia, I realized there is a lot more to the agriculture industry, from the forages grown to feed livestock to the creation of newer, hardier livestock breeds capable of surviving in various climates. I have benefited greatly from this experience.

The World Food Prize Youth Institute and Borlaug – Ruan Internship are great programs helping young adults become passionate about food security, not just for themselves, but for people the world over. Being selected as a Borlaug – Ruan intern has

made a huge impact on my life, and I am thankful for being selected for this amazing opportunity.



Acknowledgements

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