Understanding the phenotypic and genotypic variation among key Ethiopian core collections and introduced forage sorghum genotypes

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Introduction
- Sorghum is an important food and feed crop in mixed crop-livestock farming systems in Ethiopia.
- The genetic basis of typical quantitative and polygenic traits such as biomass yield and related traits is complex.
- Genetic associations with agronomic traits can be used to improve screening of existing germplasm to select specific populations with superior biomass sorghum cultivars.

Objectives
- To explore the diversity in key Ethiopian core collection for various forage purposes,
- To develop dual-purpose sorghum varieties that can improve the food and feed needs of sorghum-livestock farmers with limited resources, and
- To develop and improve alternative uses of forage sorghum as hay and silage for dairy farming and fattening.

Methods
- A total of 510 genotypes (360 obtained from Ethiopian SMIL core collection, and 150 introduced forage sorghum) were evaluated in a row-column design with 2 replications trials.
- Data on biomass and related traits were recorded in three growth stages: in booting stage for hay; in early hard-dough stage for silage; and in maturity for dual-purposes.

Results
- A significant variation (P<1%) in biomass yield and Brix was observed for a range of genotypes evaluated from both the Ethiopian SMIL core collection and from the introduced forage sorghum.
  - **Ethiopian SMIL core collection**: Dry matter yield ranging from 1 to 31.4, 1.11 to 49.35, and 1.42 to 34.02, t/ha in booting, early hard-dough stage, and maturity, respectively were observed.
  - **Introduced forage sorghum**: Dry matter yield ranging from 2.24 to 31.2 and 3.38 to 40.58 t/ha in booting stage, and early hard-dough stage, respectively were observed.

Conclusions
- Preliminary results indicate high levels of diversity in biomass yield and related traits.
- A detailed chemical composition analysis is being carried out to support the variation in important agronomic traits such biomass yield.
- If confirmed, the observed diversity offers opportunities for the development of high-quality biomass sorghum cultivars for smallholder sorghum-livestock farmers and beyond.

Way forward
- Understand genetic basis underlying variation in important traits such as biomass yield and composition.