Dear Reader,

Here comes the planting season. Have you already prepared land for planting and spared farm inputs such as manure, seeds and labor? If you have been heaping compost manure, you will not need to spend your hard-earned money in purchasing synthetic fertilizer, which is no match for a well composted farmyard manure when it comes to enriching your soil.

Also, do not be undecided on where to get seeds for planting. If you have preserved seeds to plant, make sure that they are of the best quality and have been stored under appropriate conditions; preferably in airtight containers or packs, stored in a dry, cool place. This ensures that they are free of pests that can infest the seeds when planted. It is not advisable to replant hybrid seeds, as they are meant to be planted only once. After planting the first time, the harvested seeds should not be stored for re-planting as the second round will not yield seeds with the desirable characteristics of the first harvest.

When you purchase seeds, ensure that the variety you purchase is suited to the climatic conditions in your region. Seed companies are continually breeding seeds according to various climatic conditions such as rainfall levels, altitude, and temperature. In this edition, we feature seed varieties for maize suitable for various regions which you can buy from Kenya Seed Company outlet near you. Some of these varieties are resistant to diseases affecting potatoes such as Maize Lethal Necrosis (MLN), and pests such as stem borers and Fall Army Worm. Whenever you buy seeds ensure to confirm the validity of the seeds you buy, by scratching the card on the package, and sending the revealed code to USSD 1393.

The Potato Cyst Nematode pest in Kenya: a hidden enemy for the potato farmer

By Charei Munene

Potato Cyst Nematodes (PCN) were first reported in Kenya in 2015. Since then, the pest has been reported in much of the potato growing areas in Kenya, with over 80% of sampled farms found to be infested. Potato production in Kenya has been steadily declining, even though the land area under potato has increased. The presence of Potato Cyst Nematodes, could be one of the factors leading to the declining production.

Whereas many diseases affecting potatoes are above the ground and therefore visible to the farmer, PCN is soil-borne and manifests on the roots and tubers, below the ground. Infected plants show symptoms that are mostly confused with symptoms of other diseases such as stunting, yellowing of leaves, reduced vigour and low yields.

Spread and dissemination

PCN can be easily spread to new farms and between farmer fields when there is transfer of contaminated soil. Contaminated soil can be transferred from one field to another through: seed tubers, equipment, farm machinery or even gumboots. In some cases, PCN can be transferred through contaminated water, which is used for irrigation, or during a heavy storm even through overland water flow; when soil is dry, strong winds can also transfer PCN in wind-blown soil.

Life cycle

In Kenya, PCN can have 2 – 3 reproduction cycles per season. Each cycle comes with the release of thousands upon thousands more nematodes on the crop. PCN eggs are enclosed in a pin-head sized, rounded structure, each with hundreds of eggs. This structure, or cyst, is the hardened shell of the now dead female, encasing 400-500 eggs each. Cysts protect the encased eggs, enabling them to survive during periods of hardship and in the absence of a potato host. Once a potato plant is present, chemical signals from growing roots stimulate the eggs to hatch. The wormlike nematodes leave the cyst and locate host roots, which they then burrow into to feed.

Over the period of about 30 days, the nematode transforms through 4 growth stages until it matures into an adult. If checked carefully in the field, cysts appear as milky-white dots on the roots. As the cysts mature they become yellow / brown dots, but which are more difficult to see when mixed in with soil particles. The mature cysts then fall off the drying and decaying roots into the soil, where they can stay for up to 20 years in a dormant but live state, awaiting the next susceptible potato crop.
Continued from Page 1

Symptoms
1. Infested fields have patches of potato that appear weak, wilted and/or stunted.
2. Yellowing of entire plant.
3. Delayed germination/emergence.
4. Extended period to flowering.
5. Reduced root size and number.
6. Lower yields and smaller tuber size.
7. Complete failure of the crop.

Current Research on PCN in Kenya
Currently, a number of options for the management and control of PCN are being researched and tested. Scientists at NemaFrica (a joint nematology laboratory between Icipe (International Center of Insect Physiology and Ecology) and ITA (International Institute of Tropical Agriculture), together with Kenyan partners are assessing various strategies for the control of PCN. These include the development of new, PCN-resistant potato varieties, which are early-maturing and have a short dormancy. Key characteristics of the most popular variety (Shangi) currently being grown by farmers, as well as being high-yielding. The scientists are also evaluating the use of trap crops, which may stimulate PCN eggs to hatch, or allow them to infect roots, but do not allow the PCN to reproduce and multiply.

Another area of research is the identification of the chemical signaling released by roots to stimulate egg hatching and use these to cause ‘suicidal hatch’ when using them without a host potato crop being present. Such chemicals, when identified and produced, can potentially be used to disrupt the PCN life cycle. Another, similar area of research is the use of banana fibre paper when planting potato, which appears to block these chemicals, preventing the PCN from finding potato roots. In addition, much work is being undertaken to better understand the biology of PCN in Kenya, where it is a new pest, having only recently been recorded here.

Machako farmer discovers gold in his farm
An article on TOF Magazine was Patrick Muli’s eye opener to the wealth creation opportunities he has been sitting on.

By Caroline Mwendwa
Patrick Muli, a member of Mutulani Poultry Co-operative Group, knew no better way of farming for household consumption. He kept a few chickens and goats and grew just enough food to feed his family. This was until he met one Mr. Joseph Mbithi a field officer under BuTVs Outreach Programme. Mr Mbithi introduced him to the idea of farming with an aim to make profits and improve his living standard and that of his family.

Through Mbithi, Patrick discovered TOF Magazine, and his life has never been the same. “I used to be an average farmer and felt limited by lack of capital to make any investment around my farming activities into income generating ventures,” says Patrick. But this changed when he came across an article in TOF, elaborating on how farmers can make use of available materials to construct poultry houses without having to invest money into the project. “I learnt from The Organic Farmer Magazine about making a chicken house using available material within my household. Mr Mbithi, visited our group and trained us on how to do it using poles from tree branches to construct a small chicken house, spacious enough to accommodate a large number of chickens without crowding,” re-calls Patrick. While training them, Mbithi, emphasized to them that there is market for chicken if only they are interested in expanding their houses to keep more chicks and venture into a small-scale poultry business.

Patrick took interest in this idea. Through training by Mbithi, he constructed the house and bought improved Kenyeye chicken with a plan to multiply them for market. Today, he is a poultry farmer with a discounted price of Ksh17,000, down from the retailer price of Ksh21, 000. Having ticked the clean water box, the group then set targets to ensure that every member to solar system installed in their homes. Today out of a total of forty members, 28 have installed solar systems and some of the members have electricity installed. Mbithi also encouraged them to purchase energy saving jikos or have improved jikos constructed in their kitchen. Today, 24 members have the modern jikos in use by all members including institutions and other retailers. Others through constant training on marketing, have cut a niche in supplying farm produce from farmers to large scale buyers. In the next edition we tell you the inspiring story of Mwende from her small beginnings as a subsistence farmer to becoming a renown sweet potato sup-plier to retailers in Machakos County.
Choose the right maize variety to plant this season

One of the ways to ensure good yields, is selecting seeds with qualities suited to your climatic region. Below is a list of maize varieties with information on their qualities and favourable climatic conditions.

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>OPTIMAL PRODUCTION LEVELS</th>
<th>YIELD (00kgs/acre)</th>
<th>SPECIAL ATTRIBUTES</th>
<th>RECOMMENDED GROWING AREAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>H6218</td>
<td></td>
<td>56</td>
<td>Blight tolerant, good husk cover, semi-flint</td>
<td></td>
</tr>
<tr>
<td>H6213</td>
<td></td>
<td>52</td>
<td>Tolerant to lodging, ear rot, rust, grey leaf spot (GLS) and leaf blight.</td>
<td></td>
</tr>
<tr>
<td>H629</td>
<td>Temperatures during the day seldom exceed 28°C and night drop to as low as 8°C.</td>
<td>48</td>
<td>Has good husk cover, very tolerant to lodging, ear rot, rust, stem and leaf blight.</td>
<td></td>
</tr>
<tr>
<td>H626</td>
<td>Maturity ranges from 160–210 days.</td>
<td>42</td>
<td>Tolerant to most leaf diseases, blight and rust.</td>
<td></td>
</tr>
<tr>
<td>H625</td>
<td></td>
<td>40</td>
<td>Tolerant to lodging, has good husk cover.</td>
<td></td>
</tr>
<tr>
<td>H614</td>
<td></td>
<td>38</td>
<td>Tolerant to blight, leaf and ear diseases and weevil attack.</td>
<td></td>
</tr>
<tr>
<td>PH1</td>
<td>Rainfall of 800 – 1500mm; Matures between 160 – 210 days.</td>
<td>16</td>
<td>Has better husk cover and can be intercropped with other crops.</td>
<td>The Lake region and the Coastal strip, Kikuyu, Mwekerenta, Hola, Gariyari, Voi, Mwattle, Kivale, Kinangop</td>
</tr>
<tr>
<td>PH4</td>
<td>Rainfall of 800 – 1500mm; Matures between 160 – 210 days.</td>
<td>16</td>
<td>Has better husk cover and can be intercropped with other crops.</td>
<td>The Lake region and the Coastal strip, Kikuyu, Mwekerenta, Hola, Gariyari, Voi, Mwattle, Kivale, Kinangop</td>
</tr>
<tr>
<td>H6243</td>
<td>Temperature range of 12°C – 30°C; Matures at 120 – 130 days.</td>
<td>32</td>
<td>Tolerant to grey leaf spot, leaf blight and rust. Excellent husk cover with flint kernels.</td>
<td>Western Kenya, Elgeyo Marakwet, coffee growing areas of Central Kenya and parts of Nyahururu.</td>
</tr>
<tr>
<td>H520</td>
<td>Matures at 100 – 110 days Does well in coffee grown belts.</td>
<td>32</td>
<td>Tolerant to leaf rust, grey leaf spot, lodging, has flint kernels and excellent husk cover.</td>
<td>Western Kenya, Elgeyo Marakwet, coffee growing areas of Central Kenya and parts of Nyahururu.</td>
</tr>
<tr>
<td>H517</td>
<td>Maturity of 750 – 1000mm</td>
<td>30</td>
<td>Tolerant to foliar diseases and pests. Has an excellent husk cover.</td>
<td>Western Kenya, Elgeyo Marakwet, coffee growing areas of Central Kenya and parts of Nyahururu.</td>
</tr>
<tr>
<td>H516</td>
<td>Matures at 100 – 110 days.</td>
<td>28</td>
<td>Good husk cover, very tolerant to lodging, ear rot, rust, grey leaf spot. Stem and leaf blight.</td>
<td>Western Kenya, Elgeyo Marakwet, coffee growing areas of Central Kenya and parts of Nyahururu.</td>
</tr>
<tr>
<td>H515</td>
<td>Maturity of 100 – 110 days Does well in coffee grown belts.</td>
<td>24</td>
<td>Tolerant to lodging, leaf blight, leaf rust and GLS.</td>
<td>Early to medium transitional zones and lowland areas of Kirinyaga, West Pokot, Bungoma, Homa Bay, Kerio Valley, Kajio, Mwea, Makueni, Kitui, Marakwet, Baringo and Koibatek, Voi, Mwattle, Mariakani, Garissa.</td>
</tr>
<tr>
<td>H513</td>
<td>Maturity of 100 – 110 days Does well in coffee grown belts.</td>
<td>24</td>
<td>Partially tolerant to maize streak virus.</td>
<td>Early to medium transitional zones and lowland areas of Kirinyaga, West Pokot, Bungoma, Homa Bay, Kerio Valley, Kajio, Mwea, Makueni, Kitui, Marakwet, Baringo and Koibatek, Voi, Mwattle, Mariakani, Garissa.</td>
</tr>
</tbody>
</table>

Highland Maize Varieties

**VARIETY**
- DH04
  - MATURITY (days): 80 – 120
  - YIELD (00kgs/acre): 16
  - SPECIAL ATTRIBUTES: Long stay green trait, drought tolerant, good level of tolerance to leaf blight, common rust and ear rot.
  - RECOMMENDED GROWING AREAS: Arid and Semi-arid areas of Makueni, Machakos, Kangundo, Siaya, Kitsum, Busia, Kibwezi, Kitui, Mwingi, Voi, Mwattle, Makayo, Turkana, Sigr, West Pokot, Isiolo, Mandera, Karachuonyo, Nyando, Kisumu Bondo and some parts of Buto
- DH02
  - MATURITY (days): 70 – 100
  - YIELD (00kgs/acre): 18
  - SPECIAL ATTRIBUTES: Early tolerant to MSV, water stress, has a long stay green trait.
  - RECOMMENDED GROWING AREAS: Early to medium transitional zones and lowland areas of Kirinyaga, West Pokot, Bungoma, Homa Bay, Kerio Valley, Kajio, Mwea, Makueni, Kitui, Marakwet, Baringo and Koibatek, Voi, Mwattle, Mariakani, Garissa.
- DH03
  - MATURITY (days): 80 – 120
  - YIELD (00kgs/acre): 22
  - SPECIAL ATTRIBUTES: A good level of tolerance to blight and MSV, good husk cover, better standability and drought tolerance.
  - RECOMMENDED GROWING AREAS: Early to medium transitional zones and lowland areas of Kirinyaga, West Pokot, Bungoma, Homa Bay, Kerio Valley, Kajio, Mwea, Makueni, Kitui, Marakwet, Baringo and Koibatek, Voi, Mwattle, Mariakani, Garissa.
- DH04
  - MATURITY (days): 80 – 120
  - YIELD (00kgs/acre): 24
  - SPECIAL ATTRIBUTES: Short, drought tolerant, good husk cover and standability.
  - RECOMMENDED GROWING AREAS: Early to medium transitional zones and lowland areas of Kirinyaga, West Pokot, Bungoma, Homa Bay, Kerio Valley, Kajio, Mwea, Makueni, Kitui, Marakwet, Baringo and Koibatek, Voi, Mwattle, Mariakani, Garissa.

Install Jiko Kisasa stove in your kitchen for clean and efficient cooking

By Pamela Okutoyi

Over the years, households have been using three stone fire set ups in cooking, until some years ago, when other inventions such as gas and electric cookers came around. Despite these inventions, a large population in the rural still use the three stone jikos, due to the high cost of gas as a fuel, and the inaccessibility of electrification. Unaffordability of these alternative methods of cooking, has made it difficult for rural families to move away from using firewood on three stone set up. But, with the evolving times, technologies that use less firewood and charcoal; and which have minimal smoke emission have been invented and are gradually gaining popularity among rural families. Popularly known as Jiko Kisasa, these cooking systems are efficient in wood use and keep the air in the kitchen clean.

Jiko Kisasa stove saves firewood by retaining heat for a long time. This is unlike the three stone jikos which burn firewood so fast and release a lot of smoke. The stoves come in various types and sizes and use firewood and charcoal. One type can be fixed in the kitchen, referred to as Maendeleo Jiko and enclosed in a metal, commonly known as the “Kuni mbili Jiko”.

How to make a portable stove

Materials:
- Clay, mud, iron
- Knead the mud-like dough removing any remaining pebbles and stones since they are contaminants that could lead to cracks in the combustion chamber.
- Fill the mud into an iron form creating the walls of the combustion chamber.
- When the walls are ready, cut the opening for the wood fuel.
- When satisfied with the shape of the combustion chamber, carefully put it into the shade to dry for several days.
- Then burn a kiln to make it stable.
- After drying, insert the respective combustion chambers into metal-made stoves.

The cost of liners varies. The price of a complete stove is sold for Ksh200 or more depending on size.

To build the stove inside your kitchen:
- Mix water with soil to form a clayey mass.
- Use the clay to fix the combustion chamber in the corner of the kitchen.
- Cut exact borders into the mud and smoothen the surface with a little stick.
- Let it dry for some days and will be ready for use.

Visit https://infonet-biovision.org/EnvironmentalHealth/Energy-Saving-Cookstoves for more information.
Ecological requirements:

This involves the following considerations:

- Altitude
- Fruit name
- Mean annual rainfall (mm)
- Temperature °C in parenthesis

### Table: Ecological requirements for selected tropical fruits

<table>
<thead>
<tr>
<th>Fruit name</th>
<th>Altitude (M. A.S.L)</th>
<th>Mean annual rainfall (mm)</th>
<th>Temperature °C in parenthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avocado</td>
<td>0 - 250</td>
<td>1000</td>
<td>16 - 30</td>
</tr>
<tr>
<td>Papaya</td>
<td>0 - 1600</td>
<td>1000 - 1200</td>
<td>21 - 33</td>
</tr>
<tr>
<td>Strawberry</td>
<td>1500 - 2000</td>
<td>1200 - 1500</td>
<td>2 - 30</td>
</tr>
<tr>
<td>Banana</td>
<td>0 - 1800</td>
<td>1000 - 2000</td>
<td>20 - 30</td>
</tr>
<tr>
<td>Pineapple</td>
<td>0 - 2100</td>
<td>750 - 1000</td>
<td>10 - 30</td>
</tr>
<tr>
<td>Pineapple</td>
<td>0 - 2000</td>
<td>650 - 3800</td>
<td>20 - 45</td>
</tr>
</tbody>
</table>

Pixie orange business plan

As long as a farmer wants to grow fruits for commodities, then when a business plan is a must. In pixie orange production, putting down a business plan is one way of ensuring the expected results. It will give you a framework for decision making with clarity based on real situations. Even before setting up a financial institution for expanding your enterprise, the business plan comes in handy. Because of space limitations, I will not present a full business plan for pixie orange enterprise. However, if you should make the decision to undertake the business plan in place, you can move forward to establish the pixie orange orchard.

Establish the pixie orange orchard

Choose a suitable farmland: The farm should be relatively flat with well-drained soils, within reach of a water source and with good sunlight. Prepare the land by ploughing and re-ploughing based on the weed condition of the farm.

Excavate holes: A hole for planting pixie orange should be 0.6 metres wide and 0.6 metres deep. Separate the top soil from the subsoil. Discard the subsoil. Mix 15-20kg of well decomposed farmyard manure and put it back in the hole ready to receive the pixie orange seedling. The holes should be spaced at 4 metres between plants within the line and 4 metres between the rows. In total, 250 holes should be excavated per acre of land.

Get pixie orange seedlings: The price of pixie orange fruit seedling is currently Ksh150. If you have technical experience and can access quality pixie orange scions, then you can use rough lemon rootstock for budding the pixie orange. Each scion goes for Ksh10. You should purchase a minimum of 1000 Ksh50 or more than 300 Ksh50. That means, one processed pixie fruit will go for Ksh50 (more than double when sold as a whole fruit).

Cost (KES/acre) 75000 5500 5500 8000 5500 5500

Value (KES/acre) 11250 15000 15000 15000 15000

Production (kg/acre) | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Yr 6
--- | --- | --- | --- | --- | --- | ---
Value (KES/acre) | 1125M | 1.5M | 1.5M | 1.5M | 1.5M | 1.5M

Table 2: Costs and income streams from investment in an acre of pixie orange fruits orchard

Pixie orange

On the basis of ecological requirements and market demand, let us say we select pixie orange for production. One can select any of the other fruits, but pixie orange is picked because currently, it attracts the highest market demands in Kenya. Their orange-yellow colour and sweet lingering taste are a magnet for buyers. You can overlook buying a pixie orange because of its many other uses in the production of fruits and nuts for food. Fruits have many other benefits including offering a strategic source of income for households.

Pixie orange

The pixie orange producer breaks even in the third year immediately the trees start fruiting. The gross margins in successive years are in millions implying that pixie orange fruit production is one of the most lucrative agribusiness ventures one can invest in. The farmer may choose to expand into the processing space to more than double the returns. Other benefits include hive products (honey, bees wax and propolis) from the beekeeping venture integrated in the pixie orange production.
Joseph Mbithi, our field officer attending to farmers in Machakos, is the nearest officer to Mutheu, and on calling him, he acknowledged that there is a Newcastle disease outbreak in his region. Mbithi assured me that he has helped several farmers to manage the illness and that their chickens have survived. Immediately, I knew I had the remedy for Mutheu. After three days, Mutheu called in to say, “thank you, the officer you sent me guided me to the solution and none of my chicks have died.”

Newcastle disease can be present in a very acute form with sudden onset and high mortality or as a mild disease with birds experiencing respiratory distress. Sometimes laying hens have a drop in egg production. Symptoms of Newcastle disease include:

- Sneezing
- Nasal discharge
- Coughing
- Greenish, watery diarrhea
- Depression
- Muscular tremors
- Drooping wings
- Complete paralysis
- Swelling of the tissues around the eyes and in the neck
- Sudden deaths and an increased death loss in a flock
- In laying birds there can be partial to complete drop in egg production; and production of thin-shelled eggs.

It is a deadly infection that can wipe out the whole flock, especially because there is no known treatment to cure it. However, as attested by our field officer in Machakos County, a natural remedy has been used by farmers, to effectively manage the illness. Below are steps to follow in treating your chickens should they exhibit Newcastle disease symptoms:

### Ingredients:
1. Red pepper
2. Ash
3. A litre of water
4. Aloe vera leaf

### Preparation method
- Put a litre of water in a container.
- Add 8 seeds of red pepper.
- Sprinkle in the mixture a tablespoon of wood ash
- Dip into the concoction a freshly cut aloe vera leaf.
- Give to the chicken for three days.

### Prevention is better than cure.
Like in other livestock enterprises when it comes to controlling and managing diseases, prevention in most instances makes the difference. As a farmer keen to avoid the cost and losses that are attributed to diseases, one should follow the following tips:

1. Separate chicks from adult hens except the mother hen.
2. Vaccinate chicks against common diseases and re-vaccinate if necessary.
3. Isolate sick birds if necessary and if control measures prove ineffective kill and bury the sick birds.

### How to identify sick chicks.

<table>
<thead>
<tr>
<th>Characteristics of healthy birds</th>
<th>Characteristic of unhealthy birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert and on guard</td>
<td>Tired and lifeless</td>
</tr>
<tr>
<td>Bright eyes and comb</td>
<td>Dull eyes and comb</td>
</tr>
<tr>
<td>Walk, run, stand and scratch</td>
<td>Sit or lie down</td>
</tr>
<tr>
<td>Continuously eat and drink</td>
<td>Eat and drink less</td>
</tr>
<tr>
<td>Normally lay eggs</td>
<td>Lay less or stop laying eggs</td>
</tr>
<tr>
<td>Smooth and neat feathers</td>
<td>Ruffled and loose feathers</td>
</tr>
<tr>
<td>Soft compact droppings breathe quietly</td>
<td>Wet droppings with blood or worms, diarrhea</td>
</tr>
</tbody>
</table>

**FARMERS FORUM**

My name is Grace Njeri from Nakuru. I am selling two-month-old pigs. To reach me call 0720 690 672

My name is Jonathan Mosbei from Eldoret. I am selling avocado seedlings. To reach me call 0716 585 353

To get help with your poultry, talk to us on Tusemezane. Call 0715 422 460. We will link you to an expert.

**https://infonet-biovision.org/AnimalHealth/New-Castle-disease**

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**Partner organizations**

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[Facebook](https://facebook.com/theorganicfarmer) | [TogetOrganic](https://@TofOrganic)

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**Contact us on the "tusemezane" platform or ask a question, kindly call or sms +254 715422460. Mail to: feedback@biovisionafrica.org**

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