

ABSTRACT

Sorghum (*Sorghum bicolor* L. Moench) is a drought tolerant crop with a potential for industrial uses. Despite increase in demand for sorghum for industrial use, the local supply is low mainly due to lack of high yielding sorghum genotypes. A number of genotypes with desirable properties for use in baking, malting and brewing have been identified however there is no information on the performance of these varieties in the agro-ecological zones traditionally used for sorghum production. The objective of the study was to contribute to an increase in sorghum production for industrial uses through determination and documentation of ideal environments for cultivation of the new sorghum lines. The specific objective of the study was to determine the effect of agro-ecological environment on yield, yield components and grain quality of selected industrial sorghum lines. The study was conducted in Mundika in Lower midland zone 2 (LM 2) in Busia County, Sinyanya (LM 3) and Masumbi (LM 1) both in Siaya County during the long rain season and in Sagam (LM 1), Nyahera (LM 3) both in Kisumu County and Mundika (LM 2) during the short rain season where agronomic and environmental suitability of nine sorghum lines identified for malting, brewing and for baking were evaluated. The experiments were conducted using a randomized complete block design (RCBD) with three replications. Planting was done at the onset of rains in each location. Data was collected from the two central rows per plot. To determine the effect of environment on sorghum grain quality, proximate analysis was done on the harvested and milled grains. All the data was subjected to analysis of variance using SAS version 8.1. Means were separated according to least significant difference (LSD) whenever the genotypic effects were significant ($P \leq 0.05$). Analysis of variance (ANOVA) revealed significant ($p \leq 0.05$) differences among sorghum lines for agronomic parameters, yield components and grain yield in all the sites. SDSA1 x ICSR43 recorded highest yields in LM 1 during the long rainy season which was 88.3, 36.0, 58.4, 73 and 87.2 % more than in LM 3 (short rainy season), LM 2 (long rainy season), LM 1 (short rainy season), LM 3 and LM 2 (short rainy season), respectively. Combined analysis showed that sorghum line x growing environment affected the nutritional quality of sorghum lines. The variances due to sorghum line were higher for starch content, protein content and amylose content, but the variability observed for tannin and amylopectin content were mostly due to agro-ecological environment of cultivation. The study showed that LM 1 in long rainy season is a stable agro-ecological environment for cultivation of the new sorghum lines. Cultivation of SDSA1 x ICSR43 line

in LM 1 and LM 2 during the long rainy season and LM 2 during the short rainy season produces quality grains for malting and brewing with regard to tannin levels.