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# How to Treat Your Palm With Antibiotic

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**HOW TO TREAT YOUR PALM  
WITH ANTIBIOTIC  
for control of  
lethal yellowing of coconut palm  
and  
lethal decline of Pritchardia palm**

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This public document was promulgated at an annual cost of \$598.21 or a cost of 6¢ per copy to inform homeowners and commercial pesticide operators who will be treating palm trees with antibiotic for disease control.

Commercial names are used in this circular to provide specific information. This is not intended as an endorsement of products named, nor as criticism of similar products not named.

# HOW TO TREAT YOUR PALM WITH ANTIBIOTIC

## LETHAL YELLOWING

**LETHAL YELLOWING** is an always fatal, highly epidemic disease of coconut palm limited to land areas within and bordering the Caribbean Sea. The disease was reported on the Florida mainland in late 1971, killing 2,000 coconut palms within one year and an estimated 20,000 trees within two years.

The first symptoms to appear in a lethal yellowing diseased tree are premature nutfall and the death and discoloration of flower stalks, often before they emerge from their buds. A palm which drops a large number of partially developed coconuts with dark discolorations at the ends should be checked for discolored flower stalks. This is the most diagnostic symptom of lethal yellowing. These flower stalks will be discolored dark brown from the tips back, and may hang limply as noted in Figure 1A. The small male flowers will adhere to such diseased flower stalks as opposed to creamy-white healthy flower stalks in which the male flowers drop

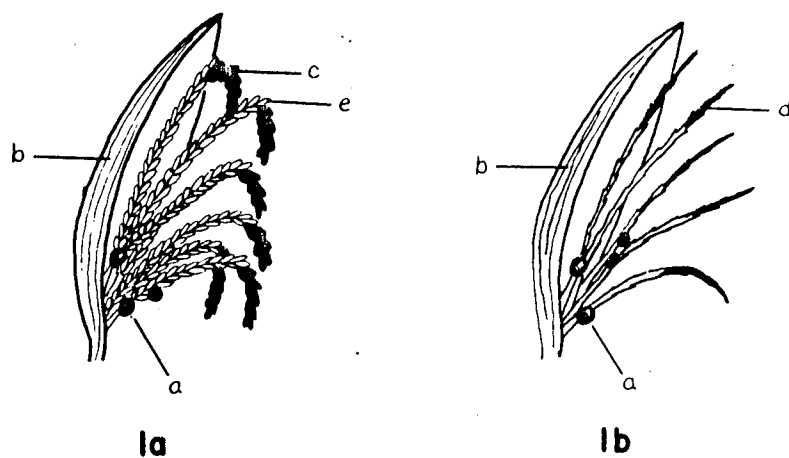


Figure 1. Coconut flower stalks: A) Diseased, B) Normal.  
a. female flower, b. bud from which flower stalk emerges,  
c. dead drooping flower stalk tips typical of lethal yellowing,  
d. normal drying out of flower stalk tips after blooming, e. male flower.

after blooming. Healthy flower stalks will dry out naturally without drooping after the male flowers have dropped (Figure 1B). Two or three discolored flower stalks may appear before any leaf yellowing develops. The yellowing usually begins in the lower fronds and extends upwards into the crown over a period of one to four months. Finally the crown topples from the tree leaving a dead telephone-pole-like stump.

The causal agent of lethal yellowing is believed to be a mycoplasma-like organism which lives within the food-conducting veins of the coconut palm. A mycoplasma is an extremely small cellular microorganism requiring an electron microscope to visualize. Mycoplasmas generally are smaller than bacteria and are sensitive to certain types of antibiotics such as oxytetracycline<sup>1</sup>.

**CONTROL OF LETHAL YELLOWING** may be achieved through an integrated series of measures which currently include 1) cutting trees in advanced stages of disease so that they cannot spread the causal agent to nearby healthy trees, 2) quarantine of affected areas so that diseased palms are not moved out to areas free of disease, 3) replanting or underplanting with the Malayan Dwarf variety of coconut palm which is known to be resistant to lethal yellowing, and 4) antibiotic treatment either as a preventive or a curative measure.

### **Oxytetracycline Treatment Of Coconut Palm**

**PREVENTIVE TREATMENTS** may be used on healthy coconut palms in neighborhoods where lethal yellowing is known to be present. If lethal yellowing is not present in your immediate neighborhood, preventive treatments are not necessary and would be an unwarranted expense. The first diseased palms in an area may be treated curatively, as explained later, and the surrounding trees then treated preventively.

The amount of oxytetracycline to use and the timing of treatments are important in order to obtain a high degree of protection for healthy palms. One gram of actual oxytetracycline (see Table 1) injected at 4-month intervals has proved highly effective in preventing lethal yellowing. Such treatments can reduce the tree to tree spread of disease by five

<sup>1</sup>Oxytetracycline has been cleared by EPA for non-restricted use by homeowners. In addition to following the precaution suggestions on the label, protective clothing should be worn. The County Extension Office can furnish information about sources of supply.

Table 1. Grams actual oxytetracycline per volume measure of Pfizer Terramycin® Tree Injection Formula and minimum amount of water to dissolve antibiotic. More water, up to 16 ounces total, may be used, depending on injection methods.

Grams actual oxytetracycline	Volume measure of Terramycin Tree Injection Formula powder	Amount of water to use
1	one slightly rounded teaspoon	½ oz.
3	one level tablespoon	1½ oz.
6	two level tablespoons	3 oz.

times. Although the oxytetracycline will only remain about one month in the treated palms, injections may be spaced at 4-month intervals due to the long incubation period of the disease. These treatments at 4-month intervals must be continued as long as lethal yellowing remains a threat to your tree.

What to expect: While preventive treatments have conclusively been proved to reduce the rate of spread of lethal yellowing, a small number of treated palms will become diseased. In such cases the trees should receive curative treatments as described below.

**CURATIVE TREATMENTS** may be made on coconut palms already showing symptoms of lethal yellowing if the disease has not advanced too far. Preferably, trees should be treated before any yellowing appears in the crown. Trees with a small number of yellowed fronds may be treated with higher doses of oxytetracycline, but the chances for disease remission are much reduced. *Trees having one-fourth or more of their fronds yellowed should be cut and removed, as they cannot be expected to respond to treatment.*

**Pre-yellowing Phase:** Coconut palms showing the symptoms of premature nutfall and/or flower stalk discoloration as shown in Figure 1a with no more than one yellowed frond should be injected with one to three grams of actual oxytetracycline (see Table 1 for teaspoon equivalents) dissolved in a minimum of 1/2 ounce of water per gram (up to 16 ounces water total may be used depending on injection method). These injections should be repeated at 4-month intervals.

**Expected Results:** In extensive tests, 50% of all diseased coconut palms treated prior to yellowing developed no further symptoms of disease and began producing healthy new fronds and flower stalks within 3 months. Approximately 25% showed little or no response and died. The remainder exhibited vary-

ing degrees of yellowing, but were able to survive and produce extensive new foliage. In effect, then, *the pre-yellowing curative injection can be expected to save about 75% of the trees receiving treatment.*

These treatments must be repeated at 4-month intervals to keep a tree free of symptoms. If a tree begins to yellow prior to the 4-month interval, it is suggested that an additional injection be given at that time. It must be noted that a tree which begins to yellow is physically weakened and its chances for survival are diminished similarly to a tree which has been transplanted.

Early Yellowing Phase: Diseased coconut palms having a small number of their lower fronds yellowed (six or less) may be treated with oxytetracycline, but have only about a 25 to 50% chance of survival. Even so, some people may want to treat such trees. It is recommended that these trees receive 6 grams actual oxytetracycline (see Table 1) in 3 to 16 ounces of water, depending on the type of injection equipment used.

## LETHAL DECLINE

LETHAL DECLINE OF PRITCHARDIA PALM is a disease which has appeared in Florida on *Pritchardia thurstonii* and *P. pacifica* (Fiji Fan Palm) palms growing in areas where lethal yellowing is attacking coconut palm. Mycoplasma-like bodies have been seen in lethal decline affected *Pritchardia pacifica* as well as in lethal yellowing affected coconut. The causal agents are believed to be identical, although the evidence is circumstantial.

Lethal decline of Pritchardia palm can be recognized upon the appearance of dark brown, dead, young flower stalks, as in coconut. Yellowing begins in the lower fronds and can kill an affected palm in about 3 months. Early in the development of this disease the folded bud or 'spear' leaf in the center of the crown will die, turn brown and collapse. Control measures for lethal decline of Pritchardia are similar to those already mentioned for coconut, except that no resistant variety is known and only curative antibiotic injections are approved.

### Oxytetracycline Treatment Of Pritchardia Palm

No preventive testing has been done for lethal decline of Pritchardia palm and only curative recommendations may be made for *Pritchardia thurstonii*. Again, as in coconut, the more

advanced the disease, the less are the chances for survival. Pritchardia palms exhibiting death of young flower stalks and spear leaf collapse may be injected with one gram of actual oxytetracycline (see Table 1) in 1/2 to 16 ounces of water, depending on the type of injection equipment used. Chances for remission are excellent, even though yellowing may continue. Treated Pritchardias have often produced a whole new crown after losing most of their old leaves to disease.

### INJECTION METHODS FOR PALM TREES

It is recommended that the antibiotic solution be injected directly into the trunks of palms to receive treatment. Spraying or soil drenches will not work. For injection, a hole must be drilled 2 to 4 inches into the trunk usually at a slight downward incline. The diameter of the hole will depend on the type of equipment being used. Of four methods suggested, two are commercially available, one may be easily rigged by the homeowner, and one is not commercially available at this time. Undoubtedly other injection methods will become available in the future and the consumer should judge each on its own merits.

**GRAVITY FEED INJECTION:** An antibiotic solution may be introduced into a tree through a simple gravity feed mechanism that the average homeowner may assemble (Figure 2). Materials required are a one quart plastic milk or bleach bottle, a cork, a piece of plastic tubing, and a 3 inch piece of 1/4 inch diameter copper tubing. A 1/4 inch diameter hole is drilled at a slight downward angle 4 inches into the trunk about 4 to 5 feet above ground level and the copper tubing hammered 1 inch deep into the hole. The proper dose of oxytetracycline is dissolved in 8 to 16 ounces of water and placed in the plastic container which is then corked. A hole is bored in the cork and the plastic tube inserted. The bottle is then inverted and hung from the tree with the plastic tubing connected to the copper tube in the trunk of the tree. A small ventilation hole must be punched in the container to allow air to enter. The copper tube and plastic tubing must be tapped gently so that all air bubbles are removed. The presence of air bubbles in the system will prevent antibiotic uptake. If no uptake occurs after several hours, tap the tubing again to release air bubbles. Sixteen ounces of solution should be taken up overnight. If no uptake occurs in 24 hours, discard the old solution and try again at a new site with fresh solution. Gravity flow injection is simple, but is not as efficient as the following methods.

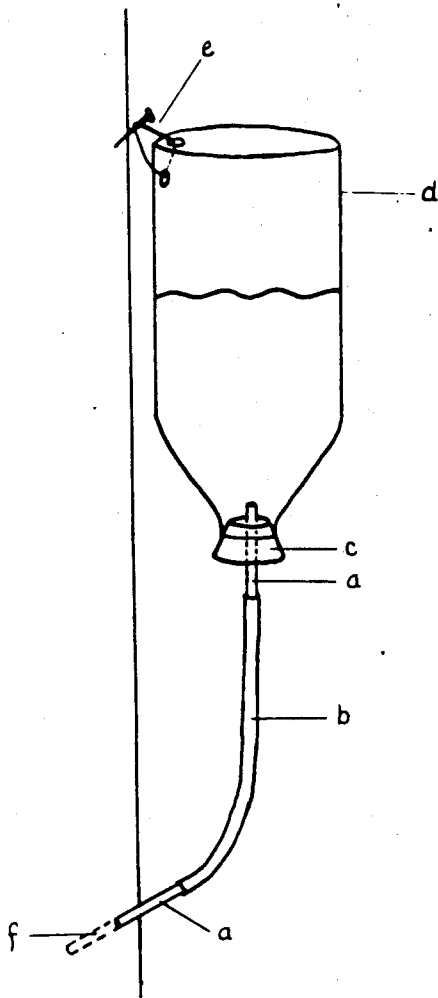


Figure 2. Gravity feed injection.  
 a. copper tubing,  
 b. plastic tubing,  
 c. cork, d. 1-quart plastic bottle, e. suspend bottle from wire threaded through holes cut in bottle, f. hole drilled in tree trunk.

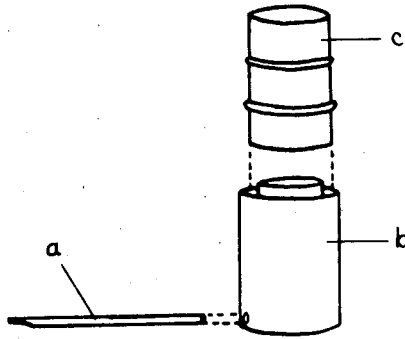


Figure 3. Mauget Injector.  
 a. feeder tube to insert in hole drilled in trunk, b. fluid reservoir, c. cap.

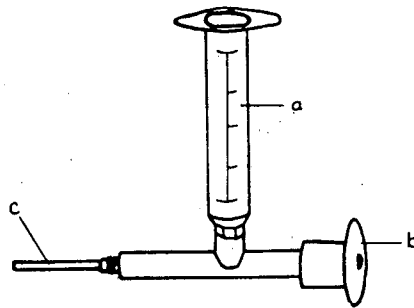


Figure 4. Minute Tree Injector.  
 a. fluid reservoir, b. pump handle, c. needle to insert in hole drilled in trunk.

**MAUGET® INJECTOR:** The Mauget injector is a small disposable plastic container that is commercially available. It is filled with 1/2 ounce of solution, used once, and discarded. A 1/8 inch diameter hole is drilled 3 inches into the trunk, a

feeder tube inserted 1 inch deep with a special tool, and the filled plastic unit placed on the tube (Figure 3). The solution should be taken up after 4 hours to overnight. Doses higher than one gram should be placed in several units, with one gram of actual antibiotic in each unit in 1/2 ounce water. The Mauget injector has proved highly efficient in introducing oxytetracycline into coconut tissues, as long as a hole is drilled into the trunk prior to inserting the feeder tube.

~~MINUTE TREE INJECTOR: The Minute Tree Injector is a commercially available device that can be used for repeated rapid injections of small volumes of solution (Figure 4). Each gram of active oxytetracycline should be dissolved in 1/2 to 1 ounce of water and placed in the solution reservoir. Then a 5/32 inch hole is drilled 3 to 4 inches into the trunk, the needle inserted, and the handle pumped. Approximately one minute is required to inject 1 ounce of solution.~~

**AIR PRESSURE INJECTION:** Another method used extensively in our research program is air pressure injection; however, no equipment is commercially available at this time. This method is similar to the gravity flow technique of Figure 2 except that a metal tank capable of holding 100 p.s.i. air pressure is used rather than a plastic bottle. Sixteen ounces of antibiotic solution is placed in the tank which is then filled with compressed air to 100 p.s.i. at a service station. *All fittings and hoses must be suitable for high pressure.* Also, a 1/2 by 3 inch hollow lag screw is used to connect the hose to the tree trunk rather than a simple copper tube. With this method 16 ounces of solution may be injected in approximately 30 minutes.

In summary, oxytetracycline injections can help prevent lethal yellowing symptoms from appearing in coconut palm, and are about 75% effective in producing disease remission in diseased coconuts treated prior to yellowing. Chances for recovery lessen as the disease becomes more advanced. Oxytetracycline is also effective in remitting lethal decline symptoms in the Pritchardia palm. Remember that not all trees will respond to treatment, that it will take about 3 months from the time of treatment until a diseased tree will begin to produce new growth, and that trees should be retreated at 4 month intervals. Do not cut a tree that begins to yellow after treatment, even if the spear leaf collapses, as the tree still has a 50% chance of survival. Through the integrated use of the control methods of quarantine, cutting trees with advanced cases, replanting with resistant varieties, and antibiotic therapy, Florida will probably be able to live with these palm diseases and still maintain the tropical appearance lent by these palms.