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Phytochemical Constituent and Functional Assessment of Corn Silk Tea Powder

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Abstract: Corn silk (*Stigma maydis*)—the thread-like styles found on the ears of *Zea mays L.*—has been widely used in traditional medicine by cultures across the world, including Native American, Chinese, Turkish and European communities. Traditionally, corn silk tea has been valued for its diuretic and healing properties and used to manage various ailments such as urinary tract infections, kidney stones, diabetes, hypertension and inflammation. Recent research has supported many of these uses, revealing that corn silk is rich in phytochemicals such as flavonoids, alkaloids, polyphenols, saponins, tannins and vitamins. These compounds exhibit diverse pharmacological activities, including antioxidant, anti-inflammatory, diuretic Effect. This review aims to summarize current findings on the phytochemical composition and pharmacological potential of corn silk tea. It highlights its traditional applications, active constituents and therapeutic prospects, offering a scientific basis for its use in modern herbal medicine and functional beverages. corn silk (CS) is usually known for it's antioxidant capacity that Can prevent the oxidation process and it is being widely studied about its health-related Benefits (Rahman and Rosli, 2014). It has several bioactive compounds such as steroids, Alkaloids, anthocyanins, saponins, carotenoids and phenolic compounds which have Cooperative effects on physical heal. Many countries have been using corn silk for the Treatment of numerous health diseases such as prostate disorders, kidney stones, obesity, Urinary infections and bedwetting. It contain flavonoids that are also responsible for their antimicrobial property because they Dislocate the cell membrane in a way that denature bacterial proteins [1]. The presence of phenolic compounds, alkaloids, polyphenols, and steroids in the silk possesses an antiseptic and antimicrobial nature against some Particular sets of microorganisms. The ethanolic extract of corn silk has proven to Possess hypotensive effects and also act as a diuretic.

Keywords: *Antimicrobial, Carotenoid, Anticarcinogenic, Anthocyanins, Antioxidant.*

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I. INTRODUCTION

Corn silk refers to the fine, thread-like fibers that grow from the female flowers of the corn plant. Each strand is connected to an individual kernel, helping with pollination. Traditionally, these silks are harvested, dried, and brewed into tea. Corn silk tea is made either by steeping fresh or dried corn silks in hot water. It is consumed worldwide for its potential medicinal benefits, mild flavor, and nutritional content. It is usually golden-brown in color with a soothing aroma.

➢ *Aim:*

To study the photochemical constituents and functional assessment of corn silk tea powder.

➢ *Objectives:*

- To study the nutritional and medicinal properties of corn silk tea.
- To explore the potential health benefits of corn silk tea for human use.
- To evaluate the effectiveness of corn silk as a natural herbal tea.

➢ *Key Components*

Corn silk contains:

- Flavonoids (antioxidants)
- Vitamins: Vitamin C, K
- Minerals: Potassium, calcium, magnesium
- Phytochemicals: Maysin, allantoin, sitosterol
- Volatile oils and tannins

➢ *Chemical Constituents of Corn Silk*

Corn silk is rich in bioactive compounds. Below is a detailed breakdown:

➢ *Flavonoids*

These are the major active compounds:

- *Maysin, Apigenin, Luteolin, Quercetin, Kaempferol, Rutin*

✓ Functions: Antioxidant, anti-inflammatory, protects tissues from oxidative stress.

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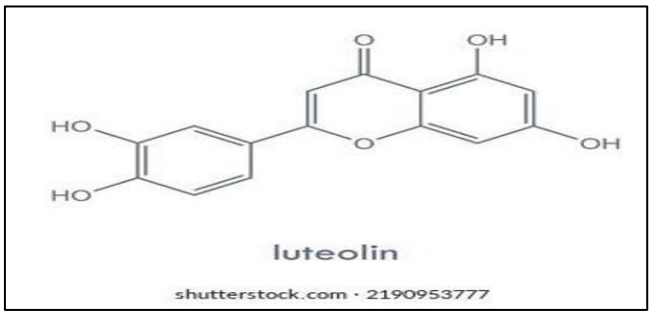
- *Phytochemical Composition of Corn Silk*

Corn silk (Stigma maydis) is a rich source of diverse bioactive compounds that contribute to its therapeutic potential.

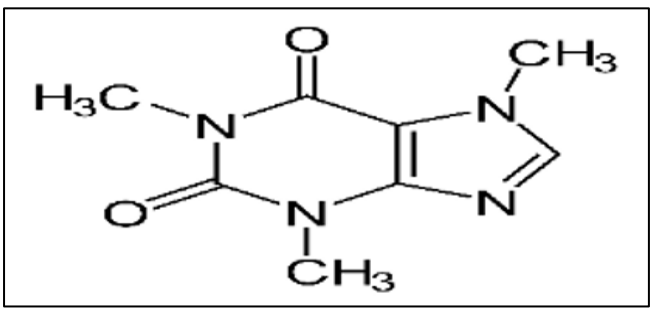
➢ *Flavonoids*

Flavonoids are among the most abundant phytochemicals found in corn silk and are considered major contributors to its biological activity. These molecules are known for their antioxidant, anti-inflammatory and diuretic properties.For example,Luteolin contribute to anti- inflammatory and vasodilatory effects which help explain the traditional use of corn silk in managing hypertension and inflammatory conditions.



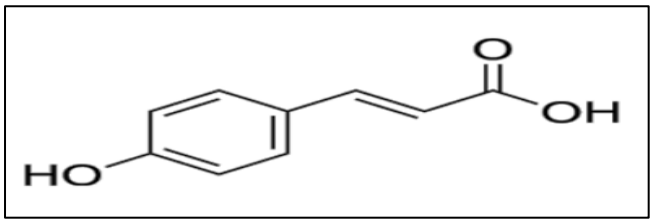
➢ *Alkaloids*

Although present in smaller amounts compared to flavonoids, alkaloids play an important role in the pharmacological profile of corn silk. These nitrogen-containing compounds may contribute to its mild sedative.



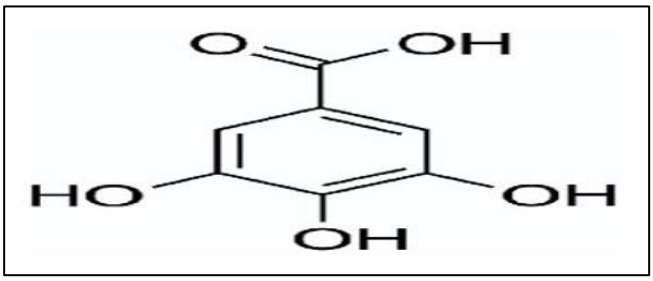
➢ *Polyphenols and Phenolic*

Acids Polyphenolic compounds—including ferulic acid, vanillic acid, caffeic acid and p-coumaric acid—are key contributors to corn silk's antioxidant activity.



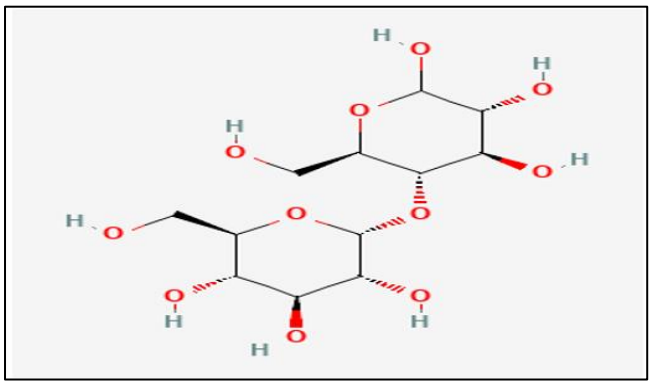
➢ *Saponins and Tannins*

Saponins and tannins are secondary metabolites with known health-promoting effects. Saponins can lower cholesterol levels, stimulate the immune system, and exhibit antimicrobial properties, while tannins have strong antioxidant and astringent activities. Together, they contribute to the protective and detoxifying effects attributed to corn silk tea.



➢ *Vitamins, Minerals and Polysaccharides*

These nutrients support its diuretic and antioxidant functions. The phytochemical richness of corn silk is responsible for its wide range of pharmacological properties. Flavonoids, phenolic acids and polysaccharides in particular play key roles in its antioxidant, anti-inflammatory and diuretic actions. These findings provide a solid biochemical foundation for understanding and validating the traditional uses of corn silk tea in herbal medicine. Recent pharmacological studies suggest that corn silk extract may possess mild antidepressant and antifatigue effects. These benefits are believed to result from the presence of bioactive flavonoids that modulate neurotransmitter activity and reduce oxidative stress in the brain.



In animal models, administration of corn silk extract significantly reduced immobility time in forced-swim tests—an indicator of antidepressant-like behavior. The antifatigue properties have been linked to improved energy metabolism and reduced accumulation of lactic acid during physical exertion.

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II. LITERATURE REVIEW

Table 1 Literature Review

TITLE (as in references)	JOURNAL /SOURCES	Content (concise memory)
Phytochemical Analysis of Corn Silk (Zea mays)	Chang et al. (PMC study)	Supports use of corn silk tea for diabetes management and protection of pancreatic β- cells; shows molecular basis (flavonoids like apigenin, luteolin) for therapeutic effects.
To investigate corn silk's antioxidant potential and its inhibitory effects on enzymes linked to diabetes and diabetic nephropathy	Corn silk (Zea mays L.) … α- amylase, α-glucosidase … diabetic nephropathy" (PubMed)	Very relevant for anti- diabetic effect of corn silk tea; provides in vitro evidence for both enzyme inhibition (thus reducing blood sugar) and protection against diabetic kidney damage.
To critically evaluate the health-promoting potential of ethanolic corn silk extract	Recent phyto- Pharmacological review (IJNRD 2025)	Provides up-to-date synthesized evidence that supports a variety of therapeutic benefits, lending strong academic backing to a project on corn silk tea.

➢ *Plan of Work:*

- *Selection of Topic and Literature Review*

✓ Identify corn silk as a natural, nutrient-rich herbal material with documented medicinal properties.

✓ Conduct an in-depth review of scientific articles, books, and traditional medicine records to understand its phytochemical composition, health benefits, and previous research.

➢ *Materials and Methods*

Table 2 Materials and Methods

Step	Procedure	Equipment Needed
1. Collection	Collect fresh, golden-brown corn silks from local market	-
2. Cleaning	Wash with tap water to remove dust and impurities	Beaker, Water
3. Drying	Spread on tray and dry in oven at 45°C for 24 hours	Hot air oven, Tray
4. Powdering	Grind dried corn silk in mixer grinder	Mixer grinder, Sieve
5. Storage	Store powder in airtight container	Amber bottle, Label

➢ *Material Preparation Basic Quality Tests*

Table 3 Material Preparation Basic Quality Tests

Test	Procedure	Observation
pH	Dip pH paper in tea sample	Record color change
Color	Visual examination	Note color intensity
Yield	(Final extract weight/Initial powder weight) × 100	Calculate perctaage

➢ *Mechanism of Action*

Corn silk promotes water and electrolyte excretion (especially Na^+ and K^+), which helps reduce blood volume and subsequently lowers blood pressure.The vasodilatory effects of flavonoids like luteolin and apigenin also contribute to its antihypertensive and diuretic actions.

➢ *Clinical and Human Trial Data*

One clinical trial involving 38 volunteers who consumed 600 mL of corn silk water extract daily for one week did not show significant changes in urine volume or electrolyte excretion. This suggests that dosage, duration, and individual variability may influence diuretic efficacy in humans.

➢ *Traditional and Therapeutic Uses Related to Diuresis*

- *Urinary and Kidney Disorders:*

Used to flush out toxins, prevent kidney stones, and relieve urinary tract irritation. Supports renal function without causing significant electrolyte imbalance.

- *Hypertension and Edema:*

Helps reduce blood pressure through diuresis and vasodilation. Commonly used in folk medicine to manage edema and fluid retention.

➢ *Safety and Dosage Recommendations*

Corn silk is considered safe and non-toxic when used in traditional doses. No significant adverse effects reported in animal or human studies at recommended doses.

- *Possible Side Effects:*

Excessive use may lead to dehydration or electrolyte imbalance. Caution advised for individuals with hypotension or those taking diuretic or antihypertensive medications.

- *Recommended Dosage:*

2–3 grams of dried corn silk steeped in hot water for 10–15 minutes, consumed 1–2 times daily.

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➢ *The Diuretic Action of Corn Silk is a Synergistic Process:*

- *Initiation:*

Potassium and bioactive flavonoids directly stimulate the kidneys to excrete more sodium and potassium.

- *Amplification:*

Vasodilation from flavonoids improves renal blood flow, supporting the increased filtration and urine production.

- *Protection:*

Antioxidant and anti-inflammatory activities safeguard the kidney structures from damage, ensuring the diuretic process can continue effectively and sustainably.

➢ *Diuretic and Kidney-Protective Effects*

Corn silk tea has traditionally been used as a natural diuretic and modern studies confirm its ability to increase urine output without causing electrolyte imbalance. Its mild and non-toxic diuretic effect is attributed to potassium, flavonoids and saponins that promote renal filtration and sodium excretion.

In animal studies, corn silk extract has been shown to reduce urea, creatinine and uric acid levels, indicating improved kidney function. This supports its use in managing urinary tract infections, cystitis, nephritis and edema. The combined diuretic and antioxidant effects make corn silk an effective renal-protective agent.

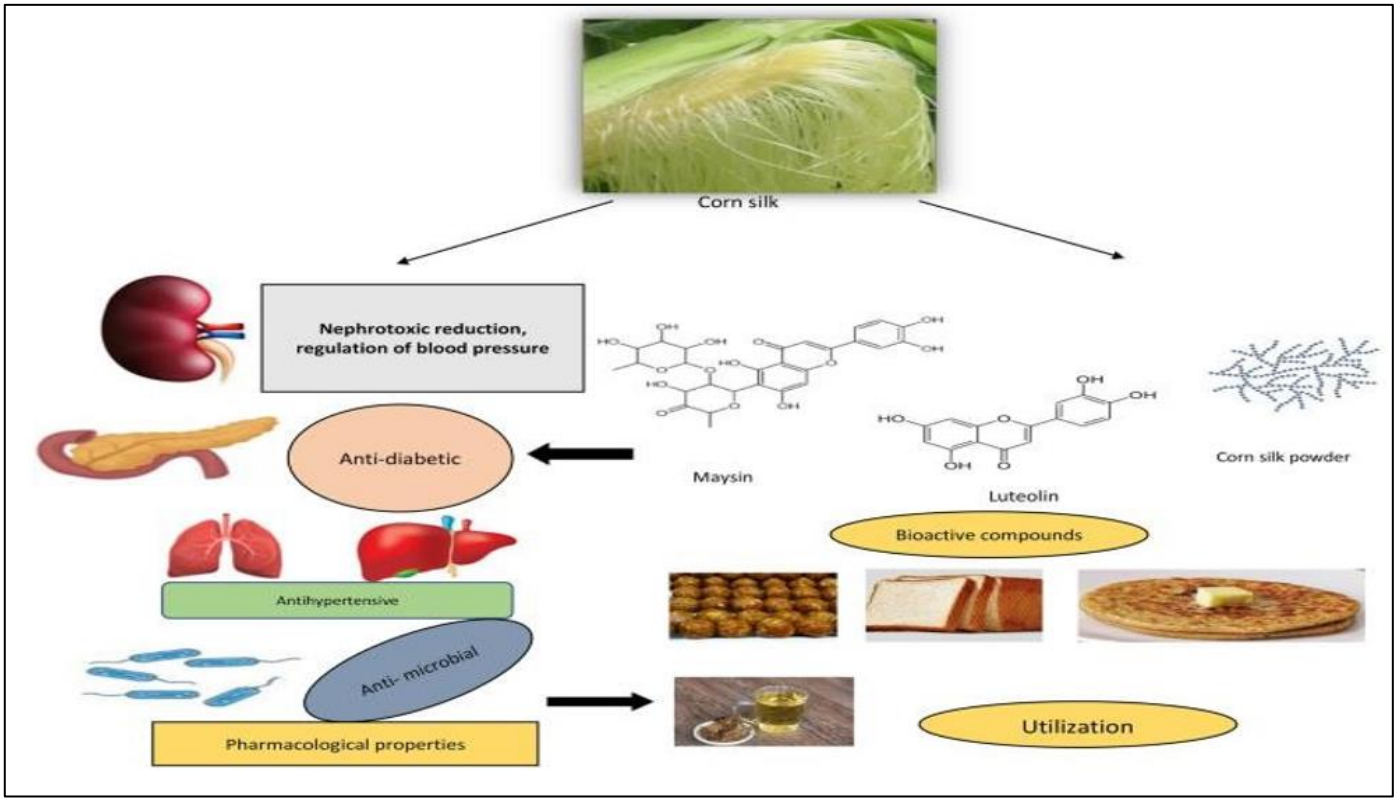

Fig 1 Diuretic and Kidney-Protective Effects

III. APPLICATIONS

➢ *Use in Urinary and Kidney Protection:*

One of the oldest and most consistent uses of corn silk is in promoting urinary health. Its mild diuretic effect helps flush out toxins, prevent the formation of kidney stones and relieve urinary tract irritation. The combination of potassium salts, flavonoids and saponins contributes to its ability to increase urine volume and support renal function without causing electrolyte imbalance.

Corn silk tea continues to be a popular home remedy for urinary infections, bladder inflammation, and mild cases of hypertension associated with water retention.

➢ *Liver Protection and Detoxification*

Corn silk has long been considered beneficial for liver health due to its antioxidant and detoxifying properties. In traditional Chinese medicine, it is used to support bile secretion and prevent jaundice. Research suggests that the flavonoids and phenolic acids in corn silk help protect hepatocytes from toxin-induced damage and improve overall liver function. These findings support its role as a natural detoxifier and hepatoprotective agent.

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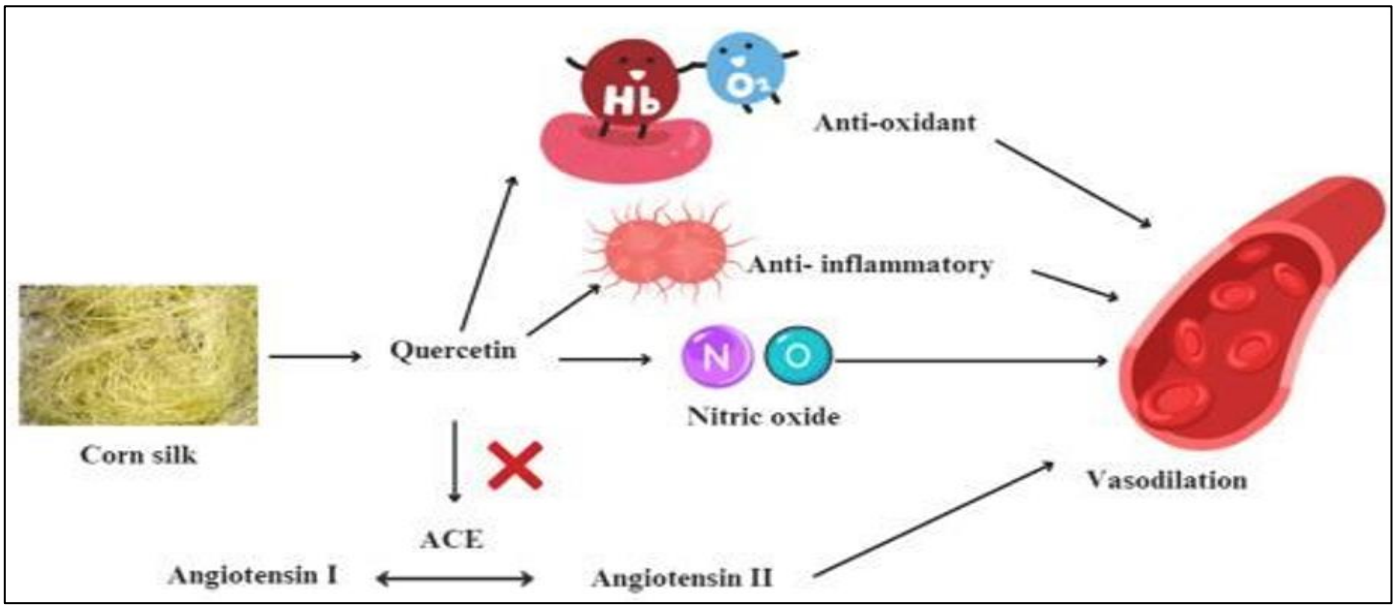

Fig 2 Liver Protection and Detoxification

- *Toxicological Studies and Safety Profile of Corn Silk*

Corn silk (*Stigma maydis*) has been widely regarded as a safe and non-toxic herbal remedy when used in traditional doses. Both historical records and modern studies indicate that corn silk tea and extracts are generally well tolerated in humans and animals. However, as with any bioactive natural product, its safety profile depends on dosage, preparation method and individual health conditions.

➢ *General Safety*

Numerous animal studies have confirmed the low toxicity of corn silk. Acute and sub-chronic toxicity tests show that even at relatively high doses, corn silk extracts do not cause significant changes in body weight, organ morphology, or biochemical parameters such as liver and kidney function markers. No mortality or behavioral abnormalities were observed in these studies, suggesting a wide margin of safety for therapeutic use.

In traditional use, corn silk tea is consumed daily as a mild diuretic or health beverage without adverse effects. The presence of essential nutrients such as potassium, magnesium and vitamins further supports its nutritional safety.

➢ *Possible Side Effects*

Although corn silk is considered safe, excessive consumption may lead to certain mild side effects. Because of its diuretic action, overuse can potentially cause dehydration or electrolyte imbalance if not accompanied by sufficient fluid intake. People with hypotension or those taking prescription diuretics should use corn silk cautiously to avoid excessive fluid loss.

Rare allergic reactions have been reported, usually in individuals sensitive to maize or related plants. Symptoms may include mild itching or skin. However, such reactions are uncommon and usually resolve upon discontinuation.

➢ *Diuresis and Kaliuresis Effects:*

Diuresis refers to the increased production and discharge of urine, while kaliuresis denotes the elevated excretion of potassium in urine. The diuretic and kaliuretic effects of corn silk (CS) aqueous extract have been widely studied to understand its influence on kidney function and electrolyte balance. A significant diuretic effect was also observed at 500 mg/kgwhile K^+ excretion increased by 62% and 63% over the same time periodsdemonstrating its hypotensive and diuretic properties, consistent with its traditional use as a natural diuretic agent. This inconsistency suggests that dosage and duration may play crucial roles in determining the efficacy of corn silk as a diuretic.

➢ *Future Aspects of Corn Silk (Stigma maydis)*

The current scientific and commercial interest in corn silk is poised to grow significantly. The future trajectory can be categorized into several key areas, moving from basic validation to advanced product development and innovative applications.

➢ *Advanced Pharmacological and Clinical Research*

While preliminary studies are promising, the future requires a more rigorous and targeted research approach.

- *Standardized Human Clinical Trials:*

✓ Need: The document highlights a key inconsistency: one human trial showed no significant diuretic effect, while animal studies were positive. This underscores the need for large-scale, randomized, double-blind, placebo-controlled clinical trials (RCTs) in humans.
✓ Future Focus: These trials must establish:

- Optimal Dosage: Determining the exact dose (e.g., mg/kg) for desired diuretic, antihypertensive, and hypoglycemic effects in humans.
- Treatment Duration: Identifying how long it takes to see effects and the safety of long-term use.

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- Standardized Extracts: Using extracts with standardized content of key active compounds (e.g., total flavonoids, maysin) to ensure consistent and reproducible results.

- *Mechanistic Elucidation:*

✓ Need: The exact molecular targets for diuresis are not fully understood.
✓ Future Focus: Research will delve into:

- Specific Renal Channels: Investigating if corn silk compounds interact with specific ion channels in the kidney nephrons, such as the Na-K-Cl cotransporter (NKCC2) targeted by loop diuretics, or sodium-chloride cotransporters (NCC).
- Hormonal Pathways: Studying its influence on the renin-angiotensin-aldosterone system (RAAS), a key regulator of blood pressure and fluid balance.
- Cell Signaling Pathways: As mentioned in the anticancer section (blocking EGFR/PI3K/AKT/CREB), similar detailed work is needed for its diuretic and anti- inflammatory actions.

➢ *Drug Discovery and Nutraceutical Development*

Corn silk is a rich source for developing new, natural-based health products.

- *Isolation and Synergy of Active Compounds:*

✓ Future Focus: Instead of using the whole extract, future research will aim to:

- Isolate Single Molecules: Identify the most potent single compound responsible for diuresis (a "lead compound") for potential drug development.

IV. CONCLUSION

Multifaceted Pharmacological Profile: Corn silk tea exhibits a broad spectrum of biological activities beyond diuresis, including significant antioxidant, anti-inflammatory, hypoglycemic, antidepressant, and antimicrobial effects. This makes it a valuable functional beverage for preventive healthcare and managing metabolic syndrome. Conducting large-scale, standardized human clinical trials. Establishing precise dosage recommendations for specific health conditions. Isolating and standardizing key active compounds for nutraceutical development. Investing in technologies for large-scale, sustainable processing and extraction.

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