













Pests	Pest Damage	Solutions	Diseases
 Diamondback moth		<p>Repellents: African marigold, black jack, tephrosia, garlic, crotalaria, chilli and peppers, eucalyptus, tomato.</p> <p>Insecticides: African marigold, black jack, tephrosia, lantana, garlic, tea, papaya, pyrethrum, crotalaria.</p> <p>Antibacterials : African marigold, garlic, tea, tomato.</p> <p>Antifungals: African marigold, garlic, papaya, crotalaria, tithonia, sweet potato, tomato, rhubarb.</p> <p>Nematicides: Cassava, garlic, papaya.</p> <p>There is a helpful book, from which we got most of our information: Henry Elwell & Anita Maas, <i>Natural Pest & Disease Control, Natural Farming Network Zimbabwe</i>, P.O. Box 8515, Causeway, Harare, Zimbabwe</p> <p>The Kiswahili version of this Plant Extract Special has been published in <i>The Organic Farmer</i> Nr. 17, Sept./Oct. 2006</p>	 Maize smut
 Stemborer			 Maize Streak virus
 Cutworm			 Mosaic virus
 Aphids			 Late blight

Plants can solve farmers' problems

All African farmers know about the damaging effects of insect pests. These are responsible for 20–30 percent of crop losses. And, many African farmers know that modern chemical pesticides often are not only poisonous and harmful to human health, but they affect beneficial insects and destroy the environment. In most cases, chemical insecticides do not solve the problem.

There are many safe, natural and simple methods of protecting plants. On the following pages we give you some useful advice for environmentally safe alternatives to replace agrochemicals.

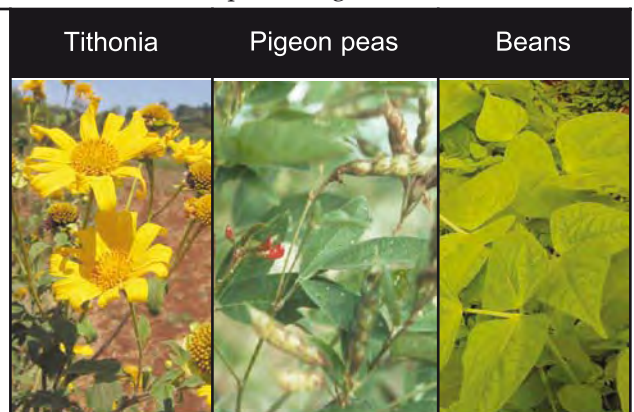
But this is not enough. Farmers should observe nature closely, then they will find the answers. First, they should reinstate the fertility of the soil; healthy plants are more resistant against pests. Second, they should provide habitats

for predators. While the insect pests live directly on the plants, the predators which prey on these pests live in hedges and trees and do their work during daytime. That means farmers should never spray during daytime, but early in the morning or late in the afternoon, when the predators have gone back to their habitats. Third, farmers should re-introduce plant diversity into cropping. This is the best way to maintain the pest–predator balance.

Every farmer should be an observer and examine carefully what is going on in their shambas. Every farmer in sustainable agriculture also has to be a researcher: They have to know which method can be used to restore the natural balance. Plant extracts are slow in acting. They do not work like chemicals; this means that farmers have to use them several times a week to produce good results.

Hedges are natural barriers

Plants can act as a physical barrier to the movement of pests. Hedges hinder the movement of aphids into the garden. A hedge of tithonia, for instance, is a natural barrier against many insects. A row of pigeon peas (mbaazi, also called Congo peas) has been used to protect tomato, potato and cabbage crops against red spider mites. Beans have been planted as decoys in rows around cabbages to protect this vegetable from spider mites. Beans are an ideal decoy for they serve four functions: insect control (decoy), improvement of the soil (legume), food for livestock, material for mulching or compost. Hedges are also habitats for many predators. Here agroforestry can play an important role.



African marigold (*Tagetes erecta*) – mbangimwitu**Use against:** Bacteria, fungi, nematodes, insects**Insects:** Ants, beetles and many others**Preparation:**

1. Crush 100-200 g of the leaves, roots or flowers. Pour on 1 litre of boiling water, stir, and soak for 24 hours, then add 1 litre of cold water. Spray on plants or into the soil.
2. Grow marigolds in rotation with crops to control nematodes, or plant as an intercrop to repel beetles.

**Blackjack (*Bidens pilosa*) – kishonanguo****Use against:** Insects, mites**Insects:** Repels aphids, ants, beetles, cabbage root fly, caterpillars, crickets, mites, termites and whiteflies**Preparation:**

1. Cover a cupful of mature seeds with water and boil for 10 minutes (or, soak the seeds for 24 hrs). Cool, add 1 litre of water and a teaspoonful of soap (not detergent such as Omo), and spray immediately.
2. Seeds can be spread around bushes to deter termites.
3. The whole plant can be crushed or hand-rubbed in water until the juice has come out, and the solution used as a spray.

**Cassava (*Manihot esculenta*) – muhogo****Use against:** Nematodes and aphids**Insects:** Aphids**Preparation:**

1. Obtain the juice by crushing the roots/tubers. Dilute 1:1 with water and spray immediately, using 4 litres diluted extract per square metre. Wait 20 days before sowing seeds. (Said to be very effective.)
2. Use cassava peelings as a mulch against nematodes.
3. Try using the starchy extract obtained after boiling and cooling whole cassava on aphids.

**Castor oil plant (*Ricinus communis*) – mbarika, mbono****Use against:** Rats, mice, termites (mounds), fungal diseases, rodent pests**Insects:** Termites, cutworm**Preparation:**

1. As a general spray, soak green seeds and leaves in water for 24 hrs, filter and spray.
2. Dry the green seeds and leaves and grind for use as a dusting powder.
3. For cutworm, put 4 cups of crushed shelled seeds in 2 litres of water, boil for 10 minutes, add some soap, dilute to 10 litres and water immediately into the soil.
4. Put green seeds into mole holes or rat runs as an effective repellent.
5. Dig seeds, leaves or oil cake into the soil to kill fungal diseases.
6. Mulch with the branches and leaves to repel termites. (Varieties with red stems are said to be more effective than plants with green stems).

Caution : Castor bean seeds are poisonous.**Chilli and sweet peppers (*Capsicum frutescens*)—pilipili, pilipili hoho****Use against:** Insects, slugs, snails, soil pests, viral diseases,**Insects:** Termites, ants, cutworm and other insects**Preparation:**

1. For a common spray, grind 2 handfuls of chillies, soak in 1 litre of water for 1 day. Shake well for a few minutes, filter, add 5 litres of water and a little soap and spray.
2. Chilli powder can be applied around the base of plants to repel ants, cutworm, slugs, snails and a wide range of soil pests.
3. The juice from sweet peppers will control mosaic virus and inhibit the spread of other viruses.
4. Chillies are often planted as a repellent.

Caution : A too-strong spray will burn the leaves.**Crotalaria (*Crotalaria juncea*)—marejea****Use against:** Fungal diseases, nematodes, insects**Insects:** Many kinds**Preparation:**

1. Rotate or intercrop as a trap crop for nematodes and many insects.
2. Crush plant parts in water to make a spray.

Caution : Mildly toxic to cattle under certain conditions; do not store seeds in rooms where humans are working.

Garlic (*Allium cepa*) – kitunguu maji

Use against: Bacterial and fungal diseases, insects, mites, mice, moles
Insects: Ants, aphids, armyworms, caterpillars, moths, grubs, mites, mosquitoes, termites
Preparation:

1. For a common spray: Crush one garlic bulb, add to 1 litre of water, mix in a little soap, and use immediately.
2. Another spray said to kill most insects, can be made by crushing three cloves in a jar (not a tin), covering with half a cup of vegetable oil and soaking for 2 days. Filter the mixture and add 10 litres of warm soapy water.
3. Bulbs can be dried, crushed and used as a dust. The dust can be added to water to make into a spray. Recommended for scab, mildew, bean rust and tomato blight.
4. Garlic planted around fruit trees and other plants will repel aphids, fruit tree borers, mice, moles and termites.

Caution: Garlic is a broad-spectrum insecticide that can kill beneficial insects as well as pests. The taste remains on the sprayed or dusted plants for up to 1 month. Do not use it 1 month prior to harvesting vegetables.



Lantana (*Lantana camara*) – mwingajini

Use against: Insects
Insects: Many species
Preparation:

1. Crush one handful of leaves in 1 litre of water, add a little soap, spray.
2. Dry and grind ashes into a dusting powder.
3. Burn the branches and dust the ash over beetles and leafminers.



Jimson weed (*Datura stramonium*)

Use against: Fungal diseases, insects, nematodes
Insects: All kinds of insects including cutworm
Preparation:

1. Dry the whole plant out of the sun, grind and use as a powder.
2. Crush a handful of leaves in 1 litre of water; add little soap and use as a spray.

Caution: The plant is poisonous, so do not put near the mouth.



Papaya (*Carica papaya*) – mpapai

Use against: Fungal diseases (e.g. coffee rust, powdery mildew and rice brown leaf spot), nematodes, insects
Insects: Quite a few kinds
Preparation:

1. Common spray: Add 1 kg of finely shredded leaves to 1 litre of water, shake vigorously. Add 4 litres of water and a little soap (20 g or 20 ml). Spray or water into the soil for cutworms.
2. Extract the juice from immature fruits to control termites.



Pyrethrum (*Chrysanthemum cinerarifolium*) – pareto

Use against: All kinds of insects
Preparation:

1. Pick flowers on a hot day, dry in the shade. Grind flowers into a powder and dust over insect pests.
2. Pour 1 litre boiling water over 50 g pyrethrum flowers (or 20 g powder) and soak for several hours. Add a little soap, filter and use as a spray.

Caution: Spray in the evening, so you do not attract bees.



Rhubarb (*Rheum spp.*)

Use against: Fungal diseases, insects
Insects: Insects with soft bodies, such as aphids, whiteflies, small caterpillars
Preparation:

1. Soak 100 g fresh leaves in 1 ltr of water for 24 hrs. Add soap and use as a spray.
2. Up to 5 large leaves in 0.5 litres of water have been used to give a stronger spray.
3. Another spray is made by soaking 1 kg leaves in 3 litres hot water for 20 – 30 minutes, cooling, then spraying on the pests.
4. Stems dug into the soil next to cabbages prevent club root.

Caution: The stems are edible but the leaves are poisonous.

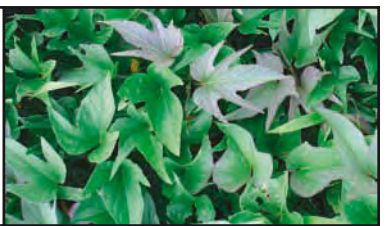




Stinging nettle (*Thabai*)

Use against: Fungal diseases
Preparation:

Boil 2 kg of stinging nettle in 5 litres of water, strain it and spray it on the crops.


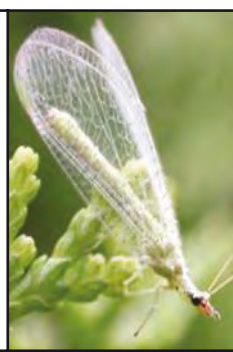





<p>Sweet potato (<i>Ipomoea batatas</i>)—kiaziki kitamu Use against: Rice brown leaf spot, rice blast and other fungal diseases, insects Insects: Aphids Preparation:</p> <ol style="list-style-type: none"> 1. Crush and soak leaves in water, use as spray. 2. Heavily starched water after cooking can be sprayed on small insects such as aphids. 	
<p>Tea (<i>Camellia sinensis</i>)—chai Use against: Fungal diseases, insects, snails Insects: Woolly aphid, squash bug, termite mounds Preparation:</p> <ol style="list-style-type: none"> 1. The used leaves can be spread around plants to repel snails. 2. The liquid (tea), when cool, can be sprayed on plants. 3. The leaves can be soaked in water and used to repel termites. You can also pour the soaked leaves into termite colonies. 	
<p>Tomato (<i>Lycopersicon esculentum</i>)—nyanya Use against: Bacterial and fungal diseases, insects, mites, nematodes Insects: Aphids, ants, asparagus beetle, cabbage worm, diamondback moth, cockroaches, whiteflies Preparation:</p> <ol style="list-style-type: none"> 1. Simmer 1 kg of chopped leaves in 2 litres of water. Cool and use as a spray. 2. Shred 2 handfuls of leaves/stems/fruit in 2 litres of water so that the green juice is extracted. Leave for 5 hours, filter, add a little soap. Spray every 2 days when the butterflies of the cabbage worms are flying. Fresh plant parts are best and should be used immediately. 3. Dried parts can be crushed into a powder and mixed with water to give a spray or applied as a dust, but it is not as effective as the fresh material. 4. Tomatoes planted around other plants will protect those plants from asparagus beetles. 5. Whole plants hung in orchards or in houses are said to protect fruit trees from many insects and the house from cockroaches. 	
<p>Caution: When the recipe calls for 'soap', use a real soap (e.g. Sunlight, Ushindi, Snowflake, etc.) and not a detergent such as Omo. Clean properly the utensils before and after preparation and applying, wash your hands and do not have direct contact with the plant extracts. It is useful to make a trial application on a few plants to test their reaction. (TOF)</p>	

Many insects are farmers' friends

Su Kahumbu, well known to the readers of *The Organic Farmer*, calls beneficial insects "good guys" (see photos below). There are indeed a lot of insects that are of benefit to farmers; they feed on other insects that damage crops.

Farmers should take conserve these predators. A farmer who is interested in the natural order and balance should create good living conditions for predators so that they can carry out their task of keeping all crop-eating insects in check.

<p>Ladybirds</p> <p>Ladybirds are really good biological control agents. Adult ladybirds will prey on greenfly and blackfly and especially on aphids.</p>		<p>Lacewings</p> <p>The green lacewing is widely used to control many different pests. The lacewing is always hungry; it is the most voracious and will eat nearly all pests.</p>		<p>Spiders</p> <p>All spiders are predatory on insects. Their catching system varies, and not all spiders use webs as traps.</p>	
<p>Ladybird larvae</p> <p>Ladybird larvae feed mainly on aphids, but also on other pests. While it is in the larval stage, one ladybird beetle can eat nearly 500 aphids.</p>		<p>Wasps</p> <p>Wasps are good biological control agents. Adult females lay eggs in other insects and the wasp larvae develop as parasites, killing the host.</p>		<p>Centipedes</p> <p>Centipedes are in general ground-based predators, feeding on slugs, slug eggs and soil-dwelling insects. They have a poisonous bite, however.</p>	