



Secrets

OF AFRICAN EDIBLE INSECT COOKERY

Compiled By

Musundire Robert
Kazembe Clotildah
Mazibeli Tiise
Nyarota Magaret
Ngadze Ruth Tambudzai
Hooper Sharon
Gitonga Nelly Gatwiri
Doreen Mtanga
Linley Chiwona-Karlton

Edited By

Sofia Boqvist
Caspar Trimmer
Anneli Sundin
Elisabeth Lindahl Rajala

Book Design & Art Direction By

Eugene Ncube

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Foreword

Edible insects are found in abundance across the African continent and vary in shapes, sizes, colours and flavour. Many insects have attractive nutritional profiles, with high contents of protein and fatty acids, minerals and vitamins. They have also been important components of diets in many countries in Africa and beyond for many centuries. However, with more modern African lifestyles combined with urbanization, there seems to be a tendency to consider these excellent sources of flavour and nourishment past their “best before date” – they are not appreciated and enjoyed as they used to be. The situation is completely different in some other parts of the world, where insects traditionally have not been part of the diet. In Europe, for example, edible insects are rapidly becoming a delicacy for both health-conscious and adventurous consumers.

With that in mind, the authors decided to develop some easy-to-cook, modern recipes incorporating edible insects found in Zimbabwe and southern Africa. These recipes have been tried and tested in a kitchen laboratory by a variety of food experts, and are certified delicious. There is something for everyone to enjoy.

Insects could make a good substitute or complement for other animal-sourced proteins like beef, pork, lamb and chicken. Switching from those meats to insects would also have positive effects on our climate, as conventional meat production is one of the major sources of greenhouse gas emissions. In addition, insects require much less feed to produce a kilogram of protein than do cows and other conventional livestock. However, one word of caution is needed. If insect consumption is to increase, there is an urgent need to ensure that the production is sustainable in order not to affect biodiversity and the environment negatively.

The recipe book you are holding in your hand has been developed by gastronomists and dedicated researchers at the Chinhoyi University of Technology, Zimbabwe. They have composed a fantastic variety of new dishes, from sweet to savoury, for those interested in new and more modern ways of preparing insects as food.

Bon appétit!

Assoc. Prof. Sofia Boqvist
Programme Director AgriFoSe2030

AgriFoSe2030

Agriculture for Food Security 2030
- Translating science into policy and practice



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Edited by:

Sofia Boqvist

Caspar Trimmer

Linley Chiwona-Karlton

Anneli Sundin

Elisabeth Lindahl Rajala

Photographs by

Eugene Ncube

Kruger Nyasulu

Robert Musundire

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Definitions

English	Common name		Scientific name
	Shona	Ndebele	
Flying termites	Ishwa	Inlwa	<i>Macrotermes natalensis</i>
Taro (Coco yam)	Dhumbe	Magogoya	<i>Colocasia esculenta</i>
Sorghum	Mapfunde	Mabele	<i>Sorghum bicolor</i>
Soldier termites	Juru	Amagenga	<i>Macrotermes natalensis</i>
Mopane worms	Dora	Icimbi	<i>Gonimbrasia belina</i>
Cayenne pepper	Mhiripiri	Ibiblebile	<i>Capsicum annum</i>
Chafer beetles	Ndere	Ithuku	<i>Eulopida mashona</i>
Edible stink bugs	Harurwa	Umtshipela	<i>Encosternum delegorguei</i>
French beans/field beans	Bhinzi	Indumba	<i>Phaseolus vulgaris</i>
Cricket	Jenya	Inyekevhu	<i>Henicus whellani</i>
Grasshopper	Hwiza/Mhashu	Inyelele	<i>Ornithacris turbida</i>

Master recipe for insect powders

Many of the recipes in this book call for a quantity of powdered insect. To prepare this, wash the fresh insects and dry with a cloth or paper. Spread out on a baking tray and put into a warm oven at 70°C until fully dried out. The precise time needed varies depending on the type of species. Sun drying can also be used instead of oven drying. When the insects are fully dry, crush to a fine powder in a pestle and mortar or a food processor. Some recipes call for the powder to be sieved through a 0.5 mm sieve.





*Flying Termite
Recipes*

Flying Termite Recipes

Flying Termite (Swarmer) And Taro Delight

This dish makes an excellent main course. The combination of protein and calories from the swarmers complements the carbohydrates and minerals in the taro. A dish highly suitable for active individuals requiring a lot of energy!



Ingredients

500 g taro
250 ml sour milk
2 eggs
Salt to taste
250 g fresh dewinged flying termites (Shona: ishwa; Ndebele: inswa)
Pinch of dried mixed herbs
1 tbsp lemon juice

Method

1. Marinate washed termites in lemon and mixed herbs for 1 hour.
2. Remove from marinade and dip in cooking oil. Grill at 220°C.
3. Boil taro in salted water until they soften and are cooked through.
4. Peel taro and mash, then gradually add egg and sour milk to make a creamy mixture.
5. Pipe into nests using a piping bag.
6. Bake taro nests at 220°C until firm. Remove and brush with beaten egg. Return to the oven until golden brown.
7. Remove from the oven; pour the grilled termites into the taro nests. Serve hot.

Figure 1 and 2: Main ingredients for termite and Taro delight.
Top: Partially sliced Taro Bottom: de-winged flying termites.

Choc Chip Swarmer Pancakes

This recipe brings together the protein and calories from flying termites and the rich flavor of chocolate chips in a product that is bursting with energy and suitably flavoured for rural and urban residents with a sweet tooth. The pancakes go perfectly with hot beverages such as coffee or tea.

Ingredients

70 g plain flour
1 tsp salt
1 tsp baking powder
1 tsp vanilla essence
1-2 eggs, beaten
2 tbsp of chocolate chips
½ cup dried roasted flying termites
50 g margarine/unsalted butter, softened

Method/Recipe

1. Mix together the butter, salt and vanilla essence until smooth and creamy.
2. Beat in eggs and slowly add flour and baking powder. Mix to a dropping consistency.
3. Add the termites and chocolate chips.
4. Heat cooking oil in a shallow frying pan and add a rounded tablespoonful of the mixture.
5. Fry one side until golden brown. Flip over and fry the other side.

Serve hot or cold.

Shelf life: *The fried pancakes can be stored in the refrigerator for 4 days. Best served warm.*

Swarmer/ Termite Ginger Biscuits

Biscuits are a favourite for all ages. They are a high-energy food product combining sweetness and rich flavour. These swarmer ginger biscuits marry the unique flavour of the flying termites with the sharp tang of ginger. This biscuit is suitable for individuals with a sweet tooth and high energy looking for a new taste experience.

Ingredients

170 g plain wheat flour
110 g soft brown/white sugar
1 tsp bicarbonate of soda

60 g butter/margarine
2 heaped tsp of powdered swarmer (0.5 mm sieved)
1 tsp golden syrup
1 egg
Pinch of salt
1 tsp ginger powder

Method

To make swarmer (flying termite) powder;
Pre-clean fresh insects and dry out at 70°C for 2 hours. Crush to a fine powder using a pestle and mortar.

1. Preheat oven to 180°C. Grease a baking tray.
2. Melt margarine or butter, sugar and syrup and stir until mixed. Remove from heat. When cool, add beaten egg and mix well.
3. Sift flour, baking soda, termite powder and salt into a mixing bowl.
4. Add the wet mixture to the dry ingredients, stirring continuously. Cover and refrigerate for an hour.
5. When cool, roll out dough into pea-size balls, roll in white sugar and arrange on greased baking tray.
6. Press down with a fork or fingers.
7. Bake for 12 minutes or until golden brown and cooked through. Makes 30–40 biscuits.

Shelf life: Biscuits can be stored in a tight closed container for 4–6 weeks.



Figure 3: Swarmer/Termite ginger biscuits.

Table 1: Nutritional composition of Swarmer Ginger biscuits

Constituent	Composition (on Dry matter basis)
Fat (%)	3.1
Protein (%)	14.7
Crude Fibre (%)	4.8
Carbohydrates (%)	70.1
Energy (Kcal/g)	349.58
Iron (as Fe) mg/kg	1.3
Zinc (as Zn) mg/kg	1.93

Swarmer/Termite Biscuits

Swarmer biscuits feature sorghum flour as a key ingredient, boosting the energy content. Without ginger, this product is a milder alternative to swarmer ginger biscuits.

Ingredients

- 50 g unsalted butter/margarine
- 110 g plain flour
- 50 ml whole milk
- 30 g powdered swarmer
- 60 g white sugar
- 30 g sorghum flour
- generous pinch of salt

Method

To make swarmer (flying termite) powder

Pre-clean fresh insects and dry out at 70°C for 2 hours.

Crush to a fine powder using a pestle and mortar.

1. Preheat oven to 230°C. Grease a baking tray.
2. Put all dry ingredients in a mixing bowl (except swarmer powder) and mix well.
3. Add the butter/margarine in small pieces and rub well and gently with fingertips to a fine crumb texture.
4. Add swarmer powder and mix well.
5. Gradually pour in milk and stir with a fork to form a soft but not sticky dough.
6. Knead dough gently 8–12 times on a floured board. Roll out and shape biscuit as desired.
7. Place biscuits in baking tray, equally spaced. Bake for 10 minutes or until golden brown.

Table 2: Nutritional composition of Swarmer biscuits

Constituent	Composition (On Dry matter basis)
Protein %	16.03
Fat %	11.91
Crude fibre %	8.71
Energy(kCal/100g)	323
Energy (kJ/100g)	1351
Iron (as Fe) mg/kg	18
Zinc (as Zn) mg/kg	13



Figure 4: Swarmer biscuits

Swarmer/Termite Pizza

Swarmer pizza is an innovative variant on the Italian classic.

Ingredients

Dough

- 300 g plain wheat flour
- 3 tsp vegetable oil and extra for coating mixing bowl
- 190 ml warm water
- 2 tsp white sugar
- 4 g active dried yeast
- Pinch of salt (optional)

Topping

- 285 g tomato paste/ puree
- 2 tbsp dried oregano
- 1.5 tsp salt
- 60 g grated green pepper
- 85 g mozzarella cheese
- 4 tbsp vegetable oil
- 30 g whole swarmers (pre-roasted)

Method

1. Preheat oven to 230°C.
2. Put water, plain flour, oil, sugar, yeast and salt (if using) in a large mixing bowl and mix to combine.
3. Knead dough on a floured board for 5 minutes.
4. Clean the mixing bowl and coat with vegetable oil. Shape the dough into a ball and place it back in the bowl. Sprinkle a little oil on top of the dough.
5. Cover the bowl and leave to rise for 30 minutes in a warm place.
6. Meanwhile oil a 41 cm diameter pizza pan. When risen, put dough in the pan and spread out evenly to fill the base using hands or a rolling pin.
7. Mix tomato puree/paste, salt and extra vegetable oil.
8. Sprinkle some half of the grated mozzarella over the base then spread the tomato mixture over it. Sprinkle green pepper, oregano, swarmers and grated mozzarella over the tomato base. Bake for 9 minutes or till the dough is golden brown.

Swarmers/Termite Burger Patties

Swarmers burger patties are a new entry to the growing list of meatless burgers. The high protein and fat contents of the flying termites make this product not only nutritionally rich but also easy to grill.

For crushed swarmer

Pre-clean fresh swarmers and dry out in oven at 70°C for 2 hours. Crush the dried swarmers to a fine powder using a pestle and mortar or food processor.

Ingredients

350 g crushed swarmer
(from approximately 500g fresh swarmers)
105 ml iced water
2.5 g powdered gelatin
3 tsp seasoning



Figure 5: Termite Pizza

Seasoning (36 g)
1 tbsp potato spice
1 tbsp garlic powder
1 tbsp chili powder

Method

1. Mix the swarmer powder, seasoning, water and gelatin in a mixing bowl.
2. Form a soft mixture of the burger patties and shape into even sized balls. Flatten with a rolling pin or between your palms. Allow to rest for 10 minutes in the refrigerator.
3. Grill or shallow fry. Serve with toasted bread buns and your favourite relishes and accompaniments.



*Soldier Termite
Recipes*

Soldier Termite Recipes

Termite In The Hole

Soldier termites are rich in protein, iron, zinc and many other essential nutrients. This recipe makes a worthy main dish. The crunchiness of the termites contrasts with the smooth texture of the mashed potatoes.



Figure 6 and 7: Soldier termites (above) and termite in the hole dish (below).

Ingredients

1 kg medium-sized potatoes
Pinch of salt
2 egg yolks
1 egg, beaten
50 g margarine or butter
Pinch of white pepper
1 tsp powdered soldier termite (0.5 mm sieved)
200 g whole roasted soldier termites
Pinch of oregano
1 tbsp cooking oil

Method

1. Preheat oven to 180°C. Grease a baking tray.
2. Wash, peel and re-wash potatoes, and cut to an even size.
3. Boil potatoes in lightly salted water until cooked through.
4. Drain and mash potatoes, passing them through a medium sieve.
5. Add egg yolk and margarine or butter to the mashed potatoes and stir vigorously. Season to taste and mix in powdered termite.
6. Place in a piping bag with a large star tube and pipe out potato nests about 5 cm diameter on the baking tray.
7. Heat oil in a frying pan, fry whole termites on medium heat. Add oregano and white pepper.
8. Pour fried termites into the centres of the potato nests. Any excess termites can be served separately.
9. Bake in oven for 10 minutes, then take out and brush with beaten egg. Return to the oven until golden brown. Serve hot.

Variations of termites in the hole

Cheesy termites in the hole

Add 100 g grated cheddar or parmesan cheese to the basic recipe. Sprinkle on filled potato nests before baking.

Termite au gratin

Mix 1 beaten egg, 100 ml milk and 100 g grated cheese (for example cheddar). Season. Pour 2 tablespoons of this mixture into each filled potato nest and bake until set.

Termite Porridge

This product does not feature fancy ingredients. The energy content of the maize and sorghum flour is well balanced with protein, iron, zinc and essential micronutrients from the soldier termites. This tasty porridge recipe is packed with nutrition and flavour.

Ingredients

- 2 cups maize meal
- 1 cup sorghum meal
- Pinch salt
- 1 cup powdered termites

Method

1. Boil the termites for 15 minutes and sun-dry or oven dry in an oven at 70°C.
2. Grind the dried termites to a fine powder in a pestle and mortar or a food processor.
3. Thoroughly mix the dry ingredients in the proportions indicated.
4. Store termite porridge powder in an air-tight container and use within 60 days.
5. To make porridge, boil water and gradually mix with powder in a ratio of 250ml water to 100g of termite porridge powder.
6. Stir continuously for 10 minutes
7. Serve while hot.

Savoury Termite and Egg Roulade

This dish is rich in flavour. Garlic, chili pepper and termite powder all have good antioxidant properties. A touch of green pepper gives the dish a garden freshness.

Ingredients

- 2 eggs
- 120 ml whole milk
- 120 g crushed garlic
- 120 g grated green pepper
- 100 g ground termite powder
- 1 tbsp chilli powder
- 1 tsp salt
- Vegetable oil for shallow frying

Method

1. Crack eggs into a bowl, add milk and salt, and beat for one minute.
2. Add onion, grated pepper and mix.
3. Heat a little oil in a frying pan to medium heat. Pour in about half of the egg mixture and cook until almost set on the top. Roll half the omelet from the left-hand side of the pan to the middle. Move the omelet to the left.



Figure 8: Termite porridge

4. Slice and serve.
If you slice when the omelet is still hot it is liable to break.
5. Add a little more oil, and pour some more egg mixture into the space on the right of the omelet. Continue rolling the omelet from the left of the pan to the middle.
5. Once more move the omelet toward the left, add more oil, and pour the remaining egg mixture into the space on the right of the omelet. Once this has set, finish rolling the omelet and remove to a chopping board.

Table 3: Nutritional composition of Savoury termite and egg roulade roll

Constituents	Composition (on Dry matter basis)
Moisture (%)	5.24
Ash (%)	1.6
Fat (%)	5.6
Protein (%)	24.9
Crude Fibre (%)	3.1
Carbohydrates (%)	59.56
Energy (Kcal/g)	373.35
Iron (as Fe) (mg/kg)	6.51
Zinc (as Zn) (mg/kg)	7.7

A close-up photograph of several mopane worm caterpillars on a tree branch. The caterpillars are covered in small, colorful bumps and are crawling along the branch. The background is a soft-focus green, suggesting a dense forest or bush. A large, semi-transparent green circle is overlaid on the center of the image, containing the text.

*Mopane
Worm
Recipes*

Mopane Worm Recipes

Mopane Worm Scones

Mopane worms are the most widely eaten insect species in southern Africa, with particularly high protein content. These mopane worm savoury scones are a new addition to the many dishes that have been made from this insect species. Scones are an ideal accompaniment to hot beverages such as coffee and tea for breakfast, lunch, dinner, tea or a snack anytime.

Ingredients

80 g cheddar cheese
1 medium onion, diced
1 tbsp finely chopped fresh parsley
1 tbsp oil
175 g self-raising flour
35 g fresh mopane worms
30 g mopane worm powder (0.5mm sieved)
½ tsp English mustard powder
½ tsp salt
½ tsp cayenne pepper
75 g butter/margarine
1 large egg
2–3 tbsp milk
Pinch of black pepper

Method

1. Preheat the oven to 200°C. Grease and dust a baking tray.
2. Sift flour, salt, cayenne pepper and black pepper in a large mixing bowl. Add mopane worm powder (Milled/ crushed in a food processor and sieved through a 0.5 mm sieve).
3. Rub in margarine/butter to the dry ingredients until sandy in texture.
4. Boil the fresh mopane worms for 15 minutes and discard water. Add fresh water and boil again for 15 minutes. Discard water and repeat twice more.
5. Place the boiled mopane worms in a baking tray, sprinkle with salt and leave to remove excess moisture until dry but pliable (approximately 10 minutes).

6. Add the mopane worms and half of the grated cheese to the sieved flour mixture and mix.
7. Make a well in the centre of the flour and add beaten egg. Mix with a round-bladed knife to a soft dough that leaves the sides of the bowl clean. Add milk if necessary.
8. Turn the dough onto a lightly floured surface and roll out to 2 cm thickness. Use a scone cutter to cut out scones. Combine and re-roll any scraps of dough until all is used up.
9. Place the scones in the baking tray and brush with milk or beaten egg and sprinkle the remaining grated cheese on top.
10. Bake in the top of the oven for 10–12 minutes or until risen and golden brown, with the cheese melted. Serve warm or cold.



Figure 9: Mopane worm savory scones

Table. 4: *Nutritional composition of Mopane worm savory scones*

Constituent	Composition
Protein (%)	24.31
Fat(%)	16.8
Crude Fibre (%)	1.81
Energy (kCal/100g)	370
Energy (kJ/100g)	1548
Iron (as Fe) (mg/kg)	23
Zinc (as Zn) (mg/kg)	10

Mopane Worm Samosa

Mopane worm samosa is an addition to the rich tradition of fried and baked pastries which originated in the Indian Subcontinent. The meaty feel of mopane worms combined with a spicy and crusty pastry make this product ideal for cocktails and light dinners.

Ingredients for samosa dough

250 g cake flour
1 tsp salt
80 ml warm cooking oil
8 tbsp warm water

Method

1. Mix cake flour, salt and cooking oil in a bowl.
2. Add warm water and mix to a soft dough.
3. Cling-wrap the dough and leave to relax for 30 minutes.
4. When pastry has relaxed, divide it into four equal balls and roll out into thin circles.
5. Heat a dry frying pan and lightly cook the pastry circles for 10 seconds on either side.
6. Cover with cling wrap or damp cloth to stop drying out.

Ingredients for Mopane filling

50 g mopane worms
3 tbsp cooking oil
½ medium onion, chopped
Pinch of white pepper
1 egg

Pinch of garlic powder
Pinch of salt
Pinch of hot curry powder
1 medium carrot, finely chopped

Method

1. Remove heads from mopane worms and chop the rest into small pieces.
2. Boil for 10–15 minutes.
3. Drain and put in fresh cold water to remove remaining impurities.
4. Rinse the mopane worms until the water runs off clear.
5. Heat cooking oil in a frying pan. Add mopane worms, salt, white pepper and garlic powder and mix.
6. Fry for 15 minutes. Add curry powder, carrots, onions and fry for further 5 minutes. Set aside to cool.

To make the samosas

1. Cut each pastry circle into 4 quarters.
2. Brush the edges with beaten egg or flour-and-water paste. Shape it into a cone and add stuffing. Close and seal remaining edges. Leave to relax.
3. Heat oil in a deep-fryer. When a piece of spare pastry dropped in the oil immediately bubbles and rises it is hot enough. Fry samosas two or three at a time until golden brown on all sides.
4. Drain on greaseproof paper and serve.
5. You can bake the samosas in the oven if you prefer them less oily. Just brush with oil on both sides and place in the oven at 180 °C for 20 minutes or until golden brown on all sides, turning once.



Figure 10: Mopane worm Samosa

Mopane Worm Balls

This recipe is a four-in-one, as it combines rich protein from the mopane worms and eggs, a starchy feel from the rice, the spicy touch of the white pepper and Mediterranean flair from the Italian seasoning. It is also loaded with nutrients and can be a substitute for other starchy accompaniments to main dishes.

Ingredients

100 g whole fresh mopane worms
1 tbsp powdered mopane worms
3 egg yolks
1 tsp salt
200 g mealie rice, boiled
50 g flour
½ tsp white pepper
1 tbsp Italian seasoning
1 cup breadcrumbs
Extra egg for coating

Method

1. Clean and boil mopane worms for at least 30 minutes to make them soft.
2. Preheat oven to 180°C. Grease and dust a baking sheet.
3. In a large mixing bowl, mix mopane worms, salt, Italian seasoning and white pepper. Leave to stand for 30 minutes.
4. Add mopane worm powder and mealie rice to mopane mixture and mix.
5. Add egg yolks gradually, stirring continuously until the mixture is a soft, pliable ball.
6. Dust the palm of your hand with flour. Place 1 tablespoon of the mixture in your palm and roll into a firm ball.
7. Coat balls in egg and egg whites then place in breadcrumbs and set aside.
8. Place baking sheet and bake on middle shelf of the oven for 30–45 minutes or until golden. Alternatively, deep fry the mopane balls in hot oil until crispy on the outside.
9. Serve with thick tomato and onion sauce.



Figure 11: Mopane Balls

Mopane Surprise

This delicacy is indeed a surprise from the beautiful savannah landscapes. Mopane surprise provides balanced nourishment as a snack, a starter, a main dish or even a whole meal. Simply put, it is starch and relish combined in a single serving. The recipe provides a true African eating experience.

Ingredients

500 g whole fresh mopane worms
500 g samp (dehulled maize kernels)
2 eggs, beaten
100 ml cooking oil
Salt to taste
300 g tomatoes
150 g onion
2 pinches oregano
20 paper cupcake cups

Method

1. Soak samp and mopane worms separately overnight.
2. Preheat oven to 180°C. Grease a muffin tin and place cupcake cups in the forms.
3. Place samp in a saucepan and add one litre of cold water and bring to the boil. Continue adding water until the samp is well cooked.
4. Boil mopane worms for about 30 minutes. Drain off water.
5. Heat the cooking oil in a frying pan. Fry the boiled worms. Add tomatoes and onions and stir continuously until cooked. Season with salt and oregano and leave to cool.
6. Combine the fried mixture with cooked samp and add enough egg to bind.
7. Scoop the mixture into the cupcake cups and bake in the oven for 15–20 minutes or until lightly browned and a skewer comes out clean.
8. Can be served hot or cold.



Figure 12: Mopane Surprise



*Chaffer Beetle
Recipes*

Chafer Beetle Recipes

Chafer Beetle Cupcakes

Chafer beetles are well-known in savannah landscapes, and the first rains of the year open the floodgates for the adult beetles to appear. It is quite strenuous to harvest adult chafer beetles from the wild as they are always patched high in tall miombo trees; however, the labour can be well rewarded with these delicious chafer beetle cupcakes. These cakes have a rich coffee-brown colour and are coupled with a cocoa aroma and high protein content. Chafer cupcakes are an ideal snack for people who want to build up muscle mass. Chafer cupcakes go perfectly with hot beverages such as tea or coffee.

Ingredients

2¼ cups cake flour
 2 tsp baking powder
 1 tsp salt
 250 g margarine or butter
 ¾ cup caster sugar
 1 tsp vanilla essence
 2 eggs, beaten
 300 g chocolate powder
 ½ cup powdered chafer beetles (0.5mm sieved)
 ¼ cup brewed cold coffee
 4 tsp cocoa powder
 ½ cup sour milk

Method

1. Preheat oven to 190°C. Grease a muffin tin and place cupcake cups in the forms.
2. Cream the margarine/butter and sugar. Stir in vanilla essence.
3. Sieve together cake flour, baking powder, salt, chocolate and cocoa powder into a bowl.
4. Fold the eggs into the creamed margarine and sugar one at a time. Stirring continuously, alternately add the flour mixture and coffee, bit by bit, to avoid curdling.
5. Add chafer beetle powder and mix in thoroughly to a dropping consistency. Add more coffee or milk, as needed.
6. Put tablespoonfuls of the mixture into paper cupcakes/greased and dusted with flour muffin tin.

7. Bake in the oven for 15 minutes or until well risen and a skewer comes out clean

Shelf life: Cupcakes can be kept for one week and can even be frozen to last longer.



Figure 13 and 14: Chafer beetles (above). Chafer beetle cupcakes (below).

Table 5: Nutritional composition of Mopane worm savory scones

Constituent	Composition (On Dry matter basis)
Protein %	14.84
Fat %	15.79
Crude fibre %	4.93
Energy(kCal/100g)	323
Energy (kJ/100g)	1276
Iron (as Fe) mg/kg	31
Zinc (as Zn) mg/kg	7

Chafer Beetle Fritters

This could be a perfect early summer snack, appealing for both rural inhabitants and urbanites, with its crunchy mouth feel and rich, garlicky flavour.

Ingredients

2 eggs, beaten
200 g self-raising flour
1 medium onion, finely chopped
1 clove garlic, crushed
300 ml cooking oil
Pinch of ground black pepper
1 tsp of salt
300 g chafer beetles whole or powdered

Method

1. Boil whole chafer beetles for 10 minutes then drain off water. Repeat three times. At the last boiling, add salt to taste. Drain.
2. Put boiled beetles in a mixing bowl. Mix in onion and 1 teaspoon of cooking oil. Cool.
3. Sieve flour into another mixing bowl. Add eggs, salt, crushed garlic, and black pepper. Mix to a dropping consistency. Add chafer beetles. Cover and refrigerate for 30 minutes.
4. Heat remaining oil in a frying pan.
5. Measure heaped tablespoons of the mixture and fry on each side for 3–4 minutes.
6. Serve when hot.

Shelf Life: Fritters are best served as fresh.

Table 6: Nutritional composition of Chafer Beetle Fritters

Constituent	Composition (On Dry matter basis)
Protein %	16.84
Fat %	18.62
Crude fibre %	6.94
Energy(kCal/100g)	459
Energy (kJ/100g)	1920
Iron (as Fe) mg/kg	15
Zinc (as Zn) mg/kg	6



Figure 15: Chafer beetles fritters



*Edible
Stinkbug
Recipes*

Edible Stinkbug Processing



Step 1: Gradual killing of the edible stink bugs. Mildly warm water, (approximately 27°C) is used to kill insects. At this stage, insects release the offensive alarm pheromone. This helps in avoiding bitter taste.



Step 3: Insects killed with hot or cold water accumulate alarm pheromones on their thoraces. Such insects have a sharp bitter taste.



Step 2: A flame is passed on the dead insects (after sieving from water) to remove volatile substances released by the insects during drying.



Step 4: Roasted edible stink bugs with a golden brown colouration. This is an indication that insects are of good quality.

Notes

Insects that are killed with too hot or cold water are not able to adequately release alarm pheromones and as a result they develop dark colours on the underside or ventral body surfaces (Step 3) as opposed to insects processed using water at approximately 27°C (warm water), according to the traditional method (Step 4). Insects with dark thoraces have a sharp bitter taste and are not desirable for human consumption.

Edible Stinkbug Recipes

Stink Bug Ginger Nuggets

This jewel of a bug occurs only in parts of southern Africa. With the addition of ginger, the strong characteristic stink vanishes, giving way to a pleasant aroma combining the ginger and the sweetness of pheromone the bugs use as an alarm signal. Packed with goodness and enriched with essential fatty acids and antioxidants from the edible stink bugs, these tempting snacks live up to their name of “nuggets”.

Ingredients

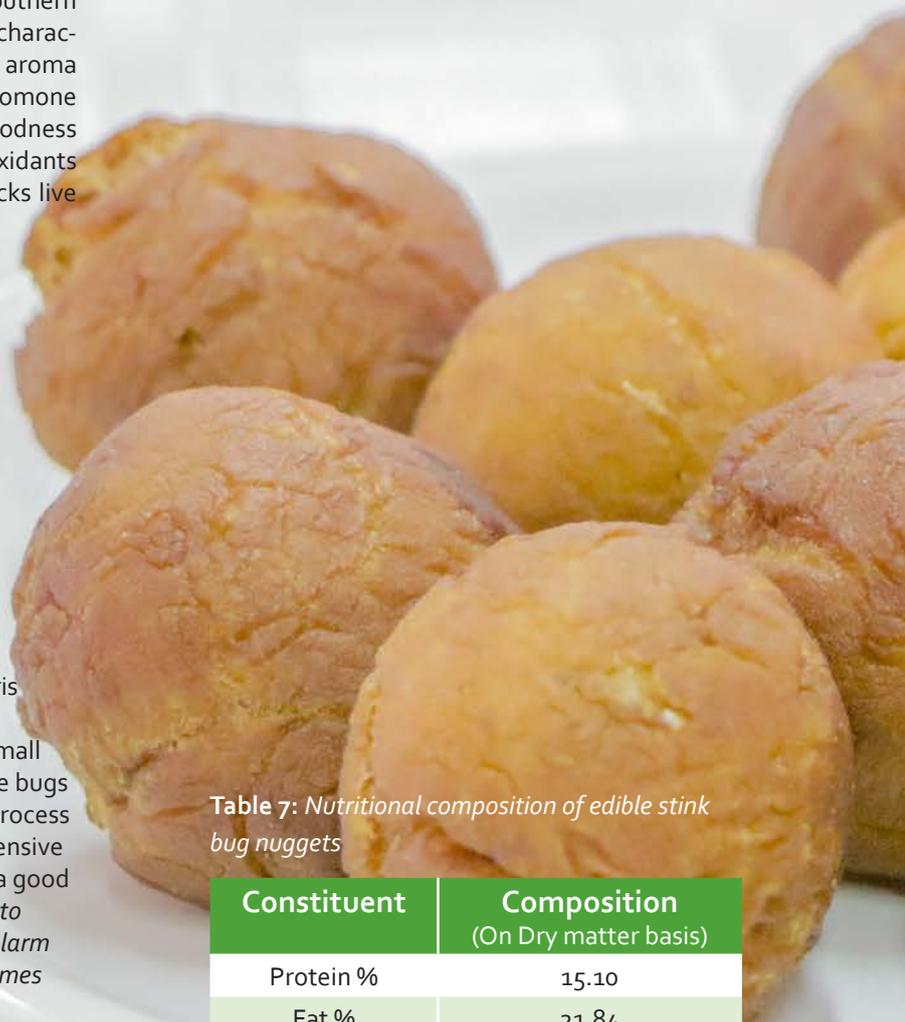
40 g roasted and roughly crushed stinkbugs
200 g cake flour
2 tsp baking powder
100 g margarine or butter
1 tbsp ginger powder
2 eggs, beaten
50-100 ml fresh milk
80 g sugar
3 tbsp cooking oil for frying

Method

1. Separate all dead bugs, leaves and debris from live bugs.
2. Place live bugs in a clay pot and add a small amount of warm water while stirring the bugs with a wooden spoon (Figure 12). This process causes the bugs to release alarm or defensive pheromones to make the bugs acquire a good taste. *Care should be taken at this stage to avoid direct eye contact with plumes of alarm pheromones. Repeat this process three times until the bugs are completely dead.*
3. Sieve insects from the water and dry on fire in a cooking pot.
4. Use a flame above the insects to remove all the remaining volatile substances released by the dead insects (Figure 13). *A colour change from green to golden brown, which takes approximately 3 minutes to develop, indicates the end point of drying.*

Table 7: Nutritional composition of edible stink bug nuggets

Constituent	Composition (On Dry matter basis)
Protein %	15.10
Fat %	21.84
Crude fibre %	2.33
Energy(kCal/100g)	319
Energy (kJ/100g)	1335
Iron (as Fe) mg/kg	25
Zinc (as Zn) mg/kg	13



Preparing the dough

1. Sieve flour, ginger powder and baking powder together.
2. Add crushed edible stinkbugs and sugar and stir to combine.
3. Cream margarine/butter and sugar until light and fluffy.
4. Add beaten eggs and fresh milk to the dry ingredients and beat to a soft dough that is not sticky.
5. Form into small balls using a tablespoon.
6. Place the balls on a greased baking sheet and bake in preheated oven for 10 minutes at 180°C.
7. Alternatively, heat oil in a deep fat fryer and fry the nuggets until golden brown.
8. Cool the nuggets and serve.

Shelf life: Can be stored for a month in an airtight container or frozen just after shaping and fried when desired



Figure 16: Stinkbug ginger nuggets



Figure 17: Edible stink bug mint cookies

Minty Stinkbug Cookies

Mint is another way of taming the seemingly unconquerable odour associated with edible stinkbugs. These crunchy cookies blend the refreshing taste of mint and with a distant hint of the sweetness of the stinkbugs. A perfect accompaniment to hot beverages such as tea or coffee.

Ingredients

- 1 cup sugar
- ½ cup softened butter or margarine
- 1 egg, beaten
- 1 tsp vanilla essence
- 1 tsp fresh crushed mint
- 1 tsp baking powder
- 1 tsp warm water
- ¼ tsp salt
- 1¼ cups cake flour
- ¼ cup powdered stinkbug

Method

1. Preheat oven to 180°C. Grease a baking sheet.
2. Cream margarine and sugar together until light and fluffy.
3. Sieve flour, salt and stink bug powder together.
4. Beat in egg, mint and vanilla essence. Sieve flour, baking powder and stink bug powder and add a little of the sieved dry ingredients into the mixture if it begins to curdle.
5. Add warm water to the creamed mixture. Stir in the rest of the sieved flour mixture while adding milk to soft dough consistency.
6. Spoon the dough (full tablespoon) onto the baking sheet and bake for 10–12 minutes.

Shelf life: The cookies can be stored for a week or more in an airtight container.

Table 8: Nutritional composition of edible stink bug mint cookies

Constituent	Composition (On Dry matter basis)
Protein %	11.76
Fat %	19.62
Crude fibre %	5.67
Energy(kCal/100g)	417
Energy (kJ/100g)	1744
Iron (as Fe) mg/kg	16
Zinc (as Zn) mg/kg	9



Edible Stink Bug Delight

Edible stink bugs are a common snack in southern Africa. The addition of fried French beans creates a tempting contrast of gold and green. The lemon garnish accompaniment offers an antidote to the strong smell of the bugs, which first-timers may find hard to deal with.

Ingredients

- 5 sliced lemon wedges
- 250 g edible stink bugs
- 1 tsp salt
- 2 tsp cooking oil
- 2 tbsp water
- 250g fresh French beans (Field beans)

Method

1. Boil edible stink bugs in salt and water for 5 minutes.
2. Add 1 tablespoon of cooking oil when water has evaporated.
3. Fry until crispy and golden brown (3 minutes).
4. Wash French beans in running water.
5. Top and tail beans and slice into 1cm pieces.
6. Fry beans for 3 minutes in 1 teaspoon of cooking oil.
7. Mix edible stinkbugs and beans.
8. Use lemon wedges as garnish.
9. Serve as a snack or side dish.



*Cricket
Recipes*

Cricket Recipes

Ground Cricket Loaf

The ground cricket has an immensely rich flavour. Ground cricket powder – made from roasted and powdered ground crickets – exudes this creature’s unique malty flavour. Tea loaf baked with ground cricket transforms this fierce-looking creature into a tasty confectionary – an amazing metamorphosis well worth exploring.

Ingredients

- ¼ cup coffee
- 250 g self-raising flour
- 100 g margarine or butter
- 100 g brown sugar
- 1 tsp baking powder
- 1 tsp lemon essence
- 60 ml sour milk
- 2 eggs
- 25 g powdered ground crickets (0.5mm sieved)

Method

To make powdered crickets

Pre-clean fresh insects and dry out in oven at 70°C for 2 hours. Crush the dried insects using the pestle and mortar to a fine powder.

1. Pre-heat oven to 180°C. Grease and line a loaf tin with greaseproof paper and set aside.
2. Cream margarine or butter and sugar until light and fluffy. Add eggs, coffee, powdered cricket and lemon essence.
3. Fold together until smooth.
4. Sieve self-raising flour and baking powder. Gradually add to the creamed mixture, folding continuously. Add sour milk to make a dropping consistency.
5. Pour into loaf tin and bake for 40–45 minutes or until a skewer comes out clean.

Shelf life: best consumed within one week.



Figure 18: The Ground Cricket *Henicus whellani*



Figure 19: *Majenya (Cricket) Loaf*

Table 10: Nutritional composition of Ground Cricket loaf

Constituent	Composition (On Dry matter basis)
Protein %	17.7
Fat %	13.17
Crude fibre %	1.21
Energy(kCal/100g)	300
Energy (kJ/100g)	1255
Iron (as Fe) mg/kg	33
Zinc (as Zn) mg/kg	26

Ground Cricket Chocolate Cake

For this cake, the rich aroma of cocoa is blended with the cricket's malty aroma. The visual appearance is an amazing velvety chocolate brown.

Ingredients

125 g self-raising flour
25 g powdered crickets
1 tsp baking powder
1 tsp bicarbonate of soda
110 g margarine/butter
55 g sugar
1 egg
1 tsp vanilla essence
2 tbspcocoa powder
100 ml sour milk

Method

To make powdered cricket

Pre-clean fresh insects and dry out in oven at 70°C for 2 hours. Crush the dried insects using the pestle and mortar to a fine powder.

1. Preheat oven to 180°C. Grease and line a small round tin.
2. Sieve all the dry ingredients into a bowl.
3. In a mixing bowl, cream margarine and sugar until light and fluffy. Add the dry ingredients gradually, folding continuously.
4. Add beaten egg and vanilla essence.
5. Lastly add sour milk gradually, stirring continuously, until the mixture reaches a thick dropping consistency. Add more sour milk if necessary.
6. Pour mixture into the prepared tin and bake for 30–45 minutes or until a skewer comes out clean.
7. Set aside and cool then decorate as desired.

Table 11: Nutritional composition of ground cricket chocolate cake

Constituent	Composition (On Dry matter basis)
Protein %	16.77
Fat %	13.44
Crude fibre %	1.44
Energy(kCal/100g)	394
Energy (kJ/100g)	1648
Iron (as Fe) mg/kg	17
Zinc (as Zn) mg/kg	5

Ground Cricket Cookies

Cricket cookies present a rich combination of iron and zinc from the crickets and energy from the sorghum and wheat flour. It's a great food for a highly energetic population!

Ingredients

50 g unsalted butter/margarine
110 g plain wheat flour
Good pinch of salt
3 tbspcocoa powder
35 g ground cricket flour
50 g sugar (white)
30 g sorghum flour

Method

To make powdered cricket

Pre-clean fresh insects and dry out in oven at 70°C for 2 hours. Crush the dried insects using the pestle and mortar to a fine powder.

1. Preheat oven to 230°C. Grease an oven tray.
2. Put all dry ingredients in a mixing bowl and mix well.
3. Add the powdered cricket and mix.
4. Add butter/margarine in pieces and mix gently with fingertips to a fine crumb texture.
5. Gradually pour in milk and mix gently with a round bladed knife to form a soft dough that leaves the bowl clean.
6. Lightly knead the dough 8–12 times on a flour board. Roll out and make cookies in the desired shape using a knife or cookie cutter. Place the cookies on the greased oven tray, equally spaced.
7. Bake for 10 minutes until golden brown.

Table 12: Nutritional composition of ground cricket cookies

Constituent	Composition (On Dry matter basis)
Protein %	11.43
Fat %	41.16
Crude fibre %	7.09
Energy(kCal/100g)	459
Energy (kJ/100g)	1920
Iron (as Fe) mg/kg	20
Zinc (as Zn) mg/kg	11

Grasshopper Delight

Grasshoppers thrive on lush green vegetation. This snack combines the crunchy and protein-rich grasshoppers with the crunchy feel of French beans. This combined snack reconciles the need to balance protein intake with vegetables.

Ingredients

5 sliced lemon discs
250 g grasshoppers
1 teaspoon salt
2 tea spoons cooking oil
2 table spoons water
250 g fresh French beans (Field beans)

Method

1. Boil grasshoppers in salted water for 5 minutes.
2. Add 1 tablespoon of cooking oil when all water has evaporated.
3. Fry until crispy and golden brown (3 minutes).
4. Wash French beans in running water.
5. Top and tail beans and slice into 1cm pieces.
6. Fry beans for 3 minutes in 1 teaspoon of cooking oil.
7. Mix grasshoppers and beans.
8. Use lemon wedges as garnish.





*LongHorned
Grasshopper
Recipes*

Bwanoni



Bwanoni

Bwanoni or Noni is the Chichewa name for *Homorocorphus vicinus* a cone-headed grasshopper so popularly harvested and enjoyed as a snack and relish in Malawi. Nsenene is the Luganda name for *Ruspolia differens*: a bush cricket in the tribe Copiphorini of the cone-head subfamily.

These grasshoppers are rich in protein, fats, minerals and vitamins providing cheap sources of these very essential nutrients especially for the rural poor. More importantly, they provide a major source of livelihood income in the rural areas.

With more than 9 million species of insects available globally, insects provide an amazing variety and potential for diversifying diets. Many young people of African ancestry have no clue on how to prepare these delicious dishes made from insects. Noni, Bwanoni or Nsenene is a very versatile ingredient in cookery.

"Follow these step by step instructions on how to wow yourself and others in making tasty and healthy dishes from Noni or Nsenene."



Figure 20: Noni bites



Noni Bites

Ingredients

150 - 200 g Fresh Bwanoni (Nsenene)
Salt to taste
½ onion chopped
Dried chilli or freshly chopped chillies (optional)
Curry leaves

Method

1. Wash the bwanoni to remove any debris.
2. Put a sturdy frying pan or pot on the fire to heat. Add the bwanoni and fry dry until desired crispiness.
3. Add the chopped onions, salt, pepper and curry leaves. Taste to your satisfaction.
4. Serve warm and enjoy with a warm or cold drink.

Figure 21: Noni bites

"Tastes great as a snack or as an appetizer, to be enjoyed with friends."

KwasuKwasuBwanoni

Ingredients

Ingredients

100-200 g fresh bwanoni

Salt to taste

Method

If you feeling peckish and cannot think of what to get your teeth into this snack is great for getting you that comfort feeling. Kwasukwasu. Literally means snacking and enjoying in Malawi. The words create a flow of the saliva, and longing for more. Dry roasted/fried bwanoni can be preserved for some time and are very handy when travelling to be eaten as an energy replenisher. All you need is a sturdy frying pan and some salt to season.



Figure 22: KwasuKwasuBwanoni

Scrumptious Eggplant Bwanoni Curry

Ingredients

150g bwanoni dry fried

100g cherry tomatoes chopped

1 onion chopped

1 medium size eggplant

1 teaspoon curry powder

2 cloves garlic chopped

Salt to taste

Pinch of black pepper

Hot chillies to taste

Curry leaves

Cooking oil



Step 1: Stir fried chopped Tomatoes and garlic



Step 2: Shallow fried eggplant

Method

1. Chop the eggplant and put in a colander or sieve and salt generously. Leave to stand for 30 mins.
2. Meanwhile, chop the onion and sauté in a sturdy pot. Add the curry powder, black pepper and stir for five minutes to develop the flavours.
3. Add the chopped tomatoes, garlic, chillies and curry leaves and stir for another five minutes.
4. Set aside the mixture. Squeeze the juice out of the salted eggplant. Dry them with a clean cloth or paper towels.
5. Take a frying pan add some oil just enough for covering the base. Heat to a sizzling point. Shallow fry the eggplant until soft and golden brown.
6. Add the eggplant to the tomato mixture; simmer for five to ten minutes.
7. Serve with oven-baked plantains, steamed bananas, steamed cassava or sweetpotatoes.



Figure 23: Scrumptious Eggplant Bwanoni Curry



Oven Baked Plantains

1. Two ripe plantains peeled and sliced into wedges. Sprinkle with salt and paprika.
2. Bake in oven at 200-Celsius degree for 20 minutes.

If preferred shallow fry. Alternatively, roast the plantains whole, note that this will take longer time to bake.

Figure 24: Sliced plantains

How this book was created

The importance of edible insects

With many more people living on this planet and environmental degradation happening as we speak, the world faces a major challenge in providing enough animal-based proteins. Insect consumption, also known as entomophagy, is common in many countries, with around 2000 species known to be consumed worldwide. In many traditional societies insects have been, and still are, eaten due to their high nutritional content and ease of collection. In Africa, we have, on the one hand, a force driving the sustainable and traditional use of edible insects, but on the other hand, there is also a “westernization” of these societies leading to a movement away from entomophagy. To genuinely make insects a universal food source for the youth, and for traditional and urban consumers, we need to change attitudes. We need to make consumers accept that achieving adequate nutrition on a global level will mean a bigger range of different diets, including nutrition from edible insects. With a high nutritional composition, mostly proteins, as well as minerals and essential amino acids, edible insects have potential to address stunting, wasting and overweight in children below 5 years age. Globally, the number of these children range from 200 to 229 million. Edible insects can help communities in Africa better access nutritious food. To address SDG2 (*End hunger, achieve food security and improved nutrition and promote sustainable agriculture*), we need innovative ways that promote consumption of edible insects. With additional potential to be farmed, insects perfectly fit a model with a small carbon and water footprint, hence also addressing SDG15 (*Take urgent action to combat climate change and its impacts*). Farmed insects result in less carbon, as well as methane gas emissions. They require less water and have a high reproduction and feed conversion efficiency compared to large livestock such as cattle and pigs.

Our project

The Edible Insects for Food Security and Health – from Practice to Evidence and Policy Implications (INSFOH, funded by The Swedish International Development Cooperation Agency (SIDA) through the AgriFoSe2030 programme) aimed to contribute to food security in rural and urban areas of southern Africa through increased sustainable use of edible insects. In general, insects have been considered as food for the poor by the larger urban population. This has been partly due to the population demographics where young people prefer more modern diets at the expense of indigenous or traditional diets. Additionally, there have been several





research and information gaps concerning the types of insects to be consumed, how they are accessed, and prepared, and their safety as food. Our project gathered perceptions on edible insects among urban people to determine the need and potential of increased consumption of insects, as well as intervention strategies. To help large scale volumes of edible insects to enter into the urban city markets, we need to establish suitable handling facilities that would ensure product safety and quality. We engaged with local urban authorities in two selected cities (one in Zimbabwe and one in Democratic Republic of Congo). We did so by providing training on all aspects of edible insects value chains, including lobbying for establishment of urban bylaws. These bylaws should facilitate fair trading of edible insects including, trading, pricing and setting up new handling facilities in the agricultural markets and engaging women and young entrepreneurs. Our project also built two handling facilities suitable for edible insects in Zimbabwe and DRC in collaboration with private and public partners. These facilities are now used to showcase hygiene and safety procedures and good market standards. In the project we also trained traders on sustainable practices in handling the insects to ensure food safety and increased shelf life. Through an information platform, traders were linked to potential markets which included urban supermarkets, hotels and restaurants.

The beginning of a journey

The increasing demand for proteins not sourced from livestock is driving more consumers to consider edible insects as a healthy alternative. The challenge for the new consumers in quickly adopting insect consumption include the so called 'yuck' factor, i.e. unaccustomed taste and mental barriers. Through a multi-stakeholder approach that includes political players, business and new product developers, a deliberate effort has been made in our project to create a diverse pool of innovative food products with insect as key ingredients. We had to take a strategic approach to transform new "consumers' hearts" to gradually accept insects as food; we have included insects as ingredients in small portions in food products that normally appeal in taste, colour and flavour to uninitiated and urban consumers. It is our hope that this cookbook will mark the beginning of a journey that will see an abundance of future innovations in this sector. We hope that this can lead to spinoffs, such as innovative cuisines that may promote and support food tourism. At the same time, we have to safeguard the conservation of wild insects, and promote widespread insect farming. Ultimately, the consumer will benefit, by accessing nutritious and protein rich edible insects. So, this cook book is one step towards reaching SDG2; to eliminate hunger in all its forms.

