IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

ANTIGONON LEPTOPUS: A COMPREHENSIVE OVERVIEW

[1]Ms.M.Largus Shylee, [2]Dr.S.Malathy , [3]Ms.M.Shanthi

[1]Assitant Professor, Department of Biotechnology, Alpha Arts and Science College, Porur, Chennai, India.
[2]Assistant professor, Department of Botany, Government Arts College , Nandanam, Chennai,India.
[3]Research Scholar, Department of Botany, Government Arts College , Nandanam, Chennai, India.

Abstract : *Antigonon leptopus*, a member of the Polygonaceae family, is a strong and fast-growing vine that can grow up to 15 meters long. Its unique heart-shaped leaves and terminal clusters of pink, red, or white flowers have earned it the nicknames "Coral Vine" and "Mexican Creeper." The vine's capacity to flourish in a variety of temperatures, from tropical to subtropical, has helped it gain global popularity as an ornamental and landscaping plant. In this review, a comprehensive literature survey was conducted to update information on *A.leptopus* botanical description, phytochemistry, pharmacological properties and their ecological importance. The plant is found to contain a diverse range of phytochemicals. Alkaloids, phenolic chemicals, saponins, triterpenoids, and glycosides are found in various regions of the plant. The plant is used ethnomedicinally in many parts of the world to treat a variety of diseases, including pain, coughing, diabetes, dermatological disorders, flu, and stomach ache. Pharmacological characteristics are being explored in several areas of the plant. The plant is known to have antibacterial, antioxidant, hepatoprotective, analgesic, anti-inflammatory, cytotoxic, and antidiabetic properties. This broad review also includes the ecological maintenance as larvicide, anti-helmintic and act as eco-friendly pesticides. From this gathered information the literature study reveals the potential ethnomedicinal utilization of *Antigonon leptopus* as well as the plant's potential use in the development of pharmaceutical products for treating diseases.

Keywords: Mexican creeper, phytochemicals, pharmacological properties, ethnomedicine, eco-friendly pesticides

INTRODUCTION

` *Antigonon leptopus*, commonly known as the Confederate vine or Mexican creeper, is a captivating climbing vine that originates from Mexico and Central America. This ornamental plant, which belongs to the Polygonaceae family, has garnered widespread attention for its striking floral displays and versatile growth habits, making it a popular choice for gardens, landscapes, and even as a houseplant (Elhaj et al., 2015). Boasting vibrant pink or white flowers that resemble clusters of hearts, *Antigonon leptopus* has a unique and enchanting appearance that has earned it the affectionate nickname "coral vine." (Jacob et al., 2001)

Beyond its aesthetic appeal, this versatile plant has also been the subject of growing scientific interest, with researchers exploring its potential medicinal and ecological applications (Balasubramani et al., 2015). Although *Antigonon leptopus* can be an aggressive grower, particularly in disturbed areas, its ability to thrive in a variety of climates and soil conditions has made it a valuable addition to many gardens and landscapes(Baral, 2011) . In this comprehensive research paper, we will explore into the history, botanical characteristics, and multifaceted uses of this captivating plant.

TAXONOMIC CLASSIFICATION

Kingdom – Plantae
Subkingdom – Trachiobionta
Division – Magnoliophyta
Class – Magnoliopsida
Subclass – Caryophyllidae
Order – Polygonales
Family – Polygonaceae
Genus –Antigonon Endl.-antigonon

Species- *Antigonon leptopus* Hook &Arn.-coral vine

BOTANICAL DESCRIPTION

About 1200 individuals live in 50 genera within the family Polygonaceae. *A. leptopus* is one of the species of this family that are used as salads, culinary ingredients, and decorative plants. *A. leptopus* is known by several scientific names, including *Corculum leptopum* (Hook. & Arn.) Stuntz and *Corculum leptopus* (Hook. & Arn.) Stuntz, *Antigonon cinerascens* M. Martens & Galeotti, *Antigonon cordatum* M. Martens & Galeotti, and Antigonon platypus Hook. & Arn. (Musthafa et al., 2017)

Among them are *Antigonon leptopus*, often known as the queen's wreath and coral vine(Akmal & Ranjan Srivastava, 2019). It is widely distributed over tropical Asia, Africa, the Caribbean, and the Americas. It is endemic to Mexico. *Antigonon leptopus* is a perennial woody climber that grows decisively, attaining lengths of 5 to 13 meters (J. M. Burke, 2011). *Antigonon leptopus* establishes a network of rhizomes from which branches can grow up to 25 cm each month. The species can also spread by seeds. It produced only a few seeds by sexual propagation(Ghareeb, 2018). *Antigonon leptopus* can thrive in hard conditions such as little light and poor soil. The vine climbs and smothers higher vascular plants, but can also spread laterally over dry regions or grasslands via rhizomes, stolons, or tubers(Castro-Dı´ez P, 2016). *A. leptopus* is a challenging plant for getting rid of due to its large tubers and rhizomes, hardiness, and several mechanisms of spread. (Eppinga et al., 2022). They negatively impacts natural plants, particularly on islands. It spreads along seashores, killing local plants. The coral vine controls the island of St. Eustatius, covering around 20% of the area and interfering with crab migration (Bhatnagar & Pradhan, n.d.; J. M. and D. Burke, 2011). Laterally spreading stems and switching oval or triangular-ovate leaves characterize this plant. While the uppermost layer of the leaves is lustrous and light green with sunken venation, the lower surface is dull and green with noticeable venation. Pink-colored bisexual blooms are typically seen in terminal panicles or axillary racemes. (J. M. Burke & DiTommaso, 2011)

Fig 1: *Antigonon leptopus*

Coralita, also known as coral vine, was introduced to Uttar Pradesh, India from Nepal due to the favorable bioclimatic conditions that encourage the spread of similar species (Baral, 2011; Lockwood, 2005; Tiwari, 2005) . Balrampur district is located on the east-west and south side of Nepal State. The introduction of coral vine in this area has harmed the natural biodiversity. It is growing along the roadside and eliminates the other plants, endangering local biodiversity, altering community structures, and disrupting ecological services (Akmal & Ranjan Srivastava, 2019). This might be because of temporal dioecism and promiscuous nature of the flowers appear to be adaptive in *A. leptopus*, allowing the species to attain xenogamy while aiding geitonogamy despite the fact that its pollinators are unspecialized. *A. leptopus* thrives as a weed in various tropical locations because to its unspecialized flowers, which allow it to exploit a range of pollen carriers (Jacob et al., 2001) .

In India, Coral vines can also be found along the coasts of Andhra Pradesh. The tubers are edible, have a nut-like flavor, and are utilized in Mexican cuisine(Apaya & Chichioco-Hernandez, 2014). Coral vines produce compounds with pharmacological value and are utilized in healthcare. Traditionally, *A. leptopus* leaves reduce edema, and a tea produced from the leaves can be used to treat diabetes, while the blooms are used to cure high blood pressure(Avn et al., 2011). In Thailand, the leaves and pink blooms are commonly consumed as cooked vegetables. The leaves and blooms of *Antigonon leptopus* are used to produce a hot herbal tea (Lim.T.K, 2013).

The plant also has anticoagulant, analgesic, anti-thrombin, anti-inflammatory, anti-diabetic, anti-lipid peroxidation, anti-helmintic, and anticonvulsant properties(Devi et al., 2019). It can treat diabetes, liver and spleen disorders, asthma, cough, and throat constriction (Idu, 2007; Lans, 2006; P. , T. D. K. , T. K. Ranjan, 2015). In Chinese traditional medicine, it is used to treat nephritis, hepatitis, and colitis (Priya et al., 2014).

PHYTOCHEMISTRY

Many primary and secondary metabolites are produced by plants. Phytochemicals are terms used for the chemical substances found in plants. Many plant metabolites have beneficial effects, which include preventing off herbivores and managing harmful organisms. Furthermore, certain plant components give plants their color and aroma. Most of these phytochemicals are in responsible of the therapeutic properties of plants. ('COMPREHENSIVE REVIEW ON ANTIGONON LEPTOPUS-A POTENTIAL MEDICINAL HERB', 2023) Investigating plant chemicals, sometimes referred to as natural products, as well as changing environmental factors that influence these chemical changes are the focus of phytochemical studies. (P. Ranjan & Tripathi, n.d.) Secondary metabolites found in therapeutic plants include alkaloids, glycosides, flavonoids, insecticides, steroids, and other related active metabolites, which have enormous therapeutic potential and have been widely employed in the medication and the pharmaceutical sector. In recent years, several reports of investigations on the phytochemistry of therapeutic plants, especially on the components that sprout, such as leaves and stems.(Jeeva et al., 2011). The chemical diversity of plant metabolites offers opportunities for the development of new medications with potential uses. The plant *A. leptopus* has a variety of compounds. While a few research have provided extensive information on the isolation of pure compounds from the plant, other investigations have found an array of phytochemicals in various plant parts. Various bioanalytical methods have been employed to identify and separate pure chemicals from *A. leptopus*. ('COMPREHENSIVE REVIEW ON ANTIGONON LEPTOPUS-A POTENTIAL MEDICINAL HERB', 2023) Plants in the Polygonaceae family are known to be high in phenolic chemicals, particularly tannins. *A. leptopus* has a variety of phytochemical components, such as phenols, coumarins, alkaloids, triterpenoids, steroids, and flavonoids. was investigated by Surendar. (Olaoluwa et al., 2013) The methanolic extract of *A.leptopus* was identified with significant phytochemical groups, which is responsible for medicinal properties. (P. Ranjan & Tripathi, n.d.) The presence of saponin, phenolic compounds, tannins, flavonoids, alkaloids, fixed oils, and amino acids was identified by phytochemical screening of *A. leptopus*'s methanolic leaf extract.(De et al., n.d.). Pradhan and Bhatnagar carried out their secondary metabolite screening in fresh leaves using Chloroform, methanol, hexane, ethyl acetate solvents. Presence of various metabolites were identified to be rich in ethyl acetate than other solvents. ((Bhatnagar & Pradhan, n.d.)

These above-mentioned phytochemicals function as antimicrobial substances by disrupting peptidoglycan formation, compromising microbial membrane integrity, and altering the hydrophobicity of bacterial membrane surfaces (Rasooli et al., 2008). Also, it exhibits diverse biological activities, including antioxidant, anti-inflammatory, antimicrobial, and antidiabetic effects (RudhraS & VenkatesanA, n.d.)

Table 1: List of phytoconstituents from various parts of *A. leptopus*

S.no	Plant Parts	Phytoconstituents	Solvents	Author
1	Leaf	Alkaloids, Steroids, Tannin, Phenols, Saponin, Terpenoid, Flavonoids, Tripenoids	Ethanol	(RudhraS & VenkatesanA, n.d.)
2	Fresh Leaf	Tannins, Cardiac glycosides, Terpenoid, Saponin, Phlobatannin	Ethyl acetate	(Bhatnagar & Pradhan, n.d.)
3	Leaves	phenolics, Ferulic acid derivatives, arachidonic acid, citronellic acid, and coumarins derivatives	Methanol	(Akmal & Ranjan Srivastava, 2019)
4	Flower	Phenol, Flavanoids , Saponins, Aminoacids, Steroids, Phytosterols, Triterpenoidal sapogenins	Methanol	(Jeeva & Christian College, 2011)

		Tannins,Xanthoproteins, Carboxylic acid, Coumarins Carbohydrates		
5	Flower	Volatile oils, carboxylic acids, glycosides, Carbohydrates, Terpenes	Ethanol	(Deepthi Bolla & kumar Bhogavalli, 2010)
6	Leaves	Triterpenes, alkaloids, Tannins, saponins, glycosides and Coumarins	Ethanol	(Elhaj et al., 2015)
7	Aerial Parts	Novel Anthraquinone derivatives	Ethanol	(Olaoluwa et al., 2013)

ANTIMICROBIAL ACTIVITY

Throughout human history, medicinal plants have been the most valuable source of compounds with potential therapeutic applications. Every civilization's folk medicine relies on natural products, and in the modern era, medicinal plants remain to be a valuable source for uncovering new therapeutic targets.(Atanasov et al., 2015) Research on plant products has been conducted in an effort to locate new antimicrobials owing to the expansion of antimicrobial resistance to pharmaceuticals(Clardy et al., 2006). The primary defence mechanism of higher plants against pathogens is the production of antibacterial chemicals(RudhraS & VenkatesanA, n.d.).

Gupta et al determined the Chloroform and ethanolic flower extracts of *Antigonon leptopus* has potent antimicrobial activity against *Staphylococcus aureus, Proteus vulgaris, Pseudomonas aeruginosa, Micrococus albus* which are common human dental pathogens. Their work proved that the ethanol extract was identified to be the most effective solvent for extracting broad-spectrum antimicrobial activity.(Avn et al., 2011) Rudhra and Venkatesan performed antibacterial activity against *Staphylococcus aureus, E. coli, K. pneumonia* with ethanol, methanol and acetone extracts of *A. leptopus*. Their research exhibit highest activity in ethanolic extract than other solvents and acetone extract had lowest activity against those organisms. (RudhraS & VenkatesanA, n.d.)

ANTIBACTERIAL ACTIVITY

Deepthi et al. revealed the significant activity of ethanol and chloroform extracts of *A.leptopus* flower against the various pathogens such as *Bacillus subtilis, Bacillus peritolis, Salmonella typhi*. Due to the presence of different phyto-constituents derived from solvent extracts these would have shown anti-bacterial activity (Deepthi Bolla & kumar Bhogavalli, 2010).

Table 2: Antibacterial activity of various parts of *A. leptopus* against pathogens

S.No	Plant Parts	Solvent Extracts	Pathogens	Author
1	Flower	Ethanol and Chloroform	*Bacillus subtilis, Bacillus peritolis, Salmonella typhi*	(Deepthi Bolla & kumar Bhogavalli, 2010)
2	Leaf Extract	Acetone, Methanol and Ethanol	*E.coli, S.aureus, K.pneumonia.*	(RudhraS & VenkatesanA, n.d.)
3	Aerial parts	Ethanol	*Bacillus subtilis and S.aureus*	(Olaoluwa et al., 2013)

ANTIOXIDANT ACTIVITY

Plants have the ability to produce a wide range of chemically important substances. Many plant species contain compounds with antioxidant properties, which serve to protect cells from free radical damage.(Padmaja et al., 2011) Free radicals are generated within cells during cellular metabolism, primarily through the process of mitochondrial oxidative phosphorylation. These include reactive nitrogen species (RNS) and reactive oxygen species (ROS), such as singlet oxygen, superoxide, peroxyl radicals, hydroxyl radicals, and peroxynitrite.(Nadia & Rachid, n.d.) RNS are formed from oxygen in the presence of nitric oxide synthetase. Both ROS and RNS can be detrimental, causing damage to cellular components like lipids, sugars, proteins, and nucleic acids, thereby disrupting normal cellular functions. Oxygen free radicals have been implicated in various human pathological conditions, including atherosclerosis, ischemic heart disease, aging, inflammation, and diabetes. Consequently, there is an ongoing need for antioxidants to neutralize free radicals (Mathew & Philip, 2013). The methanolic extract of *Antigonon leptopus*, when extracted and purified, yields

several compounds: nhentriacontane, ferulic acid, 4-hydroxycinnamic acid, quercetin-3-rhamnoside, kaempherol-3-glucoside, b-sitosterol, b-sitosterol-glucoside, and d-mannitol. As a result, it exhibits antibacterial, anti-inflammatory, and antioxidant properties (Vanisree et al., 2008). The ethanolic extract of *Antigonon leptopus* was containing potential free radical scavenging activity was proven by Satish and his co-workers by performing DPPH method. This activity is attributed due to the presence of phenols, flavonoids terpenoids and such other chemical compounds present.(Kavatagimath et al., 2020) Scavenging of DPPH radicals was discovered during an in-vitro investigation used to investigate the antioxidant activity of ethanolic extracts of *Antigonon leptopus*.The extract exhibited dose-dependent cytotoxicity, as demonstrated by its IC50 value of 289.60 µg/ml. The current study examined the cytotoxicity (MTT) of an ethanol extract of *A. leptopus* (leaves), phytochemical screening, and in-vitro antioxidant (DPPH assay). Using 2.2Di (4-tert-octylphenyl)-1-picryl-hydrazyl (DPPH), the ethanol extract of *A. leptopus* (leaves) was screened for its ability to scavenge free radicals, and 3-(4, 5-dimethyl thiazol-2-yl)-2, 5-diphenyl tetrazolium bromide (MTT) was used as a standard antioxidant to screen for cytotoxicity. *A. leptopus* ethanol extracts from leaves(Osman et al., 2015). Swaroopa and Swathi observed that the methanolic extract and fractions of *Antigonon leptopus* were tested for antioxidant activity utilizing DPPH radical scavenging activity, the hydroxyl radical scavenging activity, superoxide anion scavenging activity, and nitric oxide radicals scavenging activity. All assays showed considerable activity, indicating that the methanolic extract and its fractions of *Antigonon leptopus* root had the potential for antioxidant activity. (Rani, 2019)

ANTI-DIABETIC ACTIVITY

Diabetes mellitus has been associated with hyperlipidemia via a variety of metabolic abnormalities(Ahmad, 2014). Among numerous metabolic disorders, insulin insufficiency has been documented to induce lipolysis in adipose tissue and give rise to hyperlipidemia(Rahman et al., 2021). According to Bailey and Day, there have been around 400 traditional plants or plant-derived products used to treat type 2 diabetes in various parts of the world. Additionally, Alarcon-Aguilara et al. reported that approximately 800 plants contain anti-diabetic properties. Chemical substances found in plants have been shown to have safe and alternative effects on diabetes mellitus.(Mannan et al., 2014) It is believed that herbal medicines function through various mechanisms to lower blood glucose levels. These include reducing glucose absorption, decreasing the activity of enzymes involved in blood glucose production, enhancing insulin sensitivity and secretion, and utilizing the substantial amount of soluble fibers found in plants to effectively decrease glucose concentrations.(Kavatagimath et al., 2020) Satish et.al. determined the anti-diabetic efficacy of ethanolic extract of *A.leptopus* against alloxan treated experimental animals. They reported the protection and regeneration of β-cells in glibenclamide- treated animals, which is a standard drug for diabetes.(Kavatagimath et al., 2020). In a similar study by Sujatha et al, methanolic extract of flowers was evaluated at 3 different doses in normal, glucose-fed and alloxan induced rats. Their research exhibited the antihyperglycemic effect. **(**Sujatha S et al., 2017). Rani et al. found similar findings in a study on streptozotocin-induced diabetic rats, indicating the antidiabetic effect of toluene, ethyl acetate, and butanone fractions of methanol extract of A. leptopus leaves. oxide radical scavenging activity, and superoxide anion scavenging activity.In diabetic rats, oral administration of butanone, ethyl acetate, and toluene fractions at 50 and 100 mg/kg body weight markedly lowered the fasting blood glucose level. The ethyl acetate fraction proved to be the most successful of the fractions examined.(Hl, 2018)

ANTI-INFLAMMATORY ACTIVITY

Inflammation is an extensive biological response comprising tissue swelling, discomfort, and leukocyte infiltration. It is a form of protective mechanism used by the body to avoid pathogens, irritants, and allergens while maintaining homeostasis. The inflammatory reaction involves a wide range of complicated processes and mediators. Most diseases are accompanied by a cascade of inflammatory responses (Ambedkar et al., 2011).

Anti-inflammatory activity of two concentrations, viz. 200 and 400 mg/kg body weight, of methanol extract of leaves of *A. leptopus* was determined by Carrageenan induced paw edema in rats(Mamidipalli et al., 2008). The extract was proven to decrease paw edema in a dose-dependent manner. In a similar study carried out by Carey et al., the methanolic extract of roots of *A. leptopus* was shown to produce a significant inhibition of peritoneal and cutaneous vascular permeability induced by acetic acid, granuloma induced by cotton-pellet and migration of leucocytes and neutrophils induced by carrageenan in animals at the doses of 100, 200 and 400 mg/kg. The dried extract of A. leptopus aerial parts inhibits cyclooxygenases COX-1 and COX-2 by 38% and 89%, respectively, at 100 µg/ml. ('COMPREHENSIVE REVIEW ON ANTIGONON LEPTOPUS-A POTENTIAL MEDICINAL HERB', 2023). In response to a study, *A.leptopus* is a treatment for pain and symptoms similar to gout in the Philippines. *A. leptopus* methanolic extracts have demonstrated

potent inhibition of xanthine oxidase. An in-vitro assay for the inhibition of Xanthine oxidase was used in a bioassay-guided isolation strategy. Chemical techniques and spectroscopic studies were used to determine the structure. With an IC50 of 1.79 microgram/ml, the isolated molecule was found to be a non-competitive inhibitor of xanthine. The discovered substance might belong to a brand-new class of inhibitors of xanthine oxidase. Patients with gout may benefit from using this derived chemical to lessen their inflammation(Apaya & Chichioco-Hernandez, 2014).

CYTOTOXIC ACTIVITY

By using the MTT test, Elhaj et al. assessed the cytotoxicity of an ethanol extract made from *A. leptopus* leaves on the Vero cell line. The extract was shown to have an IC50 value of 289.60 µg/ml and to exhibit dose-dependent cytotoxicity. This was shown to have moderate activity, therefore it might be used to create a new medication.(Elhaj et al., 2015) Kanthal et al. demonstrated a dose-dependent cytotoxic impact of chloroform extract of entire plant (by MTT assay) against two cell lines, A-549 and CHOK 1. Pradhan and Bhatnagar found dose-dependent cytotoxicity of several solvent extracts of *A. leptopus* leaves, including hexane, ethyl acetate, methanol, and chloroform, against brine shrimp larvae (Bhatnagar & Pradhan, n.d.).

HEPTOPROTECTIVE ACTIVITY

Raju et al., determined the ability of *Antigonon leptopus* stem ethyl acetate and methanol extracts to protect Wistar albino rats' livers from damage caused by carbon tetrachloride (CCl4). Silymarin (50 mg/kg.p.o.) served as the reference standard, whereas ethyl acetate and methanolic extracts (100, 200 mg, and 400 mg/kg.p.o.) were administered, respectively. The extracts were successful in protecting the animals' livers from the harm that CCl4 caused. Significant reductions in serum enzyme, SGOT, SGPT, ALP, and total bilirubin (TB) demonstrated this. Mice treated with CCl4 showed a number of pathological alterations, including vacuolization and centribular necrosis, whereas animals treated with extract and silymarin showed considerable protective effects. The study found that methanolic and ethyl acetate extracts have hepatoprotective properties against CCl4-induced hepatotoxicity in rats (Raju & Rao, n.d.).

LARVICIDE ACTIVITY

Olaleye et al found the leaf extract of *A.leptopus* in combination with other plant extracts inhibit the life cycle of housefly *Musca domestica.* Due to their feeding habits and close proximity to human habitation, houseflies have the potential to carry millions of bacteria on their feet that might spread at least 65 diseases to people, including typhoid fever, dysentery, cholera, poliomyelitis, yaws, anthrax, tularemia, leprosy, and tuberculosis. The developmental stages of M.domestica fly was identified to be elongated and by increasing the concentration of leaf extract on larval stage lead to death.(Olaleye et al., 2017) *A. leptopus* contains phytochemicals that impact the life cycle of house flies, including alkaloids, flavonoids, sterols, glycosides, tannins, and saponins.(Elhaj et al., 2015)

ANTI-HELMINTIC ACTIVITY

Helminthiasis, often known as worm infestation, is one of the world's most common diseases and a major public health concern. Helminth diseases affect hundreds of millions, if not billions, of people globally, due to increased worldwide mobility and immigration from developing countries(Choudhury GB, 2010). Sony Priya et al., carried out the antihelmintic activity on earthworms with *A.leptopus* chloroform extract in various concentration. Alpendazole was chosen as standard drug against earthworms. The result of their revealed that it has considerable potential against worms, might be the presence of phenols, hydrocarbons, quinazolines, coumarins, steroids, and terpenes such as cadinene and juniper camphor are among the bioactive chemicals. Terpenes often found in plant oils include juniper camphor and cadinene.(Dullu V., 2014; Priya et al., 2014)

Ethyl acetate and methanol extracts of *Antigonon leptopus* roots and rhizomes were tested for their anthelmintic properties against Pheretima posthuma. Both extracts were tested at different concentrations (10, 20, 40, and 80 mg/ml) in a bioassay that measured the worms' paralysis and death times. In comparison to the common medication piperazine hydrate, the results showed that the ethyl acetate and methanolic extracts significantly produced paralysis at lower doses (10–80 mg/ml) and also primarily caused mortality at higher doses of 80 mg/ml. According to the study mentioned above, Antigonon leptopus's methanolic extract exhibited greater activity than its ethyl acetate extract ($p<0.001$) (Raju J.N, 2011).

ECO-FRIENDLY ORGANO-PESTICIDE

Most insecticides used in the developing world are imported from industrialized countries. These synthetic piscicides cause biohazards (Kumar De et al., n.d.). Herbal piscicides are the most environmentally friendly alternative to dangerous chemical pesticides in aquaculture to control fish fry predators and unwanted fishes since they are highly potent, eco-friendly, locally available, biodegradable, and less toxic to non-targeted animals(Yunis Aj. et al., 2014). Kumar De et al., processed the fish *Anabus testudineous* in the

presence of *A.leptopus* as toxic substances. Their study revealed that the aqueous extract of *A.leptopus* can be potential source of organic pesticide, since high mortality was identified on test fishes.

CONCLUSION

The weed *Antigonon leptopus* was nowadays found in most of the coast regions. It was observed to produce flowers throughout the year. Alternation in the climatic changes all over the world may lead the plant to alter their flowering, fruiting and vegetative phases makes *A.leptopus* to be a successful weedy climber(Jacob et al., 2001). According to a thorough review of the literature, the plant *A. leptopus* is frequently used to treat a variety of conditions, including diabetes, cough, discomfort, and skin issues. *A.leptopus* has been the focus of numerous pharmacological investigations, which have revealed strong bioactivities including antidiabetic, antibacterial, analgesic, anti-inflammatory, cytotoxic, hepatoprotective, and antioxidant activity. Chloroform extracts of the entire plant were used in a cytotoxic investigation using the MTT assay against cell lines, which revealed a dose-dependent cytotoxic impact. Radical scavenging activity was demonstrated by an antioxidant investigation conducted on an ethanolic extract of *A.leptopus*. Ethyl acetate extract of *A.leptopus* roots was also tested for hepatoprotective efficacy against carbon tetrachloride-induced liver injury. The possible therapeutic qualities of the plant *A.leptopus* can be explained by the presence of distinct phytochemicals in different plant sections. The plant can be used as a treatment for a number of illnesses and to make medications with strong pharmacological effects that can be beneficial for people.

REFERENCES

[1] Amberkar Mohanbabu Vittalrao, Tara Shanbhag, Meena Kumari K.*, K. L. Bairy And Smita Shenoy.(2011) Evaluation of antiinflammatory and analgesic activities of alcoholic extract of kaempferia galanga in rats. Indian Journal of Physiology Pharmacogology 55(1): 13-*24*.

[2] Ahmad, W. , K.I., K. M. A. , A. M., S. F. , and K. N. (2014). Evaluation of antidiabetic and antihyperlipidemic activity of Artemisia indica linn (aeriel parts) in Streptozotocin induced diabetic rats. *Journal of Ethnopharmacology*, *151*, 618–623.

[3] Akmal, M., & Ranjan Srivastava, R. (2019). Effect of <i>Antigonon leptopus</i> Leaf Extract on Seed Germination and Seedling Growth of <i>Trigonella foenum graecum</i> *International Journal of Natural Resource Ecology and Management*, *4*(5), 147. https://doi.org/10.11648/j.ijnrem.20190405.16

[4] Apaya, M. K. L., & Chichioco-Hernandez, C. L. (2014). New steroidal saponin from *Antigonon leptopus* Hook. and Arn. *Pharmacognosy Magazine*, *10*(39), S501–S505. https://doi.org/10.4103/0973-1296.139781

[5] Atanasov, A. G., Waltenberger, B., Pferschy-Wenzig, E. M., Linder, T., Wawrosch, C., Uhrin, P., Temml, V., Wang, L., Schwaiger, S., Heiss, E. H., Rollinger, J. M., Schuster, D., Breuss, J. M., Bochkov, V., Mihovilovic, M. D., Kopp, B., Bauer, R., Dirsch, V. M., & Stuppner, H. (2015). Discovery and resupply of pharmacologically active plant-derived natural products: A review. In *Biotechnology Advances* (Vol. 33, Issue 8, pp. 1582–1614). Elsevier Inc. https://doi.org/10.1016/j.biotechadv.2015.08.001

[6] Avn, G., Rao Bandlamuri, R., Jagarlamu, J., & Kumar Bhogavalli, P. (2011). Studies on anti-microbial activity of flower extracts of *Antigonon leptopus* against common dental pathogens. *Scholars Research Library Annals of Biological Research*, *2*(2), 99–103. www.scholarsresearchlibrary.com

[7] Balasubramani, G., Deepak, P., Sowmiya, R., Ramkumar, R., & Perumal, P. (2015). Antigonon leptopus: A potent biological source for extermination of fish bacterial pathogens Providencia and Aeromonas. *Natural Product Research*, *29*(10), 958–960. https://doi.org/10.1080/14786419.2014.957696

[8] Baral, B. , M. B. L. (2011). Antagonistic characteristics and phytochemical screening of invasive alien species of Nepal Himalaya. *International Journal of Pharmaceutical & Biological Archives*, *2*(5), 1444–1450.

[9] Bhatnagar, S., & Pradhan, L. (n.d.). *Exploration of cytotoxic and antioxidant potential of Antigonon leptopus (Family: Polygonaceae)*. http://www.wjpsonline.org/

[10] Burke, J. M. (2011). *SYSTEMATICS OF ANTIGONON AND TROPICAL ERIOGONOIDEAE: PHYLOGENY, TAXONOMY, AND INVASION BIOLOGY*.

[11] Burke, J. M. and D. (2011). Coralita (Antigonan leptopus): International introduction of a plant with documented invasive capability. *Invasive Plant Science and Management*, *4*, 265–273.

[12] Burke, J. M., & DiTommaso, A. (2011). Corallita (*Antigonon leptopus*): Intentional Introduction of a Plant with Documented Invasive Capability . *Invasive Plant Science and Management*, *4*(3), 265–273. https://doi.org/10.1614/ipsm-d-10-00088.1

[13] Castro-Dı´ez P, P. A. T. A. V. M. (2016). Linking the impacts of plant invasion on community functional structure and ecosystem properties. *Journal of Vegetation Science*, *27*, 1233–1242.

[14] Choudhury GB, N. B. J. P. P. S. E. P. (2010). Phytochemical investigation and screening for anthelmintic activity of leafy extracts of various Ocimum (Tulsi) species. *Journal of Pharmacy Research*, *3*, 2140–2141.

[15] Clardy, J., Fischbach, M. A., & Walsh, C. T. (2006). New antibiotics from bacterial natural products. In *Nature Biotechnology* (Vol. 24, Issue 12, pp. 1541–1550). https://doi.org/10.1038/nbt1266

[16] COMPREHENSIVE REVIEW ON ANTIGONON LEPTOPUS-A POTENTIAL MEDICINAL HERB. (2023). *International Research Journal of Modernization in Engineering Technology and Science*. https://doi.org/10.56726/irjmets32946

[17] De, S. K., Bhattacharya, R. P., & Bhanja, B. (n.d.). *Antigonon leptopus (Hook.And Arn.)-A new Potential Plant Origin Ichthyotoxicant on Channa punctatus (Bloch, 1793) for Aquaculture Management*. https://doi.org/10.5281/zenodo.6479297

[18] Deepthi Bolla, N., & kumar Bhogavalli, P. (2010). Preliminary phytochemical screening and antibacterial studies of the flowers of Antigonon leptopus. *Scholars Research Library Annals of Biological Research*, *1*(4), 229–233. www.scholarsresearchlibrary.com

[19] Devi, V. S., Sudhakar, B., Prasad, K., Jeremiah Sunadh, P., & Krishna, M. (2019). Adsorption of Congo red from aqueous solution onto *Antigonon leptopus* leaf powder: Equilibrium and kinetic modeling. *Materials Today: Proceedings*, *26*, 3197–3206. https://doi.org/10.1016/j.matpr.2020.02.715

[20] Dullu V. (2014). Anthelmintic Activity of Ethanolic Leaf Extract of Jasminum mesnyi. *Asian Pacific Journal of Tropical Disease*, *4*(1), 273.

[21] Elhaj, A. M., Osman, E.-B. E., Koko, W. S., Garbi, M. I., & Kabbashi, A. S. (2015). Antioxidant activity, phytochemical screening and cytotoxicity of ethanolic leaves extract of Antigonon leptopus. In *Research Journal of Agriculture and Environmental Management* (Vol. 4, Issue 4). http://www.apexjournal.org

[22] Eppinga, M. B., Haber, E. A., Sweeney, L., Santos, M. J., Rietkerk, M., & Wassen, M. J. (2022). *Antigonon leptopus* invasion is associated with plant community disassembly in a Caribbean island ecosystem. *Biological Invasions*, *24*(2), 353–371. https://doi.org/10.1007/s10530-021-02646-w

[23] Ghareeb, Z. F. and T. L. S. (2018). Micropropagation protocol for *Antigonon leptopus* an important ornamental and medicinal plant. Journal of Genetic Engineering and Biotechnology. *Journal of Genetic Engineering and Biotechnology. In Press.*

[24] Hl, R. (2018). Medicinal Uses, Phytochemistry and Pharmacological Activities of *Antigonon leptopus* Hook. and Arn. (Polygonaceae): A Review Article in. In *Journal of Chemical and Pharmaceutical Research*. www.jocpr.com

[25] Idu, M. , O. H. I. (2007). Medicinal Plants of Edo State, Nigeria. *Research Journal of Medicinal Plant*, *1*(2), 32–41.

[26] Jacob, A., Raju, S., Kanaka Raju, V., Victor, P., & Appala Naidu, S. (2001). Floral ecology, breeding system and pollination in *Antigonon leptopus* L. (Polygonaceae). In *Plant Species Biology* (Vol. 16).

[27] Jeeva, S., & Christian College, S. (2011). *Preliminary Phytochemical and Anti-Bacterial studies on Flowers of selected medicinal plants*. http://www.openaccessscience.com

[28] Jeeva, S., Johnson, M., Aparna, J. S., & Irudayaraj, V. (2011). Preliminary Phytochemical and Anti-Bacterial studies on Flowers of selected medicinal plants. In *Int. J. Med. Arom. Plants* (Vol. 1, Issue 2). http://www.openaccessscience.com

[29] Kavatagimath, S. A., Jalalpure, S. S., Hiremath, R. D., & Kempwade, A. A. (2020). In-vivo screening of ethanolic extract of *Antigonon leptopus* flower for anti-diabetic and antioxidant potential. *Indian Journal of Pharmaceutical Education and Research*, *54*(2), S261–S268. https://doi.org/10.5530/ijper.54.2s.82

[30] Kumar De, S., Prasad Bhattacharya, R., Dey, D., Kumar De, D., & Prasad Bhattacharya Bikash Bhavan Kolkata-, R. (n.d.). *Madhya Bharti-Humanities and Social Sciences UGC Care Group I Journal (मध्य भारती)*. https://www.researchgate.net/publication/369545436

[31] Lans, C. A. (2006). Ethnomedicines used in Trinidad and Tobago for urinary problems and diabetes mellitus. *Journal of Ethanobotany and Ethanomedicine*, *2*, 45.

[32] Lim.T.K. (2013). *Edible medicinal and non-medicinal*. *8*, 643–649.

[33] Lockwood, J. L. , C. P. , B. T. (2005). The role of propagule pressure in explaining species invasions. *Trends in Ecology & Evolution*, *20*, 223–228.

[34] Mamidipalli, W. C., Rao Nimmagadda, V., Kumar Bobbala, R., & Gottumukkala, K. M. (2008). Preliminary Studies of Analgesic and Anti-inflammatory Properties of *Antigonon leptopus* Hook. et Arn Roots in Experimental Models. In *Journal of Health Science* (Vol. 54, Issue 3).

[35] Mannan, M. A., Rupa, B. A., Azam, K., Ahmed, M. N., & Hasan, M. N. (2014). A Quick Review on Anti-diabetic Plants and Action of Phytochemicals. In *International Journal of Advanced Research* (Vol. 2, Issue 5). http://www.journalijar.com

[36] Mathew, A., & Philip, S. (2013). Antioxidant Activity of Some Common Medicinal Plants. In *International Journal of Pharmaceutical and Clinical Research* (Vol. 5, Issue 2). www.ijpcr.com

[37] Musthafa, M. M., Adel, M., Marikar, F. M. M. T., Rajandram, D., & Ahmed, A. B. A. (2017). Phytochemical, pharmaceutical and biochemical activites of selected climber plants: A review. In *Annual Research and Review in Biology* (Vol. 16, Issue 5). SCIENCEDOMAIN international. https://doi.org/10.9734/ARRB/2017/34796

[38] Nadia, Z., & Rachid, M. (n.d.). *Antioxidant and antibacterial activities of Thymus vulgaris L*.

[39] Olaleye, T., Muse, W., Adekanbi, S., Isang, D., Alabi, I., Imeh-Nathaniel, A., & Nathaniel, T. (2017). Powdered leaf extracts of Harungana madagascariensis, Margaritaria discoidea, and *Antigonon leptopus* disrupt larva and pupa stages of a tropical disease vector. *Asian Pacific Journal of Tropical Disease*, *7*(12), 778–782. https://doi.org/10.12980/apjtd.7.2017D7-200

[40] Olaoluwa, O. O., Aiyelaagbe, O. O., Irwin, D., & Reid, M. (2013). Novel anthraquinone derivatives from the aerial parts of *Antigonon leptopus* Hook & Arn. *Tetrahedron*, *69*(33), 6906–6910. https://doi.org/10.1016/j.tet.2013.05.014

[41] Osman, E. E., Koko, W. S., & Kabbashi, A. S. (2015). *Antioxidant activity, phytochemical screening and cytotoxicity of ethanolic leaves extract of Antigonon leptopus*. http://www.apexjournal.org

[42] Padmaja, M., Sravanthi, M., & Hemalatha, K. P. J. (2011). Evaluation of Antioxidant Activity of Two Indian Medicinal Plants. In *Journal of Phytology* (Vol. 3, Issue 3). www.scholarjournals.orgwww.journal-phytology.com

[43] Priya, K. S., Satyavathi, K., Bhojaraju, P., Kumari, Y. R., Prasad, D. V., Sesha, M., Durga, S., Preeti, P. M., Pardhava Lovaraju, K., & Kanthal, L. K. (2014). GC-MS PROFILING AND ANTHELMINTIC ACTIVITY OF *ANTIGONON LEPTOPUS* LEAVES. *International Journal of Pharmaceutical Sciences and Research*, *5*(5), 1914–1918. https://doi.org/10.13040/IJPSR.0975-8232.5(5).1914-18

[44] Rahman, S., Jan, G., Jan, F. G., & Rahim, H. U. (2021). Phytochemical Screening and Antidiabetic, Antihyperlipidemic, and Antioxidant Effects of Leptopus Cordifolius Decne. In Diabetic Mice. *Frontiers in Pharmacology*, *12*. https://doi.org/10.3389/fphar.2021.643242

[45] Raju, J., & Rao, G. (n.d.). *Investigation of hepatoprotective activity of roots & rhizomes of Antigonon leptopus Hook against carbon tetrachloride-induced hepatotoxicity in rats*.

[46] Raju J.N, R. G. B. (2011). Anthelmintic Activities of *Antigonon leptopus* Hooks and Mussaenda Erythrophylla Lam. *International Journal of Pharmacy and Pharmaceutical Sciences*, *3*(1), 68–69.

[47] Rani, S. V. (2019). Effect of Root Extract Fractions of Anti-gonon leptopus Hook. et ARN. on Antioxidant Activity. *International Journal of Pharmacy and Biological Sciences-IJPBS TM*, *2*, 9. https://doi.org/10.21276/ijpbs.2019.9.2.76

[48] Ranjan, P. , T. D. K. , T. K. (2015). Evaluation of antidepressant activity of ethanol and chloroform extracts of Antigonan leptopus. *European Journal of Biomedical and Pharmaceutical Sciences*, *2*(3), 366–375.

[49] Ranjan, P., & Tripathi, K. (n.d.). *ANTIGONON LEPTOPUS: AN REVIEW*. www.ejpmr.com473

[50] Rasooli, I., Shayegh, S., Taghizadeh, M., Darvish, S., & Astaneh, A. (2008). Phytotherapeutic Prevention of Dental Biofilm Formation. *Phytother. Res*, *22*, 1162–1167. https://doi.org/10.1002/ptr

[51] RudhraS, & VenkatesanA. (n.d.). *Phytochemical studies and Antimicrobial Activity on the leaves of Antigonon leptopus and Ecbolium viridae*. https://doi.org/10.1101/2024.04.16.589845

[52] Tiwari, S. , A. B. , S. M. , S. K. (2005). An inventory and assessment of invasive alien plant species of Nepal. *IUCN Nepal, Kathmandu*.

[53] Vanisree, M., Alexander-Lindo, R. L., DeWitt, D. L., & Nair, M. G. (2008). Functional food components of *Antigonon leptopus* tea. *Food Chemistry*, *106*(2), 487–492. https://doi.org/10.1016/j.foodchem.2007.06.013

[54] Yunis Aj. et al. (2014). Acute toxicity and determination of the active constituents of aqueous extract of Uncaria tomentosa bark in Hyphessobrycon eques. *Journal of Toxicology*.