



collagen synthesis

BACKGROUND

Growing an astounding 30m tall, the Salix nigra, or Black Willow tree is known for its remarkable tenacity. The Willow's root strength and general resilience are but a few of the qualities that highlight it as the most commercially and economically important member of the Salix genus.

In addition to its modern industrial and manufacturing applications, Native American tribes such as the Patowatomi and Chippewa found uses for nearly all of the tree's components. The roots were often manipulated to produce a variety of dyes, the bark was charred and crushed to be used as gunpowder, and the wood itself became the primary material used for artificial limbs due to its weight, density, and pliable nature.

Medicinally, the Black Willow's extreme bitterness was found to be an effective substitute for Quinine amongst early American settlers. It has been documented that the tree's inner bark contains the highest concentrate of its active chemical component. Often used in a tea, the bark is effective in treating rheumatism, arthritis, dysentery, fevers, headaches, and some sources tout its efficacy for asthma and gout. Additionally, forming a pulp-like poultice from the bark is useful as a natural treatment for cuts, wounds, sprains, bruises and swelling. As a wash, willow bark extract is considered an astringent for healing psoriasis and other skin diseases. Even the leaves have been used internally for the treatment of minor fevers, colic, and other common ailments.

SCIENCE

Though they are of different families, Salix Alba (White willow) and Salix nigra (Black willow) are often used interchangeably due to their strikingly similar uses and composition. The primary chemical constituents of both species are tannin, an overarching term for a common polyphenolic compound, as well as salicin, a

Code Number: 10200

INCI Name: Salix Nigra (Willow) Bark Extract INCI Status: Approved REACH Status: Complies CAS Number: 84650-64-6 EINECS Number: 283-522-3

Origin: Botanical **Processing**: **GMO** Free No Ethoxylation No Irradiation No Sulphonation Additives: Preservatives: None Antioxidants: None Other additives: None Solvents Used: Water Appearance: Colorless to Light Amber Liquid Soluble/ Miscible: Water Soluble 88% Biodegradability Microbial Count: <100 CFU/q, No Pathogens

Suggested Use Levels: 2.0 - 5.0% Suggested Applications: Antimicrobial, Exfoliating, Problem Skin, Anti-Aging

Benefits of ABS Willow Bark Extract:

- Anti-inflammatory
- Antioxidant
- Strong Exfoliator
- Works with Problem Skin
- Natural Antimicrobial



glucoside of saliycylic acid. While tannin only plays a small role in the active component of Salix nigra in which it is responsible for protein, amino acid, and alkaloid binding, it is important as a regulatory compound. Salicin, a derivative of Salicylic acid, was first isolated in 1828 by German and French chemists working with White Willow (common European counterpart of Black Willow).

Upon ingestion into the human body, salicin is hydrolyzed to release salicylic acid in the stomach. Toward the end of the nineteenth century, salicylic acid was then converted into the synthetic compound, acetylsalicylic acid, the active ingredient in Aspirin. **ABS Willow Bark Extract** is derived from the bark of the black willow tree. **ABS Willow Bark Extract** contains 10% salicylates. In its standardized form, **ABS Willow Bark Extract** provides consistent levels of salicylates, commonly referred to as natural salicylic acid, allowing its use as an active ingredient. **ABS Willow Bark Extract** is completely water soluble and can be used in any cosmetic formulation to enhance cell turnover, act as a natural anti-microbial agent, or as a replacement for synthetic salicylic acid.

BENEFITS

The Black Willow, the North American counterpart to the originally examined European White Willow, maintains the ability to function against the same, if not a wider variety of ailments. Due to its versatility, Salix nigra has become a prime candidate for cosmetic and personal care applications. Willow bark extract has solidified itself as one of the principal herbal remedies to treat pain and act as an anti-inflammatory analgesic agent. Within the Cosmetics Industry, willow bark extracts are employed as a natural source of salicylic acid. As reported at the Society of Investigative Dermatology, Willow Bark Extract provides the benefits of salicylic acid such as exfoliation, and anti-microbial action, without any of the typically associated irritation from the active alone.

EFFICACY DATA

As shown in Figure 1, **ABS Willow Bark Extract** exhibited antioxidant activity comparable to 200µM Trolox[®]. The antioxidant capacity of **ABS Willow Bark Extract** increased as the concentration increased, as a result we can assure that its ability to minimize oxidative stress is dose dependent. **ABS Willow Bark Extract** began exhibiting antioxidant activity at a 0.0005% concentration and was designed for problem skin with exfoliation and antimicrobial properties. With the present study we can confirm that this unique ingredient is not only capable of providing functional benefits but it is also capable of providing potent antioxidant benefits when added to cosmetic applications.



ORAC Assay

Figure 1. Antioxidant capacities.

COX-II, a precursor and indicator of inflammation was measured, As shown in Figure 2, ABS Willow Bark Extract was able to inhibit COX-II production. This decrease in COX-II production indicates a reduced inflammatory environment which can decrease the signs of aging and photodamage. For these reasons, we can assume **ABS Willow Bark Extract** is suitable for cosmetic applications designed to provide antiaging and anti-inflammatory properties. The data obtained from this study met criteria for a valid assay and the positive and negative controls performed as anticipated.



COX-II Percent Inhibition

Figure 2. COX-II Percent Inhibition.

As shown in Figure 3, ABS Willow Bark Extract exhibited anti-inflammatory effects on LPS-treated fibroblasts. As expected, the changes in IL-6 production using ABS Willow Bark Extract appears to be dose dependent. This decreases in IL-6 production indicates a reduced inflammatory environment which could decrease signs of aging and formation of fine lines as well as wrinkles.



IL-6 ELISA

Figure 3. ABS Willow Bark Extract-treated fibroblasts IL-6 concentrations.

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A Double Challenge Test was completed using 3.0% **ABS Willow Bark Extract**. **ABS Willow Bark Extract** was combined with water and EDTA to obtain a 3% final concentration. Samples were inoculated with E. coli, P. aeruginosa, S. aureus, A. brasiliensis and C. albicans. During the first 28-day incubation period, samples were periodically collected and tested for the presence of these microorganisms. Following this initial 28 days of incubation, the cream samples were then re-inoculated with the microbial cultures and sampled over an additional 28-day period. The graphs below show the positive antimicrobial results for **ABS Willow Bark Extract**.



Antimicrobial Insult Test 1

Figure 4. 3% ABS Willow Bark Extract solution was inoculated with selected microorganisms. on day 0.



Antimicrobial Insult Test 2

Figure 5. 3% ABS Willow Bark Extract solution was re-inoculated with the selected microorganisms on day 28.





Antimicrobial Insult Test 3

Figure 6. 3% ABS Willow Bark Extract solution was re-inoculated with the selected microorganisms on day 56.

ABS Willow Bark Extract was evaluated for its ability to accelerate cell renewal by means of a traditional Dansyl Chloride protocol. Two products were tested, with the remaining untreated site serving as the biological control. The products were applied in a randomized fashion. Approximately 50 microL of product was applied to the appropriate test site once per day. The sites were then examined daily under ultraviolet light (SL-3660 Long Wave Ultra Violet, Black Light Eastern Corp., Westbury, Long Island, NY) for fluorescence. The test was continued until no fluorescence was detectable at any site. The values listed reflect the average time for each product. The results indicate that **ABS Willow Bark Extract** is capable of increasing cellular renewal by 27% when compared to the untreated control.



Cellular Renewal

Figure 7. Cellular Renewal over 18 days.

As evidenced in a 4 week efficacy study of **ABS Willow Bark Extract** on skin, skin density was improved by 33.59% after 24 hours and by 44.42% after 4 weeks when compared to the untreated control. When compared to the base cream **ABS Willow Bark Extract** improved skin density by 36.72% after 24 hours and after 4 weeks **ABS Willow Bark Extract** improved density by 32.41%. Results indicate that **ABS Willow Bark Extract** is capable of improving skin density when compared to both the untreated control as well as the base lotion. **ABS Willow Bark Extract** has a strong positive effect on skin's density when used at recommended use levels.



Comparative Difference in Skin Density

Figure 8. High Resolution Ultrasound Skin Imaging Results.

Fibroblasts treated with **ABS Willow Bark Extract** at 0.01%, 0.1%, and 1.0% exhibited a reduction in oxidative stress levels compared to fibroblasts exposed to AntA. These data indicate **ABS Willow Bark Extract** scavenges unnecessary ROS, which may help to attenuate characteristics of cellular aging.



Figure 9. The effect of ABS Willow Bark Extract on ROS scavenging.





Sirius Red/Fast Green Collagen Assay was conducted to assess the changes in collagen synthesis by **ABS Willow Bark Extract** treated in vitro cultured human dermal fibroblasts. As shown in Figure 10, **ABS Willow Bark Extract** exhibited positive collagen synthesis activity. The increase in collagen production may lead to improvement in the dermal-epidermal junction integrity as well as an improved scaffolding matrix. For these reasons, we can assume **ABS Willow Bark Extract** is also suitable for cosmetic applications designed to boost collagen synthesis to aid in providing a younger and healthier complexion.



Figure 10. Collagen Concentration.

References

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