

BIOPLASTIC SWIM PADDLES

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INTRODUCTION

- *TYR's Catalyst 2 Training Paddles* are made of polypropylene (a petroleum plastic).
 - Polypropylene takes a long time to decompose.
- **bioplastic**: a plastic produced from biodegradable, natural & renewable resources.
 - Starch is a common component in bioplastics.



OBJECTIVE

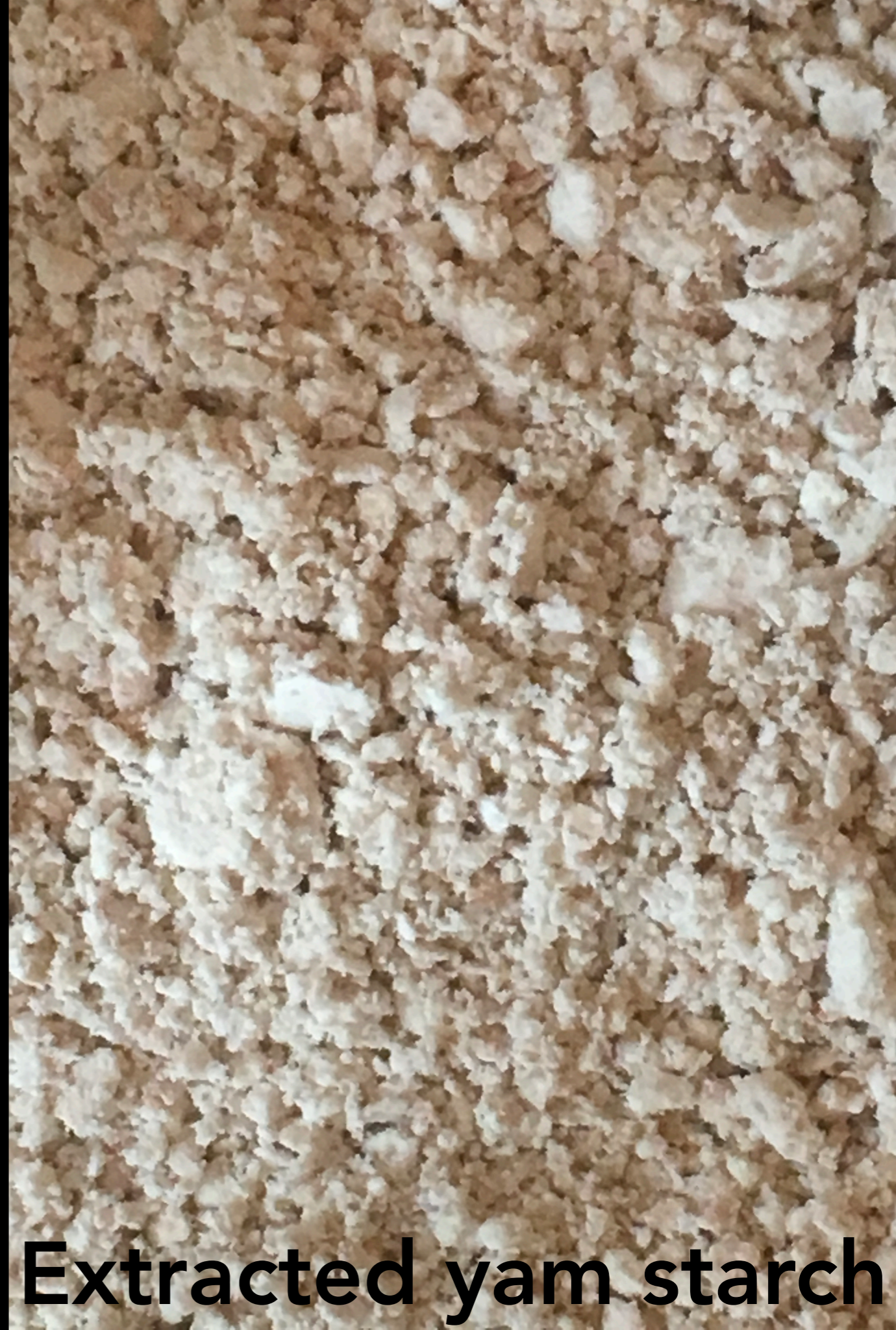
- To produce a yam starch plastic which will decompose at a faster rate than polypropylene, and to waterproof said plastic.

HYPOTHESES

- If the production of a yam starch plastic is tested, then the production of said plastic will succeed because starch is a key component in bioplastics, and tubers such as yams have a high starch content.
- If a yam starch plastic is coated with beeswax, then said plastic will become water-resistant because beeswax repels water.
- If a yam starch plastic is tested for decomposition, then said plastic will decompose at a faster rate than polypropylene because bioplastics are made of biodegradable, natural and renewable resources.

PART #1: STARCH EXTRACTION

- Starch was extracted from yams through an existing starch extraction process.
- The result was a soft, white powder with an odour similar to acetic acid (vinegar).



Extracted yam starch

PART #2: PLASTIC PRODUCTION

- The extracted yam starch from Part #1 replaced potato starch in an existing potato starch plastic recipe.
- The result was a smooth, thin & weak plastic.



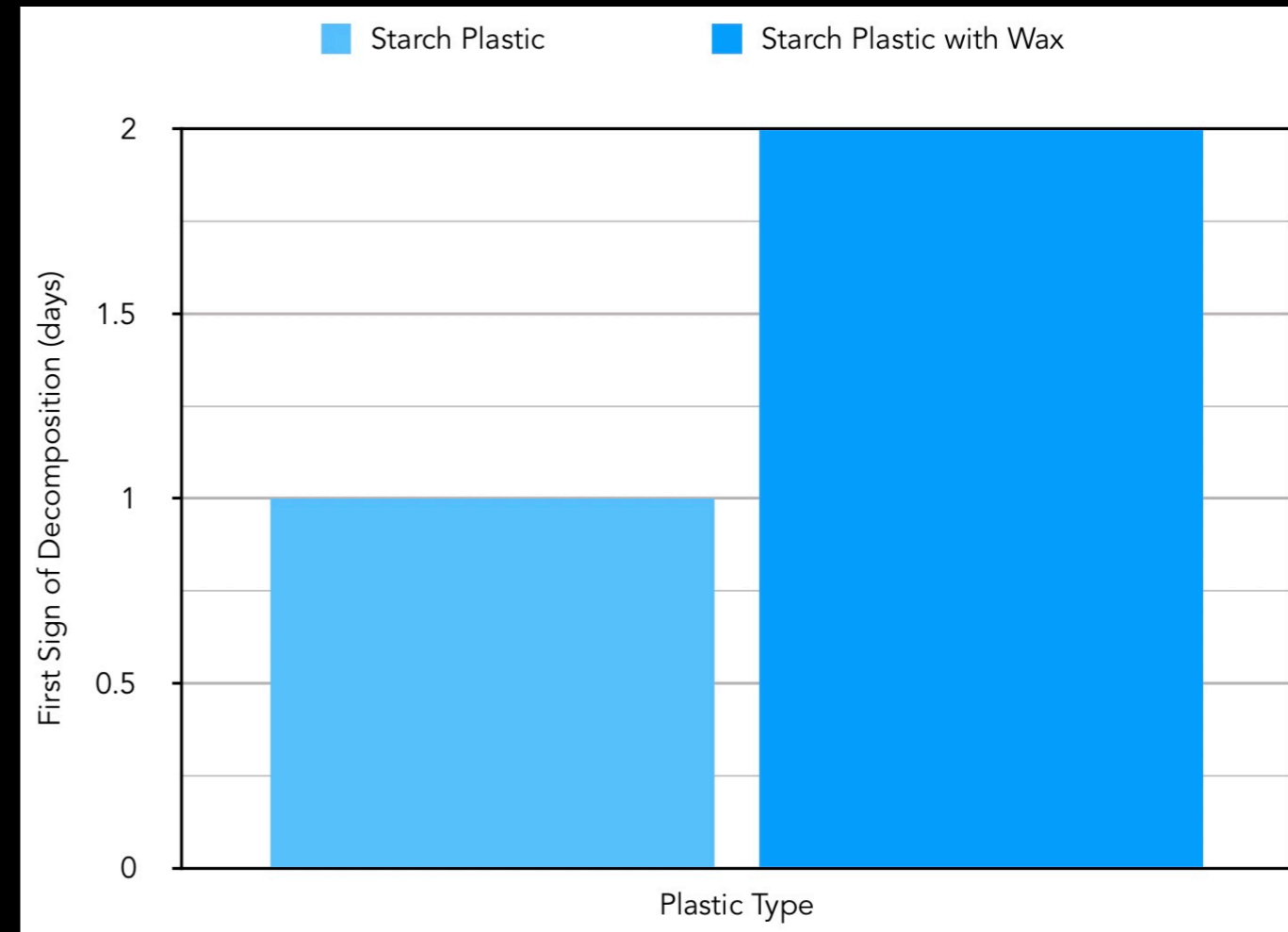
PART #3: WATERPROOFING PROCESS

- The produced plastic from Part #2 was coated with beeswax.
- The result was a water-resistant plastic with an odour similar to honey.



PART #4: TESTING PROCESS

- The yam starch plastic & beeswax-coated yam starch plastics were pressed into soil.
- The yam starch plastic began to decompose after 1 day.
- The wax-coated yam starch plastic began to decompose after 2 days.



TRIAL AND ERROR

- The starch extraction process was tested with multiple plants, but said plants did not yield starch.
- The resin became too thick after being heated for a certain amount of time.
- The produced plastic would originally be coated with soy wax, but beeswax was a cheaper alternative.
- Results of Part #4 may have been affected by humidity, light, soil type, temperature & weather.

FUTURE

- The starch of multiple plants could be tested in bioplastic production.
- Pre-extracted starch could be bought to speed up the experiment.
- The produced plastic could be strengthened with gelatine or agar.
- Soy wax could replace beeswax.
- The testing process could record the # of days until the plastic fully decomposes.

IMPACT

- The experiment expands knowledge about methods to reduce climate change and pollution.
- The world's petroleum plastic sports equipment & more will be replaced with a natural and biodegradable alternative.