A Comparison of Ceramic and Wooden Mediums for Artificial Pollinator Habitats to Mitigate Thermal Shock and Fungal Spread

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In North America, solitary bees are primary pollinators for a variety of commercial crops and native plants. Habitats have dwindled over time due to nonnative grass lawns and pesticide use. Artificial pollinator habitats are commonly utilized, consisting of a wooden frame filled with reeds or solid wooden blocks drilled holes. This design faces a variety of issues, including thermal shock from quickly changing temperatures and fungal and bacterial spread. Coated ceramic may act as a more efficient alternative to prevent these risks. Unglazed ceramic, acrylic-coated ceramic, and beeswax-coated ceramic were compared to wood to determine which material would best mitigate thermal shock and fungal spread. Prototypes were exposed to heat for five minutes as internal temperature was recorded every 30 seconds. Rates of change of temperature increase and decrease were calculated. An ANOVA test was used to determine the difference between the rates of change for each prototype; results were statistically significant ($p<.05$). Fungal spread was quantified by inoculating the centermost hole of each prototype with Aspergillus niger and dividing the prototypes into three radii: 0.5 inch, 1 inch, and 1.5 inch. After 8 days, internal wall and external front and back walls of holes were swabbed and transferred onto agar plates. Plates were incubated for 48 hours; colonies were counted. Overall, beeswax-coated ceramic performed consistently well at both preventing fungal spread and thermal shock. This material can be used to develop safer artificial pollinator habitats to encourage population growth of crucial native bee species.

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