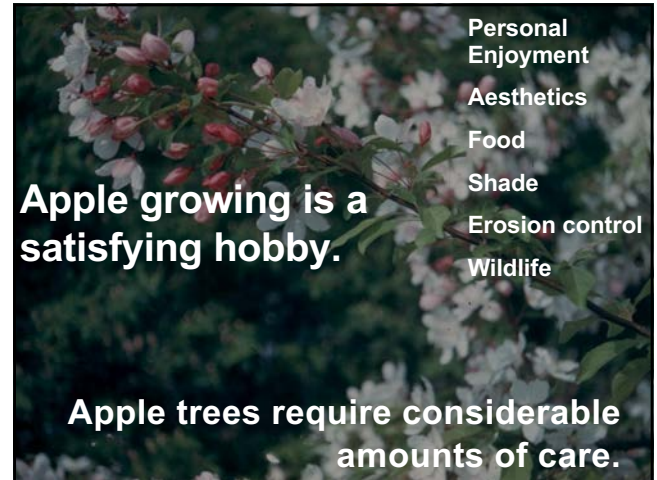




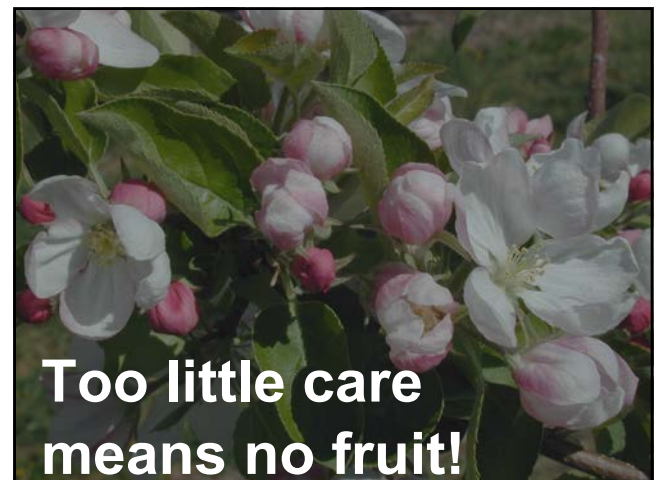
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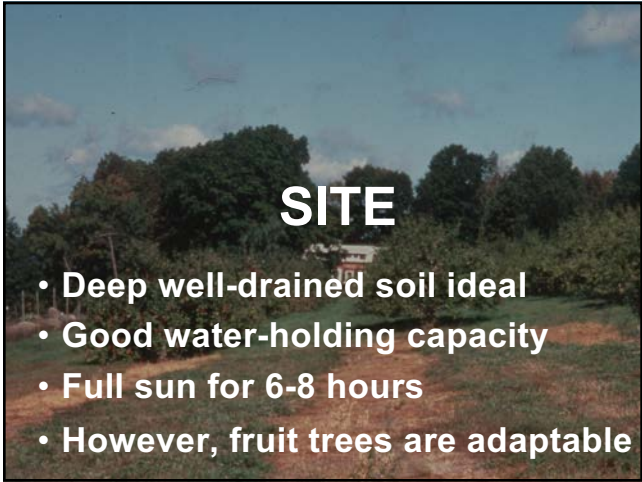
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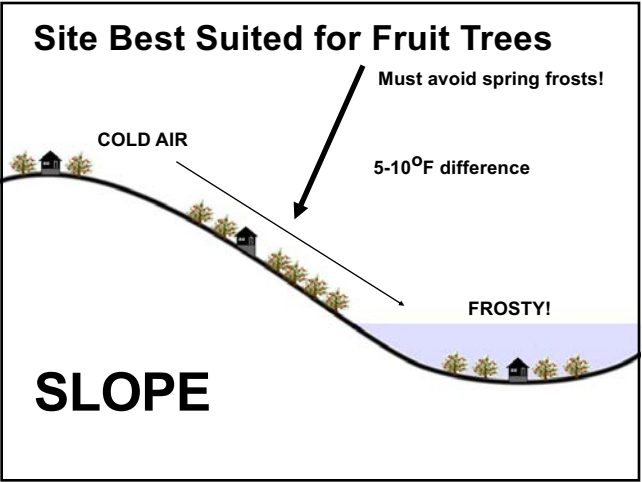
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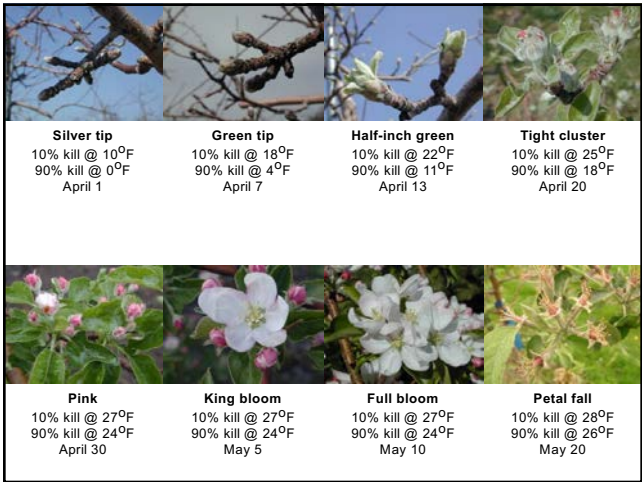
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9



10

Apple seeds and seedlings came to this country with the Pilgrims. By 1642, there were 1000 producing acres of apples in New England.

These fruit and those produced for the next 200 years were used primarily for cider (i.e. hard cider).

During this 200-year period, nearly all apple trees were grown from seed, but a few varieties were introduced.

11



Roxbury Russet

Oldest US variety.
Named before 1650.

MA

12



Baldwin

Original seed planted about 1740.
Wood Pecker Apple.
Colonel Baldwin began propagating it in 1798.
No. 1 variety in US in 1915.

MA

13



Rhode Island Greening

Seed planted in 1748.
Green's Inn Apple from Rhode Island.
Widely distributed by 1800.

RI

14

In the early 1800's, a temperance movement resulted in a dramatic reduction in cider consumption, and subsequent reduction in acreage of apples.

In the same period, grafting began to be used for commercial production, and many farmers named a variety or two.

Thousands of varieties were named and propagated in the 1800's, with nearly 500 from New England alone.

15



Hubbardston

MA

16



Golden Russet

MA

18



Westfield Seek No Further

CT

22



Esopus Spitzenburg

NY

25



Fameuse

France

26



Gravenstein

Germany

27



Lady

France

28



Northern Spy

NY

29



Wealthy

MN

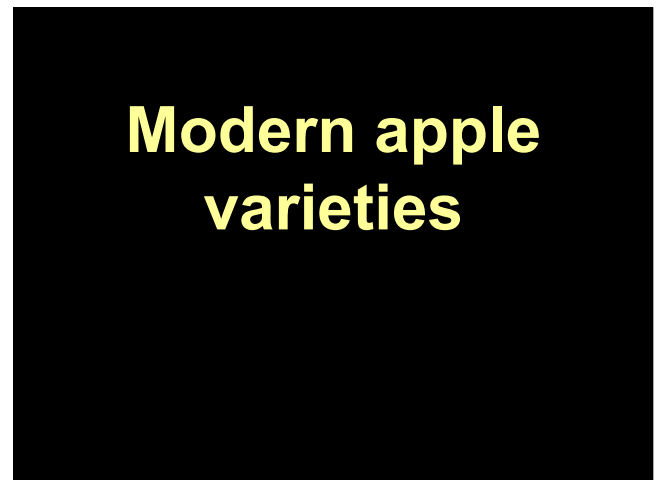
31



Wolf River

WI

32



33



34



35



36



37



Empire

NY

38



Golden Delicious

WV

39



Akane

Japan

40



Braeburn

New Zealand

41



42



43



44



45



Mutsu Japan

46



Cameo WA

47



Creston BC

48



Golden Supreme ID

49



Sansa

Japan

50



Pink Lady

Australia

51



Suncrisp

NJ

52



Zestar!

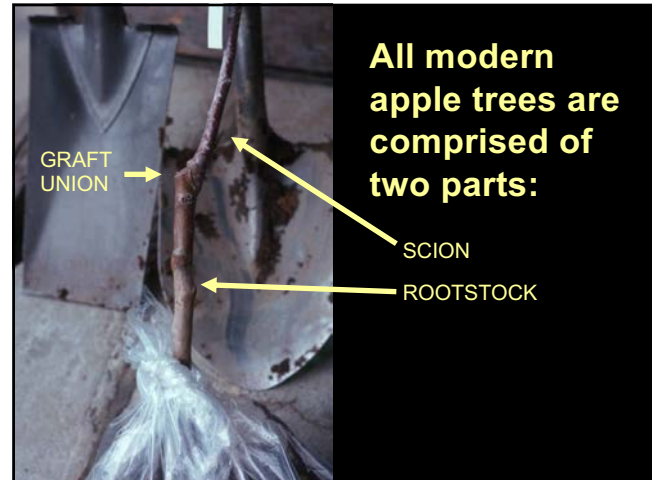
MN

53

Apples require cross pollination

- Each tree should be within 50 feet of a pollinizer
- Crab apples can pollinate apples
- Bloom times must overlap
- Pollen must be viable

54



57

Propagation & Rootstocks (Grafting & Budding)

Prior to 1800, nearly all trees were propagated by seed. In the early 1800's grafting (+budding) began to be used extensively. These trees were almost entirely budded to seedling rootstocks.

- 1700 – desirable materials for rootstocks
- 1800 – grafting of varieties became common
- 1850 – first clonally propagated rootstocks
- 1950 – commercial clonal rootstocks

58



59



60



61



62



HISTORY

- Dwarf apple tree
 - 300BC Two students of Aristotle
 - Alexander the Great sent back from Asia Minor to the Lyceum
 - Theophrastus recorded the acquisition and suggested it had been long grown in Asia Minor
 - 1000-1200AD Tun Dynasty, China

64

HISTORY

- **Budding & Grafting**
 - 1400's – began to be used in Europe
 - Dwarf trees used as rootstocks for trellises and espaliers
- **Rootstocks**
 - 'Paradise' (French Paradise) very dwarf
 - 'Doucin' (English Paradise) less dwarf

65

HISTORY

- **East Malling Research Station (1912)**
 - Collected/classified 'Paradise' + 'Doucin'
 - Found 24 distinctly different stocks
 - Numbered EM.I to EM.XXIV
 - Names modified to M.1 to M.24
- **Breeding at East Malling (1917)**
 - Woolly apple aphid resistance (N.Spy)
 - Malling-Merton Series (MM.101 – MM.115) – 1950's

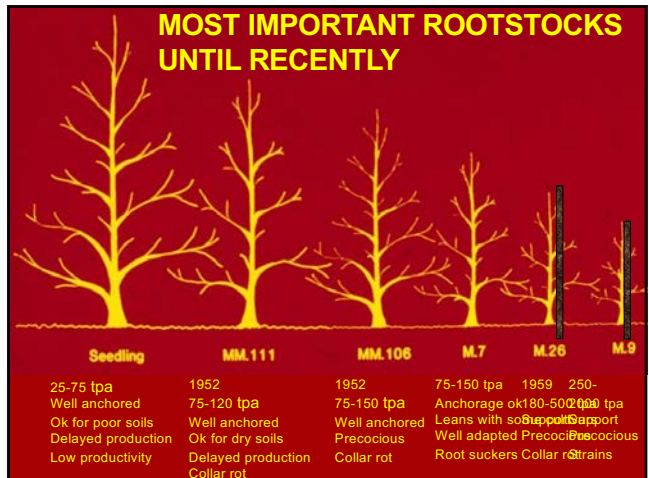
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HISTORY

- **Modern Rootstock Origins**
 - **M and MM series from England**
 - M.9, M.7, M.26, M.27, MM.106, MM.111
 - **G series from US**
 - G.11, G.16, G.30, G.41, G.65
 - **V and O series from Canada**
 - V.1, V.3, O.3
 - **B series from Russia**
 - B.9
 - **P series from Poland**
 - P.2, P.16, P.22

67

MOST IMPORTANT ROOTSTOCKS UNTIL RECENTLY



68

Apple Tree Spacing

- Seedling – 20-30 ft
- MM.111 – 15-20 ft
- MM.106 – 15-20 ft
- M.7 – 12-20 ft
- M.26 – 6-12 ft
- M.9 – 2-8 ft

69

PRIOR TO PLANTING

- Take soil sample, submit it for testing
- Correct fertility and pH (6-6.5)
- Add organic matter
- Create a weed-free planting area

70

**Planting
time = April**

**Plan ahead and
order the trees
you want!**

**Quality is more
important than
price – no
seconds!**

**Caliper 5/8", 4-6'
tall, 1-yr-old**

71

**Upon arrival of
trees:**

**If dry, soak in
water for no
more than a
day**

**Store in a
cool, well
ventilated
area (no
ethylene)**

72



73



74



75



76

Apple Fertilization

- After planting
1/3 lb 10-10-10 per tree
- Subsequent years
1/2 lb 10-10-10 per year of tree age (up to 6-8 lbs/tree)

Nonbearing years

- 1.5-2 ft of growth optimal
- Reduce N if growth excessive

Bearing years

- 8-18 in of growth optimal
- Often, N fertilization can be reduced
- Leaf analysis could be used

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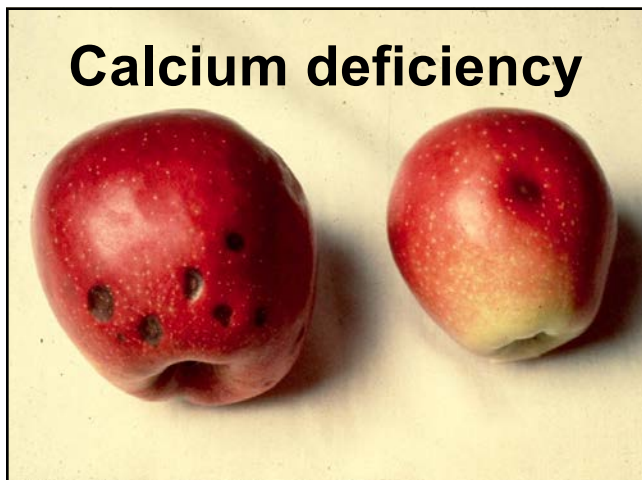
Boron deficiency



1/8 pound Borax per tree per year in spring

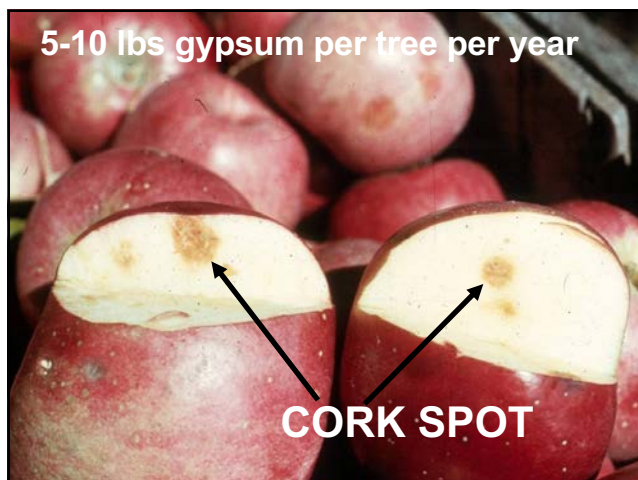
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Calcium deficiency



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5-10 lbs gypsum per tree per year



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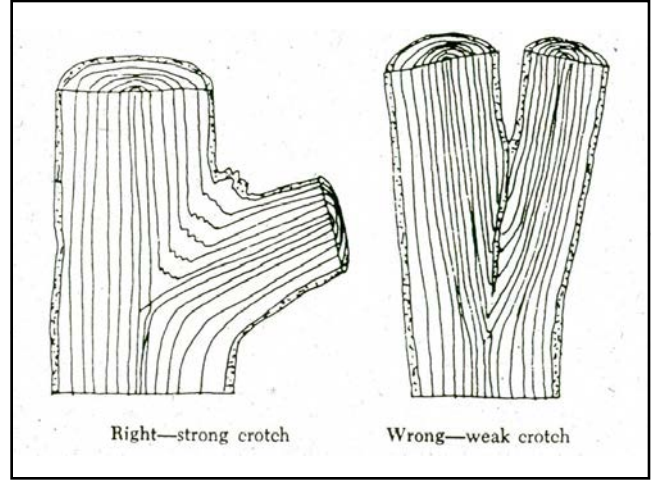
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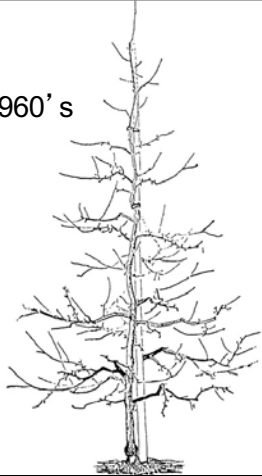
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Slender Spindle

- Wertheim (Netherlands) 1960's
- Central leader
- Average 7.5' x 5'
- Full dwarfing rootstock
 - G.16, M.9, B.9, P.2, P.16
- Supported trunk
- Manipulated leader
- Manipulated branches



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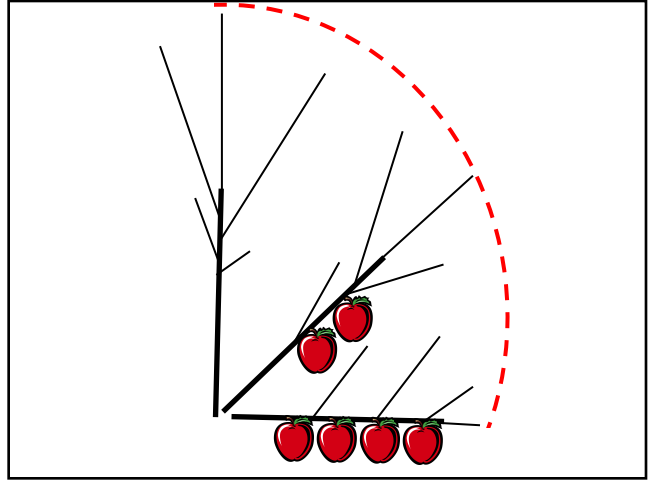
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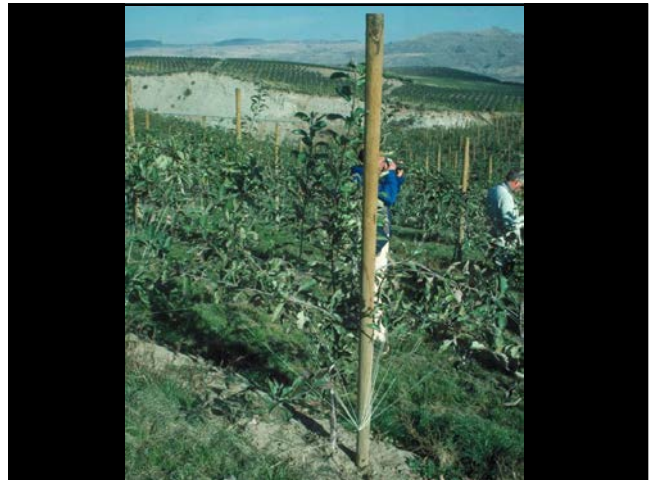
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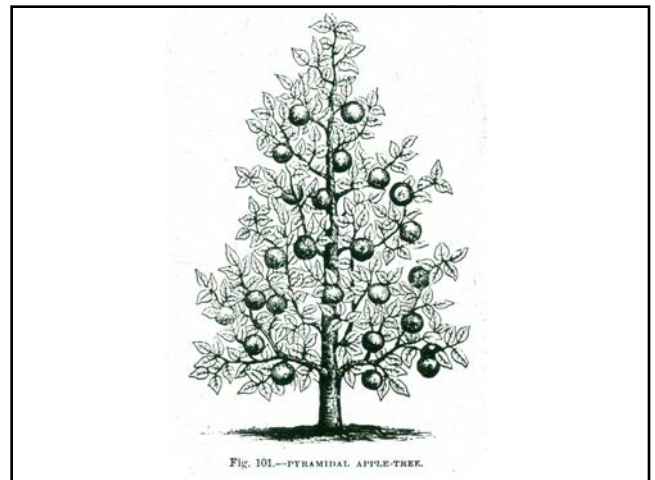
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116

Flower-bud Formation

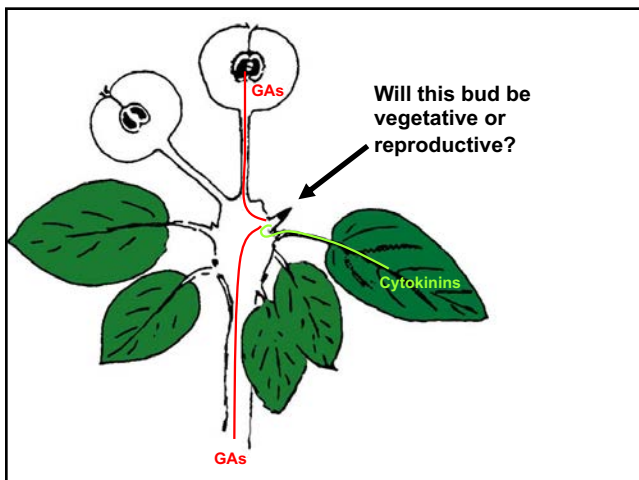
- Spur flowers – 40-50 days after bloom
Up to 120 days – optimal weather, very annual variety
- Tip flowers – when growth stops and terminal bud forms
- Axillary flowers – after spur and tip flowers



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120

BEARING HABIT OF APPLES



121

Apple Fruitlet Removal

- Thinning of young fruit is necessary
- Increased fruit size
- Enhanced bloom next year
- Late June – thin to 8 inches

122



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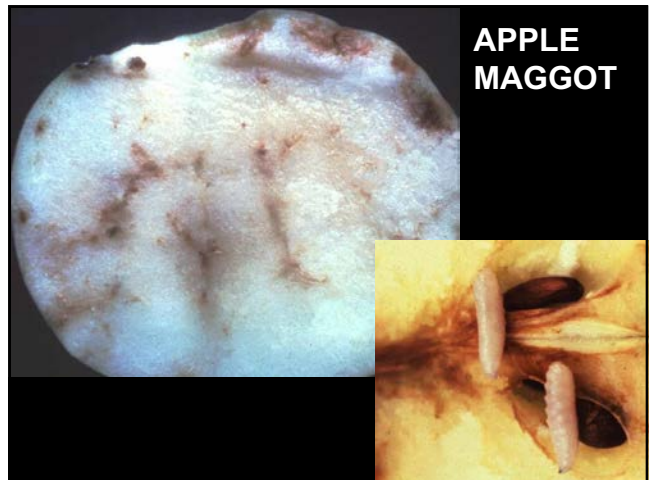
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Begin treatment in early August for mid-season and later varieties.

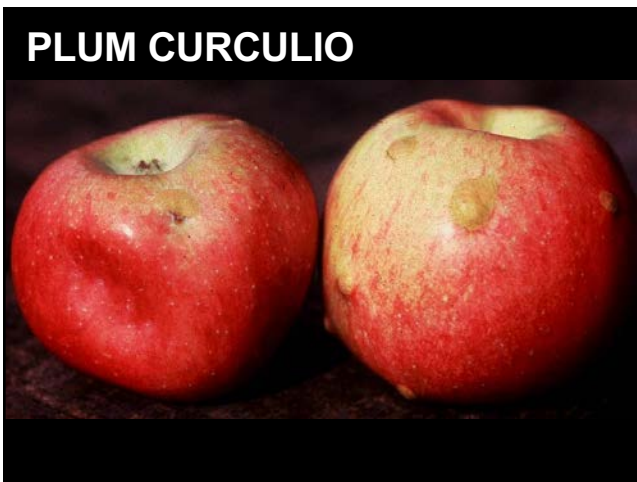
- Esfenvalerate (Ortho Bug-B-Gone Garden & Landscape®) good control, may increase other problems
- Carbaryl (Sevin®, Complete Insect Killer®) fair control
- Malathion (Malathion Concentrate®, in Bonide Fruit Tree Spray®, Malathion Plus®) fair control

141



- 4" dark red sphere
- Tangle Trap®
- Odor lure
- Placed early July
- Cleaned weekly

142



143



144



145

Treatment begins at petal fall.

- Esfenvalerate (Ortho Bug-B-Gone Garden & Landscape®) good control, may increase other problems
- Carbaryl (Sevin®, Complete Insect Killer®) fair control, possible fruit thinning
- Malathion (Malathion Concentrate®, in Bonide Fruit Tree Spray®, Malathion Plus®) fair control

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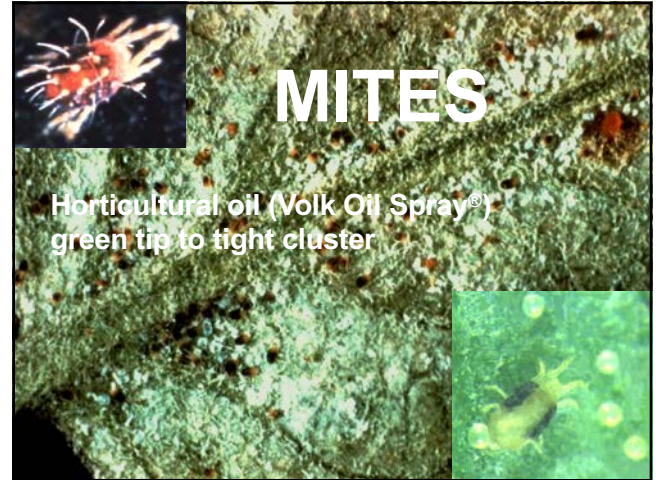
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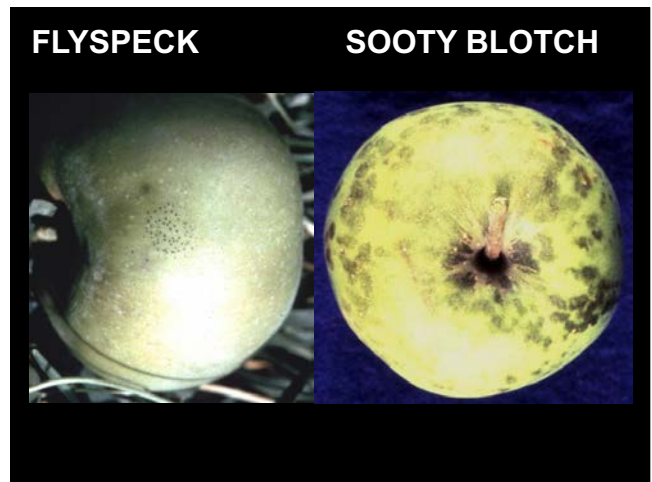
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