



Student Presentation Symposium

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General Image, Sensory Acceptability, and Willingness to Buy Innovative Cowpea-Based Dishes



Charmaine Sehoole

Academic Abstract

The consumption of indigenous food crops, such as cowpea, has been declining probably due to its poor image, lack of cowpea-based recipes, and possibly consumers disliking the sensory properties of cowpea-based dishes. This research aims to provide valuable insights into three cowpea-based recipes' general image acceptance. Eighty-seven participants, mainly Gen Z adults (87%) aged between 18 and 28 and predominantly female (65%), participated in the study. Convenience sampling was used to recruit participants via a University of Pretoria consumer database. The participants evaluated samples of cowpea vetkoek burger, cowpea butternut bunny chow, and cowpea chai ice cream based on general image, overall liking, and purchase intent. The results revealed that the participants had a positive general image perception of all three recipes. The three dishes received mean scores of between 6 and 7 on a 9-point hedonic scale (1=dislike extremely;9=like extremely); these values equate to the descriptions: *like slightly to like moderately*. Additionally, the participants showed a positive willingness to buy cowpea-based dishes. The study's findings will help recipe and food product developers develop recipes and products that are acceptable to consumers and facilitate consumer adoption of cowpea beans. Overall, this research provides a step towards promoting the consumption of indigenous food crops such as cowpea beans.

Easy-to-Read Abstract

Indigenous food crops like cowpeas are not eaten widely because people do not know how to cook them and do not always enjoy them. This study looked at people's attitudes to recipes using cowpea. The study showed that most people were positive about the recipes and were interested in buying these kinds of dishes. This study will help food makers better understand people's preferences and how people could eat cowpeas in recipes like this.

The Commercialization Potential of Underutilized Crops along their Value Chains for Food and Nutrition Security in South Africa



Waliyat Oloyede

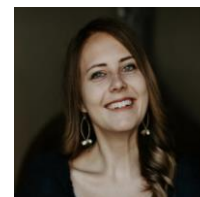
Academic Abstract

Due to their resistance to adverse climate conditions, nutrient density, and cultural preferences, underutilized crops qualify as viable alternatives for addressing food insecurity and malnutrition. Promoting and incorporating indigenous nutrient-dense crops into food value chains could ensure sustainable and resilient food systems, improve diet quality, and increase smallholder farmers' incomes. While the potential of underutilized crops can respond to ending hunger and poverty, the commercialization of these crops along the value chain is yet to be fully exploited. Underutilized crop farmers are the most vulnerable in the food systems with poor access to infrastructure, inputs, and markets, and who often have access to less than two hectares of land (Loeper et al., 2016). Bambara groundnut (*Tindlubu*), Cowpea (*Timbaweni*), and Orange-fleshed sweet potatoes (*Bhatata*) are some examples of relevant underutilized African crops that are prevalent and consumed among rural residents in South Africa. However, the potential to commercialize is hampered due to challenges in their value chains. This study therefore investigates the potential to overcome the constraints and challenges in the value chains of Bambara groundnut, Cowpea, and Orange-fleshed sweet potato in Mpumalanga, South Africa.

Easy-to-Read Abstract

Indigenous food crops have many benefits for health and are easy to grow on local farms. If more people bought, farmed, and ate these food crops, this would help to make food systems stronger, give people a better diet, and help farmers make income from selling these crops. These crops are not widely farmed, bought at markets, or eaten. This study looked at how to break down barriers in three types of indigenous food crops (Bambara groundnut, Cowpea, and Orange-fleshed sweet potato) in Mpumalanga.

South African Consumer Knowledge of the Current Paediatric Food-Based Dietary Guidelines



Rochelle Van veijeren

Academic Abstract

The co-existence of undernutrition, overnutrition, and micronutrients collectively comprises what is known as the Triple Burden of Malnutrition, with young children (aged 0-5 years) being severely affected due to their vulnerability and dependence on caregivers for appropriate nourishment. Under the United Nation's second Sustainable Development Goal, the "Zero Hunger" initiative sets out to alleviate this Triple Burden of Malnutrition by 2030. However, achieving this goal is at risk if the prevailing consumer ignorance towards young child feeding endures. To address this issue, the Paediatric Food-based Dietary Guidelines (PFBDGs) serve as an educational resource to caregivers. These guidelines hold the potential to render objectives like the second SDG more attainable. Despite the presence of proactive measures like the PFBDGs, caregivers often jeopardize the health of young children by overestimating their own feeding abilities. This phenomenon is explained by the Dunning-Kruger Effect (DKE), a cognitive bias wherein individuals with limited expertise in a specific field tend to overrate their own knowledge or proficiency. The study aimed to investigate the potential existence (or absence) of DKEs in consumers' knowledge of all dimensions of the PFBDGs. The findings indicated that subjective knowledge surpassed objective knowledge within the Hygiene, Nutrition, and Food Safety dimensions, indicating prominent DKEs in these domains. Consequently, these areas pose significant risks in terms of young child feeding. Interventions in these specific fields are essential to facilitate the attainment of goals such as the Zero Hunger target.

Easy-to-Read Abstract

It is important to make sure that all people, most of all young children, eat a healthy diet that gives them all the nutrients they need to grow and develop well. The Paediatric Food-based Dietary Guidelines (PFBDGs) give caregivers a clear idea of how much and the types of food to feed their children between birth and 5 years of age. This study looked at how much caregivers know about the different parts of the PFBDGs. The findings show that many caregivers are not aware of all the different parts of the PFBDGs and they need to be educated more about the guidelines.

Feeding Practices and Anthropometry of Mothers and their Infants Residing in 2 Provinces of South Africa



Rodrey Mafodi

Academic Abstract

Malnutrition is a challenge both globally and in South Africa, it affects and is responsible for the deaths of children under the age of five. Malnutrition is a result of inadequate intake and infections. This study aims to investigate the dietary practices of mother-child pairs in rural and urban settings in South Africa during the COVID-19 pandemic. A structured questionnaire was used to collect socio-demographic information about the mothers and the children. For anthropometric measurements, a digital scale was used to measure the weight for both mother and child measure to the nearest 0.1 kg, and length/ height was measured using a stadiometer and measuring mat measured to the nearest 0.1cm for mothers and children respectively. A single 24-hour recall was used to determine the dietary practices of the mothers and children. The WHO breastfeeding questionnaire was used to investigate the breastfeeding practices of children 6-23 months. Nine percent of the children were wasted, 8.0 % were stunted, and 9.1% were underweight. Iron intake was low for mothers with an intake of 10.4 and 13.1 mg/day in Gauteng and the Free State respectively. Vitamin C intake for Gauteng and Free State was respectively (21.0 and 17.0 mg/day). The MDD was met by 34.2 and 44.3 % of infants and young children in Gauteng and the Free State respectively. Based on the findings in Gauteng province and the Free State, inadequate dietary practices are prevalent and result in malnutrition, stunting wasting, and underweight in South Africa.

Easy-to-Read Abstract

Malnutrition is a body condition that happens when the body does not get enough nutrients from eating too little or from eating too little of different kinds of food with the right types of nutrients. This study looked at the types of foods mothers and their children ate over a day during the COVID-19 pandemic. The study found many of the children showed signs of malnutrition like low iron for the mothers and the children show low weight and poor growth for their ages.

Integrating Sensory Analysis in Routine Sweetpotato Breeding

Mariam Nakitto



Academic Abstract

Traditionally sweetpotato breeders have not included the sensory preferences of people who eat sweetpotato in their selection criteria. Sensory analysis tools have the potential to avert this challenge. However, sweetpotato breeding methods (long cycle, many samples, few roots), the nature of sweetpotato (varied shapes and sizes, perishability, small variations between genotypes, high variation among genotypes), and the dynamic market present a unique challenge for integrating such tools in routine breeding. In recognition of these challenges, this work developed a package comprising four tools for integrating sensory analysis into routine breeding. First, a comprehensive set of protocols for descriptive sensory analysis including a comprehensive sweetpotato lexicon with defined attributes, their references, and evaluation procedure; details on how to prepare, replicate, and serve samples; and a workshop technique to train panels were developed. Second, an instrumental texture analysis protocol based on descriptive sensory analysis was developed to evaluate the texture parameters of the genotypes. Third, flavour biomarkers indicative of different flavours perceived from sweetpotato were identified to facilitate instrumental prediction of sweetpotato flavour quality. Fourth, a decision tree compatible with the existing selection index was designed to guide breeders on whether a genotype meets consumer acceptability or not. These tools altogether overcome the barriers of integrating sensory analysis in routine sweetpotato breeding and are expected to lead the revolution towards consideration of eating quality in breeding selection.

Easy-to-Read Abstract

In the past, sweetpotato farmers did not look at or think about the taste, look, feel, and cooking of sweetpotatos for the people who eat them. Farmers have concentrated more on the types of sweet potatoes that are the best and easiest to grow. This study looked at making a set of tools to help researchers and farms better understand the taste, look, feel, and ways of cooking sweetpotatos for the people who eat them so that people who eat them can get the benefits of these healthy crops.

Nutritional and Functional Properties of Infrared and Microwave Heat Moisture-Treated Sorghum Meals

Rose Baah



Academic Abstract

Starch is the main component of sorghum meals. The digestibility of a carbohydrate-rich product can be estimated by the glycaemic index (GI) using in vitro starch digestibility assay. Despite the statements in literature that, “sorghum foods are slowly digested starch and good for people with diabetes and obesity”, other researchers have proven sorghum foods to have a high and intermediate GI. Heat-moisture treatment (HMT) is one of the environmentally friendly physical modification methods that can be used to improve the physicochemical properties of starch without destroying its granular structure. The nutritional and functional properties of infrared and microwave HMT sorghum meal were studied. Three types of sorghum meal (white and red non-tannin, red tannin) were treated by HMT at 25 % moisture by microwave (MW) and infrared energy (IR) (250 W) for 15 minutes. All the microwave and Infrared HMT sorghum meal had significantly ($P < 0.05$) lower pasting peak viscosity as compared to the untreated samples. There was a reduction in the *in vitro* starch digestibility of the HMT samples with the red tannin sorghum type showing the lowest estimated glycaemic index (eGI). HMT of starch changes the crystalline nature of the starch granule, which leads to the conversion of a fraction of amorphous lamella to a crystalline form. Tannins in tannin-type sorghum can also form complexes with starch and amylase enzymes through hydrogen bonds or hydrophobic interaction to reduce starch digestibility. This increases the amount of slowly digestible starch and resistant starch and further reduces the eGI. The results of this study suggest that HMT by MW and IR energy changes the functional and nutritional properties of sorghum meals and has the potential to be used in the development of lower GI sorghum foods.

Easy-to-Read Abstract

Sorghum is high in starch which can affect people with conditions like diabetes and obesity. Our bodies break down starch and this affects the sugar levels in our blood. This study used a way of processing sorghum to make it easier for people to break down its starch when eaten and for the sugar to enter the blood slowly over time. The study showed positive results. This way of processing could be used more widely to process sorghum products which makes it easier for people to digest its starch when eaten.

Impact of Enzyme-Treated Bran on Extruded Sorghum Snacks' Physical, Functional, Nutritional, and Sensory Properties



Charles Antwi

Academic Abstract

High-fibre snacks are crucial for health and disease prevention, but their extrusion cooking can negatively affect their expansion ratio and sensory properties, reducing consumer acceptability. This study investigates the effects of adding Viscozyme[®]-treated sorghum bran on the properties of extruded sorghum snacks to produce high-fibre expanded snacks that maintain acceptable quality. The experiment used a twin-screw extruder to extrude sorghum endosperm flour with and without sorghum bran and enzyme-treated sorghum bran. The extrusion process occurred under high shear conditions, with specific parameters including feed moisture of 20%, feed rate of 10 kg/hr, screw speed of 500 rpm, and five temperature zones ranging from 60°C, 70 °C, 80°C, 100°C, 140°C, and 140°C. The resulting expanded snacks were analyzed for their physical, chemical, functional, nutritional, and sensory characteristics. The expanded snacks from refined sorghum flour enriched with 2-hour Viscozyme[®]-treated bran showed a similar expansion ratio to those made from refined sorghum flour alone but higher than untreated bran extrudates. The enzyme treatment also increased the water solubility index (WSI) and decreased the water absorption index (WAI) compared to snacks with untreated bran. The study suggests that Viscozyme[®]-treated sorghum bran can enhance the quality of expanded snacks by increasing the expansion ratio, reducing bulk density, and altering water solubility and absorption characteristics.

Easy-to-Read Abstract

Fibre is needed by the body to function. High-fibre snacks are one way to make sure people eat enough fibre but when more fibre is included in these snacks it can change the look and feel in a way that people may not enjoy. This study looked at a way of processing sorghum bran to keep the fibre high and make an enjoyable snack for people to eat.

Effect of Physico-Chemical Treatments on Properties of Banana Flour

Moses Barigye



Academic Abstract

This study aimed to determine the effect of freeze-thaw cycles and glycerol mono-stearate on the functional and nutritional properties of flour from two banana varieties. Mature green bananas of Mpologoma and Kibuzi varieties were peeled, dried, and milled into flours. The flours were separately subjected to freeze-thaw cycles and glycerol mono-stearate treatments. The pasting, functional, nutritional properties, and starch digestibility of the treated banana flours were determined. Freeze-thaw cycles resulted in an increase in WAC and WHC for both Kibuzi and Mpologoma varieties. The same treatment resulted in a decrease in OAC and solubility for both varieties. Peak, breakdown, setback, and final viscosities for both varieties increased with an increasing number of freeze-thaw cycles. Swelling power and solubility for Kibuzi and Mpologoma decreased with increasing concentration of glycerol mono-stearate while the WHC and WAC for both varieties increased under the same treatments. Setback and final viscosities increased with increasing glycerol mono-stearate concentrations while peak and breakdown viscosities decreased under the same condition. The increase in setback viscosity was more with glycerol mono-stearate than freeze-thaw cycles. Rapidly digestible starch for both varieties was reduced when 2.5% glycerol mono-stearate was added and the same treatment led to an increase in resistant starch for both varieties. Physical and chemical modification of banana flour can be used as an alternative way of producing different food ingredients. The addition of 2.5% glycerol mono-stearate to banana flour can be used to make ingredients for lowering the glycemic index of different food products.

Easy-to-Read Abstract

Foods that are high in starch can affect people with conditions like diabetes and obesity. This study looked at two different ways of processing flour from two types of bananas to lower the starch in the flour while trying to keep the look and feel the same. The study explains the different scientific properties of the two ways of processing the flour.

Effect of Different Drying Methods on the Properties of Banana Flour



Desire Ssemmanda

Academic Abstract

This study evaluated the effect of different drying methods on the nutritional composition and functional properties of East African Highland Cooking Bananas (*Matooke*) flour. Two varieties of *Matooke*; *Kibuzi* and *Mpologoma* were studied. Conventional oven, microwave, infrared, and solar drying methods were studied. The nutritional composition, as well as the functional and pasting properties of the flours, were determined. Microwave drying had the highest drying efficiency with the shortest drying time (30 min at 200W and 18 min at 400W). An increase in microwave power resulted in a 40% reduction in drying time. Drying by infrared and solar drying took 30 and 240 min, respectively. Drying in the conventional oven dryer took 240 and 60 min at 60°C and 70°C, respectively. An increase in drying temperature resulted in a 70% reduction in drying time. Microwave flour dried at 400W had the lowest final moisture content (0.4% for *Kibuzi* and 0.6% for *Mpologoma*) and infrared drying had the highest (5.2% for *Kibuzi* and 4.1% for *Mpologoma*). The different drying methods had varying effects on the proximate composition and functional properties of the *Matooke* flour. The dry matter ranged between 89.0-92.0%, crude protein 5.0-10.2%, crude fat 0.1-1.8%, dietary fiber 0.8-2.7%, carbohydrates 73.6-80.0%, and ash 3.9-4.9%. The flour's solubility ranged from 15.6-21.1 g/100g and swelling power ranged from 9.6-15.7 g/g. Solar-dried flour had the highest peak and breakdown viscosities while microwave-dried flour had the lowest peak viscosities. The *Matooke* flour produced can be used as a functional ingredient in food formulations.

Easy-to-Read Abstract

It is important to store flour made from East African Highland Cooking Bananas (*Matooke*) flour for better shelf life. If the flour is dried well then this increases the time it can be stored. This study looked at how long it takes to dry flour with different ways of drying and how well the methods work. The study also looked at the nutrients and scientific properties of the flour after the different ways of drying.

Effects of Sourdough-Type Fermentation and Sorghum Type on the Techno-Functional Properties of the Batter Used for Kisra, a Fermented Flatbread



Sami Ali

Academic Abstract

Techno-functional properties of six sorghum types: Tabat, Macia, and Lekgeberwa (tan plant Type I non-tannin) and Wadahmed, Wafer, and Gadam (white colored Type II tannin) were determined during sourdough batter-type fermentation (up to 40 h) for Kisra production. As expected, all sorghum types showed a progressive decrease in pH to about 3.3, with fermentation duration up to 40 h. The drop in pH was accompanied by an increase in titratable acidity, suggesting a lactic acid fermentation. There was an increase in pasting viscosity of the batter during fermentation compared to the non-fermented control, but viscosity at 40 h was lower than that of 16 and 24 h. Lactic acid fermentation increased the free amino nitrogen as indicated by increased the free amino nitrogen. A reduction in protein molecular weight as shown by SDS-PAGE and dis-aggregated flour particles by light microscopy suggests the breakdown of the protein matrix surrounding the starch granules in the sorghum flour. Thus, starch was more freely available to absorb water to paste and produce a higher viscosity from zero to 40 h. The decrease in pasting viscosity from 24 h to 40 h of fermentation was related to starch hydrolysis, as there was a reduction in total starch in the batter and pitting of starch granules, as shown by scanning electron microscopy. Fermentation generally had a greater effect on the techno-functional properties than the sorghum types. except for Gadam. Protein and tannin contents also affect the techno-functional properties during fermentation. The techno-functional changes of sorghum batter during fermentation, especially the high pasting viscosity might be useful for the structure design of kisra and other gluten-free sandwich wrap-type sorghum-based products, but this needs further investigation.

Easy-to-Read Abstract

This study looked at the scientific properties of six types of sorghum, an indigenous food crop, which was fermented for use in kisra which is a type of bread made from sorghum. The study found that fermented sorghum may be useful for Kisra and other wrap-type products made with sorghum. This needs to be studied further to better understand its use

Cowpea Sidestream Valorisation for the Development of Biopackaging Materials



Mondli Masanabo

Academic Abstract

Packaging is a huge industry and accounts for about 40-42 % of total plastic consumption. Most of these plastics are petroleum-based and non-biodegradable. Examples include polyethylene, polypropylene, and polyethylene terephthalate. When improperly disposed they end up accumulating in the environment as waste. This has motivated research into alternative biodegradable plastics from locally available renewable resources. Agricultural biomass waste has been previously used to produce biodegradable bio-packaging materials. In this study, we demonstrated the use of locally available agricultural sidestream from cowpea as a feedstock to produce bio-packaging materials, such as cellulose fibres, bio-composite films, and injection moulded bio-composites for potential applications in flexible and rigid packaging applications. The conversion of low-value cowpea sidestream to high-value packaging material may potentially create a new value chain system and revenue of income for farmers, reduce cowpea sidestream waste, and contribute to the development of environmentally friendly biodegradable packaging materials.

Easy-to-Read Abstract

Packaging is used widely across the world. It contains plastic which puts harmful chemicals back into the environment, takes a very long time to break down after it is used, and makes up a lot of waste. Now researchers are looking at ways of making packaging from more natural resources that breaks down faster and does not cause harm to the environment. This study looked at making packaging from the parts of the cowpea plant that are left over after farming. This could help to give farmers another way to make money, gives farmers a way of dealing with cowpea waste, and is not harmful to the environment.

Plant-Based Meat Alternatives in South Africa: An Analysis of Products on Supermarket Shelves

Nishani Moonaisur



Academic Abstract

All over the world, the development of products that resemble meat but contain predominantly plant-sourced ingredients is a prime focus. This study aimed to explore plant-based meat alternative (PBMA) products in the South African retail market as well as review internal (nutritional content and ingredients) and external (country of origin, cost/kg, and label claims) factors of the products. This study also compared the nutritional content of PBMA and comparative meat products. Seventy-eight PBMA products were included: plant-based sausages (n=23), burgers (n=31), chicken-style (n=11), mince (n=8), and the “other” category (n=5) providing for a variety of product lines. Information from product packaging (total fat, saturated fat, fiber, protein, sugar, sodium, carbohydrates, and energy density) was extracted for all PBMA (n=78) and comparative meat product lines (n=28). Meat products tended to be comparatively higher in saturated fat, whilst PBMA were higher in carbohydrate, sugar, and dietary fibre content. The sodium content of plant-based mince was approximately five times higher than beef mince. On-pack claims for PBMA included vegetarian/vegan/plant-based (80% of products), high in/source of protein (48%), containing no genetically modified organisms (GMOs) (16%), and gluten-free (26%). The plant protein trend has prompted innovation in PBMA, however wide nutrient ranges and higher sodium levels highlight the importance of nutrition guidelines for their development. The findings of this study may assist in exploring consumer engagement with PBMA products, which could guide new product development within the category. However, information about possible barriers, drivers, consumer expectations, and attitudes toward these products is also required.

Easy-to-Read Abstract

There is a focus on food products that look and taste like meat but are made from plants across the world due to the benefits of eating a plant-based diet. This study looked at plant-based food products that are sold in shops compared with meat-based products. It looked at things like the nutrients, what goes into the products, the cost, where the products are made, and what is written on the labels. The study will help food makers and sellers better understand things that affect the products that are bought and sold at shops. More research is needed to understand what people think and feel about these products.