2021 Issue 115

Footsteps

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Featuring practical solutions to development challenges, *Footsteps* magazine inspires and equips people to work with their local communities to bring positive change.

Footsteps is published by Tearfund, a Christian relief and development agency working with local partners and churches to meet basic needs and address injustice and poverty. *Footsteps* is free of charge.

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Cover photo: Women in the Democratic Republic of Congo clean caterpillars harvested from the trees surrounding their village. **Read their story on page 14.** Photo: The Salvation Army

A note from the editor

Scientists estimate that insects make up 90 per cent of all species of animals on the planet, and more than half of all living things. In fact, the total weight of all the insects in the world is about 70 times more than all the people!

Insects help to maintain the balance of nature. They are important pollinators of trees, crops and other plants. They help to break down waste such as dead animals and they are an important food for many different creatures including fish, reptiles, birds and mammals.

This edition of *Footsteps* takes a closer look at the many benefits of insects including the role they can play in tackling food insecurity, land degradation and climate change. It considers how to control pests without using damaging chemicals and celebrates the extraordinary life of the honey bee.

'Let the fields be jubilant, and everything in them; let all the trees of the forest sing for joy.'

Psalm 96:12

Jude Collins, Editor

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The importance of insects

By Jeremy Williams

Bees, butterflies and other insects play an important role in pollination. This beautiful butterfly was photographed in Nepal. Photo: Sunil Shrestha/Tearfund

Catching a grasshopper is not easy. They are fast and alert, and they jump or fly away when you approach them.

But my friend Tojo taught me a good method. Choose a long, thin bamboo stick and hold it high as you crouch down. When you see a grasshopper on the ground, creep slowly closer. Then thwip! Down comes the bamboo stick. If your aim is good, you stun the grasshopper and put it in your pocket.

This is what Tojo and I used to do during the morning break at primary school in Madagascar. He would take the grasshoppers home at lunchtime and bring them back in the afternoon, fried and seasoned. He would share them with me, and I would share my cracker mix in return.

I thought this was quite a fun activity, but I soon noticed that I was the only one who would join Tojo. In fact, the other children were laughing at him because his family could not even afford the little packets of cracker mix that the street vendors sold.

And so, after a while, we stopped catching grasshoppers. Tojo preferred to go hungry than to be laughed at for eating insects.

‘In some ways, insects are the most successful creatures on earth.’

It was the other children who were missing out. Insects are an excellent source of protein and other nutrients. They might be a pest sometimes, but insects keep the natural world in working order. Whole ecosystems would fail if they were not there. These tiny creatures are vital to the future of life on our planet.

Marvellous diversity

In some ways, insects are the most successful creatures on earth. They are certainly the most diverse: more than a million different species have been identified, and scientists estimate that there may be up to 10 million species in total. They are also the most numerous. If we tried to count the total number of insects in the world, the numbers would be too huge to be meaningful.

There is an extraordinary range of different types of insects including ants, bees, beetles, butterflies, cicadas, dragonflies, locusts, moths, praying mantises, stick insects and wasps. Some never leave the soil, or live their whole lives as parasites in the fur of a host animal. Others travel huge distances, flying freely over borders, oceans, forests and deserts as true citizens of the world.

Some insects live solitary lives. Others, such as honey bees and ants, build sophisticated communities. Some leave little trace. Others, like termites, have their own architecture. Even the ▶

lives of individual insects are diverse and strange, since all have a larval stage that looks completely different from their adult form. For example, maggots are the larvae of flies, and caterpillars are the larvae of moths and butterflies.

There is so much to marvel at in the insect kingdom. My personal favourites are ants. I have spent many happy hours watching them (as the writer of Proverbs encourages in Proverbs 6.6)! One time in Kenya I saw a column of ants work together to form a bridge and cross a stream. It was mesmerising – even if it was interrupted by lots of jumping about and slapping of legs as the ants found me too!

Of course, insects have many ways to make human lives miserable. Fleas in the bed, weevils in the flour. Cockroaches. Flies. An encounter with a wasps' nest can be a horrible experience. Wood beetles can kill a tree or destroy a building. A locust infestation can take a farmer's livelihood. Tiny mosquitoes carry diseases that kill millions of people every year. Our relationship with insects is complicated.

We need insects

Even though they annoy and distress us sometimes, we cannot live without insects. The biologist and ant expert E O Wilson offers a humbling thought: 'If all humankind were to disappear, the world would recover a richness that has been lost for thousands of years. But if insects were to vanish, the environment would collapse into chaos.'

Insects matter because they fulfil so many important roles in nature. One of them is pollination, which is vital to plant reproduction. The plants produce colourful flowers and sweet nectar, both of which attract insects. As the insects feed on the nectar, pollen sticks to their bodies and legs. Then, as they visit other flowers, the pollen rubs off resulting in reproduction and new growth. This exchange runs the living world.

Insects also recycle waste. They gnaw and burrow through dead wood, partnering with fungi and bacteria to break it down. They carry away the last remains of dead animals or other insects. As things are dismantled, their nutrients are released to feed something new. Nothing is wasted, and new life comes from the old.

To return to where we began, insects are also a food and many places have a culture of eating insects of various kinds. That was a culture in decline in Madagascar when I was a child, but it remains strong elsewhere.

Termites recycle dead and decaying plants into new, fertile soil. They make mounds out of soil and saliva to protect their nests below.
Photo: Andrew Philip/Tearfund

Insects are a high-quality, protein-rich food. They are quick and cheap to produce with a fraction of the land, water or carbon emissions of other forms of protein, such as cattle. Because they are natural waste processors, they can be fed on agricultural by-products and food waste such as rotten fruit. They can be food for us, or used as feed for chickens, fish and other livestock.

Insects have an important role in a sustainable future. My friend Tojo had the right idea after all.

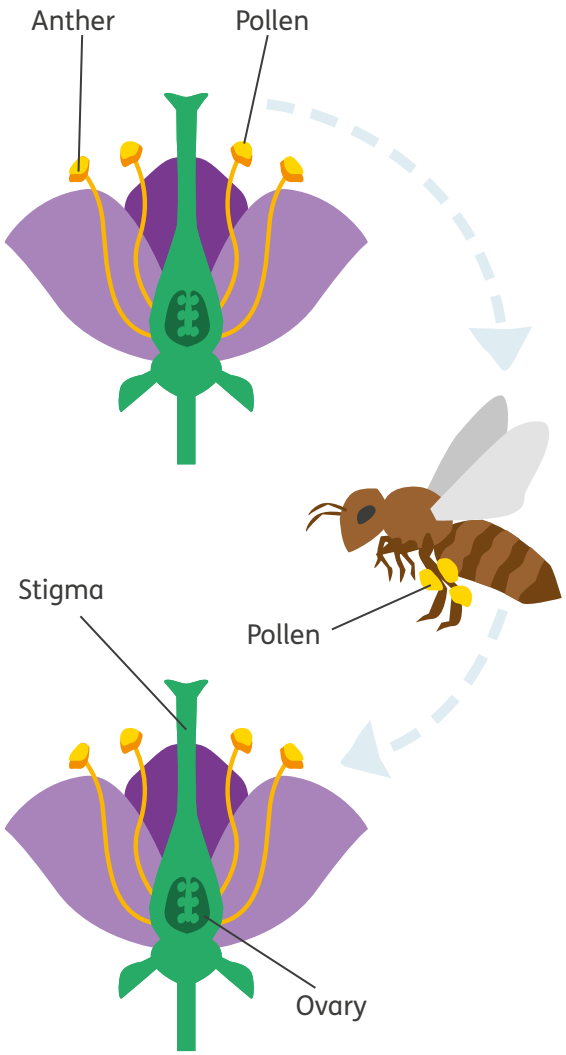
Jeremy Williams is a writer and campaigner on social and environmental issues. He is the author of Climate Change is Racist: Race, Privilege and the Struggle for Climate Justice*, and writes a blog on sustainability at* **earthbound.report**

Cross-pollination

Cross-pollination is the transfer of pollen grains from the male anther of a flower to the female stigma of another flower of the same species. This leads to fertilisation and the production of seeds and fruit.

Although many plants can pollinate themselves, the increased genetic diversity caused by cross-pollination often results in stronger plants that grow more quickly and are more able to adapt to changes in their environment.

1. The bright colour and fragrance of a flower attract an insect.
2. As the insect collects nectar it brushes against the anthers and pollen sticks to its body and legs.
3. The insect is then attracted by another flower.
4. As the insect feeds, the pollen on its body is transferred to the stigma of the new flower.
5. The pollen allows fertilisation to take place in the ovary.
6. The ovary turns into seeds that grow into new plants.



Honey bee guardians

By Guy Stubbs

'In our community there is a lot of unemployment and I was struggling to even pay the transport costs for my children to go to school,' says mother-of-three Lonny Ndlovu from Bushbuckridge in South Africa. 'That is why I started beekeeping.'

Along with other members of her community, Lonny was invited to take part in a project run by local organisation African Honey Bee.

Central to the project is the recognition that God blesses each of us with gifts including relationships, abilities and local resources. When we understand what these gifts are, we can use them to transform our lives and reach out to serve others.

Getting started

The first step is to establish self-help groups. These give people the opportunity to identify the collective resources and skills available to them. They also learn group management and financial skills, and start to save small amounts of money.

The guardians learn how to make their own beekeeping equipment. Photo: Guy Stubbs/African Honey Bee

This money can then be invested in businesses such as beekeeping, chicken farming and vegetable growing.

Participants, known as honey bee guardians, learn how to make their own beekeeping equipment using locally available and recycled materials. For example, old clothes are turned into protective gloves and hats, and empty paint cans are used to make smokers. (Beekeepers use smoke to help keep the bees calm during hive inspections).

Environmental benefits

The guardians learn about the importance of bees for cross-pollination, and how to look after them in a way that both restores the local environment and contributes to self-sufficiency.

Lonny says, 'I want to improve my life, my family life and my community life. I want people to respect the environment and realise that the environmental problems we have are really serious.

'Beekeeping is encouraging people to look after the trees and other plants that the bees need. If we

Discussion questions

In a group or on your own, reflect on the following questions.

- Have you noticed any change in the number of bees or other pollinating insects (eg butterflies) in your area? If you are not sure, ask some of the older people in your community if they have noticed any changes.
- What can you do to make your area more attractive to bees and other beneficial insects? What economic and environmental benefits do you think this might have?

look after the bees then the bees help us through pollination. We put the hives near the crops and the pollination helps us to grow good-quality vegetables. We can also make a lot of honey to eat and sell.'

As well as cross-pollinating crops, the bees pollinate the surrounding natural vegetation. As the trees and other plants flourish, they improve the soil by holding it in place and protecting it from the sun, rain and wind. Rainwater caught by the trees soaks into the ground instead of running off, reducing the risk of drought. The trees also attract birds, animals and other insects, some of which are important for pollination and natural pest control.

Food on the table

With her savings, new knowledge and flourishing businesses, Lonny is now in a position to support others in the community. She is the manager of a drop-in centre for vulnerable children where she teaches them how to look after the environment, support the bees and grow their own food.

'Now I have a lot of jobs that I am doing and my family is improving,' she says. 'More people have jobs in the community, including the young people, and the children can go to school and on to higher education. The improvements in our community are very big. Everyone is now able to put food on the table.'

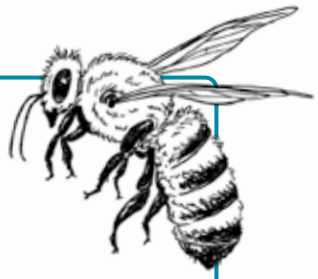
Central to all of this are the bees. 'I love my bees very much,' says Lonny, 'so I have decided to expand my hives. I also want to help my self-help group to look after their bees better, and I want to support more people in my community to improve their lives.'

Guy Stubbs is the founder and Director of African Honey Bee, a Christian social enterprise in South Africa. **africanhoneybee.co.za**

Further reading

The organisation Bees for Development has an online resource centre that contains many training materials, books and other resources for beekeepers and beekeeper trainers. The resources are free of charge and some are available in several languages. **resources.beesfordevelopment.org**

Lonny and her son, Tshegofatso, look after their bees, and the bees look after them. Photo: Guy Stubbs/African Honey Bee



Bees and flowers

Honey bees and flowering plants depend on each other. The bees take pollen from flower to flower, which fertilises the plants and allows them to reproduce.

In return:

- the nectar in flowers gives bees the energy they need to build, maintain and regulate the temperature of their nest
- the bees use nectar to make honey to eat and beeswax for nest construction
- pollen provides the protein and other nutrients bees need to raise their young
- resin collected from tree buds and sap contains antimicrobial compounds that disinfect the nest.

The bees make honey by passing nectar from mouth to mouth until the water content is reduced. Then, in the winter, they use water to dilute stored honey so they can use it for food.

Sadly, in many places bee populations are declining. This is mainly due to the widespread removal of flowering plants to make way for single crops that only flower once a year. Chemicals sprayed on the crops also kill bees and other pollinating insects.

One solution is to plant a range of crops, flowers, trees and shrubs that flower at different times and provide nectar and pollen throughout the year. In addition, natural pest management techniques should be used instead of chemicals wherever possible (see page 18).

Case study
A close alliance

Community members in Salima district, Malawi, are forming an important alliance with honey bees. In response to widespread deforestation and land degradation they are dedicating areas of land to natural regeneration, allowing shrubs and trees to grow once more. However, despite by-laws and penalties, some people are not yet respecting these protected areas.

Bees, when disturbed, can give a nasty sting, so the communities are hanging bee hives made from earth pots, logs, baskets, tins and plastic buckets from the trees. The buzz of these busy creatures is helping to keep intruders out.

The communities have noticed that the honey harvests are much higher in the reforested areas, compared to areas without trees. This is because the bees have easy access to sufficient water, nectar and pollen. Their pollination activities are also helping the forest and surrounding crops to flourish which, in turn, is encouraging more people to keep bees and look after the trees.

Sainani Bikitala is proud of both his trees, and his bees. Photo: Marcus Perkins/Tearfund

Assemblies of God Care, Malawi
malawiassembliesofgod.org

Bible study

Thriving communities

By Rev Francis Ananda Chipukunya

Checking a hive in Bolivia. Photo: Zoe Burden/Tearfund

The Bible says that when we study creation, God reveals truths and facts about himself that we might not otherwise know (Romans 1:20; Psalm 19:1–4).

This is certainly true of honey bees. These fascinating creatures can teach us a lot about how to build thriving communities.

United

Most honey bees spend the majority of their time feeding other bees, rather than themselves. This helps them to strengthen their relationships with each other and live in harmony.

Jesus said that people will know his followers by the love that we have for each other (John 13:34–35). If we are to be effective witnesses to the good news of Jesus it is important that we live in unity: one in spirit and mind (Philippians 2:2).

Discussion questions

- Are the people around you living in harmony? If not, how can you help them to reconcile their differences (Matthew 5:9)?
- What roles do you have in your family, church and community? Ask God if there is anything else that he would like you to be doing, or anything that he would like you to change.
- Do you find it easy or difficult to put others first? How can you show kindness to someone today?

Team work

In a bee colony, every bee has a vital part to play. The queen lays the eggs, the drones fertilise the eggs and the workers collect nectar and make honey. Together, the bees manage their time and resources in a way that helps their whole community to stay safe and thrive.

The Lord has placed every bee in the hive for a reason: to fulfil its purpose. He places each of us in our families, churches and communities for the same reason (1 Corinthians 12). And whatever role we have, it is important.

Others first

When honey bee workers find a good source of nectar they return to the hive and dance! This dance tells the other bees where they found the nectar so they can go and get some too.

God wants us to put the needs of other people first. This includes sharing what we have (Acts 4:32–35) and showing kindness and love to those around us (Mark 12:31; Luke 10:25–37).

Rev Francis Ananda Chipukunya is the founder and project leader of Support for Change Initiative Ministries in Malawi.

Edible insects

By David Allan

Insects are eaten and enjoyed in many cultures across the world.

They are an important source of protein and provide significant livelihood opportunities for people in both rural and urban areas. Compared to many other sources of protein, such as cattle and pigs, their impact on the environment is minimal.

Nutritious

Insects are rich in protein, fibre, useful fats, vitamins and minerals. They can be eaten whole or they can be ground into a powder and incorporated into other foods.

Increasing attention is being given to the use of insects as a feed ingredient for livestock and fish. Several companies in different parts of the world are rearing insects such as black soldier fly for this purpose.

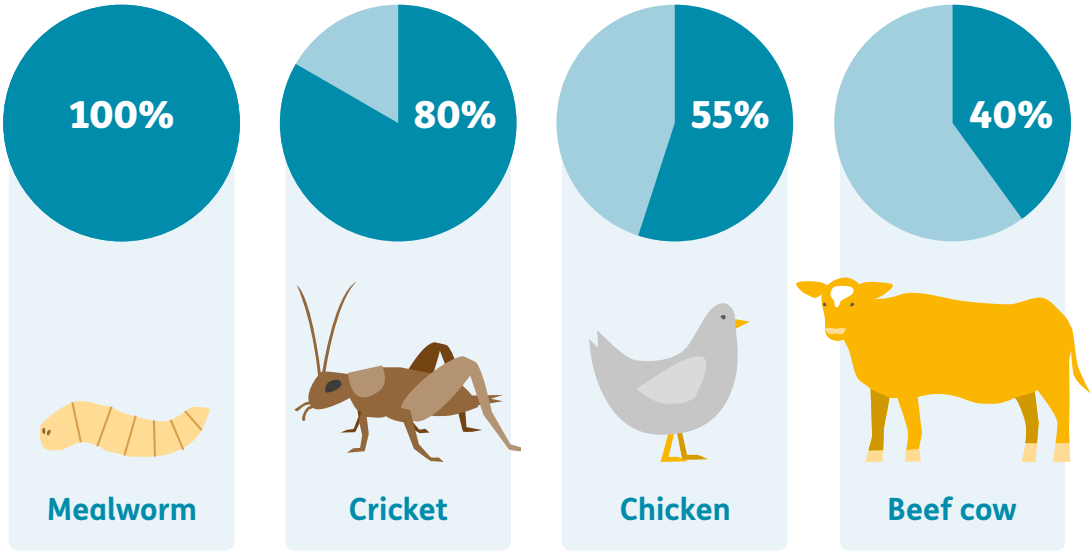
Low environmental impact

Population growth, urbanisation and rising incomes are increasing the global demand for food, especially protein from animals. However, intensive livestock production and over-grazing are significant contributors to land and water pollution, forest degradation and climate change.

The rearing and harvesting of insects offers a viable alternative.

- Insects need much less food and water than livestock to produce the same amount of useful protein. This is because they grow quickly and are good at converting food into bodyweight. In addition, almost all of the insect can be eaten compared to only 40 per cent of a cow and 55 per cent of a chicken or pig.
- Insects reproduce quickly and can be reared in a small space on agricultural and food waste.

Selling edible insects on a market stall in Myanmar. Photo: Spectrum



Percentage of each animal that can be eaten

Data source: Food and Agriculture Organization (2013) *Edible Insects – Future prospects for food and feed security.*

- Insects produce much lower levels of damaging greenhouse gases than conventional livestock. For example, pigs produce up to 100 times more greenhouse gases per kilogram of bodyweight than mealworms.

In some places, natural increases in insect populations during the year can provide opportunities for large numbers to be harvested from the wild. This includes swarms of agricultural pests such as locusts. However, care must be taken not to eat locusts or other insects that might have been sprayed by insecticides as part of a pest-control programme.

> **'Pigs produce up to 100 times more greenhouse gases per kg of bodyweight than mealworms.'**

It is important that insect populations are not damaged by over-harvesting. One way to reduce the risk of this happening is to plant and look after trees and shrubs that edible insects like to use for food and shelter.

Local by-laws can also help to prevent over-harvesting: for example, by not allowing insects to be collected during a certain part of the year.

Livelihoods

The gathering, rearing, processing and sale of insects offer important livelihood opportunities in both rural and urban areas. Simple, low-cost techniques and equipment can be used, making it possible for anyone in the community to get involved.

Income can be enhanced through the promotion and adoption of good food hygiene standards to ensure the insects are safe for human consumption.

Use the following pages to help start a discussion about food safety in areas where insects are consumed on a regular basis.

David Allan is Executive Director of Spectrum – Sustainable Development Knowledge Network – in Myanmar. **spectrumsdkn.org**

Further reading

The Food and Agriculture Organization's website – **fao.org/edible-insects** – contains a lot of information about the use of insects for food and animal feed. Available in English and French.

Tearfund's *Advocacy toolkit* includes advice on how to work with local government representatives to establish local by-laws. Download from **learn.tearfund.org** in English, French, Spanish or Portuguese.

Eating insects safely

If food becomes contaminated with bacteria and other germs, people who eat it may become ill. Traces of chemicals such as pesticides can also make people unwell. It is therefore important to take precautions at every stage of the food production process to reduce the risk of contamination.

Harvest

- Capture healthy insects in a place where there is no risk of contamination. For example, away from industrial sites and farms where chemicals may be used to control pests and weeds.
- Avoid over-harvesting any particular type of insect by monitoring insect levels over time. If numbers begin to drop, work with your community to identify the best way to solve the problem. This may include planting trees or other vegetation to attract greater numbers of the insect. You may also wish to establish a local rule that no insects can be harvested for a certain period each year. This will allow the insects to reproduce and increase in number.
- Kill the insects quickly by freezing or drowning, and do not use chemicals.

Store and transport

- Rinse the insects in clean, salty water.
- Dry the insects and store them either cooled or frozen in clean packaging.
- Keep a record of when the insects were harvested and label and date the packaging. This helps to make sure that the older insects are eaten or sold first.
- If they are being transported, keep the insects cool or frozen.

Cook

- Cook fresh insects as soon as possible after harvest to avoid the risk of them spoiling.
- Use good hygiene practices and do not prepare the insects if you are unwell.
- Clean the insects and remove wings, legs and other parts that are not edible.
- Using fresh oil, fry or heat the insects to a high temperature to kill any bacteria or parasites.
- After cooking either eat immediately or cool and cover to reduce the risk of contamination.
- Keep a record of when the insects were cooked and label and date any packaging.

Hygiene precautions

Fresh, well-cooked and covered food will be free from germs and safe to eat. However, precautions need to be taken to make sure the food does not become contaminated.

- Always wash your hands before touching food.
- Make sure that plates and utensils are clean and protected from flies.
- Use safe drinking water to cook with.
- In hot weather food can spoil quickly. Either eat it straight after cooking or keep it cool and covered.
- Keep all pests and animals away from food, including flies, mice, rats, cockroaches, chickens, dogs and cats. Flies often carry faeces and germs on their feet so just one fly crawling over food can spread diarrhoea to the people eating it.

Sell

If selling cooked insects online:

- minimise the length of time between cooking and delivery, keeping the product cool and covered
- use clean and hygienic packaging.

If selling on a market stall or in a shop:

- ensure that all surfaces are clean and that the product is protected from birds, flies and other insects
- keep the product as cool as possible by providing shade
- ensure that the area around the stall/shop is clean and free from waste
- wash your hands regularly and consider wearing a face covering
- do not sell the product if you are unwell.

Reintroducing edible caterpillars

By Violet Ruria

In Mandiba territory of Kongo-Central in the Democratic Republic of Congo (DRC), edible caterpillars are a delicacy and have been harvested for generations. They are rich in high-quality proteins, fats and micronutrients and they can be sold in the market for a profit.

However, many of the trees and plants that the caterpillars need to survive have been cleared due to timber extraction, slash-and-burn agriculture and charcoal production. Caterpillar numbers have fallen and some species have disappeared completely. Communities that used to rely on caterpillars and other forest products for food and income are experiencing high levels of adult and child malnutrition.

To address this challenge, The Salvation Army in DRC is partnering with local organisation Songa Nzila to increase the availability of caterpillars through reforestation and caterpillar farming. Caterpillars are cheap to produce and everyone can participate in breeding and rearing them including women, children and people with disabilities.

New skills

With support from village elders, each community establishes a Caterpillar Management Committee. These committees learn how to breed caterpillars and grow the trees that the insects need for food and protection. The committee members then pass on these skills to others in their communities.

Jonathan cleans his harvest of caterpillars on the banks of the Lasa River. Photo: The Salvation Army

The children enjoy getting involved in every aspect of the project. Photo: The Salvation Army

To involve the next generation, tree nurseries are established in local primary schools. Each contains more than 3,000 plants made up of seven species of caterpillar food trees. As the pupils and teachers look after the seedlings they learn about the importance of both trees and caterpillars.

The seedlings are distributed to the communities to plant. Once established, the trees attract different species of moth to lay their eggs, which eventually produce caterpillars.

Some species of moth have not been seen in the communities for a long time. To help reintroduce them a breeding laboratory has been established in the area using only native species. Once the eggs hatch, the larvae are transferred to the trees in the communities.

Through cooking demonstrations, song and drama, people are taught how to cook the caterpillars in a way that maintains both taste and nutrients. This includes special recipes for infants and young children.

Many benefits

Kusongi Basega has recently joined the caterpillar project. Reflecting on the progress she has made so far, she says, 'At first glance nothing is visible, but we are seeing a gradual availability of delicious edible caterpillars close to our home.'

> **'As the pupils and teachers look after the seedlings they learn about the importance of both trees and caterpillars.'**

Kusongi works as a farmer and sells cassava in the local market to provide for her six children. She is hoping that soon she will be able to sell caterpillars as well to increase her income.

'Malnutrition will soon be a thing of the past in our village,' she says.

Violet Ruria works with The Salvation Army as a Programme Advisor on sustainable livelihood development. **salvationarmy.org.uk/id**

International insect treats

Photo: Spectrum

Myanmar: Cricket and pennywort salad

Ingredients

- 1 bunch Myin khwa ywet (pennywort), or any green leafy vegetable that can be eaten raw
- 40g sesame seeds
- 1 onion
- 1 tomato
- 25 crickets
- 1 teaspoon salt
- 1 piece ginger, chopped
- 5 garlic cloves, crushed
- 2 tablespoons sunflower oil
- ¼ lime

Method

1. Wash and prepare the vegetables:
   - cut or slice the pennywort into small pieces and set aside
   - slice the onion into small pieces
   - cut the tomato into small pieces.
2. Wash the crickets and remove the wings and legs.
3. Heat the oil in the frying pan and fry the onion, ginger and garlic until the onion changes colour.
4. Add the crickets to the frying pan and cook until they are brown and crispy.
5. Place the cut pennywort into a bowl with the tomato pieces, the sesame seeds and a sprinkling of salt. Add the fried crickets and onion and mix well together.
6. Serve sprinkled with lime juice.

This recipe is from the book *Everyday insects* by Ei Phyu. Published by Spectrum in Myanmar.
facebook.com/everydayinsects

Photo: Wanda Wirtz

Colombia: Hormigas culonas

Ingredients

- Hormigas culonas (large, leaf-cutter ants)
- Water
- Salt
- Butter or lard

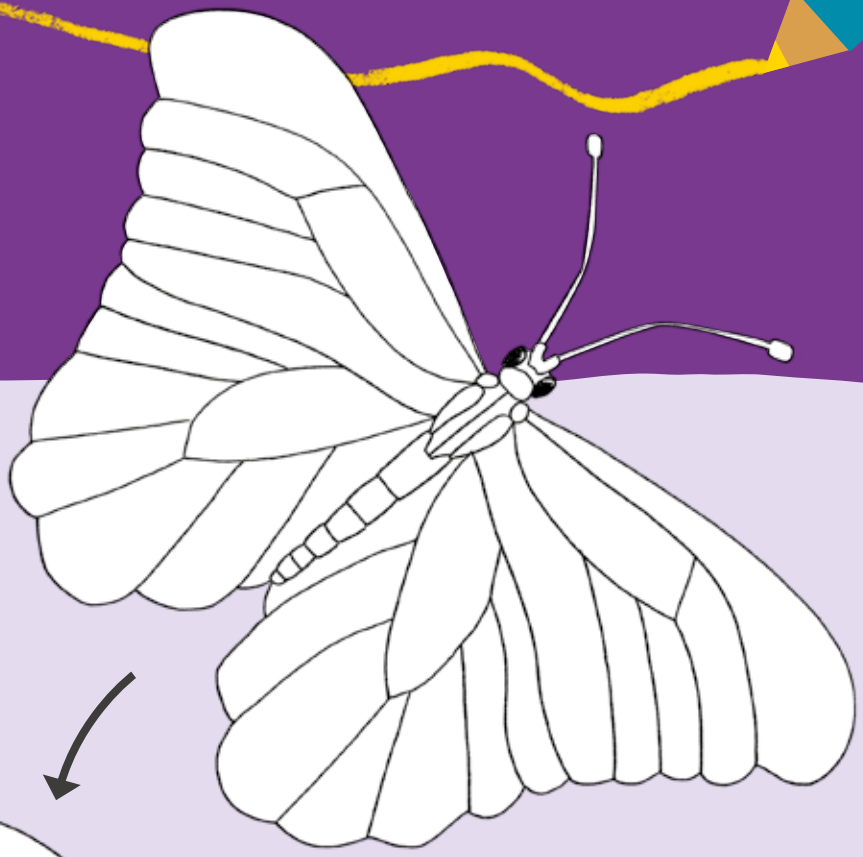
This is a common way of cooking hormigas culonas in Colombia.

Method

1. Gently remove the wings, head and legs from each ant.
2. Soak the ants in salty water for a few minutes.
3. Heat a clay pot or iron pan, lightly greased with butter or lard.
4. Drain the ants and toast them in the pan until they are crispy, stirring constantly so they do not burn.
5. Sprinkle with a little salt and serve.

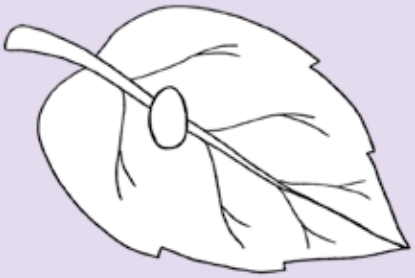
Children's zone

Beautiful butterflies



Butterflies are found all over the world and many have beautiful colours and patterns. What do the butterflies look like where you live?

Butterflies have four life stages: egg, caterpillar, chrysalis and butterfly.

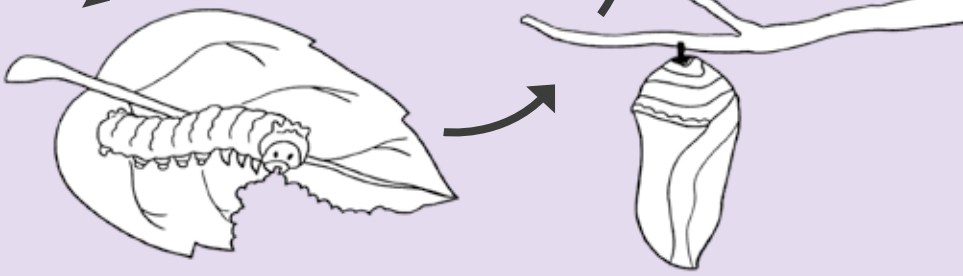


Stage 1: egg

The female butterfly lays her eggs on the leaves or stems of plants. Inside each tiny egg, a caterpillar grows.

Stage 2: caterpillar

Once it is big enough, the caterpillar eats its way out of the egg and then starts to eat the leaves of the plant. As it grows, its skin splits open, revealing a new, larger skin underneath. This happens several times.



Stage 3: chrysalis

Eventually, the caterpillar uses silk to attach itself to a leaf or twig. It then sheds its skin one last time to become a chrysalis. The outer surface of the chrysalis hardens into a protective shell. Inside, the caterpillar changes into its adult form.

Stage 4: butterfly

After a few weeks the shell splits open and a beautiful butterfly comes out! The butterfly waits for its wings to dry and then it flies off to find a mate, and to drink the sweet nectar that is found in flowers.

Bible verse memory challenge!

Can you learn this Bible verse?

'Therefore, if anyone is in Christ, the new creation has come: the old has gone, the new is here!'

2 Corinthians 5:17

The caterpillar is very different from the butterfly, and the butterfly never goes back to being a caterpillar. Trusting in Jesus is a bit like this. We become new people when we decide to follow Jesus.

Use crayons or pens to colour in this picture.

Natural pest management

Insects are very important to agriculture. They pollinate crops, recycle nutrients, control other insects and improve soil fertility. However, when insects start to damage crops, they need to be managed.

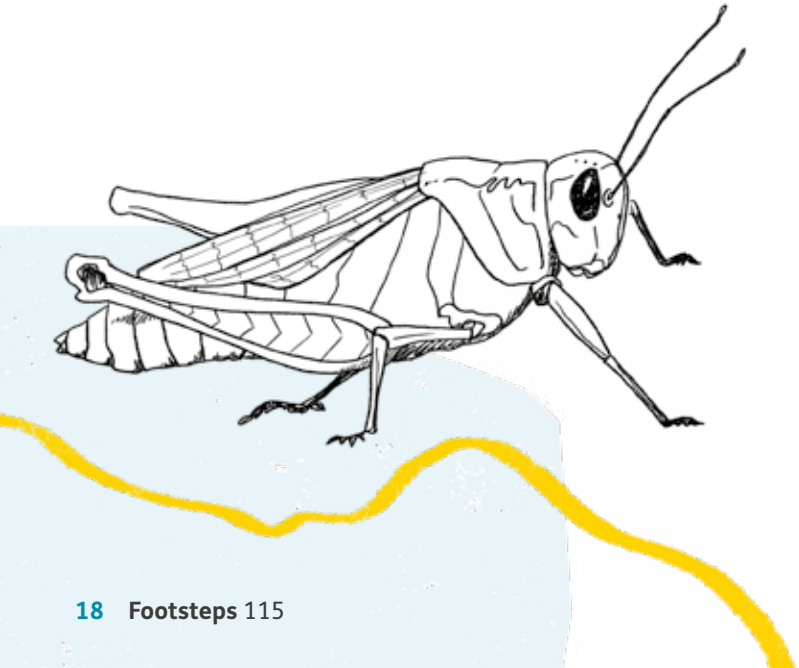
'Natural pest management' is a method of controlling insect pests without using chemicals. Instead, other insects, birds, animals, plants or mechanical techniques are used.

What is a pest?

An agricultural pest is an insect or animal that causes damage to a plant or crop. It is possible for an insect to be a pest in one situation and beneficial in another.

Common insect pests include:

- borers that weaken the plant such as termites and stem-borers in maize
- aphids that pierce the leaf or stem and suck the sap, weakening the plant and spreading disease
- beetles, weevils and caterpillars that eat leaves
- grasshoppers and locusts that bite the top off seedlings.



Learning about pests

Before deciding which pest-control method to use, it is important to learn about the pest. It would be a mistake to waste time and money controlling an insect when it is not causing any damage.

1. **Identify the pest.** For example, if there are holes in the leaves, go to the plant at different times of the day and night to see if you can find the pest in action.

2. **Learn about the pest.** Learn about its life cycle, food and natural enemies. Often there is a stage of the life cycle when it is easier to control insect pests, such as getting rid of the eggs before they hatch. A pest can be controlled by removing its food source or introducing natural enemies (predators). Talk to local farmers and agricultural advisors to find out more, or search for information about the insect online.

3. **Monitor the behaviour of the pest.** Does the pest appear on a seasonal basis? Can it be found all over the plant or crop, or only in certain places? Is the pest increasing or decreasing in number?

4. **Decide when to take action.** Biodiversity is important and we should try not to disturb the natural balance of ecological systems unless it is absolutely necessary. It is only worth investing money in pest control if the cost of damage caused by the pest is greater than the cost of controlling it.

5. **Evaluate the effect.** After a natural pest-control method is used, evaluate its effect. Will you use this method again, or should another be tried? Did the method affect other insects? Was that a good or a bad thing?

Chemical pesticides

Chemical pesticides have many disadvantages. Although they remove the pest, they also kill many of the insects that are useful to the crop. If not used carefully, pesticides can pollute soil and water supplies and make people unwell.

The benefits of chemical pesticides decrease over time as pests become resistant to them. This means that the pesticide kills the weaker pests, leaving the strongest to breed a new generation that is not affected by the pesticide.

Natural pest controls

Once you have discovered all you can about the insects that are affecting your crops, you can decide on the best method or methods to control them.

Plants

- Grow different types of plants together to reduce the movement of pests between rows. For example, if radishes are planted next to melons, beetles will not move between the rows because they do not like the taste of radishes.
- Protect the main crop by surrounding it with strong-smelling plants that many insect pests do not like, such as garlic.

Predators

- Grow non-agricultural, seed-producing plants and trees to attract birds that eat insect pests.
- Attract insect-eating animals by growing plants they like to eat, or that provide shelter and protection from other predators. Toads can eat thousands of insects each month, including cutworms, ants and caterpillars. Spiders also eat many insect pests.
- Encourage beneficial insects such as ladybirds by ensuring that there are plants and flowers nearby that they can feed on. Ladybirds can eat 40–50 aphids each day and their larvae can eat even more.

Mechanical control

- Pick larger insects off plants by hand. (This is effective in small plots before the pest breeds, but is not a practical solution in large fields).
- Cover fruit and vegetables to protect them from flies and other insects.
- On small plots, use sticky insect traps.

Natural pesticides

Pesticides can be made using natural ingredients. For example, caterpillars, aphids and ants can be controlled using a red chilli pepper spray.

To make the spray:

- chop up a cup of red chilli peppers and add two litres of water
- leave to stand for two to three days, or boil for 15 minutes
- mix in a handful of soap power and then filter the liquid through a piece of cloth
- spray onto crops in the evening: once a week in dry weather and three times a week in wet weather
- wash crops before consuming.

Further reading

- *Footsteps 110: Farming for the future*
- *Footsteps 77: Food security*
- *Footsteps 54: Household agriculture*

Download from **learn.tearfund.org** or write to us to receive printed copies. *Footsteps* is available in English, French, Spanish and Portuguese.

Case study
Controlling fall armyworm

Fall armyworm, the larva of a type of moth, has been damaging crops and contributing to food insecurity across many parts of southern Africa since 2015.

During the 2016–2017 growing season, farmers in Malawi's Rumphi district made an interesting observation. They noticed that crops being grown using conservation agriculture techniques were less affected by fall armyworm than the other crops in the area.

This observation resulted in a three-year research project led by Tearfund partner Synod of Livingstonia Development in collaboration with the University of Livingstonia and Lyunyangwo Research Station. The research, funded by the Scottish Government, involved 300 local farmers.

An infestation of fall armyworm has devastated this maize crop. Photo: Colin Cosier/Tearfund

Benefit of mulch

One of the main principles of conservation agriculture is permanent ground cover. This reduces the risk of soil erosion, keeps the soil moist and reduces the growth of weeds. To achieve this, a layer of vegetation is often added to the soil as a mulch.

The research found that plots where conservation agriculture techniques were used showed the least number of fall armyworm eggs, caterpillars and crop damage. The scientists think one of the main reasons for this is because mulch allows a wide range of organisms to thrive in the soil and some of them – probably ants – feed on the eggs of the fall armyworm.

Muchi, one of the farmers involved in the research, was delighted with the results. He said, 'I consider this as a game-changer for my farming. I am now able to limit the attack of armyworms in my maize field and harvest higher quantities of maize.'

Further reading

Conservation agriculture newsletter

Canadian Foodgrains Bank publishes four newsletters on conservation agriculture each year in English, French, Kiswahili and Portuguese.

Download from **foodgrainsbank.ca**, email cfgb@foodgrainsbank.ca or write to Canadian Foodgrains Bank, PO Box 767, Winnipeg, MB, R3C 2L4, Canada.

Community

Make a mosquito trap

Do you make your own insect traps? If so, please let me know how you make them and send me your photos!

Here is a simple mosquito trap that I have made in the past. It releases carbon dioxide and the mosquitoes mistake it for the breath of humans and other mammals.

The trap only catches a few mosquitoes so it is important to take other precautions to avoid being bitten, such as sleeping under a mosquito net impregnated with insecticide.

You will need:

- a cup of hot water
- quarter of a cup of sugar
- one gram of yeast (one third of a teaspoon)
- an empty two-litre plastic bottle

Method

1. Cut the bottle in half around the middle.
2. Heat the water, add the sugar and stir until it has dissolved.
3. Once the solution has cooled, pour the mixture into the bottom half of the bottle and add the yeast to begin the carbon dioxide reaction.
4. Remove the cap, turn the top of the bottle upside down and push it into the bottom half of the bottle to create a funnel.
5. Use some tape or string to hold it in place.
6. To increase the effectiveness of the trap, secure a black sock, cloth or piece of paper around the outside.

Looking for a meal, mosquitoes enter through the funnel and then drown in the liquid. Every two weeks empty the bottle and add more mix.

Jude Collins, Footsteps *editor*

I hope you like *Footsteps* magazine's new look! We have changed the design to make it easier to read, use and share.

Have you listened to our podcast yet?

You can listen to all episodes of our 'How to build community' podcast at **tearfund.org/podcast**. Let me know what you think!

Interview

Urban cricket farming

Chan Tola Cheam is a cricket farmer in Cambodia. Here she tells us more about it.

Why did you decide to rear crickets?

I really like the taste of crickets. When I was young we used to catch and cook them and they were so delicious. People sell crickets along the side of the road but I tend not to buy them because I do not know if they are fresh or safe to eat.

About four years ago, my church started to go through the Umoja process. This process encourages churches and communities to look at the resources they already have, and to learn new skills from each other.

A pastor in my Umoja group was rearing crickets at his home and when I saw how simple it was, I thought maybe I could raise them too.

How did you get started?

My husband agreed that we should try farming crickets on our rooftop. With technical support from the pastor we prepared two tanks using metal for the frames and medium-density fibreboard for the sides. Each tank is about 1 metre deep, 1 metre wide and 2.5 metres long.

Cricket eggs take about ten days to hatch and then the crickets are ready to harvest 40 to 60 days later, depending on the type. Our first harvest was about 15 kilograms. I cooked them all and shared them with family and friends.

What happened next?

I decided to try selling some of the crickets from the next harvest. I asked around but the street sellers did not give me a good price, so I started to sell them online.

Initially I only sold raw crickets, but many people started asking me to cook them first. I could not keep up with demand so I expanded my business.

Chan Tola meets all the needs of her crickets including food, water and egg boxes for shelter. Photo: Kagna Sorn/Tearfund

Chan Tola cooks the crickets according to the different tastes of her customers. Photo: Kagna Sorn/Tearfund

I now have six tanks on the roof housing crickets at different stages of development.

How do you look after them?

Crickets eat many types of green vegetables and plants which I collect from around the house. I was told not to use vegetables from the market because they might contain traces of pesticides. This can kill the crickets.

If it gets too hot or too cold the crickets might die, so it is important to protect them from the sun and rain. Nets over the tanks protect the crickets from birds, and engine oil spread around the outside of the tanks helps to stop ants from crawling in and eating the eggs.

How are the crickets processed?

First I clean the tank and discard all the waste and dust. Next I put down clean egg boxes and the crickets settle into them. I then shake the crickets into a bucket of water where they drown.

> **‘I appreciate the flexibility that cricket farming brings as it leaves me time to do other things during the day.’**

I wash them and deep-fry them in oil with lime leaves. The customers can decide what else they want me to add depending on their tastes: green onions, garlic, sugar or chilli, for example.

What are the benefits of rearing crickets?

It is a good business. I can sell 40 to 50 kilograms of crickets each month for five dollars per kilogram raw and 12.5 dollars per kilogram cooked.

I appreciate the flexibility that cricket farming brings as it leaves me time to do other things during the day. My family and I also enjoy having plenty of tasty crickets to eat!

Umoja, which means ‘togetherness’ in the Swahili language of East Africa, equips church leaders and their congregations to work together with their local community to bring about transformational change.

Umoja materials can be downloaded free of charge from **learn.tearfund.org** *in multiple languages.*

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A tasty snack

By Andrew Osuta

November is the month to harvest, sell and celebrate nsenene, a type of bush cricket and Uganda's favourite edible insect. This type of cricket – *Ruspolia differens* – has been consumed in Uganda for centuries.

The humid air of Uganda's second rainy season causes swarms of nsenene to migrate across the region in search of food and mating partners. Hundreds of trappers take to the streets and fields, and there is a buzz of activity surrounding the capture, sale, preparation and consumption of this seasonal delicacy.

'When November rains came, we knew the nsenene were also going to come. We used to rush into Arua to catch them because it was the only place with reliable electricity,' recalls Flora, a 28-year-old harvester who spent a lot of time catching the insects by hand when she was a child.

Electricity has now arrived in Flora's town and each November electric bulbs are attached to large iron panels. The light attracts the crickets, they hit the iron panels and then they fall into polythene sheets.

'My best harvest was in November 2018 when I sold nsenene for 6 million shillings (USD 1,644),' says Flora.

Women congregate near the fruit and vegetable markets and lay out green, brown and yellow nsenene on woven trays. They sell the insects in any quantity – even by the spoonful – so everyone can afford to have a taste of this delicious, nutritious snack. Children and women carry hoppers full of the insects on their heads, selling them to eager passers-by.

Most village savings groups register increased savings in November due to the processing and sale of the insect.

Fried crickets with onions in Uganda.
Photo: Mariya Sukhoveyko/Shutterstock

'In nsenene, there is no loss!' says Asiku, a local electrician often hired to wire up the bulbs at harvest time.

Andrew Osuta is a nutritionist with Action Against Hunger in Uganda. **actionagainsthunger.org**

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