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EFFECTS OF VARYING DURATION OF DIFFERENT PROCESSING METHODS ON NUTRIENT QUALITIES AND TOXICITY (ANTI-NUTRITIONAL FACTORS) OF NEGRO COFFEE (*SENNA OCCIDENTALIS)* SEEDS MEAL

Ibrahim*, M. J., Tsado, D.N., Adama, T.Z., Adama, J.Y., Muhammad, M.L. and Yohana, A.

Department of Animal production, School of Agriculture and Agricultural Technology, Federal University of Technology Minna

ibrahimmj@futminna.edu.ng

08036020469

ABSTRACT

The study investigated the effect of duration on processing methods (germination 24hrs, 48hrs, 72hrs, Roasting 10mins, 15mins, 20mins, fermentation 24hrs, 48hrs, 72hrs) proximate composition results showed increased dry matter, from (Raw 93.40%, germination 24hrs 92.80%, fermentation 24hrs 98.00, to the highest in germination 48hrs, 98.60,) crude protein from (Raw 11.20%, germination 24hrs 22.75%, to the highest in fermentation 72hrs 41.65%), Fluctuation was observed in the percentage Crude fiber and Ether extract with Raw having highest crude fiber 5.50%, Roasting 10min 5.00%, and fermentation 72hrs having lowest crude fiber 1.50%). Ether extract Raw 12.00%, germination 24hrs 12.50%, germination 48hrs fermentation 24hrs 8.00 respectively, and roasting 15mins recording lowest ether extract (7.50%). Mineral (ash) was highest in Raw 6.50% and lowest in fermentation after 24hrs (3.00%). NFE increases from 58.00% in raw *senna* to 82.00% after germination 48hrs. There was appreciable reduction in the concentration of anti-nutrients between the varying duration of the three different processing methods. Highest reduction of phytate was recorded in germination 72hrs reducing from 240.00mg/100g in raw seed to 198.11mg/100g. Roasting 20min had the most pronounced effects on tannin reducing it from 384.1mg/100g in raw seed to the lowest 283.11mg/100gm. Fermentation 72hrs had the most effects on Oxalate reducing it from 84.26mg/100gm to 70.63mg/100gm. Germination 72hrs reduces saponin from 179.00mg/100mg to 153.62mg/100gm.and Alkaloid from 255.00mg/100gm to 168.26mg/100gm.In conclusion, germination for 72hours gives the best result without any negative effect and improves the nutrient values and therefore recommended for adoption.

KEY WORDS ;Negro Coffee, Threshing, Anti-nutritional factors, Attenuation and Winnowing

INTRODUCTION

The daily quest for affordable food/feeds, medication and forages has led to the discovery of many under-utilized plants rich in phyto-chemicals and biologically active metabolites. However presence of anti-nutrients (secondary metabolite) has limited the optimal utilization of nutrients present in those under-utilized plant resources by different mechanisms (for example inactivation of some nutrients, diminution or attenuation of the digestive process or metabolic utilization of food/feed which exerts effect contrary to optimum nutrition (Soetan and Oyewole 2009). Such chemical compounds, are frequently associated with leguminous plants and are very cheap, easily accessible and available all year round. (Shaahu *et al*.,2015). One of such lesser known leguminous plants which is under-utilized is Negro coffee (*Senna occidentalis*)

The Objective of this study is to find and recommend the best of the three processing methods to reduce the anti nutritional factors of Negro coffee (*Senna occidentalis*).

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MATERIAS AND METHODS

Method of Processing Negro Coffee Senna occidentalis Seeds.

Matured dry Negro coffee pods were harvested and further sundried before threshing and winnowing to separate clean seeds. The clean seeds are further treated to reduce the anti nutritional factors to tolerable levels.

Fermentation (for 24, 48, and 78 hours)

500g of *Senna occidentalis* was weighed for each of the duration stated above and fermented for 24, 48 and 72hrs,oven dried at 105^{oc} for 3hrs 15minutes.

Roasting (for 10, 15, and 20 minutes)

500g of the seed sample was roasted in a toaster machine at 100.3^{oc} for 10 minutes,15minutes and 20minutes, allow to cool and ground into powder,

Germination (for 24, 48, and 78 hours)

500g of the seed was used for germination at 24, 48, and 78 hours duration, spread in a wet jute bag each, and kept inside the laboratory, for each of the duration mention above, water was sprinkled at every 3hours interval, and at the end of each of the duration, the germinated sample (75%). will be collected and oven dried for three hours. Each replicate of the three methods was ground into powder, packaged and labeled in a polythene bag each *in preparation for proximate and Anti-Nutritive Analyses.*

2.4 Statistical Analysis

All the data were analyzed using pie chart.

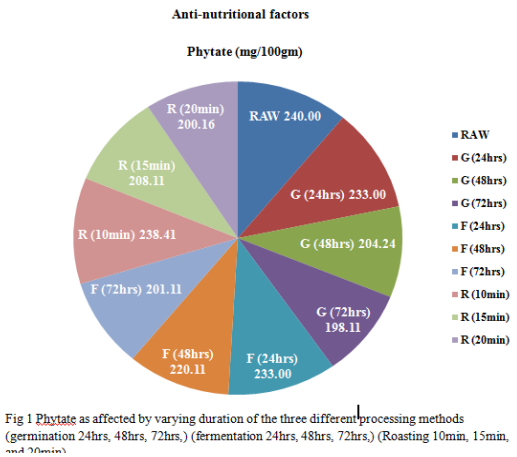


Fig 1 Phytate as affected by varying duration of the three different processing methods (germination 24hrs, 48hrs, 72hrs,) (fermentation 24hrs, 48hrs, 72hrs,) (Roasting 10min, 15min, and 20min)

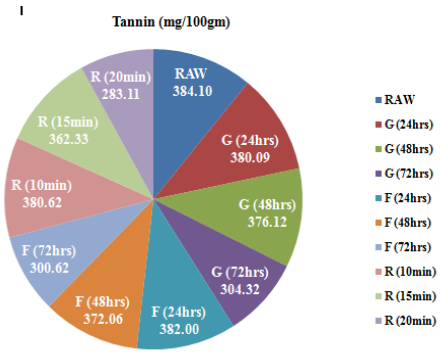


Fig 2 Tannin as affected by varying duration of the three different processing methods (germination 24hrs, 48hrs, 72hrs,) (fermentation 24hrs, 48hrs, 72hrs,) (Roasting 10min, 15min, and 20min)

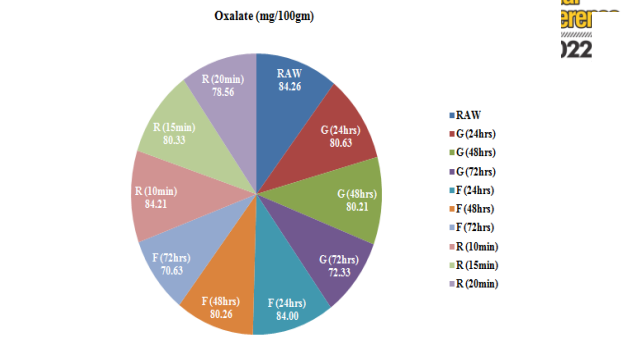


Fig 3. Oxalate as affected by varying duration of the three different processing methods (germination 24hrs, 48hrs, 72hrs,) (fermentation 24hrs, 48hrs, 72hrs,) (Roasting 10min, 15min, and 20min)

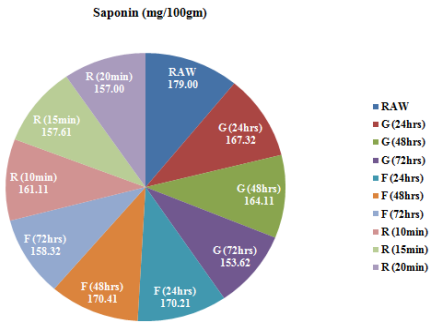


Fig 3. Saponin as affected by varying duration of the three different processing methods (germinatio 24hrs, 48hrs, 72hrs,) (fermentation 24hrs, 48hrs, 72hrs,) (Roasting 10min, 15min, and 20min)

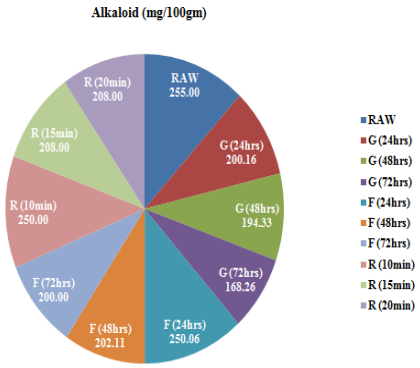


Fig 3. Alkaloid as affected by varying duration of the three different processing methods (germination 24hrs, 48hrs, 72hrs,) (fermentation 24hrs, 48hrs, 72hrs,) (Roasting 10min, 15min, and 20min)

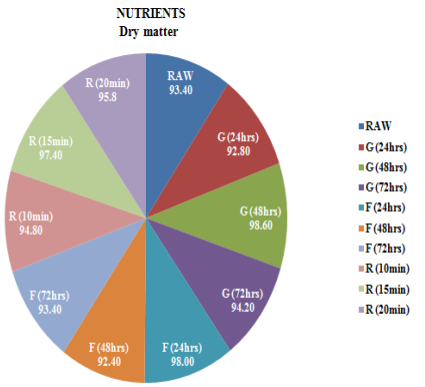


Fig 3 Dry matter as affected by varying duration of the three different processing methods (germination 24hrs, 48hrs, 72hrs,) (fermentation 24hrs, 48hrs, 72hrs,) (Roasting 10min, 15min, and 20min)

RESULTS AND DISCUSSION

Effect of varying duration of the three different processing methods on anti nutritional factors of Negro coffee (Senna occidentalis) seeds meal

The pie chart above shows the anti-nutritional factor analysis and nutrient composition of raw *Senna occidentalis* seeds and the processed seeds subjected to varying duration of the three different processing methods. Under varying duration of the three processing methods phytate reduction was highest in germination at72hrs, reducing from 240.00mg/100g in raw seed to 198.11mg/100g, which is lower than the tolerable level 200-265mg/100 reported by Soetan *et al*.,(2013). Tannin reduced from 384.1mg/100g in raw seed to the lowest 283.11mg/100gm after roasting for (20 minutes), which is lower than 800-900mg/100gm reported by Nastis and Malachek (2000). Oxalate reduced from 84.26mg/100gm to lowest 70.63mg/100gm after fermentation 72hours. This is lower than the tolerable levels of 200mg/100gm reported by Sidhu *et al*., (2004). Saponin reduced from 179.00mg/100mg to the lowest 153.62mg/100gm after 72hrs germination which is lower than recommended safe level of 200mg/100gm reported by Soetan *et al*., (2013). Alkaloid reduced from 255.00mg/100gm to the lowest 168.26mg/100gm after 72hours germination, this is lower than the recommended safe level of 220-260mg/100gm reported by Mc Donald (1995).

CONCLUSION AND RECOMMENDATION

The result of this study shows, that germination at72hours had the most effects on anti-nutritional factors and remarkable effects on improving the nutrient contents of the seed. In

addition the result of germination and fermentation enhances the nutrients content of *Senna occidentalis* and lowered the anti-nutrients (secondary metabolite), thus satisfactory utilization of *Senna* will be ensured and could serve as a valuable feed ingredient in under-developed and developing nations where feed is a very important limiting factor. *Senna occidentalis* can also be used to replace conventional sources of protein and energy due to their high costs**.**

REFERENCES

McDonald,P., R.A Edwards,J.F.D. Greenhalgh and C.A. Morgan, (1995). *Animal nutrition*. 5th Edn.,Longman Singapore Publishers (Pte) Ltd., Singapore.

Nastis, A.S. and Malachek, J. C. (1981). Digestion and utilization of nutrients in Oak browse goats. *Journal of Animal Science*, 53:283-290

Shaahu, D.T., Carew, S.N. and Ikurior, S.A.C. (2015). Effect of processing on proximatecomposition, energy, anti-nutritional factors,amino acid and mineral composition of lablabseed. *International Journal of Scientific and Technology Research* 4(4): 1-4.

Siddhu P., K. Vijayakumari and Janardhange, K, (2004). Nutritional and chemical evaluation of raw seeds of the tribal pulse *Vigna triblobata*. Nutrition, 42: 97-103

Soetan, K. O., Akinrinde, A. S., and Ajibade, T. O. (2013). Preliminary studies on the haematological parameters of cockerels fed raw and processed guinea corn *(Sorghum bicolor) Proceedings of 38th Annual Conference of Nigerian Society for Animal Production* (2005). Pp. 49 - 52