

Bamboo's Extract for Rejuvenating Skin

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Abstract: Bamboo is a name for over 1,400 species of giant grasses in 115 different genera. All bamboos have wood-like stems. Bamboo mainly grows in Africa, America and in Asia but can easily grow in Europe. The fastest growing perennial, evergreen bamboo plant is a member of the grass family Poaceae and constitutes a single subfamily Bambusoideae. Bamboo extract contains various compounds like flavones, glycosides, phenolic acids, and amino acids which together provide antioxidant, skin-soothing, and astringent properties, higher percentage of silica supports collagen production contributing more glowing and healthier skin appearance, improves skin elasticity, strengthens bones, increases connective tissue, helps overall joint flexibility, assists in preventing hair thinning, encourages hair growth, alleviates eczema and psoriasis, improves hair condition & luster, protects & strengthens nails.

Index Terms: fastest growing grass, skin rejuvenating properties, active constituents, silica benefits, skin cell renovation, silica extraction, species and activity.

Introduction:

Bamboo is a perennial, giant, woody grass belonging to the group angiosperms and the order monocotyledon. ^[1] Bamboo refers to any of a group of plants in the subfamily Bambusoideae, which is a part of the true grass family. ^[2] Basically a grass, belongs to family Poaceae, comprising four subtribes: Arundinarieae, Eubambuseae, Dendrocalameae and Melocanneae. ^[3] Bamboo is spread over 1,250 species under 75 genera in the world (Upreti and Sundriyal 2001). Out of these, about 136 species under 23 genera are available only in India (Sharma 1980). ^[4] Phyllostachys promiensis, which belongs to the tribe Bambuseae, is an important bamboo species that is widely distributed in the south of China. ^[5] There are 3 large genera (Bambusa, Dendrocalamus, and Ochlandra) of bamboos in India with more than 10 species each. Together; these three genera represent about 45% of the total bamboo species found in India. On the other hand, there are some genera which are represented by only one species each e.g. Ampelocalamus, Sarocalamus, Chimonobambusa, Pseudostachyum, and Stapletonia. ^[6] The distribution of bamboos on planet earth extends from 51°N in Japan to 47°S in South Argentina. The bamboo can grow in an altitudinal range which extends from just above the mean sea level up to 4,000m. ^[7]

Scientific classification: Table 1: Classification ^[8]

1	Kingdom	Plantae
2	(Unranked)	Angiosperms
3	(Unranked)	Monocots
4	(Unranked)	Commelinids
5	Order	Poales
6	Family	Poaceae
7	Subfamily	Bambusoideae
8	Supertribe	Bambusodae

The stems and leaves are used in the ayurvedic system of medicine as blood purifier, in leucoderma and inflammatory conditions. An infusion of the leaves is used as an eye-wash. It is also given internally for bronchitis, gonorrhoea and fever. The dealcoholized extract of leaves has shown anti-bacterial activity against *Bacillus subtilis* (Ehrenb.) Cohn, *Micrococcus pyogenes* Lehmann & Newmann var. *aureus* Hucker syn. *Staphylococcus aureus* Rosenb., *Aerobacteraerogenes* (Kruse) Beijer., *Salmonella typhi* (Schroter) and *S. paratyphi* (Kaysers) Castell. ^[9]

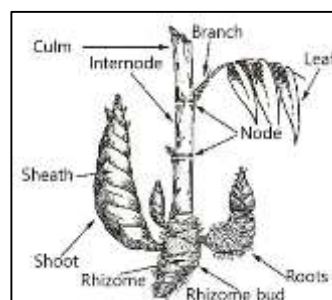


Figure 1 Anatomy of Bamboo Plant

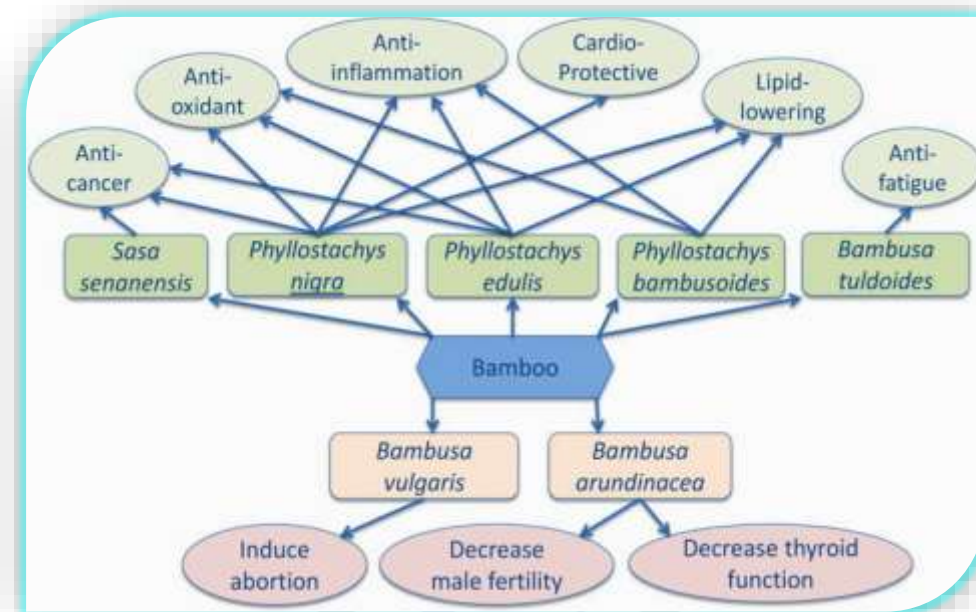
Different species with their therapeutic activity:

Figure 2 Different species with their activity

It is used as astringent, acrid, sweet, cooling, expectorant, constipating, cardio tonic, haemostatic, aphrodisiac, and diuretic. The sprouts are acrid, bitter, laxative and are useful in inflammations, ulcers and wounds. The burnt roots are applied in the ringworm, bleeding gums and to painful joints.^[10]

Chemical Composition:

Table 2: Chemical Composition

Sr. No.	Active constituent	Percentage
1	Vitamin E (α -Tocopherol) 1mg ^[11]	7%
2	Vitamin C (4mg)	7%
3	Vitamin B6	6%
4	Thiamin(0.150mg)	12%
5	Riboflavin (0.070mg)	5%
6	Niacin ¹² (0.600mg)	4%
7	Cellulose	73.83%
8	Hemicellulose	12.49%
9	Lignin	10.15%
10	Aqueous Extract	3.16%
11	Pectin ^[13]	0.37%
12	Silica	90.56%
13	Potash	1.10%
14	Peroxide of Iron	0.90%
15	Alumina	0.40%
16	Moisture ^[14]	4.87%
17	Starch	2-6%
18	deoxidized saccharide	2%
19	Fat	2-4%
20	Protein ^[15]	0.8-6%
21	Extractives, resins, tannins, waxes and inorganic salts ^[16]	2-10%

Effect of active constituents on skin:

- A. **Vit E:** Vitamin E is made up of four tycoferol proteins and four tocotreinol proteins. These are fat-soluble compounds.
- B. It is known to contain antioxidants. Antioxidants fight against free radicals in the body. Free radicals are known to damage body cells. Therefore, vitamin E is good for protecting the body's skin cells from being damaged^[17]
- It helps prevent signs of aging.
 - It reduces sun damage
 - It can help reduce the appearance of scars
 - It may help moisturize skin^[18]
- C. **Vit C:** Analysis of keratinocytes in culture has shown that vitamin C influences gene expression of antioxidant enzymes, the organisation and accumulation of phospholipids and promotes the formation of the stratum corneum and the differentiation of the epithelium ingeneral^[19]
- **Boosts Collagen Production:**
Age and sun damage cause us to lose collagen, leading to wrinkles and sagging skin. Vitamin C boosts your skin's collagen production to give firmer, more plump skin and smooth out fine lines and wrinkles.
 - **Fights Free Radical Damage and Signs of Aging:**
The antioxidant properties of vitamin C help fight free radicals and damage caused by UV radiation. The result is anti-aging action for younger-looking skin!
 - **Brightens Dark Spots:**
Vitamin C helps lighten hyper pigmentation and brown spots. It also inhibits melanin production for evening skin tone and brightness.
 - **Skin Repair:**
It helps to repair damage from sun exposure and collagen loss by encouraging healthy cell turnover and regeneration. Some users have noted that it helps fade scars as well.
 - **Helps Protect the Skin Against Sun Damage:**
Vitamin C gives you some added sun protection by thickening the dermis layer of the skin to help guard it against harmful UV rays and sun exposure.^[20]
- D. **Silica:**As we grow older, the amount of Silica present in our tissues begins to decrease. This natural decrease in Silica levels can have detrimental effects on the body's organ systems and tissues. Since the skin is our largest organ we want to be sure we are supplying the body with these nutrients.^[21]

Benefits of Silica for the Hair and Skin:

Silica acts as a glue, it sits inside collagen, providing strength, flexibility and resilience to connective tissues. Silica also creates bonds between the protein molecule that are responsible for the skin's natural ability to retain water, which is critical for repair and cell renewal.

- Silicon increases tissue levels of **hydroxyproline**, a key amino acid required for collagen and elastin synthesis.
- Silicon improves the firmness and strength of connective tissues and cartilage, along with skin, nails, and hair.^[22]
- Silica helps to regenerate the skin.
- Silica helps delay the aging process.
- Strengthens hair with luster and suppleness.
- Helps the hair grow stronger and faster.
- Regulates blood circulation and strengthens blood vessels crucial for spider veins.
- Natural anti-inflammatory, can help with eczema and psoriasis.
- Gives your skin a glow because it is a strong carrier of oxygen, and it increases the transport of both nutrients and oxygen to the skin.
- Within 12 weeks you should see significant results, such as a brighten complexion and firmer skin.
- Silica helps the body to achieve hormonal balance, which in turn helps reverse hair thinning and loss.
- Carries nutrients to the hair follicles ensuring they are supplied with all the vital minerals necessary for hair growth and vitality.^[23]
- Healing- As a part of collagen, silica can speed healing of burns, wounds and scar tissue.^[24]

Skin Rejuvenation:

Facial rejuvenation is a cosmetic treatment (or series of cosmetic treatments), which aims to restore a youthful appearance to the human face. Facial rejuvenation can be achieved through either surgical and/or non-surgical options.^[25] Procedures can vary in invasiveness and depth of treatment. Surgical procedures can restore facial symmetry through targeted procedures and facial restructuring and skin alterations. Non-surgical procedures can target specific depths of facial structures and treat localized facial concerns such as wrinkles, skin laxity, hyper pigmentation and scars.^[26]

- ✓ One of the biggest components of collagen is actually silica. Since collagen is the connective tissue that makes up most of our skin, it is not difficult to realise the importance of adequate silica levels within our bodies. Having sufficient and well toned collagen will make our skin look soft and young which in turn helps with suppleness and an increased capability of being moisturised.
- ✓ Whenever collagen is damaged in skin, and incidentally this is occurring all the time due to free radical damage, silica is required to take care of this by rebuilding and regenerating this connective tissue.
- ✓ Incidentally, silica is also an excellent supplement in combating mild to moderate acne. It does so by firstly enhancing collagen production which ensures healthy outer cell layers of the skin which are less likely to get inflamed from the hormonal waste that is connected with acne.
- ✓ Additionally, silica supplementation is great for the removal of toxins which arise as a result of digestion. These toxins normally seep into the bloodstream and cause inflammation leading to acne and dull lifeless skin!
- ✓ Silica's role for hair health appears to be two-fold. Firstly, silica helps to achieve hormonal balance. An imbalance in the female sex hormones is one of the biggest single causal factors for hair loss and the thinning of hair. An intake of silica will most definitely help to prevent hair thinning, restore vitality to hair and may even address hair loss without the need for hormone mimicking herbs. This property is particularly suitable for those with cell mutation associated with excess oestrogen.
- ✓ Secondly, silica bonds with many minerals in the body. Aside from removing aluminium from the body, silica takes many nutrients to the peripherals of the body, namely the hair, skin and nails, and thus ensures that the hair follicles are supplied with all the vital minerals necessary for hair growth and vitality.^[27]

Silica Extraction from BAMBOO leaves:



Figure 3 Bamboos (Ampelocalamus)

- Bamboo leaves were collected from Sragen, Central Java to remove alkali impurities, the bamboo leaves were crushed and leached by 1M HCl for 2 hours.
- After washing in water and drying the bamboo leaves were calcined at 650°C for 2 hours in muffle furnace to remove organic impurities.
- Silica was extracted from Bamboo Leaf Ash, (BLA) using sol-gel Method to produce silica xerogel.
- In this method, 60 ml NaOH 2M were added to 10g BLA and boiled for 1 h with constant stirring to extract the silica and produce sodium silicate solution. The solution was filtered through Whatman No.41.
- The filtrate solution was sodium silicate, cooled to room temperature and the pH solution was reduced with 1N HCl to 7.0 under constant stirring to produce silica gels.
- When the solution gel was formed, it was aged for 18 h. After aging, the soft gel was gently broken by adding 100 ml distilled water and centrifuged at 3000 rpm to make slurry.
- The slurry was filtered and washed. The supernatant was discarded and the gel was dried at 80 °C for 12 h to produce white powder silica (xero-gel).^{[28][29]}

Yusoff et al. [1992] studied the chemical composition of one, two, and three year old bamboo (*Gigantochloa cortechinii*). The results indicated that the holocellulose content did not vary much among different ages of bamboo. Alpha-cellulose, lignin, extractives, pentosan, ash and silica content increased with increasing age of bamboo.^[30]

Conclusion:

The study of bamboo is not only specific for decoration & construction but also useful for medicinal purpose, as a food and most importantly for bones because of the silica content is very high in bamboo than the other plants, silica is very useful for rejuvenation of skin cells and other appendages hairs and nails.

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