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Earthworms churn out organic manure cash for Trans Nzoia scientist

Expert in vermicomposting bets on eco-friendly venture to ease the use of artificial fertilisers linked to emissions

By PAULINE ONGAJI

When James Wafula started California Vermifarm, focusing on earthworm farming back in 2018, it was just a part of an academic project.

But along the way, this endeavour has grown into both a money-making venture and environment conservation initiative.

At California Vermifarm, which is located at Sibanga Market in Kitale, Trans Nzoia County, Mr Wafula specialises in vermicomposting, the process of turning organic debris into worm castings (manure).

"Here, I look into ways of enhancing the nutrient content of vermicompost by including in their feedstock green biomass that is known to contain relatively higher amounts of potassium and nitrogen than other green leaves. The nutrient content of vermicompost depends on the type of feedstock they are given," he says.

On his farm, Mr Wafula who holds a master of science degree in Renewable Energy from Oldenburg University, Germany, has several demonstration plots where he studies the effect of different mixtures of fertilisers on plant growth. The former Energy ministry official also graduated from the University of Nairobi with a bachelor of science degree in chemistry.

Through this farming, there is vermicast production also called worm castings, worm humus, worm manure or worm faeces, which is the end-product of the breakdown of organic matter by earthworms. At the moment he has a production capacity of about 10 tonnes.

Then there is the production of vermitea, a lateral product of the vermicomposting process, which contains nitrogen, phosphorous, micronutrients, hormones and earthworm enzyme, which promote plant growth and yield as well as increase the resistance of the plant to disease and pests.

"I also produce Eisenia fetida, known under various common names such as manure worm or redworm. This is a species of earthworm, which I sell to other farmers," explains Mr Wafula.

But apart from the business side of it, this farming has immense environmental advantages. "The right proportion of organic, biofertiliser and chemical fertiliser can produce an equivalent yield of the crop as that produced by chemical fertilisers. We can, therefore, decrease our use of chemical fertilisers. The latter has been known to increase the emissions of carbon dioxide and nitrous oxide from the soil. Both of these are greenhouse gases."

His inspiration to venture into this stems from his experience with the biogas dissemination programme while at the Ministry of Energy.

"I wanted to add value to the effluent from the biogas plant by producing an improved organic fertiliser. By using the effluent (cow dung slurry) as part of the feedstock for earthworms, vermicompost can be produced," he says.

Though rewarding, this venture requires skill and caution. "For instance, when it comes to choosing vermibedding, any biodegradable material that provides the worms with a relatively stable habitat, you must ensure that it has high absorbency. This is because worms breathe through their skins, and therefore must have a moist environment in which to live. There should also be good bulking potential because worms require oxygen to live."

Apart from that, he says, there has to be high carbon and low protein (nitrogen) content. "High protein levels can result in rapid degradation and its associated heating, creating inhospitable conditions," explains Mr Wafula.

Also, though earthworms will consume many types of dried animal manures and biodegradables, you have to ensure that the feeds containing high amounts of carbohydrate or woody residues are composted beyond the heating stage.

"The feed and supplements can be spread on top of the bedding about three-four inches deep. Food scraps should be pre-composited or covered to prevent fruit flies and other pests. Feed the worms regularly (once or twice a week). When all of the feed has been consumed, it is time to feed again. If too much feed is added, the beds may overheat, become anaerobic (oxygen-deprived), or too acidic," he explains.

Nutrient tests are usually carried out at the Kenya Agriculture and Livestock Research Organisation labs. One should also look out for predators including mites, birds and ants such as safari ants, he says.

"For this reason, enclosing the vermicomposting site with wire netting can mitigate bird invasion. Ants can be controlled with insecticide powders sprinkled cautiously at the base of the vermibed bins," says Mr Wafula.

Harvesting beds or bins, he says, may be accomplished by several methods. "The common harvesting technique is using either brilliant sunlight or bright light shining overhead to drive the worms deeper into the pile to escape the light," he says.

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What About Livestock? Here's how Kenya and ILRI are Building Climate Resilience in the Sector

In its fight against climate change, Kenya gets crucial research support for its big and growing livestock sector

PHOTO | ILRI/GEOFFREY NJENGA

Kenya is a leader in climate-change research and policy in Africa. ILRI takes great pride in partnering with Kenya on work that is improving the livelihoods of its smallholder farmers and herders, as well as food and nutritional security for the whole population.

The multi-year series of droughts ravaging Kenya's vast north-eastern drylands is but the latest alarm bell ringing of the dangers a changing climate is bringing to this largely rain-fed agricultural nation. As pastures and riverbeds dry up, an estimated one and a half million livestock have been lost and three and a half million livelihoods devastated.

Following three consecutive poor rainy seasons, the country's pastoral households, normally so resilient, are finding themselves no longer able to cope. Unable to keep most of their stock alive, to feed and nourish themselves adequately, or to continue to educate all of their children, households and communities here are being forced to ask for support, which Kenyan and humanitarian agencies are providing.

But the Kenya Government is doing much more than that. As a major livestock-producing country, Kenya is specifically targeting efficient livestock management in its 'climate-smart agriculture' agenda. This includes Kenya's plans to reduce its greenhouse gas emissions as stipulated in its 'nationally determined contribution' to achieve the global temperature goal set out in the 2015 Paris Climate Accords.

Partnering with Kenya in this work to develop its livestock systems in the face of climate change is the CGIAR's International Livestock Research Institute (ILRI).

ILRI works directly with Kenya's government ministries, research agencies, private companies and local communities to help solve problems faced by the country's millions of small-scale livestock farmers and herders trying to produce food under a drying, harsher and more erratic climate.

Much of this joint Kenya-ILRI climate change work falls in four broad areas.

1) Developing climate-smart livestock policies and solutions

Joint ILRI initiatives with Kenya's Ministry of Agriculture, Livestock, Fisheries and Co-operatives, are helping to guide implementation of the Kenya Climate-Smart Agriculture Implementation Framework and other national climate-related policies.

ILRI's Mazingira ('Environment') Centre is determining reliable greenhouse gas emission factors for livestock, to help Kenya and other African countries more accurately report on their greenhouse gas reduction targets.

ILRI is also supporting Kenyan livestock solutions to climate change that provide both greater gender equality and more jobs for the youth. And ILRI has helped Kenya improve the efficiency of its livestock production systems, which enhances livestock yields while reducing livestock greenhouse gas emission intensities via better feeds and breeds and better management of rangelands and manure.

2) Implementing early warning and climate information systems

ILRI and Kenyan experts are building tools that help the country to prepare for climate shocks. ILRI leads a programme in Kenya, for example, called Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA), which makes climate information services and climate-smart agricultural information more accessible to smallholder farmers. This joint ILRI-Kenya work includes the Kenya Agricultural Observatory Platform, which is developing a web-based dashboard bundling climate and agricultural advisories.

ILRI and Kenya host the Jameel Observatory for Food Security Early Action (https://jameelobservatory.org/), which is creating open innovation 'labs' where observatory partners, collaborators and a wider community of practice can connect to identify bottlenecks to climate-related food security and nutrition in drylands.

3) Building more efficient livestock markets and value chains

ILRI is working with Kenya to develop or refine livestock market information systems and value chains. One of these, KAZNET, uses a mobile phone app to crowdsource market data in pastoral areas so that livestock producers and traders have ready access to the same information on livestock prices.

4) Expanding local capacity in developing profitable, safe and sustainable livestock systems

A major climate change objective of both ILRI and Kenya is greater knowledge exchange and local capacity in research on livestock herding and mixed farming systems.

Through the Programme for Climate-Smart Livestock, ILRI and Kenya have created knowledge resources encouraging farmer-to-farmer training while promoting local knowledge and practices on climate adaptation and mitigation. And through their many training and fellowship opportunities, ILRI and Kenya are enhancing the capacity of hundreds of Kenyan researchers, technicians and partner staff to support Kenya's national climate change agenda.

For more information, go to www.ilri.org or email ILRI-Kenya@cgiar.org