

A Review: *Searsia* genus and Its Potential Anti-Cancer Properties

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ABSTRACT

The *Searsia* genus, belonging to the *Anacardiaceae* family, comprises small trees and evergreen shrubs primarily found in Southern Africa, with some species extending to East Africa and the Mediterranean. While these species are well-known for their ecological roles in stabilizing soils and providing habitat for wildlife, they also possess significant medicinal value, particularly in traditional African medicine. *Searsia* plants are rich in bioactive compounds such as flavonoids, phenolic acids, and tannins, which exhibit potent anti-inflammatory, antibacterial, antioxidant, and anticancer properties. This has drawn scientific interest, especially regarding their potential in cancer treatment. Notably, *Searsia chirindensis* and other species have demonstrated cytotoxic effects against various cancer cell lines, attributed to compounds like gallic acid and other polyphenolics. This review delves into the phytochemical profiles of selected *Searsia* species, exploring their medicinal properties with a particular focus on their anticancer activities. The anti-inflammatory properties of these plants, coupled with their antioxidant activities, suggest a promising role in cancer prevention and treatment, although further research is necessary to confirm these benefits in clinical settings.

Keywords *Searsia* genus, Phytochemistry, Anticancer, Antioxidant, Anti-Inflammatory.

INTRODUCTION

The *Searsia* genus, which is a member of the *Anacardiaceae* family, includes a range of tiny trees and evergreen shrubs that are primarily found in Southern Africa, with some species being found in East Africa and the Mediterranean. Because of these plants' anti-inflammatory, antibacterial, and antifungal qualities, they have been utilized traditionally; this is indicative of the genus's rich ethnopharmacological knowledge. The investigation of *Searsia* species' possible anti-cancer effects has drawn recent scientific attention¹. These plants are abundant in bioactive substances such as flavonoids, phenolic acids, and tannins, which are well-known for their anti-inflammatory and antioxidant properties, according to phytochemical investigations². Research has revealed that several *Searsia* species are the source of substances that are cytotoxic to different types of cancer cell lines. Because *Searsia chirindensis* contains a high concentration of gallic acid and other polyphenolic chemicals, extracts from the plant have shown substantial antiproliferative action against human cancer cells³. The triggering of apoptosis and the prevention of cancer cell proliferation appear to be the processes behind the anti-cancer activity of *Searsia* species⁴. These benefits are mostly attributed to the phytochemical's antioxidant qualities, which have the capacity to counteract free radicals and reduce oxidative stress, two major factors in the development of cancer. Furthermore, the inflammatory environment that promotes tumour growth and progression is reduced by the anti-inflammatory qualities of *Searsia* extracts⁵.

METHODOLOGY

The current review manuscript used desktop internet search and keywords to identify articles of the *Searsia* plant genus. A deeper focus was also

made to check its medicinal use, phytochemistry, antioxidant and anticancer activity, and establish possible gaps for future studies. The reviewed literature included conference papers, books, theses, and papers published in peer-reviewed international journals, as well as reports from international, regional, and national organizations. Scientific attention targeted was for the past 5 years and a very few was found which necessitated to have a broader search to include all and that was also identified that this *Searia* plant genus is getting less research attend.

PHENOLIC ACIDS AND FLAVONOIDS

Among the substances in the *Searsia* genus that have been examined the most are phenolic acids and flavonoids. These metabolites support the anti-inflammatory and antioxidant characteristics seen in several species⁶. For instance, *S. lancea* contains high concentrations of flavonoids such as myricetin, kaempferol, and quercetin, which have strong antioxidant properties by scavenging free radicals and lowering oxidative stress⁷. High concentrations of flavonoids, including myricitrin, which has been connected to anti-inflammatory and antibacterial properties, have also been found in studies on *Searsia leptodictya*⁸. It was discovered achieved to separate phenolic acids from *Searsia undulata* and *S. lancea*, such as gallic acid and protocatechuic acid. These substances have strong antioxidant properties that aid in preventing free radical-induced cellular damage⁹. Furthermore, antibacterial properties of phenolic acids derived from *Searsia* species have been demonstrated, preventing the growth of pathogens such as *Escherichia coli* and *Staphylococcus aureus*¹⁰.

The high tannin content of the *Searsia* genus is widely recognized, and it is especially noticeable in species like *S. lancea* and *S. undulata*. Polyphenolic substances called tannins have a variety of pharmacological properties, such as antibacterial

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and anticancer properties¹¹. According to studies, *S. lancea* tannins have high antibacterial activity against both Gram-positive and Gram-negative bacteria, suggesting that they could be a useful natural antimicrobial agent source¹². Furthermore, the traditional usage of *S. undulata* in wound healing and infection prevention has been associated with its high tannin concentration. Tannins have also been linked to anticancer effects¹³. Studies on *S. lancea* and *S. undulata* have shown that tannins can cause cancer cells to undergo programmed cell death, or apoptosis, which raises the possibility that they could be used in cancer treatment. These species' tannin-rich extracts have been proven to have inhibitory effects on cancer cell lines, including those from the prostate, colon, and breast¹⁴.

PHYTOCHEMISTRY

Numerous bioactive substances have been found by phytochemical investigations, such as tannins, phenolic acids, and flavonoids. One of *S. lancea* main flavonoids, quercetin, has been demonstrated to have anti-inflammatory, anticancer, and antioxidant properties. Quercetin functions by scavenging free radicals and preventing the growth of cancer cells, especially those that arise from the breast and colon¹⁵. *S. lancea* been proven to have antibacterial properties due to its tannins, which, along with flavonoids, make the plant useful for treating infections in traditional medicine¹⁶. Research has also shown that the plant could stop the growth of microorganisms, including *Escherichia coli* and *Pseudomonas aeruginosa*. *S. leptodictya* is well-known for having a high concentration of the flavonoid myricetin, which has potent anti-inflammatory and antioxidant qualities. It has been suggested that myricetin from *S. leptodictya* defends against oxidative stress by regulating inflammatory pathways and preventing the generation of cytokines that promote inflammation¹⁷. Myricetin may be used to treat inflammatory diseases like arthritis and chronic inflammatory challenges because of its anti-inflammatory properties¹⁸. Additionally, it has been demonstrated that *S. leptodictya* possesses antibacterial action. Extracts from the plant have been proven to have inhibitory effects on a variety of bacterial strains, including methicillin-resistant *Staphylococcus aureus* (MRSA)¹⁹. The plant's strong tannin and flavonoid content, which enhance its antibacterial properties, support its traditional usage in wound healing and infection prevention. The *Dune Currant*, or *S. undulata*, is another species that has a high tannin concentration. Studies have identified tannins and phenolic acids as important bioactive ingredients, supporting the plant's traditional applications for wound healing and infection prevention²⁰. *S. undulata* tannins have shown antibacterial properties against *Staphylococcus aureus*, indicating that they may be useful in the development of natural antimicrobial therapies²¹.

ANTICANCER AND ANTIOXIDANT ACTIVITIES

Research on the bioactivity of *Searsia* species has shown promise for both cancer treatment and prevention. Many species, including *S. lancea* and *S. leptodictya*, are rich in flavonoids like quercetin, kaempferol, and myricetin, which have been shown to suppress cancer cell growth and trigger apoptosis in a variety of cancer cell lines²². These flavonoids work against cancer by modifying important signalling pathways that control the cell cycle and induce apoptosis. Another important bioactivity found in the *Searsia* genus is antioxidant activity²³. It has been demonstrated that flavonoids and phenolic acids found in species like *S. lancea* and *S. undulata* neutralize free radicals and decrease oxidative stress, which is linked to the emergence of chronic illnesses like cancer and cardiovascular diseases. *Searsia* species are interesting prospects for the development of natural antioxidants for therapeutic use due to their high antioxidant capacity²⁴. One of the main contributing factors to the development of cancer is oxidative stress, which is defined as an imbalance between the body's capacity to neutralize reactive oxygen

species (ROS) and their creation. Antioxidant plants, like those in the *Searsia* genus, can counteract reactive oxygen species (ROS) and stop DNA damage, which is a risk factor for cancer²⁵. Extracts high in polyphenols have shown substantial antioxidant activity in investigations on related *Searsia* species, indicating that they may be able to prevent oxidative damage and lower the risk of cancer²⁶. For example, extracts from *S. chirindensis* had considerable free radical scavenging action. Moreover, the direct anti-cancer properties of polyphenols found in *Searsia* species have been associated with the reduction of cancer cell proliferation²⁷. Research on other polyphenol-rich plants has shown that these substances can alter the signalling pathways of cancer cells, causing apoptosis and cell cycle termination in a variety of cancer cell lines²⁸.

ANTI-INFLAMMATORY PROPERTIES

It is commonly acknowledged that persistent inflammation accelerates the growth and spread of tumours and is a key element in the development of cancer²⁹. *Searsia* species have anti-inflammatory qualities that highlight their potential to prevent cancer. Pro-inflammatory enzymes including cyclooxygenase-2 (COX-2) that are overexpressed in several malignancies have been demonstrated to be inhibited by extracts from *Searsia* species. *S. lancea* inhibits COX-2 and lowers pro-inflammatory cytokine levels, demonstrating strong anti-inflammatory properties³⁰. Because *S. lancea* is closely related, it is conceivable that the latter will have anti-inflammatory properties akin to those of *S. lancea*, which would further bolster its potential as an anti-cancer drug.

CONCLUSION

The wide range of secondary metabolites found in the *Searsia* genus—flavonoids, tannins, and phenolic acids, in particular—contributes to the group's diverse array of pharmacological effects. Investigations into species such as *S. lancea*, *S. leptodictya*, and *S. undulata* have shown significant antibacterial, antioxidant, and anticancer characteristics. These bioactivities demonstrate how the *Searsia* species may be further investigated for medicinal and pharmacological uses, especially in the prevention and treatment of cancer. Further research into specific species within this family, could reveal novel compounds with therapeutic properties, especially in the areas of cancer treatment, inflammation control, and infection management. *Searsia* species have long been used in African medicine, recent pharmacological studies are revealing these plants' promise as sources of new anti-cancer drugs. To validating and possibly utilizing these qualities for cancer treatment, more research on their bioactive components, mechanisms of action, and clinical significance is required.

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DISCLOSURE

None.

AUTHORS CONTRIBUTION

The authors have made significant contributions to the article.

ETHICAL CONSIDERATION

No ethical consideration was required for this study as it does not involve any interventions with humans or animals.

DATA AVAILABILITY

All relevant data supporting the findings of this article are included within the manuscript. No supplementary materials are required.

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