

MALTED SORGHUM AND ADJUNCT BREWING POTENTIALS OF LOCAL AND IMPROVED SORGHUMS

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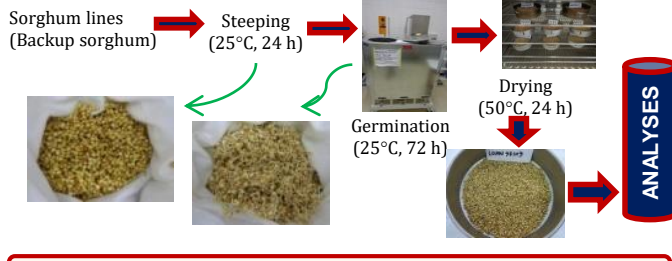
INTRODUCTION

❖ Alternative cereals to barley for malting and brewing are essential because of climate change, non-viable cultivation of barley in tropical and sub-tropical region [1].

❖ Sorghum malt starch has higher gelatinization temperature than barley malt starch. This adversely influences hydrolysis of the starch by malt α -amylase [2] and exacerbated by disulphide bond mediated cross-linking of prolamins which may also limit starch granule expansion [3]. This highly limits subsequent hydrolysis of the starch to fermentable sugars [4] & limit hydrolysis of the proteins into FAN [5].

❖ Sorghum lines that express waxy and HD traits have been developed by Texas A&M University showed promising potentials for brewing [6]. However, optimization and pre-scale-up of the lines has not been studied. Thus, the aim of this study was to optimize malted adjunct sorghums for brewing potentials of local and improved sorghums genotypes.

EXPERIMENTAL



RESULTS AND DISCUSSION

a) Grain Quality - composition vs adjunct potential

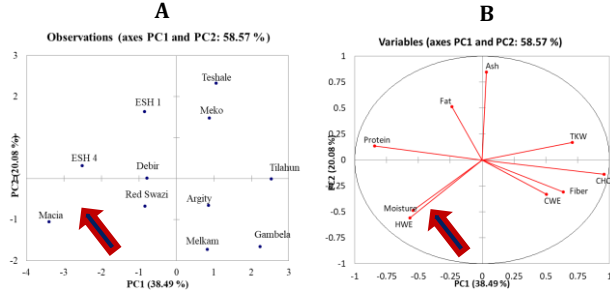


Figure 1 PCA of unmalted sorghum composition & adjunct quality

❖ Sorghum genotypes showed considerable variations in composition and adjunct quality. This is consistent with the findings that has been reported about unmalted sorghum qualities.

❖ Debir, Macia, ESH4 and ESH-1 - have excellent brewing quality in terms unmalted adjunct (Fig. 1) - attributed to their higher HWE.

CONCLUSIONS

The study reveals that Macia and Melkam are suitable for adjuncts being higher in HWE. ESH-1 and Melkam could be considered for malting with comparable desirability to that of waxy and HD lines. Generally, this study shows that the malting and adjunct quality characteristics checked in this experiment seemed to exhibit comparable results. These sorghums (malted or unmalted) have a potential to be used for brewing process - partly replacing barley malt or other adjunct.

b) Grain Quality - endosperm texture vs waxy-HD sorghums

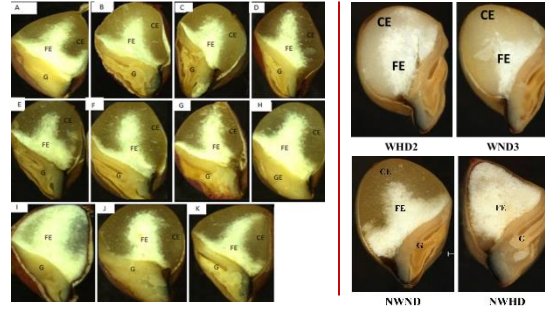


Figure 2. Stereo-microscopy sections of local (Left) and Novel sorghums (right): (A Argity, B Debir, C ESH-1, D ESH-4, E Macia, F Gambella-110, G Meko, H Melkam, I Red-Swazi, J Teshale and K Tilahun, waxy-HD, Waxy, HD and regular sorghum).

❖ The endosperm texture of the sorghums varied from corneous to floury (Fig. 2). Red Swazi was the only floury. Argity & Melkam had intermediate endosperm texture and all others were corneous /hard.

c) Sorghum malt: Extract, Endosperm Modification, & sugar analysis

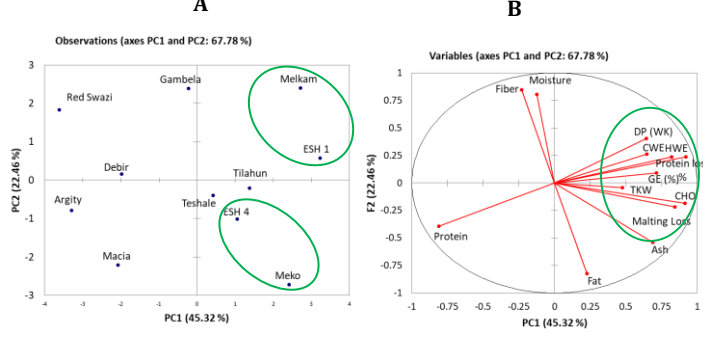


Figure 3 PCA of malted sorghum and associated malting quality

❖ Melkam (45.53) and ESH-1 (47.37) produced HWE when malted and had better malted adjunct quality (Fig 3).

❖ In case of limited production in waxy sorghum lines, these back up local sorghum lines (malted) could be used to partially replace barley malt in brewing.

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