

## EXECUTIVE SUMMARY

### Research objectives:

- Evaluate mortality rate of Aloe mite (*Eriophyes aloinis* Keifer) caused by selected commercial miticides.
- Evaluate the effect of selected insecticides and an experimental compound on the population growth of fungus gnats and whitefly in ornamental plants.
- Evaluate the effect of selected insecticides on the control of Mealybug on *Mirtana sp.*
- Evaluate silicon absorption by Verbena plants and its effect on insect resistance.
- Establish the biology of *Klambothrips myopori*, myoporum thrips on *Myoporum laetum*.
- Determine the effect of pH on growth rate and optimum pH for maximum growth of selected species of cactus and succulents.
- Determine the effect of several types of biocontainers on plant growth of greenhouse grown tomato plants.
- Determine the effect of container drainage area on plant water usage, leachate and plant quality.
- Determine if an experimental protein surfactant combination (PSC) will produce faster root growth than typical under normal plug production and if the increased root growth results in bigger, faster growing plants.
- Determine if a selected PSC will help root-bound plugs break roots loose for repotting.
- Determine the effect of a sea water concentrate on growth rate and survival rate of Golden Barrel (*Echinocactus grusonii*) and *Echeveria 'Lola'*.
- Evaluate the effect of aqualok foam on root and shoot growth of petunias.
- Determine if chlorine dioxide water treatment reduces the disease incidence in plants irrigated with recycled water.

### Summary of Research

1. **Project Title:** Efficacy of Commercial Miticides in the Curative Control of Aloe Mite (*Eriophyes aloinis* Keifer) (Ongoing).
  - Commercial miticides vary in their efficacy to control Aloe mite. The rate of mite mortality varies greatly among treated plants.
  - It is essential to achieve good plant coverage, since the mite is microscopic and it is well protected at the point of insertion of the leaves with the stem. The best control should be provided by systemic chemicals. In a preliminary evaluation, Kontos and Pylon caused the highest reduction of mite population.
  - Application of miticides should be done at the first sign of infection. Aloe mite is not always present in affected tissue, especially when the infection is advanced. The chemicals injected by the mite seem to continue affecting the plant tissues even after the mite is not present.
2. **Project Title:** Efficacy of an Experimental Insecticide to Control Whitefly in Gerbera Daisies (*Gerbera jamesonii* L.) (Ongoing).
3. **Project Title:** Efficacy of Selected Insecticides to Control Whitefly in Gerbera Daisies (*Gerbera jamesonii* L.)
  - Talstar Pro, Avid and Sanmite at 4 ounces resulted in statistically higher mortality than the untreated control.
4. **Project Title:** Efficacy of Selected Chemicals to Control Citrus Mealybug on *Mirtana sp.*
  - F7954 and Talstar Pro statistically reduced the number of mealybug compared to the control
  - Efficacy of an experimental chemical on whitefly control was evaluated.
5. **Project Title:** Efficacy of Selected Insecticides to control fungus gnats on Celosia (*Celosia plumosa* L.) (Ongoing).
6. **Project Title:** Silicon absorption and insect resistance on Verbena
  - Silicon content was found to increase in the stems and leaves and decrease in the roots
  - The powder formulation was most readily absorbed
  - The amount of silicon absorbed was not enough to ward off whitefly population

7. **Project Title:** Biology and gall formation of *Klambothrips myopori*, myoporium thrips on *Myoporum laetum*.
  - All stages of the insect from egg to adult can be found infesting twisted gall like tissues of myoporium caused by thrips feeding.
  - The myoporium thrips has two instar nymphs and two motile pupal stages.
  - At 30°C, the egg stage takes 13.9 days to hatch, the first and second instars take 13.9 days to develop to the first pupal stage. The first pupa takes 5.3 days and the second 5 more days to reach the adult stage, for a total of 24.2 days to develop from egg to adult.
  - One, 2, 4, and 8 thrips were placed in cages containing myoporium rooted cuttings. A single thrips on a terminal growth can cause the twisted galling of myoporium.
8. **Project Title:** Effect of Substrate pH on the Growth of Golden Barrel (*Echinocactus grusonii*), *Crassula* 'Spring Time' and *Chamaelobivia* 'Rose Quartz'
  - The optimum pH range for maximum growth of golden barrel was 5.5 but the plants grew well in pH as low as 4.2 and as high as 6.3.
  - The optimum pH range for maximum growth of *Chamaelobivia* 'Rose Quartz' was 5.5 to 6.4. This plant can tolerate slightly acidic conditions but did not do well at higher pH.
  - The optimum pH range for maximum growth of *Crassula* 'Spring Time' was 6.4. This plant tolerated slightly acidic conditions.
  - The species studied were sensitive to changes of pH and there is an optimum pH range for maximum growth for each species; it is important to consider the origin of a species and the local pH range when adjusting for pH and possibly grouping species by general area of origin.
9. **Project Title:** Effect of biocontainers on shoot and root growth of tomatoes
  - Plants grown in biocontainers were smaller and lighter than plants grown in plastic pots.
  - DOT Pots were the fastest to degrade when planted and the least restrictive to the roots, however, they also tend to break easily when handled.
  - CowPots degraded easily in the soil and allowed good root growth; they conserved their integrity better than DOT pots during the growth period.
  - Coir pots allowed adequate growth of the roots but after 4 weeks in the soil they had not significantly degraded.
  - Paper pulp pots degrade in the soil but at a slower pace than Cow and DOT Pots.
10. **Project Title:** Comparing a High Strength Formulation of a Plant Growth Regulator to a Low Strength Commercial Formulation (proprietary work)
  - Use of high strength formulation would allow use of lower amounts of chemical. Phytotoxicity and efficacy of the compound was evaluated.
11. **Project Title:** Evaluation of Aqualok Foam in Hanging Baskets (proprietary work)
  - Performance of plants in hanging baskets with aqualok insert and in baskets with 100% medium was compared to evaluate plant growth and post harvest behavior.
  - Performance of plants in hanging baskets with aqualok insert and in baskets with 100% medium and 60% medium-40% perlite was compared to evaluate plant growth and post harvest behavior (Ongoing).
12. **Project Title:** Effect of Container Drainage Area on Growth, Appearance, Water Use and Leachate of Petunia (*Petunia x hybrida*) and Lemon Thyme (*Thymus pulegioides* L.)
  - High container drainage area did not result in increased amount of water used by petunia plants during the growth cycle. Although plants in containers with more drainage required more frequent irrigation, they required less water per irrigation.
  - Container drainage did not have an effect on the amount of water leached per pot.
  - Greenhouse-grown petunia plants in containers with less drainage were bigger than plants in containers with more drainage area; however, field-grown petunia and lemon thyme plants in each pot type were similar in volume.
  - Petunia root fresh weight was higher in pots with more drainage. Root dry weight in greenhouse-grown petunias were similar among container types, however, field-grown petunias had higher root dry weight when grown in containers with more drainage.
  - Plant quality was the same in all plants and was not affected by growing mix or drainage area.

- Good quality petunia plants can be grown in containers with more or less drainage. It is possible to grow plants in containers with more drainage area and using less water per irrigation when there is close monitoring of the water applied and the frequency of irrigation.
  - Lemon Thyme plants were not affected by container type.
13. **Project Title:** Effect of a Selected Protein Surfactant Combination on Plant Growth of Dusty Miller (*Centaurea cineraria* L.)
- The PSC had a positive effect on the growth of plugs of Dusty Miller after four weeks of application.
  - Roots and shoots of treated plugs had higher fresh and dry weights than untreated plugs.
  - PSC treated plugs grew faster than untreated plugs. PSC treated plugs reached commercial size 5 weeks after germination; this was one week earlier than untreated plugs.
  - After transplant, PSC treated plugs grew into plants that continued to have heavier roots but were not bigger than untreated plants.
14. **Project Title:** Effect of a Novel Protein Surfactant Combination on Root Growth of Root-Bound Gerbera daisies (*Gerbera jamesonii* L.)
- Two weeks after transplant, roots and shoots of treated plants had higher fresh and dry weights than untreated plugs. However, four weeks after transplant PSC treated and water treated root and shoot weights were the same.
15. **Project Title:** Effect of a Novel Protein Surfactant Combination (PSC) on Plug Growth of Selected Species in a Commercial Plug Production Facility.
- The PSG had a regulatory effect on Primula, Gerberas, Cyclamen and Tarragon; the PSC-treated plugs were shorter than the control. Ranunculus plugs treated with the PSC were taller than water-treated plugs.
  - The PSC improved plug root development of Celosia, Coleus, Cyclamen, Ranunculus, Petunia, Snapdragons and Vinca.
  - Root weight of Celosia, Coleus, Gerberas, Pansy, Ranunculus, Petunia and Tarragon was higher in PSC treated plugs than in water treated plugs.
  - The PCS did not have an effect on shoot weight of the species studied with the exception of Primula and Delphinium. PCS treated Primula plugs had lighter shoots than water treated plugs and PCS treated Delphinium plugs had heavier shoot dry weight than water treated plugs.
  - The PSC is a new material that affects root growth and plant height; its effects are specific to each plant species and more studies are required before commercial recommendations can be made.
16. **Project title:** Effect of a Natural Soil Amendment from Sea Water on Rooting and Growth Rate of Golden Barrel (*Echinocactus grusonii*) and *Echeveria* ‘Lola’
- C-GRO sea water extract did not increase growth of *Echeveria* ‘Lola’.
  - C-GRO sea water extract decreased the number of dead plants after transplant for both species and increased the weight and volume of *Echinocactus grusonii*.
17. **Project Title:** Efficacy of chlorine dioxide as a water disinfectant on the incidence of disease symptoms in ornamental plants (Ongoing).
- Chlorine dioxide used as a water disinfectant could allow the use of recycle water for the production of healthy plants, reducing the use of pesticides.