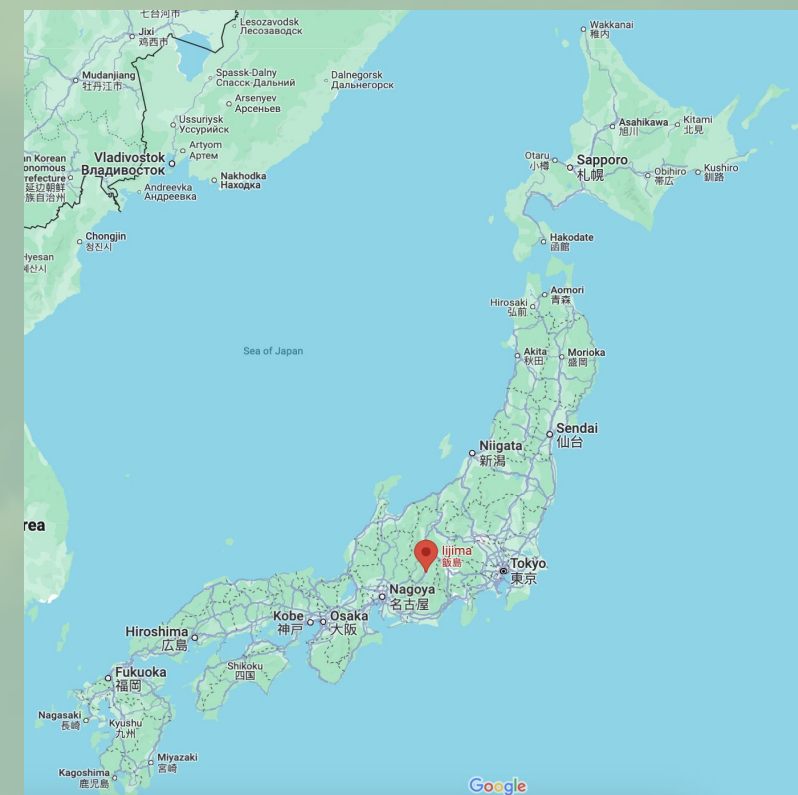




Nectar Microbes: Weather & Forest Cover Correlation in a Countryside Landscape

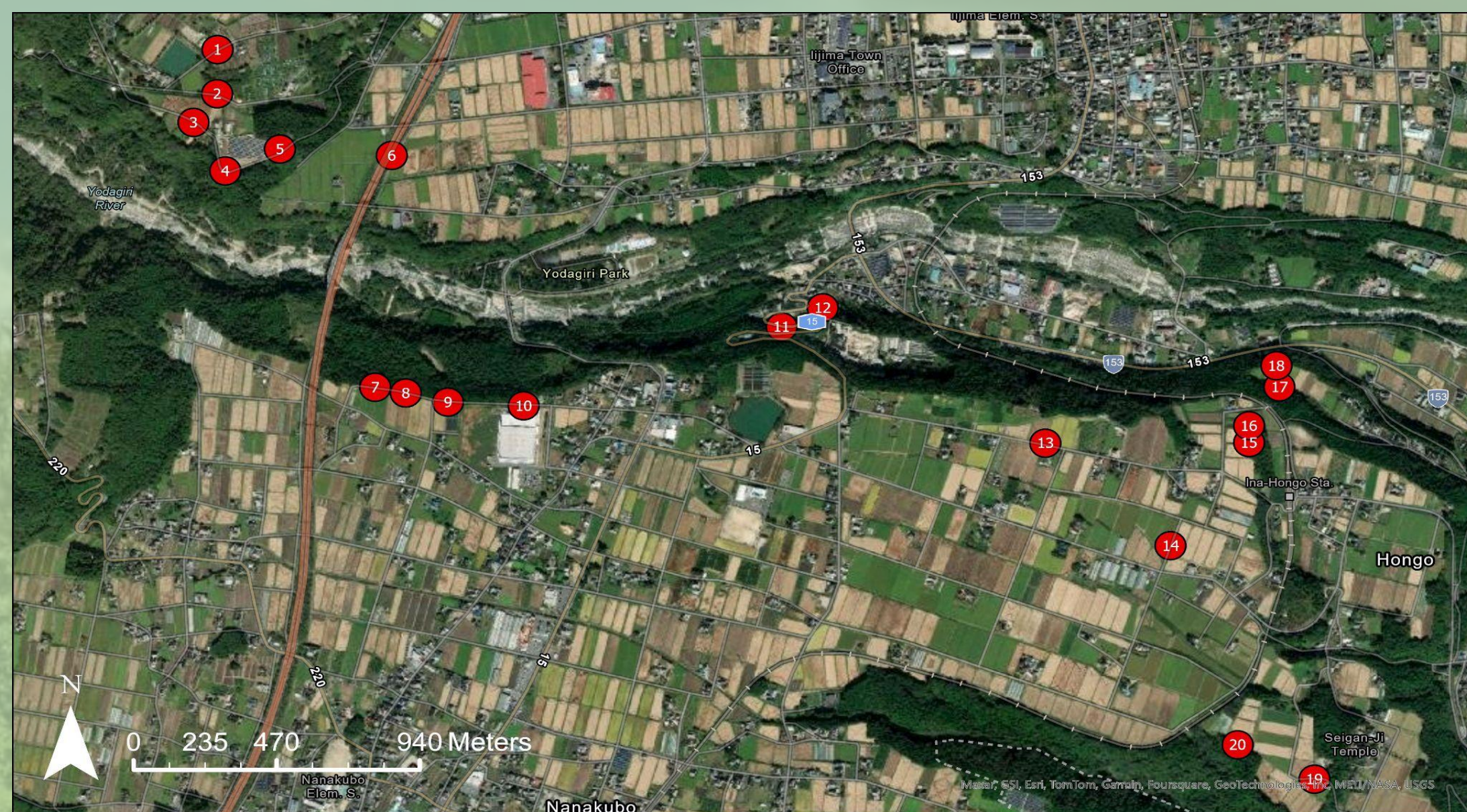
Emily Celallos Fuentes¹, Jessie Kong¹, Kaoru Tsuji², Tadashi Fukami¹
¹Department of Biology, Stanford University, ²Department of Biology, Kobe University



ホタルブクロ
Spotted Bellflower
Campanula punctata

Iijima, Nagano
Prefecture, Japan

Upside down bell shape makes it
ideal for nectar sampling in the
rainy season.



Sampling Sites

Objectives

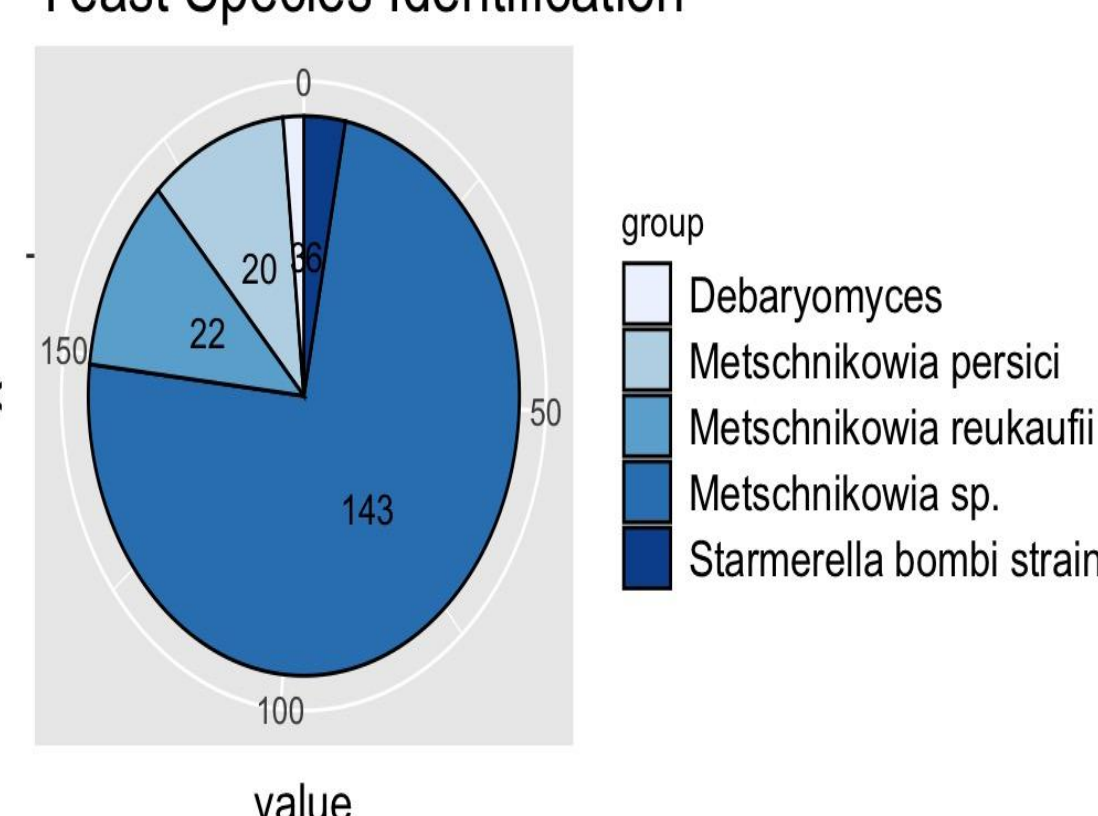
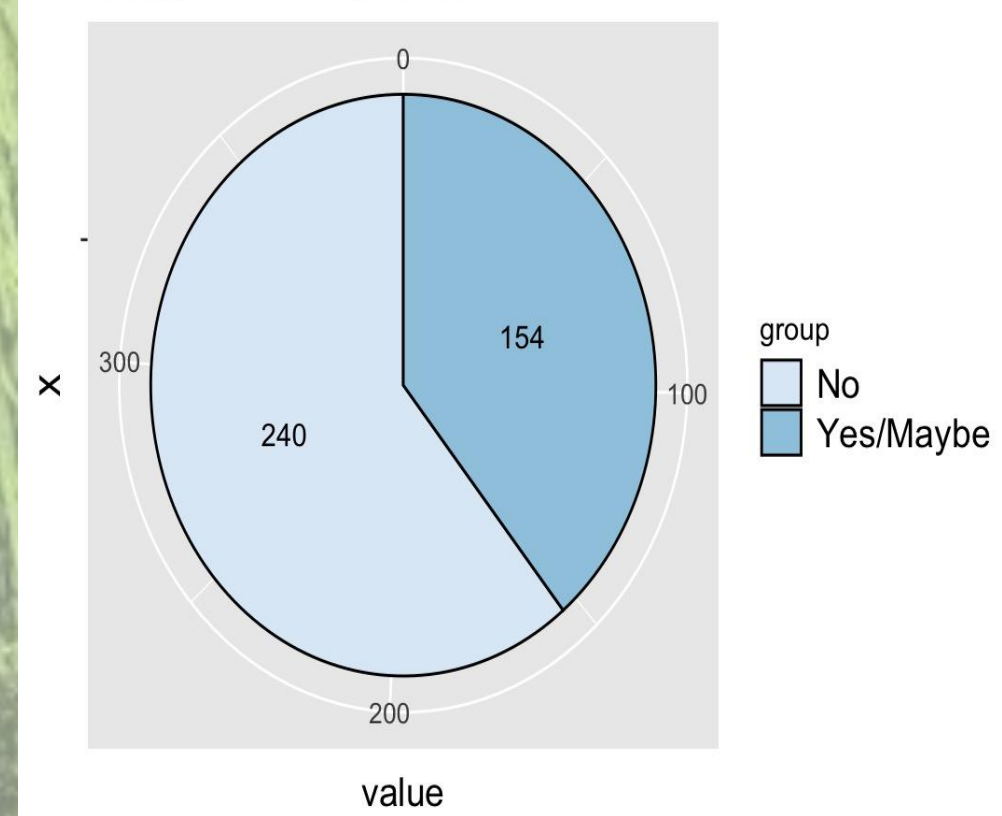
- Find a correlation between landscape features and *Metschnikowia* yeast growth in nectar.
- Find potential influence of weather on microbe growth in nectar.

Significance

- *Metschnikowia* is a nectar specialist yeast.
- Studying how environmental factors, such as land cover and weather, can affect microbial growth in nectar, can help us better understand plant-pollinator interactions and their impact on the dynamics and health of the surrounding ecosystem.

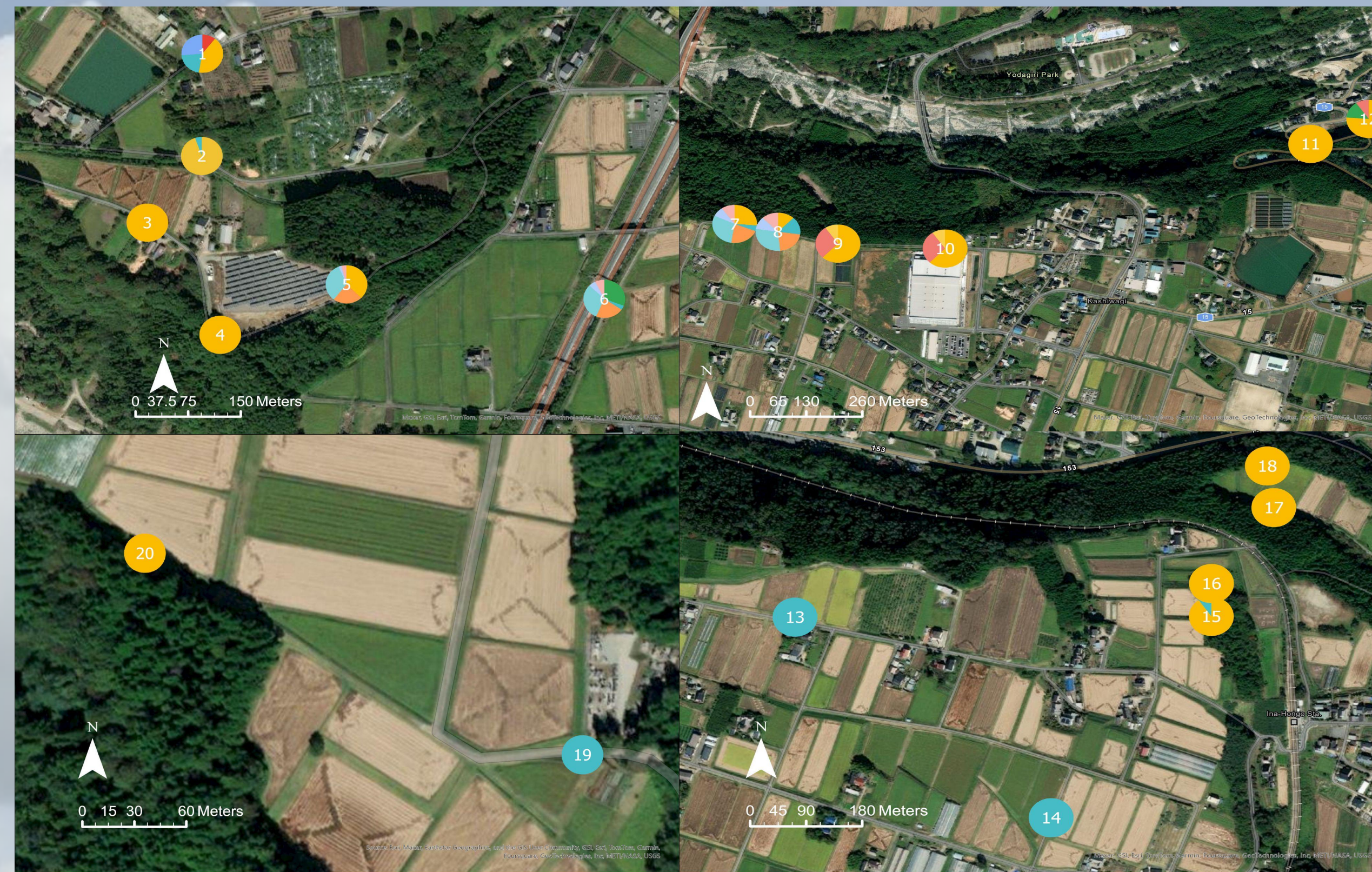
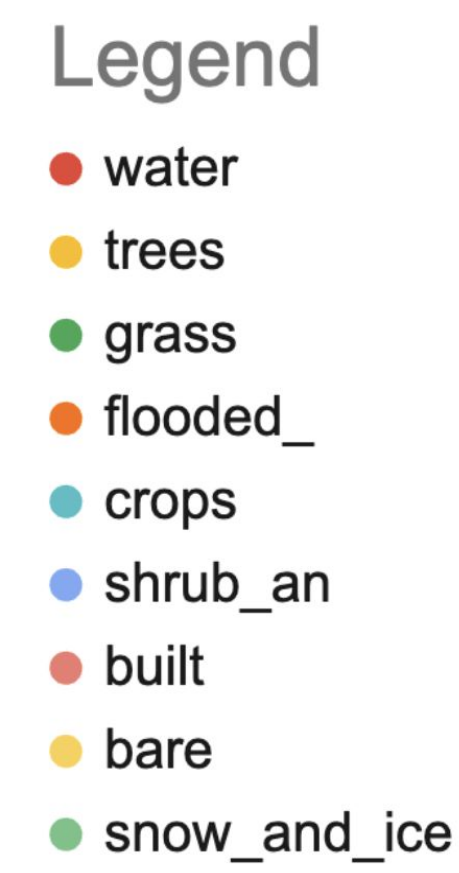
Metschnikowia-like?

Yeast Species Identification



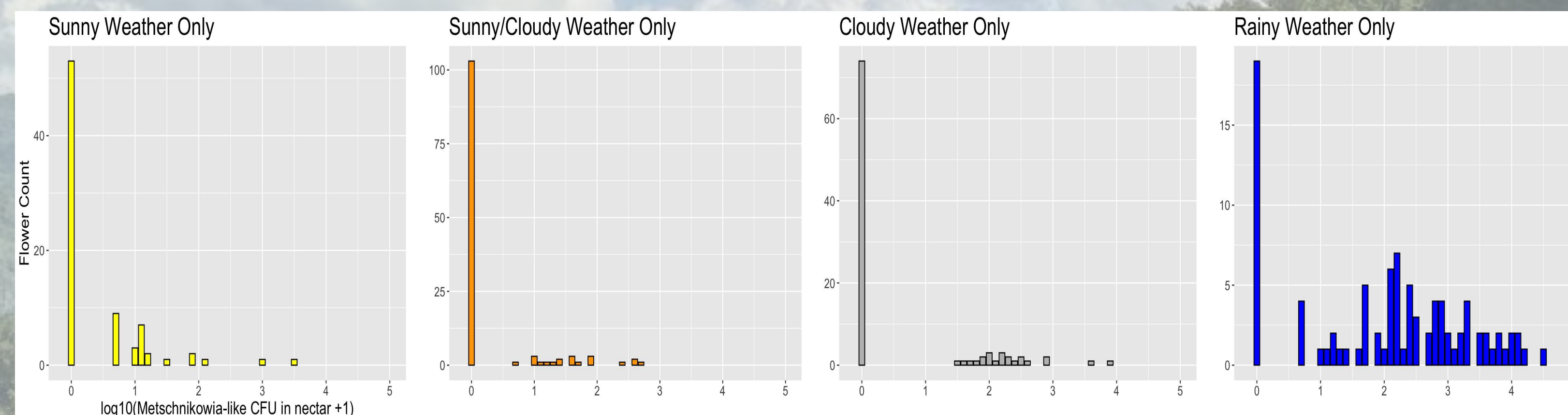
^ Our prediction of whether
or not a yeast sample visually
appeared to be *Metschnikowia*.
We sent only
Metschnikowia-like yeast
samples for DNA sequencing.

^ Through DNA sequencing,
we confirmed that the
majority (95%) of the selected
samples were indeed
Metschnikowia and nectar
specialist yeast.

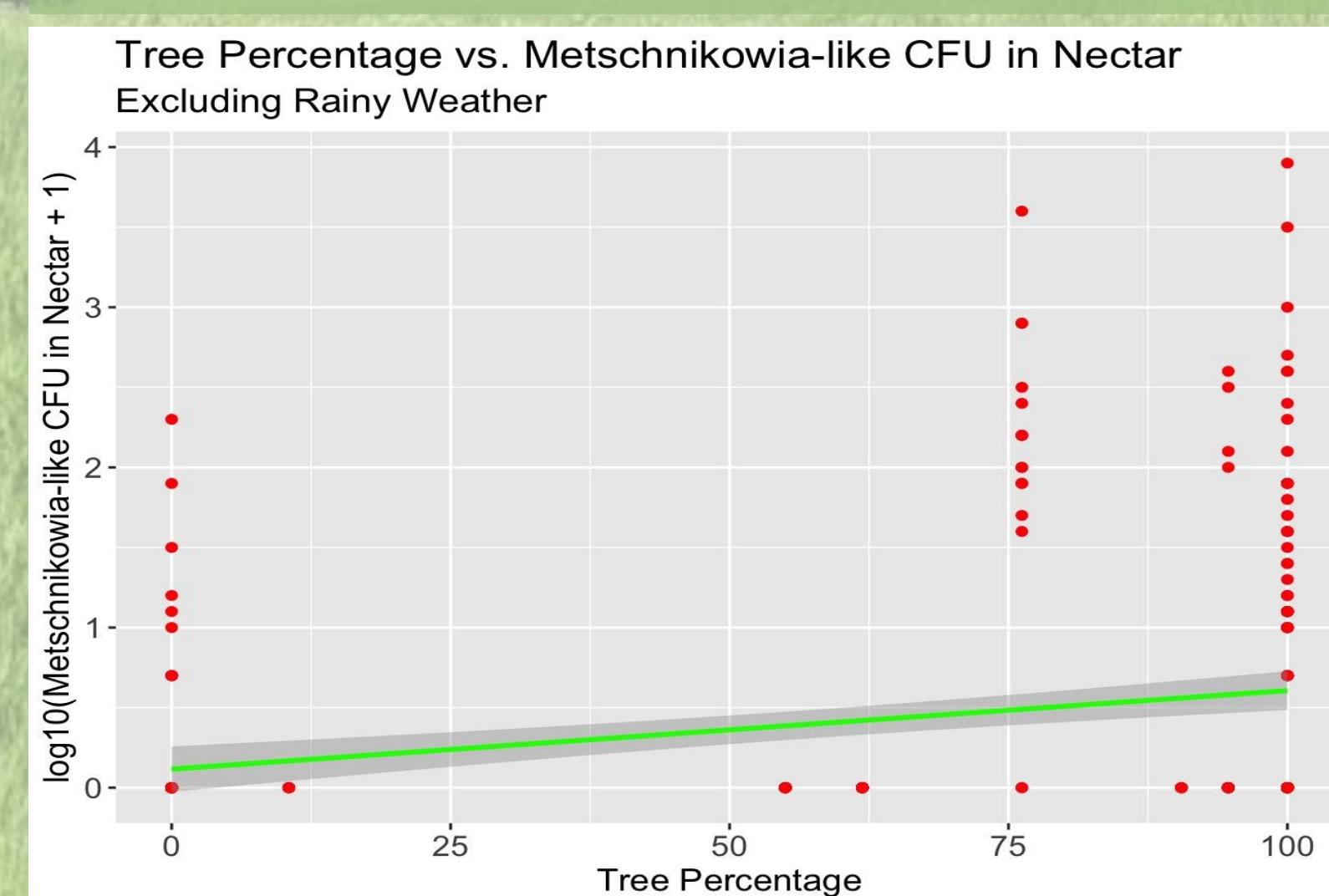


Land Cover Surrounding Sample Sites (20m radius)

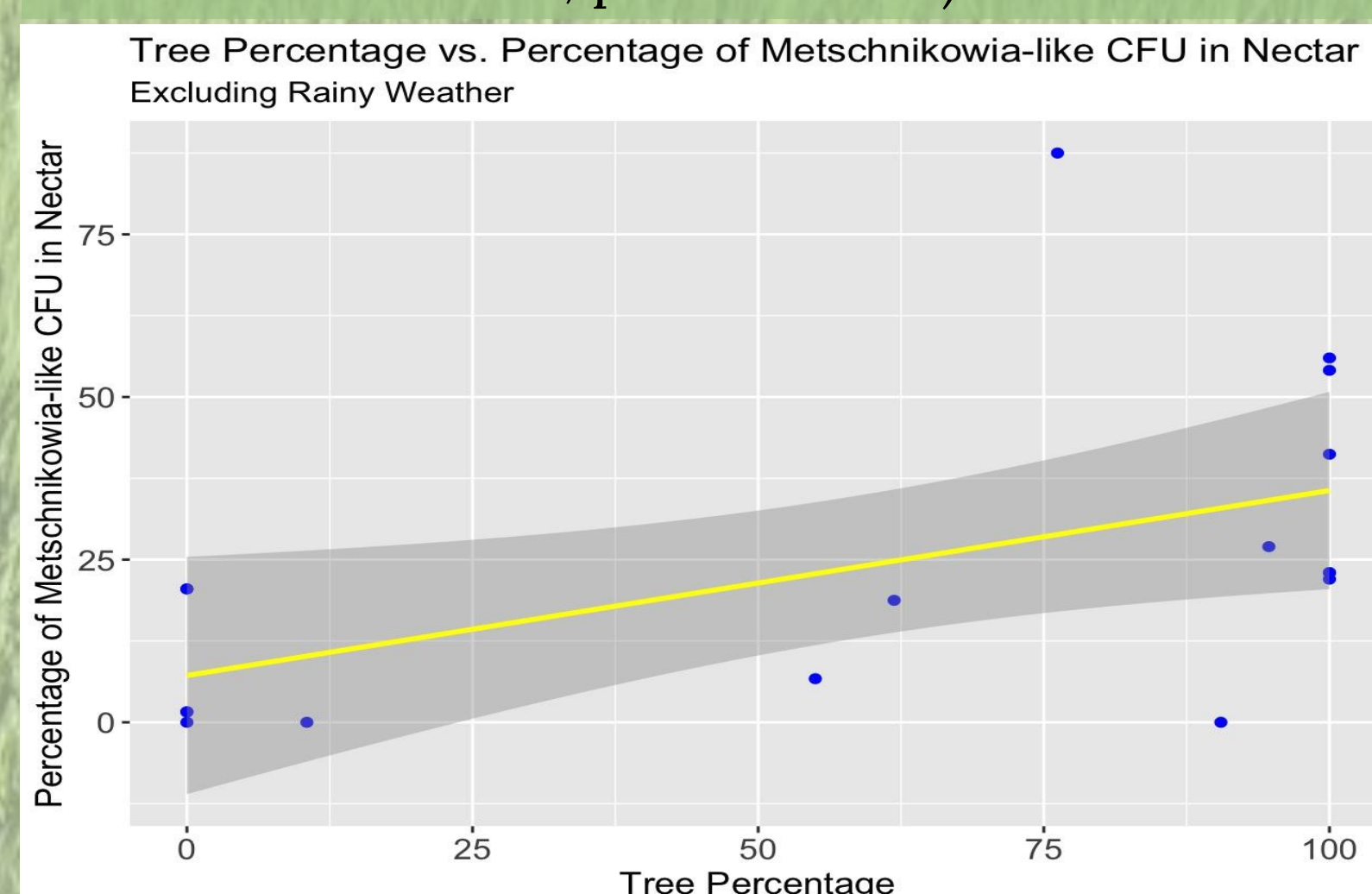
Results



^ *Metschnikowia*-like CFU in Nectar by Weather Condition(divided among our four selected weather categories).
Metschnikowia-like CFU appears to be the highest during rainy weather.

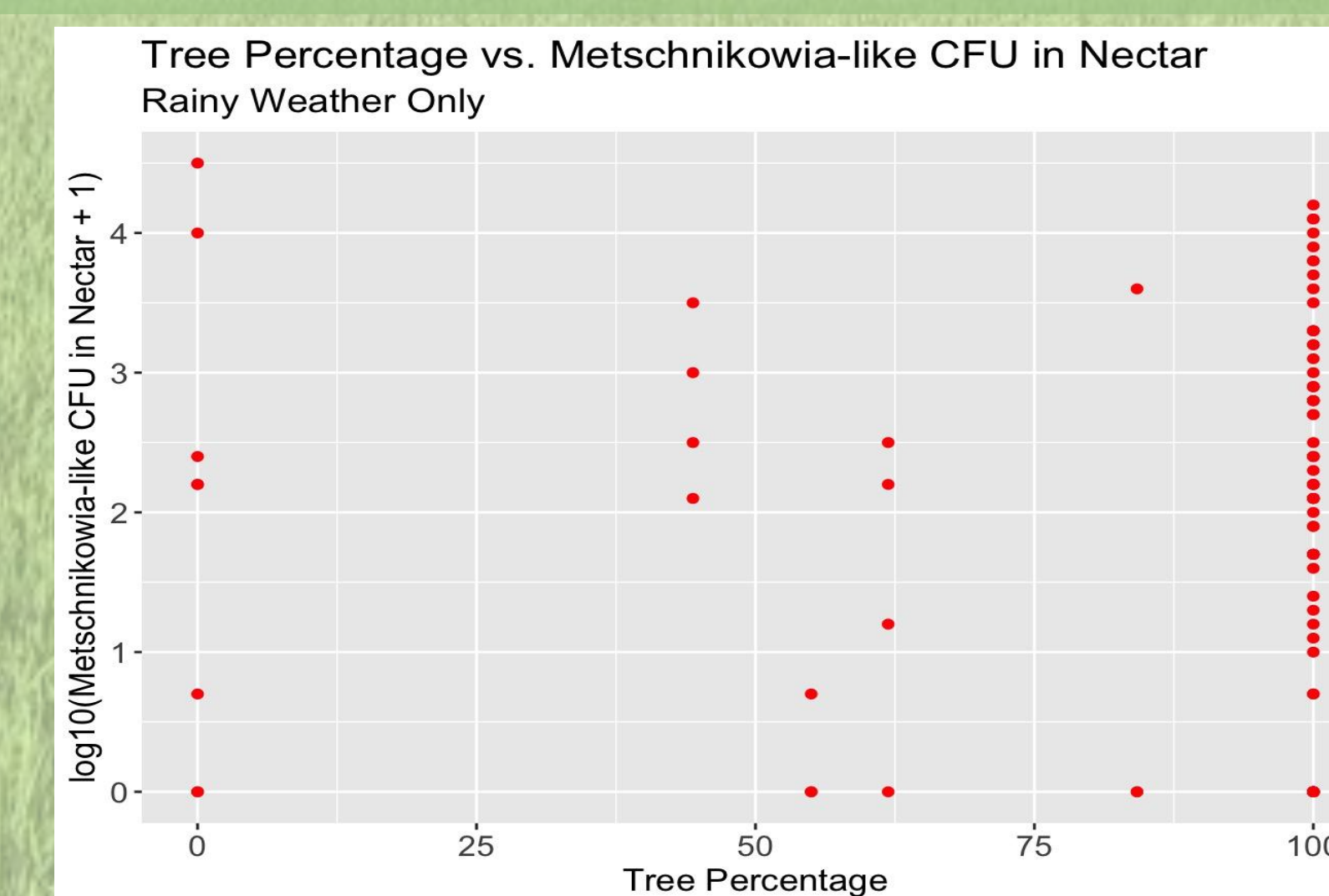


^ Appears to be a positive correlation ($R^2=0.074$, $p=9.597e-07$)

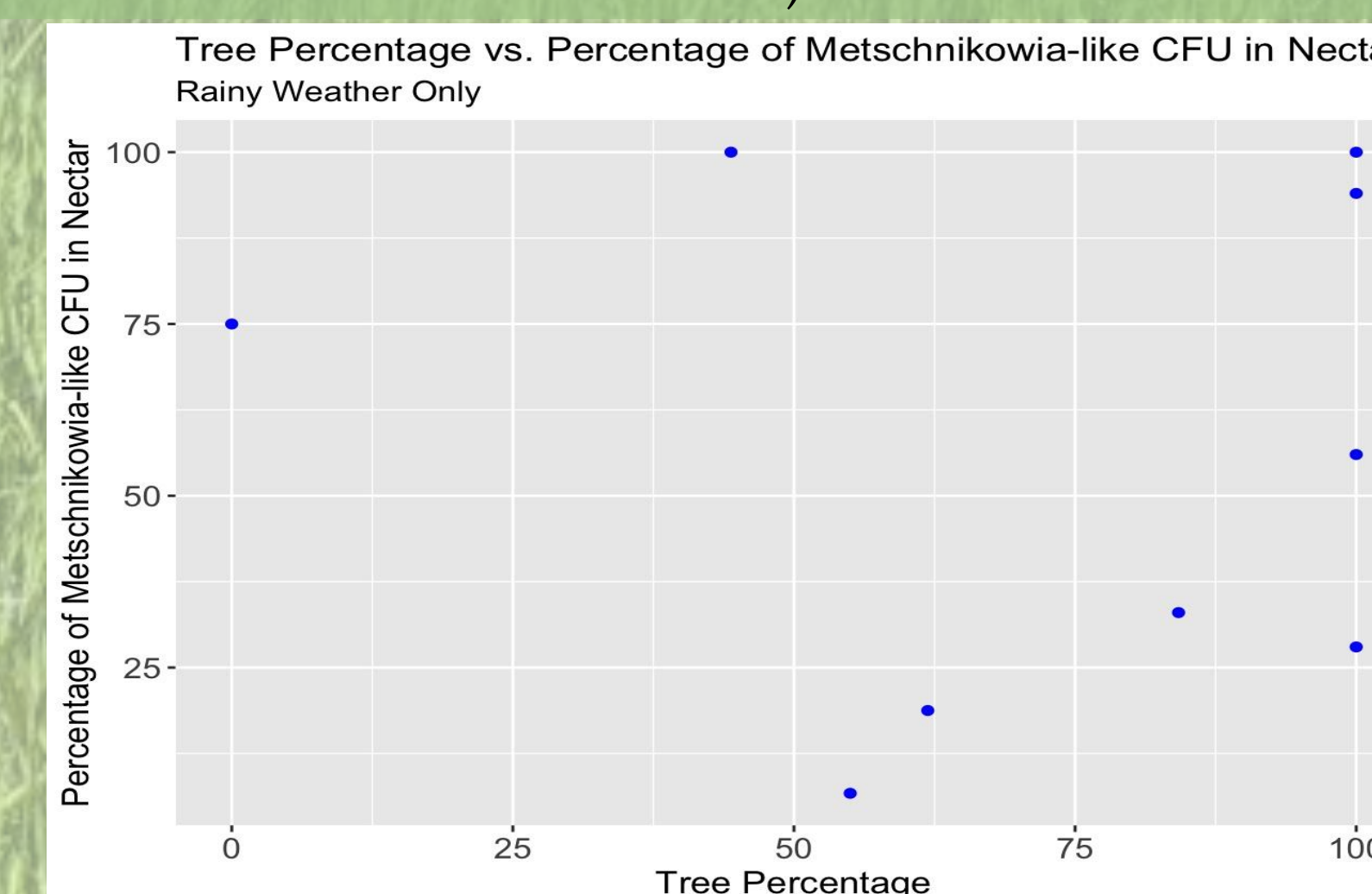


^ Appears to be a positive correlation ($R^2=0.232$, $p=0.029$)

* "Percentage of *Metschnikowia*-like CFU in Nectar" refers to the percentage of yeast at each site that appeared to be *Metschnikowia*-like.



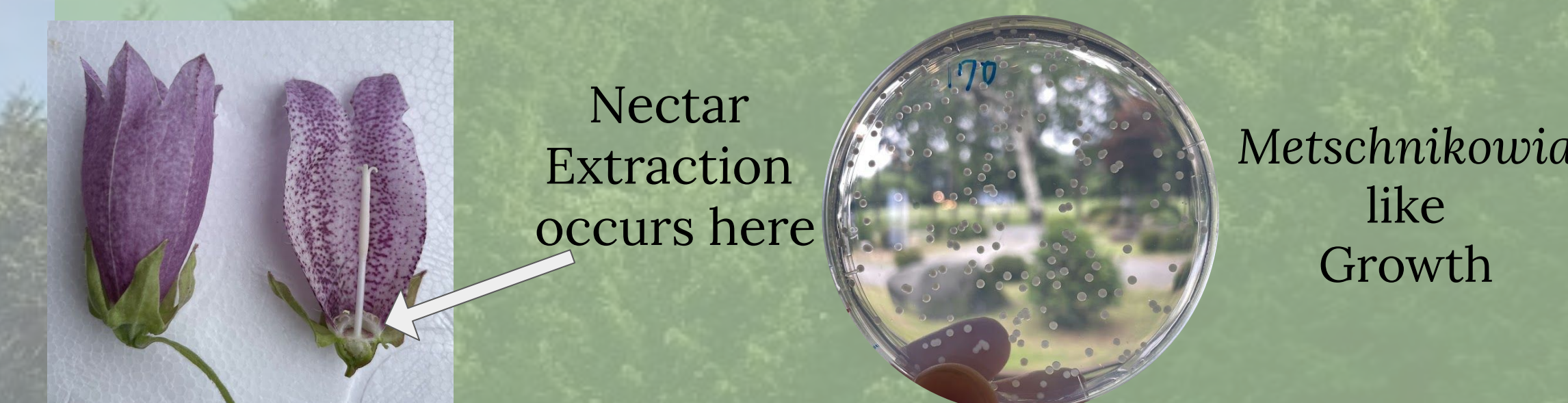
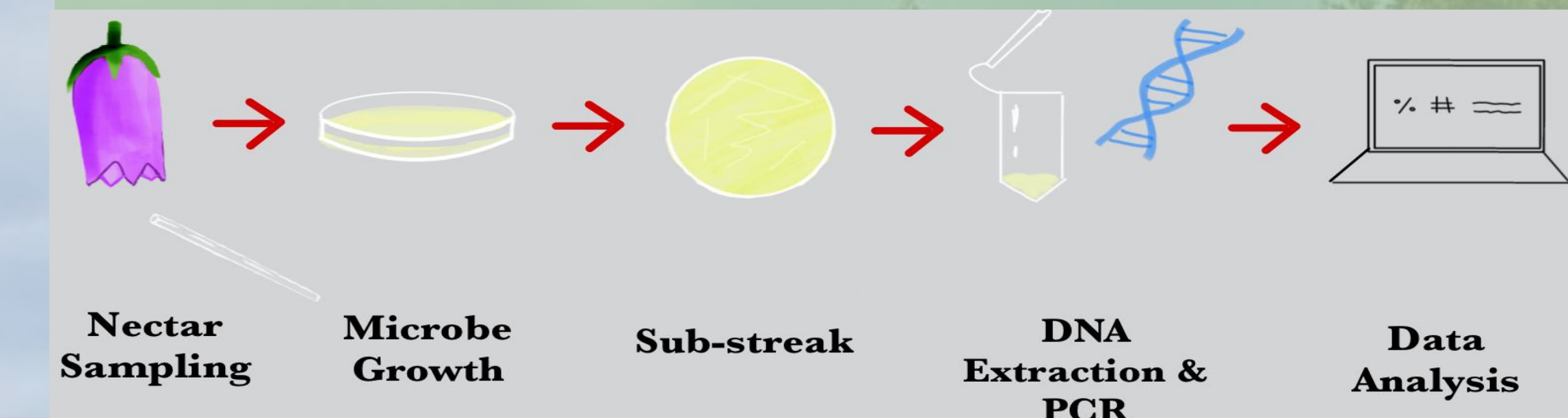
^ Appears to be no correlation ($R^2=-0.008$, $p=0.261$)



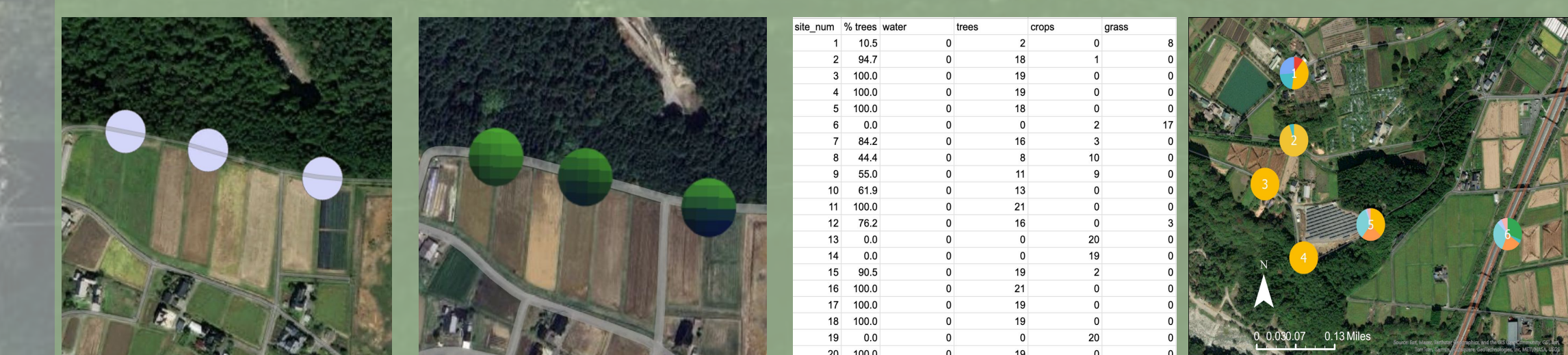
^ Appears to be no correlation ($R^2=-0.143$, $p=0.973$)

Methods

Weather Condition According to Sampling Date:
❖ June 17: Sunny ❖ June 21: Cloudy ❖ July 1: Rainy
❖ June 19: Sunny ❖ June 29: Sunny ❖ July 2: Cloudy
❖ June 20: Cloudy ❖ June 30: Rainy ❖ July 3: Sunny/Cloudy



Land Cover Method



Create 20m
radius circles
in ArcGIS

Overlay
Dynamic World
Classification
Data

Calculate
Percentage of
Land Cover

Generate Pie
Charts, Export
to Map

Conclusions

- ❖ Significant correlation between forest cover and yeast abundance found when sunny or cloudy, however this correlation is not shown when rainy.
- ❖ Rainy weather appeared to enhance yeast growth.

Future Directions

- ❖ Assess similar relationships in other types of yeast from samples.
- ❖ Assess effects of weather on nectar microbes in a controlled environment to potentially find direct causation.

Acknowledgements

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