



Therapeutic Slumber: Pet Mattress with Botanical Oils and Fibre Innovation

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Abstract:

This study focuses on developing a pet mattress with superior comfort, hygiene, and durability using a blend of natural and synthetic fibers with herbal additives. The core materials include Ramie, known for tensile strength and breathability, Recron, offering resilience and cushioning, and Kapok, providing moisture resistance and thermal regulation. Herbal enhancements include Neem, a natural insecticide protecting against pests, Khus Grass, ensuring cooling properties, and Holy Basil, an antimicrobial agent preventing bacterial and fungal growth. These additives, applied as coatings and powders, ensure sustained release and enhanced efficacy. The mattress delivers antibacterial performance, temperature regulation, and longevity while supporting environmental sustainability with biodegradable resources. This holistic design offers an eco-friendly solution for pet owners prioritizing comfort and well-being.

Keywords: Pet Mattress- Natural Fibers-Herbal Coatings-Herbal Powder-Antibacterial-Cooling- Sustainable Bedding.

Objectives

1. Use truly sustainable natural materials.
2. Prove the mattress kills pet bacteria with tests.
3. Show the mattress cools pets with measured results.
4. Test the mattress for durability and easy cleaning.
5. Confirm the mattress is safe for pets and owners.

Introduction

The imperative to provide pets with a sleeping environment that fosters optimal health and well-being has driven the development of this innovative pet mattress. Traditional pet bedding solutions frequently fall short, exhibiting deficiencies in breathability, antimicrobial protection, and thermal regulation, which can culminate in discomfort, unpleasant odors, and the proliferation of harmful microorganisms. This research endeavors to address these shortcomings by engineering a sustainable pet mattress that synergistically combines natural and synthetic fibers with potent herbal additives, thereby enhancing comfort, hygiene, and longevity.

The mattress's structural framework is meticulously constructed using a blend of Ramie, Recron, and Kapok fibers. Ramie, celebrated for its exceptional tensile strength and breathability, forms a robust and well-ventilated core, ensuring long-term durability and effective temperature regulation. Recron, a high-quality polyester fiber, provides a plush and resilient surface, offering superior cushioning and support that conforms to the pet's body. Kapok, a naturally lightweight and hydrophobic fiber, contributes to moisture resistance and hypoallergenic properties, preventing the mattress from retaining dampness and minimizing the risk of allergic reactions. The functional enhancements are achieved through the strategic incorporation of Neem, Khus Grass, and Holy Basil, applied both as a surface coating and integrated within the fiber matrix in powder form. Neem, a powerful natural insect repellent, creates a protective barrier against pests, safeguarding the pet from infestations and irritations. Khus Grass, renowned for its intrinsic cooling properties, regulates temperature, ensuring a comfortable sleeping environment even in warm climates, mitigating the risk of overheating. Holy Basil, a potent antimicrobial and air-purifying agent, provides a hygienic surface, inhibiting bacterial and fungal growth and improving air quality around the mattress. This dual application method ensures sustained release and enhanced efficacy of the herbal compounds, maximizing their therapeutic benefits. The resulting pet mattress exhibits superior antibacterial performance, effective cooling properties, exceptional durability, and enhanced air purification, while also championing environmental sustainability through the utilization of biodegradable and renewable resources. This holistic approach to pet bedding design offers a practical and eco-conscious solution for pet owners seeking to provide their companions with optimal comfort, hygiene, and well-being.

Materials

1. Selection of fibers:

- **Ramie Fiber**

Ramie fiber is increasingly favored for pet mattresses due to its combination of beneficial qualities. Its exceptional durability ensures that pet beds withstand frequent use, while its natural composition appeals to environmentally conscious pet owners and minimizes exposure to synthetic chemicals. Furthermore, ramie's breathability promotes airflow, contributing to a comfortable and hygienic resting space by regulating temperature and preventing moisture buildup. Notably, ramie also possesses natural antimicrobial properties, which help control odors and inhibit bacterial growth, making it an ideal material for maintaining a clean pet environment. Adding to this, the fibers strength and resistance to rot, makes it a very good choice for pet beds that may encounter moisture.

Ramie Fiber



- **Kapok Fiber**

Kapok fiber is a popular choice for pet mattresses due to its impressive natural qualities. Harvested from the kapok tree, it's a sustainable and hypoallergenic option, ideal for pets with sensitivities. Its inherent breathability allows for excellent air circulation, regulating temperature and ensuring comfort in various climates. Additionally, kapok's natural waxy coating provides moisture resistance, inhibiting mold and mildew growth for a hygienic sleeping space. The fiber's soft, cloud-like texture offers comfortable support, appealing to pets seeking plush comfort. Overall, kapok's combination of sustainability, hypoallergenic properties, breathability, moisture resistance, and comfort makes it an excellent, natural choice for pet mattresses.

Kapok fiber



- **Recron Fiber**

Recron fiber, a synthetic polyester, is a common choice for pet mattresses due to its practicality and affordability. Its cost-effectiveness makes it a budget-friendly option, while its durability and resilience ensure the mattress can withstand frequent use and maintain its shape. Being hypoallergenic, Recron minimizes the risk of allergic reactions in pets, and its hydrophobic nature repels moisture, preventing mold and mildew growth and promoting a hygienic environment. Additionally, Recron-filled mattresses are easy to clean, often machine-washable, making them a convenient and low-maintenance option for pet owners seeking a durable and practical sleeping solution for their animals.



Recron fiber

Methodology

I. Materials Requirement:

- **Fabric:** Grey fabric.
- **Filling:** Kapok fiber, Ramie fiber, Recron (polyester) fiber
- **Coatings:**
 - ❖ Neem Oil
 - ❖ Khus grass (vetiver) oil
 - ❖ Holy basil (tulsi) oil
- **Blendings:**
 - ❖ Neem powder
 - ❖ Khus grass (vetiver) powder
 - ❖ Holy basil (tulsi) powde

II. Equipments:

- Sewing machine
- Scissors
- Measuring tape
- Pins or clips
- Iron
- Spray bottle
- Container for oil mixture
- Mixing container
- protective gloves.

Procedure flow chart



III. Procedure:

1. Fabric Preparation:

The initial stage of crafting the pet mattress involves meticulous fabric preparation. To using a measuring tape precisely measure and cut the chosen grey fabric to the desired dimensions of the pet mattress. Adding a seam allowance of 1 to 2 centimeters along each edge. This allowance provides sufficient material for secure stitching and prevents the seams from fraying. Once cut,

thoroughly inspect the fabric for any wrinkles that could compromise the smooth finish of the mattress cover. Utilize an iron set to the appropriate fabric temperature to eliminate these imperfections, ensuring a flat and even surface. Cut two identical pieces of the prepared fabric. These pieces will serve as the top and bottom panels of the mattress cover.

2. Oil Preparation

The creation of the protective and aromatic oil blend begins with the careful measurement and combination of the individual oils. In a clean, separate container, meticulously measure out the desired quantities of neem oil, khus grass oil, and holy basil oil. For this specific formulation, neem oil constitutes 50% of the total mixture, valued for its potent insect-repelling properties. Khus grass oil, contributing 30%, is added for its cooling and calming effects, while holy basil oil, also at 20% brings its antimicrobial and aromatic qualities to the blend. Once measured, thoroughly mix the oils using a similar implement, ensuring a homogeneous solution. This ensures that the beneficial properties of each oil are evenly distributed throughout the final product. Throughout the mixing process, it is essential to wear protective gloves to prevent skin irritation and to protect the purity of the oils from any external contaminants.

3. Fabric Coating

The critical stage of imparting the therapeutic properties of the oil mixture to the fabric involves a meticulous coating process. In a well-ventilated space, lay out the prepared fabric pieces on a clean, protective surface. With the previously created oil blend readily available, begin the application. Using a clean spray bottle, gently and evenly distribute the oil mixture across the entire surface of both sides of each fabric piece. The goal is to achieve a uniform coating, ensuring that every fiber of the fabric is lightly imbued with the oil blend. Avoid oversaturation, as excess oil can lead to prolonged drying times and potential discomfort for the pet. The fabric should feel damp, not dripping wet. Pay particular attention to the edges and corners, ensuring these areas receive adequate coverage. Once the oil mixture has been applied, carefully spread the coated fabric pieces in a single layer, allowing for optimal air circulation. Position the fabric in a well-ventilated area, away from direct sunlight, which could cause the oils to evaporate too quickly. Allow the fabric to air dry naturally for several hours. Periodically check the fabric by gently touching it; it should feel dry to the touch, with no lingering dampness. The oils should be fully absorbed into the fibers, leaving a subtle, pleasant aroma. This thorough drying process is essential



Neem Oil



Holy Basil Oil



Khus Grass Oil

4. Fiber Blending With Powders:

The creation of the optimal filling for the pet mattress hinges on the precise blending of fibers and powders. Begin by carefully determining the desired ratios for both the fibers and the powders, ensuring a harmonious balance of comfort, support, and therapeutic benefits. The fibers, a blend of 40% of kapok fiber, 30% of ramie fiber, and 30% of Recron fiber is recommended, providing a combination of softness, durability, and resilience. For the powders, a blend of 50% of neem powder, 30% of vetiver powder, and 20% of holy basil powder is suggested, offering a potent combination of insect-repelling, calming, and antimicrobial properties. Measure the required amounts of each fiber and powder according to the determined ratios. In a large, clean mixing container, preferably made of plastic or stainless steel, begin by combining the kapok, ramie, and Recron fibers. Mix the fibers, ensuring an even distribution before proceeding. Once the fibers are thoroughly combined, carefully add the measured amounts of neem powder, vetiver powder, and holy basil powder to the fiber mixture. Using gloved hands or a suitable mixing tool, such as a large spoon mix the fibers and powders. The goal is to achieve a homogenous blend,



Neem Powder



Holy Basil Powder



Khus Grass Powder

where the powders are uniformly dispersed throughout the entire fiber mass. Pay particular attention to breaking up any clumps or agglomerations of powder, ensuring a smooth and consistent texture. Continue mixing until the blend appears uniform in color and texture, with no visible concentrations of powder. This thorough blending process is crucial for ensuring that the therapeutic benefits of the powders are evenly distributed throughout the mattress filling, providing consistent protection and comfort for the pet.

5. Filling the mattress

With the meticulously prepared fiber blend now ready, and the mattress cover sewn and turned right-side out, the next step is to fill the mattress. Begin by gently grasping handfuls of the blended fibers and systematically stuffing them into the mattress cover. Distribute the fibers evenly throughout the entire interior space, paying particular attention to filling the corners and edges thoroughly. These areas are prone to becoming underfilled, leading to an uneven and less supportive mattress. To ensure a uniform fill, gradually add the fibers, pausing periodically to gently pat and shape the filling. This helps to eliminate any air pockets and create a smooth, consistent surface. When filling the corners, use smaller handfuls of fibers and carefully push them into place, ensuring they are fully packed. Similarly, when filling the edges, work methodically, ensuring an even distribution of fibers along the entire perimeter. Continue adding fibers until the mattress reaches the desired level of firmness and support. The filling should be evenly distributed, creating a smooth, plump surface without any lumps or depressions. Once the desired fill is achieved, inspect the mattress from all angles to ensure uniformity and consistency. This meticulous filling process is crucial for creating a comfortable and supportive pet mattress that provides optimal comfort.



Final product

Test Result:

International Research Journal
IJNRD
Research Through Innovation



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Approved by ACITE, New Delhi & Affiliated to Anna University, Chennai.
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Principal

TESTING RESULT

Ref. No: KSRCT/TXT/2024-25/TR06

Sample Received Date: 21.03.2025 Report Date: 27.03.2025

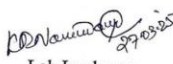
Sample Type: Grey Fabric

Physical

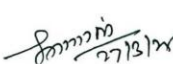
1. Fabric Abrasion Test (Average Weight Loss %)	-	3.056 %
2. Tearing Strength		
Warp wise Tearing Strength	-	2.816 gms
Weft wise Tearing Strength	-	2.899 gms

Chemical

1. Water Absorption Test	-	0.75 (Good)
2. pH Test	-	7.0
(pH of 7 being neutral, < 7 acidic and > 7 alkaline)		



Lab In-charge
(Dr. KR Nandagopal)



HoD -Textile
(Dr. G. Karthikeyan)

 NBA Tier-I	 Rs. 6.50 Crores NTTM Funding	 Rs. 43.75 Lakhs MSME Funding	State Winners		
			Startup TN01 MSME Rs. 1 Lakh	EDII HACKATHON Rs. 1 Lakh	BAGATHON 2024 Rs. 2 Lakhs

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Conclusion:

This study introduces a novel pet mattress designed to transcend conventional bedding, prioritizing therapeutic benefits alongside comfort and sustainability. By meticulously selecting Ramie, Kapok, and Recron fibers, the mattress achieves a balance of durability, breathability, and support, catering to the fundamental needs of pets. The innovative integration of herbal additives, Neem, Khus Grass, and Holy Basil, through both oil coatings and powder blending, addresses critical concerns like pest control, temperature regulation, and microbial hygiene, offering a holistic approach to pet wellness. This dual application method ensures consistent and lasting therapeutic effects. Furthermore, the emphasis on biodegradable materials reflects a commitment to environmental responsibility, aligning with the increasing demand for eco-conscious pet products. The detailed methodology, encompassing fabric preparation, oil application, fiber blending, and mattress filling, underscores a rigorous approach to quality and consistency. Ultimately, this research aims to provide pet owners with a superior, health-enhancing bedding solution, setting a new standard for pet comfort and well-being while minimizing environmental impact.

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