
Quantification of sorgoleone in 353 African sorghum accessions

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Abstract

353 sorghum accessions comprising 148 landraces from South Africa, 97 landraces from Botswana, 66 landraces from Namibia, 15 landraces from Zambia, 11 wild sorghums and 7 sweet stem sorghums from Zimbabwe, and 9 released/breeding material grown in Zimbabwe, Mozambique, Malawi, Botswana, Tanzania and Zambia were screened for sorgoleone content by high performance liquid chromatography in 2016. Sorghum seeds were planted in petri dishes in three replicates in the Weed Science Laboratory (Department of Crop Science, University of Zimbabwe). Six days after germination, roots of seedlings were excised from the shoots and immersed in HPLC-grade methanol (1:20) w/v for 3 minutes to extract the sorgoleone. The crude extract was filtered and evaporated in a water bath with temperature set at 45°C. The dried extract was dissolved in mobile phase (1mg/ml) and the solution filtered through a poly filter 0.45µm prior to HPLC analysis. Quantification was based on a calibration curve using purified sorgoleone as an external standard. Differences in sorgoleone concentration among accessions were observed. Very high levels of sorgoleone were detected in accessions that included a Zimbabwean wild sorghum IBS749 (355.24 µg/mg RFW); a Botswana landrace IS19450 (464.43 µg/mg RFW) and three South African landraces IS14002, IS14003 and IS9456 (381.20 µg/mg RFW, 472.69 µg/mg RFW, and 584.69 µg/mg RFW respectively). Sorgoleone was not detected in 11 of the 353 sorghum accessions tested. In the majority (316) of accessions, sorgoleone was in the range of 0.01 – 200 µg/mg RFW. In many of the accessions, a major compound that was eluted at about ≈0.3 minutes after injection, and 5 to 9 minor compounds were also detected. The results indicate that sorghum from some parts of Africa contains large quantities of sorgoleone and other major and minor compounds. There is potential for use of sorghum allelopathy for weed control in Africa.

Keywords: African sorghum, sorgoleone, high performance liquid chromatography, allelopathy, weed control

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