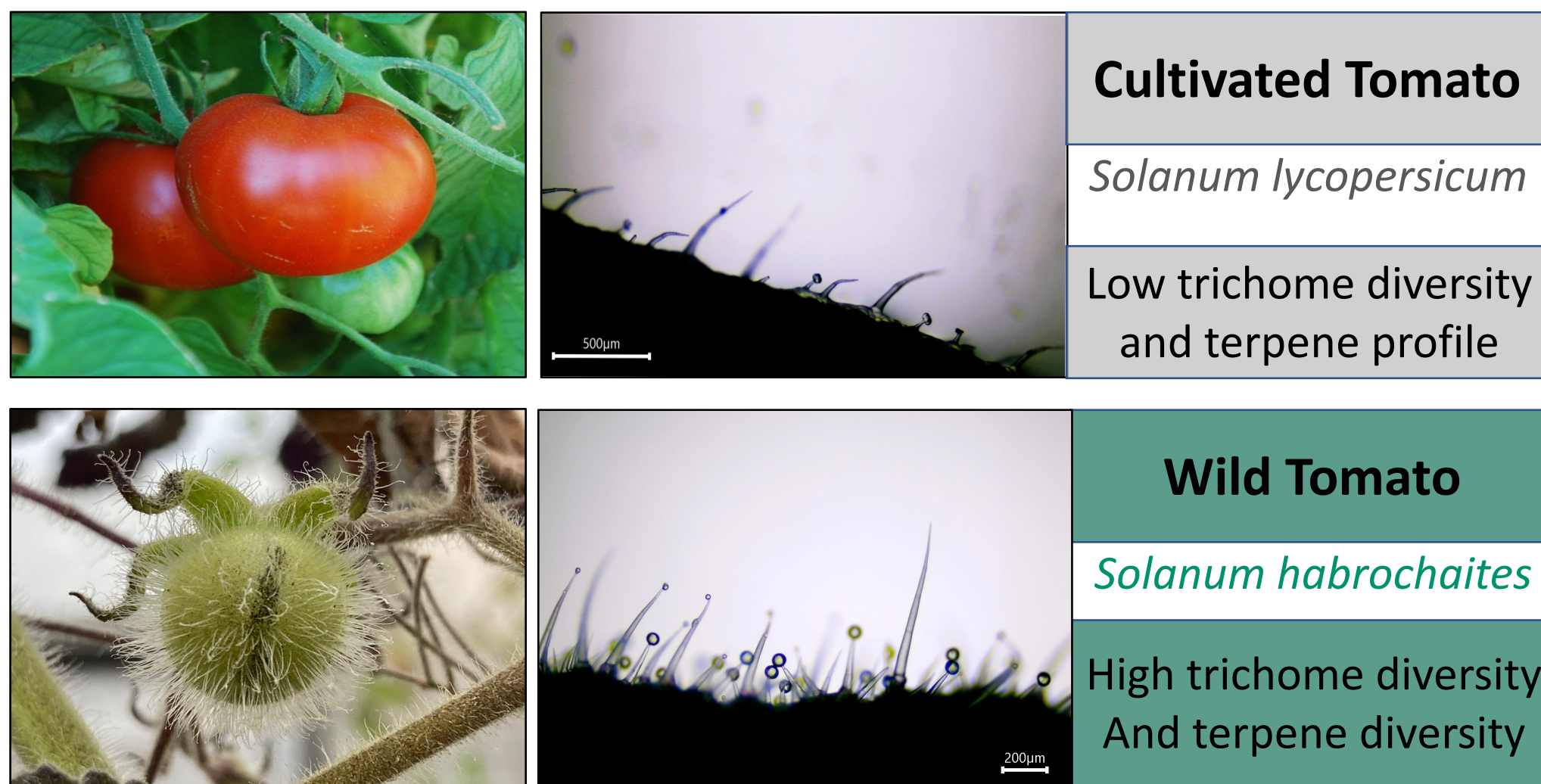


Introduction



Cultivated Tomato

Solanum lycopersicum

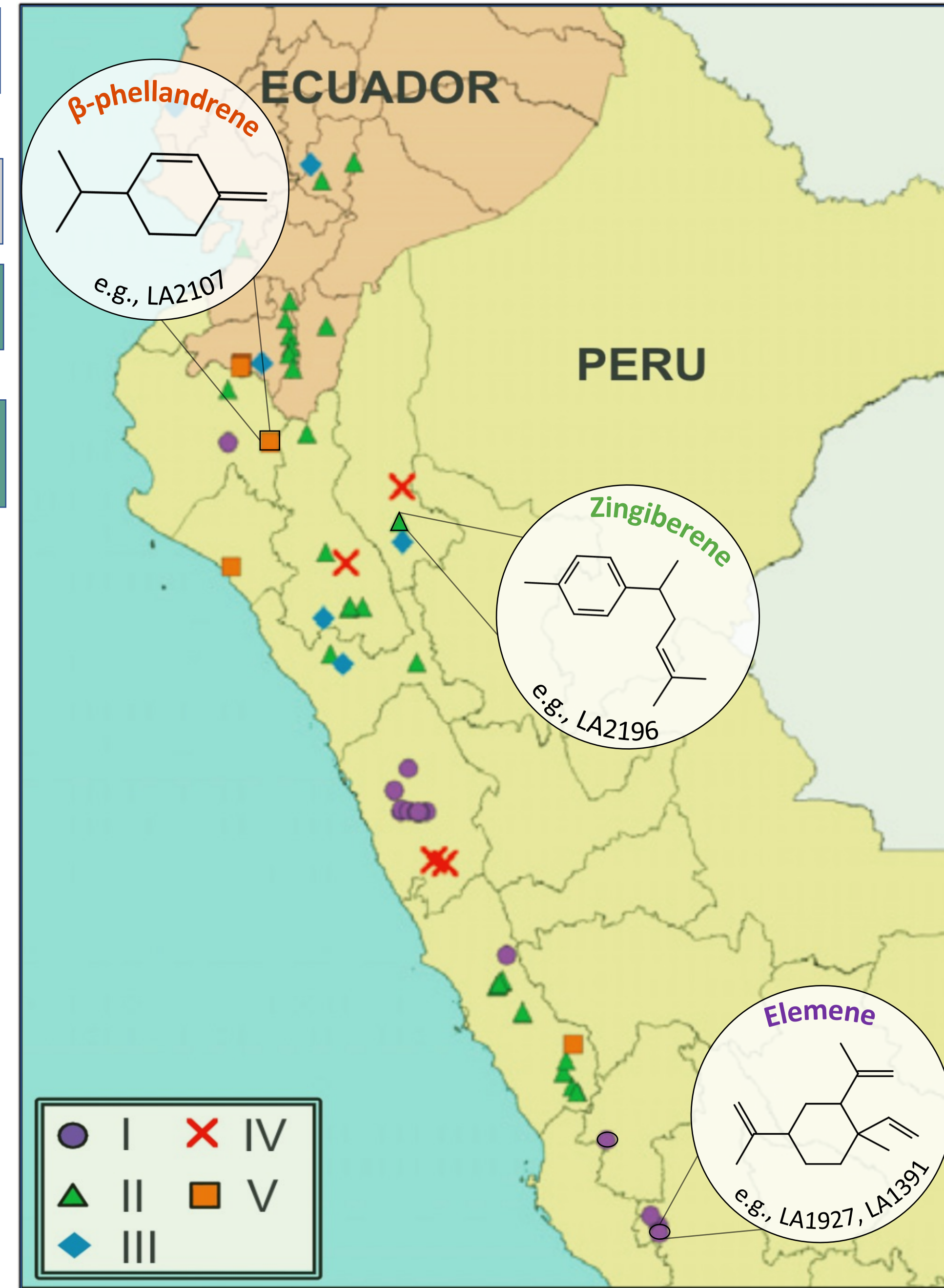
Low trichome diversity
and terpene profile

Wild Tomato

Solanum habrochaites

High trichome diversity
And terpene diversity

- Solanum* spp. employ various strategies to defend against herbivory, including structural defenses (trichomes) and specialized chemical compounds (terpenes)¹.
- Cultivated tomatoes, *S. lycopersicum*, have been bred for agronomic traits, reducing diversity within their defense mechanisms, making it more susceptible to insect herbivores.
- S. habrochaites*, native to Peru, have individuals (accessions) across locations with different terpene content².
- Little is known on the effect of wild tomato, *S. habrochaites*, on chewing herbivores like Colorado Potato Beetle (CPB).



Map displaying the general location of genetically diverse *S. habrochaites*, differentiated by their predominant terpenes (i.e., Elemene, Zingiberene, β -phellandrene)?

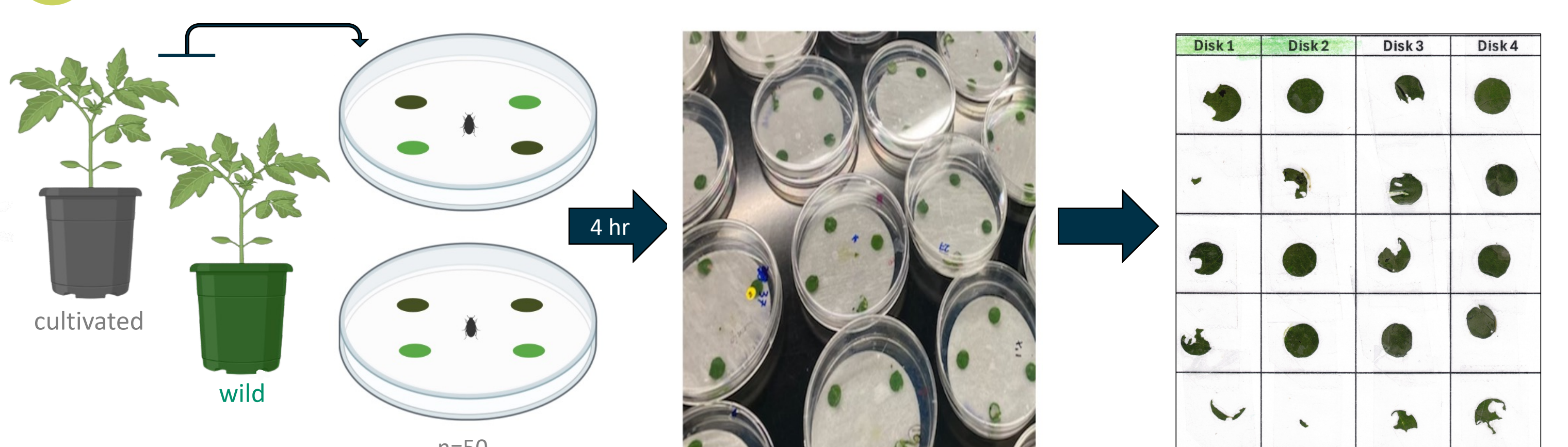
Objective: Screen wild tomato effect on CPB performance, and larvae preference against wild and cultivated tomato plants.

Methods: Screen wild tomato resistance against CPB herbivory

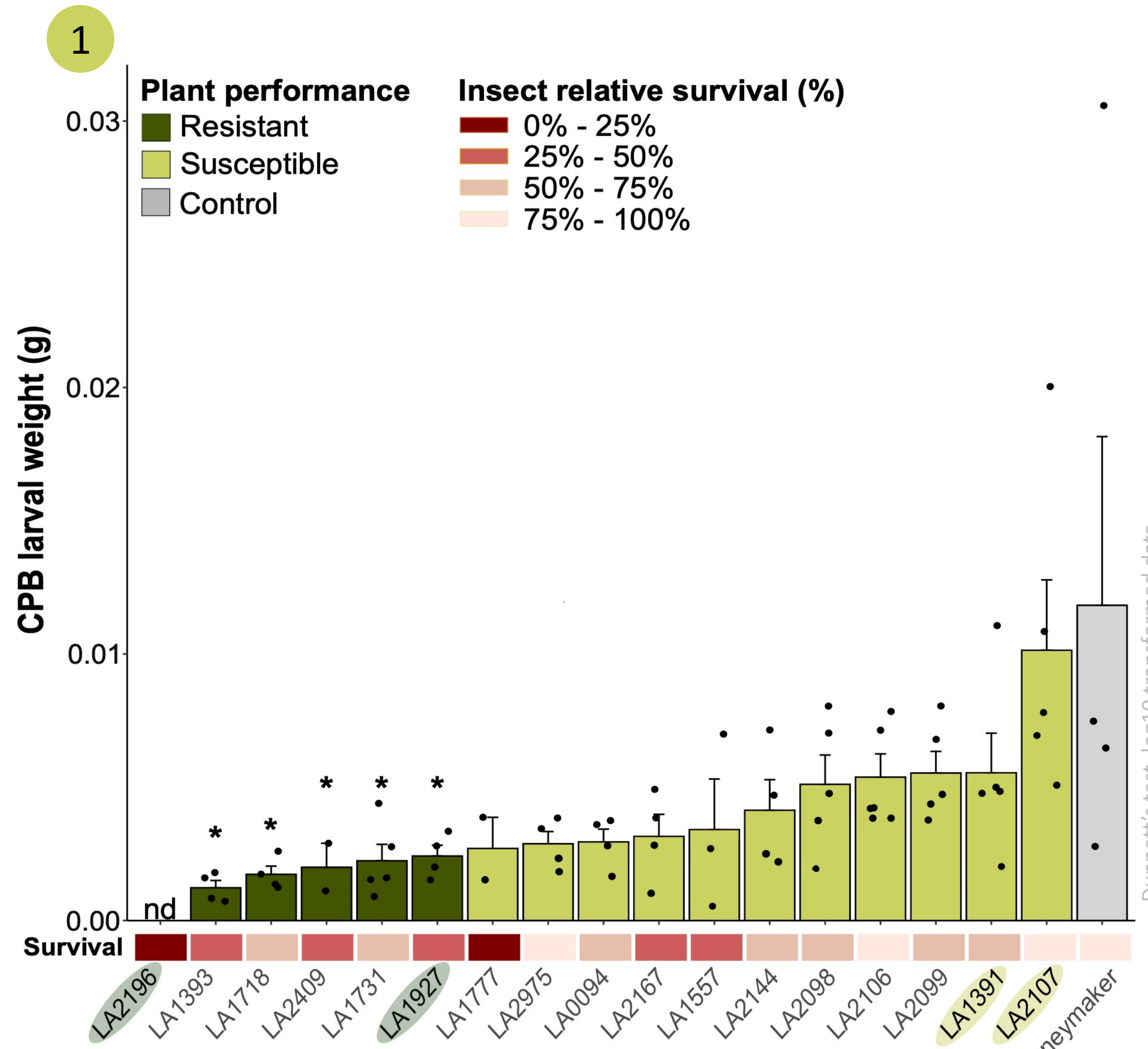
1 No Choice Bioassay



2 Two Choice Bioassay

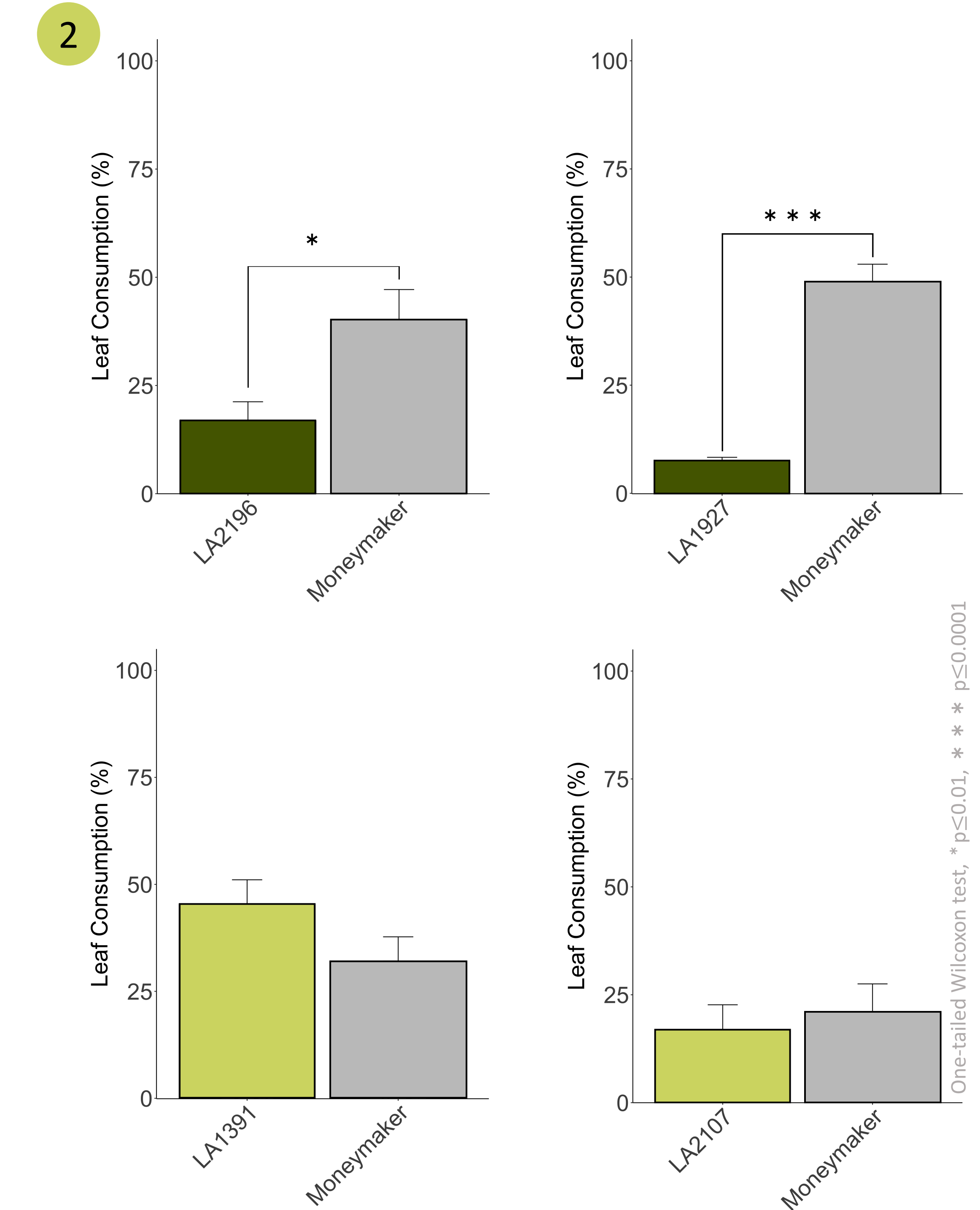


Results : CPB performance on no-choice assays



- CPB performed poorly on fifteen out of seventeen accessions of **wild tomatoes** when compared to the cultivated tomato control (Moneymaker).
- CPB larvae feeding on **resistant** accessions (LA2196, LA1393, LA1718, LA2409, LA1731 and LA1927):
 - weighed **20% less** than those feeding on cultivated Moneymaker.
 - had a reduced relative survival of **50% or less**.

Results : CPB preference on two-choice assays



- CPB were deterred by LA2196 and LA1927, with insects consuming leaf material from cultivated tomatoes
- Visual olfactory cues may be at play influencing CPB preferences against **wild tomatoes**.

Conclusion

- Choice assays suggest plant defenses as potential drivers of resistance:
 - S. habrochaites* accessions have resistance mechanisms that negatively impact insect herbivory by reducing weight and survival chances of CPB larvae.
 - Resistant** accessions show less damage when provided at the same time as cultivated tomato.
 - S. habrochaites* is more resistant to CPB compared to cultivated *S. lycopersicum* and could be used to develop more resistant tomatoes.

Future Directions: Understand what mechanisms or metabolites make CPB more attracted or repelled to tomatoes, via isolating and identifying the predominate terpenes from each accession.

References & Acknowledgments

We would like to thank Dr. Helen Tsai for providing us with the CPB eggs.

¹ Bosorogan, A. *et al.* Tomato defences modulate not only insect performance but also their gut microbial composition. *Sci Rep* 13, 18139 (2023).

² Gonzales-Vigil, E. *et al.* Evolution of TPS20-related terpene synthases influences chemical diversity in the glandular trichomes of the wild tomato relative *Solanum habrochaites*. *The Plant Journal* 71, 921–935 (2012).

