



A farmer gathers his maize harvest at Aror irrigation scheme in Elgeyo Marakwet County last month. Farmers who harvest early especially before the rains will protect their maize against damage from rotting, pests and aflatoxin poisoning.

Dear farmers,

The widespread use of chemicals in farms is alarming. Despite a lot of awareness creation on the dangers of chemical use, farmers still find chemicals the easiest way to control weeds, pests and diseases. Multinational companies selling chemicals have increased their promotional campaigns and strengthened their distribution networks to reach every market centre in the country.

Due to the aggressive marketing of agrochemicals, many farmers opt for the chemicals especially for weeds, pest and disease control. As we have mentioned many times in this magazine, the use of chemicals has many negative side effects on people, animals and the environment. It is also to blame for the many diseases now affecting consumers of food crops grown using them. Indeed, most of the chemicals in the local market are already banned in developed countries due to their side effects but the chemicals companies still sell them in many other countries without strict laws.

Already some farmers are beginning to see the value of using plant extracts and other environmentally friendly methods in crop production. This is due to the increase in diseases associated with consumption of food grown using chemicals. It is our hope that in the foreseeable future, more farmers will embrace safe food production methods that improve our health and keep the environment safe (page 2 and 3).

Once again, tea farmers across the country are set to receive their second payment popularly known as "bonus." Although a number of tea factories have paid their farmers good rates for their tea, there is an outcry in some tea growing areas due to the low earnings. It is important that farmers are provided with the right information on how they can improve quality at the production level.

But farmers are not solely to blame for the poor earnings, the level of management in many tea factory companies is wanting. There is an urgent need to train the management in all the factories to ensure that the directors who manage them have the right skills for them to provide leadership and ensure the production units are run efficiently for the benefit of farmers.

Harvesting maize early reduces loss

TOF - Harvesting seasons usually pose a big challenge to farmers who do not plan well in advance. One of the major hurdles may be insufficient timing and lack of resources, especially labour. As a result, a lot of time is wasted as farmers look for money to pay for harvesting. Some farmers wait until the school holidays to start harvesting when they get free labour from their school going children. When harvesting is



A maize cob affected by mould

done late, a lot of maize rots in the *shamba*, resulting in huge losses to farmers. Ideally, maize that is planted from mid March to end of April, would be ready for harvest in October.

Excess moisture causes rotting

This means that by September, most of the maize has reached maturity and needs to be cut and staked in readiness for harvesting. Experts advise that as soon as the silk at the tip of the maize cob (ear) turns black, the maize is ready for cutting and staking in readiness for harvest. If the maize stays longer than this period, chances are that a lot of it will start rotting. The short rains usually begin in October.

Any maize that is not harvested during this period is often exposed to excess moisture. This encourages rotting and the development of mycotoxins which pose danger to humans and animals.

Proper drying before storage

After harvesting, the next big challenge is storage. Maize meant for storage should be properly dried. It should have a moisture content of about 13.5 per cent. Any moisture content above this percentage exposes maize to development of mycotoxins.

Aflatoxins

According to the UN World Health Organisation (WHO) reports, billions of people in Africa and the rest of the developing world are exposed to aflatoxin poisoning. Aflatoxins cannot be seen with the naked eye. In most cases, infected maize looks normal. Aflatoxins can develop in maize when it is still growing in the *shamba*. This happens mainly when maize is harvested late due to high accumulation of moisture. Damage through broken grains and holes drilled by weevils and stem borers allow the fungus to invade the maize grain in the field and in the stores. See Farming Tip Page 7

In this issue

Danger of chemicals 2&3



Rearing indigenous chickens 4&8

Chia seeds 5

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Excessive pesticide use killing farmers silently

Many farmers use chemicals that have dangerous side effect on people, animals and the environment. This leads to loss of biodiversity, pollution and increases chances of pests developing resistance.

Berita Mutune | Farmers in Kenya continuously use chemical insecticides and spray more frequently in response to damage by key crop pests. However, most commercial pesticides are very effective but are not eco-friendly to natural enemies, human and wildlife safety. This raises severe global environmental concerns. In addition, overuse of pesticides leads to both direct and indirect costs implications for farmers, and pollution to the environment.

Direct and indirect losses

In addition to the economic losses caused by the direct action of insect pests that damage crops, the chemical pesticide used to control these pests can also cause indirect economic losses related to the purchase and application of insecticides, medical treatment for people poisoned by insecticides and reduction in labour. Other indirect losses include loss of biodiversity, irreversible changes in the natural ecosystems and damages caused by environmental contamination, leading to greater future costs of controlling pests.

Commonly used chemicals

From interviews with farmers in Mount Kenya region it has been established that many commonly used chemicals such as carbamates, organo-phosphates and organo-chlorines (these chemicals have serious side effects on humans, animals and the environment) are still in use. They also affect parasitoids (beneficial organisms that

attach themselves to pest, in the process killing them) and predators which are important in the control of pests.

Exposure to pesticides

The health risk for adverse pesticide exposure varies significantly depending on many factors: Individual characteristics such as premature age and health status. The specific pesticide, and exposure circumstances have different impacts. Exposure to pesticides at any point in the life cycle has the potential to cause a range of short-term and long-term health problems.

Symptoms of poisoning

Early Symptoms of acute poisoning include: Headache, fatigue, weakness, dizziness, restlessness, nervousness, perspiration, nausea, diarrhoea, loss of appetite, loss of weight, thirst, moodiness, soreness in joints, skin irritation, eye irritation, irritation of the nose and throat.

Chronic poisoning can cause chemical burns on the skin, increased rate of breathing, loss of reflexes, uncontrollable muscular twitching, unconsciousness, birth defects for unborn, cancers and even death.

Pesticide sprays

Prevention

Although most farmers are



Pesticide warning label

aware of the simple precautionary measures necessary to prevent the hazards arising from



Yellow polythene stripes with a sticker trap help reduce pests drastically especially in a greenhouse environment

pesticide use; they are unable to put this knowledge into practice. This is due to high illiteracy level, ignorance and carelessness. Some measures to use include:

1. Personal preventive measures

- Proper labelling and storage of containers.
- Pesticide exposure can be significantly reduced by protecting clothing of certain parts of the body where the skin shows increased absorption, such as the scrotal region, underarms, face, scalp, and hands.
- Avoid eating/smoking while handling pesticides.
- Using chemical-resistant gloves and masks has been shown to reduce contamination.
- Checking the direction of the wind to avoid contact with chemicals while spraying.
- Use the recommended dose of that particular pesticide.

Currently there many biopesticides, fungicides and other harmless products that farmers can use in the market (see TOF No. 108, May 2016).

2. Appropriate legislation

- Government can help control accessibility of the most toxic pesticides.
- Continuous review and recommendations of improved pesticide policies.
- Implementation of sustainable epidemiological surveillance and monitoring of pesticide poisoning in clinical settings and communities.
- Improved medical management and mental health care of the people with pesticide poisoning in health care facilities at different levels.
- Provide training to farmers and care givers at different sectors and levels.
- Develop or strengthen community programmes that minimize risks of intentional and unintentional pesticide poisoning.

Conclusion

The health care system should work closely with the agricultural extension services and provide health care information to farmers especially the prevention, recognition, and treatment of pesticide poisoning. **Berita Mutune is a Research Assistant in ICIPE.**

The Organic Farmer is an independent magazine produced monthly for the East African farming community. It promotes organic farming and supports discussions on all aspects of sustainable development. The articles in the The Organic Farmer do not necessarily reflect the views of ICIPE nor Biovision Foundation.

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Avoid using chemicals in greenhouse farming

Excessive use of pesticides pollutes the environment, threatens human health and diminishes soil fertility, negatively affecting agricultural production.

Wanjiru Kamau | For the past 60 years, pest control has been based largely on the use of synthetic chemical pesticides and this is practiced by farmers in Kenya as in many parts of the world. However, pest and disease control still pose a major challenge to most farmers, especially small-scale farmers, due to the high cost of pesticides and equipment as well as low awareness levels. Data from Environmental Protection Agency of the US (2002) shows that the global use of synthetic pesticides at the beginning of the current millennium exceeded 2.5 million tonnes per year while world pesticide expenditures were around \$32 billion.

As greenhouse farming grows, plants become more susceptible to pests for several reasons, including monoculture cultivation which sometimes stimulate pest and disease development. Consequently, pest and disease control in the greenhouse pose the greatest impact not only to the environment but also on human health. Pesticide residues in food crops are a problem if the residue level is above the legal limit (maximum residue limit or MRL) at harvest. Persistent low levels of pesticide residues are also a problem as they can result in pest and disease resistance to the chemical being used.

Previously, it was a norm for farmers to embrace the use of chemical methods for pest control. Uninformed and excessive use of pesticides compromises on the environment, and human health and it lowers agricultural production.

Farmers unaware of danger of chemicals



Whitefly infested leaf

Photo: James Wathuge



Photo: James Wathuge

Chemicals used to control pests and diseases in greenhouses have harmful effects on workers and consumers of food produced using such conventional methods

Some of the challenges associated with pesticide use in greenhouse farming activities include; insufficient knowledge about chemical selection and application techniques. There is also inadequate information on the exact measures of pesticides to use for different regions and for each type of crop.

Due to continuous application of chemical pesticides; the environment, human and animal health exposed negative effects of the pesticides. Additionally, since plants constantly bear fruit and have a long harvest period, some farmers forget to follow the rule of leaving an interval between the last pesticide application and harvest season (pre-harvest interval). That is to say, pesticides are applied while harvest is on going.

Dangerous chemicals still in market

There is evidence indicating that the conventional pesticide practices is unnecessary and that Integrated Pest Management (IPM) practices can be adopted without sacrificing yield. However for this to be successful, the farmers appear as the most significant actor in this process. Current trends in pesticide usage are showing significant differences between developed and developing countries.

In economically advanced countries, old techniques are replaced by new systems that are based on minimum use of chemical ingredients and new pesticides, which are less per-

sistent in the environment are introduced. On the other hand, farmers in developing countries still use classic pesticides which are cheaper but carry more risks for environmental, animal and human health.

What should be done by farmers?

Some recommended agricultural practices for greenhouse farming activities include;

Use integrated pest management (IPM)

IPM is defined as an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides.

The use of biologically based technologies account for a significant part of the crop protection in the market. It is important to go for safer alternatives such as the use of biological control measures, the use of natural predators instead of only relying on chemical control.

Keep the farm clean

A clean farm usually has fewer pest and disease problems. Keep the farm free of weeds and carefully, bury or burn the diseased plants and old plant matter to prevent pest and disease spread.

Avoid calendar spraying

Calendar spraying is the application of pesticides on a schedule irrespective of whether there is actual presence of pests and diseases in the crop or not. This practice may result in an increase

in pest and disease resistance to pesticides. This leads to a great waste of time and money.

Monitor pests and diseases

It is important for farmers to check their crop regularly for pests and diseases. These can be done by carefully checking plants with a magnifying glass or hand lens and placing of sticky traps on poles in the greenhouses. This method can be used to check for the presence of specific pests. Regular monitoring ensures problems are found and controlled early. Therefore, controlling them would be easy and it saves time and money and increases on the crop yield.

Increase the pre-harvest interval

Increasing the recommended withholding period is one way greenhouse farmers would reduce the risk of pesticide residues. Farmers need to be confident that their produce does not exceed the MRL by using organic or biological alternatives.

To minimize environmental damage, use of organic agriculture would offer best solutions to the crops, human, soil and the environment. Farmers too enjoy bumper harvest with a promotion of a healthy lifestyle. This could be done through sensitization programs on environmental awareness to reduce risks of pesticide as well as retain and develop local markets.

Wanjiru Kamau is the Information Liaison and Policy Manager at the Kenya Organic Agriculture Network (KOAN).

Improve your earnings from indigenous chickens

Indigenous poultry farming has become popular in Kenya due to high demand by consumers for local chickens but farmers lack the techniques of optimizing production and profits.

William Ayako | Unlike in the past when most consumers in urban areas preferred to eat broilers, today consumers both in rural and urban areas have a high demand for local chicken more than broilers. Most food outlets in both urban and rural areas are often flooded with consumers demanding local chicken. The change in eating habits has been prompted by the consumer awareness on the harmful effects of using growth hormones and antibiotics in broiler rearing. The use of antibiotics in broiler farming has been associated with the development of drug resistance by some infectious bacterial strains which infect human beings.

However, despite the huge demand for local chicken, most farmers still lack knowledge and skills of maximizing profitability in local poultry rearing. As such it is important to understand the strategies of how to reap the benefits of the hidden treasure in local poultry farming.

The following are some of the tips:

Use of artificial incubator

Most local poultry farmers still use natural incubation whereby, the mother hen would sit on the eggs for 21 days. This is for convenience because the hen would turn the eggs and hatch them. The method is also cheap and requires minimal investment. The system requires simple tools such as basin or plastic for containing 10 -15 eggs depending on the size of the mother hen. The hen and the eggs require protection from the predators. The system is however slow and is limited to setting few eggs according to the capacity of the mother. Use of artificial incubators can solve this challenge, but it would require extra investment on electricity or solar power. Simple incubators with a capacity of 60 - 90 eggs are available although they would require an extra investment of Ksh 20,000/- to 30,000/- depending on the manufacturer. There are also locally made incubators which are powered by 12 volt DC batteries. Use of artificial incubators increases the number



Chickens reared using organic practices: Proper management can improve the productivity and productivity of indigenous chickens

of eggs per setting. Hence an increase in the number of hatched chicks.

Brooding of the chicks

Separating the chicks from the mother hen immediately after hatching can enhance profitability of local poultry farming. Use of artificial brooders can increase survival rate of chicks. It is easy to monitor behavior of chicks in brooder and also easy to monitor their comfort. The mother hen would start to lay next cycle of eggs early (in 2 - 3 weeks) after separating her with the chicks whereas a brooding hen would take 12 - 20 weeks to brood the chicks before she starts the next egg laying cycle. Artificial brooding can be done by a charcoal brooder *jiko*, biogas brooders or by electricity using special brooding bulbs. A brooder guard made of ceiling board should be put around the chicks to keep the heat within the brooder. Artificial brooding takes 4 weeks for the chicks to be covered well with feathers and thereafter, the brooding heat can be removed. Separat-

ing the mother hen from chicks increases their egg laying cycle and production of more chicks.

Feeding and watering of the chicks

Chicks should be offered good quality feed for a period of eight weeks to enable them to gain weight faster. They should be offered formulated chick and duck mash in adequate amounts. Chicks do not eat much and as such, it is not expensive to offer them complete mash. 10 day old chicks can eat 1kg of chick mash in 2 - 3 weeks. 1kg of chick mash costs about Ksh 50. Chicks should also be given clean drinking water in adequate amount. A good check for this is that water and feed should always be readily available for the chicks. After 8 weeks, the local chicks should be supplemented with growers mash for 30 days in the house before they are allowed to scavenge from the fourth month. Good feeding management would ensure that the birds grow faster and become ready for the market earlier than the free range birds.

Housing of the chicks

A good house is necessary to protect chicks from adverse weather conditions, diseases and predators. The chicks should be housed separately with mature birds to reduce the risk of transferring diseases from mature birds to chicks. Losses due to predator birds and theft would be reduced by almost 100% with good housing whereas losses due to diseases would be kept within bearable limits. Contagious diseases like fowl pox would be minimized if chicks are kept in separate houses with mature birds. However, the chick houses should be kept clean and hygienic sheds for prevention and control of parasites such as mites and fleas. Good housing would increase the number of finished birds for selling.

Vaccination of the chicks

Local poultry chicks should be vaccinated against common poultry diseases such as Gumboro disease, New Castle Disease and fowl pox. Chicks should be given the first Gumboro vaccination within the first 7 - 10 days and a repeat vaccination of the same within 2 -3 months in Gumboro disease hot spot areas. The first New Castle disease vaccination should be given in the second week while the second vaccination of the same should follow between 2 - 3 months. Fowl pox vaccination should be given in the sixteenth week. Vaccination increases the survival rate of chicks and also the number of birds for selling.



A trader sells eggs at Kangemi open air market: Healthy chickens lay more eggs

William Ayako is a Livestock Production Scientist at KALRO, Nairobi.

Chia seeds: A super food with many health benefits

Chia seeds contain many essential minerals such as calcium, phosphorus and manganese. The seeds have many other compounds that prevent chronic diseases and improve human health.

Dr Peter Mokaya | Chia seeds are a fairly new entrant into the local market and it is gaining popularity with small scale farmers, especially organic farmers and health conscious consumers. The increasing popularity of Chia seeds, its nutritional and health benefits are the focus of this article.

What are Chia Seeds?

Chia seeds are members of the *Salvia Hispanica* family, along with mint. They were a prized food to the ancient Aztecs and Mayans of South America. "Chia" is the ancient Mayan word for "strength", and the tiny seeds were valued for their energy-boosting properties and known as "runners food" used by athletes.

Advantages of Chia seeds?

Chia seeds are a quick and easy-to-use source of protein, healthy fats, dietary fibre, minerals, vitamins, and antioxidants. Antioxidants speed up the skin's repair systems, and prevent further damage. Although they have similar health benefits as flax seeds, Chia seeds may soon edge out flax seeds because they do not have to be processed before they are eaten, and they do not deteriorate, unlike flax seeds. In fact, Chia seeds are said to last up to two years with no refrigeration, due to their high levels of antioxidants. This is useful in many local environments where refrigeration is limited.

Their high concentration of the plant-based Omega-3 fat Alpha-Linolenic Acid (ALA) is one of their major claims to popularity and acceptability. Chia seeds contain up to 40 per cent oil, with 60 percent comprised of Omega-3. ALA is considered essential because the human body cannot make it. Hence, the need to supplement it in your diet—or its long-chain animal-based fat, such as the omega-3 found in seafood and eggs.

While Chia seeds have been found to increase levels of both ALA and EPA, another Omega-3



A chia plantation: Chia seeds have many nutritional benefits

fat, they cannot increase some essential fats (Omega-3 DHA) in the human body, so there is need to consume some animal-based Omega-3 in addition to plant-based Omega-3 to improve health.

Specific benefits of Chia seeds include the following:

- Chia seeds are known for lowering triglycerides and supporting healthy cholesterol levels.
- Chia seeds have blood pressure lowering properties and can prevent some heart diseases.
- They have anti-inflammatory activity and reduce inflammatory action.



Chia seeds

- Chia seeds have been found to control anti-diabetic action through various mechanisms.
- The seeds have liver-protective properties through its anti-oxidative actions.
- Chia seeds are protective against arthritis through its anti-inflammatory actions.
- The seeds provide protection against autoimmune diseases.
- They have been found to confer protection against many forms of cancer.

Chia seeds contain a number of additional useful phytochemicals, each with its own unique

benefits. This includes myricetin, quercetin, and kaempferol, known for their antioxidant, anti-inflammatory, anti-cancer properties and caffeic acid. This phytochemicals contribute to all the above outlined benefits of Chia seeds.

- Chia seeds promote weight loss and reduce chronic diseases. In a study of 67 metabolic syndrome patients, those who drank a beverage containing Chia seeds for two months experienced weight loss as well as a reduction of triglycerides and blood glucose levels.

- It's thought that the combination of fiber and protein in chia seeds, along with the gel-like texture it forms when combined with liquid, contributes to feelings of fullness and satisfaction. This mechanism partially contributes to the weight loss. Among people with type 2 diabetes, supplementing with chia seeds for 12 weeks resulted in reduced systolic blood pressure and significant decreases in A1C, a measure of a person's average levels of blood glucose.

- Chia seeds, have a high content of fibrinogen, a natural clotting agent that when lowered improves blood flow. In some studies, it decreased an inflammatory marker called hs-CRP, by 40 percent. Chia seeds contain about 10 grams of fibre in just two tablespoons. Mounting research suggests a high-fiber diet can help reduce the risk of premature death because it helps to reduce the risk of a number of chronic

diseases which include; type 2 diabetes, heart disease, stroke, and cancer.

- Chia seeds are rich in useful minerals: Just two tablespoons of chia seeds provide 18 percent of the daily recommended value for calcium, 35 percent for phosphorus, 24 percent of magnesium, and about 50 percent for manganese. These minerals are useful for various enzymatic and metabolic activities that maintain or restore health.
- Chia sprouts, like many other seeds, may offer some of the highest levels of nutrition available, including vitamins, minerals, antioxidants, and enzymes that help protect against harmful elements in the human body. Many of the benefits of sprouts relate to the fact that, in their initial phase of growth, the plants contain more concentrated amounts of nutrients.
- Chia seeds are easy to store and can be consumed in many food combinations: as a "top up" to various foods, salads, soups and other innovative food combinations.

Are there any negative effects from consuming Chia seeds?

Like all things with positive benefits, Chia seeds have a few cautionary considerations. A notable example being, if one has a history of dysphagia (or trouble swallowing), caution should be exercised when consuming Chia seeds especially dry Chia seeds. The seeds can quickly form a gel-like ball that can partially block the esophagus, requiring medical attention to remove.

What is the way forward?

Like all foods, consume Chia seeds in moderation. Best use the organic varieties, alongside other foods rich in animal Omega-3 sources, including fish, eggs, butter and cheese. For more information on this and related health and nutritional questions and clarifications, feel free to contact the author of the article at the address given below:

Dr. Peter Mokaya, Director and CEO, Organic Consumers Alliance (OCA), Website: www.organicconsumers.co.ke Email: Peter.Mokaya@organicconsumers.co.ke or Mokaypm@gmail.com

Organic farming has rekindled my hope

After learning various organic farming technologies from TOF magazine, Mr. Kyalo has put them into practice, increasing his yield and income.

Venter Mwongera | "My parents used to say that hard work pays off. I casually laughed it off. But, today I'm reaping the benefits of hard work in organic farming business," says Mr. Onesmus Kyalo.

Mr. Kyalo is an organic farmer in Kwa Vonza in Kitui County. His choice of crops includes tomatoes, spinach and kales. At first, he was not sure whether the farming venture would produce enough for his family of seven and leave him enough for sale. But today, he is not only a jubilant provider for his family but also a businessman whose produce has a ready customers in Kwa Vonza market.

"I spent many years in white colour jobs. I was not used to farm work. I was contented with a desk and a chair that my employer offered and a guarantee of a salary at the end of the month. When Civil Servant Retrenchment Program was rolled out in 1998; the axe fell on me," Mr. Kyalo remembers.

Magazine introduced him to organic farming

The 40-year-old organic farmer owes his success to the Biovision



Organic farmer Mr. Onesmus Kyalo, working on his tomato crop

Africa Trust's Farmer Communication Programme (BvAT-FCP) for offering him organic farming lessons in *The Organic Farmer* magazine, which is one of its many farmer communication channels to its farmer partners.

According to Mr Kyalo, "Caritas too, a farmer arm of the Catholic Diocese of Kitui beefed up the knowledge I gained from *The Organic Farmer* magazine with mentorship in the application of the agricultural technologies besides sinking a borehole to allow sustainable irrigation of my crop."

The farmer spends all the day in his ¼-acre of land watering, weeding, manuring and propping his tomatoes, his spinach and kales. During the harvesting season, Mr. Kyalo harvests one bag of spinach, one bag of kales and 3 crates of tomatoes every

day. From a bag of spinach he fetches Ksh 2000, kales Ksh 3000 and tomatoes Ksh 1000.

Helping hand

During the harvesting season, his wife, Catherine Muema Mutinda, helps to market their farm produce.

The couple reaps benefits to the tune of more than Ksh 25,000 as monthly income from their organic farming venture. Mr. Kyalo attributes his good farming practices to his thirst for knowledge in anything he puts his mind to.

He narrates with joy how he learnt the steps involved in preparing manure from *The Organic Farmer* magazine.

"I followed guidelines provided for in *The Organic Farmer* magazine in an article that featured manure preparation.

thesis. Leaves will wilt, turn pale or yellow and growth will be stunted.

Prevention and control

- Inter-cropping with vegetables to protect plants against the pest.
- Natural enemies will provide adequate control of whiteflies.
- Avoid or remove plants that repeatedly host high populations of whiteflies.
- Removing infested leaves or hosing down with water sprays in early stages of the pest.



Whitefly nymphs on a capsicum leaf

- Mulches can repel whiteflies from your gardens.
- Use of yellow sticky traps
- Neem oil

Farming venture maintains his family

Mr. Kyalo is also blessed with five children. He says, "I derive my joy from my farming activity which allows me to feed my lovely children with naturally grown food. I also clothe and pay their school fees from the returns of this produce."

The seventh born in a family of 12 is filled with praises for his parents who inculcated the values of hard work at a tender age. Although Mr. Kyalo detested farming activities, he turned to organic farming as a last option after untimely retrenchment. "I eat food that I'm sure it is well cultivated and safe. While propping my tomatoes, I cut the ripe ones and eat them as I continue attending to them. I do not need to wash them as they are fresh and have no chemicals" he says happily.

Recognised by church project

"It is such a joy," he confesses adding, "reading *The Organic Farmer* magazine was an eye opener for me. It gave me the knowledge that I lacked in farming before."

Due to sheer hard work, Mr. Kyalo is also one of the beneficiaries of a Ksh 2000 grant offered by Caritas Project of Catholic Diocese of Kitui. "Caritas empowers hardworking farmers by giving them farming inputs and equipment including sinking boreholes to ensure sustainability, says Joseph Kamau, Director, Caritas Kitui.

Plant Clinic

By Berita Mutune



White flies: A stubborn pest to control

Whiteflies are tiny, sap-sucking insects that may become common in vegetable especially during warm weather. They excrete sticky honeydew and cause yellowing or death of leaves.

Crop affected: Beans, citrus, tomato, sweet potato and avocado.

Symptoms

Whiteflies use their piercing, needle-like mouthparts to suck sap from the food-conducting tissues in plant stems and leaves. Large populations can cause leaves to turn yellow,

appear dry, or fall off plants. Whiteflies excrete sugary liquid called honeydew, so leaves may be sticky or covered with black sooty mould that grows on honeydew. The honeydew attracts ants, which interfere with the activities of natural enemies that may control whiteflies and other pests. They can be identified by checking the undersides of leaves around the veins for white insects, even if they aren't visible, and feel leaf surfaces for honeydew. Due to feeding, plants will quickly become extremely weak and may be unable to carry out photosyn-

- Insecticidal soap
- Natural predators eg. Lady beetles
- Hand picking

Another simple method for whitefly control

1. Mix 20ml of hydrogen peroxide with some little water. Add the mixture to a 20-litre knapsack sprayer filled with water.
2. Add 20ml of liquid cooking oil into the knapsack.
3. Spray the affected crop, including the underside of the leaves where the nymphs (young whiteflies) attach themselves and suck juice from the leaves of the affected plant.
4. Remove all the yellow polyethylene papers with the sticky glue and discard them safely to keep your environment clean and safe.

Protect mangoes from the powdery mildew disease

Kindly help me solve this problem. My mango trees are unable to set any fruit. At flowering stage, the flowers are covered by a white substance, which eventually turns black. Thereafter, they shrink, turn black and die off. What could be the cause? Michael Komen, Arror, Elgeyo Marakwet.

The problem affecting your mango trees could be powdery mildew (*Oidium mangiferae*). Powdery mildew is one of the most serious diseases of mangoes, affecting most of the varieties. It is a fungal disease that attacks the young tissue of the flower, stalk, leaves and fruit.

Infection shows initially as small patches of white powdery mycelium which may later join to cover large areas as the disease progresses and spreads up and down the length of the plant. Older leaves and flower stalks have a purplish-brown colour and dark brown spots with a greasy appearance form along the bottom side of the leaves. Powdery mildew grows well in areas with high humidity and moderate temperatures.

Mode of spread

The disease-causing spores are blown to other farms by wind.

Symptoms on flowers, flower stalks, and young fruits

Infected flowers, flower stalks, and young fruits become coated with the whitish powdery growth of the pathogen. Flowers are most susceptible to infection once they have begun to open. Infected flowers may fail to open and fall off whilst the infected small fruits abort and fall off.

The flowers and fruits eventually turn brown and dry. The dead flowers can easily crumble in one's hand. Fruits that become infected after they have set have purple-brown blotchy lesions (wounds) that crack and form corky tissue as the fruit enlarges.

It is also reported that infected fruit may become yellow and misshapen and even the entire fruit may become covered by mildew and fail to ripen. Attacked fruits turn brown and shed prematurely. This is common in cool and cloudy weather.

Symptoms on leaves

On some mango varieties,



White spores of Powdery mildew colonize a flowering mango plant (above). Mango leaves affected by Powdery mildew dry and die off (below)



growing and younger leaves are highly susceptible and may curl up and become distorted. Older leaves are more resistant to infection. Grayish, necrotic lesions or large, irregularly shaped spots may form on the upper side of the leaf and leaves tend to curl downwards.

On very susceptible varieties,

the youngest leaves may become completely covered with fungal spores and mycelium, and eventually die.

On some varieties, the whitish residue of the fungus tends to appear on the lower leaf surface, along the leaf midrib. Leaves may become brown and dry, and drop from the plant if

disease is severe.

Prevention and control measures

Choice of mango varieties

Use of less susceptible varieties is the best control measure for this disease. The most susceptible mango varieties are Zill and Kent.

Cultural practices

- Choose hot, dry areas for mango cultivation; if possible, avoid areas that consistently have rain during the flowering season.
- Prune unwanted or competing adjacent tree species, allowing more sunlight and air circulation in the canopy.
- Pick up fallen mango foliage and destroy it, remove severely infected leaves, flowers and fruits.
- Intercrop mango with other fruit trees or forestry species.
- Keep tall weeds away from mango trees.

Plant nutrition

- Fertilize the tree as required to promote vigorous growth.
- Foliar applications of organic phosphate fertilizer solutions.

Other control strategies include:

- Baking soda (sodium bicarbonate) mixed with water is an old home-remedy spray for powdery mildew.
- 70% neem oil which is soluble.
- *Ampelomyces quisqualis* is a registered biopesticide capable of parasitizing *O. mangiferae* pathogen.

Answer by Berita Mutune

Farming Tip

The danger of aflatoxin in maize

After harvest, most farmers sort rotten maize and set it aside for feeding livestock mainly cattle, sheep, goats, pigs and even poultry. What they may not know is that any rotten maize has a high level of mycotoxins that are harmful to people and animals. Mycotoxins are a group of naturally occurring chemicals produced by certain moulds (a type of fungi) which grow on cereals when they are exposed to warm moist conditions. Mycotoxins can grow on variety of crops and foodstuffs including cereals, nuts, spices,



dried fruits etc. Mycotoxins that are found in food are called aflatoxins (B1, B2, G1, G2 and M1). Mycotoxins can cause liver cancer, kidney damage, problems with digestion, reproductive disorder and suppression of the immune system in humans and even animals. Aflatoxins

can cause immediate death in chickens and pigs. Most feed manufacturers in Kenya rely on rotten maize to make animal feeds but they add toxin binders. Binders are compounds that attach themselves to the mycotoxins and prevent them from getting into blood stream through the animal's stomach walls. Some of the manufacturers may not use the binders in the right way and these may affect animals and even people who consume milk, meat, eggs and other products from the affected animals.

TOF **Radio** answers your questions

TOFRadio is broadcast on KBC on Thursday at 8:45pm and Mbaitu FM on Friday at 8.30pm. Tune in and listen to farmer experiences and expert advice on agribusiness and eco-friendly farming methods. On this page, we respond to some of the issues raised by farmers in their correspondence to the radio program. Send your questions and comments via SMS 0715 916 136.

Better care for hens increases egg laying

Joyce Wambui Mahui | It is not only quite frustrating for farmers when their prized hens stop laying eggs suddenly but also a cause for concern.

In fact, when this happens, a farmer needs to find out if the hen is sick. It is important for the farmer to monitor closely the health and the diet of hens to ensure they are continuously laying eggs during the laying period. There are many reasons why hens stop laying eggs, but most of this can be solved if the farmer is committed to making their poultry farming a success. Reduced numbers of eggs collection in a day from the hens' cage might be caused by many reasons and the farmer may offer remedies in the following ways:

Diet

Diet is a key element for a healthy hen. An unbalanced diet and insufficient feed make hens stop laying eggs as they should during the laying period. Have you changed their diet or the brand of pellets which you are feeding your chickens?

Sometimes, mainly due to lack of money, farmers may stop feeding their chickens layer pellets or layer mash and instead, feed them on maize. Maize does not contain enough protein. Chickens especially laying hens require a balanced diet to continue laying eggs. Hens need up to 20grams of protein each day to continue laying eggs.

Feeding hens with a good quality layer mash with a correct balance of protein, carbohydrates, vitamins, calcium and other minerals is the best investment for a farmer.

High protein residual may also be available at the farm like pumpkin seeds and mealworms which can also help boost egg production. Grit and water in the hens' diet also help them in the digestion process of their food. Routine cleaning of their cages and filling their water drinking points with clean water too would improve in laying eggs.



A hen with her chicks: Sudden change in egg production may indicate a problem that requires attention from the farmer

Stress

Stress can cause hens to stop laying. When chickens are frightened, hungry, thirsty, moving them to a different pen, introducing new chickens; disrupts their pecking order. This takes few days to establish the new pecking order. All these changes can cause stress to the hens. These changes disrupt their routine and egg laying routine.

During this time they may stop laying eggs but again, after a few days, they start laying.

Lighting

Proper lighting in the chicken's coop is always required. Hens require 14-16 hours of good lighting each day to lay well. Sometimes, due to the weather and climatic changes, the natural daylight may fail. As a result, egg production is affected too. The solution to this is to place an artificial lamp in their coop to provide the light. This keeps them awake and they continue laying eggs unless a farmer wants to let them take a break from laying.

The temperature should also be put into consideration. Hens lay best when it's not too cold or too hot. Keep them warm when the weather is cold and provide them with plenty of shade and cool water when it is hot.

Diseases or parasites

Diseases can slow or stop egg laying. If your hens have suddenly stopped laying it is very likely that they are unwell. If

your hens show any symptoms of diseases, it is important to consult your local veterinarian or extension worker to further investigate into the problem.

Sometimes chickens get respiratory viruses which can be confused for colds. Chickens do not catch colds. They get respiratory viruses. If the symptoms look like those of cold e.g. a runny nose and they begin to gurgle or snore, then, an urgent action is needed immediately. Once the first snore is heard; the chickens with the symptoms are supposed to be quarantined (isolated) from the rest of the flock.

Controlling the respiratory viruses in chickens in a natural way is the best practice for farmers to adapt. Some of these methods are provision of fresh herbs such as aloe vera which is considered an antibiotic, adding garlic in chickens' drinking water beside daily cleaning of their water drinking points.

Notorious parasites such as lice, mites and worms too, bring discomfort to chickens. Chickens that are infected with any of the above parasites have pale combs and continuously scratch themselves. The easiest and the best way to treat and prevent any parasite from infesting hens is to always keep the chickens' housing clean. Periodic sprinkling of ash in the chickens' pen would keep off the parasites.

Molting

Molting is a natural process where all chicken shed their feathers, which grow later.



0717 551 129 / 0738 390 715

Chickens on sale: 2½ months old KARI chickens. Price negotiable. Contact 0710 247 281, Nairobi.

Organic produce for sale: We are offering organic vegetables, fruit and spices for sale. We have *sukumawiki*, spinach amaranth, chia seeds, rocket black, Chamomile, Fenugreek, basil, mint, asparagus, parsley, beetroot, lemongrass, Taragon, tree tomato and Pepino fruit and seedlings. Contact Wanjiru's Park Farm and Resource Centre, Limuru Tel. 0723 158 680.

Silage tubes for sale: We sell silage tubes, improved KARI chickens, day old chicks. Farmers in Western and North Rift, call Star Rays Educational Centre, Nangili 0721 245 443.



WhatsApp

Whatsapp Farmers Group: Join farmers and agribusiness experts. To join send your full name and county to 0721 245 443.

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When such an occurrence is observed, farmers should not confuse this process for a symptom of an illness. Chickens molt each year and the feathers may take around 6 to 12 weeks for the new feathers to grow. During this period, hens stop laying eggs. The best help farmers can give to help their chickens to go through molting smoothly is to feed them with a high-quality layer feed with a high protein concentration. This kind of feeds boosts their immune systems.

Age

As hens get older, their laying frequency decreases. Usually, hens are at their laying peak during their first and second year. As they approach three years, their laying decreases. By the time they're about five years old, their laying decreases at about half as frequently as they did at their peak. If hens are fed well, they can live up to 8-10 years of age although, during this period, they rarely lay eggs. For continuity purposes, farmers are advised to raise a new flock every few years to have a continuous supply of home-grown eggs. ■