Anita Roddick, Founder Body Shop
Over a third of the world’s food is grown in the gardens and plots within the town boundary and as agriculture gets bigger, more mechanised and more controlled, we grow fewer varieties. It’s here in the garden where we can do our bit to promote diversity, not only in varieties grown but in taste.

You know they feed the world and nurture the earth. This is what we can do if we are lucky enough to have a plot to grow our food from that tastes of something. Want to be inspired? Then stayed tuned to this week’s Hands On.

NARRATOR
Kenya’s Rift Valley. Its uplands are the county’s market garden. With good soil and benign climate, almost anything will grow. Elsewhere it’s a different story as poor farmers leave the land to work in the city.

But there are other ways to make farms more productive, grow more food and even create jobs for school leavers.

Now this message is being delivered direct to farmers and the messengers are school children.

At Nayanduhuru primary school it’s time for maths. All the examples are practical ones rooted in the soil behind the school where the children are growing crops.

Veronica Waihenya, Nyandarua Primary School
When we tell them about the gardening that you are going to the garden and you introduce them, they are really happy about it, they are excited, and everybody all, every child want to participate in the work.

NARRATOR
Agriculture is central to the syllabus thanks to Gardens For Life a scheme being run in three countries by the UK’s Eden Project and Department For International Development, DFID.

In class they learn about agricultural theory, nutrition, science and economics, while in the garden they get their hands dirty and gain hands-on knowledge of the food production cycle.

Emily Ajema Saland
I feel so happy, you know, you see the way it is coming up the first, the shoots. We are so happy about it and then I’m going to take it, eat it, and feel good because you are the one who worked for that, for that, for the upcoming of the plant.

NARRATOR
The pupils follow different crop cycles across the seasons. What they take home is practical knowledge of the latest farming techniques, precisely the aim of the programme.

Most come from farming families with little or no education.

Veronica Waiheny
They are doing what we call the mixed farming. You get somebody putting the maize, beans, potatoes in the same plot and if they were mixed it together but now we try to re-educate the children or to educate them that when you put them separately they do better, because they don’t compete of the nutrients.
NARRATOR
Small farms like this show how traditional cultivation doesn’t always work. Mixed crops are overgrown with weeds, lack water and are invaded by pests.

In the past farmers have learnt from advisors but with Gardens For Life, the children are the teachers.

Frederick Gichohi
I’ve come a very big person. I’d like to be an agricultural also.

NARRATOR
Former pupil Joseph Wanjuki has taken his lessons home. He’s been given a corner of the family’s land. His grandmother is so impressed she’s already tried her hand growing one of her own crops.

Peris Wahjiru
This is where I grow my maize. I wish you’d seen it before I harvested it. I had it planted properly in rows just like my grandson showed me how.

Joseph Wanjuki
I feel proud when I play, I plant some spinach in this part in this land then my family can, can compassionate me and tell me to continue.

NARRATOR
Gardens For Life isn’t only about knowledge.

Pupils come from one of the poorest villages in the area where malnutrition is common but with the help of a water pump and irrigation, the garden is growing food for all.

Once harvested, crops go straight to the kitchen for school dinners. For some children these school dinners are their only balanced meal.

Francis W Muchuni, Munyaka Secondary School
I have a mission to continue farming because you cannot exist without eating and you must eat for you to live.

NARRATOR
Pupils also learn how to make farming profitable. Local grocers are now queuing up to buy from their garden. It’s now one of the best local suppliers.

Margaret Njeri
They have so many vegetables, they’re always fresh and they are better quality because the leaves haven’t been half eaten by worms. It’s changed our lifestyle because there’s a constant supply of vegetables now even during the dry season.

NARRATOR
Profits go back to the school and in the local village people can now buy fresh vegetables all year round.

Eunice Mjugi, Munyaka Secondary School
Farming is a good business and my future forecast to be a farmer to be growing, eating every crop that we have been growing in school so that people outside there can know more about them.
NARRATOR
The Scottish Highlands. Usually regarded as poor land for farming anything except sheep. No longer.

These flowers and rich soil show it’s possible to turn barren land into a productive garden, so what’s the secret?

Moira Thomson
It’s very poor land.

The farmers stopped growing vegetables fifty years ago but here we’ve used a mixture of volcanic rock dust and composts to create new soils on this barren land and now we can grow bumper vegetables.

So come and see how we have done this.

NARRATOR
Rock dust is a waste product of large-scale quarrying. It contains minerals and nutrients trapped in the ground for millions of years.

It’s claimed to deliver the same minerals to the soil as natural geological features like glaciers or volcanoes.

Cameron Thomson
Live micro-organisms have never been exposed to this. When you apply rock dust to the ground, the calcium and magnesium content in the rock dust combines with atmospheric carbon that forms carbonates and the carbon comes out of the atmosphere back down to earth in the rainfall.

Moira Thomson
This is our compost and rock dust mixture here. Underneath here is actually very moist. The rock dust helps to hold the moisture in. This is why we think it could be helpful in arid regions to actually help people to grow soils and keep them moist.

NARRATOR
It might seem like a simple case of crushing the odd rock to a powder and sprinkling it on the soil but it’s not quite that easy.

The perfect dust comes from glacial gravel or volcanic rock like basalt. The Thomsons favour the volcanic rock widely found in Scotland.

Moira Thomson
That’s the rock dust. It has seventy-eight plus minerals and trace elements in it and this is what’s lacking in all soils over the whole world. We need to replace these minerals and this is the simplest way to do it.

NARRATOR
Rock dust success is partly due to earth worms which condition the soil by mixing minerals in the dust with organic material.
Moira Thomson
Some worms, the worms earthe the rock dust they really do all the work. They eat it and in the worm casts we have carbon and minerals, lots of trace elements readily available to the plants. This is how rock dust works.

These are worm casts. They’re usually brown and slimy with hardly any dry powdery matter and you can see all the sparkles, all the minerals in there, minerals and trace elements that the worm has actually eaten and when they come out the other end of the worm, all this glitter is released to the soil, to the plant roots.

NARRATOR
Cameron and Moira see rock dust as part of the solution to climate change. More fertile soils and richer plants mean more carbon dioxide can be absorbed.

Cameron Thomson
The carbon that used to be the deep soil and giant trees is up in the atmosphere along with our fossil fuel carbon. Now every quarry on the planet has rock dust and if we really wanted to, we could apply rock dust to the hills, to the deserts, to agricultural land and what do you think would happen? Everything would grow. Carbon would come out of the atmosphere.

NARRATOR
Cameron and Moira’s years of dedicated research are now yielding results so impressive that the authorities in Scotland have invested in sixty-four plots of land: thirty-two growing crops with rock dust and thirty-two without. The first ever UK field trials using rock dust as an agricultural fertiliser. In this corner of Scotland the Thomsons’ sustainable ecological earth regeneration centre is now open to the public as a showcase for the transformative powers of rock dust.

Moira Thomson
You don’t need GM, you don’t need chemicals. You can grow organic bumper produce with rock dust.

NARRATOR
In northern Thailand, farmers are discovering they can boost their soil’s productivity with mineral-infused clay called Bentonite. The clay comes from weathered volcanic ash used for centuries as a traditional medicine.

NARRATOR
Poorly managed sugar cane and cassava crops grown for export have exhausted the land of its precious minerals. Meanwhile over the past thirty years, 80% of the region’s primary forest vital to protect the soil from the sun and feed it with nutrients has been destroyed.

Andrew Noble, International Management Institute
What we’ve got here is soil and the forest, and you can see in the top ten to fifteen centimetres it’s dark and black. The reason for that is because it’s got high amounts of organic carbon.

Well here you’ve got land that’s been under production for the past forty years and you can see that top ten/fifteen centimetres. There’s no dark colouring, it’s bleached white and low nutrient holding capacity, low physical or structural stability, low water holding capacity and that’s due to the loss of organic matter.
NARRATOR
Over the past two years field trials have used bentonite clay as a fertiliser on a variety of crops in a project supported by the Consultative Group on International Agricultural Research, CGIAR. The eighty-seven participants share their results with farmers’ networks across Thailand.

Andrew Noble
Bentonite is a locally available product here and is sourced down on the central plains. The approach that the farmers have taken is mixing them with the soil with composted rice husk and chicken manure and Bentonite on a one to one to one basis, producing a product like this which has all the attributes that you want as a growing media for crops and plants.

Sungwian Pradermdee
I heard about bentonite at a local farmers’ network meeting and I introduced the technology to our farmers here. We’ve tested it and found that we have a very good production but I hope that the soil will be better now. Poor soil is everywhere in the world, and if farmers use this technology they’d find improvement without using toxic materials.

NARRATOR
This farmer has a holistic approach to farming. He uses water from his pond for irrigation, raises fish, produces his own biological fertiliser and grows everything from spring onions to organic rice. He’s been trying out bentonite and the results are clear.

Piratn Chunsir
Nearly every crop has improved through the application of bentonite. It’s easy to forget things so I always try to record the results I observe, the changes that have taken place before and afterwards. We want to share this knowledge through our networks because that way you can help the poor families in Thailand.

NARRATOR
Traditionally farmers looking for soil enhancers used material dredged up from excavations or from termite mounds. It’s effective but scarce and needs large quantities.

Andrew Noble
This farmer here has taken lately sourced termite mound materials and built these terraces to form a vegetable garden.

Here you can see that the growth is pretty good but in fact within two or three years it would diminish. If she had used bentonite, the responses would be just as good and if not, the persistence much longer.

NARRATOR
These students are training as organic farmers. They have been taking part in controlled trials in this paddy field using different fertilisers. Here they’re harvesting one quadrant a metre square from each plot.

Andrew Noble
As you can see that the middle one here, number two, this is veg material and you can see quite clearly that the yield here is much much lower than that of termite mound material and on my right here on bentonite.
Farmer
We think we’ll start using this bentonite because as we see, it has good results and has a better capacity to supply nutrients to the plants.

Andrew Noble
What we have done here is prove the concept of using clay materials as a means to rejuvenate these degraded soils and we do know that it is cost-effective from both the cost of material and the yield or production increases. It’s really up to farmers now to take, take it and run with it as well as the commercial sector who would do the marketing and providing of the materials.

NARRATOR
Bolivia. Traditionally native potato varieties, papas Andinas, were a staple for Andean farmers but the range being cultivated has steadily decreased.

To stop this decline, farmers are starting to experiment while a potato association is going back to native varieties improving them and selling them in the city.

Martin Ortiz, Native Potato Producers Association
Now we have to produce and multiply more seeds and increase the size of the potato association because we need more of us to satisfy demand.

NARRATOR
Just twenty-six years old, Martin Ortiz is a native potato entrepreneur. He’s president of the producers association which has started to grow more native Andean potato varieties in a project run by NR international and DFID.

Martin Ortiz
These potatoes were grown by our grandparents and great-grandparents. Before we’d keep these native potatoes for our own use and we’d eat them on special occasions like festivals and birthdays and we didn’t ever sell them in the markets, but they’re very good to eat.

NARRATOR
The potatoes are dug up and sorted into varieties, then they’re put into sacks and taken on horseback to the packing centre.

The potatoes are weighed, washed and put out to dry. Any duds are discarded. They’re growing several varieties that were in danger of extinction.

After bagging and weighing, they’re labelled with their potato type and on the back a selection of four traditional Andean recipes.

Finally they’re delivered to supermarkets in Santa Cruz and Cochabamba. Martin’s been dealing with them for just over a year.

Martin Ortiz
We went to the supermarkets with samples which we carefully bagged and labelled so they could try them out. Then about a week later they came back to us and said that they’d liked them there in the city.
NARRATOR
They also supply a manufacturer who produces native potato crisps alongside the usual brands. The interesting shapes and colours are a hit with city dwellers.

Claudio Velasco, Innova
By bagging the potatoes or selling them for crisps, the farmers are adding value to the product.

In doing so they’re making sure that they can access the market.

NARRATOR
Potato growing is a success but the farmers don’t want to fall into the monoculture trap.

The potato association is constantly trying out other crops to complement potatoes, and nurture the soil.

Felix Vedruegz
So this is an experiment. We’ll see over the next one to six years after growing this forage crop, I’m going to plough this land again and plant potato seeds, then I’ll see what results we get.

NARRATOR
About an hour and a half from the capital La Paz, three hundred farmers within a hundred kilometre radius gather at a technology fair, a chance to compare notes on how their experiments are going.

Buses ferry groups to different trial plots so farmers can see which techniques might work for them.

Claudio Velasco
What’s good about this way of working is that we don’t claim that these technologies are definitive or complete. The idea is that we work with the farmers to constantly adapt and improve them to make sure the innovations suit their needs.

NARRATOR
Northern Tanzania.

Every year when the rains come and the crops are newly planted, farmers worry about losing an entire year’s harvest and their livelihood to one of East Africa’s most voracious pests, the army worm.

It’s the end of the dry season and farmers are planting maize.

Standing guard is the latest weapon in the farmer’s arsenal, a moth trap designed to catch the army worm in its early stages.

The trap is part of a new early warning system. It’s baited with a female sex hormone which lures the male moths into it.

In the morning the trap is checked and the moths counted. It’s not designed to cut moth numbers dramatically but it can alert farmers if a plague of worms looks likely so they can raise the alarm.

The person with the strongest lungs is given the job of warning the farmers in the fields. No one can say they weren’t told.
Rogati Kiwale  
When the announcement is made, we do the monitoring.  

By shaking the maize leaves we find the very young larvae.  

And if we see the larvae then we take control measures immediately.  

NARRATOR  
For those with money, the next stop is the local pesticide shop.  

Janet Mossi, Agrovet  
It’s a situation like panicking when the farmers find the army worm in their fields and most of the farmers rush here to buy insecticide and take advice on how much they should use.  

NARRATOR  
Using toxic and expensive pesticides isn’t ideal and most can’t afford them.  

New research from the Natural Resources Institute supported by the UK Department for International Development’s crop protection programme may have the answer.  

Until recently little was known about the army worm or its lifecycle. After years of scientific trials it seems a natural bio-pesticide could do the job.  

Nucleo-polyhedrovirus, or NPV, is lethal to the army worm and the bodies of dead caterpillars remain highly infectious.  

These can be collected, freeze-dried and pulverised to a deadly powder. The virus kills the caterpillars but is completely harmless to everything else.  

Wilfred Mushobozi, Army Worm Novel Control Project  
We found that up to 90% of the farmers cannot afford to buy chemical insecticides.  

NPV is the cheapest method of controlling the army worm. We are talking about one dollar per hectare and it’s the safest method.  

We can apply the NPV in a very environmentally sensitive area without damaging any environment.  

NARRATOR  
It’ll take some years to collect enough NPV-infected caterpillars to roll out the scheme across the country but combined with the early warning system, it could soon be saving many farmers from the scourge of the worm.