



Development of seat mats for drivers using Aloe vera

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Abstract

The automotive industry is continuously evolving to enhance driver comfort and safety. One crucial aspect of driver comfort is the seating experience, which plays a significant role in reducing fatigue and enhancing overall well-being during extended journeys. This abstract introduces a novel approach to seat mats for drivers, incorporating Agave Americana, commonly known as the American Century Plant, as a sustainable and effective material.

The proposed seat mats for drivers are designed to offer a blend of durability, breathability, and comfort. Agave Americana fiber is known for its exceptional strength, making it an ideal candidate for a material that can withstand the rigors of daily use in a vehicle. Furthermore, its natural breathability helps regulate temperature and moisture, ensuring a more comfortable seating experience during long drives.

Ultimately, the adoption of Agave Americana-based seat mats has the potential to improve driver well-being, reduce the environmental footprint of automotive manufacturing, and contribute to the broader shift toward sustainable materials in the industry.

Keywords: Agave Americana; Seat Mats; Breathability; Cooling agent; Automotive industry.

1. Introduction

In the ever-evolving world of automotive design and technology, the focus on driver comfort and sustainability has become paramount. One such solution lies in the utilization of Agave Americana, a resilient succulent plant, in the creation of seat mats for drivers. Agave Americana, also known as the American century plant, is a versatile, sustainable, and abundantly available resource.^[1] It delves into the potential benefits and impact of Agave Americana seat mats, emphasizing how this plant can be harnessed to enhance driver comfort while reducing the environmental footprint of automobile manufacturing. The modern driver's relationship with their vehicle goes far beyond its performance and aesthetics; comfort plays a crucial role.^[2] Drivers spend considerable time behind the wheel, making their experience a key factor in overall satisfaction and safety.

Agave Americana, with its exceptional properties, offers a solution that bridges the gap between luxury and eco-consciousness. The environmental benefits of Agave Americana, highlights its rapid growth, minimal water requirements, and biodegradable qualities^[3]. Additionally, we will discuss the natural strength and durability of Agave Americana fibers, which make them ideal for automotive applications.^[4] Agave Americana is a succulent plant native to the arid regions of the Americas, known for its thick and sturdy leaves. Agave fibers are naturally insulating, helping to regulate temperature. Agave mats have excellent breathability, allowing air to circulate through the fibers. This reduces moisture build up, keeping drivers dry and comfortable during extended periods of sitting. Agave Americana is a sustainable and renewable resource. It grows abundantly in arid regions, requiring minimal water and maintenance.^[5,6]

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Seat mats made from this plant are resistant to wear and tear, providing long-lasting protection for driver seats. One of the most significant advantages of *Agave Americana* seat mats is their biodegradability^[7]. At the end of their lifespan, these mats can be composted or naturally decompose, reducing the environmental impact associated with disposal. *Agave Americana* is a succulent plant native to the Americas, known for its robust and resilient fiber. In addition to its functional benefits, using *Agave Americana* for seat mats aligns with the growing trend towards sustainable and eco-friendly materials in the automotive industry. *Agave Americana* is a renewable resource that requires minimal water and maintenance, making it an environmentally responsible choice for car manufacturers and consumers alike.^[8,9]

2. Material and methods

2.1. Harvest Agave Leaves

Select well-established *Agave Americana* plants that have lush, lengthy leaves. Cut the leaves close to the plant's base utilizing a sharp knife or machete.

2.2. Prepare Agave Leaves

The knife can be used to remove the thorns from the leaves. To achieve uniformity in size, trim the edges of the leaves. The leaves should be cut into long strips that are 1-2 inches broad.



Figure 1 Shredding

2.3. Shredding

Cut the agave leaves into vertical shreds.

2.4. Drying

After that, the agave plants are dried artificially or organically using techniques like air drying or low-temperature ovens. This facilitates easy drying and aids in the plant's absorption of moisture.



Figure 2 Drying

2.5. Soak the Leaves

To soften the agave leaves, immerse them in water. You should routinely change the water during this procedure, which may take many days. Retting is used in the procedure.



Figure 3 Extractions of Fibers

2.6. Weaving

After the leaves have softened, they become pliable. You can start weaving your seat mat. Begin by creating the base of the mat. You can use a simple twill or over-under pattern for weaving. Weave the together tightly to create a strong and durable mat. Make sure to keep the pattern consistent.



Figure 4 Weaving Method



Figure 5 Weaving

2.7. Securing the Edges

Once you have reached the desired size for your seat mat, secure the edges by weaving the leaves back over themselves or tying them off.

2.8. Drying and Shaping

Allow the seat mat to dry naturally in a shaded area, as direct sunlight may cause the Agave leaves to become brittle. While drying, you can shape the mat to your desired form, such as a square, rectangle, or circle.

2.9. Final Product

Your Agave Americana seat mat is now ready for use. Place it on your driver seats, chairs, benches, or any seating area where you want to add a natural touch. Creating seat mats from Agave Americana leaves is not only an environmentally friendly project but also a way to explore traditional and sustainable weaving techniques.



Figure 6 Agave Mats

3. Testing

3.1. Cooling test

The cooling method uses a dynamic sweating hot plate testing platform to measure the energy released from a human skin model by the evaporation of sweat. The sweating plate consisted of an 20 cm fiber heated test plate surrounded by a 2-inch guard ring to prevent lateral heat loss. Unlike a conventional sweating guarded hotplate, the system uses a heat flux sensor embedded in the surface of the test plate to measure heat exchange from the plate and through the test material sample placed on the plate surface. Positive heat flux readings from the embedded thermal sensor indicate heat loss from the plate to the environment. A water circulation system located under the hotplate cools the sweating plate.

Table 1 Cooling test

S. no	Heating temperature	Cooling temperature	Time period of cooling	% of cooling system
1	40° C	1° C	30 min	60 %

4. Questions and feedback

Survey on development of seat mats for Drivers using Agave Americana

Table 2 Survey about Seat Mats

S.no	questions	yes	no
1	Do you use a driver seat mat in your vehicle?	87.5%	12.5%
2	Have you ever used products made from Aloe Vera plant?	50%	50%
3	How important is durability when choosing the driver seat mat?	100% (important)	(not important)
4	How often do you experience discomfort when driving without a driver seat mat?	75% (frequently)	25% (occasionally)
5	Are there any specific features you look for in a driver seat mat?	40%	60%
6	Which type of materials will you choose for the driver seat mat?	96% (natural)	4% (synthetic)
7	Do you have any specific brand or model recommendations for a driver seat mat, that you find particularly good?	8%	92%

5. Conclusion

The utilization of Agave Americana fiber in seat mats for drivers represents an exciting and sustainable advancement in the automotive industry. This natural, durable, and eco-friendly material offers numerous benefits that can significantly enhance the driving experience while aligning with the industry's evolving commitment to environmental responsibility. The introduction of Agave Americana-based seat mats not only brings comfort and durability to the forefront but also demonstrates a dedication to sustainability. The inherent strength and breathability of Agave Americana fiber ensure that drivers experience a more comfortable and less fatiguing journey, particularly on extended drives. Agave Americana-based seat mats are not only enhances driver comfort but also reflects a more sustainable, environmentally responsible, and innovative future for the automotive sector. This endeavor signifies a step forward in creating a better and more responsible driving experience for all.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest among all authors.

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