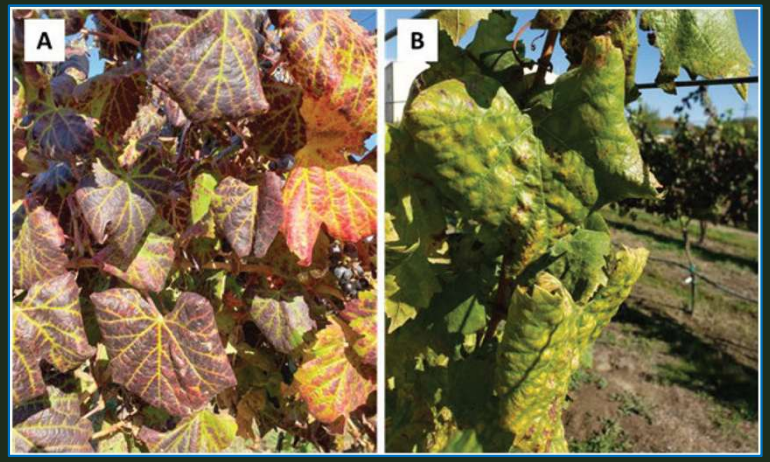
Harnessing Natural Gene Silencing to Control Grapevine Viruses

Presenting author: K. Kruger

Viticulture pathogens



Grapevine leafroll disease (GLD)



Downy mildew



Powdery mildew

Management Strategies



Pesticide administration



Virus-free propagation material



Roguing

Aim

Developing innovative tools to improve grapevine health and reduce the impact of viral diseases in vineyards. This study evaluates a novel RNA-based spraying-treatment approach for controlling Grapevine virus A (GVA) and improving plant resilience.

Approach



Produce GVA targeting dsRNA

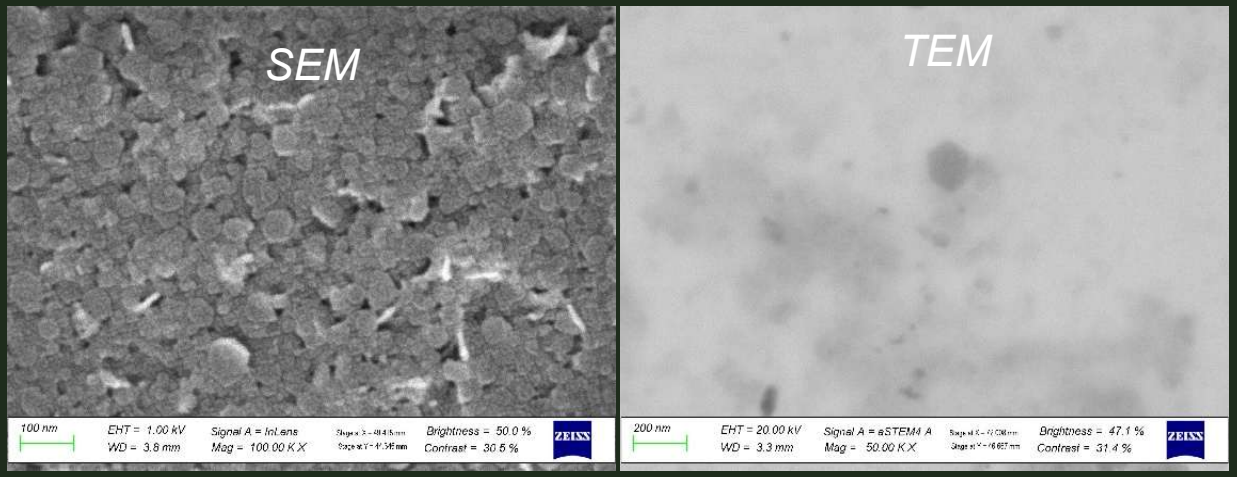
Efficacy experiment of dsRNA:
3 groups, 5 plants per group
- Mock control group
- ”Naked”-dsRNA treatment group
- Nanoparticle-dsRNA treatment group

Tissue collected at 0, 7 and 14 days-post treatment (DPT). Samples included treated (local) leaves and systemic (newer growth) leaves

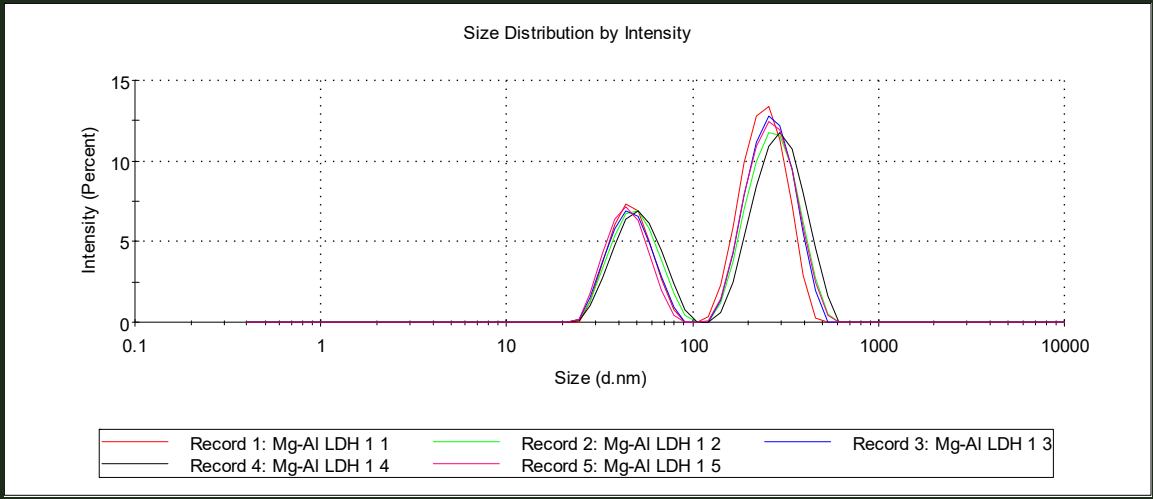
Results

Layered Double Hydroxide (LDH) Nanoparticles

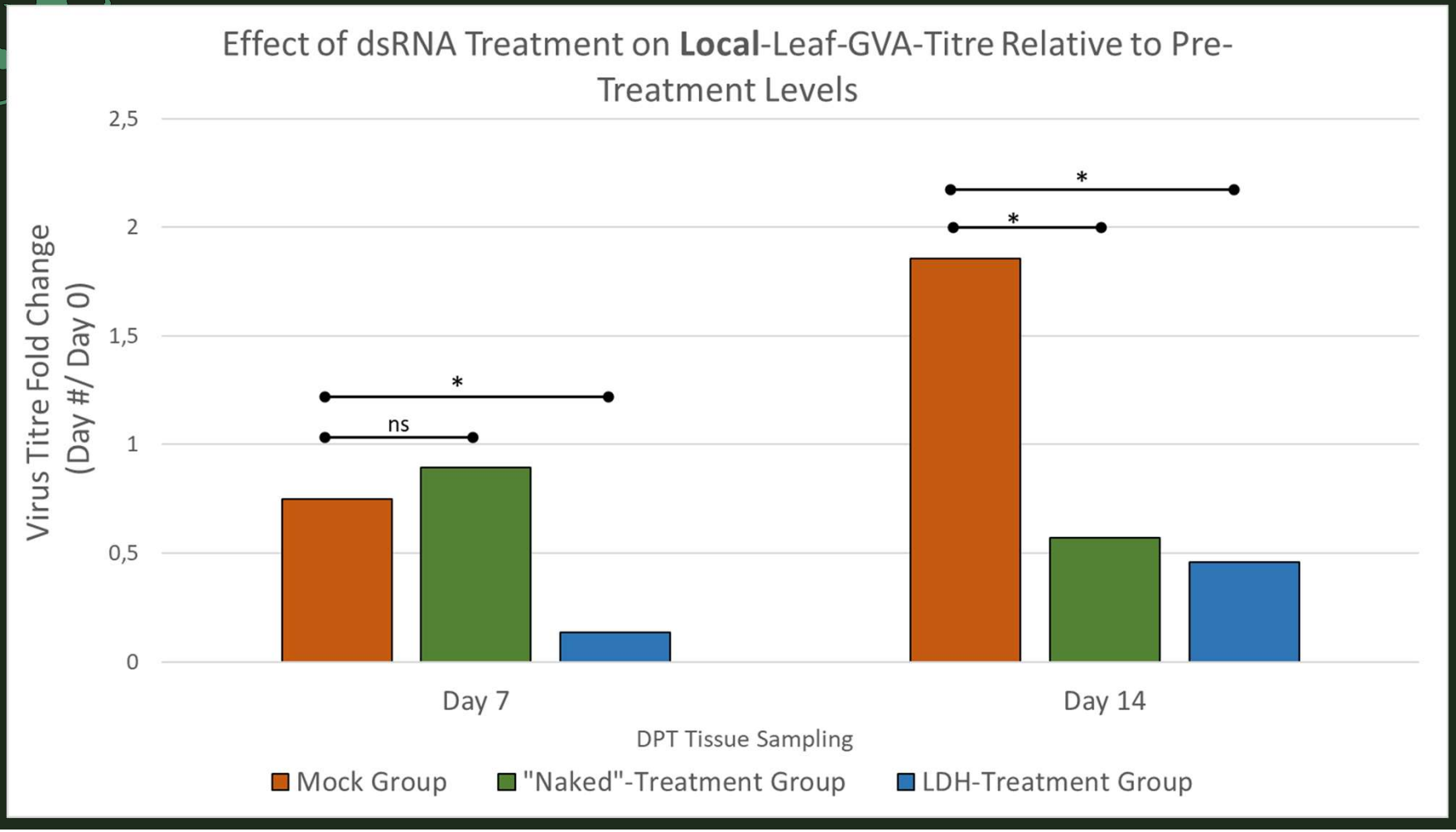
Morphology Confirmation



Size confirmation



Grapevine Treatment Outcomes



Local Leaves

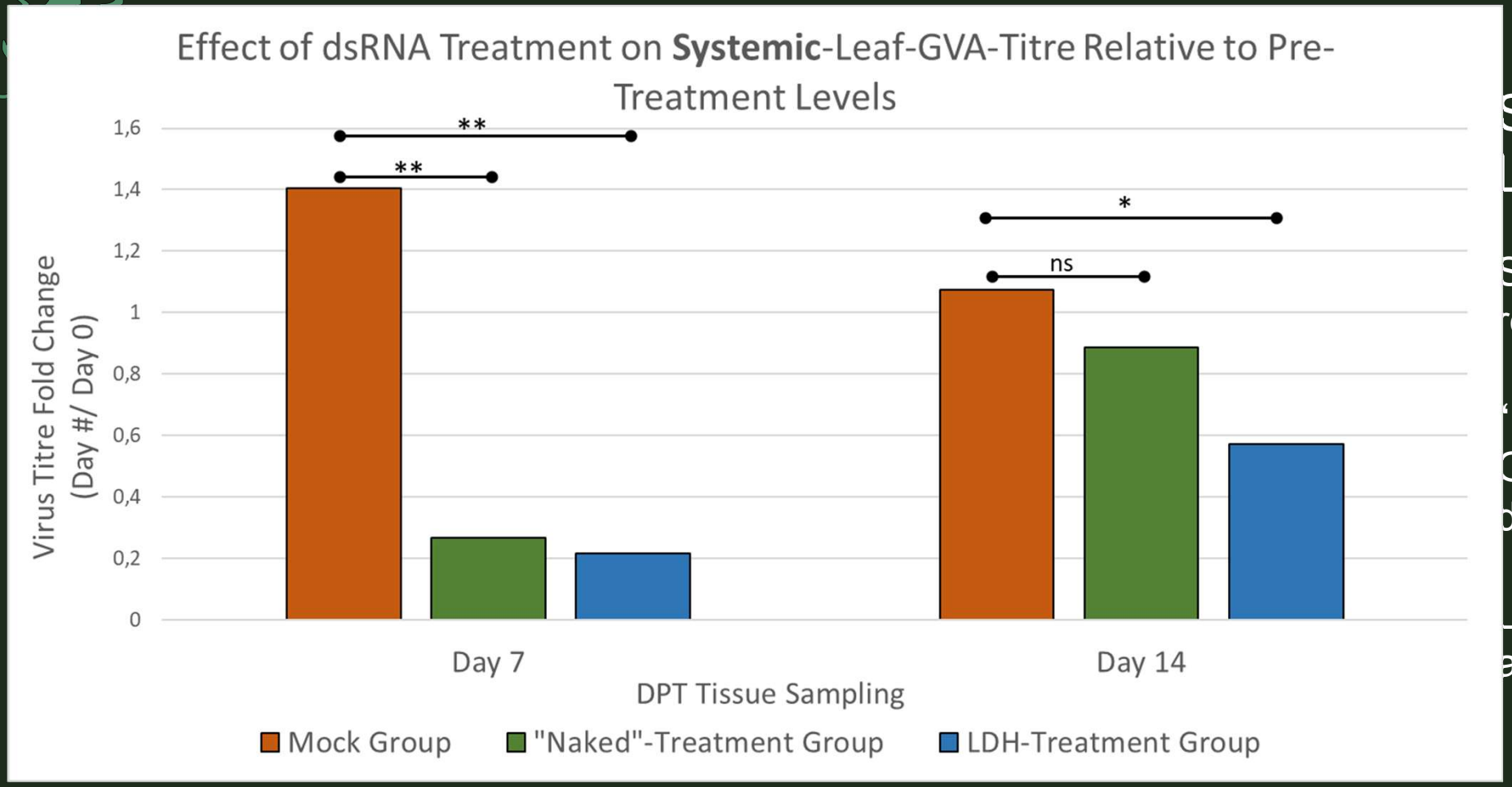
Significant reductions (*) in:

“Naked”-dsRNA Group (Green) at day 14

LDH Group (Blue) at 7 and 14 days

Results

Grapevine Treatment Outcomes



Systemic Leaves

Significant reductions (*) in:

"Naked"-dsRNA Group (Green) at day 7

LDH Group (Blue) at 7 and 14 days

Conclusion

- Produced large batch, low cost and highly specific dsRNA molecules
- This study demonstrated dsRNA efficacy in treating GVA in grapevine
- LDH Nanoparticles demonstrate increased treatment durability and longevity and improved upon “Naked”-dsRNA
- Treatments lifespan ~14 days

Acknowledgments

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