# From Agricultural Waste to Ocean Rescue? CocoQuill Oil Sorbent: An Effective and Eco-Friendly Synergistic Coconut Fiber–Chicken Feather Sorbent for Oil Spill Cleanup

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Marine oil spills are a severe form of pollution, causing lasting ecological and economic damage. Polypropylene sorbents are non-biodegradable and pose environmental concerns. Thus, our aim is to develop a sustainable sorbent using agricultural waste for efficient oil spill cleanup. We propose a novel oil sorbent, CocoQuill Oil Sorbent, synergizing coconut fiber (Cocos nucifera) and chicken feathers (Gallus gallus domesticus) with hydrophobic and oleophilic properties for oil removal from water. Different ratios were evaluated for oil absorption capacity, oil-water selectivity, and reusability and degradation performance. The 1:9 coconut fiber to chicken feather ratio showed the highest absorption capacity under static (16.69 g/g) and dynamic (20.74 g/g) conditions. One-Way ANOVA indicated significant differences among seven sorbent compositions ($p<.001$), while Tukey HSD showed no significant difference between the 1:9 ratio and 100% chicken feathers (static $p=0.903$; dynamic $p=0.666$). The 1:9 ratio also achieved the highest oil selectivity (96.56%). One-Way ANOVA indicated significant differences among sorbent compositions ($p<.001$), while Tukey HSD showed no significant difference between the 1:9 ratio and 100% chicken feathers ($p=1.000$). In reusability and degradation tests, the 1:9 ratio retained 74.40% performance over five cycles. One-Way ANOVA showed significant differences in reusability ($p<.001$), while Tukey HSD showed no significant differences between the 1:9 ratio and other ratios ($p>0.05$). Therefore, CocoQuill Oil Sorbent at a 1:9 ratio is a feasible, effective, and eco-friendly oil sorbent to protect aquatic environments, reduce water pollution, and support Sustainable Development Goals through agricultural waste recycling and sustainable water management.

**Awards Won:**