6. CONCLUSIONS AND RECOMMENDATIONS

Zimbabwean sorghums lack ideal agronomic and physico-chemical characteristics defined in terms of high polyphenols, plus hard endosperm and thin pericarp. Simple and effective treatments are recommended for processing the available polyphenol-rich sorghums.

Malting, alone, reduces polyphenol content but does not reduce the enzyme inhibitory power of sorghum tannins. Concerning chemical treatments during steeping of tannin-containing grain, malting should be done in combination with NaOH or HCHO treatment in order to reduce the enzyme inhibitory power of sorghum tannins. NaOH will also reduce the length of malting as it enhances water uptake of the grain. It appears that NaOH treatment is potentially a simple, relatively safe alternative to HCHO for use in sorghum malting.

In abrasive milling, reduction in polyphenol content is largely due to the abrasion of grain outer layers. The traditional, dry abrasive decortication technique is, therefore, recommended for milling tannin-containing grains since conditioning moisture and chemical treatments using water, HCl, HCHO and NaOH neither give significant reduction in polyphenol content nor improve the yield of decorticated flour. However, chemical treatments using HCHO and NaOH and conditioning moisture appear to be advantageous in roller milling, as the enzyme inhibitory power of tannins is significantly reduced in roller-milled flour. Thus enzyme inhibitory assays are recommended as a way of assessing treatment effects where animal-feeding

experiments cannot be conducted. Conditioning just prior to roller milling or abrasive decortication is recommended for future work.

Concerning chemical treatments in wet milling, steeping sorghum grain in dilute NaOH will give starch pastes with higher PV, CPV and setback than when water, HCl or HCHO is used. NaOH treatment will also give starches with reduced PV temperature and brighter colours due to polymerisation reactions between polyphenols and alkali. Thus dilute alkali steeping during wet milling is recommended to enhance the physico-chemical characteristics of sorghum starch. The polyphenol content of sorghum will influence starch properties, for example, grain polyphenol content is positively correlated to starch pasting PV. Similarly, kernel characteristics will also affect sorghum starch properties as grain floury endosperm portion is negatively correlated to starch amylose content and peak gelatinisation temperature.

Developing quality products using highly-coloured starch, isolated from polyphenol-rich sorghums, is an alternative towards improving the overall image of sorghum but the challenge will lie in obtaining a uniform pink colour from different batches of the same sorghum varieties during commercial operations. Future work should consider assessing the exact composition of starch and the yield of prime grade starch obtained under alkaline processing conditions.

The chemistry of sorghum phenolic compounds should be further investigated to understand the reactions that take place during food processing of high-tannin sorghums.

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8. PUBLICATIONS

Published

Beta, T., Rooney, L. W., Marovatsanga, L. T., and Taylor, J. R. N. 1999. Phenolic compounds and kernel characteristics of Zimbabwean sorghums. J. Sci. Food Agric. 79:1003-1010.

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Beta, T., Rooney, L. W., Marovatsanga, L. T., and Taylor, J. R. N. Effect of chemical treatments on polyphenols and malt quality in sorghum. J. Cereal Sci.

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Beta, T., Rooney, L. W., and Taylor, J. R. N. Effect of chemical conditioning on the milling of high-tannin sorghum. J. Sci. Food Agric.

Presentations

Beta, T., Rooney, L. W., Marovatsanga, L. T., and Taylor, J. R. N. 1997. Grain quality evaluation of sorghum varieties in Zimbabwe. Poster presented at the 14th biennual South African Association of Food Science and Technology (SAAFOST) international congress and exhibition, 1-4 September 1997, Pretoria,

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