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Connecting formal and informal systems for forage crop improvement and scaling

Part II: Scaling considerations for forage crops

Michael Peters, Solomon Mwenda, Uwe Ohmstedt, José L. Urrea-Benitez.

The Alliance of Bioversity International and CIAT



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Outline

- **PART I**

- Why are livestock and forages important: the facts
- Contributions to the livestock sector
- The role of animal source foods in human health
- Livestockplus - The sustainable intensification of forage-based systems
- Main types of forages
- TropicalForages selection knowledge tool update
- New stats – TropicalForages

- **PART II**

- Tropical Forages – Some remarks
- Origins – generalized
- Forage demand in Africa – few words
- Forage seed supply systems in Africa
- Considerations for scaling: AAA
- Example: Forage breeding scheme PPP
- Herbaceous legumes – AAA
- Trees and shrubs – AAA
- Global adoption trends forage hybrids – 2001 to 2019

Tropical Forages – Some remarks

- Feed contributes **50 to 60%** to of livestock production costs.
- Forages among the most cost efficient feeds.
- Increasing demand for improved forages in Africa.
- Limitation seed supply systems.
- **Dryland Limitation water**
 - Irrigation for tropical species
 - Use of dryland species E.g. barley, cactus
 - Forage conservation (e.g. hay, silages)
 - Feed transfer from more favorable to less favorable environments (condensed forages/feeds e.g. pellets)

Origins - generalized

Grasses Center of diversity SSA – mostly Eastern and Southern Africa.

African grasses basis of ruminant production in LAC.

Legumes and shrubs center of diversity mostly Latin America and the Caribbean and Tropical Asia.



Forage demand in Africa – few words

Demand for planted forages is rapidly increasing

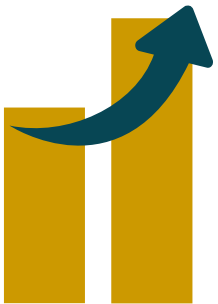


With at least **30,000 to 35,000** farmers currently having adopted planted forages and a target of **100,000** adopters over the next four years in Eastern Africa.

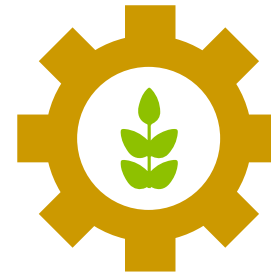


To respond to new social, economic and environmental challenges, a **systems change is needed**.

This includes maintaining a portfolio of currently used forages, exploring the diversity of forages – e.g. grasses in tropical Africa and legumes in tropical Americas and Asia – in their center of origin and amplifying the diversity of forage options through introduction of germplasm selected from wild relatives and breeding.



Context is market integration as a driver to invest in improved forages and the resulting **higher productivity, higher quality and prolonged** survival in the drought period.

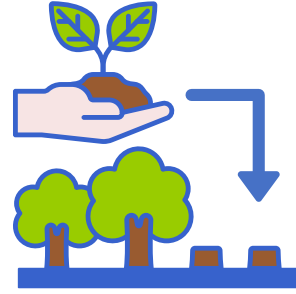


To be successful, this will require parallel work on the **sustainable management of forages**.

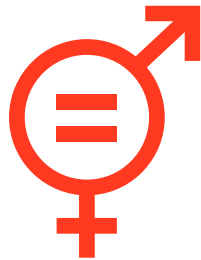
Forage demand in Africa – few words



Forage conservation (e.g. silage, hay and densified forages) will play an increased role as land resources decrease and vulnerability increases.



Traditional forages have attributes that complement improved ones to achieve resilience to **climatic** and other shocks while promoting **agrobiodiversity**.



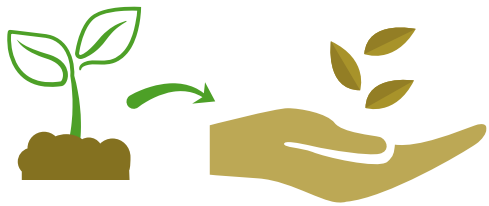
Gender influences choice and adoption.



Thus, in summary, **diversity in plant genetic** resources will need to go hand in hand with diversification and intensification of management.

Forage seed supply systems in Africa

Seed supply systems are underdeveloped for most forage species, not achieving criteria availability, affordability and accessibility at all scales. Differences in terms of species to achieve these criteria will be analyzed below.



- The development of business models for economically sustainable seed production (including vegetative propagation) and marketing requires **concerted action at both demand and supply levels**, to ensure a minimum market security for forage seed producers and distributors.
- A **reliable seed distribution network** in our view needs to include involving public-private partnerships and incorporating international, national and local seed suppliers, for biophysical and market considerations.
- **Awareness creating activities** are critical.

Considerations for scaling based on functional seed supply systems:

Availability, affordability, and accessibility (AAA)



Grasses: Most widely used/commercialized i.e. >> **150 Million ha worldwide**

- **Selection parameters:** Biomass, forage quality, tolerance to biotic (pests and diseases) and abiotic stresses (scarcity and access of water).
- Contribution to organic matter, favorable GHG balances and mitigating nitrate leaching and N₂O emissions.



Legumes

- High protein content.
- BNF and positive effect on GHG balances.



Forage shrubs and trees (also mainly legumes)

- Nutrient cycling.
- Often high drought tolerance.
- Slow establishment but often long term persistence.

Grasses – Availability, affordability, and accessibility

Selections from the wild and increasingly bred lines



Availability relatively good.

- Still limited seed supply systems in most African countries.
- Limited diversity e.g. Napier, Rhodes common in Eastern Africa, Deho in Ethiopia.
- Seed production and commercial viability affected by photoperiod.
- Chicken-egg for cost to import as cost is related to scale.
- Bred lines IP protected though some enterprises allow small scale vegetative multiplication.
- Variable seed certification rules could hamper dissemination.

Affordability

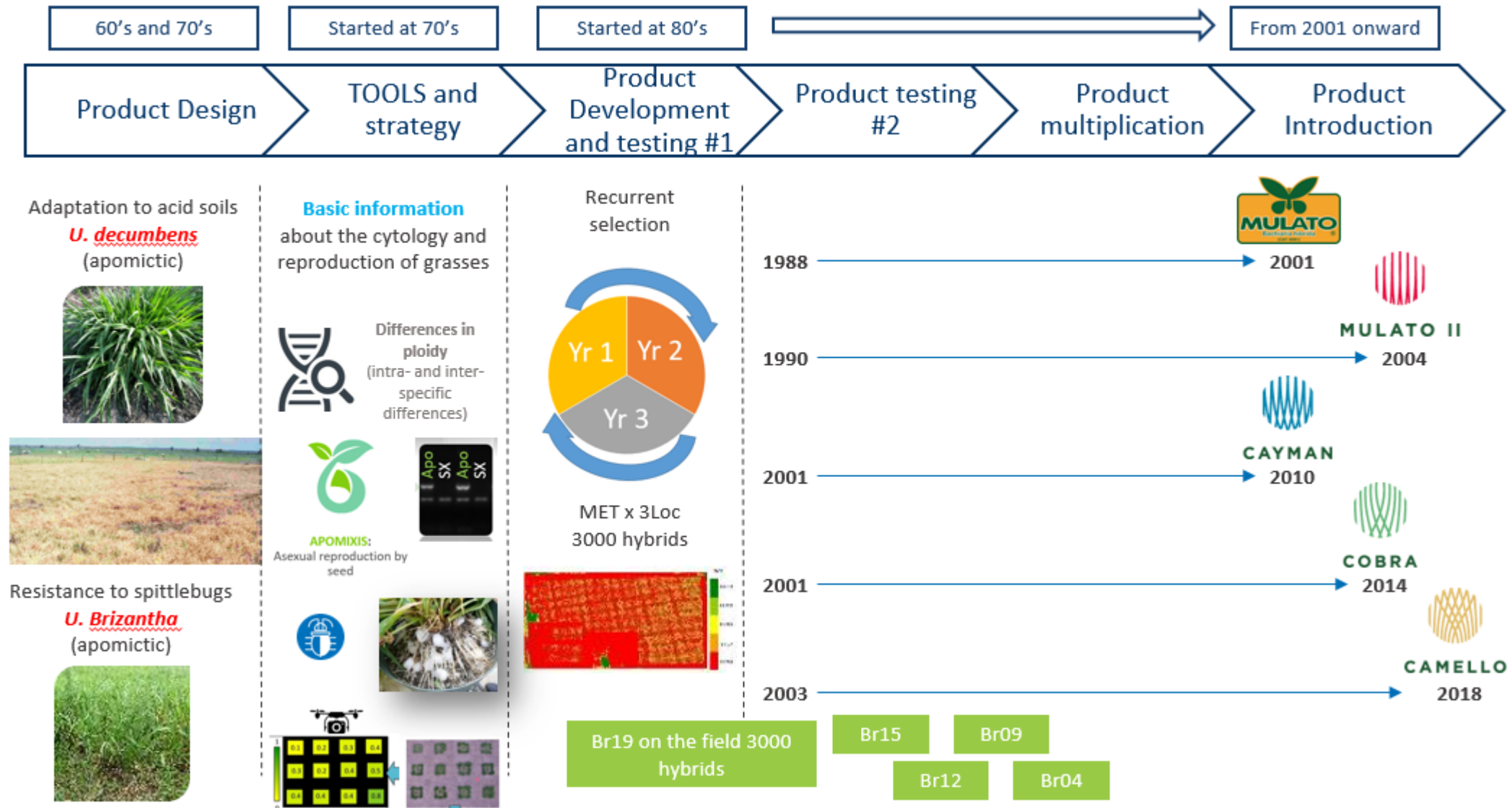
- Cost related to scale and packaging.
- Vegetative propagation can open market with smallholder.

Accessibility

- Often underdeveloped seed supply schemes for wide reach require novel business models (e.g. links with cooperatives, agrovet stores) and awareness creation.

While for tropical grasses there is defined interest of the private sector to engage, this is still more limited for tropical legumes, the latter with a few exceptions relying much stronger on propagation and dissemination through e.g. farmer to farmer distribution, development actors and small to medium scale business involving farmers through contract farming.

Example: Forage breeding scheme PPP



Herbaceous legumes – Availability, affordability, accessibility

Mostly selections from the wild



Availability mostly insufficient

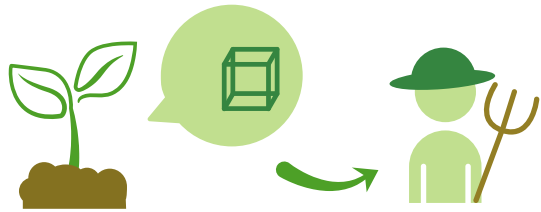
- High variability between countries.
- Limited new varieties in the last decades resulting in limited diversity.
- Seed production not strongly affected by photoperiod and few IP limitations.
- Little commercial production.
- Variable seed certification rules could hamper dissemination.

Affordability

- ??? As highly limited production.
- Could be an opportunity for small scale businesses.

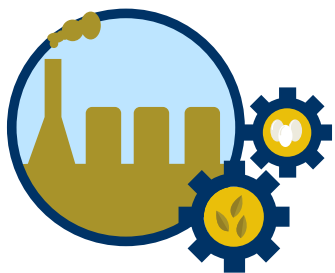
Accessibility

- Limited adoption.
- Requires integrated approach for awareness creation and business models for production and dissemination.
- Strong reliance on propagation and dissemination through e.g. farmer to farmer distribution, development actors and small to medium scale business involving farmers through contract farming.



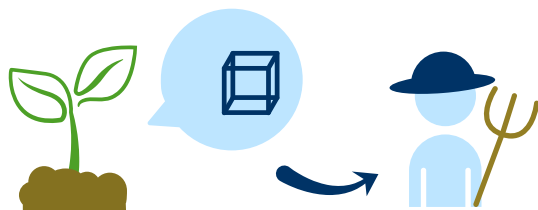
Trees and shrubs – Availability, affordability, accessibility

Selections from the wild



Availability poor

- Limited knowledge and seed supply systems in most African countries.
- Limited diversity e.g *Leucaena leucocephala*.
- Seed certification rules to be defined.
- Limited knowledge on production and storage.



Affordability

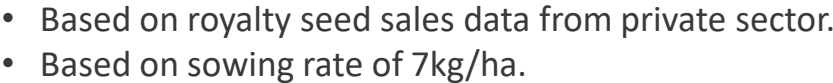
- ??? As highly limited production.
- Could be an opportunity for small scale businesses.



Accessibility

- Need for awareness creation including knowledge on managing of the critical establishment phase (lot of care needed, but benefit is high persistence).

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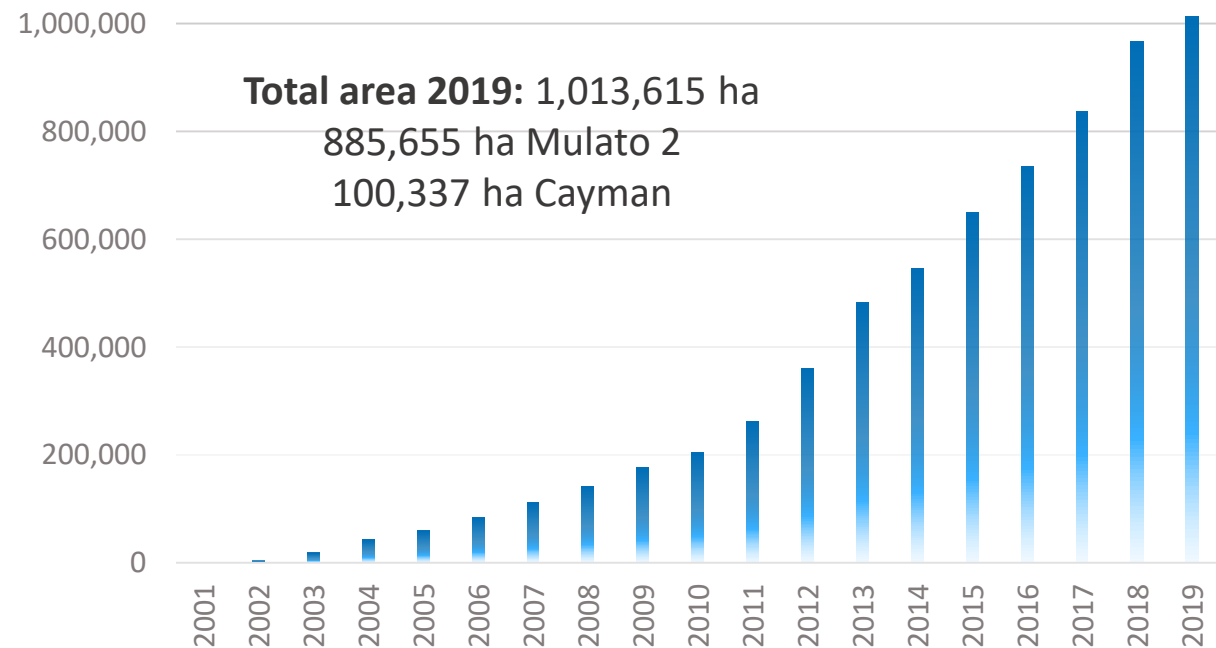
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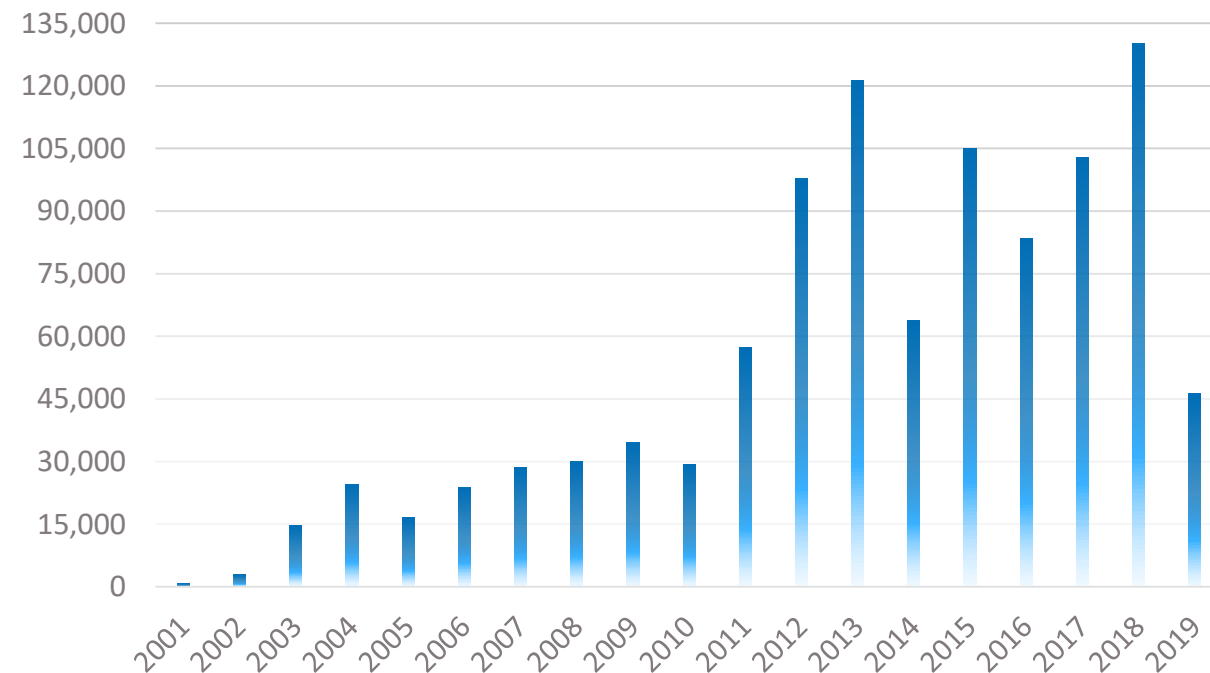
 CIAT
International Center for Tropical Agriculture
Calle 300, Bogotá, Colombia

Global adoption trends forage hybrids – 2001 to 2019

CIAT'S UROCHLOA SPP. HYBRIDS GLOBAL ADOPTION
(CUMULATIVE, HA)



CIAT'S UROCHLOA SPP. HYBRIDS GLOBAL ADOPTION
(ANNUAL, HA)



- **Mulato**, the first commercial Brachiaria hybrid was released in **2001**.
- Based on royalty seed sales data from private sector.
- Based on sowing rate of 7kg/ha.

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Thank you!



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