

**Advanced Horticulture –
Pest Management,
Soil and Water Management**

Tomato



Tomato – Plant Considerations

- ❑ Warm Season Vegetable
- ❑ Deep Rooted (Pepper and Eggplant – Medium Deep)
- ❑ Moderate Water Needs
- ❑ Low Tolerance to Excess Soil Moisture
- ❑ Medium to Good Tolerance to Drought
- ❑ Medium Tolerance to Humidity
- ❑ Low to Medium N, P, K Needs

Tomato – Soil Management Considerations

- Soil Types – Adaptable to Many

Sandy – Warm up faster, Better Drained
Best for early field planting

Clay Loam – Higher Yields, Higher Water Holding Capacity
- More Susceptible to Root Diseases

Whole leaf and petiole nutrient sufficiency guidelines

Sufficiency range by growth stage

<u>Plant Part</u>	<u>Nutrient</u>	<u>First Flower</u>	<u>Full Bloom</u>
Whole leaf	%N	4.6 – 5.2	3.5 – 4.5
	%P	.32 - .49	.25 - .41
	%K	2.2 – 3.5	1.6 – 3.1
Petiole dry	ppm NO ₃	8 – 12,000	4 – 8,000
	ppm PO ₄	2,500-3,500	2 – 3,000
	%K	5 – 8	3 - 5

Whole leaf and petiole nutrient sufficiency guidelines

Sufficiency range by growth stage

<u>Plant Part</u>	<u>Nutrient</u>	<u>First Flower</u>	<u>Full Bloom</u>
Petiole Sap	ppm NO ₃	600 – 900	300 – 600
	%K	3 – 4,000	2,500-3,500

Potassium Deficiency



Tomato – Water Management Considerations

- ❑ Deep Rooted → Deep, Infrequent Irrigations
- ❑ Frequency Factors:
 - Soil Type
 - Crop Growth Stage
 - Variety
 - Irrigation Method
 - Furrow/Flood – 7 to 14 days
 - Drip – 1 to 3 days

Tomato – Water Management Considerations

- ❑ Soil Salinity and Irrigation Water Salinity
- ❑ Lower Salinity → Less Frequent Irrigation, More Quantity each Irrigation
- ❑ Higher Salinity → More Frequent Irrigation, Less Quantity each Irrigation
- ❑ Tomato Moderate Tolerance to Salt
 - $EC < 2.5$ mmhos/cm (Soil)
 - $TDS < 2,000$ ppm (Water)

Tomato Furrow Irrigation



Tomato – Water Management Considerations

- ❑ Very High Relationship Between Soil/Water Status and Disease Susceptibility
 - Root Diseases – Phytophthora Root Rot
 - Foliage (stem, leave) Diseases – Late Blight, Early Blight
 - Fruit Diseases – Bacterial Speck,

Drip irrigation requirement between irrigations without inducing crop water stress

<u>Soil texture</u>	<u>Irrigation requirement (mm)</u>
sand	5.0 – 7.5
sandy loam	7.5 – 12.5
silt loam	12.5 – 18.0
clay loam	12.5 – 18.0
clay	10.0 – 15.0

Tomato – Disease Management Strategies

❑ Avoidance and Prevention

- Resistant Varieties, including Root Stock
- Cover Crops, Green Manure, Compost
- Sanitation
- Crop Rotation

Tomato – Disease Management Strategies

- ❑ Avoidance and Prevention
 - Proper Soil Tilth
 - Precise Water Management
 - Correct Nutrient Management

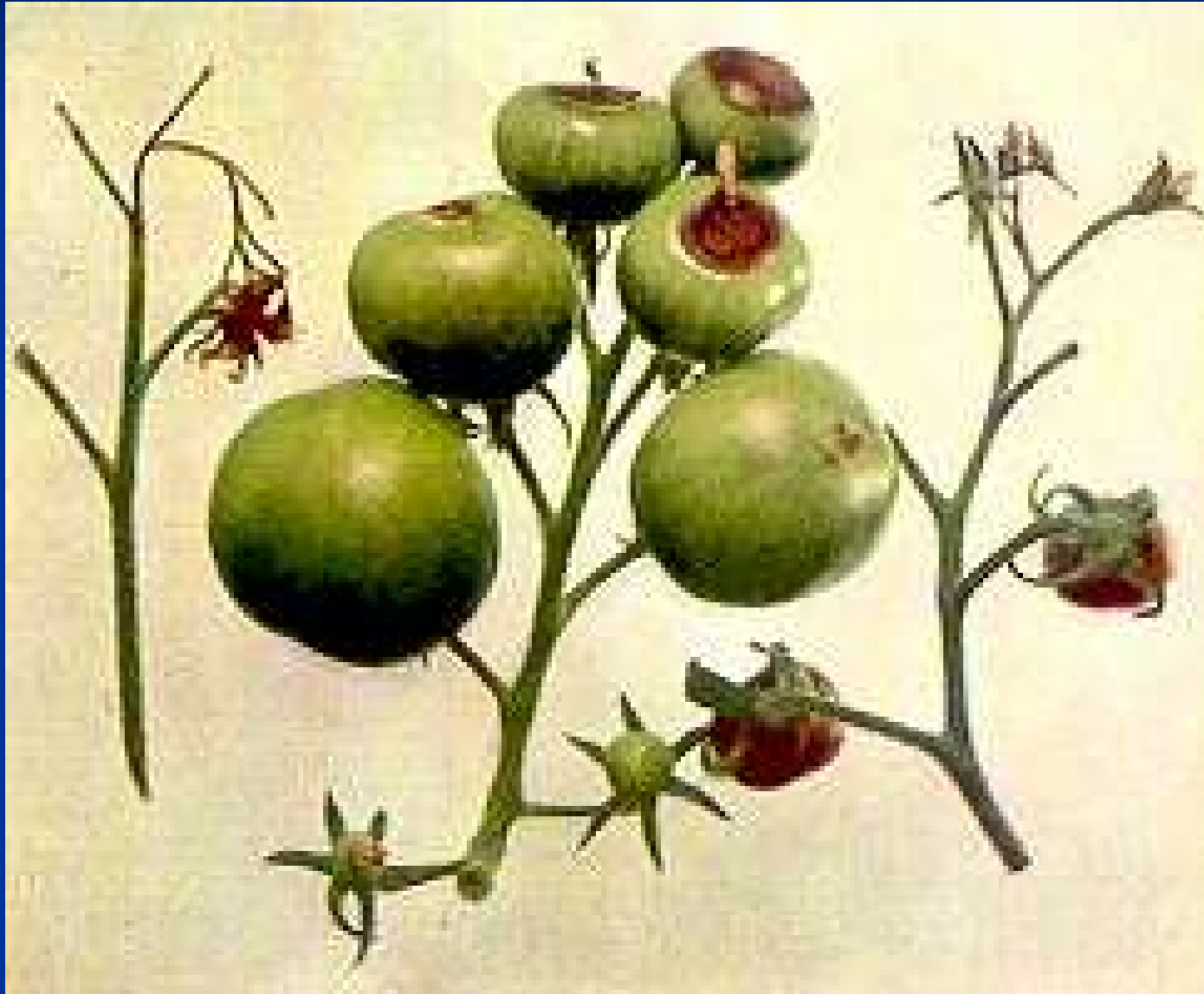
Tomato – Disease Management Strategies

- ❑ Management and Control
 - Monitor for Diseases Frequently
 - Adjust Environment as Possible
 - Control / Manage Insects
 - Use Pesticides

Physiological / Non-pathogenic Diseases

- ❑ Examples – Blossom end rot, Catface / Cracking
- ❑ Major causes – Water management, soil compaction, temperature fluctuations

Blossom End Rot – Calcium Deficiency



Phytophthora Root Rot - Tomato





Phytophthora Root Rot

Phytophthora Root Rot



Tomato – Fusarium Wilt



Tomato – Fusarium Wilt



Tomato – Fusarium Wilt



Late Blight - Tomato



4.

Tomato Late Blight



Alternaria Rot



Tomato – Bacterial speck



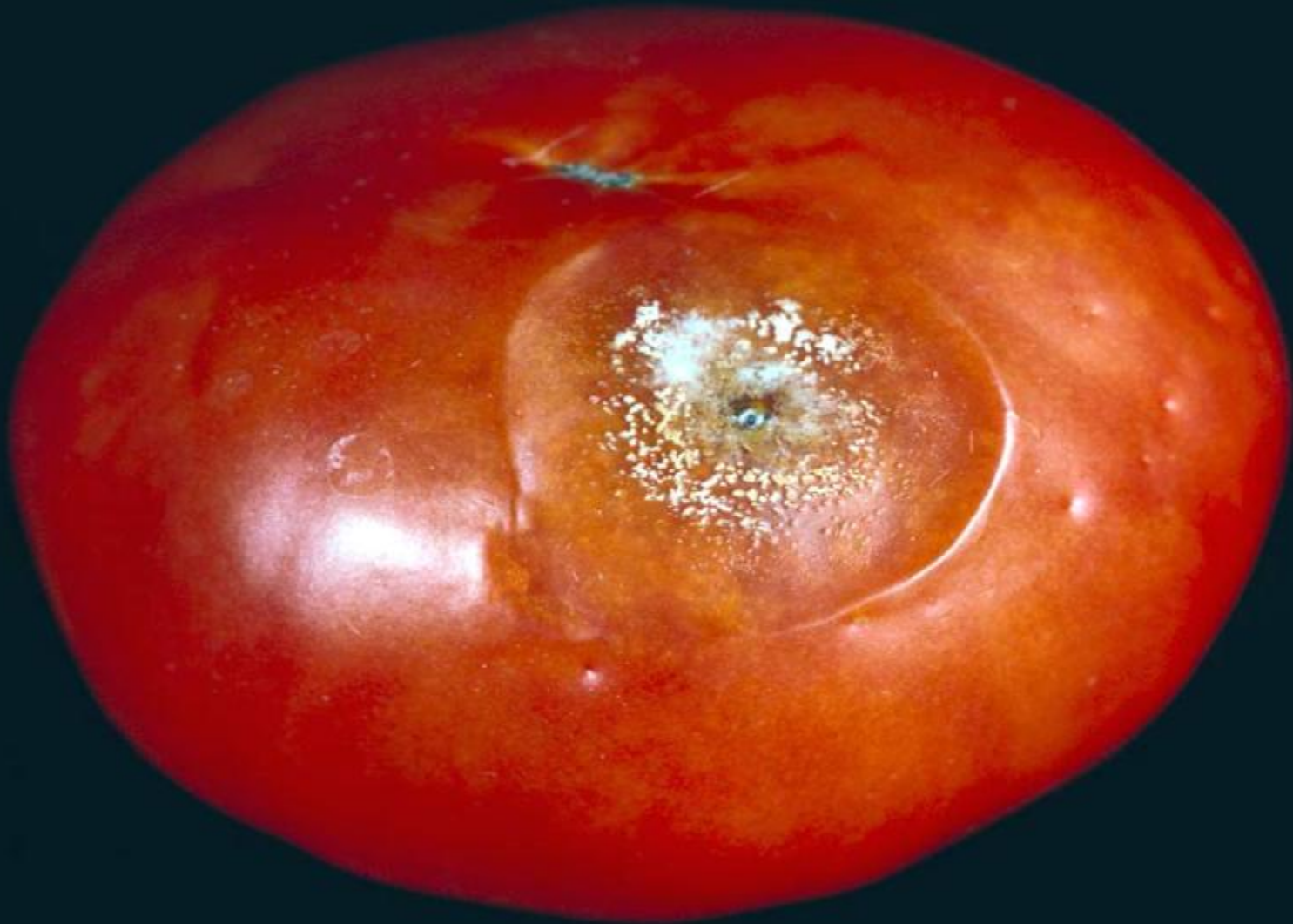
Rhizopus Fruit Rot



Anthracnose Rot



Fusarium Rot



Late Blight - Tomato



Tomato Pests - Nematode

- Microscopic roundworms - feed on plants by puncturing cells and sucking their contents.
 - Root knot : *Meloidogyne incognita* and *M. javanica*
 - Lesion : *Pratylenchus* spp.
 - Stubby root : *Trichodorus* sp. and *Paratrichodorus* sp.
 - Needle : *Longidorus africanus*

Lesion Nematode



Nematode Management

□ Cultural Practices

- Crop rotation with non-susceptible crops
- Deep plowing,
- Fallow, and
- Destroy susceptible weed hosts
- Proper irrigation and crop nutrition

Nematode Management

- Resistant cultivars
- Monitoring
- Solarization
- Treatment with Pesticide

Weed Management Components

- Monitoring - Knowledge of what weeds are present
- Weed Management Before Planting
- Weed Management At Planting
- Weed Management After Planting

Weed Management - Monitoring

- Monitoring - Knowledge of what weeds are present
- Conduct weed surveys on each field at least twice a year
- Note the location of weeds producing seed
- Examine field edges and ditch banks

Weed Management – Pre-Plant

- Crop Rotation
- Field preparation
- Soil solarization
- Herbicides

Weed Management – At Planting

- Planting dates
- Cultivation
- Transplanting

Weed Management – Post-Plant

■ Cultural practices

- keep canal banks free of weeds
- subsurface drip irrigation
- maintain deep furrows

■ Cultivation and hand-weeding

- cultivate when weeds are small
- Eliminate plants that have dodder attached

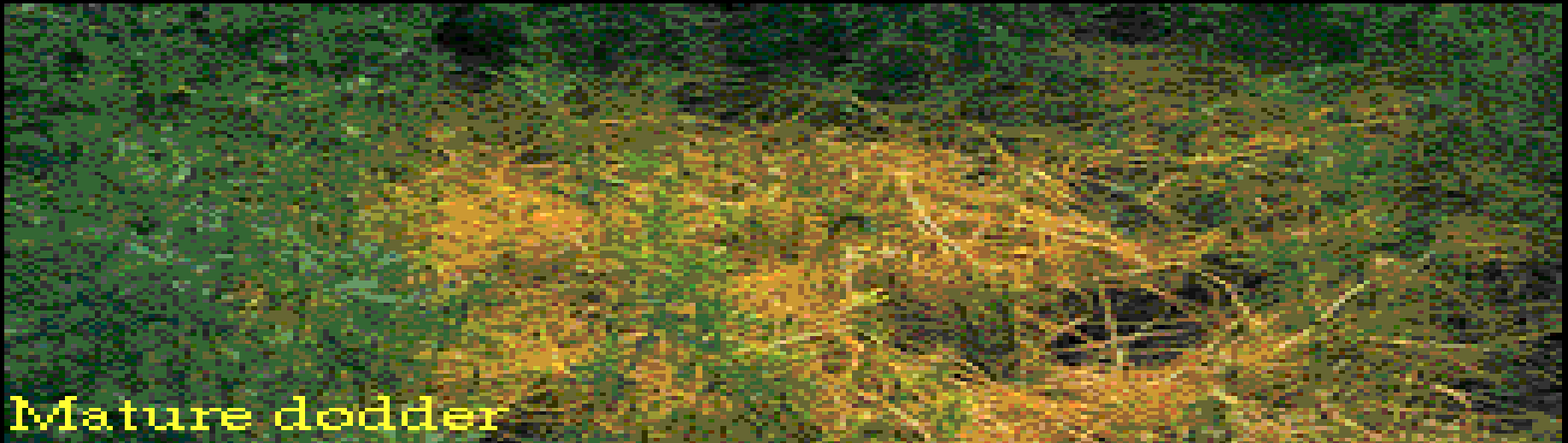
■ Flaming

■ Herbicides

Dodder on Tomato



Flowers



Mature dodder

Black Nightshade



Black nightshade berries



Mature plant



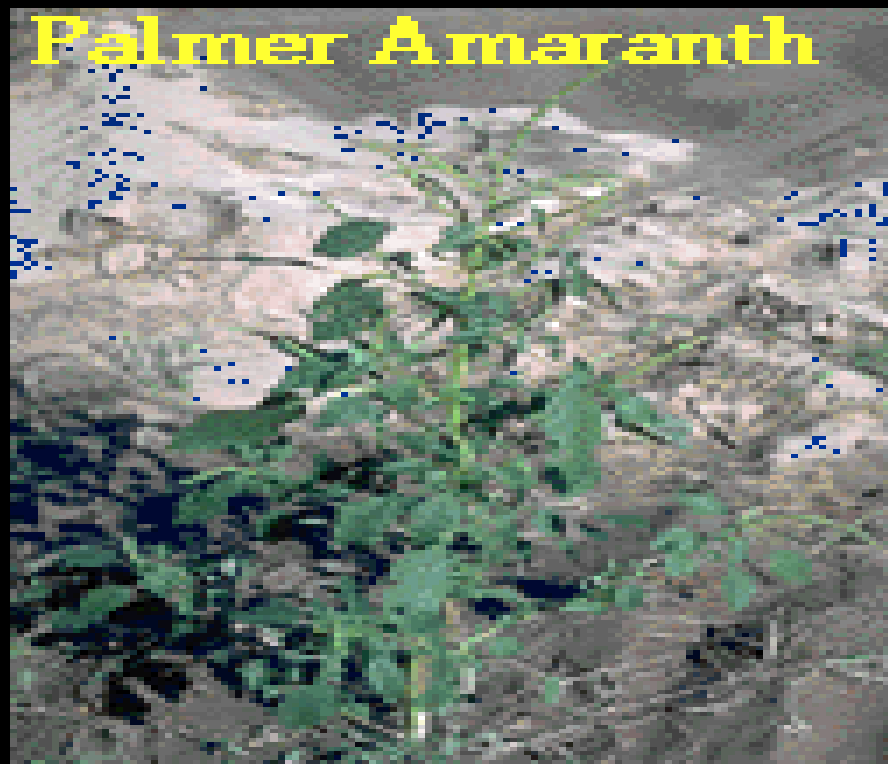
Seedling

Pigweed (Amaranthus)

Tumble pigweed



Palmer Amaranth



Redroot pigweed



Prostrate pigweed



London Rocket



Seedling



Flowers



Mature plant

Purple Nutsedge

Yellow nutsedge tubers



Nutsedge flower



Young plant



A photograph of a tomato field under a blue sky with white clouds. In the foreground, there are rows of tomato plants with many ripe, red tomatoes. In the background, a white barn with a grey roof is visible. The entire image is framed by a dark blue border.

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