

## Abstract

Inadequate soil moisture constrains sorghum production in dry lands leading to low yields. We conducted a study in Kitui County from 2nd October and 29th December 2021 to assess the impact of In situ water harvesting and soil mulching on grain yield and associated attributes of sorghum in semi-arid areas of south-eastern Kenya. The experiment was conducted in a randomized complete block design with 12 treatments comprising three farming practices (ridge-furrow, flat and zai pits) and three types of soil mulching materials (black plastic films, transparent plastic films and grass). The control treatments consisted of farming practices without mulching materials. The highest grain yield was observed in ridge-furrow with black plastic mulch (4498.33 kg ha<sup>-1</sup>), indicating an increase of 41.4% compared to the lowest yield observed in conventional flat (3180.33 kg ha<sup>-1</sup>). There was a non-significant difference in grain yield between flat planting with black plastic film mulch (4040.33 kg ha<sup>-1</sup>) and flat planting with transparent plastic film mulch (3920.33 kg ha<sup>-1</sup>). The moisture content was lowest in conventional flat planting (4.16 mm) and highest in zai pits with black plastic mulch (12.62 mm), indicating an increase of 203.4%. Plastic film mulches had a greater effect on increasing the grain yield attributes (panicle size, LAI, 1000 seed weight and stem girth) compared with the grass mulch. It was evident that black plastic mulching combined with ridge-furrow was the best combination for increasing grain yield; thus, their potential could be explored to increase food security in semi-arid areas of southeastern Kenya.