RESEARCH PROGRAM ON Livestock

**CGIAR**

Tropical Forages Selection Tool

SUMMARY

The Tropical Forages Selection Tool (TF) is an open-access online expert knowledge system created by a team of renowned international forage specialists between 2000 and 2005 and updated between 2017 and 2020. It provides detailed information on 172 major forages grown in the tropics and sub-tropics and incorporates a species selection tool based on target environment and forage use. The ability to select and prioritize forages for specific production niches, environments, socio-economic and animal requirements is important to mitigate feed shortages and improve natural resource management as part of sustainable farming systems.

The tool consists of two parts:

1 - Forage Factsheets: These contain information on the most used/recommended tropical forages (172 total), including the scientific name of the species, synonyms and common names, a morphological description, their distribution and uses/applications, agronomic information and feeding values, production potential, seed production, strengths and limitations, and cultivars and promising accessions.

Figure 1. Home/landing page of the tropical forages tool
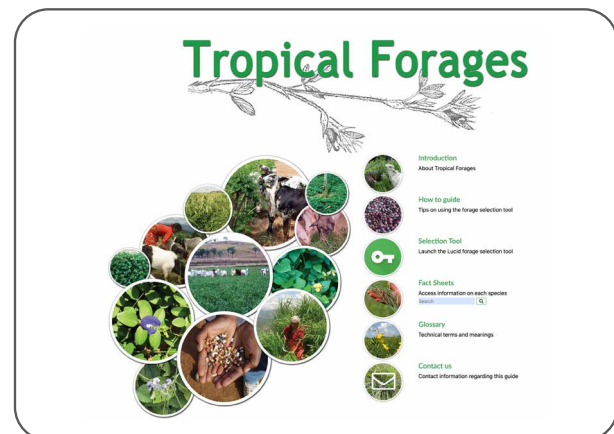
2 - A Selection Tool: This enables users to enter their site-specific agro-ecological information, such as latitude, altitude, rainfall, soil texture, and soil fertility, and provides users with potential forage options based on the selected features. The tool is linked with the forage factsheets so that users can access more detailed information on the suggested forage options.

The Tropical Forages tool is helping a broad range of users select forages that are best suited to specific environments, climate and livestock. Photo Alliance of Bioversity International-CIAT/Georgina Smith

Alliance

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International Center for Tropical Agriculture
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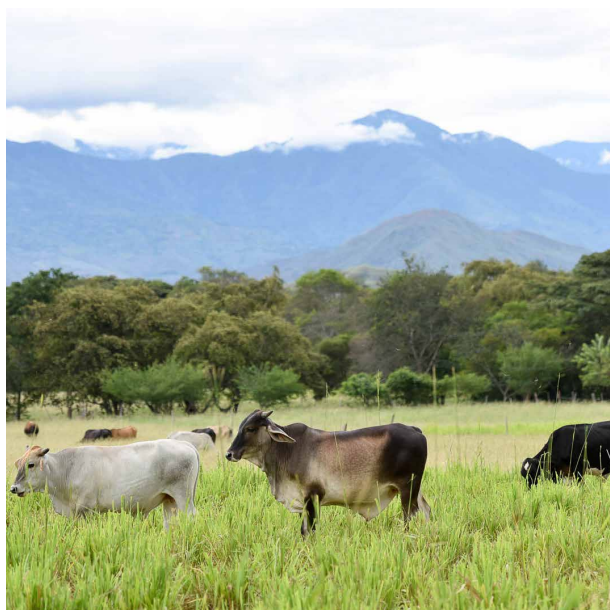
ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

THE CHALLENGE

Forecasts predict that global demand for meat, milk and eggs will double by 2050, with the largest increases coming from developing countries. That scenario cannot materialize without at least a parallel increase in availability of quality animal feed. Forages–either from short term or permanent pastures, from conserved hay or silage, or sourced from cut and carry systems–are usually the most cost-effective option to meet feed demands in ruminants and even in pig and poultry production.

Forages are also central to the ever-increasing "sustainable intensification" of mixed crop-livestock systems where they underpin livestock production and can provide ecosystem services including replenishment of soil nutrients, particularly nitrogen, improved soil health, pest control and reduced soil erosion.
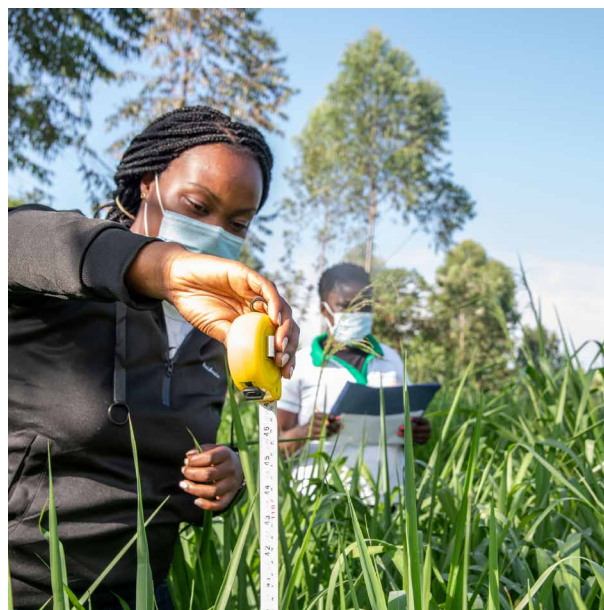
Unlike forages in temperate farming systems, forage species that are best suited to tropical and subtropical farming systems and how they might be used is a relatively new area of science, which has grown since its start in the mid-20th century. Also unlike in temperate systems, where relatively few species of grasses and legumes are used, over 150 species of tropical and sub-tropical grasses and legumes have been recognized for their potential production or environmental value.

Despite the growing demand for livestock products and feed options to underpin that growth, many national and international institutions across the globe have severely reduced investment in tropical and subtropical forage research. Consequently, there is an alarming worldwide shortage of expertise in tropical and subtropical forage adaptation and use to help interpret the wealth of information on adaptation, potential use, and value of this large number of species accumulated over 70+ years.

The tropical forages tool is helping researchers, NGOs, farmers and a range of other users identify the most appropriate forages for different ecosystems.
Photo Alliance of Bioversity and CIAT/Georgina Smith

Use of appropriate forages in the right ecosystem can generate multiple benefits for livestock farmers, such as improved productivity and incomes, restoration of soils and reduced erosion.
Photo Alliance of Bioversity International and CIAT/Neil Palmer

HOW DOES THE TOOL ADDRESS THE CHALLENGE?

The tool was initially developed between 2000 and 2005 to aggregate the expertise of experienced, often retired, forage specialists from across the globe, to guide new generations of researchers, advisors, development specialists and conversant farmers to make informed choices of species and genotypes for specific environments and farming systems. The tool has since become the preeminent resource for information on tropical and sub-tropical forage species, their adaptation and potential use. The tool was completely revised and updated from 2017 to 2020 to make it more accessible to a broader audience.

WHAT DOES THE TOOL ENABLE YOU TO DO?

The Tropical Forages tool allows users to:

• Identify a list of forage species suitable for specific combinations of climates, soils, production systems and management via a selection tool and Fact Sheet software.

• Access and download comprehensive information on these species with details of adaptation, uses and management of species, cultivars, and elite accessions.

• Access information on potential risks (mostly weediness or toxicity) associated with the use of species.

• View images of the various forages and their use.

• Request seed samples through the linked Genebanks of ILRI and CIAT.

WHO IS THE TOOL FOR?

The tool is aimed at a broad range of end-users. These are researchers, advisors, policy makers, extensionists, development specialists and conversant farmers. Farmers and extensionists are increasingly being targeted by the tool, especially since the release of the new version in 2020, which can be accessed online or through a mobile application.

BENEFITS OF THE TOOL

• Livestock producers can select appropriate forages for their agro-ecological context, access valuable information on their characteristics and how to grow them, and by this, increase the efficiency of their production systems

• Extensionists can more easily support livestock producers in the selection of appropriate forage materials for their agro-ecological context, and provide tailored solutions on how to grow and manage them

• Policy makers can use the tool to identify promising forage materials for the regions of interest in their countries and based on this, develop more tailored policies and investment support

• Development specialists and agencies can more easily identify forage materials for their areas of intervention, access valuable information on how to grow and manage them, and based on this, more clearly focus a) strategic decision-making, and b) on-farm development support

• Researchers get an overview of promising forage materials for different tropical regions, their characteristics, performance, management, and limitations, and based on this, can more efficiently plan field evaluations, i.e., reducing the number of potential materials to the most promising ones more easily and before planting them

HOW THE TOOL WORKS

No pre-knowledge or training are required to use the tool, which includes a 'How-to guide' and 'Glossary' section. The tool is free and can be accessed on a web browser (www.tropicalforages.info) or through a mobile application designed for smartphones, which can be used offline.

Depending on the details of the agro-ecological information provided by the users and the selected features, it takes 5-10 minutes to get from data entry to the list of recommended forage materials.

The latest edition of the tool, released in 2020, is adapted to smartphones, thereby expanding its potential use to livestock producers and potentially rural poor farmers. The automatic translation option means that non-English users can now benefit from the tool.
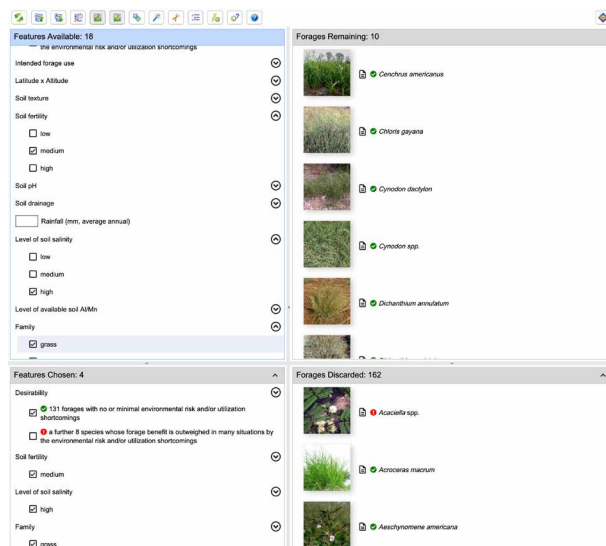

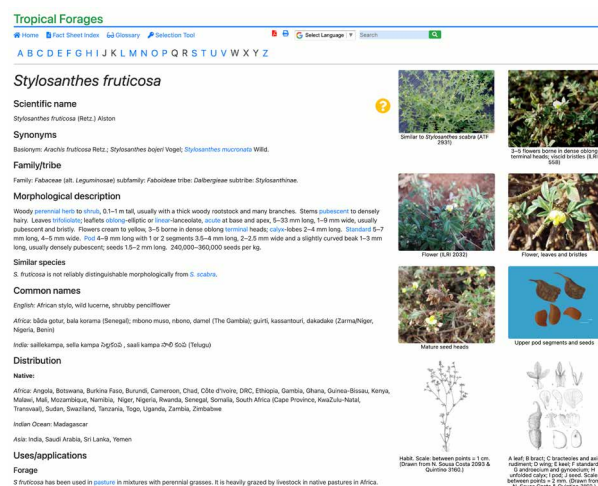**Figure 2.** Some examples of the filtered features of the Selection Tool

Figure 3. Example of a Forage Factsheet

The Tropical Forages tool is being used for educational purposes in rural agricultural schools and colleges. Photo Alliance of Bioversity International and CIAT/M. Sotelo

HOW IS THE TOOL BEING USED AND BY WHOM?

A total of 217 users answered an online user survey that was conducted from August to September 2021, to gather feedback on the user experience and usefulness of the tool.

Majority of respondents (75%) were from the education and research sectors. About 10 per cent were extension agents and about 8 per cent were either from seed producing companies/distributors or farmers. Approximately 90 per cent work within the agriculture and livestock sector.

About 40 per cent of users consult the tool at least once a month, while about 28 per cent use it once or several times per week. The Factsheets are the most used feature (48.8%), followed by a combination of consulting the Selection Tool and the Factsheets (43.8%). This confirms that both features are key for users, and that the Selection Tool is often the gateway to access the information on the different forage species.

The information gathered from the tool was used primarily for education purposes (35%), followed by research (31.8%), and for farmer training and/or extension services (23%). About 10 per cent of respondents said they use the tool for farm improvement or simply for obtaining knowledge.
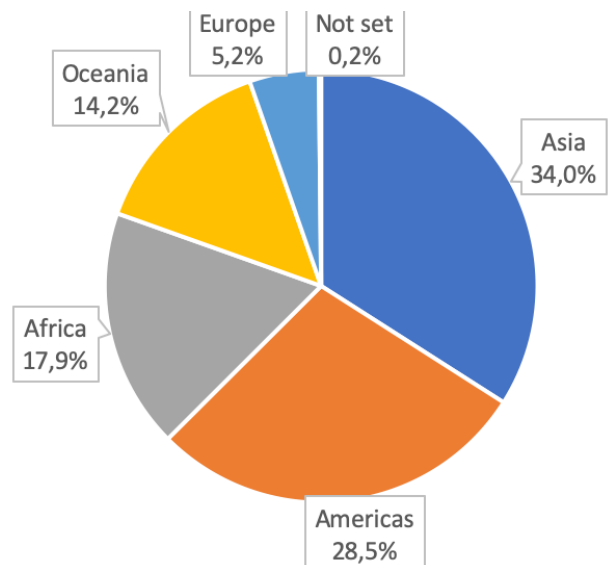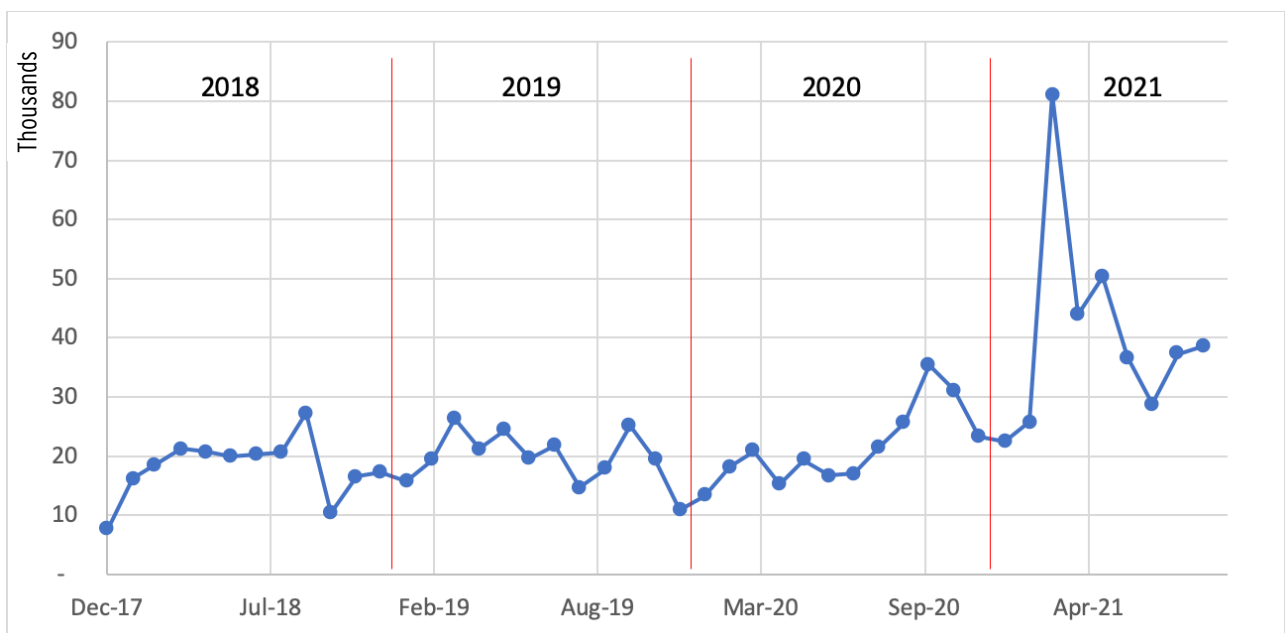

Figure 4. Where users connect from. Source: Google Analytics, Sept 2021

Figure 5. Monthly user statistics from January 2018 to September 2021. Following the release of the new version in August 2020, user numbers more than doubled. Source: Google Analytics

GROWING USE OF THE TOOL

The Tropical Forages tool is one of the most used and cited (>660 citations) forage databases worldwide. It is the first result that appears in search engines when searching for information on tropical forages. It is widely used in the education and research sectors and has contributed to increasing the global knowledge base on tropical forages. The tool is now attracting users from other sectors, such as extensionists and primary producers, thanks to the availability of the mobile application and new language features.

NEW FORAGE POSSIBILITIES IN A CHANGING CLIMATE

The Misiones province in Northern Argentina traditionally has a sub-tropical climate, without a dry season. The El Niño phenomenon has, however, brought months of extreme drought, requiring livestock producers to explore new cattle feeding strategies.

Since several years, researchers and students from the Universidad del Salvador (USAL) have been using the Tropical Forages Selection tool in a course called '*Forrajicultura*' (Agriculture of forages). Using the knowledge gathered from the tool, they are developing extension materials for the cattle farmers of the Misiones province, recommending forage species that are best adapted to the current and potential new conditions, such as high humidity and extreme drought.

"I don't know any other source of information that includes that level of detail for each species. Specifically, the agricultural inputs required for each of the presented materials. For me, that information is priceless for my work".

Prof. Germán Kimmich, USAL

A KEY EDUCATIONAL RESOURCE

Researchers from the Earth University in Costa Rica are using the Tropical Forages tool as a key resource in the university's Tropical Animal Production course. Students from more than 30 countries in the Americas and Africa use the tool to gather information on species that are part of the University's campus collection (around 40 species/accessions).

"It is very difficult to find legitimate information on forages, and the info provided by seed sellers tends to be biased. We have found on Tropical Forages technical information validated scientifically, and the recommendations of the selection tool have been very assertive for different environments".

Dr. Rafael Marzall do Amaral,
Earth University professor

Researchers from the Alliance of Bioversity International and CIAT are training young Colombian farmers on how to use the Tropical Forages tool.
Photo Alliance of Bioversity International and CIAT/José Luis Urrea

Livestock farmers in the district of Lushoto, in the Tanga region of Tanzania, are planting improved forages as a means to boost production and lower the environmental footprint of their farms. Photo Alliance of Bioversity International-CIAT/Georgina Smith.

Acknowledgements

How can I find out more?

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Publications

Cook BG; Pengelly BC; Schultze-Kraft R; Taylor M; Burkart S; Cardoso Arango JA; González Guzmán JJ; Cox K; Jones C; Peters M. 2020. Tropical Forages: An interactive selection tool. 2nd and Revised Edn. International Center for Tropical Agriculture (CIAT), Cali, Colombia, and International Livestock Research Institute (ILRI), Nairobi, Kenya. www.tropicalforages.info

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