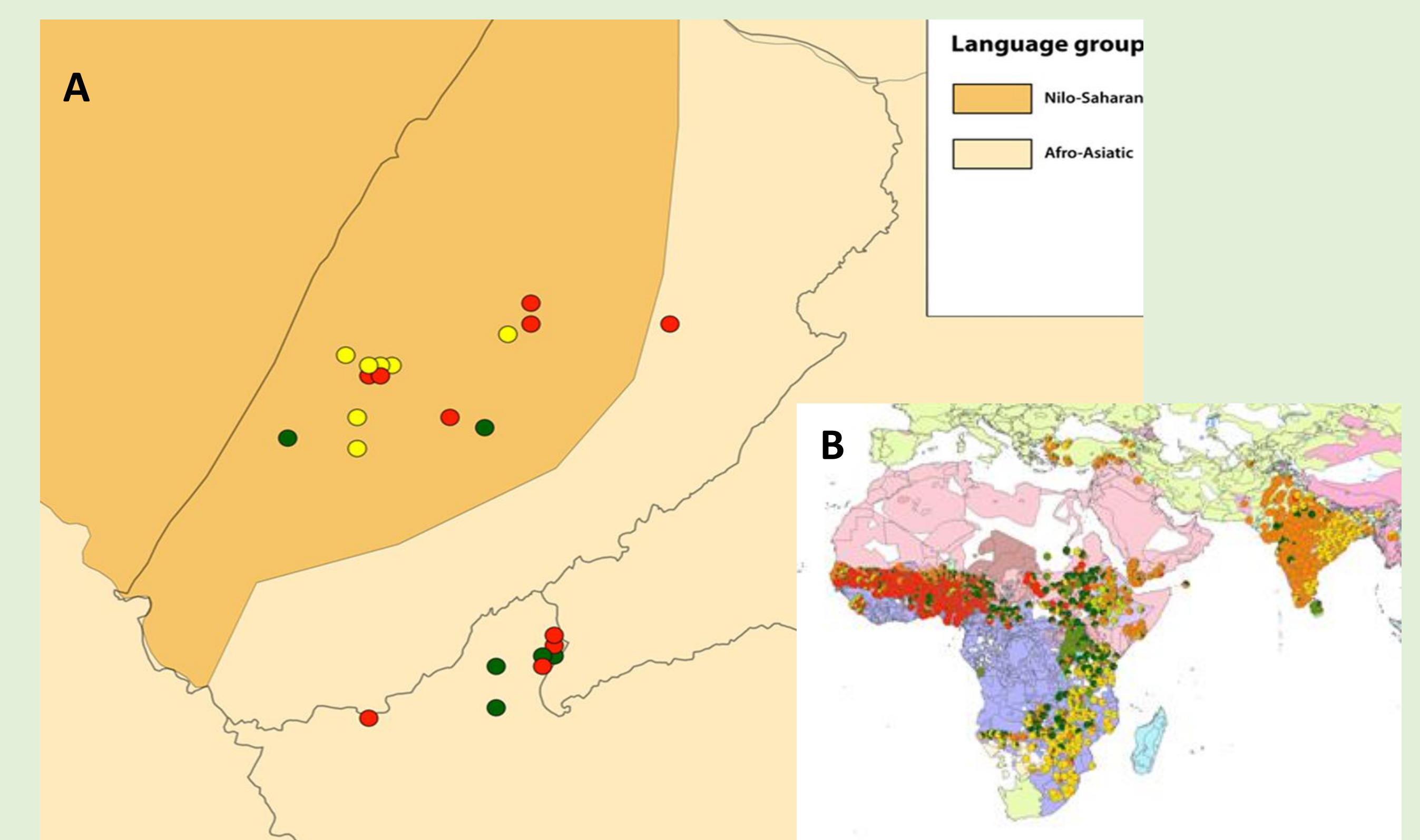


## 1. Background and purpose

- Understanding the processes that shape crop genetic diversity is crucial for sustainable management of a vital part of the planet's biodiversity.
- There is a deep historical relationship between crops and cultures. Crops are genetically shaped by cultural selection and cultures are shaped by the characteristics of the crops.
- Sorghum is the fifth most cultivated crop worldwide and a staple food crop for hundreds of millions of people across the drylands of the African and Asian continents.
- Ethiopia is located in a center of diversity for sorghum and all of the five botanical races of sorghum are cultivated by farmers in the country. The diversity of sorghum in Ethiopia is due to the historical movement of people and plants and the diversity of agroecological conditions in the country.
- In recent studies of sorghum genetic diversity in Ethiopia, little attention has been paid to ethnolinguistic factors. This study addresses this gap by focusing on two sorghum-growing ethnolinguistic groups in Northwestern Ethiopia, the Kunama and Tigrayan, belonging to the Nilo-Saharan and Afro-Asiatic language families, respectively.

## 2. Objective

- The objective of the study is to understand the relationship between ethnolinguistic diversity and sorghum diversity, variety preferences and seed management practices in a cultural boundary area.



**Fig. 2.** Map of sorghum population structure. A) Structure in the study area, B) Global population structure. Legend: colours reflect genetic groups.

## 5. Results

### 5.1. Sorghum varieties grown

- Overall, **22** sorghum varieties reported: **16** farmers varieties and **6** improved varieties, **Kunama** reported **13** varieties, **Tigrayan** living in same district as **Kunama** reported **10**, **Tigrayan** in the other district reported **16**.
- The most grown varieties were:
  - Kunama** (Tahtay Adiyabo): *Dagnew* (72%), *Wediaker* (36%), and *Tsa'da chumurey* (27%).
  - Tigrayan** (Tahtay Adiyabo) : *Dagnew* (54%), *Tsa'da chumurey* (27%), and *Mereway* (24%).
  - Tigrayan** (Asgede Tsimbila): *Mereway* (86%), *Melkam* (28%), and *Wedisibush* (7%)

### 5.2. Morphological and genetic diversity

- We found significant differences in varieties grown across the communities studied, but farmers living in geographic proximity had more similar sorghum preferences and seed management practices despite cultural differences.
- Based on **20** morphological markers we classified **eight** of the farmer varieties as **Durras**, one as **Durra-Bicolor**, one as **Bicolor**, one as a **wild type** and **two** as **Caudatums** (Table 1).
- The geographical distribution of the identified groups reflects association with the ethnolinguistic distribution, but also admixture (Table 1).
  - The two most widely grown varieties of the **Kunama** community belong to the **Caudatum** botanical race, while the most widely grown varieties of the **Tigrayan** belong to **Durras**.
  - The **Tigrayans** in the same district as the **Kunama** are also cultivating **Caudatums** grown by their neighbors, while also cultivating **Durras** of their co-ethnics.

### 5.3. Population structure of sorghum

- The population structure of the sorghum varieties included in this study corroborates the morphological pattern.
- The genetic clustering does not reflect a 1:1 relationship with the morphology-based grouping with both **Durras** and **Caudatums** clustering in several groups. (Table 1).
- There is a geographic clustering across the two districts reflecting ethnolinguistic affinities (Fig. 1A). The pattern at local level mirrors the global genetic structure where Afro-Asiatic peoples mainly cultivate **Durras** and Nilo-Saharan mainly **Caudatum** (Fig. 1B).

**Table 1.** Comparison of local names, botanical race, and genetic structure. Varieties with an asterisk (\*) are improved varieties.

Ethnic groups	Ethnic groups		Botanical Race	Genetic Group
	Kunama	Tigrayan (in Tahtay Adiyabo)		
Dagnew	Dagnew		Caudatum	2
Wediaker	Wediaker	Fikrey/ Hishnur	Caudatum	1
Getsharas	Getsharas		Durra	1
Keyih Chumurey	Keyih Chumurey		Durra	2
Mereway	Mereway	Mereway	Durra	3
Tsa'da Chumurey/Chumurey/Zeriegebru	Tsa'da Chumurey/Zeriegebru		Dura	1/2
-	-	Wedisibuh	Durra	3
-	-	Mereway Kemkem	Durra	3
Akoma	Akoma		Durra	2
-	-	Shulkuit	Durra	3
Tewzale	Tewzale		Durra-bicolor	1
-	-	Merway Wedihidar	Durra	3
Ganseber	Ganseber		Bicolor	2
Zerie systan	Zerie systan	Zerie systan	Wild type	1
Dekeba*	Dekeba*		Durra	1
-	-	Melkam*	Durra	1/3
-	-	Argeti*	Durra	1
Mruts zerie*	Mruts zerie*		Durra	3



**Fig 3.**Tigrayan farmers in Asgede-Tsimbila district showing the Mereway variety of sorghum

## 3. Methods

### Data collection:

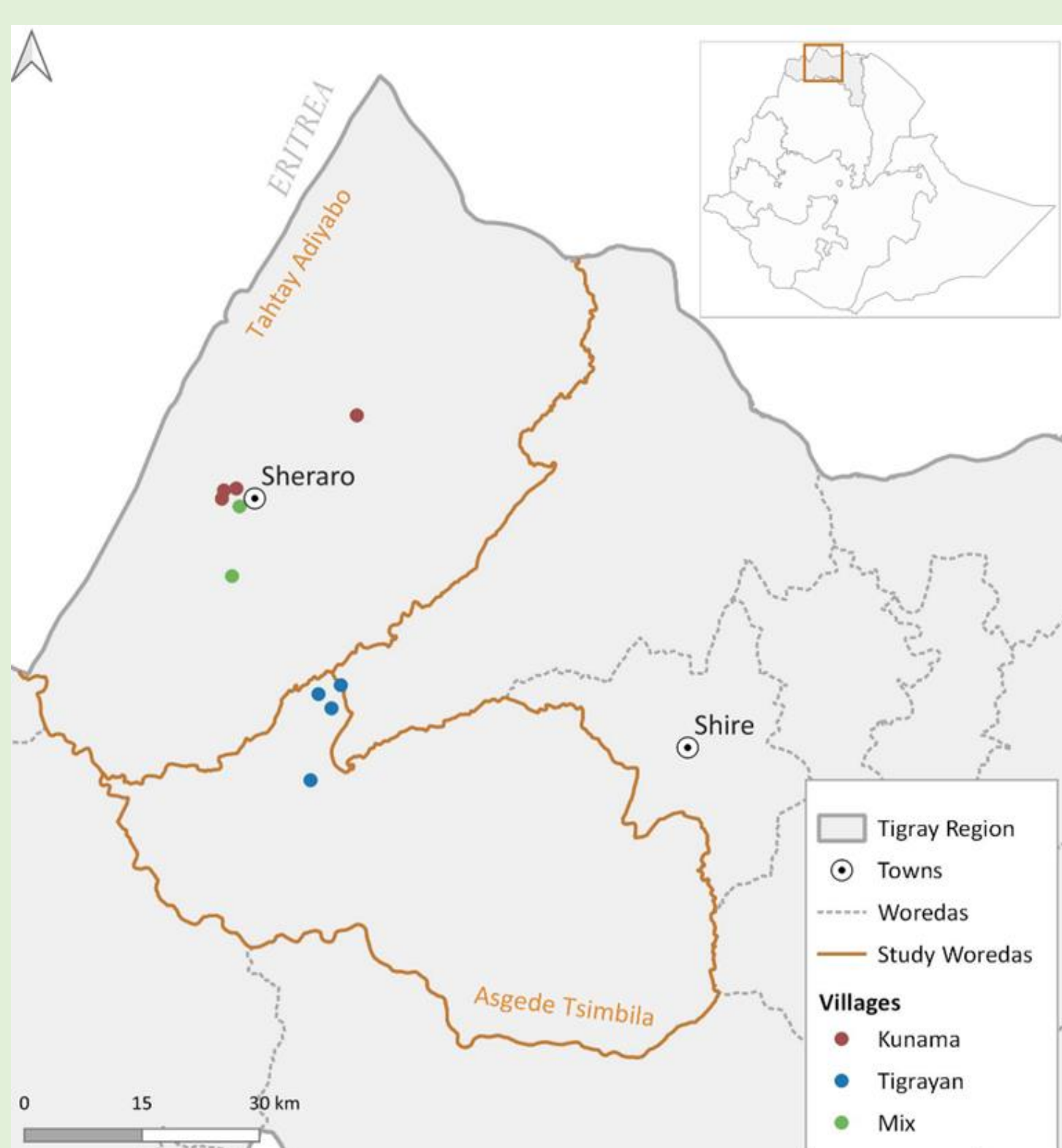
- Field work was conducted in 2019-2020.
- Data on varietal use, selection practices and trait preferences were collected using household survey, key informant interviews, and focus group discussion.
- Information on community history and changes in sorghum use and practices were documented with oral histories.
- Collection of sorghum panicles in farmers' fields

### Data analysis:

- Descriptive statistics using SPSS V.27
- Morphological and genomic** characterization of **43** sorghum samples representing 14 farmer varieties and four improved varieties
- Thematic** content analysis of qualitative data

## 3. Study area description

- This research was conducted in two districts (*Woredas*) of the northwestern part of Tigray region of Ethiopia namely: **Asgede Tsimbila** and **Tahtay Adiyabo** (Fig. 1).
- Both districts are located in uniform agroclimatic regions, but with differing ethnolinguistic groups. Tahtay Adiyabo has a **mix of Kunama and Tigrayan** population, whereas **only Tigrayan** live in Asgede Tsimbila.



**Fig. 1.** Map of the two districts (or woredas) studied.

## 5.4. Preferred traits

### Use traits

- The differences in the varieties grown are also attributed to preferred traits and seed management practices between **Kunama** and **Tigrayan**
- High quality for **injera** preparation (a traditional fermented flatbread) was considered the most important use trait.
- The most cultivated varieties reflect these use preferences; e.g., **Mereway** and **Dagnew** (most widely cultivated by Tigrayan and Kunama, respectively) are considered to produce **high quality injera**.
- More **Kunama** respondents than **Tigrayan** highlighted the use of sorghum for construction materials (to make fences and small sheds).
- Only the **Tigrayans** living in Asgede Tsimbila district reported using **Mereway** boiled grains to treat hepatitis, while only **Kunama** used **Dagnew** boiled grains to treat malaria.

### Agronomic traits

- Three agronomic traits were ranked as most important by all groups (**high yield, early maturing and resistance to Striga**). The varieties most commonly cultivated by farmers reflect these agronomic trait preferences; e.g., **Mereway** and **Dagnew** are high yielding.

## 5.5. Seed selection practices

Most **Tigrayan** in the Asgede Tsimbila district select seed in the **pre-harvesting stages**, while most **Kunama** and their **Tigrayan** neighbors select **during the harvesting stage**.

- Large seed size** was emphasized by all groups, the **Kunama** focus on **early maturity**, the **Tigrayan** in the same district focus on **yield**, and the **Tigrayan** in Asgede Tsimbila district focus on **large and long panicles** as a selection criterion.
- The difference in selection criteria reflect the difference in the types of sorghum varieties grown among the different ethnic groups. Bigger seed size is reflected in **Durras** as compared to **Caudatums**.



## 6. Conclusions and recommendation

- Sorghum is a key part of the culture, entangled with livelihoods practices, cuisine, medicine and material needs.
- In this study, ethnic boundaries, historical factors, and socio-cultural factors influenced patterns of sorghum genetic, varietal, and morphological variation.
- The differences in the varieties grown, traits preferred and seed management practices between the **Kunama** and **Tigrayan** emphasize the underlying deeper association between their cultural identities and the varieties they grow.
- Understanding cultural and social preferences towards sorghum varieties, their traits, and the criteria used for seed management is crucial for the success of crop breeding programs, climate change adaptation policies and development interventions.
- Cultural factors should be taken into account in studying crop diversity patterns.

## 5.9. References

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