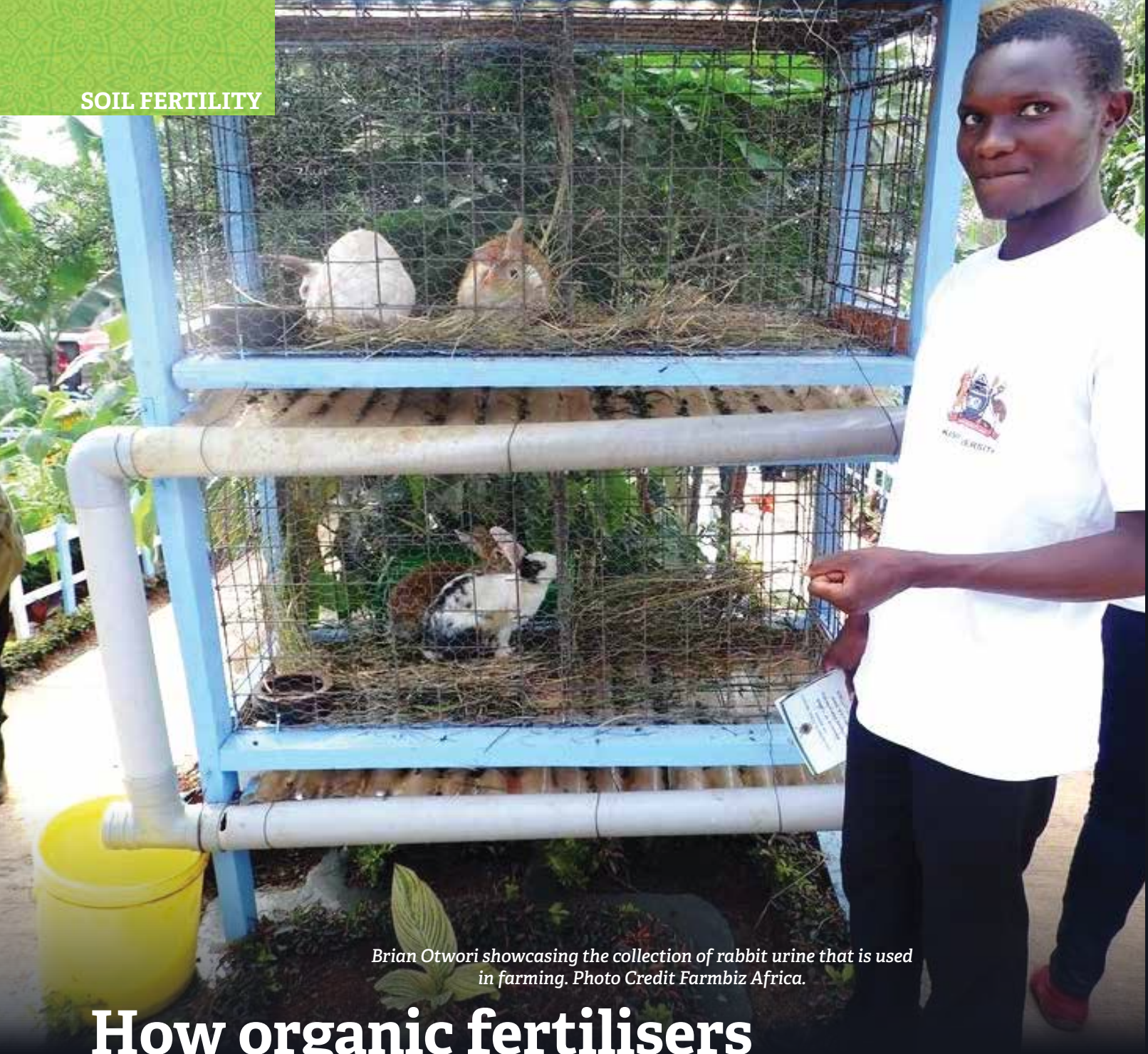

Brian Otwori showcasing the collection of rabbit urine that is used in farming. Photo Credit Farmbiz Africa.

How organic fertilisers regenerate soils

By Ruth Anita Vaughan

NATURAL organic fertilisers are derived from animal or plant matter, manures, algal and seaweed products, and organic wastes from processing and food industries. They tend to have a high carbon content and be more diverse in nutrient content, are slower acting and longer lasting. They benefit agriculture by not only adding important plant nutrients, but also building soil organic matter (SOM) and soil fertility.

SOM is critical for soil function and soil quality.

Soil quality is defined as the capacity of a soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance soil and water quality and support human health and habitation. Years of intensive farming using inorganic

fertilisers and aggressive tilling techniques have burnt off the SOM and damaged the structure of the soil and its capacity to function properly, which has left us relying more and more on chemicals to maintain our food production. Organic fertilisers are a part of the process required to regenerate our soils.

Climate change, global warming and carbon footprints are key words that we hear more and more. Climate change threatens our very existence on this earth. A move towards integrating organic fertiliser use into our farming systems has a huge positive capacity to alleviate climate change by reducing our carbon footprint, sequestering carbon into our soils, and creating living soils that are more resilient to climate change and more productive.

In the last few years, the cost of manufacturing and shipping inorganic fertilisers around the world has risen substantially, and this cost is being borne by our farmers and governments. This has created a positive shift in the economics of producing and using organic fertilisers. Many of the organic fertilisers available today are created from biproducts of animal farming or from organic waste products from households and industry. This goes a long way to reducing waste and environmental pollution and boosting a local circular economy.

The importance of soil organic matter
Organic fertilisers contribute to SOM which is essential for many soil functions as follows:-

- Direct supply of plant nutrients through recycling and decomposition.
- Stable humus compounds hold and release nutrients, making them more available to plants and reducing volatising and leaching losses, increasing the efficiency of fertiliser use.
- Buffering high and low soil pH and high salinity effects.
- Providing a nutrient source for soil microbes thereby increasing microbial activity and biodiversity in the soil. This is not just important for plant nutrient uptake, it also reduces soil-borne pests and diseases, and is a natural bioremediation of pesticide residues, heavy metals, human pathogens and other toxins.
- SOM promotes aggregate formation and soil structure stability. This in turn improves water infiltration, water holding capacity, resistance to compaction and erosion and better root penetration, nutrient uptake, yields and food nutrient density. In Africa one of the biggest yield limitations is water. The amount of water that a soil can hold is critical in successful cropping. The breakdown of this important soil function is a main contributor to the floods and droughts that we are seeing more and more of.
- SOM buffers heavy metals, toxins and pesticides, reducing uptake by plants and improving our food safety.

Soil organic matter levels sit between about 1-8 percent for mineral soils, and depend a great deal on soil texture, soil management, vegetative cover, moisture levels and temperatures. Low organic matter levels are found in hot areas, sandy soils, and intensively farmed soils. Higher organic matter levels are found in peaty soils, low-lying flooded valleys, high altitude cold soils and organic or regenerative agricultural systems. Soil organic matter consists of actively decaying organic material that is the energy source for microbes and is important for the release and recycling of plant nutrients – this breaks down to more stable humus compounds that are important for soil structure.

Many farming activities burn off the SOM, resulting in a decline in soil health and requiring an ever-increasing amount of inorganic farm inputs to maintain yields. This includes but is not limited to mono-cropping, soil cultivation and overuse of inorganic nitrogen fertilisers. A responsible GAP farmer will monitor both the SOM level and the C:N ratio of soil annually and prepare a soil health programme including organic fertiliser use to build up SOM and then maintain it at optimum levels for maximum fertiliser efficiency, moisture storage, plant health and yields.

Organic fertilisers
Natural organic fertilisers may be produced on the farm (composts, manures, green manure crops, vermiculture etc.) or purchased in.

One novel organic fertiliser that is gaining traction fast is rabbit urine. Rabbit urine contains higher levels of nitrogen and potassium than most natural fertilisers as well as a good balance of other nutrients, in a soluble and readily available form. It is very versatile and can be used as a foliar spray or a nutrient drench. Rabbit urine and rabbit pellets contain high levels of beneficial microbes. Rabbit urine also has amazing fungicidal and insecticidal properties that can greatly reduce farmers' reliance on conventional pesticides.

Organic fertilisers vary a great deal in content, and it is important to test the exact elemental and organic composition to be able to balance nutrient applications to the soil. Organic fertilisers can contribute high levels of plant nutrients, allowing farmers to reduce their application of inorganic fertilisers and save money. One must test potential risk factors from organic fertilisers, for example: human pathogens, heavy metals, pesticide residues and toxic salts. These can be measured in the laboratory to reduce the risk attached to the using organic fertilisers. Commercial organic fertilisers in Kenya should comply to the KEBS Standard KS 2290:2018.

Humic and fulvic acids from organic fertilisers enhance plant growth positively and directly through physiological and nutritional effects. Some act as natural plant hormones and can improve seed germination, root initiation and nutrient uptake as well as being direct sources of nitrogen, phosphorus, and sulphur. One of the most striking characteristics of humus substances is their ability to interact to form complexes. By forming complexes humus can dissolve, mobilise and transport metals and pollutants in the soil and contribute to a reduction in toxicity of heavy metals and pollutants while improving the availability of essential plant micro-nutrients.

A listing of commercially available organic fertilisers in East Africa can be found on this link https://shambaza.com/organic-fertilizers.