

The potential of tropical forage species maintained in the ILRI-forage-genebank for sustainable agriculture and food-security

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Background

More than 18 thousand accessions from over 1000 tropical forage species, including leguminous fodder trees, herbaceous legumes, and forage grasses, are maintained in the ILRI forage genebank in Addis Ababa, Ethiopia. The species offer high-quality, protein-rich fodder for subsistence and commercial livestock production, and they constitute the primary source of animal feed in the tropics. The majority also offer prospects for sustainable agriculture and the intensification of tropical biodiversity while fitting well into agroforestry systems and the restoration of degraded lands. Through nitrogen fixation, the leguminous plants play a vital role in increasing soil fertility, whereas perennial grasses have several advantageous properties for a variety of sectors, including the production of biofuels and papers. We have been studying some of the species with the aim of tapping into the genetic diversity that sits in these crops, in order to better understand how we can support their improvement so that they can contribute to food and feed systems, soil health management, and rehabilitation of degraded lands.



| Forage grasses | Forage legumes | Fodder trees and shrubs |
|---|--|--|
| <p>➤ Main source of livestock feed in tropics</p> <p>FILE PHOTO JOSEPH KANYI Napier grass, Bishoftu</p> | <p>➤ Improve soil fertility through nitrogen fixation</p> <p>Legume based cropping system</p> <p>Biological Nitrogen Fixation Crop residue Mineral Nitrogen Decomposition</p> <p>Venâncio and Pereira, 2020</p> | <p>➤ A good source protein-rich forage during dry periods</p> <p>Photo from Factsheet 7, Mekonnen et al., 2017, CGSpace. Photo credit: Google</p> |
| <p>➤ Play significant role in rehabilitation of degraded lands</p> <p>Gation check dam supported with elephant grass in Alekit-wonz watershed, Amhara region, Ethiopia (Adimassu et al., 2018)</p> | <p>➤ Some have dual purpose serving as a protein source for both humans and animals</p> <p>Cowpea (left) and lablab (right) accessions growing at Bishoftu</p> | <p>➤ Fit well in agroforestry systems</p> <p>Konso Landscape/terraces; Photo credit: Google</p> |
| <p>➤ Some are used in industries, like the production of biofuels and papers.</p> <p>Chopped up Napier grass (<i>Pennisetum purpureum</i>) harvested to be evaluated for its potential use as a renewable fuel, biofuel. (Photographed by PEGGY GREB/US DEPARTMENT OF AGRICULTURE/SCIENCE PHOTO LIBRARY).</p> | <p>➤ Some have medicinal value</p> <p>A recent report suggested that the bioactive compounds in lablab, for instance, may be used to treat SARS-CoV-25 (Liu et al., 2020). In veterinary medicine, lablab has been used to treat a number of diseases in livestock, including lung problems in sheep, cattle, and goats.</p> | <p>➤ The fodder tree species improve the sustainability of farming systems and offer opportunities for sustainable agriculture and intensification of tropical biodiversity because of their deep roots, ability to fix nitrogen, and physical stability in the landscape.</p> |

We have studied within species genetic diversity on some of the species

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| <p>Genetic diversity in Napier grass, <i>Cenchrus purpureus</i> (Muktar et al., 2023)</p> | <p>Genetic diversity in Lablab, <i>Lablab purpureus</i> (Njaci et al., 2023)</p> | <p>Genetic diversity in Rhodes grass, <i>Chloris Gayana</i> (Negawo et al., 2021)</p> | <p>Genetic diversity in Sesbania, <i>Sesbania sesban</i> (Negawo et al., 2022)</p> |
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Conclusions

- The tropical forage species maintained in the ILRI forage genebank display significant genetic variation both within and across species.
- Despite their significance and high diversity, tropical forages species are neglected, poorly understood underutilized crops and have received less research attention by the conventional breeding and molecular technology approaches.

References

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