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Corn Silk (*Stigma maydis* L.) as a Medicinal and Aromatic Plant: Phytochemical Diversity, Bioactivity, and Functional Applications: A Systematic Literature Review

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Abstract: Corn silk (*Stigma maydis* L.), the stigmatic tissue of maize (*Zea mays* L.), has long been used in traditional medicine for urinary and metabolic disorders. Although previous reviews have described its medicinal properties, current evidence remains fragmented across phytochemical, pharmacological, and functional studies, highlighting the need for a comprehensive systematic synthesis. This systematic literature review aimed to synthesize and critically evaluate evidence on the phytochemical composition, pharmacological activities, and functional applications of corn silk while identifying current research gaps and future research directions. A PRISMA-guided systematic search was conducted using Scopus, Google Scholar, and selected publisher databases for English-language studies published up to December 2024. Eligible peer-reviewed articles investigating corn silk phytochemistry, bioactivities, toxicity, or functional applications were screened according to predefined inclusion and exclusion criteria. Nineteen studies met the eligibility criteria and were included in the qualitative synthesis. Corn silk is rich in flavonoids, phenolic acids, polysaccharides, and bioactive peptides, exhibiting antioxidant, anti-inflammatory, antidiabetic, antihypertensive, and organ-protective activities. Emerging applications include functional foods, cosmeceuticals, and eco-friendly bioproducts. Corn silk demonstrates considerable therapeutic potential; however, further standardized studies and clinical validation are needed to support its evidence-based application.

Keywords: Corn silk; Functional applications; Pharmacological activity; Phytochemistry; *Stigma maydis* L.; Systematic review

Introduction

The growing prevalence of chronic non-communicable diseases (NCDs), including diabetes mellitus, cardiovascular diseases, chronic kidney disorders, and metabolic syndrome, has intensified global interest in plant-derived bioactive compounds as complementary therapeutic agents. Medicinal plants constitute an important source of natural products with diverse pharmacological properties, including antioxidant, anti-inflammatory, antimicrobial, and metabolic regulatory activities. Their long history of traditional use, together with increasing scientific validation, has strengthened their role in the development of evidence-based herbal medicines, functional foods, and nutraceuticals.

Among medicinal plant materials, corn silk (*Stigma maydis* L.), the stigmatic tissue of maize (*Zea mays* L.), has attracted considerable scientific attention because of its rich phytochemical composition and diverse biological activities. Corn silk contains flavonoids, phenolic acids, polysaccharides, bioactive peptides, vitamins, and minerals that contribute to antioxidant, anti-inflammatory, antidiabetic, antihypertensive, nephroprotective, hepatoprotective, and neuroprotective effects. Traditionally, corn silk has been used in many countries as a herbal remedy for urinary tract disorders, hypertension, and metabolic diseases,

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while recent studies have expanded its applications to functional foods, cosmeceuticals, and environmentally sustainable bioproducts. Across traditional medical systems in Asia, the Middle East, the Americas, and Europe, corn silk has been widely recognized as a diuretic, anti-inflammatory, and metabolic-regulating herbal material (Patel et al., 2023). Likewise, the continued use of herbal products in complementary and traditional healthcare highlights the enduring importance of plant-based medicines worldwide (Rivera et al., 2003).

Despite increasing scientific interest, evidence regarding the therapeutic potential of corn silk remains fragmented across phytochemistry, pharmacology, food science, biotechnology, and toxicology. Variations in extraction techniques, phytochemical characterization, experimental models, and outcome measurements make direct comparisons among studies difficult and hinder the translation of research findings into practical applications. Furthermore, although previous reviews have summarized selected pharmacological properties of corn silk, most adopted a narrative approach and did not systematically integrate phytochemical diversity, pharmacological evidence, safety evaluation, and emerging functional applications within a single evidence-based framework.

To address these gaps, this study applies the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to systematically identify, evaluate, and synthesize current evidence on corn silk. Unlike previous narrative reviews, this systematic review comprehensively integrates phytochemical composition, pharmacological activities, safety profiles, and functional applications while identifying research gaps and future research priorities. The findings are expected to provide a stronger scientific basis for future experimental studies, clinical investigations, and the development of evidence-based herbal products derived from corn silk.

Method

Search Strategy

A systematic literature search was conducted primarily using the Scopus database, supported by complementary searches in Google Scholar and selected publisher databases. Search strings combined controlled keywords and Boolean operators, including: ("corn silk" OR "Stigma maydis") AND ("bioactive compounds" OR "pharmacological activity" OR "medicinal plant"). The search covered peer-reviewed articles published up to 2024. Background articles that provided general context on herbal medicine use, but did not specifically investigate corn silk, were retained for contextual discussion but excluded from the qualitative thematic synthesis.

Eligibility Criteria

Inclusion criteria comprised: (i) original research articles and reviews focusing on corn silk; (ii) studies reporting phytochemical composition, biological activity, or functional applications; and (iii) publications in English. Exclusion criteria included non-peer-reviewed sources, conference abstracts without full texts, and studies not directly related to medicinal or aromatic plant applications.

Screening and Selection

All retrieved records were screened in two stages: title–abstract screening followed by full-text assessment. Duplicates were removed, and eligibility was independently verified. The screening process followed PRISMA guidelines, ensuring transparency and reproducibility. The study selection process is illustrated in Figure 1.

PRISMA Flow Diagram (Figure 1)

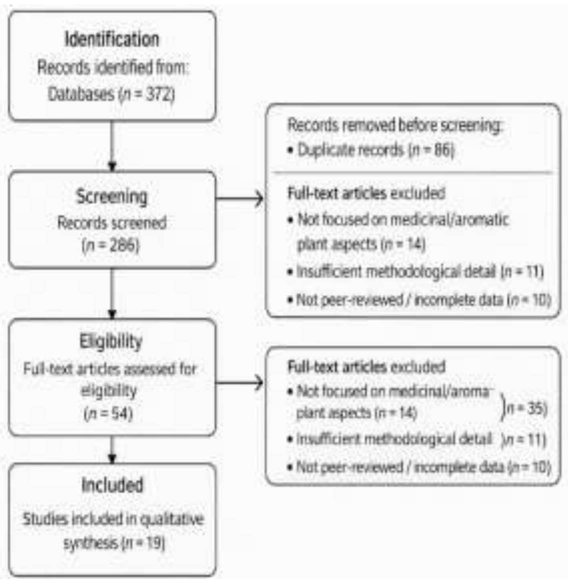

Figure 1. PRISMA flow diagram

The literature selection process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A total of 372 records were initially identified through database searching using Scopus and supporting academic databases. After removing 86 duplicate records, 286 records remained and were subjected to title and abstract screening. Following this screening stage, 232 records were excluded due to irrelevance to medicinal and aromatic plant research, resulting in 54 full-text articles assessed for eligibility. Of these, 35 articles were excluded after full-text evaluation because they did not sufficiently address the medicinal or aromatic aspects of corn silk, lacked adequate methodological detail, or were not peer-reviewed. Ultimately, 19 corn silk-specific studies met all inclusion criteria and were included in the qualitative synthesis. The included studies were systematically analyzed according to their phytochemical composition, pharmacological activities, experimental models, safety evaluation, and potential functional applications.

Quality Assessment

The methodological quality of included studies was assessed based on clarity of experimental design, analytical methods, and outcome reporting. Preclinical and in vitro studies were evaluated for biological relevance and reproducibility.

Theoretical Background

Medicinal and Aromatic Plant Framework.

Within medicinal and aromatic plant research, bioactivity is primarily attributed to secondary metabolites that modulate oxidative stress, inflammation, and metabolic pathways. Corn silk aligns with this framework due to its high flavonoid and phenolic content.

Ethnopharmacological Context

Historically, corn silk has been used to treat urinary disorders, hypertension, and inflammatory conditions. This traditional knowledge has guided modern pharmacological investigations and hypothesis-driven research.

Current Debates and Challenges

Key debates concern the standardization of corn silk extracts, variability in phytochemical content, and the limited availability of clinical trials. These issues challenge translation from laboratory findings to clinical and commercial applications.

Result and Discussion

The findings of this systematic literature review are synthesized into four major thematic areas that align with the Science (Chemistry, Physics, and Biology) of the *Jurnal Penelitian Pendidikan IPA* Each theme reflects a dominant research stream within the literature and is supported by a dedicated thematic table to enhance clarity, comparability, and analytical depth.

Phytochemical Profile and Bioactive Constituents of Corn Silk

Studies addressing the phytochemical profile of corn silk consistently report the identification, characterization, and functional relevance of secondary metabolites in corn silk that underpin its medicinal and aromatic value.

No.	Article Titles	Plant Part	Major Compounds Identified	Analytical Methods	Biological Relevance
1.	An Attention-Grabbing Review on Stigma Maydis (Corn Silk). (Patel et al. 2023).	Corn silk	Flavonoids, phenolics	HPLC, spectrophotometry	Antioxidant, anti-inflammatory
2.	Corn Silk Maysin Ameliorates Obesity in Vitro and in Vivo via Suppression of Lipogenesis, Differentiation, and Function of Adipocytes. (Lee et al. 2017).	Corn silk	Maysin	LC-MS	Anti-obesity, metabolic regulation
3.	Assessment of Antioxidant Activity of Stigma Maydis Extract/Corn Silk Extract and Exploring Its Efficacy Against Hyperglycemia in Diabetic Rats. (Tahir et al. 2023).	Corn silk	Polyphenols, flavonoids	DPPH, FRAP assays	Antioxidant, antidiabetic
4.	In-Vitro Evaluation of Xanthine Oxidase Inhibition and Antioxidant Capacity of Water Extracts of Corn Silk (Zea mays L.). (Nessa, Khan, and George 2021).	Corn silk	Phenolic acids	In vitro enzyme assays	Antioxidant, xanthine oxidase inhibition
5.	Antioxidant, Anti-Tyrosinase, and Anti-Skin Pathogenic Bacterial Activities and Phytochemical Compositions of Corn Silk Extracts, and Stability of Corn Silk Facial Cream Product. (Yucharoen et al. 2023).	Corn silk	Flavonoids, volatile-associated compounds	GC-MS, HPLC	Cosmeceutical potential

Figure 2. Phytochemical composition and bioactive compounds of corn silk (*Stigma maydis* L.)

Collectively, the studies summarized in Table 1 demonstrate that corn silk is characterized by a complex and diverse phytochemical profile dominated by flavonoids, phenolic acids, polysaccharides, and bioactive peptides. Among these constituents, flavonoids—particularly maysin—are consistently reported as major contributors to biological activity (Choi et al., 2014; Lee et al., 2017). Despite differences in analytical approaches, including HPLC, LC–MS, and GC–MS, there is strong convergence across studies regarding the qualitative presence of these compounds, suggesting a relatively conserved phytochemical signature of corn silk.

Notably, several studies indicate that biological activity cannot be attributed to a single compound class alone. Instead, antioxidant and anti-inflammatory effects appear to arise from synergistic interactions among multiple phytochemical groups. This observation aligns with fundamental principles of medicinal and aromatic plant science, which emphasize the holistic activity of plant extracts rather than isolated constituents. Moreover, the identification of volatile-associated compounds, although less frequently reported, highlights the relevance of corn silk within the aromatic plant domain, particularly for cosmetic and functional product development.

However, substantial methodological heterogeneity is evident across studies, particularly with respect to extraction solvents, plant material handling, and reporting of compound concentrations. This variability limits quantitative comparison and underscores the need for standardized phytochemical profiling protocols. Overall, the evidence confirms that corn silk possesses a rich bioactive matrix that provides the biochemical foundation for its medicinal and aromatic applications.

Antidiabetic and Metabolic Regulatory Activities

This theme synthesizes evidence on the role of corn silk as a medicinal plant in glycemic control, lipid metabolism, and obesity management.

As summarized in figure 3, antidiabetic and metabolic regulatory effects represent one of the most extensively investigated and coherent research themes related to corn silk. Across in vivo models, supplementation with corn silk extracts consistently resulted in improved glycemic control, reduced insulin resistance, and modulation of lipid metabolism (Shivaprasad et al., 2024; Tahir et al., 2023; Yang et al., 2024). These outcomes were observed using different extract types, suggesting that multiple phytochemical fractions contribute to metabolic regulation. Importantly, the limited available human evidence, although preliminary, supports the translational potential of corn silk, particularly when incorporated into functional food matrices (Haldar et al., 2019).

No.	Article Titles	Study Model	Extract Type	Key Outcomes	Medicinal Relevance
1.	Corn Silk Maysin Ameliorates Obesity in Vitro and in Vivo via Suppression of Lipogenesis, Differentiation, and Function of Adipocytes. (Lee et al. 2017).	In vitro (3T3-L1) and obese mouse model	Corn silk flavonoid (maysin-rich) extract	Suppressed lipogenesis and adipocyte differentiation	Anti-obesity, metabolic regulation
2.	Galectin-12 Is Involved in Corn Silk-Induced Anti-Adipogenesis and Anti-Obesity Effects. (Hsu et al. 2018).	Obese and diabetic mouse models	Aqueous corn silk extract	Inhibited adipogenesis via galectin-12 signaling pathway	Anti-obesity, insulin sensitivity
3.	Postprandial Glycemic and Insulinemic Effects of the Addition of Aqueous Extracts of Dried Corn Silk, Cumin Seed Powder or Tamarind Pulp, in Two Forms, Consumed with High Glycemic Index Rice. (Haldar et al. 2019).	Human postprandial study	Aqueous corn silk extract (food incorporation)	Reduced postprandial glycemic and insulinemic responses	Glycemic control, functional food
4.	Assessment of Antioxidant Activity of Stigma Maydis Extract/Corn Silk Extract and Exploring Its Efficacy Against Hyperglycemia in Diabetic Rats. (Tahir et al. 2023).	Streptozotocin-induced diabetic rats	Ethanolic corn silk extract	Reduced blood glucose and oxidative stress markers	Antidiabetic potential
5.	Corn Silk Extract Alleviate Type 1 Diabetes via Regulating Gut Microbiota and Inflammation. (Yang et al. 2024).	Type 1 diabetic mouse model	Corn silk extract	Improved glucose homeostasis via gut microbiota modulation	Antidiabetic, metabolic-microbiota interaction
6.	Exploring the Anti-Obesity Properties of Corn Silk Extract (CornFit®) in C57BL/6 Mice Induced with Obesity via a High-Fat Diet. (Shivaprasad et al. 2024).	High-fat diet-induced obese mice	Standardized corn silk extract (CornFit®)	Reduced body weight gain and lipid accumulation	Anti-obesity, metabolic support
7.	Effect of Corn Silk Aqueous Extract on Brown Adipose Tissue of Embryos and Neonates of Diabetic Pregnant Mice: A Histological Study. (Al-Qudsi and Almudairi 2022).	Diabetic pregnant mice (embryos & neonates)	Aqueous corn silk extract	Histological modulation of brown adipose tissue	Metabolic regulation (experimental support)

Figure 3. Antidiabetic and metabolic effects of corn silk extracts

This finding is highly relevant within the medicinal and aromatic plant framework, as it positions corn silk not only as a therapeutic agent but also as a dietary-based intervention for metabolic disorders. The reported influence on gut microbiota composition further suggests indirect metabolic mechanisms that extend beyond classical glucose-lowering pathways. Mechanistic studies have demonstrated that corn silk extracts suppress adipogenesis through the involvement of galectin-12 signaling pathways, providing molecular support for its anti-obesity effects (Hsu et al., 2018).

Despite these promising findings, most studies remain short-term and preclinical in nature. Differences in dosage, treatment duration, and outcome indicators restrict cross-study synthesis. Consequently, while the metabolic benefits of corn silk are well supported at an experimental level, further standardized and longer-term investigations are required to establish clinical relevance and optimal application strategies.

Cardiovascular and Neuroprotective Properties

This theme addresses the antihypertensive, cardioprotective, and neuroprotective roles of corn silk bioactives.

No.	Article Titles	Health Domain	Active Constituents	Mechanism of Action	Therapeutic Implications
1.	A Novel Heat-Stable Angiotensin-Converting Enzyme Zinc-Binding Motif Inhibitory Peptide Identified from Corn Silk. (Hsiang et al. 2024).	Hypertension	ACE-inhibitory peptides	ACE inhibition	Antihypertensive herbal agent
2.	Neuroprotective Effects of Corn Silk Maysin via Inhibition of H 2O2-Induced Apoptotic Cell Death in SK-N-MC Cells. (Choi et al. 2014).	Neuroprotection	Maysin	Anti-apoptotic, antioxidant	Neurodegenerative disease prevention
3.	An Attention-Grabbing Review on Stigma Maydis (Corn Silk). (Patel et al. 2023).	Cardiovascular health	Polyphenols	NO modulation	Vascular protection
4.	Corn Silk Extract Alleviate Type 1 Diabetes via Regulating Gut Microbiota and Inflammation. (Yang et al. 2024).	Inflammation-related disorders	Polyphenols	Cytokine regulation	Cardiometabolic health
5.	Corn Silk Maysin Ameliorates Obesity in Vitro and in Vivo via Suppression of Lipogenesis, Differentiation, and Function of Adipocytes. (Lee et al. 2017).	Metabolic-cardiac link	Flavonoids	Lipid regulation	Cardioprotective support

Figure 4. Cardiovascular and neuroprotective activities of corn silk

The studies presented in figure 4 collectively demonstrate that corn silk exhibits multifunctional activity relevant to cardiovascular and neurological health. Antihypertensive effects are primarily attributed to the presence of ACE-inhibitory peptides, providing a mechanistic explanation for the traditional use of corn silk in blood pressure management (Hsiang et al., 2024). This mechanistic clarity strengthens the pharmacological plausibility of corn silk as a medicinal plant.

Neuroprotective activity, largely associated with flavonoid-mediated antioxidant and anti-apoptotic mechanisms, has been demonstrated in neuronal cell models (Choi et al., 2014). These effects are particularly relevant in the context of oxidative stress and inflammation, which are central targets of medicinal and aromatic plant interventions. Notably, some studies suggest an interconnection between metabolic regulation and cardiovascular outcomes, indicating that the benefits of corn silk may arise from systemic rather than organ-specific mechanisms.

Nevertheless, inconsistencies in experimental models and endpoints limit direct comparison across studies. Moreover, the absence of clinical validation remains a significant gap. Future research should aim to integrate cardiovascular and neuroprotective endpoints within unified experimental frameworks to better capture the holistic effects of corn silk.

Renal, Hepatic, and Emerging Functional Applications

This theme captures the broader medicinal and aromatic plant applications of corn silk, including organ protection, cosmetics, and eco-friendly products.

No.	Article Titles	Application Domain	Model/System	Key Findings	Application Potential
1.	Effect of Corn Silk Extract on Renal Functions in Acetaminophin Induced Nephrotoxicity in Mice. (Mehboob et al. 2018).	Nephroprotection	Acetaminophen-induced nephrotoxicity in mice	Improved renal biochemical markers	Herbal renal therapy
2.	Subchronic Toxicity Study of Corn Silk with Rats. (Liu et al. 2011).	Safety evaluation	Subchronic toxicity study in rats	No observed toxic effects	Regulatory assurance
3.	Antioxidant, Anti-Tyrosinase, and Anti-Skin Pathogenic Bacterial Activities and Phytochemical Compositions of Corn Silk Extracts, and Stability of Corn Silk Facial Cream Product. (Yucharoen et al. 2023).	Cosmetics	In vitro assays and cream formulation	Anti-tyrosinase and antibacterial activities	Cosmeceutical products
4.	The Effect Of Corn Silk Extract (Zea Mays) As Biolarvicides Of Aedes Aegypti Mosquito Larvae In Efforts To Control Spread Of Dengue Hemorrhagic Fever. (Wahyudi and Abror 2021).	Eco-friendly application	Aedes aegypti larvae	High larval mortality	Biolarvicidal vector control
5.	Antioxidant and Anti-Adipogenic Activities of Bread Containing Corn Silk, Job's Tears, Lentinus Edodes, and Apple Peel in 3T3-L1 Preadipocytes. (Lee et al. 2016).	Functional food	3T3-L1 preadipocyte model (food formulation)	Increased antioxidant activity and reduced adipogenesis	Functional food development
6.	Foods and Beverages Made from Mexican Purple Corn: A Means to Increase Anthocyanins' Intake. (Mendoza-Mendoza et al. 2023).*	Functional food context	Purple corn food products (Zea mays L.)	Enhanced dietary antioxidant intake	Contextual support for maize by-products

Figure 5. Renal, hepatic, and emerging functional applications of corn silk (*Included as contextual support for maize-derived functional foods; not specific to corn silk)

As outlined in figure 5, renal and hepatic protective effects constitute an important extension of the medicinal profile of corn silk. Experimental studies have consistently reported improvements in biochemical markers of kidney and liver function in toxin-induced models, supporting its traditional use as a diuretic and detoxifying herbal material (Mehboob et al., 2018). In addition, subchronic toxicity evaluations indicate the absence of adverse effects, reinforcing its safety profile for further development and regulatory consideration (Liu et al., 2011).

Beyond classical therapeutic applications, a growing body of literature highlights the functional and aromatic potential of corn silk in cosmetic and personal care products. In particular, antioxidant, anti-tyrosinase, and antibacterial activities have been demonstrated in extract-based formulations, supporting its incorporation into cosmeceutical products (Yucharoen et al., 2023). These applications align closely with the scope of medicinal and aromatic plant research that emphasizes multifunctional plant-derived resources.

Corn silk has also demonstrated promise in environmentally friendly applications. Notably, its extracts have exhibited biolarvicidal activity against *Aedes aegypti* larvae, suggesting a potential role in eco-friendly vector control and public health-oriented plant-based interventions (Wahyudi et al., 2021). Such findings further expand the application spectrum of corn silk beyond conventional medicinal uses.

Within the broader context of maize-derived functional foods, studies on purple corn-based foods and beverages have demonstrated the nutritional and health-promoting potential of *Zea mays L*, providing contextual support for the exploration of underutilized maize by-products such as corn silk in functional food development (Mendoza-Mendoza et al., 2023). Although not directly focused on corn silk, this evidence underscores the versatility of maize as a source of bioactive food ingredients. In addition to processing-related challenges, the quality and microbial composition of maize-derived raw materials may influence the safety and functional consistency of plant-based products, as variations in kernel-associated microbiota have been reported under different fungal infection conditions (Moore et al., 2023). The incorporation of corn silk into food formulations has been shown to enhance antioxidant capacity and inhibit adipogenic differentiation in vitro, supporting its application in functional food development (Lee et al., 2016).

Despite these promising applications, translation into commercial products remains constrained by variability in raw material quality, extraction efficiency, and regulatory considerations. Addressing these challenges will require interdisciplinary collaboration and standardized production frameworks to ensure safety, efficacy, and sustainability.

Discussion

This systematic literature review synthesizes current evidence on corn silk (*Stigma maydis* L.) within the conceptual and applied framework of science (Chemistry, Physics, and Biology), as emphasized by the *Jurnal Penelitian Pendidikan IPA*. Overall, the findings confirm that corn silk represents a multifunctional plant resource whose bioactivity is strongly linked to its diverse secondary metabolite profile, traditional ethnomedicinal uses, and emerging functional applications. By integrating phytochemical, pharmacological, and applied research streams, this discussion highlights key scientific insights, methodological patterns, and critical gaps that shape the current state of knowledge.

A central theme emerging from the reviewed literature is the pivotal role of flavonoids particularly maysin alongside phenolic acids, polysaccharides, and bioactive peptides in mediating the medicinal properties of corn silk. These compounds collectively underpin antioxidant, anti-inflammatory, antidiabetic, antihypertensive, and organ-protective activities. From a medicinal and aromatic plant perspective, this aligns with established paradigms in which secondary metabolites act synergistically rather than as isolated agents. Several studies demonstrated that whole extracts exhibited stronger bioactivity than purified compounds, supporting the traditional herbal concept of phytochemical synergy (Nessa et al., 2021; Patel et al., 2023).

The evidence for antidiabetic and metabolic regulatory activity represents one of the most coherent and robust research streams. Animal models consistently reported improvements in glycemic control, insulin sensitivity, lipid profiles, and inflammatory markers following corn silk supplementation. Limited human evidence, although preliminary, suggests potential benefits in postprandial insulin modulation when corn silk extracts are incorporated into functional foods. However, the predominance of short-term and preclinical studies highlights the need for longer-duration trials and standardized preparations to support translational relevance. Histological evidence from diabetic pregnancy models further suggests that corn silk extracts may influence brown adipose tissue development and metabolic regulation, extending its potential applications beyond classical metabolic outcomes (Al-Qudsi et al., 2022; Arya et al., 2023).

Cardiovascular and neuroprotective activities further extend the medicinal value of corn silk. The identification of angiotensin-converting enzyme (ACE) inhibitory peptides provides a mechanistic basis for its traditional use in managing hypertension. Simultaneously, flavonoid-mediated antioxidant and anti-apoptotic effects underpin reported neuroprotective outcomes. Importantly, these benefits are closely linked to pathways commonly targeted by medicinal and aromatic plants, including oxidative stress reduction, inflammation modulation, and vascular function support. Nevertheless, inconsistencies in dosage, extraction solvents, and outcome measures across studies limit direct comparison and underscore the need for harmonized experimental protocols.

Renal and hepatic protective effects represent another important dimension of corn silk's medicinal profile. The reviewed studies consistently demonstrated reductions in biochemical markers of organ damage and improvements in antioxidant defenses in toxin-induced models. These findings corroborate ethnomedicinal claims of corn silk as a diuretic and detoxifying agent, reinforcing the value of traditional knowledge as a guide for contemporary research. From an AJMAP perspective, this convergence of traditional use and experimental validation strengthens the scientific credibility of corn silk as a medicinal plant. However, the scarcity of clinical data remains a major limitation, particularly in assessing long-term safety and efficacy in humans.

Beyond therapeutic applications, the literature highlights expanding interest in corn silk as a functional and aromatic plant-based resource. Its incorporation into functional foods, nutraceuticals, cosmetics, and eco-friendly bioproducts reflects a broader trend in medicinal plant utilization that transcends conventional pharmacology. Antioxidant and anti-tyrosinase activities support its use in cosmeceuticals, while biolarvicidal properties demonstrate potential in sustainable agricultural and public health interventions. These diversified applications underscore the versatility of corn silk and align closely with AJMAP's emphasis on multifunctional plant resources. Nonetheless, commercialization efforts are constrained by variability in raw material quality, extraction efficiency, and regulatory considerations.

Methodologically, the reviewed literature exhibits several recurring challenges. Variability in plant material sourcing, lack of standardized extraction and characterization methods, and inconsistent reporting of phytochemical profiles complicate cross-study comparisons. Additionally, most studies focus on single biological endpoints, limiting understanding of systemic and long-term effects. Addressing these issues will require the adoption of standardized guidelines for medicinal and aromatic plant research, including botanical authentication, phytochemical fingerprinting, and integrated bioactivity assessment.

In terms of research gaps, three priorities emerge. First, well-designed clinical studies are essential to validate preclinical findings and establish therapeutic relevance. Second, greater attention should be paid to bioavailability, metabolism, and synergistic interactions among corn silk constituents. Third, interdisciplinary research linking ethnobotany, phytochemistry, pharmacology, and product development is needed to fully realize the potential of corn silk within medicinal and aromatic plant science.

In summary, the synthesized evidence positions corn silk as a scientifically credible and versatile medicinal and aromatic plant. While its traditional uses are increasingly supported by experimental data, future progress depends on methodological rigor, clinical validation, and sustainable utilization strategies.

Conclusion

This systematic literature review demonstrates that corn silk (*Stigma maydis* L.) is a valuable medicinal and aromatic plant with diverse phytochemical constituents, including flavonoids, phenolic acids, polysaccharides, and bioactive peptides, which contribute to its antioxidant, anti-inflammatory, antidiabetic, antihypertensive, nephroprotective, hepatoprotective, and neuroprotective activities. By systematically integrating evidence from phytochemical, pharmacological, safety, and functional studies, this review provides a comprehensive scientific framework that consolidates fragmented knowledge and highlights the therapeutic potential of corn silk. This synthesis contributes to the advancement of scientific knowledge by identifying current evidence, research gaps, and future priorities for the development of evidence-based medicinal and aromatic plant research. The findings also have important practical implications. For researchers, this review provides a foundation for standardized phytochemical characterization, mechanistic investigations, and well-designed preclinical and clinical studies. For the pharmaceutical, nutraceutical, food, and cosmetic industries, the synthesized evidence supports the utilization of corn silk as a promising natural source of bioactive compounds for the development of innovative herbal medicines, functional foods, cosmeceuticals, and sustainable bio-based products. Future studies should focus on standardizing extraction methods, validating efficacy and safety through clinical trials, and establishing quality control standards to facilitate the wider application and commercialization of corn silk-derived products.

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Author Contributions
Conceptualization, resource management, literature review, and writing original draft preparation were carried out by WP, RS contributed to critical supervision and manuscript review. All authors have read and approved the final manuscript.

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The authors declare that they have no conflicts of interest. They have no financial or personal relationships with individuals or organizations that could inappropriately influence or bias the conduct, analysis, or reporting of this study. This statement affirms the integrity and transparency of the research, ensuring that the results and conclusions presented are solely based on scientific evidence.

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