



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

<b>Name(s)</b> <b>Kaitlyn A. Arst</b>	<b>Project Number</b> <b>S1103</b>
<b>Project Title</b> <b>Using Earth-Friendly Biodegradable Fiber Matting Berms to Reduce Soil Erosion</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this study was to determine whether earth-friendly biodegradable Coconut Coir, Straw and Raffia each rolled onto jute fiber matting and made into berm covers could be used to prevent wind soil erosion degradation. If so, which soil biodegradable berm cover is most effective in controlling wind soil erosion? This research is divided into two phases. Phase one is conducting a wind simulation test. Phase two is determining a plant germination experiment.</p> <p><b>Methods/Materials</b> Soil was divided into 4 containers. Coconut Coir, Straw and Raffia berms were prepared and were tamped on top of the soil of its respective container. One container, as the control had no augmented surface cover placed on the soil. All 4 containers were angled to model a slope. Using a 150 p.s.i. 6 gallon air compressor a consistent medium flow of wind simulation was conducted daily for 2 weeks. An Anemometer was used to test the wind speed and the climate temperature. After each cycle of wind simulation, runoff soil was collected from each container, dried, sieved and weighed. Nitrogen, phosphorous, potash and pH balance levels of the soil content were tested. After 14 days of wind simulation, 25 seeds of Pisum sativum var. macrocarpon were planted in its respective receptacle to test soil quality. Each day the seeds that sprouted were recorded.</p> <p><b>Results</b> Soil with the biodegradable Raffia berm cover was the most effective in controlling wind soil erosion with an 11.2 grams average soil run off. The control soil with no soil additives had a mean average of 169.1 grams soil run off and it was over 323% more soil runoff than the Raffia berm. The control plant also had the lowest germination rate after 21 days with 60% growth while the Raffia Berm plants had a germination growth rate of 96%. The pH balance tests of the soil ranged from Alkaline level 7.5 to 7.0 Neutral levels. The N, P and K content ranged from surplus to depleted.</p> <p><b>Conclusions/Discussion</b> The results demonstrated the Raffia berm was most effective in reducing wind soil erosion and indicated this stabilizing cover can be used as an earth-friendly alternative for effectual management of soil erosion. Straw would be the next option when evaluated with the Coconut Coir, which had greater quantity of soil runoff and lower seed germination. The study showed wind soil erosion is more prevalent when the soil does not have a Coconut Coir, Straw or Raffia berm cover.</p>	
<b>Summary Statement</b> I determined whether novel biodegradable lightweight jute fiber matting berm covers could be used to reduce wind soil erosion.	
<b>Help Received</b> I designed and built the berms by myself after an internet search on technique. My mother reviewed my results.	