Mass propagation and utilization of native shrubs in landscaping in Kuwait

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Outline

- Why native plants?
- Objectives
- Germination studies
- Vegetative propagation
- Irrigation requirements
- Pest and diseases
- Conclusion

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Why Native Plants for landscaping?

- Withstand the harsh climates
- Minimal water, nutrient requirement
- Tolerance to salt and drought
- Conserve the native plants & protect from extinction
- Sustain the genetic diversity

Objectives

- Best propagation method for mass propagation of native plants
- Irrigation requirements

Selected Plants

- *Lycium shawii*
- *Nitraria retusa*
- *Ochradenus baccatus*

Lycium shawii

Lycium shawii

- Common name: Awsaj (العوسج)
- Family: Solanacea.
- Spiny **perennial shrub** up to **150 cm** in height.
- The leaves are elliptical and congested in close clusters
- It has purple/white, trumpet-like flowers
- Flowering- March to April

Nitraria retusa

Nitraria retusa

- Common name: Ghardag (الغردق).
- Family: Zygophyllaceae
- Description: **salt-tolerant bush** found in the coastal areas of Kuwait and on Mutla ridge.
- large shrub about **150 cm high**.
- The branched are woody and thorny, and it is **grazed** upon **heavily** by animals. It has fleshy heart shaped leaves, and greenish yellow flowers (spring)followed by red berries.

Ochradenus baccatus

Ochradenus baccatus

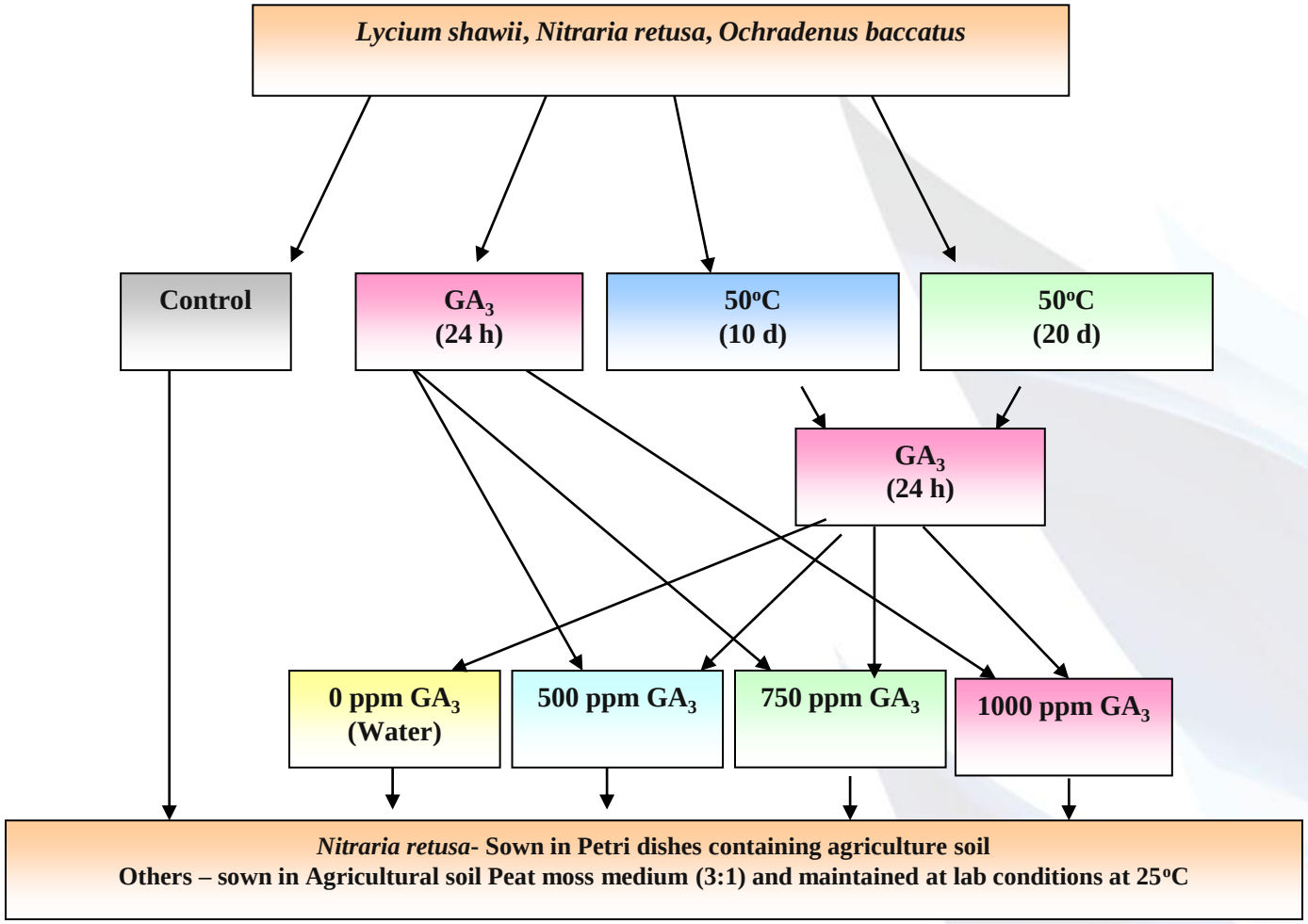
- Common name: Gurdi (غرظي).
- Family: Resedaceae.
- large **dense shrub** found in sandy, stony areas
- **two meters** tall, with grey-green linear leaves
- yellow flowers, followed by whitish berries containing black seeds

Seed Source

- Seed bank of KISR

Species	Location
Seeds	
Lycium shawii *Ochradenus baccatus*	Sabah Al- Ahmad Natural Reserve
Nitraria retusa	Nuwaiseeb
Cuttings	
Lycium shawii *Nitraria retusa*	Sulaibiya Benaider

Treatment Details- Germination Studies



Vegetative Propagation

- IBA (1000 ppm and 2000 ppm),
- NAA (400 ppm,1000 ppm),
- GA_3 (500 ppm, 750 ppm and 1000 ppm)
- commercial hormones
    - Pokon (2500ppm IBA)
    - Hormex (1000ppm IBA)
    - Ormone radicante in polvere (5000ppm NAA)

Irrigation Studies

Species	Spacing (m)
Nitraria retusa	2 x 2
Lycium shawii	2 x 2
Ochradenus baccatus	1.5 x 1.5

Location:

Urban Development Garden, Salmiya

Irrigation levels

- no stress (field capacity)
- 50% moisture depletion
- 75% moisture depletion

- Drip irrigation
- Soil moisture meters
- Water meters to quantify the amount of irrigation water used
- Biomass of the plants at the end of the experiment

Results

Lycium shawii

- The highest germination (94.67%) -dry heat for 20 days + 500 ppm GA_3
- 750 ppm GA_3 - 93%
- 1000 ppm of GA_3 - 91% germination
- Control- 55%
- **maximum vigorous seedlings with good shoot biomass within a short period of time- 500 ppm (89%)**

Lycium shawii

- 100% of cuttings resulted in rooting
  - 1000 ppm IBA
  - ormone radicante in polvere (Rigenal P) 5000 PPM NAA
  - hormex (1000 PPM IBA)
  - Control- 80%
  - GA_3 negative effect on rooting

Lycium shawii

Growth performance (Irrigation studies)

- Highest relative growth in **plant canopy** was recorded in plants with no stress irrigation.
- Most of the plants were found to defoliate during June- August, 2009. New leaf growth was observed during September 2009
- *Lycium shawii* can be considered as a tolerant plant to water stress and can perform at its best when irrigated at 75% depletion.

Nitraria retusa

- 20 d + 750 ppm GA_3 -(94%)
- 20 d + 500 ppm GA_3 (90.67%)
- **1000 ppm GA_3 (85%)- in 18 days with highest root, shoot biomass**
- Un-treated seeds required 55 d to obtain 79% of germination, poor-shoot, root biomass

Nitraria retusa

- 1000 ppm IBA (26.66%),
- 400 ppm NAA (20%) and hormex (13.33%)
- Highest relative growth in plant height was recorded in plants irrigated at 75% depletion level.
- *Nitraria retusa* plants can be maintained with a minimal irrigation at 75% depletion.
- Nevertheless, during summer when the evaporation rates were high, no stress irrigation was needed to obtain an aesthetically beautiful bushy landscape plant.

Ochradenus baccatus

- 10 d +750 ppm GA_3 -100%
- 500 ppm (99%) and 1000 ppm (97%) GA_3
- Control- 74%
- Exposure to dry heat for 20 d with or without various concentrations of GA_3 combinations retarded the germination.
- **500 ppm GA_3 -producing vigorous seedlings**

Ochradenus baccatus

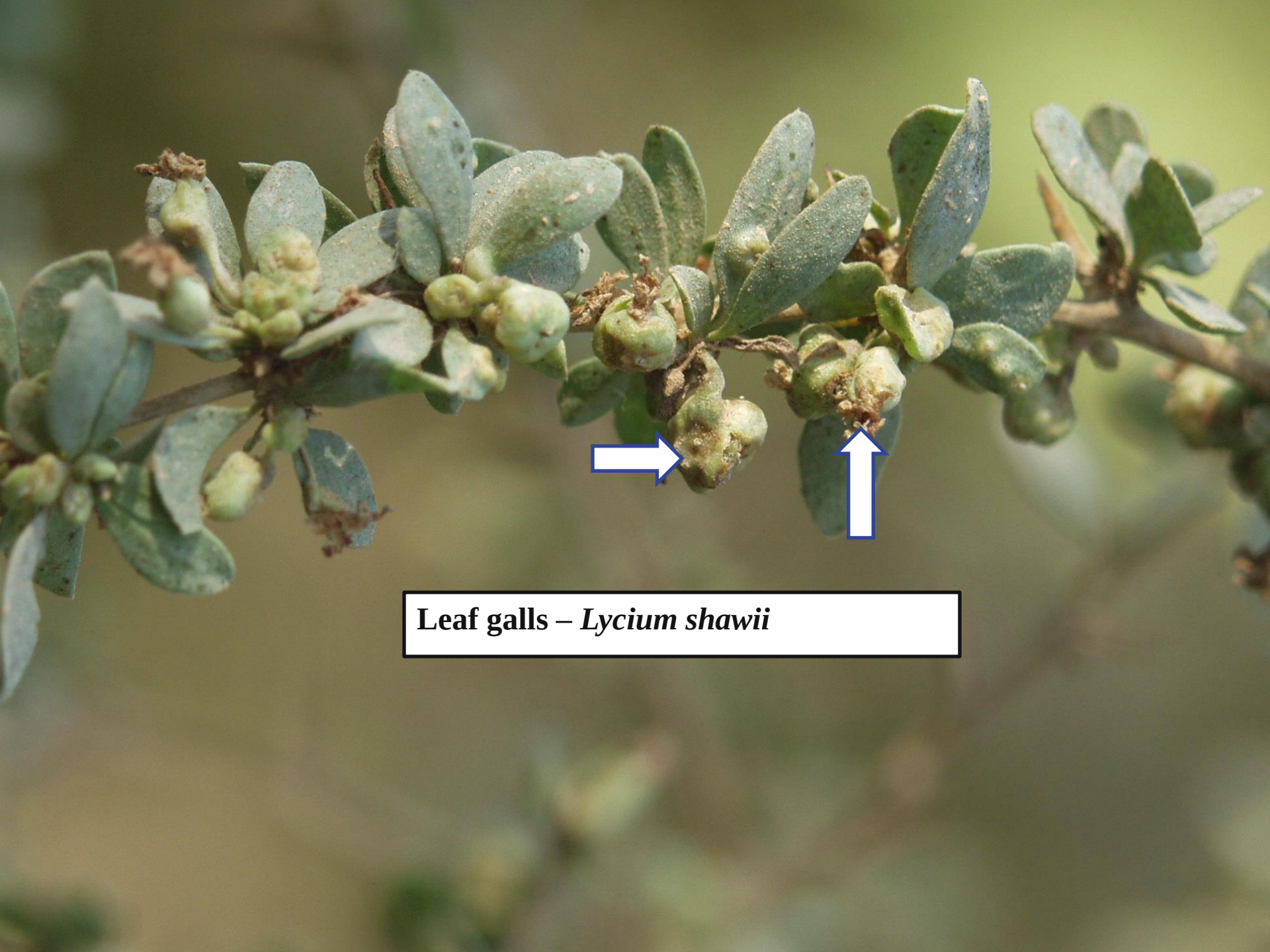
- Relative growth in average plant canopy was maximum in plants irrigated at 50% depletion;
- *Ochradenus baccatus* can survive with irrigation at 75% soil moisture depletion level in summer. However, as the plant exhibited a positive crop water stress index, it is recommended to irrigate at 50% moisture depletion to get a plant with luxuriant canopy.

Recommended Irrigation Scheduling for Selected Native Plants

Crop	Spacing	Winter [i]				Spring				Summer			
		Average Daily Demand (l)		Peak Daily Demand (l)		Average Daily Demand (l)		Peak Daily Demand (l)		Average Daily Demand (l)		Peak Daily Demand (l)	
		Per plant	Per sq. m	Per plant	Per sq. m	Per plant	Per sq. m	Per plant	Per sq. m	Per plant	Per sq. m	Per plant	Per sq. m
Nitraria retusa	2x2	0.715	0.179	0.775	0.194	1.435	0.359	1.725	0.431	2.033	0.508	2.401	0.600
Lycium shawii	2x2	0.473	0.118	0.498	0.125	1.405	0.351	1.688	0.422	1.959	0.490	2.553	0.638
Ochradenus baccatus	1.5x1.5	0.747	0.332	0.828	0.368	1.495	0.664	1.812	0.805	2.118	0.941	2.455	1.091

Winter (December – February), Spring (March- May), Summer (June – October)
(*Source: Ministry of Planning, 2006)*

Pest or Disease????



Leaf galls – *Lycium shawii*

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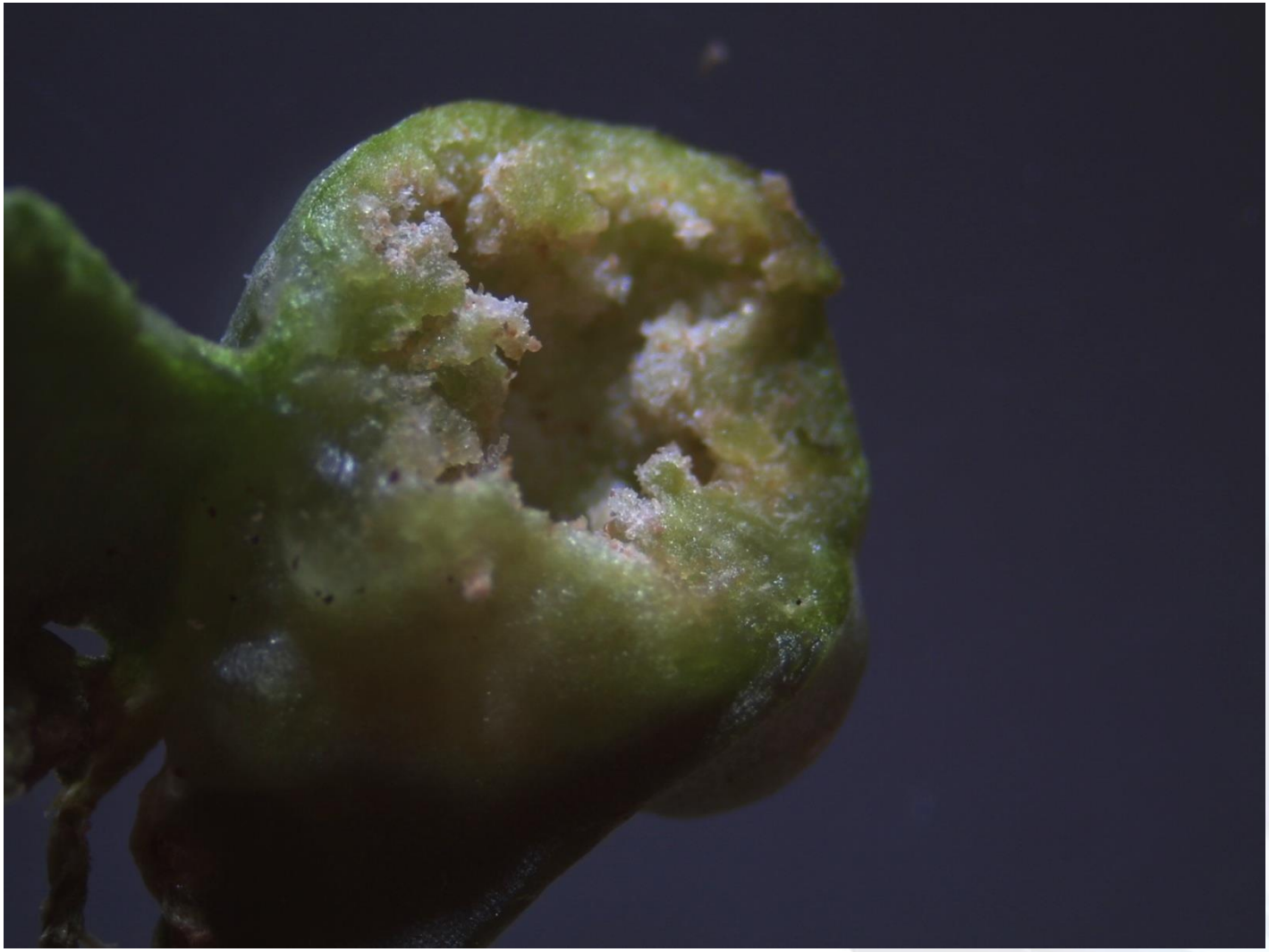

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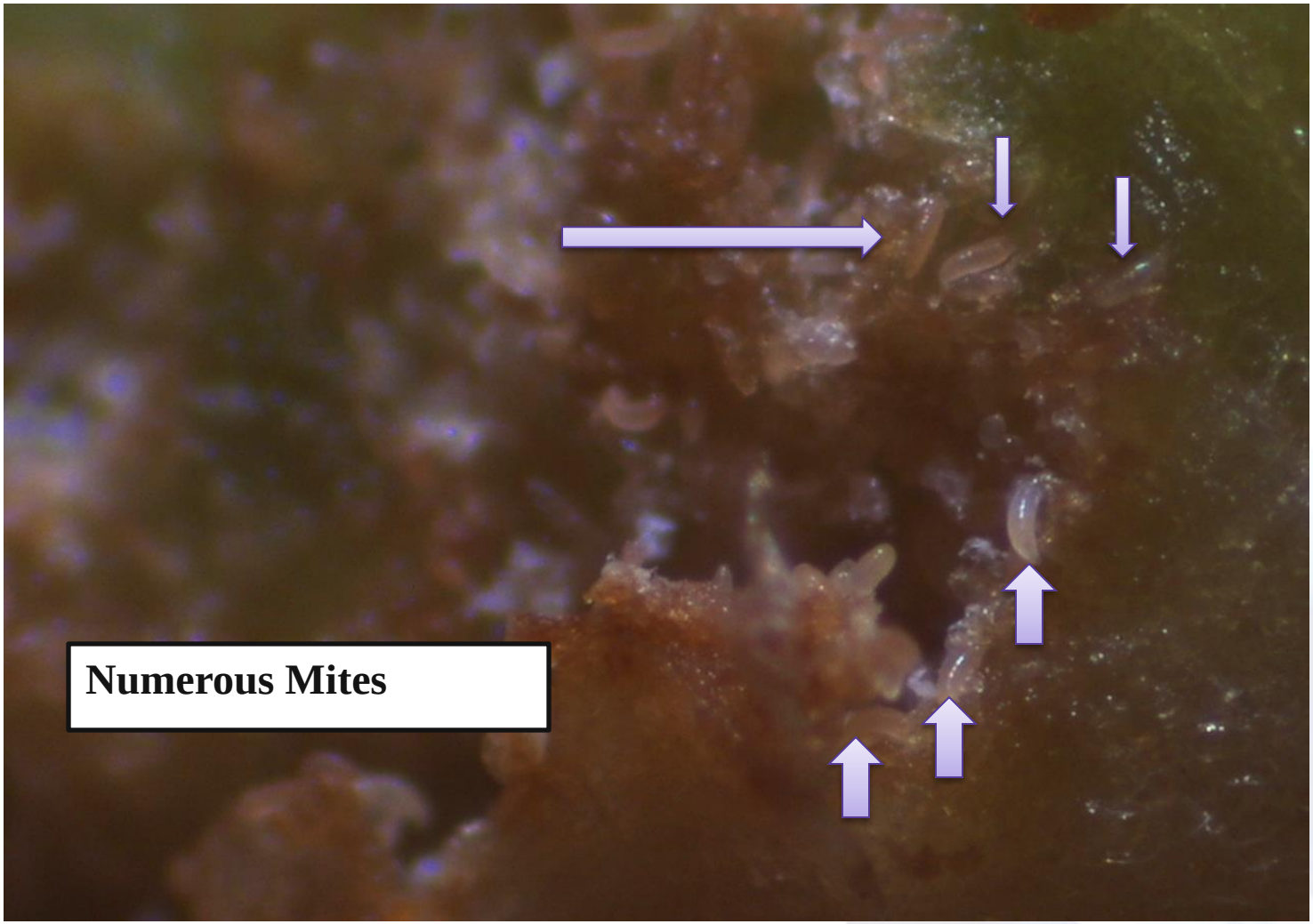
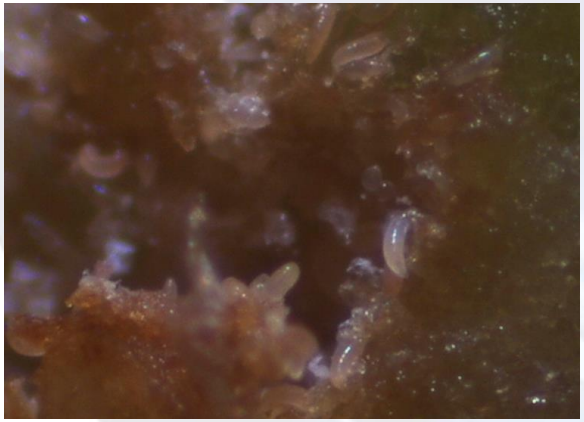

Numerous Mites

Control

- They feed on leaves and the tissues enlarge to form galls. Observed during spring.
- **Eriophyid Mites??**
- spindle-shaped bodies, not visible to naked eyes
- No pesticides are effective. Miticides suggested.
- Prune all the infected leaves and burn.
- Use of Azadirachtin (neem extract) to be tested.



Conclusion

Lycium Shawii

- Propagation thro' cuttings are faster (1000 ppm IBA/ Hormex).

Nitraria retusa

- Seeds (1000 ppm GA3)
- More investigations on vegetative propagation suggested.

Ochradenus baccatus

- Seeds, 500 ppm GA_3
- Irrigation needs of 2, 3, 5 yr old trees should be evaluated.

THANK YOU