



COMMON AGRICULTURAL PESTS AND DISEASES

IDENTIFICATION GUIDE

Peace Corps Senegal
2009

PESTS ARE BAD

The purpose of this guide is to aid in the identification of the most common insects and diseases in Senegal. Due to the limitations of the publishing house, the booklet does not include comprehensive information on effective pest treatment. The pictures and descriptions in this guide are merely meant as a means to pinpoint the pests plaguing a field or garden, which will enable an informed search for solutions using more detailed technical resources. Any submissions for subsequent versions of this booklet, especially clear color photographs, are highly welcome. A table of contents is provided below for reference.

Cover photo from the G. Eric and Edith Matson Photograph Collection at the Library of Congress (<http://commons.wikimedia.org/>)

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APHIDS

PUCERONS

Aphidoidea: *Aphis craccivora*, *A. gossypii*, *Myzus persicae*

Adults are between 2 and 3 mm long, with very soft green, brown, or black bodies that will crush under light pressure. Some have wings.

Aphids are normally found on the underside of the leaf and inside developing, initially along the veins but more widespread when population increases.

Aphids stunt plant growth by sucking large amounts of sap, with leaves shriveling and discoloring; they also produce honeydew, on which a sooty mold can grow and stifle photosynthesis. Aphids are responsible for the spread of over a hundred types of viruses.



Photo by John Obermeyer, Purdue University (at <http://www.purdue.edu/>)



Aphid-borne viruses can affect cucumber, melon, squash, beans, potatoes, lettuce and beets.

Aphids can be controlled by wood ash, as well as neem. Dimethoate and Acephate are effective. A high volume of water (from rain or by hand) can flush them out too.

BLISTER BEETLES

MÉLOÏDES/CANTHARIDES

Meloidae: *Mylabris* spp., *Coryna* spp.

Between 10 and 15 mm long, blister beetles have either a black or grey body with yellow or red bands on their wing covers. Upon contact with human skin, they will release a liquid that causes painful, irritating blisters, similar to those caused by poison ivy.



Blister beetles shoot right for the flowers, where they enjoy a meal of pollen. In the case of a grain, this reduction in pollen production will reduce the amount of seed; for other crops (especially cowpeas), it will prevent fruit or pod formation.

Millet is a favorite target, as is okra; corn and cowpeas also suffer.



These beetles are attracted by the color blue, so fill a bright blue container with soapy water: beetles will come to drink and stay to die. Alternatively, light a tire on fire in a field to smoke them out.

CATERPILLARS/CUTWORMS

CHENILLES

Lepidoptera: includes several species

Depending on species, they can be between 15 and 50 mm long. Everyone knows what a caterpillar looks like.

They are often found on the leaves, enjoying a stolen meal, but can also be in more hidden areas, so watch specifically for caterpillars eating sensitive areas of growth.

They will tear apart leaves and flowers, reducing plants' ability to photosynthesize and reproduce; they can also make holes in fruit, allowing disease to penetrate and reduce yields. Certain species prefer the inside of plant stems, causing major disruptions of nutrient flow and can ruin yields.

Caterpillars are found on most crops, but are especially damaging to cabbage (once they get inside the head, they are difficult to remove), tomato (since everything seems to affect tomato), and cowpeas.



Hot Pepper solution is effective, as are tobacco and neem. Treating seed beds with wood ash can prevent initial infestation, as can keeping weeds under control early (by reducing egg-laying sites). Cypermethrine, Decamethrine, Endosulfan, Sumithion, and Acephate can kill these bugs dead.

FRUITFLIES

MOUCHES DES FRUITS

Tephritidae: *Ceratitis capitata*, *Dacus vertebratus*,
Bactrocera cucurbitae

The various fruitflies in Senegal are generally between 0.5 and 0.8 cm long, with yellowish brown markings.

These flies are most often found on the fruit of plants, but can also go for the flowers.

The damage comes from the eggs these flies lay under the skin, as the larvae carve out a home for themselves inside the fruit. They leave the door open for fungus, and the fruit rots.



Photo by USDA Agricultural Research Service (<http://ars.usda.gov/>)

Plants such as cucumber, melon, squash, watermelon, zucchini, tomatoes, and cowpea are the most affected, but fruitflies have also been observed on eggplant, mango, and papaya as well.



Photo by USDA Agricultural Research Service (<http://ars.usda.gov/>)

Protect young fruit by covering with dry leaves, straw, a bag, or netting until the skin toughen enough to prevent egg-laying. Harvest ripe fruit in a timely manner to reduce the number of potential hosts. Remove infested fruit immediately and burn/

bury to prevent the spread of the flies. Neem, pepper, and garlic solution can repel the flies; Decis and Dimethoate are effective as well.

GRASSHOPPERS & LOCUSTS

SAUTERIAUX & CRIQUETS

Acrididae: *Oedaleus senegalensis*; *Nomadacris septemfasciata*; *Schistocerca gregaria*

Up to 8 cm long, with jagged legs and stiff wings.

They sit on plants and will jump away when disturbed.

Damage results from their eating the plants; they are especially devastating to seedlings, and depending on the size of the infestation, these can be a nuisance to or a pestilence upon mature plants. They can chew through protective netting unless it's made from metal.

Grasshoppers will generally eat anything green, both in fields and in gardens. Watch out for them in the dry season, when greenery is scarce.

Organophosphates (Malathion, Dimethoate, etc.) have some effectiveness when population is small. Generally, however, spraying pesticides just causes the grasshoppers to move elsewhere. Neem and garlic reportedly have an effect in reducing plants' palatability, also causing them to move elsewhere. Lighting a tire can smoke them out as well. Assuming there is another nearby patch of plants for them to go to (and hopefully weeds, not someone else's field), they may relocate. In the dry season, when a village garden is often the only green thing around, this can be difficult.



Photo by Michel Lecoq, CIRAD-Prifas (at <http://ispi-lit.cirad.fr/>)

LEAF BEETLES

ALTISES

Chrysomelidae: *Nisotra uniformis*

These beetles can be up to 10 mm long, with a reddish-brown color, and a shiny body.



These insects chew upon the leaves, leaving hundreds of small holes. This reduces photosynthetic area and ultimately plant yield. In addition to this direct damage, these insects are also responsible for the spread of plant diseases such as the Okra Mosaic Virus.

These bugs are most fond of okra and bissap,

Treat with neem and wood ash. Outside of that, Dimethoate and Acephate can take care of infestations, or Endosulfan if necessary. As this insect is quite exclusive in its diet, extensive infestations may benefit from crop rotation in the area.



LEAF-FOOTED BUGS

PUNAISES

Coreidae: *Anoplocnemis curvipes*

10 to 15 mm long, these bugs are brown/black with red-tipped antennae. They have small spikes roughly resembling shoulders, and their rear legs are broad (like leaves).

These like to infest cowpea plants during pod development, although they can also be found in peanut fields.



These bugs do a great deal of damage by sucking on the pods, causing them to shrivel. The seed within will wrinkle and take on a dark color. Particularly

in bean fields, vigilance is necessary once plants start to flower, as a sufficiently high population of these pests can reduce yields to zero.



Neem helps; Endosulfan kills. Alternatively, igniting a tire in the field can smoke them out.

LEAFHOPPERS

CICADELLES/JASSIDES

Cicadellidae: *Empoasca spp.*

Leafhoppers are between 2 and 3 mm long, with a greenish color. As the name implies, they hop on leaves.

Generally, they are found on the underside of a leaf, and prefer to stick by the veins.

They suck the leaf's juices and eat chlorophyll. Telltale signs of their presence include yellowing at the edges of leaves, and eventually of the entire leaf. They can also account for tiny (less than 1 mm diameter) white spots on young leaves.

Eggplant and jaxatu are the most commonly affected plants, but leafhoppers also enjoy tomatoes. They are also present on cowpeas during early stages of the plant's growth.

Neem works, as does a pepper solution. Most chemicals are also effective, but unnecessary unless the problem has gone unnoticed for a long time.



Photo by Steve L. Brown, Univ. of Georgia (at <http://www.forestryimages.org/>)

NEMATODES

NÉMATODES

Meloidogyne spp.

Nematodes are microscopic worms, and the Root Knot Nematodes common in Senegal, while themselves invisible, have an obvious presence as indicated by the telltale nodes on the roots they inhabit.

The knots on the roots restrict the flow of nutrients, severely limiting plant growth. Signs include marked yellowing of leaves, and eventually drying down.

Eggplant, jaxatu, potato, tobacco, okra, cowpeas, rice, and cotton are susceptible to infestation. Papaya and banana plants attract nematodes.

In areas affected, rotate with less sensitive crops, like sorghum, millet, corn, cabbage, onion, or garlic. Growing peanuts, which are sensitive, can serve as a trap, and upon harvest the nematodes will be pulled out along with the peanut plants. Prolonged flooding can help reduce an infestation in the soil, as can a fallow period. Natural treatment options include neem and marigold; the chemicals Mocap and Furadan are deadly to nematodes.



Photo by Bridge J., IIP. (at <http://www.infonet-biovision.org/>)

SPIDER MITES

ARAIGNÉES ROUGES

Tetranychus cinnabarinus, T. urticae

Two main species in Senegal, both tiny (0.5 mm) specks. Despite the common name in French, one is a yellowish bronze (sometimes with a silvery sheen); the other indeed a rusty red.

They are initially found on the underside of the leaf by the veins. As they multiply, they begin to look like a thick dust; later they spin webs that cover the whole leaf. Checkmate.



They damage a plant by sucking its juices. Initial infestation causes yellow mottling in the center of the leaf; mites are difficult to see at this point. Larger, more visible populations cause leaves to turn a yellowish brown. Beyond this, they may infest other parts of the plant.



Eggplant, jaxatu, and tomato are the most susceptible crops, but *Moringa olifera* and other species can be affected as well.

When the infestation is still small, remove affected leaves and wash the plant with soapy water. Tobacco solution can help, as can diluted milk.

Dicofol and Dimethoate are also helpful. If the infestation gets bad, remove and burn the plant before the mites spread.

THRIPS

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Thrips tabaci

Thrips are about 1 mm long, black in color, and can have wings.

In cowpeas, they are generally found in the flowers; in onions, they are found in the greens. In both cases, it is essential to open the flower/green and look within for signs of infestation, as it is only when the population gets out of control that they will be visible on the exterior.



Thrips suck the plant juices. In the case of cowpeas, this causes flowers to abort, thus preventing pod formation. In onions, the leaves will turn dry and silvery. Thrips are also responsible for the transmission of a number of viruses.



Neem is quite effective if done early and regularly. Once an infestation takes hold, however, Decis or Dimethoate (Decis preferably) are necessary to eliminate the pests.

WEEVILS

BRUCHES

Callosobruchus maculatus

Weevils are between 3 and 5 mm long, either brown or black in color, with a pointy beak-like proboscis.

Initially, the weevils lay their eggs on seeds, visible as white specks stuck to the grain. Once these hatch, the larvae burrow their way into the grain, feeding there until adulthood, when they retreat out of the hole they created.



Photo by University of California (at <http://agspsrv34.agric.wa.gov.au/>)

The vigor and ultimately germination rate of a seed lot are affected by the holes. One hole will generally not prevent germination; two holes means it's time to find new seed.

Cowpeas are by far the most affected crop, but weevils can also affect peanuts

When saving seeds, any combination of sand, ash, and neem leaves layered with the seed can reduce or prevent infestation, but the recommended method is to use Phostoxin tablets. Saving seeds in an airtight container with Phostoxin (aluminum phosphide, which produces PH_3 when moistened) is a cheap method for ensuring the seeds' safety. The fumigant will effectively kill adults, larvae and eggs.

WHITEFLIES

MOUCHES BLANCHES

Aleyrodidae: *Bemisia tabaci*; *B. argentifolii*

Adults are 1 mm long, with two pairs of white, rounded wings on a yellowish body. Bodies are covered in a waxy powdery substance.

They can be found on any part of the plant, but generally like the underside of the leaf where they feed and lay eggs. Once these eggs hatch, the young will commence feeding.



They do damage by sucking the sap, which weakens the overall plant; they also excrete

honeydew as a waste product, on which a sooty mold can grow that reduces photosynthesis. Fruit dropThe real problem, however, is their transmitting viruses, which can significantly reduce yields in a number of plants. Fruit drop can occur.



Photo by schizo-psykick.de (at <http://www.psykick.de/>)

Cassava, cotton, cowpea, cabbage, cucumber, melon, squash, watermelon, okra, eggplant, jaxatu, potato, tomato, pepper, and tobacco plants are all susceptible.

Neem works, but treatment must be strict as a single infestation brings viruses. Decis also works.

DISEASES AND NUTRIENT DEFICIENCIES

There are a host of diseases that can affect plants in Senegal, and while space requirements preclude listing all of them here, here are a few tips to help in distinguishing between fungal, bacterial, and viral infections, and some of the biggest offenders.



Photo by Cornell University (at <http://blogs.cce.cornell.edu/>)

Fungal Infections often involve specific points of infection, normally with discoloration and drying out radiating outwards (concentrically) from such points. Anything fuzzy or powdery like mold is a good indicator. When a fungus affects a fruit, it tends to brown and rot. These types of infection often develop in moist conditions.

One particular type of fungal infection to watch out for is stem rot/root rot. The plant will seem as if it is deprived of moisture (leaves wilting and drooping), but if soil is wet, check at the base of the stem for infection. This type of disease will cause a plant to die completely. Prevent by keeping excess moisture under control.



Photo by Cornell University (at <http://blogs.cce.cornell.edu/>)

DISEASES AND NUTRIENT DEFICIENCIES

Bacterial Infections are similar to fungal problems in that they depend on moisture. They often develop when there is a cut in the plant's protective surface, which is more often than not caused by insects. Other infections get into the interior of the plant, and so are not immediately visible.



Bacteria thrive in a tropical environment. Infections cause decay and rot, as well as plant weakness; they also often produce a sticky or slimy substance, sometimes hidden in the stem or roots. Examine the plant well after any tear or sign of weakness, and eliminate diseased plants or rotting fruit.

Sometimes bacterial problems can be mistaken for fungal ones (compare the bacterial leaf spots on the right with the ones caused by a fungus on the facing page). Keep in mind that bacterial problems may appear greasy, with a yellow halo immediately around spots of infection. Bacteria will never produce the kinds of spores that fungi do.



Photo by Cornell University (at <http://blogs.cce.cornell.edu/>)

DISEASES AND NUTRIENT DEFICIENCIES

Viral Infections usually affect the entire plant, with symptoms including discolored (either light or dark, and especially with a mosaic type pattern), curled, and shriveled leaves, and/or a stunting of growth.

Viruses are spread by insects, in soil, and seed/cuttings. Once a virus infects a plant, it's there to stay. If it's just one plant, it's best to remove it before the virus spreads; if the entire field is affected, there may be a (reduced) yield, but it's best to destroy the plants at the end of the cycle. Never save seed from a diseased plant.



Photo by Ndiaga Cisse and Anthony Hall (at <http://www.fao.org/>)



Photo by Univ. of California (at <http://www.aes.ucdavis.edu/>)

One of the most common viruses in Senegal is Tomato Yellow Leaf Curl Virus. It is spread by flies while the plants are still in the seed bed, but the infection is invisible to the eye until fruiting begins. At this point, leaves will curl, and the plant will only bear fruit once before failing. Protect seed beds from flies by covering with netting.

DISEASES AND NUTRIENT DEFICIENCIES

Nutrient Deficiencies are extremely common as soils here are generally poor, both in nutrients and in organic matter content. They are easily mistaken for disease as they cause the entire plant to show signs of weakness.

The soil's water content, pH, and temperature all contribute to a plant's ability to uptake nutrients, and many nutrient deficiencies it can be difficult to pinpoint which nutrient is lacking, but the following can give a general idea of the effects of certain specific nutrients' absences.

Nitrogen deficiency will cause older leaves to yellow and the rest of the plant will have a light green color.

Phosphorous deficiency results in younger leaves looking reddish-purple. In addition, the tips of leaves will look burnt.

Potassium deficiency will cause older leaves to scorch and wilt at the edges.

A fertilizer will be rated for the relative amounts of these three macronutrients (hence NPK), but plants also require high levels of calcium, magnesium and sulfur, not to mention numerous micronutrients. In addition to just applying fertilizer, ensure an adequate amount of organic matter in the soil. This acts as a sponge for the chemicals in fertilizer, and will ensure their long presence in the soil. Compost made from diverse materials will obviously enhance organic matter content and will likely contain a wide range of nutrients.

STRIGA

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Striga hermonthica

While not a traditional pest, this weed is so noxious to fields that it deserves its own mention. It tends to develop above ground after farmers have completed their normal weeding, and can therefore significantly damage harvests of cereal crops.

Like most plants, it is found on the soil. It has bright, pretty flowers (pink or purple, normally), and grows to about 40 cm in height. Before the plants develop, the field will show significant yellowing in patches where

the striga roots are present.



Striga's roots are parasitic upon those of the affected crop, intercepting nutrient flow and therefore growth. Some farmers believe that adding fertilizer will eliminate Striga: in fact, this provides sufficient nutrients for the crop as well as the weed, causing physical signs to vanish while the problem remains.

Millet is the most commonly affected, but there are varieties of Striga that affect sorghum and corn too.

The plant can live underground for sometime. When it sprouts above ground in September, pull it out before it produces seed. In fields where the infestation is severe, rotate non-cereal crops for at least two years.

CHEMICAL PESTICIDE USE

There are a number of situations where organic pest control fails to meet farmers' needs: a field can be too large for homemade solutions given the labor involved; some pests are unresponsive to organic countermeasures; while natural pest control is great for prevention, established infestations require something stronger. Whatever the reason, please be careful when using chemicals. In America, farmers benefit from safety equipment and training; here in Senegal, both of these are lacking and some of the chemicals available are illegal elsewhere because of their overly noxious character.

Please encourage farmers to use poisons safely. When possible, get them to use protective equipment, and failing that, put a covering over their face. In all cases, they should pump the chemical such that the wind carries the poison away from them. Apply only the recommended amount or concentration of chemical: this information is available in Peace Corps' Gardening in Senegal book, or if not, the vendor should (theoretically) be able to give the proper dose. Apply in the evening, after people have finished working in the fields. Always respect the delay period required between application and harvest. Ensure that the farmers store chemicals far from the reach of children and in well-ventilated areas.

One grows food to eat healthier and provide income; these benefits are annulled when a farmer is poisoned and has to pay for medical treatment.



NOTES

NOTES



Corps de la Paix Américain
Almadies Lot N/1 TF 23231
B.P. 2534, Dakar RP