

柑橘種植法

顧玉成·楊 波●編著



柑橘类水果的种植和管理

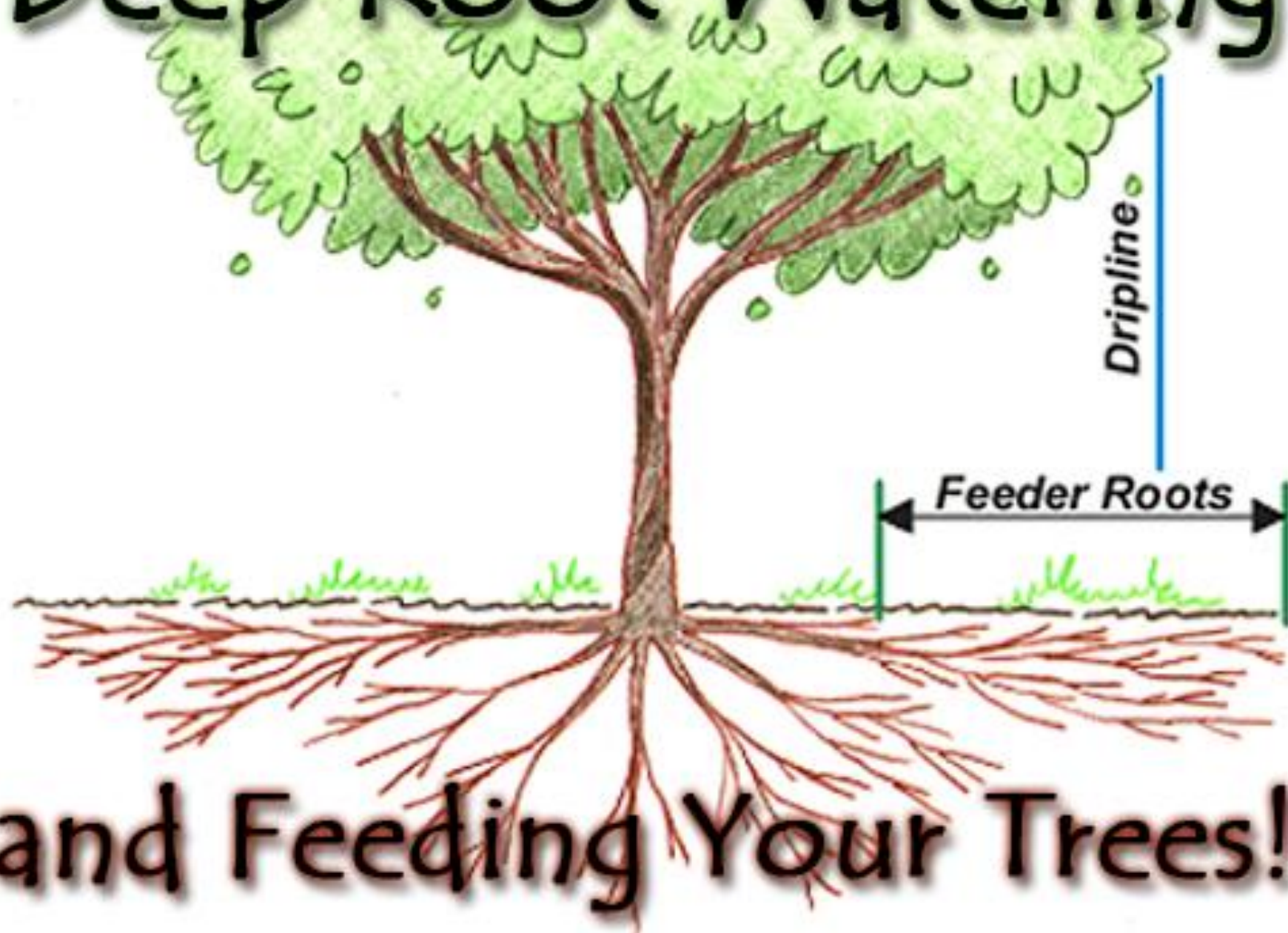
1	Flower, fruit and uses	花, 果实和用途	
2	Health benefits	健康益处	
3	Climate and Photoperiod	气候和光周期	
4	Soil	土壤	
5	Planting	种植	
6	Fertilizing	施肥	
7	Watering	浇水	
8	Tree Care	果树管理	
9	Overwintering	过冬保护	
10	Propagation	繁殖	
11	Pest management	虫害处理	
12	Disease management	病害处理	

7. 浇水

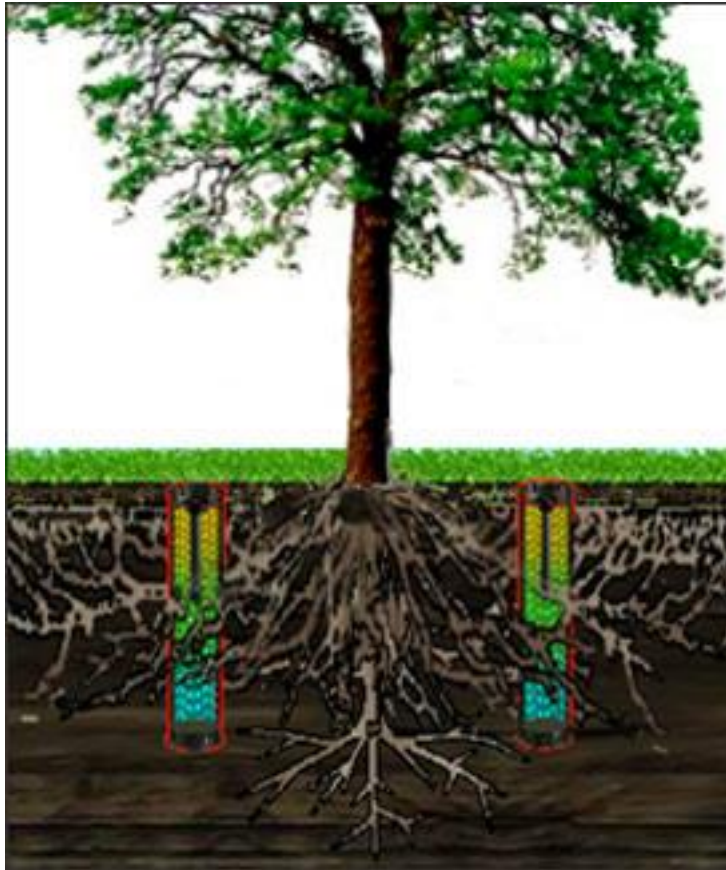
1. 深浇水效果更好
2. 浇水之前可以有几英寸的干土，缺水会导致开花延迟和果实脱落.
3. 芭乐树耐涝和耐热

Guavas can take considerable neglect, withstanding temporary waterlogging and very high temperatures

Deep Root Watering



and Feeding Your Trees!





RECLAIMGROWSUSTAIN.COM

specialty engineered ABS cap

ribbed dome construction built for
sledge hammer installation

UV protected

guards against cracking or weathering

slotted cap for drip line

easily connects to your automatic dripline

extraction hole

for easy removal with only a screwdriver



internal filter

keeps rock and dirt out, ensuring proper irrigation

durable shaft

1" interior diameter, allowing water to flow easily

tapered head

allows for better ground penetration

perforated shaft

optimal water/fertilizer saturation

deeper fertilization

add directly into the spike

reinforced ABS tip

internal ribbing for added strength



USE WITH A HOSE OR DRIP LINE

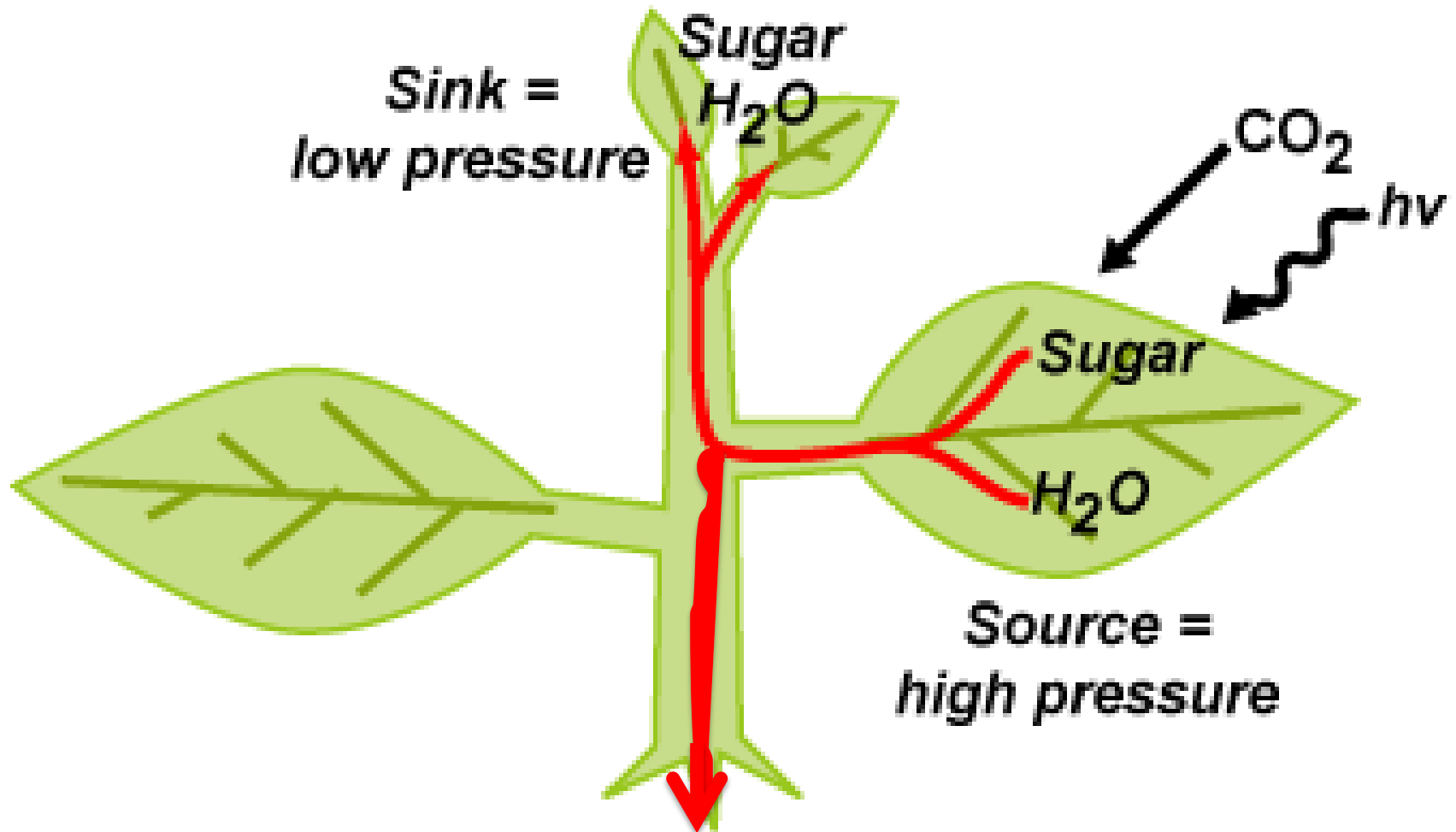


8. 如何收获又大和又甜 的**柑橘**



Store No.819566

糖被向上和向下运



**使用30～40叶
为支持一个水果**

Use 30 to 40 leaves to
support one fruit



123RF



123RF



123RF



123RF



123RF



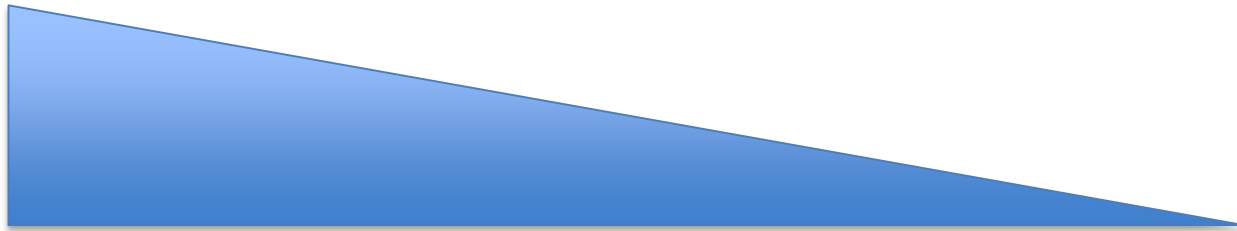
123RF





The acid levels of fruits decrease as the fruit ages.

Jan Feb March April



如何增加产量

How to increase yield

Gibberellic acid (GA₃) spray

赤霉酸 Chì méi suān

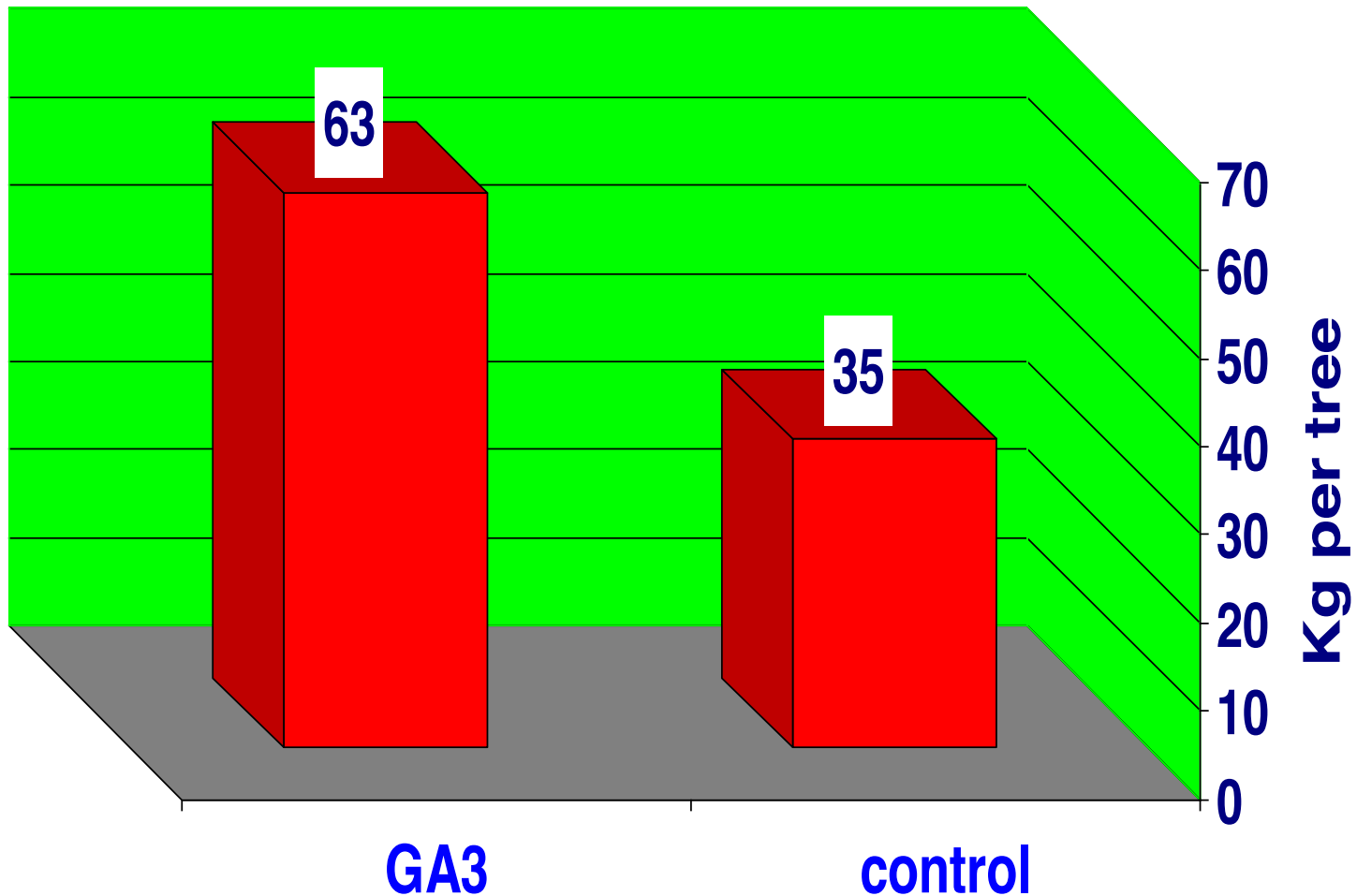
The plant hormone gibberellic acid is essential for fruitlet survival.

Spray with GA₃ on full bloom increases fruit set. It causes fruitlet survival and increases yield.

GA₃ sprays are efficient in mandarins and not in other citrus varieties.

True for mandarin only 柑橘

effect of GA₃ spray on yield of 'Or' mandarin



Girdling 环剥

A strip of bark is removed from the tree trunk or branches.

It causes temporary disruption of conductive vessels (phloem) that carry carbohydrates to the roots.

More carbohydrates remain in the canopy which enable better fruit set.

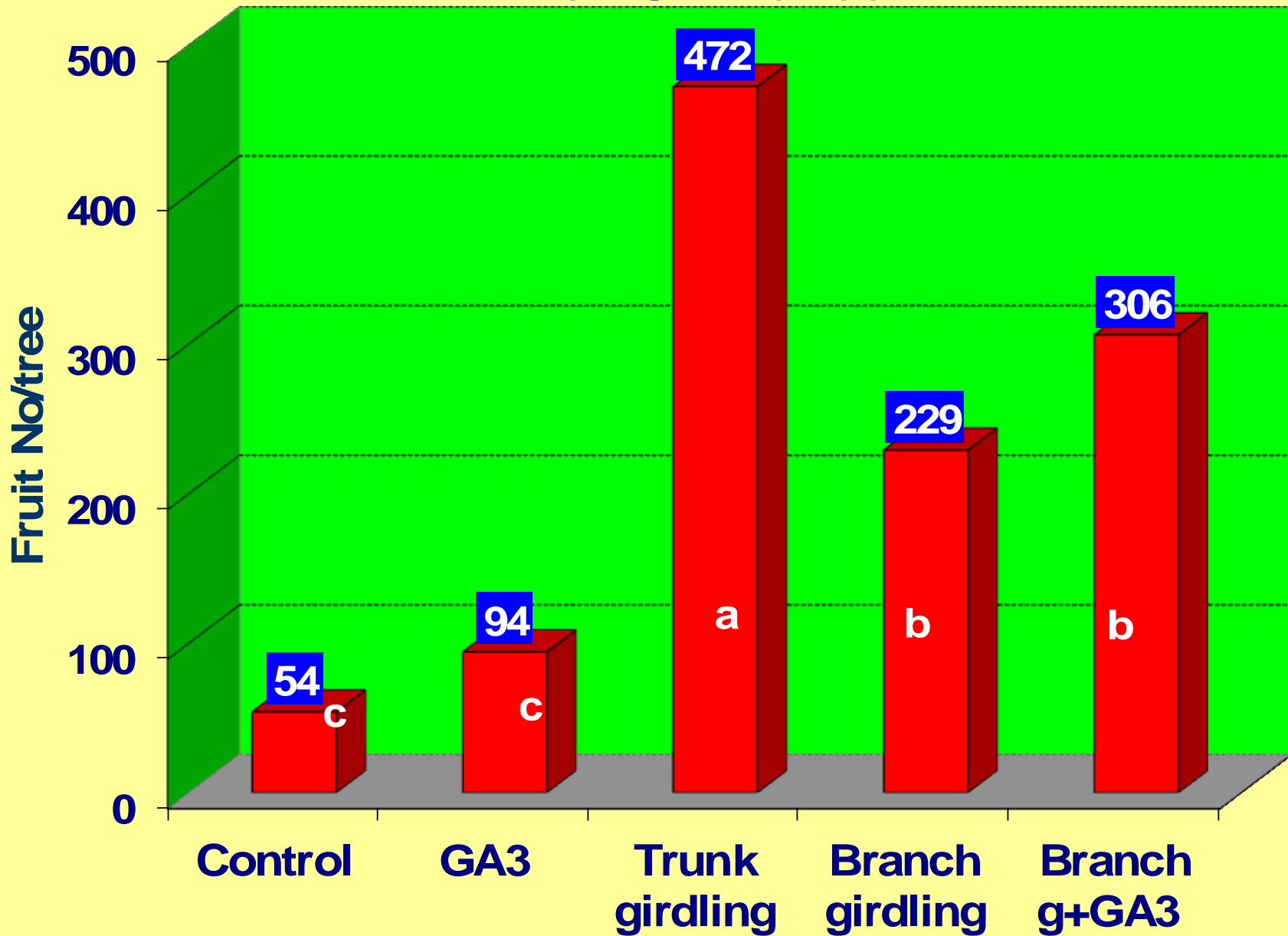


The girdling is carried out by special instruments

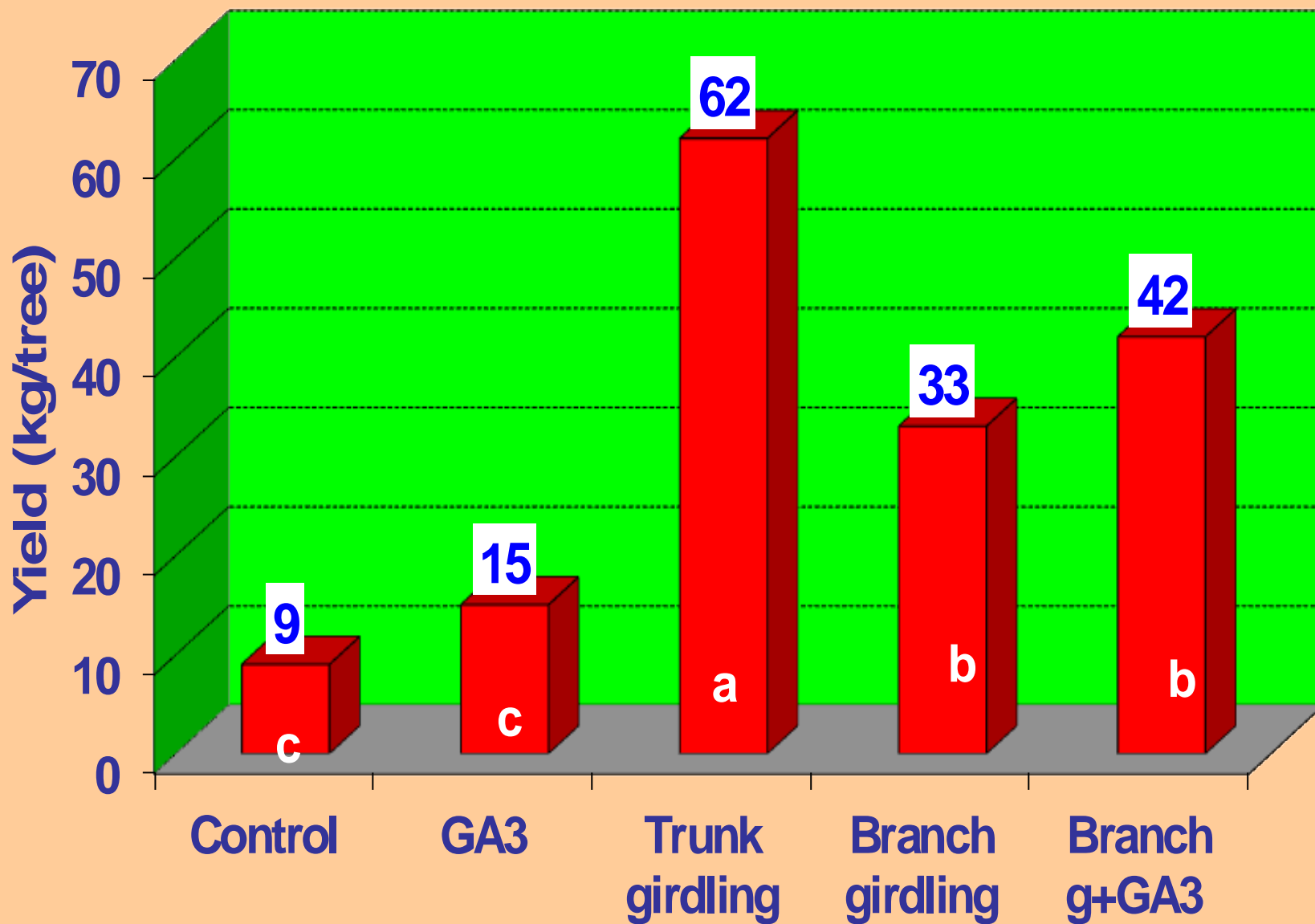


A new instrument for girdling developed in Israel:
roller skates

Effects of the treatments on fruit number of 'Or' mandarin



Effects on the yield of 'Or' mandarin

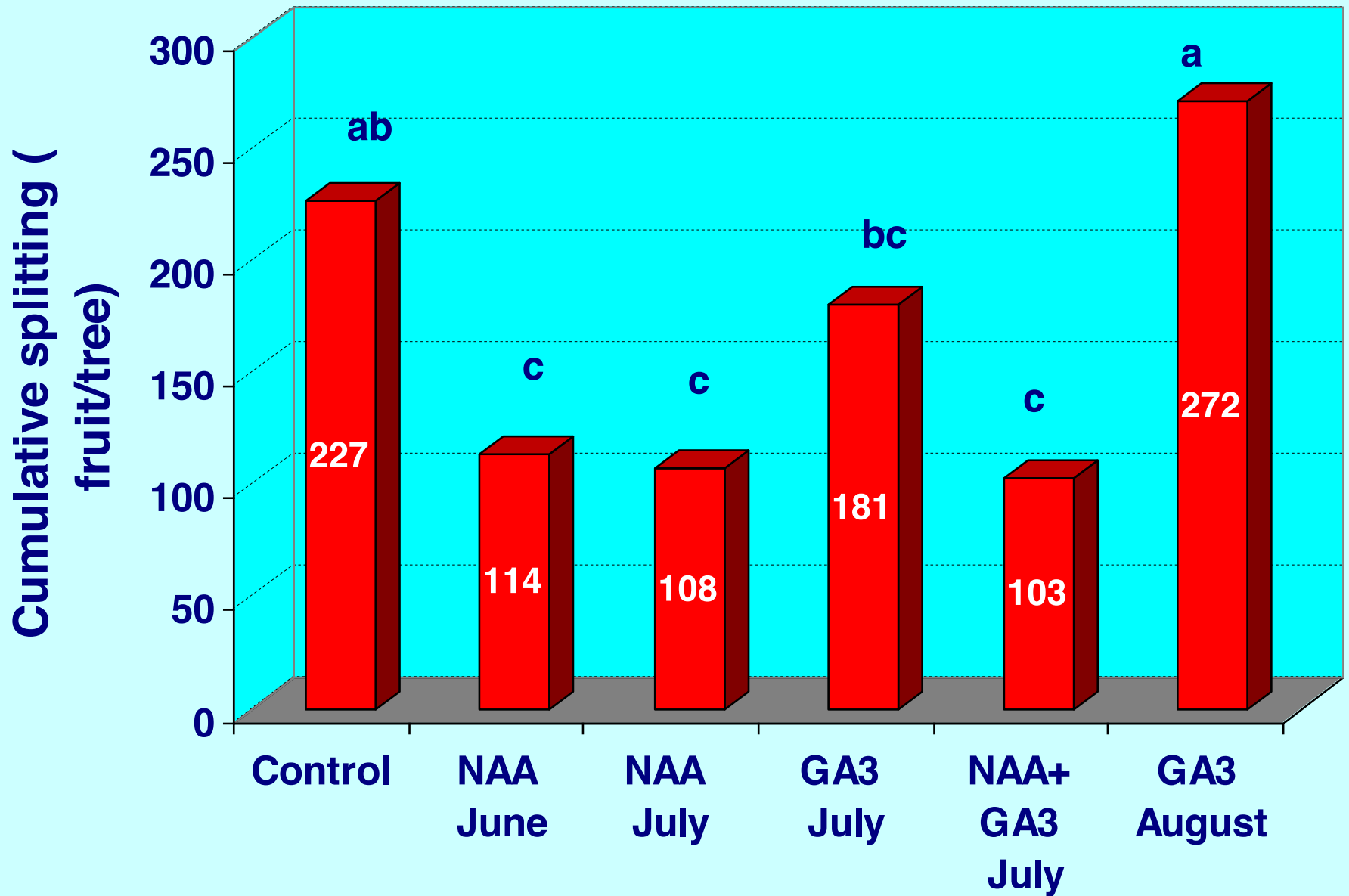


Fruit splitting reduction

Some citrus varieties suffer from fruit splitting which causes fruit abscission and losses of part of the yield.



Effects of the treatments on fruit splitting



适当修剪小芽保持养分

Pruning & maintenance of site

- 1) Citrus trees can produce fruit in all but the most shaded part of the tree, and need not be regularly pruned to allow more light into the interior of the canopy.
- 2) Even when the crop load is heavy, individual fruit size is large, so pruning to reduce the crop load and improve fruit size is not necessary except occasionally with tangerines.
- 3) Finally, citrus fruit quality is typically just as good or better from a minimally pruned tree as compared with one that is heavily pruned.

适当修剪小芽保持养分

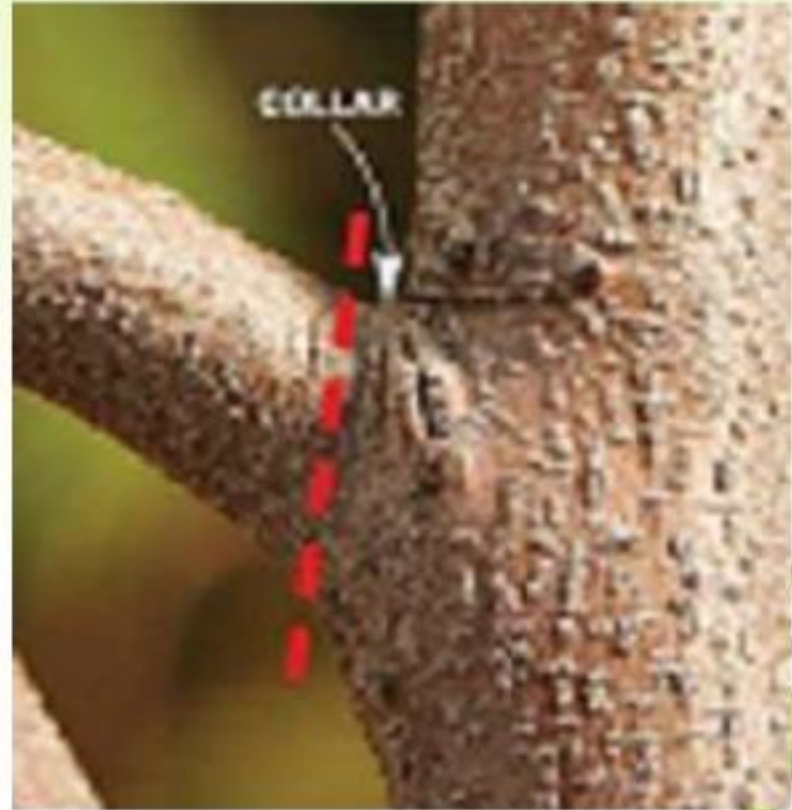
Pruning & maintenance of site

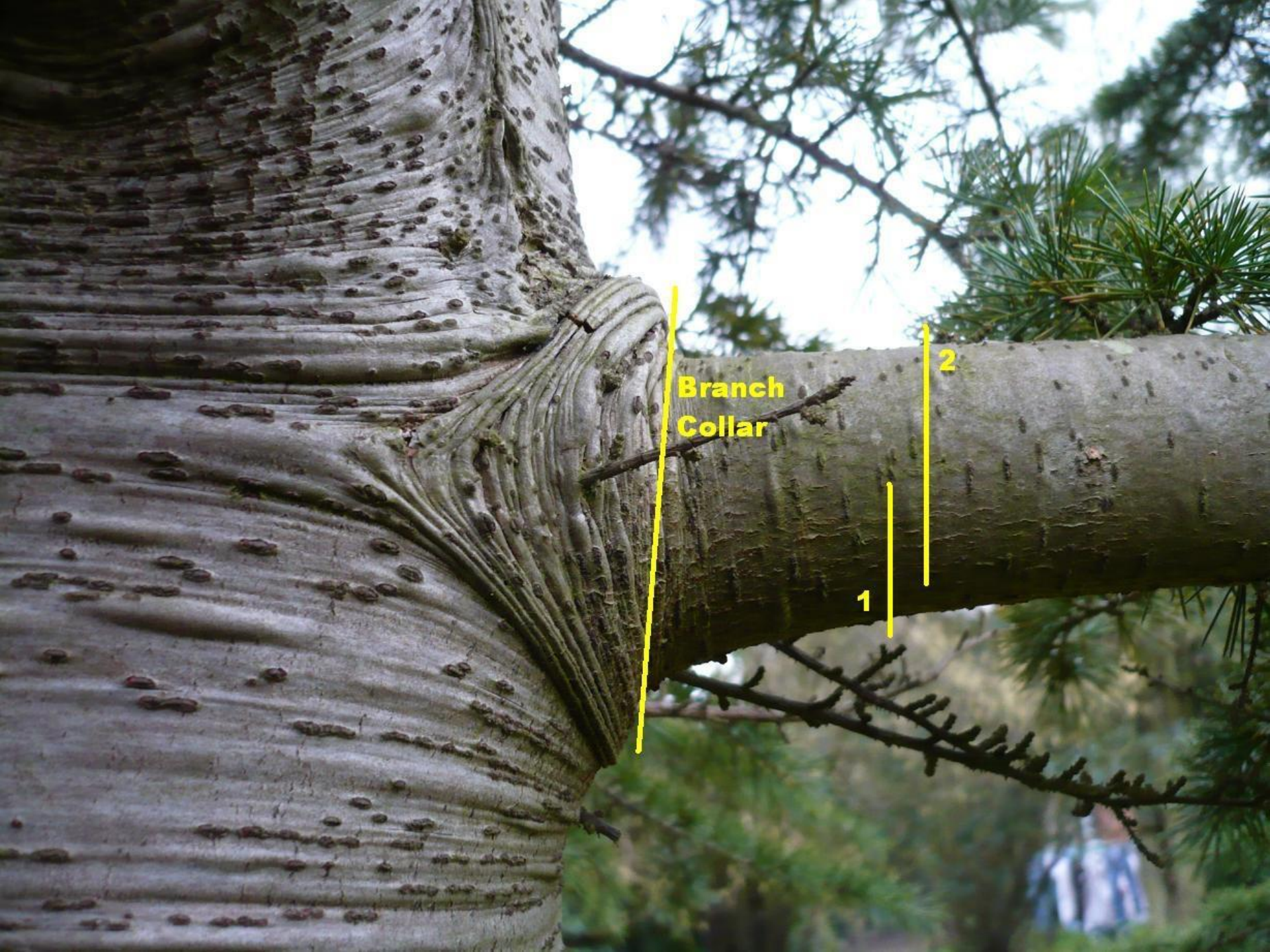
- 1) Sprout removal
- 2) Elimination of weak limbs within the tree canopy.
- 3) Remove crisscrossing limbs
- 4) Open up the center of the canopy to improve light penetration.
- 5) Also, the bottom of the canopy may need to be removed

Pruning

The Collar Method

Collar method is a type of natural target pruning in which the branch collar is left on the main tree stem instead of removing the whole branch. Branch collar is the base area of a branch where the tissues of the branch and the main tree join together forming a wrinkled surface. Pruning the branch from this collar is a widely practiced method.





**Branch
Collar**

2

1



6 种常见的修剪树/玫瑰的原则

Six general ways to prune a small tree/Rose

1) 去掉死枝

2) 去掉交叉的枝子

3) 去掉小枝

(prune a branch above the collar for tree)

4) 向下面长得枝子 Prune to an outward facing bud step

5) 底部的枝子 Strip all remaining leaves and clean up base

6) 适当施肥 Feed with appropriate fertilizer



Prune trees as needed to open the canopy and remove dead branches or suckers.

Use a pruning saw to remove entire
Branches that grow inward, across other
branches or vertically should be removed.

9. 冬季防护方法

**Overwintering technique:
Protection from cold temperature**

Overwintering technique: Protection from cold temperature

1. Only needed for young tree



10. 繁殖方法

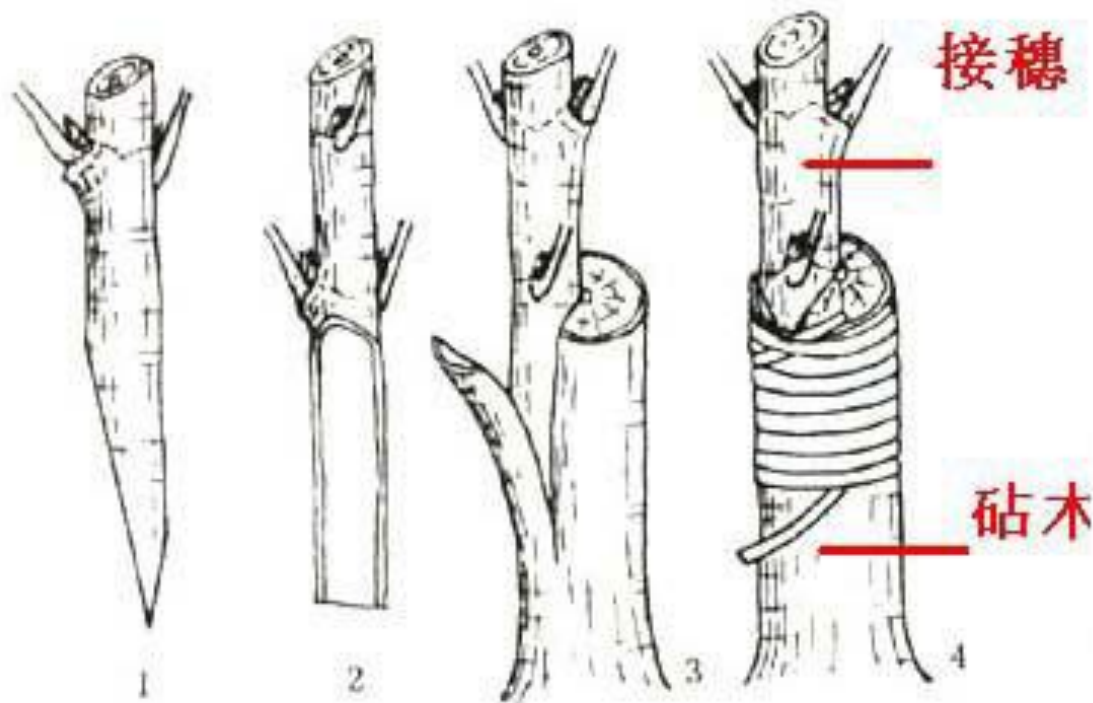
Propagation

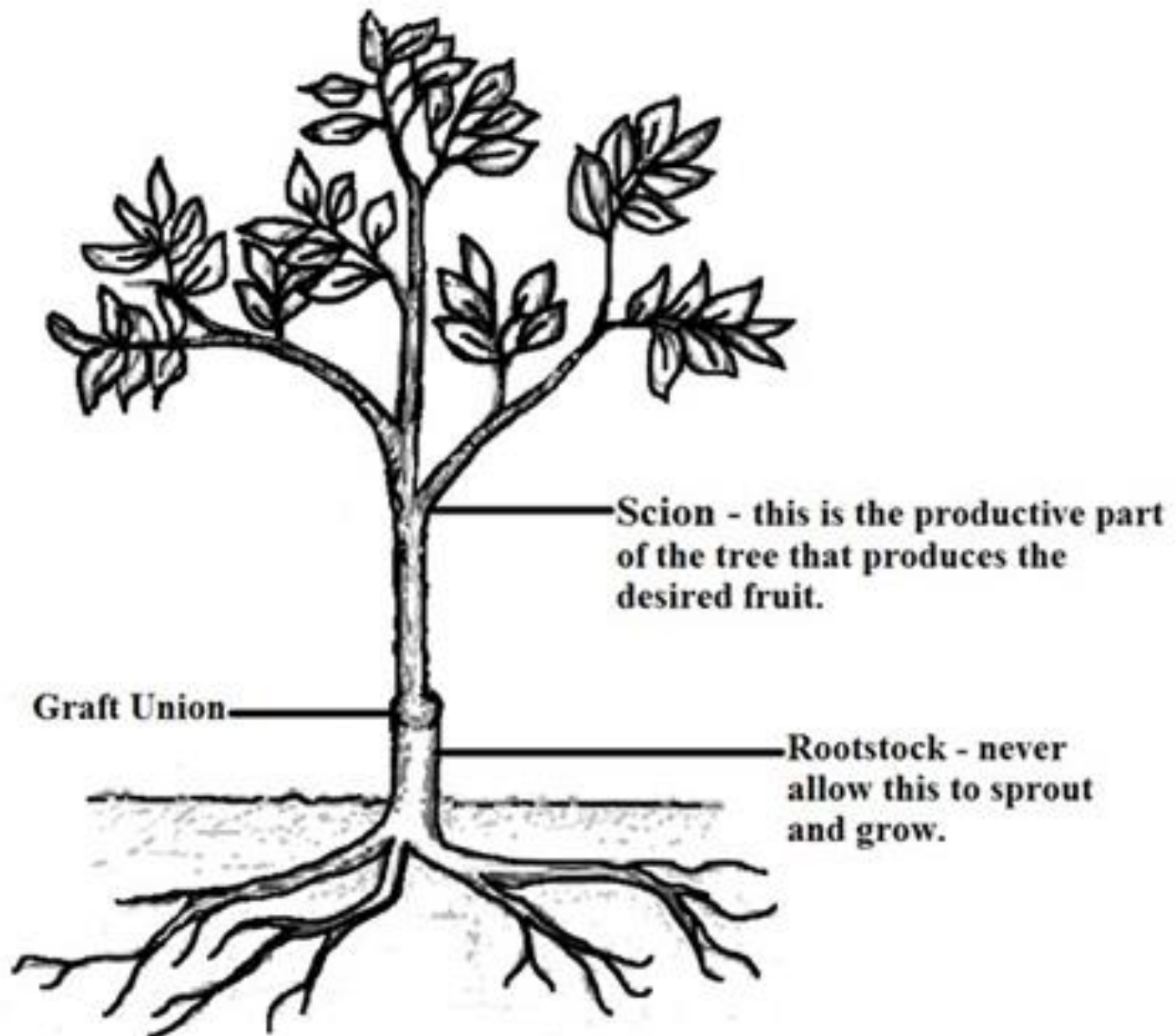
最简单，最好的方法

Easiest and best method

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[https://www.youtube.com/watch?
v=TQgVFq-7kEs](https://www.youtube.com/watch?v=TQgVFq-7kEs)

[https://www.youtube.com/watch?
v=xTDoW-NsJTE](https://www.youtube.com/watch?v=xTDoW-NsJTE)

[https://www.youtube.com/watch?
v=l1HSOy-3JGU](https://www.youtube.com/watch?v=l1HSOy-3JGU)

[https://www.youtube.com/watch?
v=1b3EmyqkPE0](https://www.youtube.com/watch?v=1b3EmyqkPE0)



如何移栽柑橘类树

How to transfer bigger citrus tree



Cut off line

1. Thoroughly water plant over night
2. Dig as much root and soil as you can
3. Prune off all major branches
4. After planting, cover with plastic bag to conserve water loss
And also seal off any wound surfaces

11. 虫害处理

Pest management

任何能活动的生物就容易杀死
Anything that moves is easier to kill

Pests and Diseases

Proper fertilizing, pruning, watering and weeding are the best prevention against pests and diseases on citrus. There are only a few pests or diseases that affect citrus trees. Many of the pests are just cosmetic and do not require any controls. If pests begin to affect the health and fruit production of the citrus tree, they can be controlled with organic products such as Neem Oil or Organocide. Feel free to stop in at Lindley's with a sample of your "citrus problems" for a diagnosis. Also the Volusia County Extension Service is available for further analysis.

Trimming and Pruning

Heavy pruning is best done in February/March, before spring growth and blooms. Always prune out dead wood first and then look for crossing branches that are rubbing and could cause wounds. Keeping the citrus pruned low for easy harvest is also recommended. Citrus trees respond well to annual pruning. It promotes fruit production and overall good health of the tree.

叶子/果实上的虫害

**Insects Problem on
leaf/fruit**

潜叶蛾

Leaf Miner



Qián yè é



UC Statewide IPM Program
© 2005 Regents, University of California

Remove infected leaf
a bad idea
Food reserve



潜叶蛾



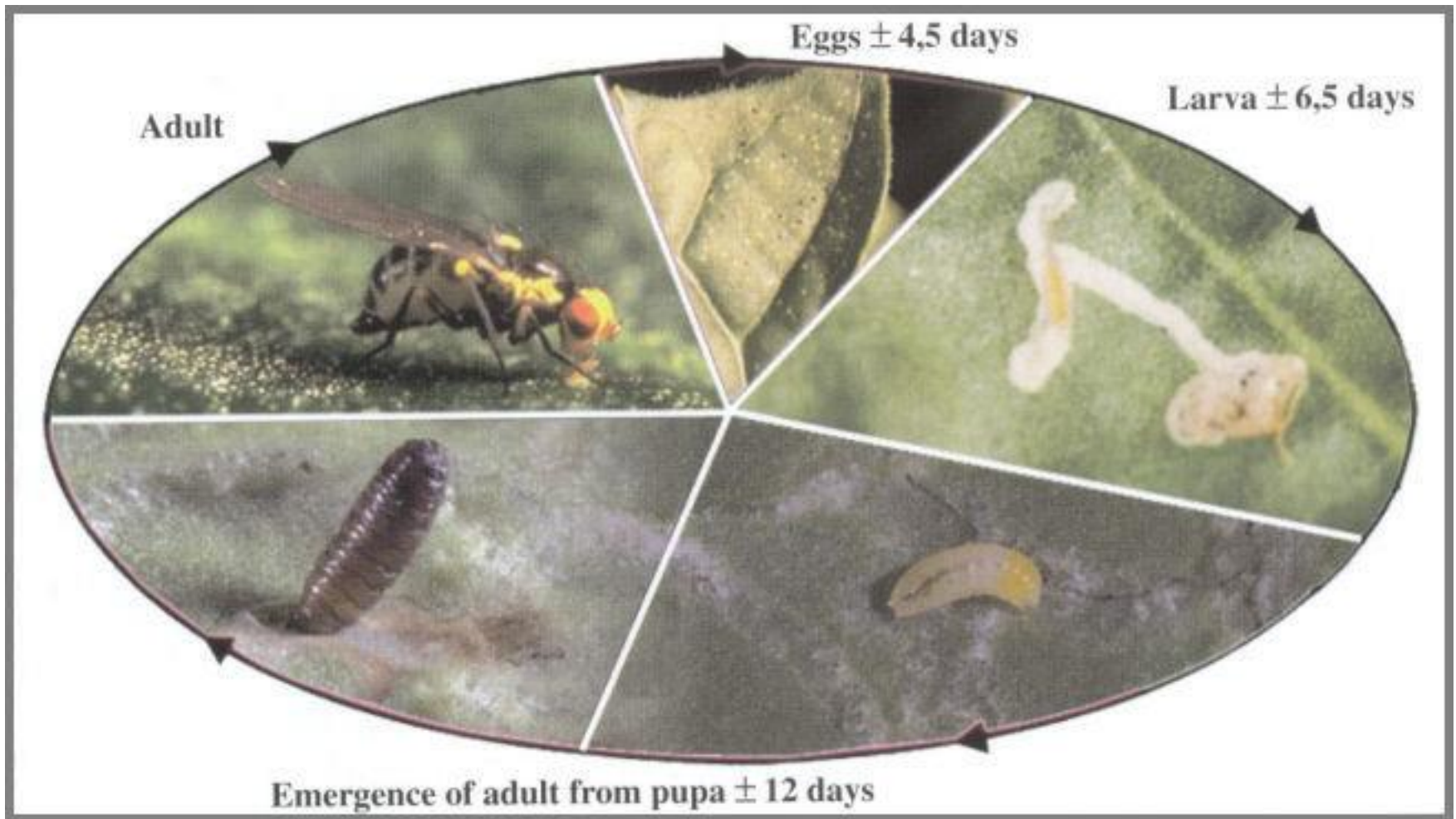
潜叶蛾



生命周期

Life span: 1-2 weeks

2-3 weeks



Pupa: 1-3 weeks

潜叶蛾幼虫



潜叶蛾幼虫



潜叶蛾幼虫在叶下方









How to outgrow leafminer attack

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult												
Larva												
Pupa												

In spring, damage is minor as the leafminer population is smaller



Pest	Organic pesticide	When to apply	How often	Effectiveness	What not to do
Leaf miner	1) Neem Oil, 2) Transfer tree to soil and apply fertilizer for tree to grow big to tolerate infection 3) Suffocation with water	Spray on Egg APPLY FERTILIZER AS EARLY AS POSSIBLE AND STOP to prevent fresh growth	7-10 days before flowering Make sure lower and upper leaf surfaces are covered	Moderate No pruning after Spring Encourage natural enemies	Do not remove infected young citrus leaf, deplete food reserve in leaf Not apply at >85F

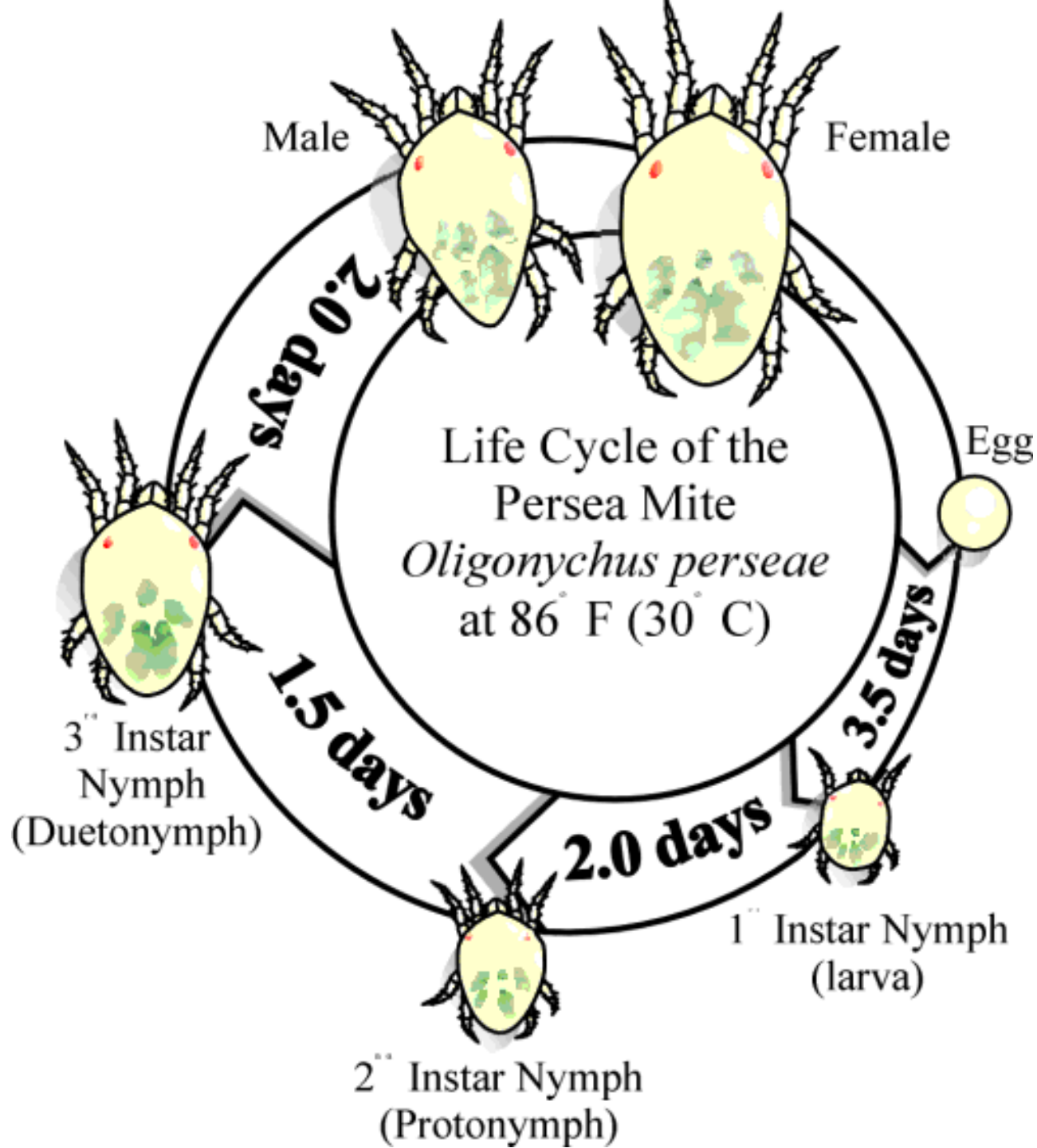


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Spider mites





Citrus: Spider mites injury to fruit



Citrus: Spider mites injury to fruit



Pest	Organic pesticide	When to apply	How often	Effectiveness	What not to do/Comment
Spider mite	insecticidal soap or insecticidal oil Neem oil, cottonseed oil etc	Apply in the morning or temp <90F Or after sunset. It works while the leaf is wet	Spray thoroughly every 2to 3 days until the problem disappear, for 2-3 weks	More Effective: for soap/oil tolerant plants : combine Soap with Neem oil or any oil based pesticides	Prune heavy infected leaves first before treatment Spray on both sides of leaf
	Horticultural oil	On fruit trees: Apply early or late season to destroy eggs			



Here are tips for using insecticidal soaps:

Spray **early** in the morning when plants are still wet with dew or late in the afternoon or after sunset when temperatures are moderate. Avoid spraying at midday in the hot sun—the soap will dry before it can work.

Spray **both sides** of the plant's leaves; many pests feed on the undersides of leaves or take shelter there when they detect movement or light changes that might indicate danger.

Do not **treat heat- or water-stressed plants**; the soap coating on leaves may hinder transpiration the exchange of gases and moisture through leaf pores.

Soaps may **damage** some plants, especially those with **dull leaf surfaces or hairy** surfaces. Soaps are less effective or may have no effect on adult pests with hard outer coatings or shells such as beetles.

Insecticidal soaps only **work while wet**. To be sure you get all or most of the pests on a plant, spray several times a week for three weeks. Keep an eye out for pests to know when it is time to spray again.

Spray plants **every 2 to 3 days** for two weeks or more for severe infestations.

Store bought insecticidal soap usually calls for two teaspoons of soap per pint of water.

Always follow the directions on the label.

The least invasive pest control is to **spray or wash infected plants** with water to dislodge harmful pests.

Predatory Mites



Produced commercially for years, Predatory Mites (*Phytoseiulus persimilis*) are an effective biological control for use against the two spotted spider mite. These natural enemies do not bite people, feed on other insects or injure plants. Once released, they will immediately begin searching for food on the underside of leaves. Control of a light infestation should occur in two to three weeks. On heavier infestations a second release may be required.

杀虫剂适用虫害类型

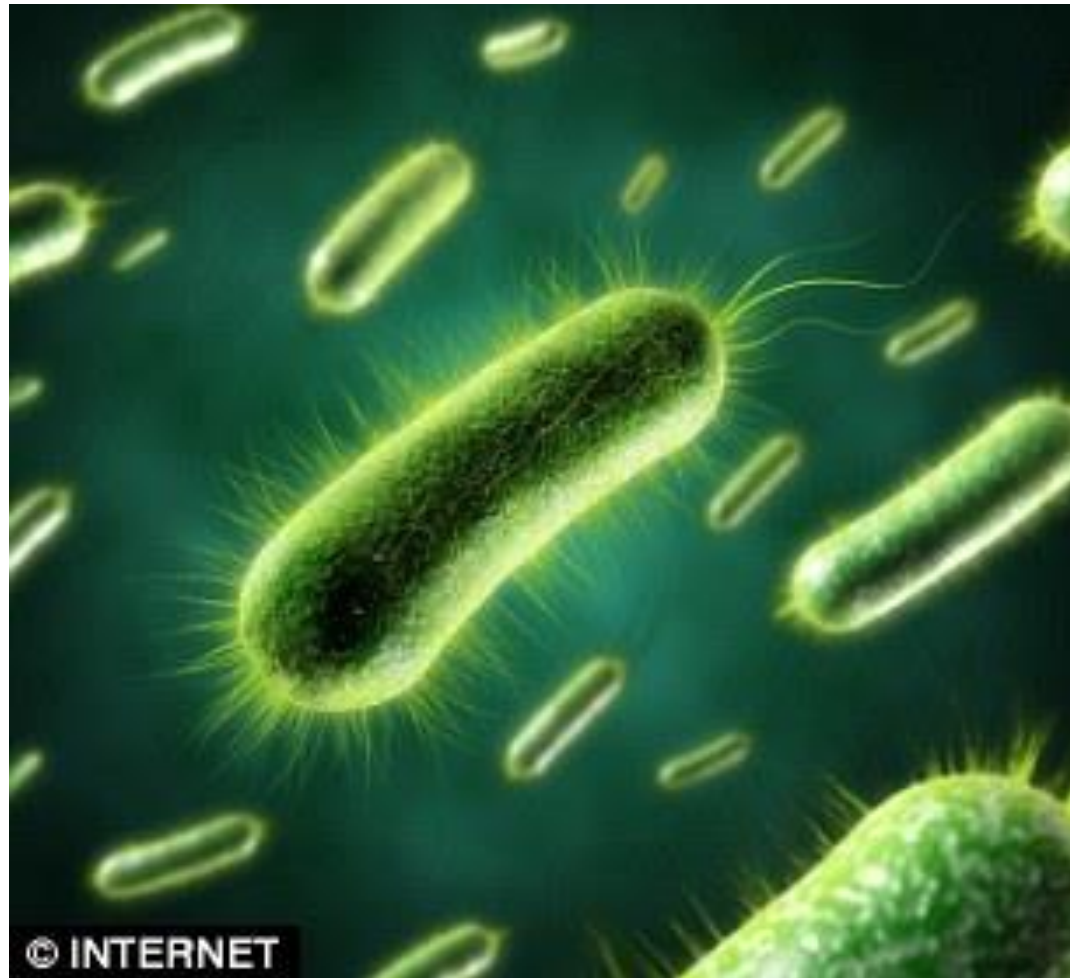
Potency of Organic Pesticides on Pests

Pesticides	Aphids	Mealbugs	Mites	Leafhopper	Scale insects	Thrips	whiteflies	caterpillar	Leaf miner	Slug/sna il
Garden Safe insecticidal soap	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Neem oil	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Horticulture oil For use on trees	Yes	Yes	Yes		Yes					
50% alcohol or 70% alcohol	Yes	Yes					Yes			
BT								Yes		
Spinosad Kill fire ant/fleas						Yes		Yes	Yes	
Pyrethrin				Yes		Yes		Yes		
Ferric phosphate										Yes

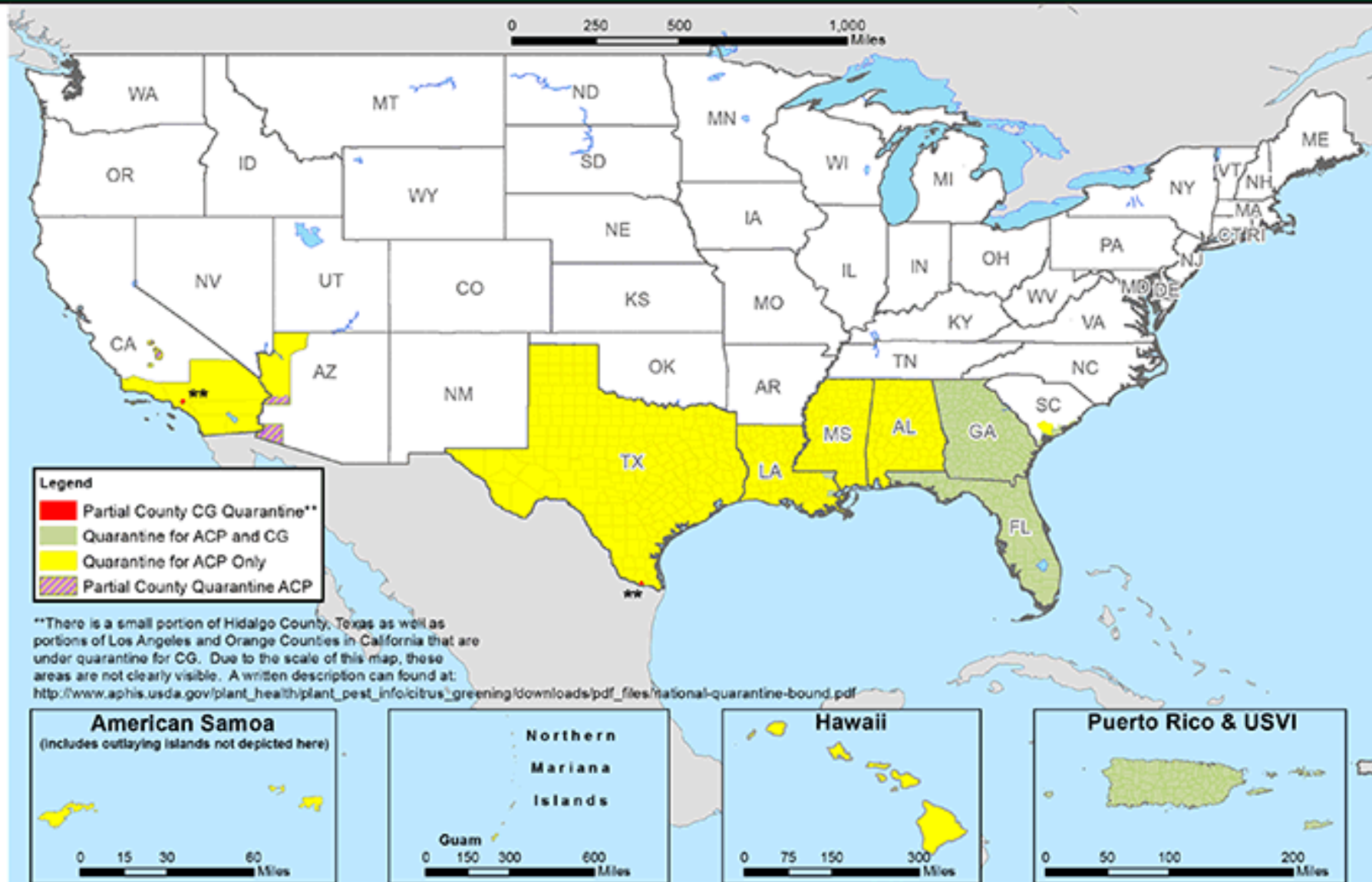
Note: To be safe, these pesticides should be used at least one week before harvest

12 病害处理-细菌

Disease management-bacteria



National Quarantine Boundaries for Asian Citrus Psyllid and Citrus Greening



Citrus Greening, most dangerous citrus disease



Citrus Greening, most dangerous citrus disease



Is a Disease-Carrying Insect Killing Your Citrus Tree?



Stop the Asian Citrus Psyllid from delivering what could be a death sentence for California citrus trees.

The insect, which can be a carrier of a fatal citrus tree disease, can be stopped – but we need your help. Protect your citrus trees and the availability of California-grown fresh citrus by inspecting for the insect often.

The Insect



The Asian Citrus Psyllid is a sign of danger. >

The Disease



Huanglongbing produces yellow, splotch leaves and kills trees. >

What to Look For



Detect the insect & determine if your tree is infected. >



**Citrus
Greening
on leaf
In Texas**



Citrus Greening



Citrus Greening



Citrus Greening



Asymmetrical blotchy mottling of leaves (this is the most common symptom seen in Texas)



Pest management

Reagent	Target	Bee	Comments
Neem oil	Phyllids	No	Spray thoroughly
Spinosad	Phyllids	Toxic	More effective but not flowering period
Azadirachtin (BioNeem)	Phyllids	No	Spray thoroughly
Insecticidal soap	Phyllids	No	Spray thoroughly
Horticultural oil (Bonide or Monterey)	Phyllids	No	Spray thoroughly

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7423.html>

Not confused with mineral deficiency as
results of soil of winter injury

Magnesium Deficiency



Magnesium Deficiency



Manganese Deficiency



Nitrogen Deficiency



Iron Deficiency



Zinc Deficiency



Iron Deficiency

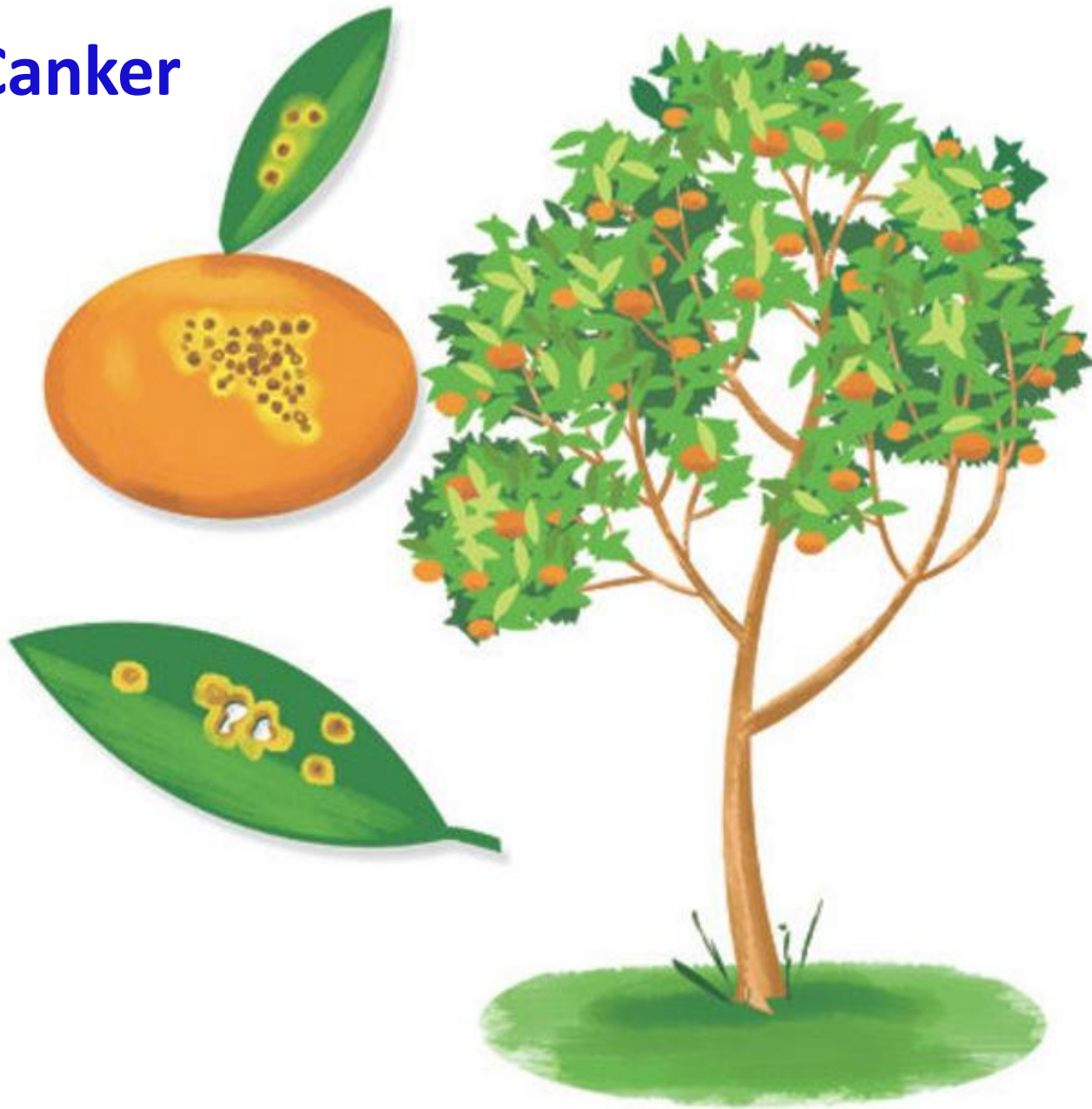


**治疗
杀死植物**

**Treatment
Kill the plant**

Citrus Canker

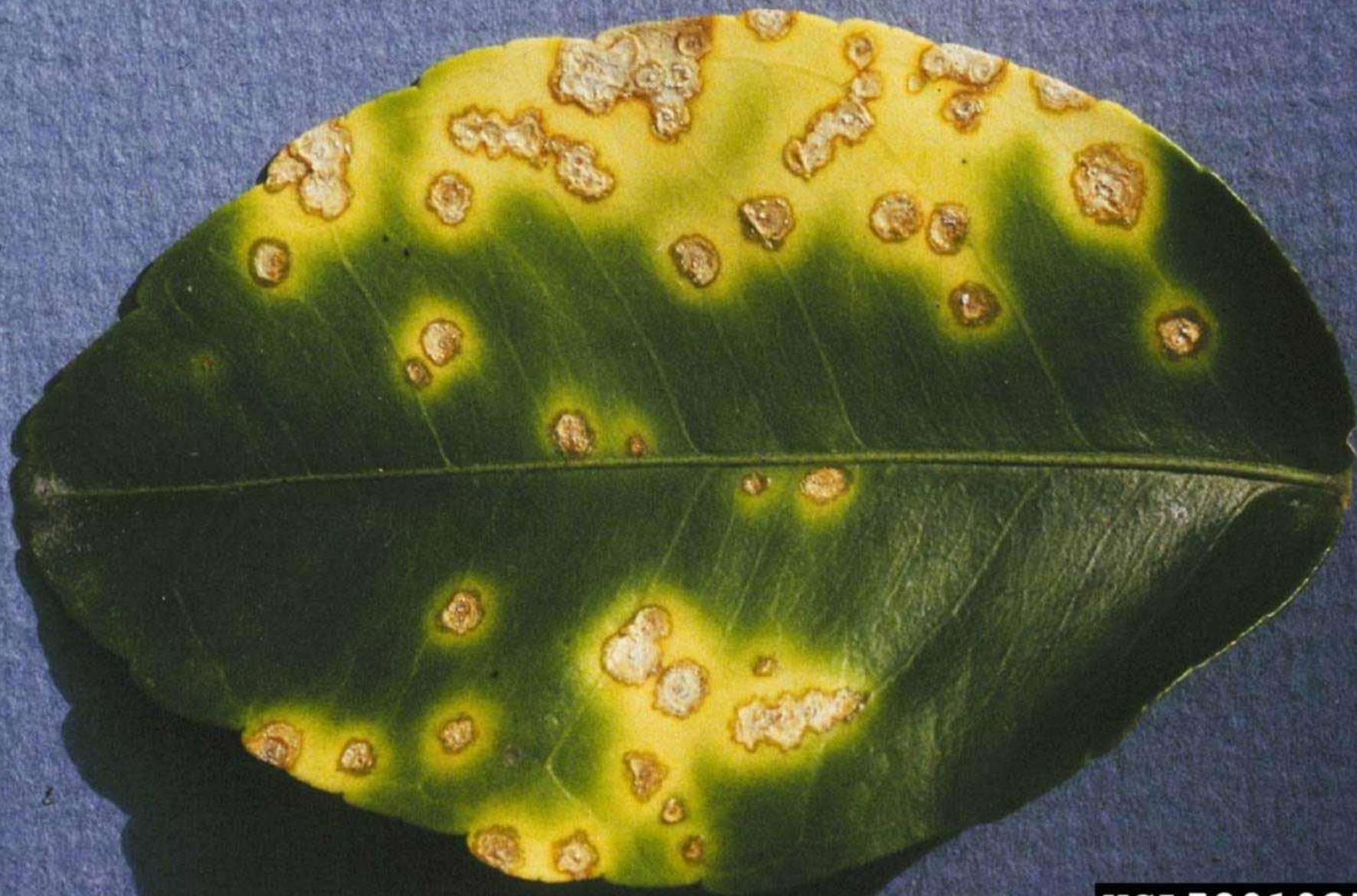
细菌



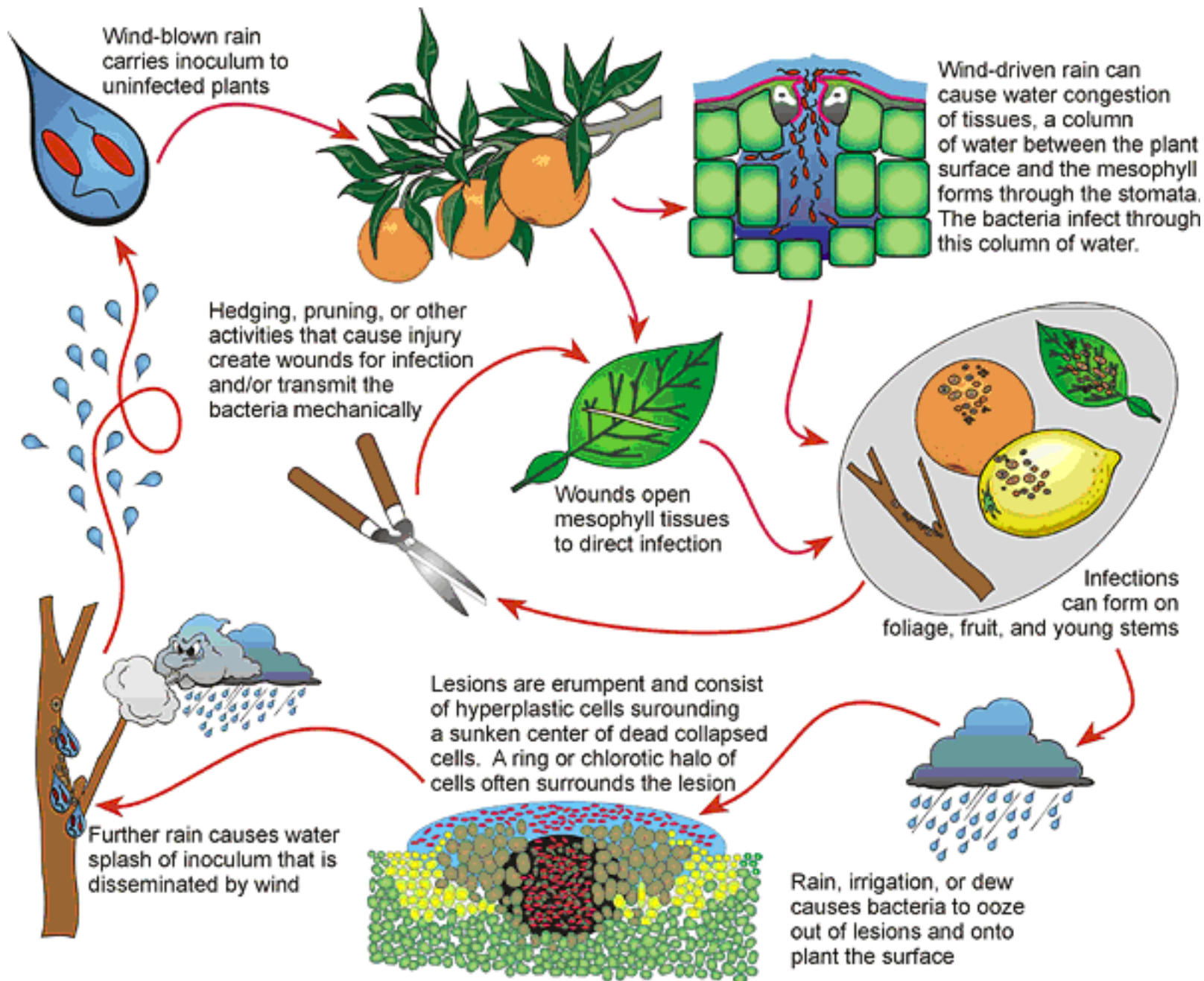
Citrus Canker









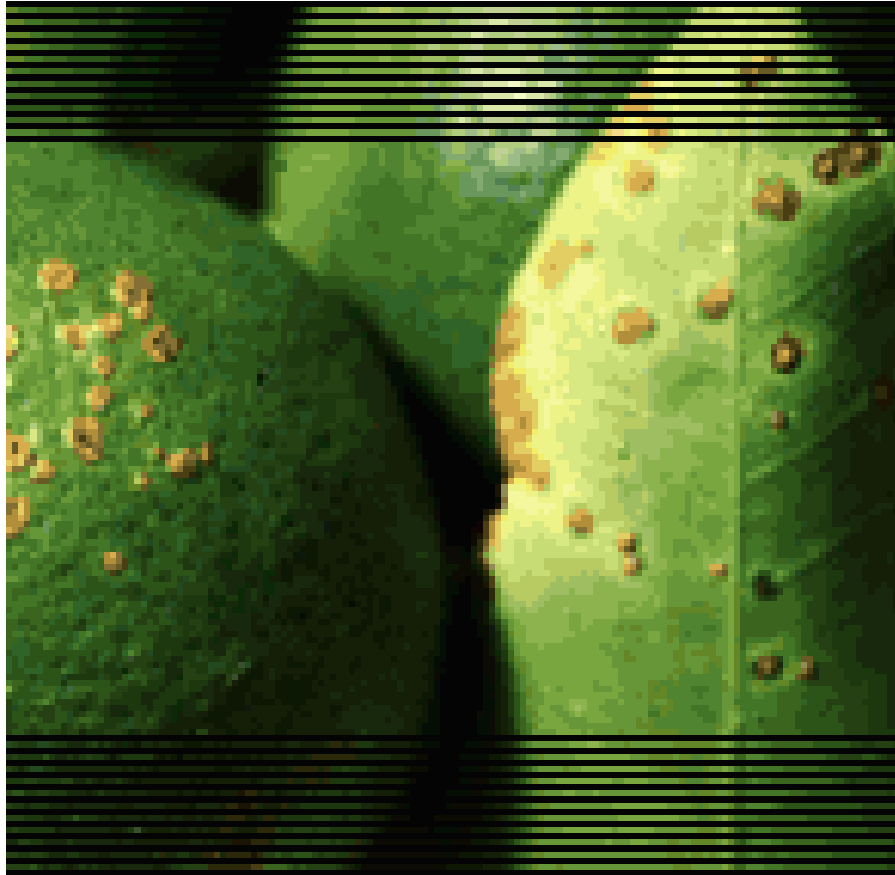


Citrus Canker

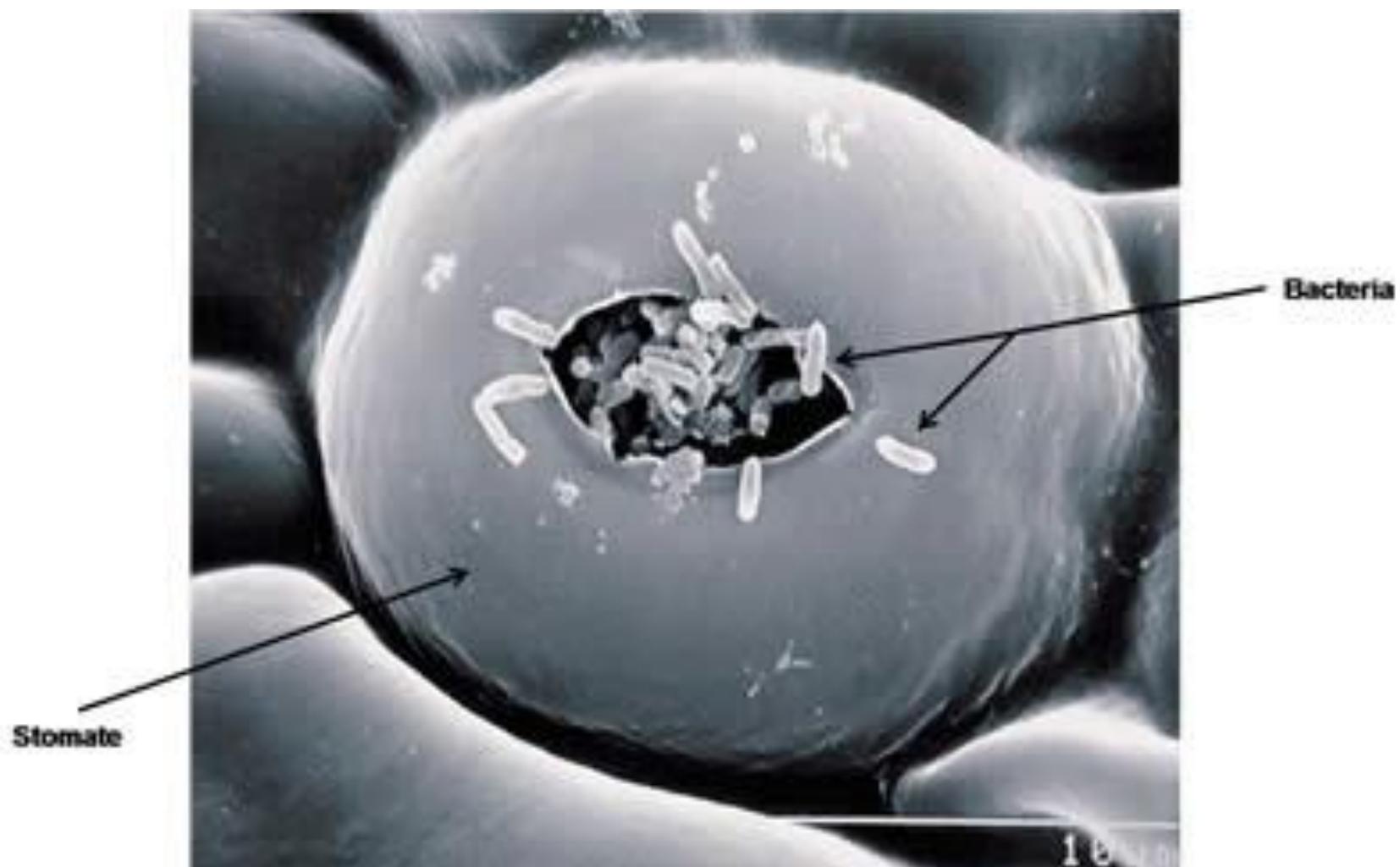
- All citrus growing areas of India & world
- Epidemic in USA
- Infect all citrus spp. plants

Symptoms:

- Firstly symptoms on lower side & later on both side of leaves
- Attack on leaves, twig, petiole, branches, fruit, thrones
- Small, round, watery, translucent raised, yellow brown spots on leaves & old branches



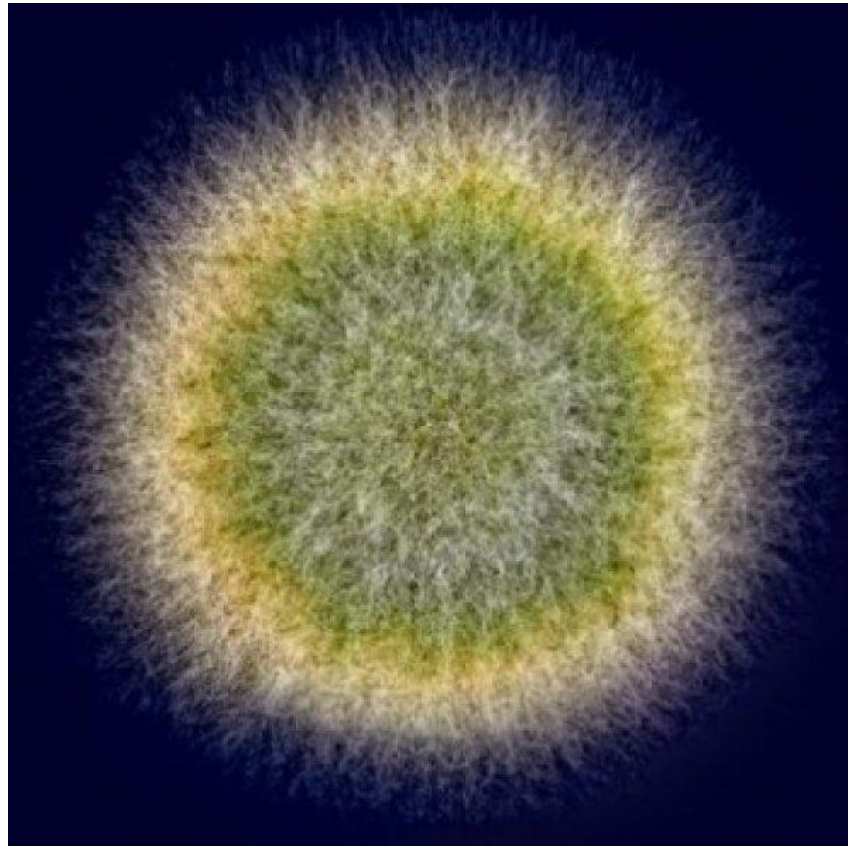




The bacterium *Xanthomonas axonopodis* pv. *citri* exuding from a stomate (*pl. stomata*) five days after infection on a citrus leaf. A stomate is a pore, mainly found on the underside of a leaf, used for gas exchange.

Citrus Mudcake-Fungus

菌, 菌类, 蘑菇, 霉, 苓

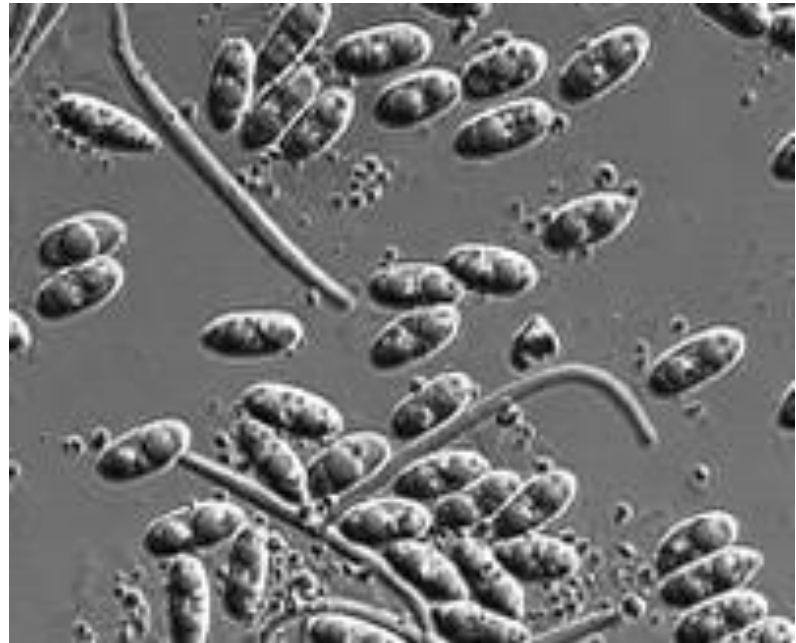


Citrus Mudcake/sandpaper



菌类 (Fungus)

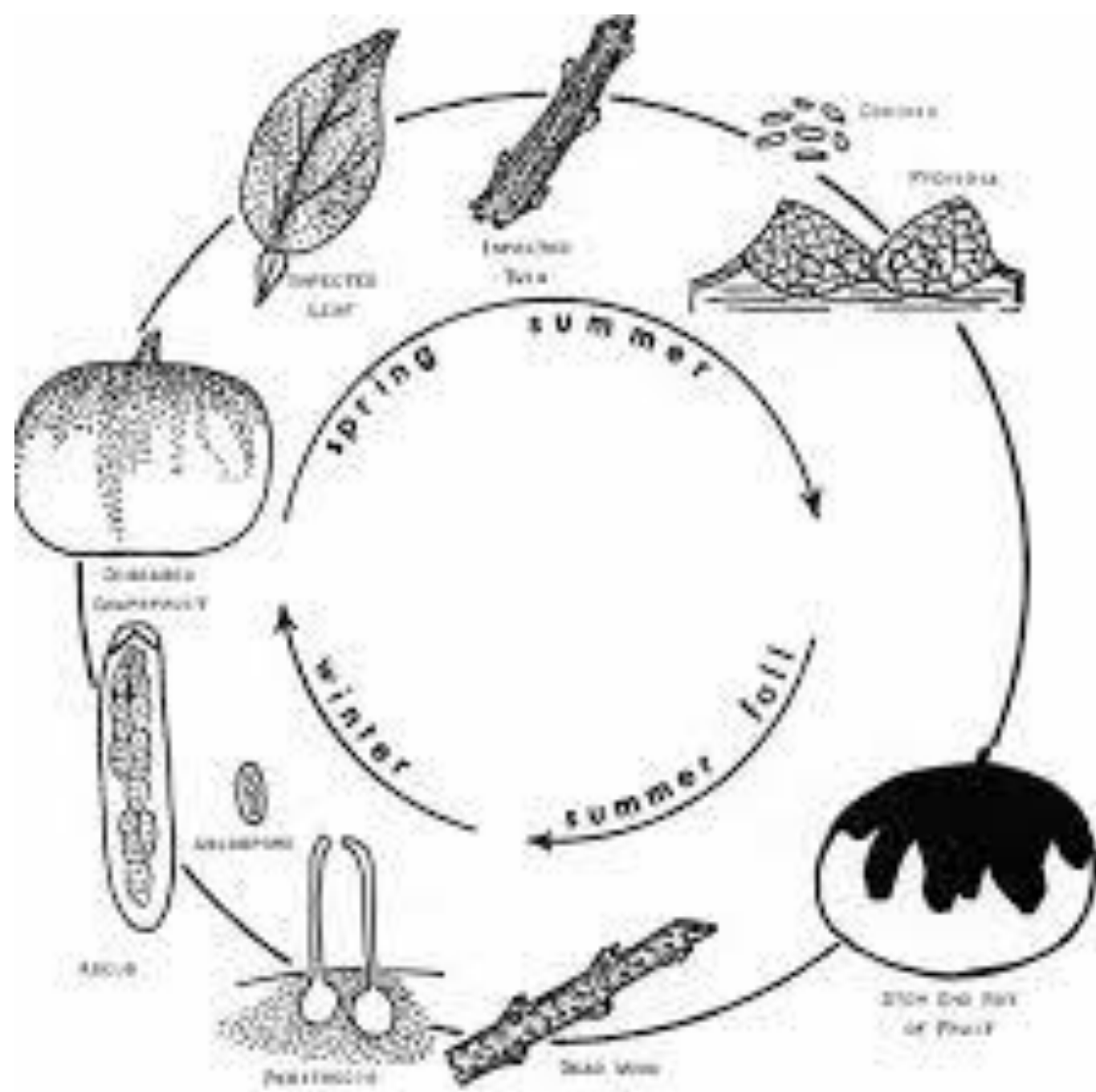
Mudcake or sandpaper symptoms of melanose (fungus) on citrus.



Mudcake or sandpaper symptoms of melanose (fungus) on citrus.



Dan Robl, USDA

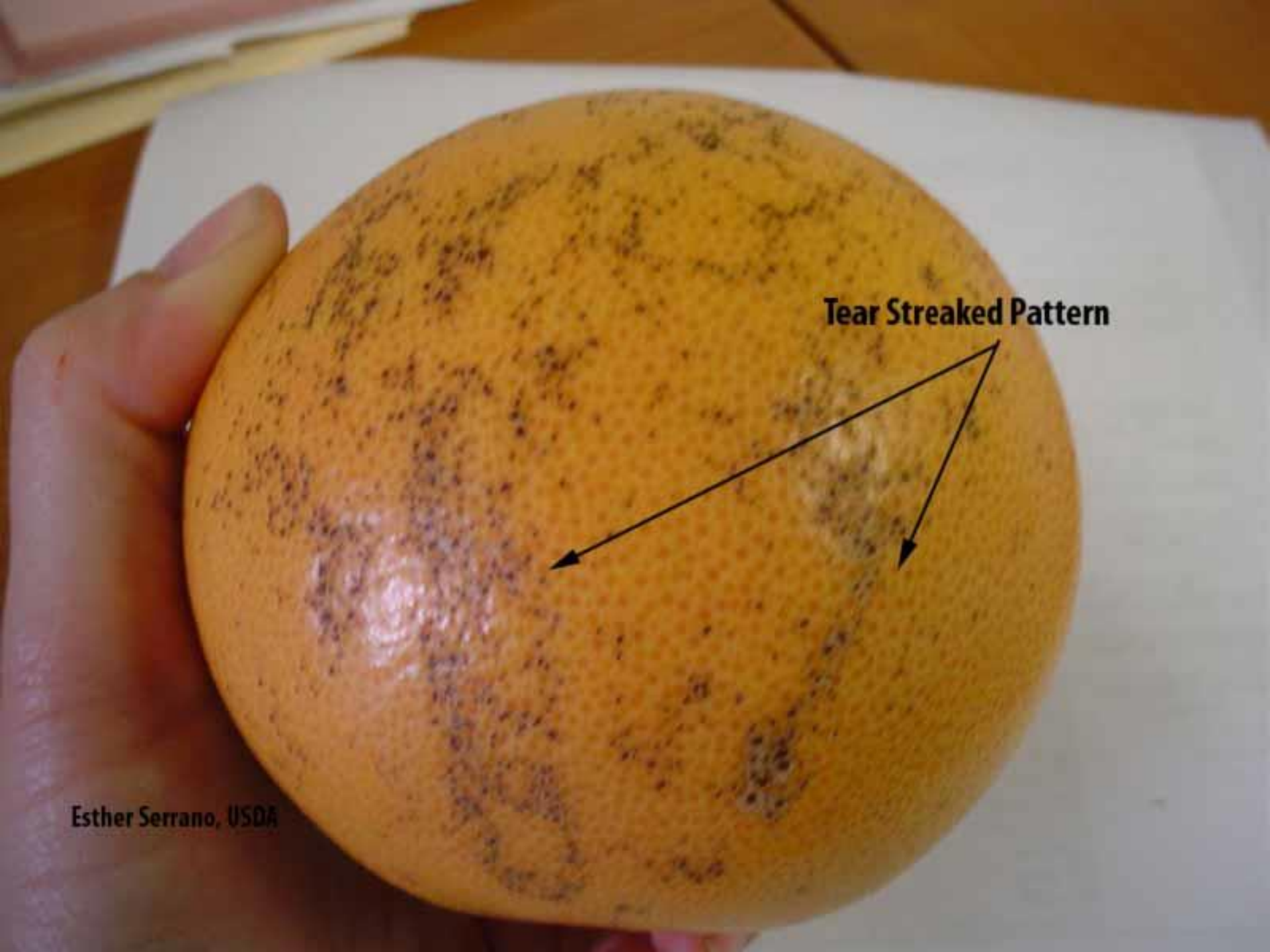






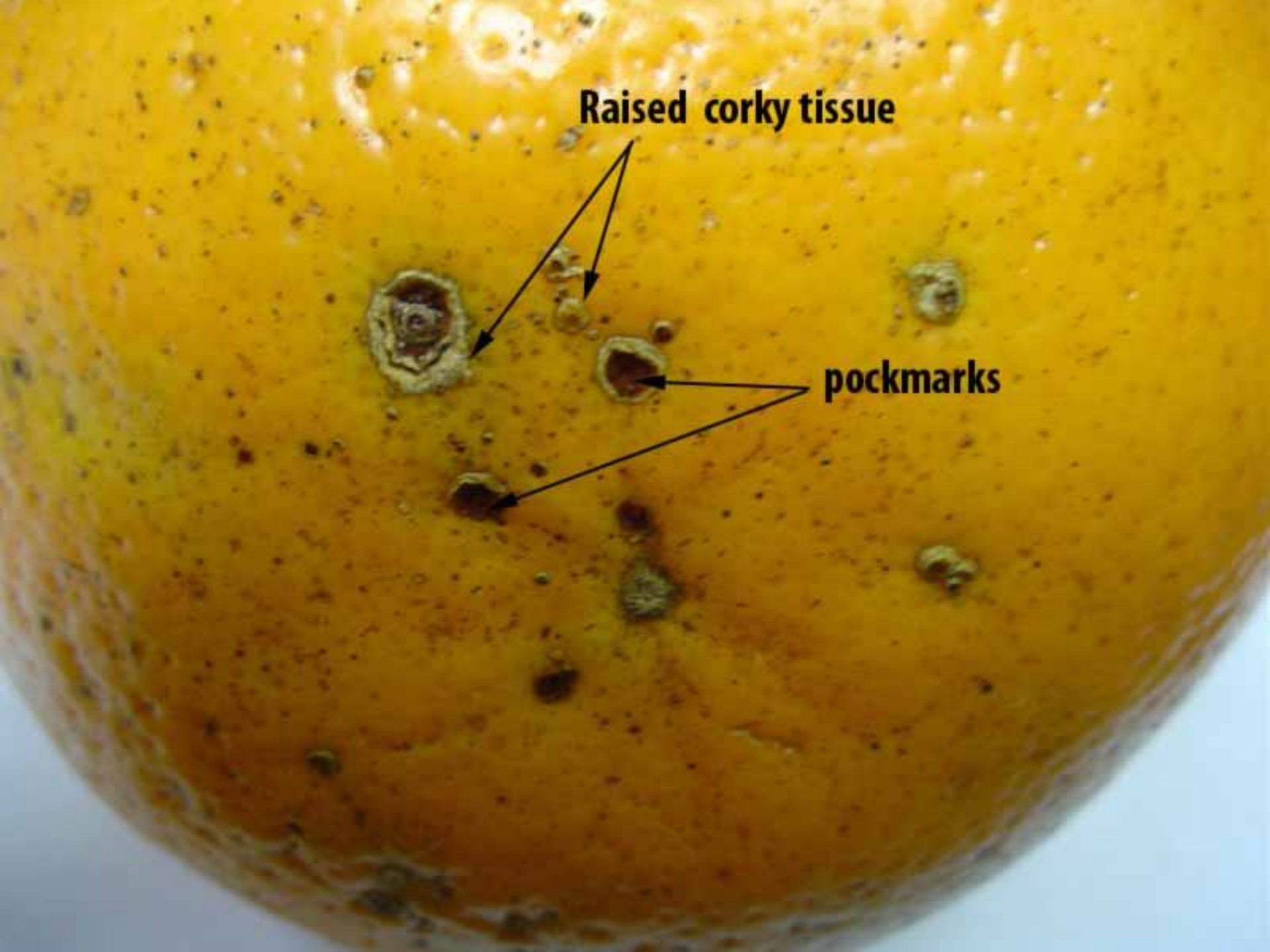
Mudcake or
sandpaper
symptoms of
melanose on
grapefruit.





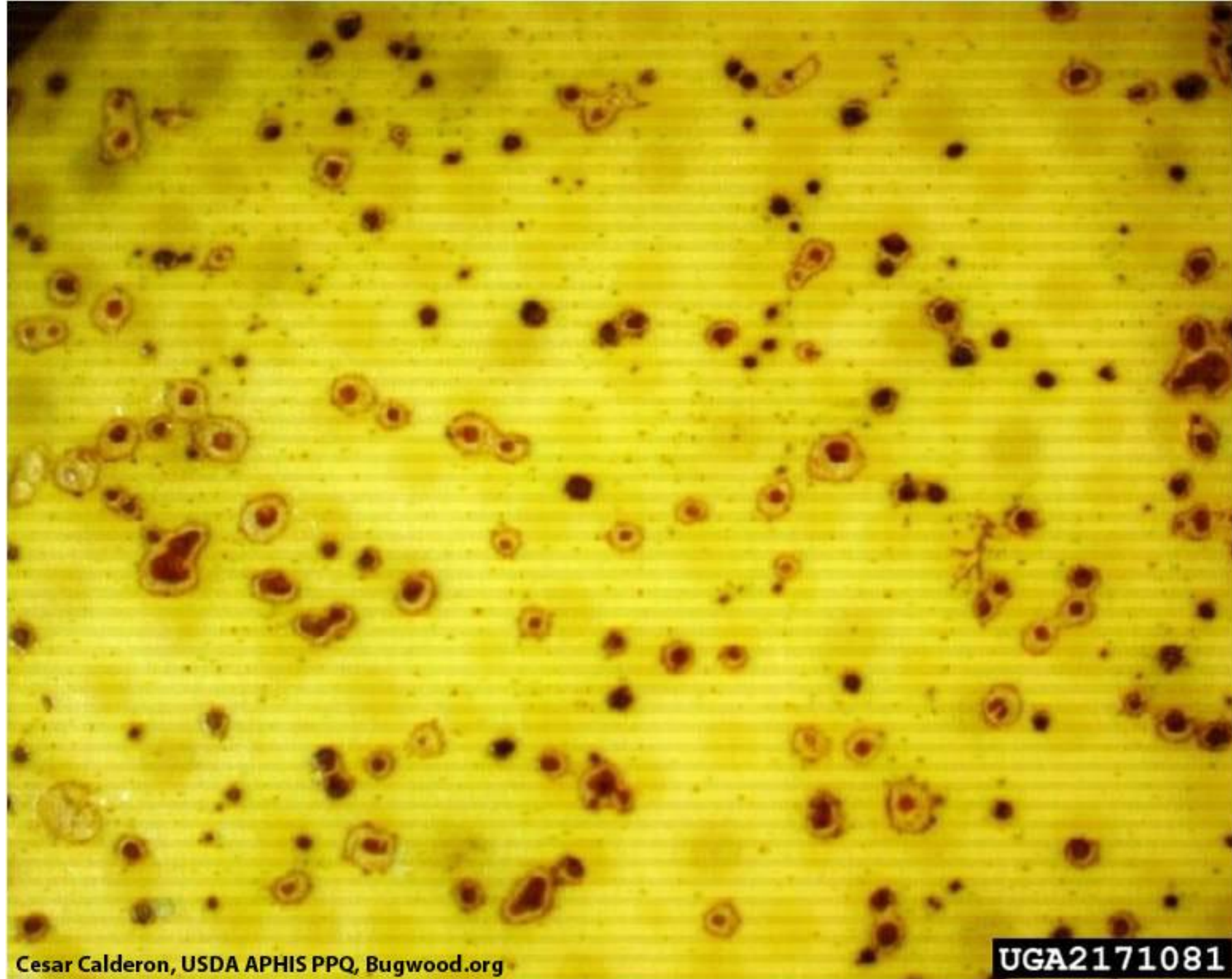
Tear Streaked Pattern

Esther Serrano, USDA



Raised corky tissue

pockmarks





UGA2171089

Control

Obviously prevention is better than cure, but the cleaning out and **removal of dead wood** to remove inoculum of the melanose fungus is important, especially in older trees.

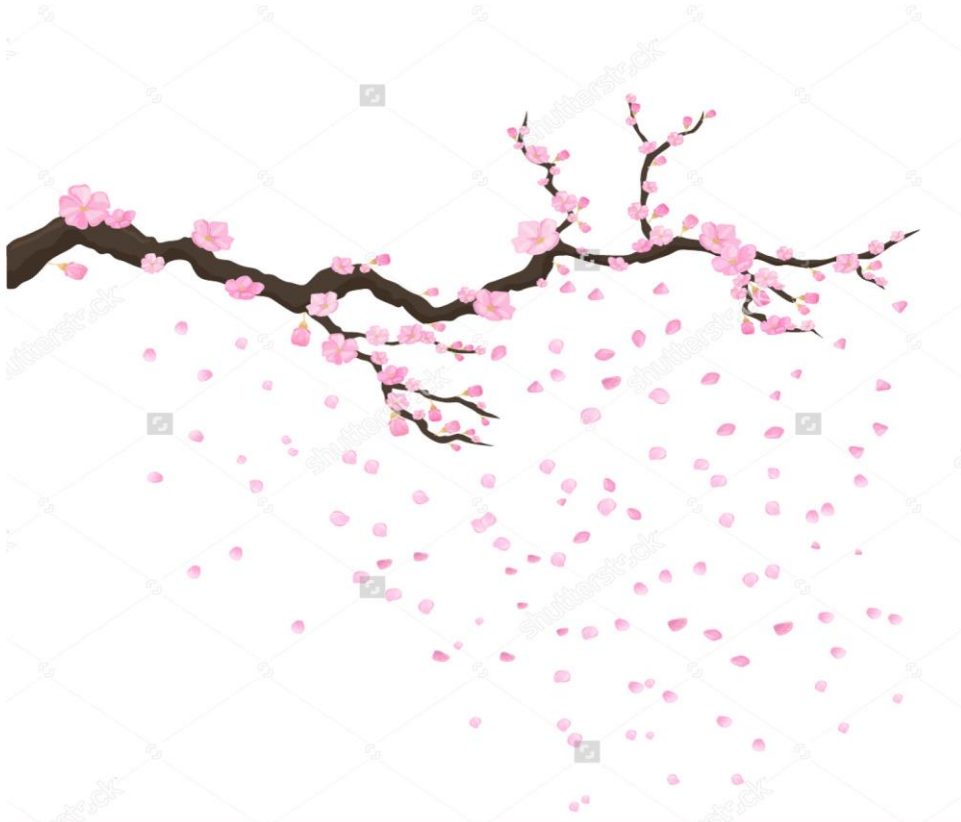
Protectant copper sprays are the only product registered for melanose control. Timing of spray applications is very important.

- 1) With Washington navel and Valencia oranges the spray should be applied at **full** petal fall.
- 2) With lemons where lemon scab is also a problem, the initial application should be made at **half** petal fall (Kiely, 1973).

Petal fall

The last stage of flower development in top fruit trees, typically around 7-12 days after full bloom; collectively, when the petals have fallen from 90% of the blossom on a tree or in an orchard.

花瓣坠落



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保护

Protection

Citrus fruit susceptibility ~ 9 to 12 weeks (**3 months**)

- 1) Spray after full petal fall (protect 3-4 weeks)
- 2) Follow-up spray 6–8 weeks after the initial spray.
- 3) Spray the leaf also on the follow-up spray

Copper Fungicides

Copper sulfate, commonly called bluestone, was one of the earliest copper-based fungicides.

Another compound, Bordeaux mixture, contains copper sulfate mixed with lime, or calcium hydroxide. Lime helps buffer or neutralize the acidic properties of copper sulfate, which helps mitigate plant damage. Bordeaux mixture is available as liquid sprays or dusts. Most copper formulations are protectant fungicides that must be applied proactively to plants or fruits before diseases are present.

早安！这应该不是什麼病！浸入食用醋可以溶解这白色的沉澱！請試試！謝謝！

