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NOVEL COWPEA MENUS FOR THE ENHANCEMENT OF DIETARY DIVERSITY AND INTAKE IN SELECTED COMMUNITIES IN LIMPOPO PROVINCE

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ABSTRACT

Cowpea (*Vigna unguiculata L. Walp*) is an important grain legume which is rich in proteins, minerals and vitamins. Cowpea production is gradually increasing in South Africa and its utilisation and consumption must be matched with its production to balance demand and supply in order to enhance job creation, income generation as well as increased diversity of nutrition and dietary intake of the rural communities. Recent reports have indicated that Limpopo province is food and nutrition insecure where 2-6 year old children are malnourished and stunted. Inadequate nutrition is an ongoing problem in rural South African communities especially in the Limpopo province due to poor diversity of daily dietary intake. Majority of poor rural populations depend on a sole-maize diet with occasional vegetables added when available. The utilisation of cowpea produce and diversity of nutrition is poor due to inadequate or poor agro-processing, which leads to few markets or utilisation channels for uptake. Given the above background, this study was conducted to train farmers on agro-processing of cowpea into different menus. The training will improve dietary intake of farmers in addition to enhanced dietary diversity to ameliorate the problem of malnutrition and over dependence on sole-maize diets. This study reports on the training conducted for one hundred and twenty five farmers on agro-processing of cowpea to produce different novel products. Different recipes were employed to produce the products. Results show that 125 farmers were trained on the preparation of Akara and Moin-moin, porridge and fortification of cereal-based meals with cowpea products. The training increased the knowledge and skills of farmers on preparation of novel menus that never existed in South Africa, which will increase their dietary intake to enhance dietary diversity as well as ameliorate the problem of malnutrition and over dependence on sole maize diets. The training will also enhance the market channels for cowpea production, which will increase the demand and supply of cowpea in addition to enhanced food security and nutrition. It is recommended that such training on the novel products be extended to schools, restaurants, correctional services, hospitals and other provinces in South Africa for a greater impacts.

Key words: Utilisation, akara, dietary diversity and intake, moin-moin, nutrition, *Vigna unguiculata*, dietary enhancement

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INTRODUCTION

Introducing water-use efficient and low-input grain legumes in rural communities, where erratic rainfall is a major contributory factor to low yield, will ameliorate the problem of food insecurity and malnutrition [1,2,3,4]. Modi and Mabhaudhi [5] reported that "reinstating and promoting grain legumes is critical to attaining food crop diversity and nutrition in rural communities". According to them, "this diversity will translate to food and nutrition security and improve the dietary intake of rural communities." Alleyne [6] reported that "one of the major concerns in rural communities is protein-energy malnutrition." Legumes are generally cheap sources of proteins, micronutrients, minerals and vitamins, and their consumption will nutritionally complement starchy diets [7,8,9]. Inadequate nutrition is an ongoing problem in rural South African communities and among some ethnic groups. About 15% of children in South Africa are reportedly born with a low birth weight as a result of maternal malnutrition [10,11]. Other problems associated with insufficient nutrition include stunting or low height for the age. Studies have shown that 26.5% of children in South African rural areas were stunted in comparison to 16.7% in urban areas. Cowpea dishes, which this study provides, in combination with other dishes (especially cereal-based dishes) will meet consumers' dietary needs. This will enhance their nutrient fortification value, making them invaluable for both children and adults.

To enhance and sustain the production of cowpea in South Africa, its production must be matched with its consumption or utilisation. Although cowpea is believed to have originated in South Africa, its consumption and diversification is very poor. The only common channel of utilisation is through the use of cowpea to make soup. However, in many parts of West Africa, cowpea can be utilised and consumed in many different ways, which have enhanced diversification of cowpea products and created markets and jobs for its associated value chain to earn regular income [2,12,13,14,15]. The importance and research of cowpea-based meals has spread to other parts of the world, Latin America, Asia, Texas and Georgia [16,17,18,19]. Unfortunately, cowpea consumption and diversification is very poor in South Africa. The essence of this study was to promote cowpea recipes for different menus in South Africa. This study aimed at improving the nutritional dietary intake of communities through the introduction of cowpea-based food products (Akara and Moin-moin et cetera) and the fortification of their maize-sole diets with cowpea products with a wide range of recipes for preparing different cowpea menus. This study reports on the training of farmers on agro-processing of cowpea to produce different products (Akara and Moin-moin, porridge and fortification of cereal-based meals with cowpea products). The recipes are a preparation guide to aid anybody

who wants to prepare assorted cowpea menus. The different preparation methods will stimulate intake and nutrition, which, in turn, will steer up the consumption and production of the crop. The products (Akara, pudding and porridge are innovative and first of their kind in South African menus). The training was to empower the farmers with the skills to prepare cowpea in different menus to enhance dietary intake, nutrition and dietary diversity.

MATERIALS AND METHODS

Description of study communities

Ga-Thaba and Ga-Chuene

The Capricorn district is divided into five local municipalities: Aganang, Blouberg, Lepelle-Nkumpi, Molemole and Polokwane. Polokwane Local Municipality covers only 3% of Limpopo. It serves as the economic hub of the province, with Capricorn District having the highest population density. Ga-Thaba village is a rural community, which falls within the Polokwane Local Municipality. It is situated in South-West of Polokwane City, about 70 km from the city. Ga-Thaba and Ga-Chuene are among the poorest areas in Polokwane Local Municipality. The majority of its inhabitants are involved in subsistence agriculture but consume mainly cereal-based diets from maize production [2].

Bela-Bela

The Waterberg district is made up of five local municipalities: Thabazimbi, Bela-Bela, Mookgophong, Lephalale and Mogalakwena. The district covers a total area of about 44,913 km^2. The main economic sectors in Bela-Bela district are agriculture, tourism and mining. Agricultural production, food security and nutrition are grossly limited by erratic rainfall and lack of improved crop varieties, which impacts negatively on the diversity of nutrition and dietary intake of rural communities.

Farmers' training on agro-processing of cowpea into different menus

To equip farmers with the skills on processing of cowpea into valuable products that will enhance their dietary intake and diversity, generate job and income, training on how to prepare different cowpea menus from different recipes was conducted. A total of one hundred and twenty five (125) farmers were trained from three selected communities (Ga-Thaba, Ga-Chuene and Bela-Bela). The training activities of this study were part of a project funded by the Water Research Commission (WRC), Pretoria, South Africa [3]. Composition of the farmers was as follows: 45 from Ga-Thaba and Ga-Chuene (Capricon District) while 80 were trained at Bela-Bela (Waterberg District). The participants were organized in Co-

operative farmers' associations, which were selected in the execution of WRC projects with the assistance of the Agricultural Extension Agents working in the study communities and districts. In Limpopo province where farmers are in organized associations, administration of training by scheduled appointments was relatively easy and fast. Local agricultural extension agents were recruited to direct the study team to communities and also to assist in communicating to farmers on meeting days for the training. During the training, all the items for the agro-processing and the recipes were made available to trainees at the training venue through the Extension Agents. To ease communication and demonstration on each training day, the trainees were divided into groups of 20 giving four groups for Bela-Bela and two groups for Ga-Thaba and Ga-Chuene. Each group was called every ten minutes for a short briefing on every training's objective, things to be done, ingredients for the menu preparation and the recipes to be followed, which were provided and interpreted into the local dialect of the farmers by the Extension Agents for those who do not understand English language. The training was organized in a wide spacious hall or open space to allow free movements and to enable everyone to see the demonstration being offered by the facilitators. When everything was set up for the cooking of a specified menu, all the trainees observed how the protocols indicated in the recipes guideline or booklet were carried out, step by step fashion under the supervision of the facilitators. Questions and comments were entertained during the training sessions to elucidate areas not clear to some of the trainees. Such questions were raised through the interpreters. At the end of each training session, the farmers were served with a product that was cooked or processed by them as lunch. This would enable them to have a good taste of the menu and appreciate the novel menu as a new addition to their family menu. The trainees were also given the opportunity to give a feedback about the day's training and taste of the menu. Trainees were given small packets of seeds to practice the menu they received during the training. During the next training session, trainees were given the opportunity to repeat and demonstrate the preparation of the last menus (farmer participatory training) to make sure that they have mastery of all the procedures, and the application of the recipes to make a good menu. The various menus reported in this study were conducted in this fashion. The recipes with their respective menus are presented and summarized with photos of the menus. Farmers' days were conducted to showcase the menus and to interact with the farmers on the various training they received.

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RECIPES FOR THE PREPARING COWPEA MENUS

Cowpea can be used in a number of ways, such as in simple cooking (for example soups or porridge) to more exotic menus (for example boiled, steamed, fried or baked dishes). The recipes presented in this study emanate from different parts of Africa, especially West Africa. This is because cowpea is mainly consumed in South Africa as a soup or porridge, or as "boil and eat." The menus presented below are usually served as family meals and during business meetings, social events or gatherings. Extra recipes for more menu preparations are presented in the Appendix.

Akara

Ingredients

- 750 g dry cowpea seed
- Vegetable oil for frying
- 1 raw chilli pepper or according to preference (optional)
- ½ medium or 1 small onion
- 1 Knorr chicken cube
- About 200 ml water
- Salt to taste

Method

"Sort the seeds to remove any foreign substance or trash (Figure 1). Soak the cowpea seeds in warm water for about an hour to soften them for easy decortication. Remove the cowpea seed coat and blend the seed together with the onion, Knorr cube and pepper (add just enough water to ensure the blade of the blender rotates easily). Blend the mixture into a good smooth paste. Pour the paste into a bowl and whisk for about ten minutes to incorporate air into the paste and add salt to taste. Pour vegetable oil into a frying pan for deep frying (about 1.5 ℓ, just enough to float the paste) and allow to heat up for about five to ten minutes on medium heat level (test the readiness or hotness of the oil by adding a pinch of salt in the heated oil and you will observe a sizzling sound that indicates that the oil is hot enough). Next, start to scoop the paste into the heated oil by using a spoon. The size and shape of the scoop on the oil depends on the size of the spoon. Deep fry until golden brown (turning each scoop regularly to avoid burning, and for even cooking). Remove the akara with a perforated spoon and place in a bowl or sieve lined with kitchen paper towels to absorb excess oil" (Figure 3).

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Figure 1: Sorted cowpea seeds (right) prior to cooking

Figure 2: Process of decortication by rubbing soaked cowpea seeds between palms to remove the cowpea coats

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Figure 3: Frying akara

Cowpea pudding (Moin-Moin)

Ingredients

- 750 g dry cowpea seeds
- 100 g prawns (optional)
- 3 Knorr chicken stock cubes
- Fresh red chillies (the number depends on preference)
- 2 big onions
- 120 g tomato puree
- 20 cl vegetable oil
- Three boiled eggs which are sliced into small pieces and 170 g shredded tuna
- 2 teaspoons ground nutmeg
- 2 litres of water
- Salt to taste

Method

"Sort and soak the cowpea seeds as described above. Remove the seed coat from the soaked seeds and blend the decorticated seeds together with onion, Knorr cube, red chillies, nutmeg and tomato puree. Blend the mixture into a good smooth paste. Pour the paste into a bowl and whisk for about ten minutes to incorporate air into the paste (to avoid it being too mealy) and add salt to taste. Add the vegetable oil (about 30 ml). Slowly add the remaining water, prawns and shredded tuna, and stir until all the ingredients are properly mixed. Cover the base of a big pot or steamer using aluminium foil or plastic. Pour some water (about an inch deep) into

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the pot and place the pot on the stove. Pour the mixture into preferred containers (plastics or nylon sachet or aluminium foil) and then insert the sliced egg into the cowpea paste of each container. Seal with aluminium foil or cover the container and place in a pot or steamer. Cook for about an hour. You can check if the moin-moin pudding is cooked by inserting a table knife into it; a slight non-sticky smear on the knife is an indication that the pudding is cooked , however,a considerable amount of sticky smear on the knife indicates that the pudding is not yet cooked. When you cut through the pudding, the insides will be set rather than watery. Note: one can also steam moin-moin using a steamer, or a microwave oven, intermittently checking to see whether it is cooked as instructed above. Cowpea pudding can be eaten in a number of ways. It could be eaten as a snack, as part of a meal, or cut up into pieces or slices as an appetiser. It could be served with fruit juice or as a side meal with jollof rice, fried rice or maize meal, breakfast cereals and milk."

Cowpea porridge or soup

Ingredients

- 750 g dry cowpea seeds
- Vegetable oil (30-50ml)
- 2 large onions
- Chillies and salt (to taste)
- 2 big Knorr chicken stock cubes

Prior to cooking

- Sort and wash the cowpeas in cold water and set aside.
- Chop two large onions and chillies.

Method

"Place the cowpea seed in a pot (large enough to accommodate the rise in volume of the cooked cowpea and to prevent spillage onto the stove) and add water to about the same level of the cowpea and set the pot on the stove to cook. Alternatively, if you have a pressure cooker, use it to reduce the cooking time. Cook until soft, adding more water intermittently when necessary. When the porridge is soft, or about an hour from the start, add the Knorr cubes, chillies and salt to taste. Add the chopped onions and vegetable oil and stir well for a good mix about 30 minutes prior to turning off the stove. Stir the porridge while cooking regularly with a spoon to avoid burning. Serve with custard, bread or maize meal with milk. It could also be served with fried potatoes, yam, banana or fried plantain (dodo) for those in West Africa".

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Rice and cowpea mix

Ingredients

- 500 g rice
- 250 g dry cowpea seeds
- Salt (to taste)
- 2 Knorr chicken stock cubes
- 1 teaspoon thyme

Prior to cooking

- Sort and wash the cowpea seeds in cold water.
- Place the cowpea in a pot, add some water and bring to the boil.
- Wash the measured quantity of rice and set aside.

Method

"Place the cowpea seeds in a pot (big enough to accommodate the rise in the cowpea volume and rice when cooked, and to prevent water spillage onto the stove) and add water to about the same level of the cowpeas, and set on the stove to cook. Add the washed rice and the boiled chicken stock about an hour after you have started cooking the cowpeas. Add salt, thyme and Knorr cubes to taste. Cover the pot and cook at a low to medium heat until the water is completely dry (check regularly to prevent burning). Turn off the heat when the cooking mixture is soft enough as this indicates that the cowpea is cooked. Cooking time is about two hours on an electric stove but with gas, it could take an hour and a half. Serve with a sauce of your choice (preferably tomato stew), along with the fried chicken or fish".

Cowpea and potato porridge or soup

Ingredients

- 250 g dry cowpea seeds
- 200 g potatoes
- 1,500 mℓ water for cooking
- 50 mℓ vegetable oil
- 20 g grated or ground onion (ground)
- 15 g ground pepper or to taste
- 2 Knorr cubes
- Salt to taste

Method

"Sort and wash the cowpea seeds and cook until soft (approximately an hour and a half). Add Knorr cubes and salt to taste at the commencement of cooking. Cut the

potatoes into uniform sizes, add to cowpeas one hour later, and cook the mixture for about 45 minutes to an hour. Add the remaining ingredients (sliced onion, pepper and oil) and cook until the mixture is soft and tasty, and has a good aroma. Serve alone, or with custard and maize meal or bread. You can add more water to the mixture during cooking if your desire is to make cowpea grain soup".

RESULTS AND DISCUSSION

Table 1 shows the number of farmers and different types of training they received on cowpea processing and preparation of cowpea-based menus or products during the execution of Water Research Commission project on food security and nutrition in selected communities in Limpopo province [2, 3]. One hundred and twenty five farmers were trained from three communities (Ga-Thaba, Ga-Chuene and Bela-Bela). The farmers were above 35 years and no young adults were involved. "The constituents of the respondents were predominantly women, which suggest that some were retirees, workers, single mothers trying to eke out their livelihood to meet their family needs." Lack of skills and knowledge of crop production and utilisation are common limitations to their emergence above poverty line. Training of farmers in basic agronomic practice and cowpea utilisation has been reported by researchers as important foundation to enhance their productivity, and increase demand through agro-processing and utilisation [1, 2, 5, 20]. The training received by the farmers will increase their productivity and enterprise to generate income among all that are in cowpea value chain through processing into different menus for diversified nutrition and uptake.

Other results on cowpea menus and cowpea-based meals used during the training of farmers on cowpea agro-processing into different products are presented in photos/figures and discussed. The atlas of menus was beautifully presented in this report.

Akara

Akara is a deep-fried cowpea paste and is one of the most common foods in West Africa [21] (Figure 4). It is often eaten as breakfast in combination with other cereal-based meals such as custard, Quaker Oats, Jungle energy and bread. This training offered a great opportunity for farmers and end users to learn how to prepare akara. Akara is an important source of protein, minerals and vitamins to all its consumers [13,16,18, 22,23]. The training received by farmers in this study will enable them improve their dietary intake and solve the problem of malnutrition and over dependence on sole maize diets. Faber et al. [10] and Labadarios et al. [11] reported that Limpopo province is food and nutrition insecure. Therefore,

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introduction and training of farmers on cowpea-based meals will increase their nutrition diversity and improve the problem of malnutrition in the communities.

Figure 4: Fried Akara prepared by farmers during the training

Moin-Moin or cowpea pudding

Moin-Moin is a steamed cowpea paste and is a popular food in West Africa particularly in Nigeria (Figure 5). It is served in parties, restaurants, and in any social gathering with other cereal-based meals such as rice and maize to fortify the cereal meals with protein. Moin-moin is very rich in proteins, minerals and vitamins [3, 19,24]. Training of farmers in this study will enable them to improve their dietary intake and enhance dietary diversity to reduce the problem of malnutrition among children and the over dependence on sole maize diets. Moin-moin and akara are important novel menus for increasing the demand and supply of cowpea in South Africa, which can enhance rural jobs creation and rural income generation in the value chain associated with cowpea production [20].

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Figure 5: Moin-moin prepared from steaming of cowpea paste

Cowpea porridge or soup

Cowpea porridge is also another way by which cowpea meal has been used to diversify diets in West Africa (Figure 6). Nearly every household prepares cowpea porridge for their dietary intake. Cowpea porridge or soup (lighter porridge) is a protein-rich menu with minerals and vitamins [25, 26,27]. It can be served as lunch in homes, restaurants, schools, and hospitals in different forms along with bread, custard, quaker oats, pumpkin, potatoes, rice and other cereals. Porridge can be served separately with rice, butternuts, pumpkin or potatoes (Figure 5) or cooked together with rice, butternuts, pumpkin or potatoes [3, 25,28]. In South Africa, cowpea soup is commonly served in homes during winter with soft bread. It can be used as a weaning meal for children because of its softness and richness in proteins, minerals and vitamins. Training of farmers in this study on akara, moin-moin and cowpea porridge will improve their dietary intake and enhance dietary diversity [5] to solve the problem of malnutrition and over dependence on sole maize diets. It also enhances the improvement of market channels for cowpea

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production, which can increase the demand and supply of cowpea in South Africa as well as to enhance food security and nutrition [29].

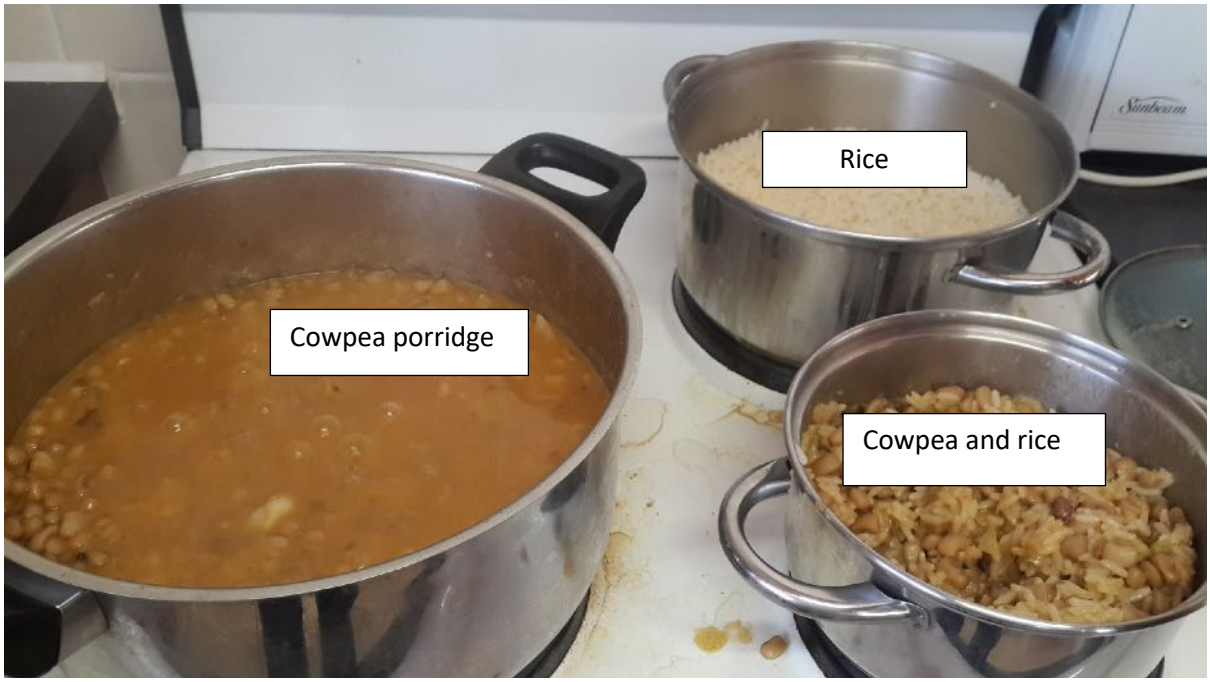

Figure 6: Cowpea porridge (left), white rice (top right), cowpea & rice cooked together (bottom right) during the training of farmers

Fortification of menus with cowpea seeds

Cereal-based meals can be fortified with cowpea either by cooking cowpea meal separately and serving with a combination of cereal meals (Figure 6) or cooking cowpea with a mixture of cereal grains (maize or rice). Farmers prefer cooking cowpea menus separately and serving them in combination with maize or rice or wheat-based meals. This is because of the difficulty in matching the cooking time needed by different crop grains in the mixture, which may lead to some grains being well cooked while others are half done or not soft enough for good organoleptic quality and satisfaction. Secondly, farmers prefer cooking cowpea menus separately and serving them in combination with maize or rice or wheat-based meals because it enables the consumers to diversify their daily dietary choice or intakes in their homes. In this study, farmers were trained on how to cook cowpea menus separately as well as in combination with mixtures of different crop grains, for example cooking cowpea with rice (Figure 6, bottom right). This will enhance their nutrition diversity and daily dietary intake. No two menus taste the same. Such diversity in their menus will increase utilisation, demand and supply of cowpea production as well as generation of jobs and income leading to alleviation of malnutrition and rural poverty.

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Figure 7: Cooked cowpea porridge served with rice, butternut and potato

Processing or preparation of cowpea dry seed for menus

The training received by farmers on how to prepare cowpea grains for any basic menu was to acquaint them with basic knowledge and skills on decortication or dehulling or preparing the menus with intact whole grains without dehulling (Figure 2). Farmers have been told that processing methods of cowpea through dehulling, cooking or frying could slightly reduce the nutrient contents in the final cowpea products [15,18,19,24]; however, for quality in terms of colour and texture of final products as in the case of akara and moin-moin, some consumers prefer the use of dehulled cowpea grains.

Farmers' days

Figure 8 shows farmers' day events conducted at Ga-Thaba, Ga-Chuene and Bela-Bela.

Several farmers' days were organised to showcase the novel menus, how to prepare meals from cowpea, and to respond to farmers' questions and feedback.

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Figure 8: Farmers' days at Ga-Thaba and Ga-Chuene (above) and Bela-Bela (bottom)

CONCLUSION

The study has achieved training 125 farmers from three communities (Ga-Thaba, Ga-Chuene and Bela-Bela) on different novel cowpea menus (akara, moin-moin, porridge) from different recipes. These menus are new, innovative and novel in South Africa. The training will improve the dietary intake diversity of farmers and ameliorate the problem of malnutrition and over dependence on sole maize diets. It will also enhance the improvement of market channels for cowpea production, which can increase the demand and supply of cowpea in South Africa as well as enhanced food security and nutrition. It is recommended that such training be extended to schools, restaurants, correctional services, hospitals and other provinces in South Africa for greater impacts.

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Table 1: Training received by farmers on cowpea menu preparation at Ga-Thaba, Ga-Chuene and Bela-Bela

Training received	Number of farmers (Ga-Thaba and Ga-Chuene) N = 45	Number of farmers (Bela-Bela) N = 80
Akara	45	80
Bean pudding (Moin-moin)	45	80
Cowpea porridge and bread	45	80
Cowpea soup	45	80
cowpea and rice	45	80
Cowpea and potato	45	80
Cowpea and butternut	45	80
Cowpea and pap	45	80
Cowpea and custard	45	80
Processing or preparation of cowpea dry seed for menus	45	80

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APPENDICES

EXTRA RECIPES

Fortification of menus with cowpea grain

APPENDIX 1: Cowpea with pumpkin and butternut

Ingredients

- 500 g washed cowpea seed
- 500 mℓ water
- 500 g pumpkin cut into one-inch thick cubes
- 1 teaspoon seasoning (salt and pepper)
- 2 Knorr cubes

Method

"Sort cowpea grains, wash and boil for an hour. Add the pumpkin and stir carefully to mix. Add seasoning and Knorr cubes to taste. Cook until soft and water reduces. Serve hot or cold with stew. Alternatively, you can also cook the pumpkin separately and serve with any of the prepared cowpea menus".

APPENDIX 2: Cowpea flour soup

Ingredients

- 115 g cowpea flour
- 120 g small piece of fish or shredded tuna
- 50 ml cooking oil
- 1 or 2 Knorr cubes
- 115 g tomatoes or 1 large tomato
- 30 g onions or 1 small onion
- 10 g or ½ teaspoon ground pepper
- 20 g or 1 teaspoon salt
- 1.5 ℓ water for cooking

Method

"Make a sauce using the oil, ground tomatoes, onion, pepper, Knorr cubes and salt. Add water to make stock. Blend the cowpea flour with some water and add to the stock, quickly and gently stirring as you do so. Cook until the bean flavour disappears. Prepare the fish and add to the mixture, continue to cook for 10-15 minutes. Season well and serve. Boiled spinach may be chopped up and added to the soup. It may be served as a soup for an appetiser or as a sauce accompaniment to pap."

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APPENDIX 3: Cowpea and coconut custard

Ingredients

- 250 g brown cowpea seed
- 140 g dry coconut
- 3-4 cloves
- 1 ℓ of water

Method

"Sort cowpea seeds, wash and cook until mushy. Mash the cowpea into a smooth paste using a wooden spoon or blender. Break the coconut open, remove the nut, and grate the copra into the water. Filter to get coconut milk. Add the coconut milk to the mashed cowpeas and strain. Add cloves and boil in an uncovered saucepan until the mixture thickens (about an hour and a half). Add salt to taste.
This dish can be served as savoury custard as well as a sweet dessert. As a savoury, it can be served as a sauce to accompany fish and maize meal. For a dessert, sugar to taste is added, and it is chilled to thicken."

APPENDIX 4: Cowpea stew with fried potato

Ingredients

- 340 g cowpea seed
- 215 g fish
- 15 g ground shrimp or shredded tuna
- 60 g or 1 medium onion
- 215 g or 2 large tomatoes
- 200 ml palm or vegetable oil
- 7 g or 1 teaspoon ground pepper
- 15 g or 1 teaspoon salt
- 200 ml water for cooking

Method

"Sort cowpea grains, wash and cook until they are soft. Prepare the fish and cut into pieces. Make a sauce using the oil, sliced onion, tomatoes, pepper, salt and the ground shrimp or shredded tuna. Add the cooked cowpeas and simmer for 5-10 minutes. Serve with fried sweet potato".

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APPENDIX 5: Cowpea and corn mix

Ingredients

- 180 g soft coated cowpea seed
- 300 g fresh green corn
- 20 g ground pepper
- 40 mℓ vegetable oil
- 15 g dried fish or shrimps
- 2.5 ℓ water

Method

"Remove the husk from corn cobs and cook in water for about 50 minutes. If dried corn is used, soak in water for about two hours prior to cooking. Strain when ready to cook. Prepare cowpea grain, wash and add to corn. Cook until soft (approximately 90 minutes). Add other seasoning ingredients and cook until the mixture is soft and tasty. Serve as a dish on its own or with stew. Note: Processed broken dry maize can be used in place of green corn".

APPENDIX 6: Cowpea puree for weaning baby food

Ingredients

- 340 g cowpeas (with coats removed)
- 15 g salt
- 1.4 ℓ water

Method

"Sort cowpea grains and soak in warm water for about three hours and remove the seed coats. Boil until soft and mushy. Add salt to taste. Use a wooden spoon to press the mushy paste against the side of the pan to obtain a smooth puree that is soft enough for baby's intake. It may be served with fried tomato sauce. Margarine or vegetable oil may be added. It is a suitable dish for infants and toddlers."

APPENDIX 7: Cowpea pie

Ingredients

- 340 g cowpea seed (brown type)
- 150 g rice
- 90 g herrings (ground) or shredded tuna
- 30 g or 1 medium onion
- 1 large tomato
- 10 g pepper

- 20 g salt (or to taste)
- 50 mℓ cooking oil
- 2 ℓ water for cooking
- 60 g margarine (for pastry)
- 120 g wheat flour (for pastry)

Method

"Cook cowpeas and rice until very soft, then mash together. Prepare a gravy using oil, ground tomatoes, onion, pepper, ground herring and salt. Add half of the gravy to the mashed rice and cowpeas. Make pastry and line a greased pie dish. Pour the mixture into the pie dish and bake in a moderately hot oven (20 minutes). When baked, pour over the remaining gravy and serve".

APPENDIX 8: Cowpea sandwich spread

Ingredients

- 250 g cowpea seed
- 10 g grated onion
- 15 mℓ lemon juice
- 10 g margarine
- Pinch of nutmeg
- 5 g salt
- 1.4 ℓ water for cooking

Method

"Sort and wash cowpea grains and boil the cowpeas until very soft, and then press them through a sieve to make a smooth paste. Add seasoning ingredients and mix well. Serve as a sandwich spread on bread with slices of tomato. It makes an excellent lunch."

APPENDIX 9: How to remove the cowpea coat

There are three different ways of removing cowpea coat:

Rubbing between the palms

Method

"Sort the grains and soak them in warm water for about three hours to soften them. Rub the soaked cowpea seeds between your palms until all the coats have come away from the seeds. Repeat the above step for all the cowpea seeds. Place the cowpea seeds in a large bowl and pour a substantial quantity of water into the bowl so that the cowpea coats float in the water. Drain off the floating cowpea coats.

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Continue pouring more water and remove floating coats until all have been removed."

Using a blender or food processor

Method

"Soak the cowpea in enough warm water to cover it for three hours. In small batches, place the soaked cowpea seeds into the blender or food processor and add enough water to cover (avoid overloading the blender with too much cowpea mixture). Using the pulse button, pulse about three to five times or until you see that the majority of the coat has come away. If your blender has no pulse button, simply put the blender on for a few seconds at a time. Repeat the above step for all the cowpea seeds. Place the cowpea seeds in a large bowl and pour a substantial quantity of water into the bowl so that the cowpea coats are floating on top of the water. Remove the floating cowpea coats. Continue adding more water and removing the floating coats until all the coats have been removed. Hand-pick any seeds still attached to the coats and repeat Step 2 above or rub between the palms if the quantity is too small to place in a blender."

Using a pestle and mortar or a wooden cutting slab and a pebble, stone or rolling pin

The pebble, stone or rolling pin must be big enough to apply enough pressure to remove the cowpea coat. This is applicable for rural families that cannot afford to buy food processors.

Method

"Soak the cowpeas in warm water for about three hours to soften them. Drain the water from the cowpea so that the seeds will not soak up more water. Scoop a small quantity of the cowpea seeds into a mortar or wooden chopping board. Use a pestle or pebble pin to rub the cowpea seeds against the inside wall of the mortar or the chopping board to remove the coats from the seeds. Repeat this process for all the cowpea seeds. Place the cowpea seeds in a large bowl and pour a substantial quantity of water into the bowl so that the cowpea coats are floating on top of the water. Pour out the floating cowpea coats. Continue adding water and removing floating coats until all the coats are removed. Hand-pick any seeds that are still attached to their coats and repeat Step 4 above or rub between your palms if the quantity is too small."

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APPENDIX 10: Making cowpea flour

Steps

Remove the coats from the required quantity of cowpeas by any of the methods indicated above. Dry the cowpea thoroughly. Grind the dried cowpea into a powder.