

# **Nonwoven Wipes: Skin Barrier Improvement using Natural Jojoba Esters**

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# Nonwoven Wipes: Skin Barrier Improvement Using Natural Jojoba Esters

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## Introduction

Jojoba (*Simmondsia chinensis*) is a perennial shrub native to Arizona, California, and Northwestern Mexico.<sup>A</sup> (Figures 1 and 2) The oil from this plant, jojoba seed oil, is a wax ester that has been used in the past as a folk remedy for renal colic, sunburn, chaffed skin, hair loss, headache, wounds, sore throats, psoriasis, and acne (e.g., sulfurized jojoba).<sup>B,C</sup> The ester is composed of long-chain linear fatty alcohols, 20 to 24 carbons in length and long-chain linear fatty acids, 18 to 22 carbons in length. Nearly all of the acid and alcohol moieties are  $\omega$ -9 monounsaturated.<sup>D</sup> More recently, Floratech has hydrolyzed this wax ester for use in various commercial cosmetic and personal care formulations such as lotions, body washes, hand sanitizers, toners, and nonwoven wipes for make up removal and facial cleansing.

Small, vehicle controlled, clinical studies were carried out to explore the benefits associated with incorporating Floraesters® K-100 Jojoba [INCI: hydrolyzed jojoba esters (and) jojoba esters (and) water (aqua)] and Floraesters K-20W Jojoba [INCI: hydrolyzed jojoba esters (and) water (aqua)] into various nonwoven wipe solutions. These solutions included hydro-alcoholic systems, non-alcohol based antimicrobial systems, and baby wipe systems. Incorporation of Floraesters K-100 Jojoba and Floraesters K-20W Jojoba resulted in increased skin hydration, increased consumer preference, and anti-irritation properties which include decreased erythema and increased skin barrier function (as compared to the known anti-irritant bisabolol<sup>E</sup>). These studies demonstrate how Floraesters K-100 Jojoba and Floraesters K-20W Jojoba can provide added functionality to multiple categories of nonwoven wipes.



Figure 1: Jojoba Seed



Figure 2: Jojoba Seed

## References / Footnotes

- A. Ed. Kartesz, John T. Natural Resources Conservation Service - PLANTS Profile. United States Department of Agriculture. Web. 30 January 2009. [http://plants.usda.gov/java/profile?symbol=SICH]
- B. Yaron, A. "Metabolism and Physiological Effects of Jojoba Oil." The Chemistry and Technology of Jojoba Oil. Ed. J Wisniak. Champagne, IL: American Oil Chemists' Society Press, 1987. 251-65. Print.
- C. Mosovich, B. "Treatment of Acne and Psoriasis." Proceedings of the Sixth International Conference on Jojoba and Its Uses. Ed. J Wisniak and J Zabicky, Beer Sheva, Israel: University of the Negev, 1985. 393-7. Print.
- D. Wisniak, J. The Chemistry and Technology of Jojoba Oil. Champagne, IL: American Oil Chemists' Society Press, 1987. 42-45. Print.
- E. Stanzl, K and Vollhardt, J. "The Case of Alpha-Bisabolol." Handbook of Cosmetic Science and Technology. Ed. AO Bareil, M Paye, and HI Maibach. New York, NY: Marcel Dekker, 2001. 277-84. Print.
- F. Corneometer is a registered trademark of Courage + Khazaka Electronic GmbH (Köln, Germany).
- G. Fresh Scent Wet Ones® Antibacterial Hand and Face Wipes Pocket Size Singles were utilized. Wet Ones is a registered trademark of Playtex Products Inc. (Dover, DE).
- H. Germ-X® Antibacterial Soft Wipes Singles were utilized. Germ-X is a registered trademark of Vi-Jon Laboratories (St. Louis, MO).
- I. Wal-Mart® Equate® Antibacterial Wipes were utilized. Equate is a registered trademark of Wal-Mart Stores, Inc. (Rockline Industries, Sheboygan, WI).
- J. Tewameter is a product of Courage + Khazaka Electronic GmbH, (Köln, Germany).
- K. Mexameter is a product of Courage + Khazaka Electronic GmbH, (Köln, Germany).

## Increased Skin Hydration: Non-Alcohol Based Wipes

Objective: Determine the skin hydration potential of Floraesters K-20W Jojoba and Floraesters K-100 Jojoba in conjunction with glycerin, when added to a non-alcohol based solution.

Design: Nonwoven wipes (45g/m<sup>2</sup> spunlace) were soaked in the 5g of test solution for 24 hours. One application of each experimental wipe was applied to dry lower legs of twelve healthy female subjects.

End Point: Increased skin hydration as measured by the Corneometer® CM 825<sup>F</sup> over four hours (Figure 3).

Figure 3: Increased Skin Hydration

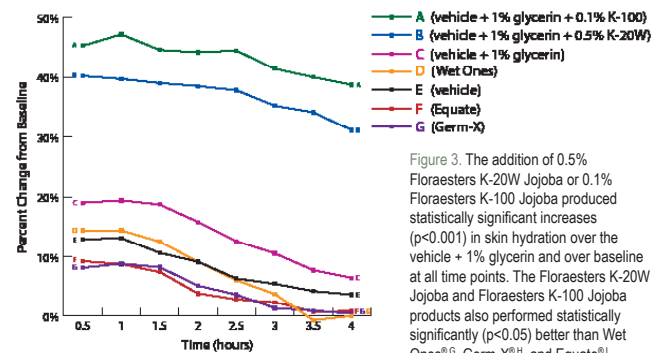


Figure 3. The addition of 0.5% Floraesters K-20W Jojoba or 0.1% Floraesters K-100 Jojoba produced statistically significant increases ( $p < 0.001$ ) in skin hydration over the vehicle + 1% glycerin and over baseline at all time points. The Floraesters K-20W Jojoba and Floraesters K-100 Jojoba products also performed statistically significantly ( $p < 0.05$ ) better than Wet Ones<sup>®</sup>, Germ-X<sup>®</sup>, and Equate<sup>®</sup>.

## Increased Skin Hydration: Hydro-Alcoholic Wipes

Objective: Determine the skin hydration potential of Floraesters K-20W Jojoba and Floraesters K-100 Jojoba in conjunction with glycerin, when added to a hydro-alcoholic solution.

Design: All solutions contained 65% ethanol, 1% glycerin, and water. Nonwoven wipes (45g/m<sup>2</sup> spunlace) were soaked in the 2.5g of test solution for 72 hours. One application of each experimental wipe was applied to dry lower legs of twelve healthy female subjects.

End Point: Increased skin hydration as measured by the Corneometer CM 825 over two hours (Figure 4).

Figure 4: Increased Skin Hydration

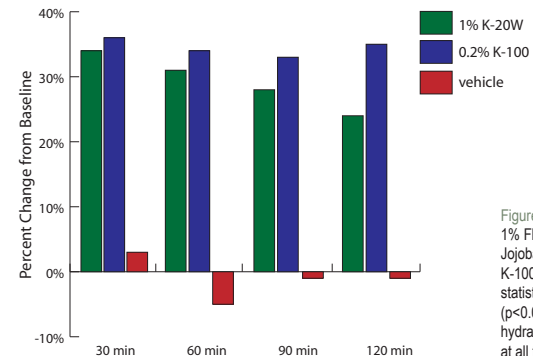


Figure 4. The addition of 1% Floraesters K-20W Jojoba or 0.2% Floraesters K-100 Jojoba produced statistically significant ( $p < 0.05$ ) increases in skin hydration over the vehicle at all time points.

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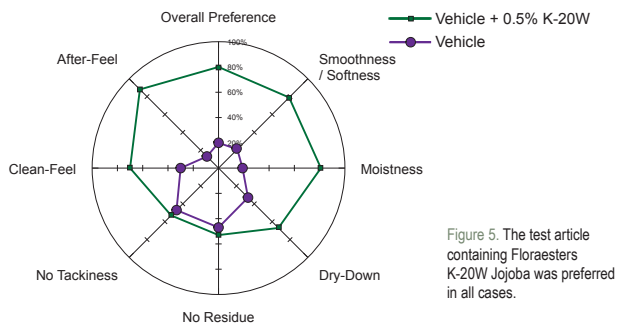
## Consumer Preference: Non-Alcohol Based Wipes

**Objective:** Determine the consumer preference between a non-alcohol based wipe with and without Floraesters K-20W Jojoba.

**Design:** Nonwoven wipes (45g/m<sup>2</sup> spunlace) were soaked in the 5g of test solution for 24 hours. One application of each experimental wipe was applied to the entire left or right hand of thirty-one healthy female subjects.

**End Point:** Consumer preference survey immediately following application (Figure 5).

**Figure 5: Increased Consumer Preference**



## Barrier Function: Baby Wipes

**Objective:** Determine the anti-irritation potential of Floraesters K-20W Jojoba and Floraesters K-100 Jojoba, when added to a baby wipe solution.

**Design:** Nonwoven wipes (45g/m<sup>2</sup> spunlace) were soaked in the 2.5g of test solution for 24 hours. The forearms of fourteen healthy subjects were dry shaved to create skin irritation. Measurements were made at baseline (pre-shave, no treatment), post-shave (pre-test article treatment), and 4, 24, 48, and 72 hours post initial test article application. Test article applications were made following post-shave, 4, 24, and 48 hour measurements.

**End Point:** Increased barrier function as measured by the Tewameter TM 300<sup>1</sup> (Figure 6).

**Figure 6: Increased Barrier Recovery**

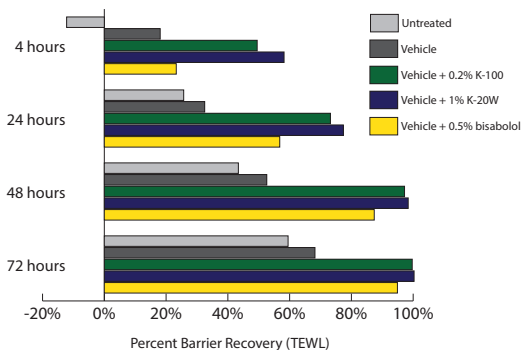


Figure 6. The addition of 1% Floraesters K-20W Jojoba or 0.2% Floraesters K-100 Jojoba produced statistically significant increases ( $p < 0.01$ ) in barrier recovery over the vehicle and untreated skin at all time points. The Floraesters K-20W Jojoba products also performed statistically significantly ( $p < 0.05$ ) better than 0.5% bisabolol at the 4 and 24 hour time points.

## Anti-Irritation: Baby Wipes

**Objective:** Determine the anti-irritation potential of Floraesters K-20W Jojoba and Floraesters K-100 Jojoba, when added to a baby wipe solution.

**Design:** Nonwoven wipes (45g/m<sup>2</sup> spunlace) were soaked in the 2.5g of test solution for 24 hours. The forearms of fourteen healthy subjects were dry shaved to create skin irritation. Measurements were made at baseline (pre-shave, no treatment), post-shave (pre-test article treatment), and 4, 24, 48, and 72 hours post initial test article application. Test article applications were made following post-shave, 4, 24, and 48 hour measurements.

**End Point:** Decreased erythema (from 4 hours to each time point) as measured by the Mexameter MX 18<sup>K</sup> (Figure 7).

**Figure 7: Decreased Erythema**

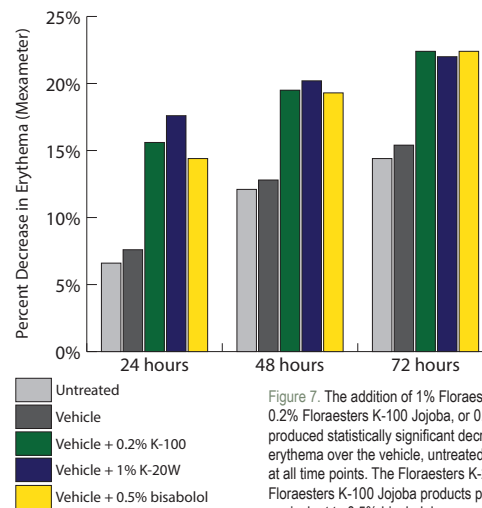


Figure 7. The addition of 1% Floraesters K-20W Jojoba, 0.2% Floraesters K-100 Jojoba, or 0.5% bisabolol produced statistically significant decreases ( $p < 0.01$ ) in erythema over the vehicle, untreated skin, and baseline at all time points. The Floraesters K-20W Jojoba and Floraesters K-100 Jojoba products performed statistically equivalent to 0.5% bisabolol.

## Conclusions

- Floraesters K-20W and K-100 Jojoba increased skin hydration when incorporated, in combination with glycerin, into non-alcoholic nonwoven wipes and hydro-alcoholic nonwoven wipes.
- Floraesters K-20W increased consumer perception when incorporated into non-alcoholic nonwoven wipes.
- Floraesters K-20W and K-100 Jojoba increased barrier function in irritated skin when incorporated into a baby wipe.
- Floraesters K-20W and K-100 Jojoba decreased erythema in irritated skin when incorporated into a baby wipe.

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