Enhancing rubber dandelion germplasm by increasing mevalonate pathway activity

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INTRODUCTION
• Taraxacum kok-saghyz (TK, a.k.a. rubber root dandelion) produces high-quality natural rubber (NR) in its roots.
• Global NR demand solely dependent on the Hevea brasiliensis rubber tree, a threatened crop.
• TK could supplement NR but is not economically viable due to low rubber yield.

AIM
Improve TK germplasm through biotechnology.
• The mevalonate (MVA) pathway produces much of the isopentenyl pyrophosphate (IPP) utilized in NR production.
• Agrobacterium rhizogenes was used to insert a multigene construct containing MVA pathway genes targeted to chloroplasts.
• The Ri gene co-inserted by A. rhizogenes causes hairy root disease and limits plant growth.
• Ri is easily identifiable and can be confirmed by PCR. Further study of Ri phenotype could result in selecting Ri plants without PCR.
• Breeding T3 MEV6 TK while excluding Ri may produce progeny with increased IPP pool and consequently NR production, making TK more valuable as a crop.

METHODS
• TK transformed in 2016 by Yingxiao Zhang.
• T1 – T2 generations propagated by Kyle Benzle.
• T3 plants September/October and are growing to maturity.
• Crosses performed to exclude Ri and produce TK homozygous for the construct.
• Plants being tested for construct and Ri by PCR.
• Plants will be harvested, and rubber content will be measured.
• Targeted metabolomics may be performed to confirm that IPP pool size increased in high rubber plants.

BIBLIOGRAPHY

ACKNOWLEDGEMENTS
• MEV6 construct provided by Prof. Shashi Kumar, International Center for Genetic Engineering and Biotechnology, Aruna Asaf Ali Marg, New Delhi, India. Laboratory and greenhouse training provided by staff and students of the Cornish and Fresnedo-Ramirez labs.
• Funding provided by American Sustainable Rubber LLC and USDA-NIFA Hatch project 230837.