SM DERMA

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# A review on high-purity botanical extracts as raw materials for innovative skincare

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*SM DERMA R&D Department*

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ABSTRACT

Botanical extracts provide multifunctional bioactives—antioxidants, anti-inflammatories, barrier modulators and signaling molecules—that help maintain skin homeostasis and protect against environmental stress. SM DERMA integrates high-purity extracts from traditionally valued plants (licorice root, citrus, aloe vera, Centella asiatica, green tea, ginseng, soybean, coconut), processed under strict quality control to preserve active constituents and ensure safety. This review summarizes mechanisms of action, evidence for skin benefits, formulation and stability considerations, safety/regulatory issues, and strategic recommendations for deploying botanical extracts as core raw materials in next-generation regenerative skincare.

## 1. Introduction

Botanical extracts are complex mixtures of polyphenols, terpenoids, polysaccharides, saponins, alkaloids and other phytochemicals that act at multiple levels: they scavenge reactive oxygen species (ROS), reduce inflammatory signaling, modulate melanogenesis, support extracellular matrix (ECM) integrity and hydrate or soothe the skin barrier. Because they act via complementary mechanisms, well-selected botanical blends can deliver balanced outcomes —antioxidant protection plus active repair— while fitting consumer demand for "natural" ingredients. High-purity, standardized extracts (chemically characterized and batch-controlled) are essential to convert traditional knowledge into reproducible cosmetic performance.

## 2. Key botanical sources: functions, active markers, and evidence

### Licorice root (Glycyrrhiza spp.) — brightening & anti-inflammatory

Licorice extracts contain glabridin, liquiritin and isoliquiritigenin. These constituents inhibit tyrosinase and melanogenesis while providing anti-inflammatory and antioxidant activity, supporting both depigmentation and barrier recovery roles in formulations. Systematic phytochemical reviews highlight licorice's multifunctional cosmetic properties and safety profile when standardized. PMC

### Citrus (Vitamin C, flavonoids) — photoprotection & collagen support

Citrus-derived vitamin C (ascorbic acid) and flavonoids (hesperidin, naringin) act as potent

antioxidants and co-factors for pro-collagen synthesis. Topical vitamin C is one of the most evidence-backed botanicals for photoprotection, anti-pigmentation and stimulation of collagen formation when formulated to ensure stability and skin delivery. PMC

**Aloe vera — soothing, hydration & wound support**

Aloe vera gel contains mucopolysaccharides, acemannan and small phenolics that provide hydration, anti-inflammatory and wound-healing support. Clinical reviews of aloe vera show benefits for wound healing and symptomatic relief of irradiated or injured skin; aloe is widely used as a soothing and barrier-support ingredient in post-procedure care. PMC

**Centella asiatica (Cica) — barrier repair & collagen synthesis**

Centella asiatica is rich in triterpenes (asiaticoside, madecassoside, asiatic acid). These molecules promote collagen synthesis, modulate inflammation, and accelerate wound healing—properties leveraged in scar care and barrier repair products. Pharmacological reviews summarize robust preclinical evidence and growing clinical interest for Cica in dermal regeneration. PMC

**Green tea (Camellia sinensis) — antioxidant & photoprotective polyphenols**

Green tea polyphenols (notably EGCG) reduce UV-induced oxidative damage, attenuate inflammatory responses, and support DNA repair pathways in skin models. Extensive preclinical and clinical data position green tea extracts as a cornerstone antioxidant and photoprotective botanical. PMC

**Ginseng root — adaptogenic anti-aging support**

Ginsenosides and related saponins show antioxidant, anti-inflammatory and collagen-stimulatory effects in skin models. Recent reviews outline ginseng's role in improving skin tone and resisting oxidative aging, making it a valuable adaptogenic botanical in anti-aging formulations. PMC

Soybean — isoflavones for skin elasticity

Soy isoflavones (genistein, daidzein) act as phytoestrogens with antioxidant properties; they can improve elasticity and reduce wrinkle formation, particularly in peri- and post-menopausal skin where estrogenic support benefits dermal structure. Recent reviews summarize both topical and oral evidence. PMC

**Coconut — barrier lipids and microbiome support**

Coconut oil and medium-chain fatty acids (lauric acid) provide emolliency, barrier reinforcement and antimicrobial support; they are frequently used to restore skin lipids and help control certain microbial burdens when purity and formulation are controlled. PMC

**3. Mechanisms of action — how extracts deliver skin balance**

Botanical extracts typically act via multi-modal mechanisms:

❖Antioxidant scavenging:polyphenols neutralize ROS and prevent oxidative damage to collagen and lipids. PMC

❖Anti-inflammatory modulation:terpenes and flavonoids downregulate NF-κB, COX-2 and pro-inflammatory cytokines, reducing erythema and accelerating recovery. PMC

❖Barrier & ECM support:polysaccharides (aloe), triterpenes (Cica) and peptides indirectly stimulate collagen or hyaluronic acid synthesis and support keratinocyte differentiation. PMC +1

❖ Melanogenesis modulation:licorice constituents and vitamin C inhibit tyrosinase and melanocyte signaling pathways, reducing hyperpigmentation. PMC +1

These complementary actions explain why blended botanical systems often show broader functional outcomes than single-target actives.

## 4. Quality control: preserving activity & ensuring safety

To translate botanical potential into reliable product performance, SM DERMA applies strict GMP and analytical control across sourcing and processing:

Standardization of actives:quantify marker compounds (e.g., glabridin, EGCG, asiaticoside) and release only batches within specs.

Gentle extraction & stabilization:use low-temperature extraction, antioxidant co-formulants, and microencapsulation to preserve labile polyphenols (e.g., vitamin C, EGCG).

Contaminant screening:microbiological testing, heavy-metal assays, pesticide screens and endotoxin checks (where applicable) to meet cosmetic safety standards.

Traceability & sustainable sourcing:certified supply chains and documentation to support claims and reduce ecological impact.

These measures ensure consistent bioactivity, reduce batch variability, and minimize adverse reactions.

## 5. Formulation & delivery considerations

❖Preserving actives:many botanicals (vitamin C, EGCG) are oxidation-sensitive. Encapsulation (liposomes, solid-lipid nanoparticles), chelating agents, oxygen-barrier packaging and pH control improve shelf stability and skin delivery. PMC +1

❖Synergistic pairing:combine antioxidants (green tea, vitamin C) with anti-inflammatories (licorice, Cica) and barrier humectants (aloe, hyaluronic acid) for balanced formulations.

❖Concentration & regulatory limits:maintain efficacious but safe concentrations; conduct compatibility testing with preservatives and other actives.

❖Delivery enhancement:for deeply regenerative claims or post-procedure recovery, botanical extracts are often combined with micro-delivery (microneedling, electroporation) or formulated as serums and ampoules for higher bioavailability.

## 6. Safety, allergenicity & regulatory notes

While botanicals are perceived as "natural," they can still cause irritation or allergic contact dermatitis (fragrances, certain terpenes). Standard safety steps include patch testing, allergen declaration (e.g., soy, coconut, citrus allergens), and clinical irritation testing for higher-concentration serums. Regulatory classification depends on claims (cosmetic vs therapeutic), and companies should avoid medical claims unless supported by clinical trials and regulatory clearance. PMC

## 7. Conclusion

High-purity, well-characterized botanical extracts remain essential raw materials for balanced, consumer-friendly regenerative skincare. When combined with modern extraction, stabilization and formulation technologies, botanicals such as licorice root, citrus (vitamin C), aloe vera, Centella asiatica, green tea, ginseng, soybean and coconut deliver complementary antioxidant, anti-inflammatory, barrier-support and ECM-stimulating effects.

SM DERMA's approach—marrying traditional plant efficacy with rigorous quality control—positions these extracts as reliable core components for next-generation skincare that protects, balances and revitalizes skin exposed to daily environmental stressors.

***Selected key references (representative)***

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