

## Dear Reader,

The cold season is here and pests such as aphids and Fall army worm as well as diseases such as bacterial wilt and powdery mildew which thrive in extreme weather are disrupting crop growth. This edition features articles that guide you in making crop rotation schedule for potatoes, detailing information about crops that you can use to disrupt pest cycle and discourage disease prevalence in the farm.

The edition also features a guide on how to use waste from your kitchen to make highly valuable inputs useful in the farm such as bokashi fertilizer, a soil quality enhancement organic fertilizer that only takes two weeks to get ready for use in the farm. The same waste is useful as feed for black soldier flies, which are reared to be used as protein feed for poultry and livestock. We also feature an inspiring story of a farmer in Meru County, who has significantly cut down costs of production after adopting black soldier fly rearing for animal feed.

Did you know the stubborn weed blackjack has its benefits? Read on to find out how you can use it as a medicinal herb, as well as a dietary supplement in vegetable preparation. Only in The Organic Farmer Magazine.



## How to prepare and use bokashi fertilizer

By Jean Paul Mackio

To yield maximumly from the farm, farmers need to understand the needs of the soil and have the knowledge on how to maintain its fertility for long-term benefits. Lack of proper knowledge on techniques of enhancing soil health, in a sustainable way has dire consequences on the farmer in terms of cost of producing food, and the safety of the food produced, for consumption at the family level and to consumers who buy the produce. The cost of conventional fertilizers has risen beyond the means of many small-scale farmers, leaving many in a panic over what their farms will produce in case they are not able to purchase the highly priced inputs. This situation has led farmers to appreciate the need for shifting from over-reliance on chemical fertilizers to more sustainable inputs that do not drain

the farmer's pockets and which will not degrade the soil's nutrient value, on continued application. The solution lies in application of organic matter which is mainly prepared using material available in the farm. There are various techniques of preparing organic soil fertilizers in the farm and learning these techniques is important for a farmer to reduce the cost of production and nourish the soil without causing environmental degradation.

*TOF Magazine team had an interview with Mr Erastus Maina of RODI-Kenya, who has been training farmers on making and use of organic manures to improve soil fertility. One major composting technique that farmers are exposed to at RODI-Kenya, is Bokashi composting. Below is an excerpt from the interview.*

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### **TOF: How is manure application important in enhancing soil fertility?**

**Mr Maina:** The main aim of using manure is to increase the bio-life/microorganisms in the soil. Microorganisms have numerous functions within the soil such as breaking down organic matter to release nutrients and improving the soil's water retention capacity.

### **TOF: What is Bokashi manure?**

**Mr Maina:** Bokashi is a Japanese word meaning fermented organic matter. Bokashi is made by mixing organic materials which are left to ferment for two weeks after which they can be applied to the farm.

### **TOF: What materials does a farmer require to prepare bokashi manure?**

**Mr Maina:** The bulk material in bokashi is the waste from livestock including poultry manure. Charcoal dust is also used in bokashi to slowly release carbon which is an integral component required in the soil. Carbon increases the aeration and porosity while absorbing pathogens within the soil. Furthermore, it also controls the temperature in the soil. Rock dust is another important ingredient that is used in the preparation of bokashi. An alternative to rock dust is wood ash. Rock dust contains important minerals that are important to plants. Wood ash is vital as it reduces the acidity within the soil. Rice husks are also used as additives during bokashi

preparation as they increase the silicon content in the soil, which is vital in increasing the strength of the crop cuticle. The stalks of maize, sorghum, millet or even wheat can be used as an alternative to rice husks. Farmers can utilize the resources that are accessible to them and therefore they should not restrict themselves to the aforementioned crops. Molasses are also used as they are a good source of energy for microorganisms which help in breaking down organic matter. Another integral ingredient is yeast which acts as a catalyst during the process of fermentation. An alternative to yeast is virgin soil (soil from a naturally forested area), which is rich in nutrients required by the soil. These are some of the vital ingredients of bokashi. However, more organic materials such as organic kitchen waste can be added to enrich the bokashi.

### **TOF: What is the procedure of preparing bokashi manure?**

**Mr Maina:** To prepare bokashi start with farmyard manure in the first layer, then add charcoal dust and bran. The next step is to mix water, molasses and yeast separately and sprinkling this mixture on the heap. The heap should not be too wet or too dry. As you add the liquid mixture, turn the heaped material to ensure homogeneity. To check for desired consistency, scoop the bokashi and squeeze in your palm, if it forms a ball, then it has a good consistency, if doesn't, then it is too dry, and if it oozes liquid, then it is too wet. Another factor that is also considered is the temperature. High temperature is an indication of

the fermentation process. Within the first seven days, the bokashi should be turned in the morning and the evening. From the seventh day, the bokashi is turned once a day up to the fourteenth day. After the fourteenth day, the fermentation process is complete and the bokashi can be used on the farm. It is advisable not to add the bokashi directly as it is only partially broken down and can scorch the crops.

### **TOF: How is bokashi applied on the farm?**

**Mr Maina:** There are various ways of applying bokashi on the farm depending on the plants and the fertility of the soil. When planting maize, for instance, one can dig a hole, add bokashi and then add soil on top of the bokashi before adding the seeds.

### **Benefits of using bokashi compost**

- Increased crop resistance to pests and diseases.
- Increased resistance to drought.
- Increased water retention in the soil.
- Increased maturity of crops.
- Better taste and increased nutrients in crop products.
- Enhanced soil health.

Bokashi is an environmentally and cost-friendly alternative to chemical-based fertilizers and its ingredients are locally available.

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<https://infonet-biovision.org/PlantHealth/Composting>



# Crop rotation schedule for potato farmers

By Mellen Nyabuto

Crop rotation is a common traditional farm practice that involves the planting of different types of crops in one farm area after a season of planting the main crop. This farming practice has great advantages. It aids in restoring and balancing the soil nutrients, lowering crop diseases and management of common weeds and insects.

Crop rotation in potato farms is mainly aimed at increasing the yield by reducing pests and diseases. In potato farming, it's recommended to do at least a yearly crop rotation scheme if not after one planting season. Some of the crops that can be grown include crops such as leek, cabbages, kales, water melons, pumpkins, green peas etc.

Different rotation crops bring about different benefits. For example in a potato farm that shows signs of nutrient deficiency, leguminous crops will be of great benefit since they enhance the soil nitrogen when they decay and generally take up less soil nitrogen while growing. The farmer, in this case, can plant peas, green peas and soybeans. When considering this kind of rotation ensure to run it at least a year long.

In cases where the farmer aims at controlling potato pests and diseases, you must have in mind the type of pest or disease that is so adamant on the farm. For a seasonal harvest of diseased potatoes, it's advised that



you rotate with a crop that is different from the potato family (solanaceous). This is because the pest is most likely to still be in the soil and a non-host crop will gradually aid in elimination since they cannot sustain it, although, it will take a long time to subsequently plant the rotational crop.

For most potato insects control also it's strongly advised that you rotate with a non-host crop. Some of the

non-host crops that can be planted to control pests include cabbage, onions, carrots, sweet potatoes and water-melons.

Below is a summary of crops that can be planted depending on the state of the farm.

<https://infonet-biovision.org/PlantHealth/Crop-rotation>



Problem/Pest/Disease	Rotation Schedule	Suggested Crop
Nutrient Deficiency	After every season of potato planting	Legumes; soy bean, peas, green pea
Tuber diseases	After every season of potato planting	Non-solanaceous crops; Cabbage, kales, Broccoli
Pests	After every season of potato planting	Non-solanaceous crops; Cabbage, Onions, Sunflower
Bacterial infestation	After every season of potato planting	Beans, Maize,



## Kericho based farmer embraces organic farming targeting export markets

**By Vincent Kipyegon**

The year has been challenging to most farmers due to rising cost of farm inputs, unpredictable weather patterns and fertiliser shortage experienced across the country. These challenges have pushed farmers to scale down farming activities or abandon it altogether. Times like these require resilient strategies to thrive and sustainable agriculture is a promising solution that most farmers must embrace to ensure steady crop production.

Mr. Kirui, a small holder farmer in Kericho County practices mixed farming. He grows butternuts in his three-acre piece of land and has seven dairy cows, from which he obtains milk for consumption at home and sells the surplus. He has set up a biogas processing system to transform the manure they produce, into fuel for household use.

Kirui has been growing butternuts for the last ten years and they are the main source of income for his family. He supplies them to supermarkets and open air markets in Kericho and Bomet counties selling 1kg at ksh70.

For a long time, Kirui like most farmers in his locality believed that for butternuts to yield satisfactorily, he had to use synthetic fertilizer in his farm and habitually squeezed his meagre income to purchase it. This was until

he attended a training organized by one of the development organizations in Kericho County promoting production of Hass avocado for exports. It is during this training that he learned there are highly lucrative export markets that do not accept fruits that have been produced using synthetic farm inputs such as fertilizers and pesticides. He also discovered that the slurry he derives from cow dung in the process of making biogas, is as good manure as the expensive synthetic fertilizers he had been spending highly on. "I wanted to explore this export market and to do so, I needed to change my approach to farming. Therefore, I decided to be intercropping butternuts with Hass avocado trees and instead of synthetic fertilizers and pesticides, I now apply slurry on the soil, to enhance its fertility and frequently use organic foliar spray to manage pests," he says. Mr. Kirui currently has 40 Hass avocado trees.

### Bee keeping venture

Kirui practices bee keeping as part of butternut farming which relies heavily on bees for pollination. "I harvest honey every 4 months which I use as a substitute for sugar and sell the rest locally. Beekeeping has opened other opportunities for me, I also provide training to farmers interested in bee farming" explains Kirui, pointing to his

apiary structure with 18 beehives.

Additionally, he makes beehives for sale, selling a langstroth beehive at ksh5,000 and looks forward to adopting a flow hive, a modern beehive that preserves the honeycomb during harvest. He intends to increase the production of langstroth beehives to 100 by the close of the year.

### Parting shot

Kirui observes that even during tough times as such, it is possible to thrive where various farming activities and locally available resources support each other to ease the burden of high cost of inputs.

He believes there is a huge market gap for butternut farming. "I sometimes get butternut orders from as far as Nakuru and Migori when all I have can only satisfy the local market, I feel like there is a market gap for farmers, especially the youths, to venture into", said Kirui. He advises that farmers can thrive in tough times by embracing sustainable agriculture practice.

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<https://infonet-biovision.org/EnvironmentalHealth/What-Organic-Agriculture>

# Reducing fowl cholera infection

By Mourice Barasa

Fowl cholera, also called *Pullorum disease*, is a contagious disease caused by a species of the bacteria *Salmonella* known as *Salmonella pullorum*. These bacteria cause diseases in turkeys and chickens. Some *Salmonella* bacteria can infect both animals and humans. *Salmonella* is, therefore, a zoonotic concern because it can spread between animals and humans.

This article discusses Fowl cholera and advises you on how to avoid and reduce incidences of infection within your flock.

The disease affects both domestic and wild birds. However, turkeys are more prone to it than chickens.

It is majorly transmitted via the egg. This means that infected chickens produce infected eggs that produce infected chicks. However, direct and indirect contact with infected surfaces can also spread infection.

## Clinical signs

These may vary depending on whether the infection is acute or chronic.

## Acute infection

- Increased mortality (sudden death) is usually the first indication of an infection.
- The birds appear lethargic, weak, and depressed; they do not eat and



will huddle together near a source of heat.

- Diarrhoea may develop which begins as a whitish discharge found soiling their vents. It then progresses to a greenish watery discharge with mucus.
- Nostrils, mouth, and eyes may have a sticky discharge which can cause your bird's eyelids to stick together.
- Coughing
- Young chicks present with an unabsorbed yolk sac on the underbelly. (Just before a chick hatches it absorbs the yolk sac through its navel. The yolk sac provides nutrients to the chick and increases its immunity. When it is not fully absorbed, the chick born will be weak and susceptible to diseases and infections.)
- Internal lesions will be found in the liver, spleen, lungs, heart, and the gizzard.
- Older birds will go off feed, and suffer from diarrhoea, poor growth, decreased egg production, and reduced fertility.

## Chronic infection

- Infected birds may present swollen wattles, feet, leg and wing joints, and ears.
- Combs may sometimes become discoloured and appear bluish or blackish.
- An acute ear infection may sometimes result in the chicken displaying a twisted neck (wry neck or torticollis).
- Lameness.
- Difficulty in breathing.

## Treatment and control

As with all diseases, control is better than cure. Reduce or eliminate incidences of Fowl cholera on your farm by doing the following:

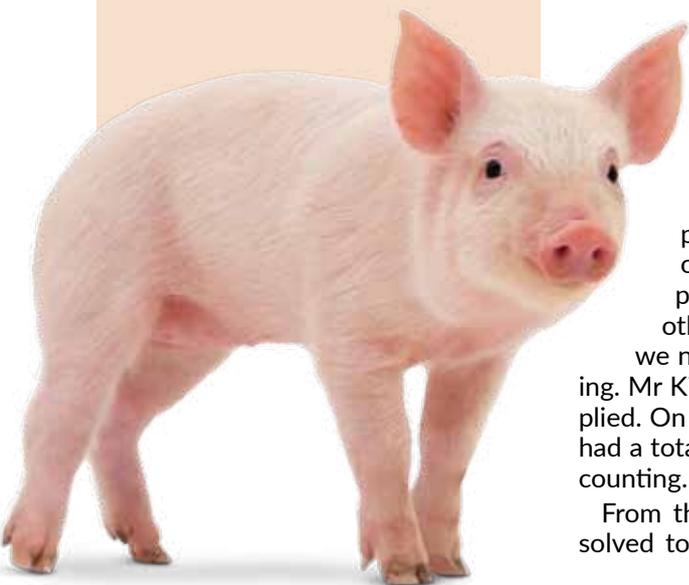
1. Screen incoming flocks for the diseases and eliminate those that are found positive. In fact, through this initiative, developed countries like the USA have eliminated Fowl Cholera. In many developing countries including Kenya, it is still present.
2. Routinely checking the parent stock of hatcheries will ensure that they are free from the disease. In Kenya, this is a matter of law and is enforced by the Directorate of Veterinary Services. It is therefore paramount that farmers purchase chicks from accredited and certified hatcheries.
3. Practice good biosecurity practices as follows:
  - i. Locate your poultry farm in an isolated area far from other poultry and livestock establishments and busy roads.
  - ii. Construct poultry houses with adequate drainage. Run-off water and untreated site water should never mix with water for consumption nor drain into or stagnate at the poultry house.
  - iii. Construct your poultry houses and stores for feeds, eggs, and other equipment to prevent the entry of wild animals and rats.
  - iv. Ensure floors are smooth and easy to clean and disinfect (concrete if possible).
  - v. Ensure that flocks come in and leave at the same time (all-in

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- all-out management system). Avoid introducing new chicken within the existing flock.
- vi. Do not mix birds of different ages.
  - vii. Ensure that all workers and visitors entering your poultry house wash their hands with soap and water or sanitise them using a disinfectant. Have a foot bath at the entrance of your chicken coop and change the disinfectant solution regularly.
  - viii. Sanitise all equipment before taking them into the poultry house and wash them with soap and water every day.
  - ix. Where possible, deliveries to the farm should be done outside the security fence to reduce the risk of external visitors introducing diseases.
  - x. When infection is suspected or confirmed, call your veterinary doctor to determine the best course of action and treatment.
  - xi. Isolate infected birds and keep them in a warm and comfortable area with easy access to food and water.
  - xii. Try to have dedicated workers handling the infected birds or ensure that workers handle infected birds separately and preferably last in line, to minimise the spread of infections.

<https://infonet-biovision.org/AnimalHealth/Chicken>



## Pig farmer finds relief from expensive animal feeds by rearing black soldier flies

By Caroline Mwendwa

On retirement from the Kenya Police Service, Mr Ashford Kinyua from Egoji in Meru County, knew he wanted to venture into profitable farming. But he had to make attempts on various types of farming before settling on one. "I started with keeping three high value dairy cows, but just as I was starting to get the drift of running a dairy farm, there was an outbreak of foot and mouth disease which wiped out my entire herd. I had to go back to the drawing board," says Mr Kinyua. With the help of his son and daughter-in-law, he made the decision to venture into pig farming. To start off, he bought six female pigs, which he inseminated artificially. "Despite having incurred high costs of artificial insemination at Ksh6,500 per pig, this method of breeding only led us to losses as the pigs aborted one after the other. That is when we realized we needed a male pig for breeding. Mr Kinyua's herd has since multiplied. On the day of the interview, he had a total of sixty-eight pigs and still counting.

From the start, Mr Kinyua had resolved to do it right by constructing

pig sties of high standards and devote his time to ensure his herd thrived in a good environment. For him, cleanliness mattered the most after feeding. "Obtaining quality feeds for the pigs has been one of the most expensive needs in developing this enterprise," he says. Protein supplements used to cost him as much as Ksh65,000 and these would only last six months. Sometimes he would buy separate feeds from local suppliers, that is soya, and canola, which he would purchase from as far as Naivasha to his home in Meru. These feeds which lasted only three months would cost him Ksh70,000 in total with a single 50kg bag of canola going for Ksh5,000. Realizing that the cost of feeding the pigs was overwhelming, Mr Kinyua sought to find out alternative sources of protein that are affordable. That is when he learnt of rearing black soldier flies, for animal feed.

Mr Kinyua had heard of black soldier flies as a source of animal feed, and even attempted rearing them but felt he required more knowledge from experts to do it right. He sent out his daughter Mercy to ask around for training opportunities that they would benefit from. Mercy learnt of training programmes offered at the International Centre of Insect Physi-

ology and Ecology (icipe) through The Organic Farmer magazine and enthusiastically booked for sessions. “I took a week leave in the month of December 2021 and visited icipe, situated at Kasarani in Nairobi for the training sessions which are offered for free. I learnt so much in the three days, as the sessions were offered by experts, through practical demonstration, and at the end of the training, I was given a starter kit with the essentials for setting up a standard black soldier caging system,” she says.

Having shared the knowledge, she acquired with the rest of the family, they all focused the available resources to make the venture successful. Today, the project produces 150Kg of black soldier flies weekly which are used to feed the pig. “To give them to livestock, we dry them under the sun, then mix with starch such as flour and bran,” explains Mr Kinyua. By using the home reared protein, this family has significantly cut down the cost of feeding the pigs as currently he does not buy any protein supplements and the only cost he incurs in rearing the black soldier flies is paying the casual labourer, at Ksh300 weekly, to attend to them. “These insects feed on organic waste, which is always available from the household,” he adds.

“Discovering that I could depend on the black soldier flies as the only source of protein for my livestock was such a relief, as it is a rich source of nutrients for the animals,” says Kinyua further adding that the pigs only need moderate feeding as too much protein can also make them too fatty, which is undesirable by consumers.

**Obtaining quality feeds for the pigs has been one of the most expensive needs in developing this enterprise**

Mr Kinyua explains that a pig consumes about two and a half kilograms of feed per day, and when expectant the amount gradually increases to six kilogram per day. After, delivery, 0.5 kilograms of feed for every piglet is added to initial amount in feeding the mother, for it to sufficiently feed the piglets and remain strong.

The retired police officer aspires to scale this venture to a commercial level, where he can sell excess proteins to neighbours and open doors for training to transfer this knowledge to other farmers who might be experiencing challenges with feeds like he used to.

Apart from pigs, Mr Kinyua still keeps cows and goats. “The amount of humus we obtain from the livestock has the potential of being turned into biogas,” he says. Already, he is laying foundations of establishing a biogas system to provide fuel for his household and reduce on the costs incurred on cooking fuel. In addition, Mr Kinyua has plans to rear fish and make his farm an integrated system, where fish, livestock and plants co-exist, depending on each other for nutrition and growth. This will also provide a balanced diet for his family, all from the farm.

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<https://infonet-biovision.org/AnimalHealth/Pigs>



## What you do not know about the stubborn weed; blackjack

**By Everlyn Night**

Modern times have greatly undermined African traditional food and medicine industry by eroding cultures and creating dependency on ‘Western’ knowledge for sustenance. The rise of organic and herbal remedies however has redirected interest to the indigenous vegetables and herbs that mostly grow freely on farms and uncultivated lands. Despite its bad reputation in the farm, blackjack has been used for a long time as a vegetable and herbal medicine to treat both human and animal diseases.

### A farmer's headache

Black jack (*Bidens pilosa*) is a drought resistant weed that occurs in most farms. The weed is invasive; which means it can grow on any viable soil. It can be found growing along roads and paths, forming dense shrubs that limit movement by humans and animals.

The notorious weed harbors many plant pests that use it to access other crops within the same field, and might also spread to other farms. The plant also competes for nutrients with farmed crops while also releasing chemicals into the soil that prevent farmed crops from growing.

### Description

The fruits of this plant are light, long, and have hooks at their ends that attach themselves onto clothing, animal fur or hair, and bird feathers. By removing the hook from their bodies, humans, animals and birds unknowingly transfer the seeds to new places. The seeds may also be dispersed by wind and can remain in the soil for long periods of time under unfavorable weather without

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being destroyed. One blackjack plant can produce about 5000 fruits in its life time.

### Existing management options

Most farmers usually opt to uproot the plant from the soil and throw it away from the garden to make sure that the weed does not reestablish.

### But, is the blackjack totally bad?

While the costs for having blackjack within one's compound might outweigh potential benefits, these benefits however should not be ignored.

### 1. Blackjack as vegetable for consumption by people

The leaves of immature or young blackjack plants can be cooked like spinach and eaten. These are highly nutritious, containing vitamins C and E, as well as calcium, beta-carotene, iron and protein. The leaves may be mixed with other vegetables such as pumpkin

leaves to mask its strong taste, and be eaten with starchy foods such as ugali, and proteins. Only leaves of immature blackjack plants are edible and not the mature ones as these are poisonous.

Fresh leaves can also be boiled and consumed as herbal tea.

### 2. Blackjack as herbal medicine for humans

Research supports the medicinal importance of blackjack, some of its qualities being anti-inflammatory, anti-allergic. Recent reports also show that it could be useful in controlling high blood pressure, diabetes, and arthritis.

The administration of blackjack to treat these conditions however needs to be monitored by a qualified herbalist or a doctor as raw plant chemicals are highly potent and might have strong side effects.

### 3. Blackjack as chicken feed and medicine

The fiber in blackjack is useful in regulating digestion in poultry. The phar-

macologic activities of the plant also make it useful in preventing coccidiosis, improving weight loss, preventing digestive disorders, as well as supplying the chicken with vitamins and minerals.

To feed it to chicken, chop fresh leaves and present them to chickens in their feeding and roosting areas.

### 4. Blackjack as mulch

Young plants could be uprooted and used as mulch to prevent excess water loss from the soil as well as in providing minerals and nutrients for other crops.

### Is it possible to grow blackjack for one's own use?

The plant survives on its own in many fields around the equator. Farmers in East Africa therefore may not need to actively cultivate it for their use. The plant however could be cultivated under controlled conditions if there is need, but containment measures have to be taken to limit its dispersal.

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<https://infonet-biovision.org/PlantHealth/Pests/Weeds>

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