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Screening of phytochemical antioxidant and anti-inflammatory activity of the *Coelachne minuta* bor

Gurumeet C Wadhawa[1*], Paresh Gaikar[1], Vitthal Shivankar[2], Maryappa Sonawale[3], Laxman R Rathod[4]
[1] Rayat Shikshan Sanstha's, Karmaveer Bhaurao Patil College, Vashi, Navi Mumbai, Maharashtra, India
[2] Rayat Shikshan Sanstha's, Chhatrapati Shivaji College, Satara, Maharashtra, India
[3] Veer Wajekar Arts Science and Commerce College, Navi Mumbai, Maharashtra, India
[4] Department of Botany, Rayat Shikshan Sanstha's, Mahatma Phule A.S.C College, Panvel, Navi Mumbai, Maharashtra, India

Abstract
The plant *Coelachne minuta* Bor belongs to the Poaceae family. This is a rare, active plant that has been used to heal a variety of ailments. The leaves and rootsof the *Coelachne minuta* Bor plant were employed in this study for phytochemical analysis as well as biological activities like antioxidants and anti-inflammatory properties. Terpenes, sterols, tannins, anthracene, saponins, reducing sugars, alkaloids, proteins, coumarins, saponosides were found in *Coelachne minuta* Borrleaves and roots extract. Well-known techniques for assessing antioxidant and anti-inflammatory activity. *Coelachne minuta* Bor has significant antioxidant and anti-inflammatory effects in both its leaves and root extract for C_2H_5OH, $CHCl_3$ and CCl_4. The anti-inflammatory efficacy of *Coelachne minuta* Bor leaves and root extracts is highest in ethanolextract.

Keywords: antioxidant, anti-inflammatory, *Coelachne minuta* bor, phytochemical

Introduction
Coelachne minuta Bor is found only in a 300-kilometer area of the Western Ghats in India's Maharashtra state. During the monsoon season, it blooms profusely on hilltops (July-August). It's a little grass compared to other *Coelachne minuta* Bor species, with spikelets up to 0.13 cm long vs 0.15-0.25 cm for the other two. Leaves are lanceolate, 0.6-3.0 x 0.15-0.4 cm, hirsute on nerves above, glabrescent underneath, and sharp at the apex. Panicles abound, measuring 3-5 cm in length. It thrives in shallow soil, ferricrete grass areas, and any lateritic soil plateau [1, 2]. Antioxidants aresubstances that protect the body from the harmful effects of free radicals. Inhibit oxidation and protect cells from harm caused by free radicals, which are unstable molecules that are produced during the oxidation process in the body [3, 4]. Free radicals cause a chain reaction, causing cells to be damaged. Oxidative stress is caused by a rise in free radical levels in the body [5, 6]. Oxidative stress is linked to a number of ailments, including heart disease, cancer, and diabetes. Free radicals are a significant target of lipid proteins and nucleic acids [7]. Antioxidants defensive mechanism works to scavenge free radicals and prevent chain reactions from starting. A balance between antioxidants and free radicals is required for appropriate physiological functions [3, 5]. Inflammation is an important defensive reaction to infection, discomfort, and injury in the body. Inflammation causes swelling, heat, redness, and pain [8, 9]. Inflammation is caused by cell loss, tissue injury, ischemia, and malignancy [10]. Acute or chronic inflammation can occur. Chronic inflammation can endure for a long time. Anti-inflammatory chemicals are used to relieve inflammation-related symptoms in the body [11]. Various phytochemicals were detected using a conventional methodology on the leaves and roots of the *Coelachne minuta* Bor plant in this investigation. *Coelachne minuta* Bor plant leaves and roots are also tested for antioxidant and anti-inflammatory activities using various extracts.

Fig 1: *Coelachne minuta* bor plant

Materials and Methods
The leaves and root of *Coelachne minuta* Bor plant were collected from Lonavala, Maharashtra. The specimen of leaves and roots washed with distilled water then specimens are dried. After completion of drying, then pulverized the specimens and powered of leaves and root *Coelachne minuta* Bor plant stored in air tight bottles. The leaves and rootsextract of the *Coelachne minuta* Bor plant were named CM-L and CM-R respectively

Phytochemical analysis
Phytochemical testing carried using estimated protocol for CM-L and CM-R extract [12-14].

Sterols
In a test tube, an equal volume of acetic anhydride was added and slowly mixed. The tube's side was then poured with 1 ml of concentrated H_2SO_4 [15,16]. The creation of a brownish-red ring at the contact zone of the two liquids and

a greenish hue in the separation layer suggest the presence of sterols. Both CM-L and CM-R tests were positive.

Tannins
Tannins were detected using a ferric chloride test [17, 18]. The appearance of a blue in this test changed to olive green as more ferric chloride was applied. For CM-L and CM-R, a ferric chloride test is positive.

Anthracene
In a test tube, 5 mL chloroform was added to floral or fruit powder and stirred for 5 minutes. The mixture was filtered, and the filtrate was agitated in an equal amount with a 10% ammonia solution. The presence of free anthraquinone is indicated by the aqueous layer turning pink, crimson, or violet when agitated [19]. The CM-L and CM-R were positive anthracene detection test.

Saponins
The powdered leaves and rootswere shaken rapidly for 30 seconds in a test tube with 10 mL distilled water. It was then allowed to stand for 30 minutes. The development of honeycomb foam implies the presence of saponins [20]. Saponins' detection test yielded positive results for CM-L and CM-R.

Flavonoids
Acetone was employed to completely retain two grammes of floral or fruit powder. The residue was removed with warm water after the acetone was evaporated over a water bath. The filtrate was allowed to cool after filtering the mixture while it was still hot before being used for the next test: In Shinoda's experiment, a few magnesium chips were added to 3 mL of an aqueous solution, and 2 drops of mild HCl were added and warmed. A pink or crimson colour indicates the presence of flavonoids [8,14]. The detection test for flavonoid was positive for CM-L but negative for CM-R.

Phenolic nucleus
The phenolic nucleus is detected using a sodium hydroxide test [20]. The detection test for phenolic nucleus was positive for CM-Lbut negative for CM-R.

Terpenes
The Liebermann reagent test aids in terpene identification by producing a blue green colour that indicates the presence of a terpene, whereas no pink colour indicates the absence of terpenes[19].Terpene's detection test was positive for CM-L and CM-R.

Reducing sugars
The Fehling reagent was used to identify reducing sugars, which was then validated by the Tollens reagent test [20]. Reducing Sugar's detection test waspositive for CM-L and CM-R.

Alkaloids
Alkaloids were identified using Bouchardat reagent and (reagent iodo-iodized) Bouchardat reagent [16]. The detection test for alkaloid was positive for CM-L and CM-R.

Proteins
The proteins were detected using the biuret reaction. In a test tube, add 2-3 drops of aqueous $CuSO_4$ diluted to 2% to a small amount of extract diluted in 2 mL of 20% aqueous NaOH. The presence of protein is indicated by purple colour formations [14]. The detection test for proteins was positive for CM-L and CM-R.

Coumarins
During extraction, each residue produced a 2 mL ethanolic solution in two test tubes. Heat both test tubes in a water bath until they are both boiling, then add 0.5 mL of 10% NaOH to one of them. To chill down each test tube, add 4 mL distilled water. A faint yellow solution shows the presence of coumarin if the liquid from the test tube in which the alkaline solution was added is transparent or more translucent than the liquid from the control test tube (without the alkaline solution [19, 21]. Coumarin's detection test revealed that it was positive for CM-L and CM-R.

Saponosides
To find saponosides, put 8-10 mL of aqueous full extract in a test tube. After shaking the tube for 10-15 seconds, it was left alone for 12-15 minutes. saponosides Saponins are detected when persistent foam reaches a height of 1 to 2 cm [22]. The saponoside test ware positive for CM-L and CM-R.

Antioxidant activity determination
DPPH Scavenging Test: The percentage of antioxidant contained in the sample was measured using a standard DPPH scavenging test procedure. This test was carried out in accordance with the established methodology. The various extracts of the plant material were prepared for this test [13, 23].

Study of anti-inflammatory activity (In-vitro models)
The anti-inflammatory efficacy of the various extracts was tested using a slightly modified Mizushima and Kobayashi dosage regimen. The albumin test was employed [24, 25].

Results and Discussions

Phytochemical analysis
Based on the findings of this study, it can be concluded that the ethanolic extract of *Coelachne minuta* Bor leaves and roots included a variety of phytochemicals.
The floral extract of *Coelachne minuta* Bor included sterols, tannins, anthracene, saponins, flavonoids, terpenes, phenolic nuclei, terpenes, reducing sugars, alkaloids, proteins, coumarins, and saponosides, according to phytochemical analysis.
The floral extract of *Coelachne minuta* Bor *i*ncluded sterols, tannins, phenolic nuclei, terpenes, reducing sugars, coumarins, and saponosides.

Antioxidant activity determination
Table 1 and table 2 show the antioxidant activity of organic solvents in *Coelachne minuta* Bor leaves and root extract for BHT, C_2H_5OH, $CHCl_3$, and CCl_4 extract. Figure 2 shows the graphical performance of BHT, C_2H_5OH, $CHCl_3$, and CCl4for CM-L (a). It was found that C_2H_5OH $CHCl_3$and CCl_4 have significant antioxidants activity. The DPPH radical activity of CM-R, $CHCl_3$, and CCl_4 was better than that of C_2H_5OH extract, as shown in Fig. 2 (b).

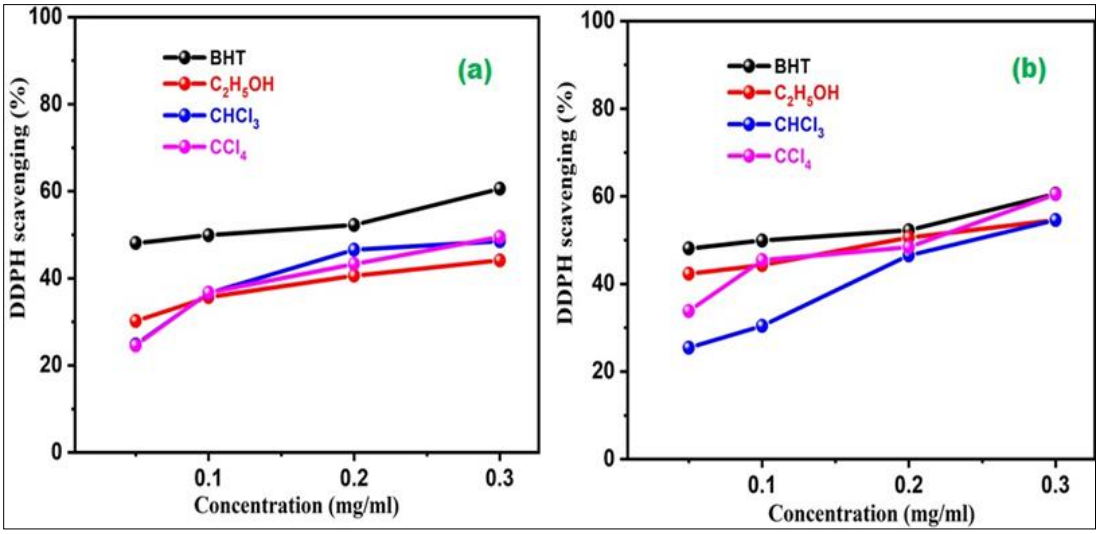

Fig 2: Antioxidant activity of CM-L and CM-R a) DPPH radical activity of CM-Lb) DPPH radical activity of CM-R

Table 1: Antioxidant activity of CM-L

Extract Conc. Mg/ml	BHT	C_2H_5OH	$CHCl_3$	CCl_4
0.05	48.1	30.2	24.8	24.6
0.1	49.91	35.7	36.59	36.7
0.2	52.24	40.6	46.55	43.3
0.3	60.57	44.12	48.5	49.5

Table 2: Antioxidant activity of CM-R

Extract Conc. Mg/ml	BHT	C_2H_5OH	$CHCl_3$	CCl_4
0.05	48.1	42.30	25.44	33.80
0.1	49.91	44.30	30.44	45.40
0.2	52.24	50.60	46.53	48.40
0.3	60.57	54.60	54.60	60.50

Determination of anti-inflammatory activity

Standard (Ibuprofen), petroleum ether, chloroform, ethyl acetate, n-Butanol, and ethanol anti-inflammatory activity (in-vitro models) for *Coelachne minuta* Bor plant's leaves and root extract tabulated in table 3 and table 4 respectively for standard (Ibuprofen), petroleum ether, chloroform, ethyl acetate, n-Butanol, and ethanol. For standard, Petroleum Ether, Chloroform, Ethyl acetate, n-Butanol, and Ethanol, Fig. 3 shows % inhibition of CM-L and CM-R. Figure 3 shows that ethanol extract has the highest anti-inflammatory efficacy for both CM-L and CM-R, compared to other extracts. In-vitro anti-inflammatory action was found in ethanol extracts of *Coelachne minuta Bor* leaves and roots, which could be related to the presence of different phytochemicals in the extract.

Table 3: Anti-inflammatory activity of CM-L

In-Vitro Anti – inflammatory activity	Dose (mg / kg)	Absorbance value (Mean + SE)	Inhibition of denaturation (%)
Control	5ml / kg	0.098	----
Standard (Ibuprofen)	100mg/kg	0.18	90.32
Petroleum ether extract	200mg/kg	0.15	72.45
Chloroform extract	200mg/kg	0.14	68.20
Ethyl acetate extract	200mg/kg	0.12	45.28
n-Butanol	200mg/kg	0.16	46.30
Ethanol	200mg/kg	0.17	86.40

Table 4: Anti-inflammatory activity of CM-R

In-Vitro Anti – inflammatory activity	Dose (mg / kg)	Absorbance value (Mean + SE)	Inhibition of denaturation (%)
Control	5ml / kg	0.098	----
Standard (Ibuprofen)	100mg/kg	0.18	90.32
Petroleum ether extract	200mg/kg	0.12	78.19
Chloroform extract	200mg/kg	0.13	24.28
Ethyl acetate extract	200mg/kg	0.12	44.18
n-Butanol	200mg/kg	0.14	67.75
Ethanol	200mg/kg	0.12	86.19

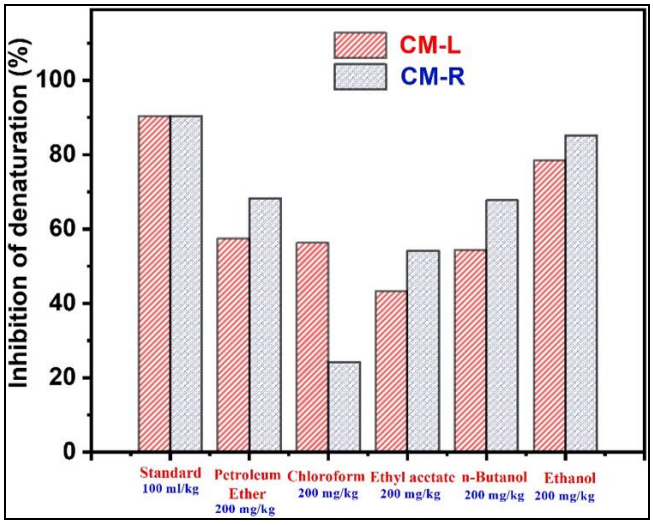

Fig 3: % Inhibition of CM-L and CM-R for standard, Petroleum Ether, Chloroform, Ethyl acetate, n-Butanol, Ethanol

Conclusions

Phytochemical research revealed that the leaves extract of *Coelachne minuta* Bor contained sterols, tannins, anthracene, saponins, flavonoids, terpenes, phenolic nuclei, terpenes, reducing sugars, alkaloids, proteins, coumarins and saponosides. The roots extract of *Coelachne minuta* Bor included sterols, tannins, terpenes, reducing sugars, coumarins, and saponosides. Both leaves and rootsextracts had the highest anti-inflammatory efficacy in ethanol extract. *Coelachne minuta* Bor leaves and rootshave strong antioxidant activity as evidenced by the free radical scavenging property, making them a powerful antioxidant that can protect against oxidative stress, which has been

linked to a variety of diseases including ageing, diabetes, cancer, cardiovascular disease, and rheumatoid arthritis. Overall, it's a natural antioxidant source that can help with illness prevention and health maintenance. According to the aforementioned trial results, it's ethnomedicinal claims were correct. This backs up the claim that the herb has been used to alleviate inflammation in the past. The study's findings encourage the use of *Coelachne minuta* Bor leaves and roots promote proper protection and sustainable use of such plant resources. Local community awareness should be improved by merging traditional knowledge with scientific findings.

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