

AC PolyJackharides



rinse-off moisturization
 Polysaccharides
 Hydration anti-frizz
 Vegan functional active
 botanical Sustainable

BACKGROUND

The creation of ingredients from food waste represents a movement towards a more sustainable future for beauty brands. Jackfruit (*Artocarpus heterophyllus*) is one of the largest edible fruits grown worldwide and is an increasingly popular ingredient in vegan cuisine. Jackfruit is replete with natural nutrients, vitamins, and carbohydrates¹, yet an estimated 70-80% of the jackfruit¹ consists of non-edible waste². Actively promoting a circular economy, Active Concepts transforms this would-be waste into an efficacious cosmetic active. **AC PolyJackharides**, comprised of jackfruit polysaccharides extracted from upcycled food industry waste, is a functional cosmetic active capable of providing moisturization to the skin, as well as hydrating and anti-frizz benefits to the hair.

Many consumers are also pushing to move away from animal derived products. Veganism is one of the leading global trends to promote a healthy lifestyle accompanied with a healthy planet. Veganism encompasses major public movements such as sustainability, animal welfare, and mindful living under the same umbrella. This mainstream culture is spreading rapidly through consumer-driven, multidirectional force, affecting the present and the future of industries worldwide. To fulfill the consumer movement towards green living and veganism, Active Concepts has developed an eco-conscious, functional active derived from jackfruit polysaccharides.

The jackfruit is a tropical fruit originating in southern Asia³. Now cultivated in many tropical regions of the world, the jackfruit bears the largest fruit of all trees, some reported weighing up to one hundred pounds. Jackfruit has historically been used in medicine for its immunomodulatory effects^{3,4,5} and is more recently becoming consumer recognizable as a popular vegan, meat alternative. Possessing many edible parts, the seeds and rags, or the finger-like projections between the seeds of the jackfruit, are the most common to be found in cuisine³. In the United States, the rags have become a staple in the diet of many vegans, due to their ability to be cooked in the same fashion as pulled pork and taco filling. While the edible parts of

Code Number: 20963

INCI Name: Water & Artocarpus Heterophyllus Fruit Extract
INCI Status: Conforms
REACH Status: Compliant
CAS Number: 7732-18-5 & 93333-78-9
EINECS Number: 231-791-2 & 297-047-4

Origin: Botanical

Processing:
 GMO Free
 No Ethoxylation
 No Irradiation
 No Sulphonation

Additives:
 Natural Antimicrobial: Lactobacillus Ferment
 Preservatives: None
 Antioxidants: None
 Other additives: None

Solvents Used: Water

Appearance: Semi-Fluid, Colorless to Yellow Gel

Soluble/ Miscible: Water Soluble
 91.8% Biodegradability

Microbial Count: < 100CFU/g,
 No Pathogens

Suggested Use Levels: 1.0 – 10.0%

Suggested Applications:
 Skin and Hair Care, Moisturization,

Benefits of AC PolyJackharides:

- Moisturization
- Anti-frizz
- Hydrating



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the fruit are utilized in the food industry, the inedible parts, deemed as waste, are able to be repurposed for promising innovation elsewhere.

The tree bearing jackfruit, the Jack Tree, is a regenerating perennial in itself, reducing the need for replanting. Sustainability is a trending movement - increasing awareness of the social responsibility and environmental impact that our choices have. Consumers are pushing for sustainable manufacturing in virtually every producing industry such as food, agriculture, energy production, fashion, and even cosmetics. From packaging to energy usage, brands are customizing their sustainable practices by offering traceability and farm-level sourcing of products to offer differentiation in a competitive market. Hero ingredients, such as jackfruit, with a unique sourcing origin makes for exciting brand inspiration and the opportunity to cut down on one's carbon footprint.

Active Concepts has focused their abilities on manufacturing and locally supplying raw materials, offering traceable, sustainability sources with every product. Wherever possible, Active Concepts focuses their strategies on ensuring that all materials and processes are environmentally sound. The production of **AC PolyJackharides** utilizes the method of circular economy in which sustainability is truly achieved when the result of product development improves the environment, the well-being of the consumer, and economically mitigating negative impacts that may hinder movement towards a "greener" economy⁶. By obtaining and reanimating discarded waste from the food industry to produce **AC PolyJackharides**, we are able to maximize ingredient yield from an economic standpoint and produce efficacious products that are essentially waste free, benefiting the well-being of both the environment and the consumer.

SCIENCE

The use of jackfruit polysaccharides allows a formulator to not only capitalize on a superfruit, hero ingredient that is trending in the food and nutrition market, but also a product capable of providing the skin with essential moisturization and the hair with hydrating and anti-frizz benefits. Polysaccharides are long chain carbohydrates capable of energy storage and providing structural support to cell wall membranes. Polysaccharides are sought after for their unparalleled film forming and hydration capacities in cosmetics⁷, increasing the skin's natural ability for repair and renewal. When the skin's protective barrier becomes damaged or disrupted due to external stressors, the skin's natural polysaccharide concentration is depleted along with essential transepidermal water⁸. This leaves the skin defenseless and will ultimately result in scaly, dry skin⁹, as well as the development of fine lines and wrinkles. The film forming properties of polysaccharides and their ability to adhere to the skin and hair are essential in order to defend and protect from unruly damage, promote an environment for skin to heal and protect hair from future damage, and provide lasting moisturization and hydrating efficacy¹⁰. In hair care specifically, polysaccharides are especially sought out for their smoothing effects in effort to tame stubborn hair and reduce frizz.

BENEFITS

Jackfruit, a popular superfruit among the vegan community, is highly praised for its nutritional value and versatile presence in a multitude of industries. Capitalizing on sustainability and veganism, **AC PolyJackharides** offers an upcycled approach to clean and eco-conscious living by utilizing jackfruit polysaccharides extracted from inedible, discarded waste. **AC PolyJackharides** is a fully-sustainable product capable of increasing moisturization to the skin, as well as hydrating and anti-frizz benefits to the hair.

EFFICACY

An *in-vivo* rinse-off moisturization study was conducted over a period of three days to evaluate the moisturization benefits of **AC PolyJackharides** in a body wash formulation. 10 M/F subjects between the ages of 23-45 participated in the study. As evidenced, the experimental containing 5% **AC PolyJackharides** saw an increase in moisture levels at each time point: 21.89% after 15 minutes, 30.09% after 1 hour, 27.01% after 8 hours, and 56.06% after 24 hours, when compared to the untreated control. When compared to the baseline, the experimental containing 5% **AC PolyJackharides** saw an increase in moisture levels at each time point: 19.94% after 15 minutes, 31.24% after 1 hour, 32.00% after 8 hours, and 38.20% after 24 hours. Results indicate that **AC PolyJackharides** is capable of increasing moisturization over time when used in a rinse-off application.

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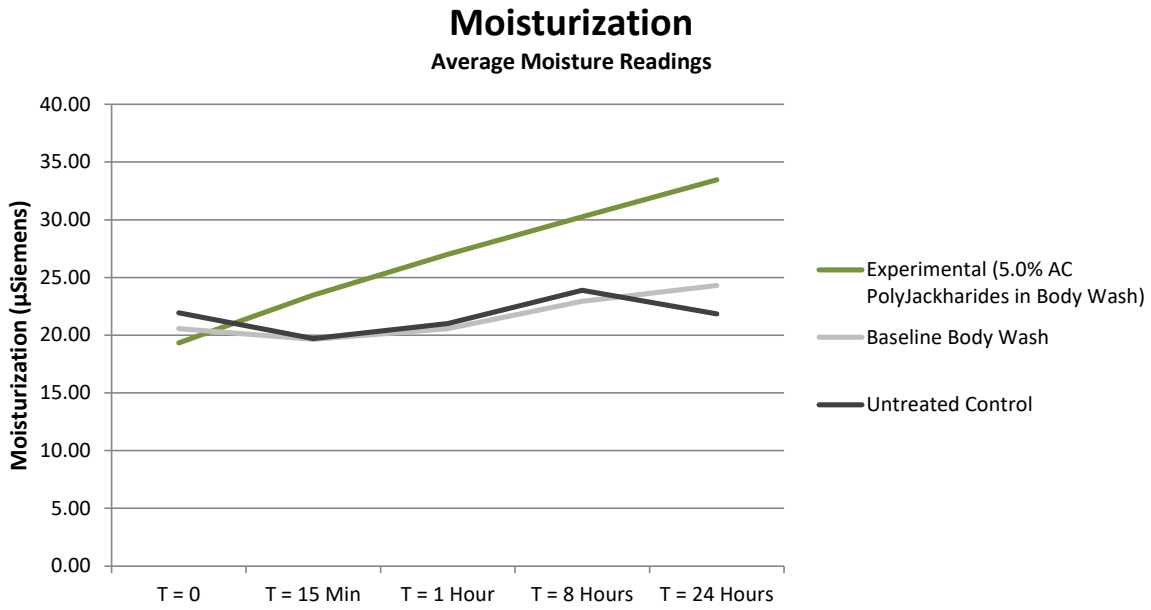


Figure 1. Average Moisture Readings.

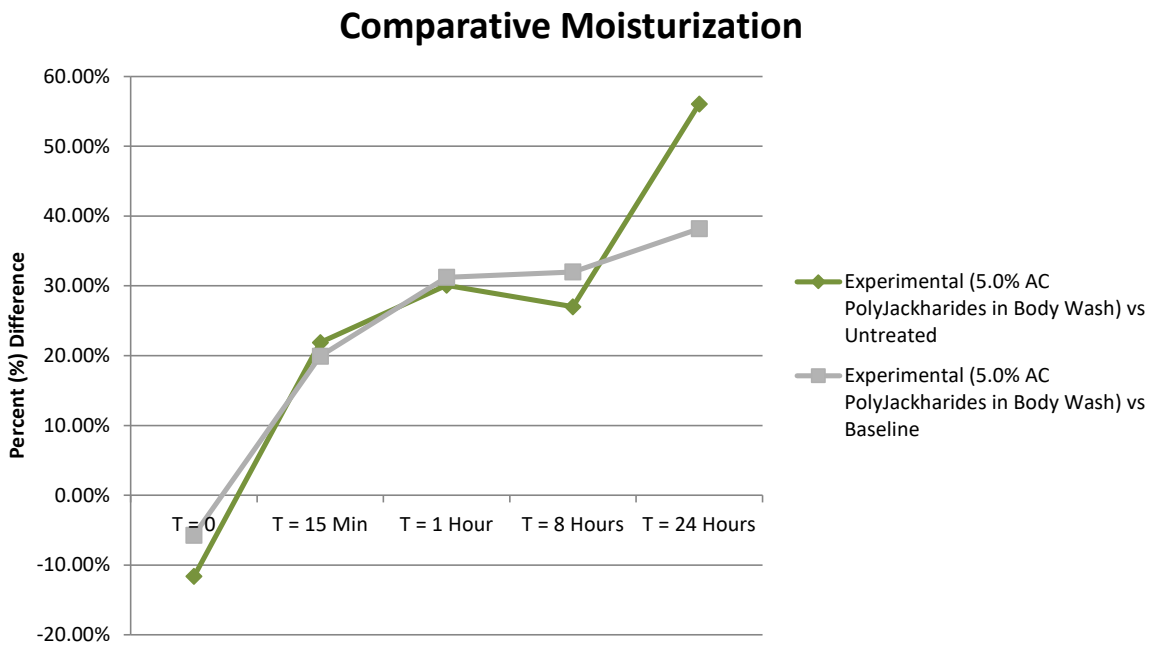


Figure 2. Improvements in Moisturization.

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A half head study was conducted to determine the comparison of a control shampoo vs. 2.0% **AC PolyJackharides** in the control shampoo. Additionally, a comparison between the control conditioner and 2.0% **AC PolyJackharides** in the control conditioner were reported. Each volunteer's hair was photographed prior to the treatment and again after the shampoo and conditioner had been applied and the hair was styled. The images of the half head study were used in conjunction with a sensory assessment subjectively rating the parameters - cleansing, smoothing, dry and wet combability, anti-frizz, overall feel, shine and hydration. This assessment was conducted both before and after treatment. Based on the results obtained, **AC PolyJackharides** is capable of enhancing smoothing, wet and dry combability, anti-frizz, overall feel, shine and hydration of the hair. These attributes makes it an ideal ingredient for use in products intended for all hair types.

Assessment of Hair Characteristics

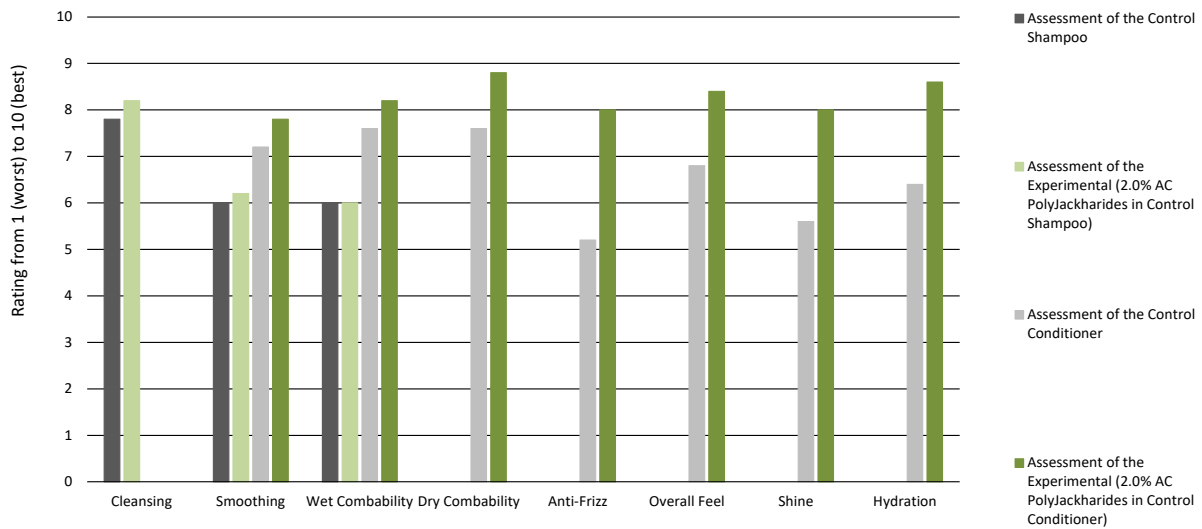


Figure 3. Salon Half Head Study Hair Characteristics.



Figure 4. Full head Baseline, Untreated Hair.

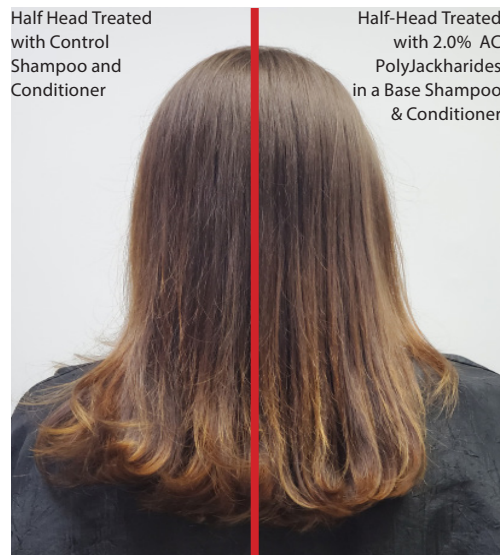


Figure 5. Half Head Treated.

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Figure 6. Full head Baseline, Untreated Hair.



Figure 7. Half Head Treated.



Figure 8. Full head Baseline, Untreated Hair.



Figure 9. Half Head Treated.



Figure 10. Full head Baseline, Untreated Hair.



Figure 11. Half Head Treated.

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Figure 12. Full head Baseline, Untreated Hair.

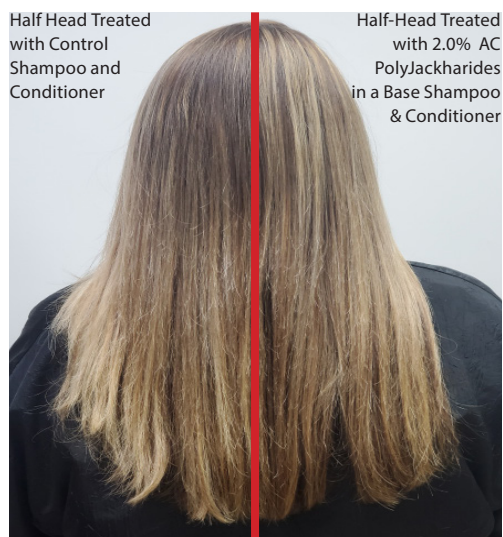


Figure 13. Half Head Treated.

References:

1. Ranasinghe, R. A. S. N., S. D. T. Maduwanthi, and R. A. U. J. Marapana. "Nutritional and health benefits of jackfruit (*Artocarpus heterophyllus* Lam.): A review." *International journal of food science* 2019 (2019).
2. Akter, F., and M. A. Haque. "Jackfruit Waste: a Promising Source of Food and Feed." *Ann. Bangladesh Agric* 23.1 (2019): 91-102.
3. Swami, Shrikant Baslingappa, et al. "Jackfruit and its many functional components as related to human health: a review." *Comprehensive Reviews in Food Science and Food Safety* 11.6 (2012): 565-576.
4. Tan YF, Li HL, Lai WY, Zhang JQ. Crude dietary polysaccharide fraction isolated from jackfruit enhances immune system activity in mice. *J Med Food*. 2013 Jul;16(7):663-8. doi: 10.1089/jmf.2012.2565. PMID: 23875906.
5. Wiater, Adrian, et al. "The Effect of Water-Soluble Polysaccharide from Jackfruit (*Artocarpus heterophyllus* Lam.) on Human Colon Carcinoma Cells Cultured In Vitro." *Plants* 9.1 (2020): 103.
6. Purvis, B., Mao, Y. & Robinson, D. Three pillars of sustainability: in search of conceptual origins. *Sustain Sci* 14, 681–695 (2019). <https://doi.org/10.1007/s11625-018-0627-5>
7. Camargo Junior, Flavio Bueno de, Lorena Rigo Gaspar, and Patricia Maria Berardo Gonçalves Maia Campos. "Immediate and long-term effects of polysaccharides-based formulations on human skin." *Brazilian Journal of Pharmaceutical Sciences* 48.3 (2012): 547-555.
8. Minzanova, Salima T., et al. "Biological activity and pharmacological application of pectic polysaccharides: A review." *Polymers* 10.12 (2018): 1407.
9. Kanlayavattanakul, Mayuree, and Nattaya Lourith. "Biopolysaccharides for skin hydrating cosmetics." *Polysaccharides*. Springer International Publishing (2015).
10. Maia Campos, P. M. B. G., M. de Melo, and F. de Camargo Junior. "Effects of polysaccharide-based formulations on human skin." *Polysaccharides SE-64*. Switzerland: Springer International Publishing (2015): 2045-2064.