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Gloriosa Superba (L.): A Current Review Of Its Phytochemical Properties And Anti-Bacterial Activities.

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Abstract
Perennial climber Gloriosasuperba L. is utilized in many parts of Africa and Southeast Asia as an ayurvedic medicinal herb. The plant was classified as endangered because of careless wild collection, despite being widely utilized in medicine for its colchicine content. Although it has a low seed set issue as well, it is now being grown because of industrial need. The herb is used to treat a variety of conditions, including snakebite, gout, arthritis, rheumatism, inflammation, ulcers, bleeding piles, skin conditions, and leprosy.Numerous chemicals, including colchicine, colchicoside (and its semi-synthetic counterpart, thiocolchicoside), superbine, gloriosine, lumicolchicine, 3-demethyl-N-deformyl-N-deacetyl colchicine, and N-formyl deacetyl colchicine, have been identified from plant components, primarily tubers and seeds. We have compiled information about this plant's occurrence, botanical description, ethanopharmacology, therapeutic applications, biological activity, and toxicological research in this review.

Keyword - *Colchicine, Gloriosine, Ethanopharmacology,*

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I. Introduction

Up to 6000 feet in elevationis *Gloriosa superba* a semi-woody herbaceous climber that can be found all over India. Originating in tropical Africa, it is currently flourishing in numerous regions of tropical Asia, such as India, Burma, Malaysia, and Sri Lanka. As a pot plant, it is currently extensively available across the tropics and around the world. Its range in Africa extends from Senegal to South Africa, Ethiopia, and Somalia. Zambia's national flower is the gloryrosa. This species can be found up to 2100 meters above mean sea level in India, where it is found in the milder mid-hill regions of Himachal Pradesh, Jammu Kashmir, and Uttar Pradesh, as well as in the hotter southern regions. In Hindi, it's called "Malabar glory lily," and in English.It is referred to as "Malabar glory lily" in English, "Kalihari" in Hindi, "Agnisikha" in Sanskrit, and "Glory lily" as its trade name. In South India, glory lilies are still harvested from the wild and used as an industrial medicinal crop due to its high colchicine content. It was one of the endangered species among the most valuable medicinal plants

and was on the approach of extinction due to overexploitation in the wild and issues during field production.Earlier than 1980, the tubers were indiscriminately harvested from the wild and utilized for medicinal applications. As a result of continuous over- exploitation of tubers from wild, the species was on the verge of extinction and was one of the endangered species among the most valued medicinal plants. Until this period, upto 75% of raw material required by pharmacies and drug manufacturers was fulfilled only from wild. *Gloriosa superba* has been reported to occur naturally in Africa, India and South eastern Asia and distributed widely throughout the tropics. It has natural occurrence through much of tropical Asia including: India, Sri Lanka, Malaysia and Burma. It occurs in thickets, forest edges and boundaries of cultivated areas in warm countries upto height of 2530 m.It is also planted as an ornamental pot plant due to its unusual and beautiful flowers, which progressively change color from green to yellow to orange to vivid red. The blossoms capture everyone's attention. (Pandey et al., 2021).

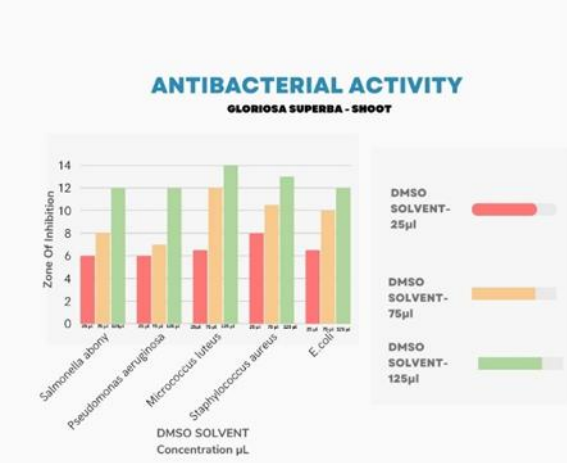
II. Pharmacological Effect

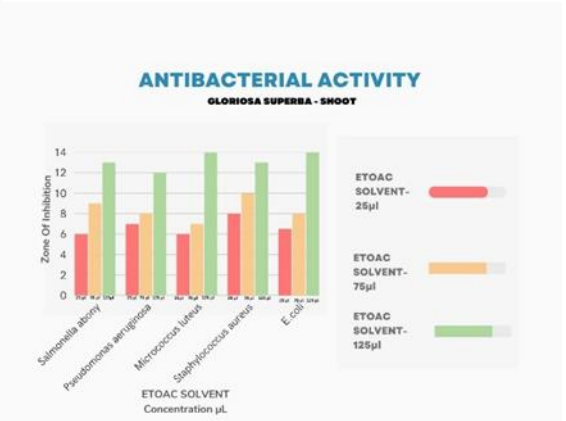
Gloriosa superba is a member of the class of medicinal plants, and as such, both traditional ethnobotany and modern pharmacology have explored the pharmacological effects of this plant. Because it can poison humans and animals accidentally or on purpose, this plant can infect them with diseases or even kill them. Plant parts can be used directly, without any additional care, to deter snakes and scorpions by putting them around windows and doors. Pharmacological research on *Gloriosa superba* has shown that this species has a great deal of promise for treating bacterial, parasite, and inflammatory illnesses.such as fever, cough, malaria, and stomach ache. Fruit paste is applied topically to cure head lice, injuries, and skin problems brought on by parasites. Head lice can be killed using leaf juice. Pregnant women who apply roots to their hands and feet will experience a more comfortable delivery. An abortion can be achieved by taking capsules containing a mixture of tuber powder and ghee twice a day. Applying a powder containing mustrad oil to the joints twice a day helps lessen arthritis discomfort. External application of tuber paste is possible for a number of skin conditions, including leprosy and wounds.

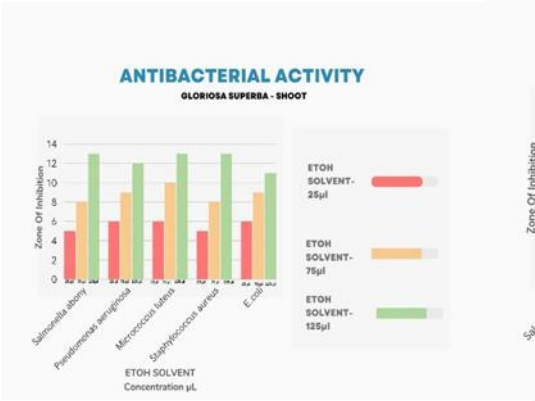
Such as stomach discomfort, fever, cough, and malaria. Fruit paste is applied topically to treat head lice, wounds, and parasite-caused skin issues. *Gloriosa superba* leaf juice is effective at killing head lice. Applying roots to the hands and feet of expectant mothers can make the delivery process more comfortable. Two times a day, capsules containing a combination of ghee and tuber powder can be used to induce an abortion. The pain associated with arthritis can be reduced by applying a powder containing mustrad oil on the joints twice a day. It is feasible to apply tuber paste externally for wounds and leprosy, among other skin disorders.In cattle, gastrointestinal issues can be treated using tuber powder. To cure cattle anthrax, mix flower paste with warm water and apply it to the soles of the feet. Milk output can be increased by giving cows tubers to mash and smear between their toes or by mixing boiling tuber water with feed grass .It can be concluded from pharmacological studies, traditional ethnobotany use, and a significant correlation between the two that Maroyi successfully passed that this plant has the potential to be a great source of medicine in the future, even though more study, clinical trials, and product development are still required.(Ebiernawiatiet al., 2022).

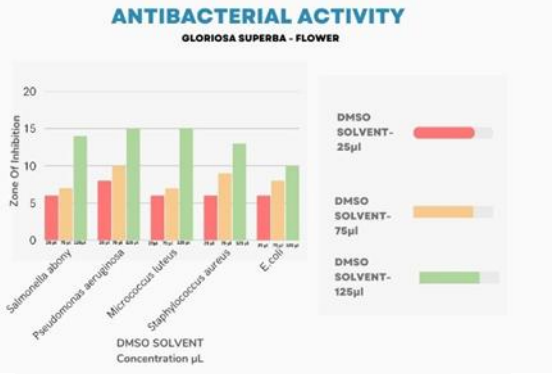
III. Antibacterial Activity

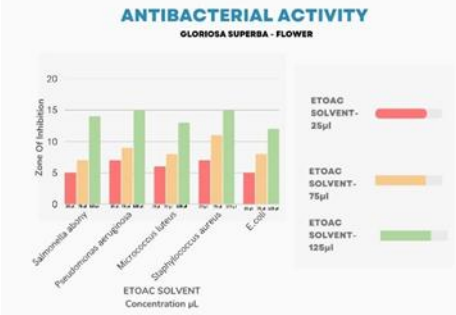
Micrococcus luteus, Staphylococcus aureus, Salmonella abony, Pseudomonas aeruginosa, and Escherichia coli bacterial strains were employed and kept in nutrient agar (HiMedia, Mumbai) slants at 4°C. Mueller-Hinton agar plates (HiMedia, Mumbai) had been produced, swabbed consistently, sanitized, and solidified. Using agar well diffusion techniques, the antibacterial activity of aqueous DMSO, ETOAC, and ETOH was assessed in vitro. The different aqueous solvent concentrations—25, 75, and 125 µl—have been put into each plate's well. The bacterial strains that were acquired from Rajah Muthiah Medical College, Annamalai University, Annamalai Nagar, are S. abony, P. aeruginosa, M. luteus, S. aureus, and E. coli. Following a 24-hour incubation period at 37°C, the area of inhibition was converted to measured (mm). Three copies have been kept.

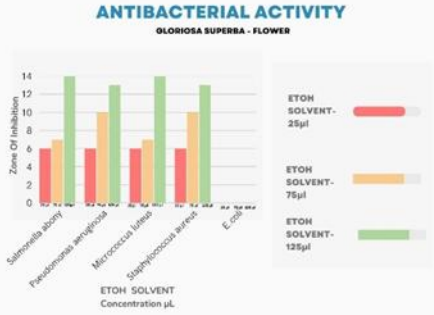

ANTIBACTERIAL ACTIVITY
GLORIOSA SUPERBA - SHOOT
Zone Of Inhibition
Salmonella abony
Pseudomonas aeruginosa
Micrococcus luteus
Staphylococcus aureus
E.coli
DMSO SOLVENT
Concentration µL
DMSO SOLVENT-25µl
DMSO SOLVENT-75µl
DMSO SOLVENT-125µl

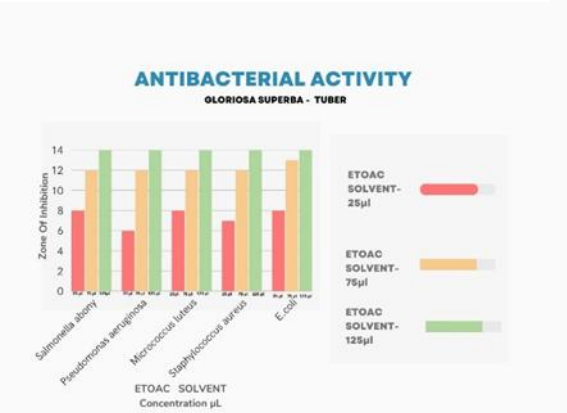

ANTIBACTERIAL ACTIVITY
GLORIOSA SUPERBA - SHOOT
Zone Of Inhibition
ETOAC SOLVENT
Concentration µL
ETOAC SOLVENT-25µl
ETOAC SOLVENT-75µl
ETOAC SOLVENT-125µl

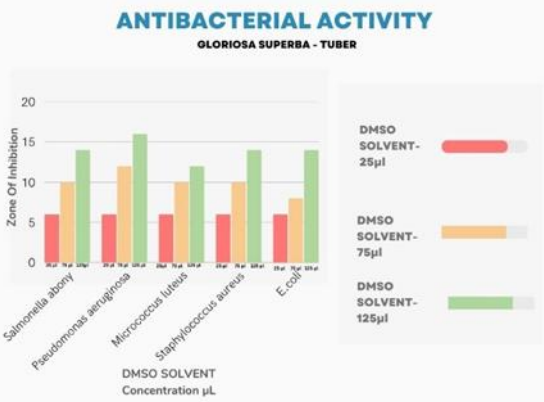

ANTIBACTERIAL ACTIVITY
GLORIOSA SUPERBA - SHOOT
Zone Of Inhibition
ETOH SOLVENT
Concentration µL
ETOH SOLVENT-25µl
ETOH SOLVENT-75µl
ETOH SOLVENT-125µl


ANTIBACTERIAL ACTIVITY
GLORIOSA SUPERBA - FLOWER
Zone Of Inhibition
DMSO SOLVENT
Concentration µL
DMSO SOLVENT-25µl
DMSO SOLVENT-75µl
DMSO SOLVENT-125µl


ANTIBACTERIAL ACTIVITY
GLORIOSA SUPERBA - FLOWER
Zone Of Inhibition
ETOAC SOLVENT
Concentration µL
ETOAC SOLVENT-25µl
ETOAC SOLVENT-75µl
ETOAC SOLVENT-125µl


ANTIBACTERIAL ACTIVITY
GLORIOSA SUPERBA - FLOWER
Zone Of Inhibition
ETOH SOLVENT
Concentration µL
ETOH SOLVENT-25µl
ETOH SOLVENT-75µl
ETOH SOLVENT-125µl


ANTIBACTERIAL ACTIVITY
GLORIOSA SUPERBA - TUBER
Zone Of Inhibition
ETOAC SOLVENT
Concentration µL
ETOAC SOLVENT-25µl
ETOAC SOLVENT-75µl
ETOAC SOLVENT-125µl


ANTIBACTERIAL ACTIVITY
GLORIOSA SUPERBA - TUBER
Zone Of Inhibition
DMSO SOLVENT
Concentration µL
DMSO SOLVENT-25µl
DMSO SOLVENT-75µl
DMSO SOLVENT-125µl

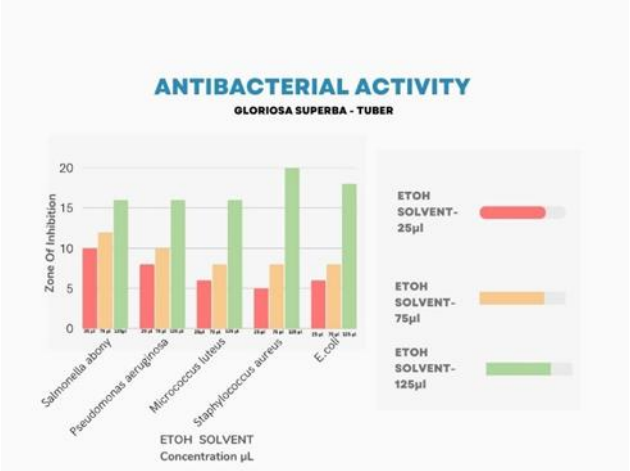


Fig: 1 Three solvent extracts of Gloriosa superba shoot, flower, and tuber extracts' inhibition zone against five distinct bacterial infections

IV. Anti Colon Cancer Activity

Globally, colon cancer is a serious health issue. The stage of the malignancy, side effects, and altered biodistribution limit the number of available treatments, including radiation, chemotherapy, surgery, and anticancer medications. Peptides derived from natural sources have emerged as a possible treatment option.It is well known that *Gloriosa superba* contains alkaloids with anticancer properties, including colchicine. These peptides found in the extracts, meanwhile, have not been investigated.Therefore, the main goal of this work is to examine the anti-colon cancer potential of a partially purified protein hydrolysate of *Gloriosa superba* superba rhizome.(Prapahanbudchart MS et al., 2017).

V. Anthelmintic Activity

Revealed that alcoholic extracts from *Gloriosa superba* tubers had strong anthelmintic action against the earthworm Eisoniafatida. The activity of *Gloriosa superba* whole plant extracts in ethanol and water against Pheretimaposthuma, or Indian earthworms, was examined. When compared to piperazine citrate (15 mg mL-1), both extracts evaluated at the dose level of 20-60 mg mL-1 shown significant action ($p<0.01$), and both extracts demonstrated strong anthelmintic efficacy, according to 13. Activity of antioxidants Significant antioxidant and antibacterial activity was demonstrated by a methanolic extract of *Gloriosa superba* leaves, and it was also proposed that this leaf could be used as a natural source of these compounds.30. 31 found that G. superba seeds, tubers, and leaves exhibited antioxidant activity in a methanolic extract.(Kaliyaperumal et al., 2015).

Qualitative analysis of phytochemistry: Confirmatory qualitative phytochemical screening of plant extracts using standard methods6 identified the main chemical groups present in the extracts: tannins, saponins, flavonoids, alkaloids, phenols, glycosides, steroids, and terpenoids.

A terpenoids test screening

For every 0.5g of extract, 2 mL of CHCl3 was added. To form a layer, carefully apply 3 mL of concentrated H2SO4. The reddish-brown coloring of the interface indicates the presence of terpenoids.

A flavonoid screening test

A test tube with 0.5 mL of extract was filled with 5–10 drops of diluted HCl and a tiny piece of magnesium ribbon. After that, the mixture was cooked for a little while. The emergence of a dirty brown or reddish-pink color indicates the presence of flavonoids.

A Alkaloids test screening

Alkaloids test was conducted by dissolving 1.36 grams of magnesium chloride and 5 grams of potassium iodide in 60 milliliters and 10 milliliters of distilled water, respectively. The mixture of both solutions was diluted to a level of 100 milliliters using distilled water. One milliliter of the extract was treated with a few drops of Meyer's reagent, which is potassium mercuric iodide. Alkaloids can be identified by the appearance of a white or pale precipitate.

A tannin test screening:

A test tube containing around 5 mL of the extract was filled with a few drops of a 1% lead acetate solution. A precipitate that is either red or yellow indicates the presence of tannins.

Saponin test screening:

A test tube containing around 5 mL of the extract was filled with a few drops of sodium bicarbonate. The mixture was left for three minutes after being well shaken. In the form of a honeycomb-like foam, saponins were apparent.

A phenol screening test:

One milliliter of extract and three milliliters of distilled water were mixed with a few drops of a 10% aqueous ferric chloride solution. Phenols were detected by the development of a blue or green color.

A steroid screening test:

Using the sides of the test tube, carefully pour 1.0 mL of concentrated sulfuric acid into the 2.0 mL of extract. The crimson color that the chloroform sheet produces indicates the presence of steroids.

A glycoside screening test:

To 5 mL of extract, add 5 mL of 5% FeCl3 and 5 mL of diluted HCl. Place in a boiling water bath to heat for 5 minutes. Shake well with benzene or any other organic solvent once cooled. Apply the same quantity of diluted ammonia once the organic layer has been removed. The ammonical layer's pinkish-red color indicates the presence of glycosides. (Pallavisharma etal 2024).

Table: 1. Pytochemical Analysis

S.No.	Phytochemical	Leaves	Tubers
1.	Terpenoids	-	+
2.	Flavonoids	+	++
3.	Alkaloids	++	++
4.	Tannins	-	++
5.	Saponins	+	++
6.	Phenols	++	++
7.	Steroids	++	++
8.	Glycosides	+	++

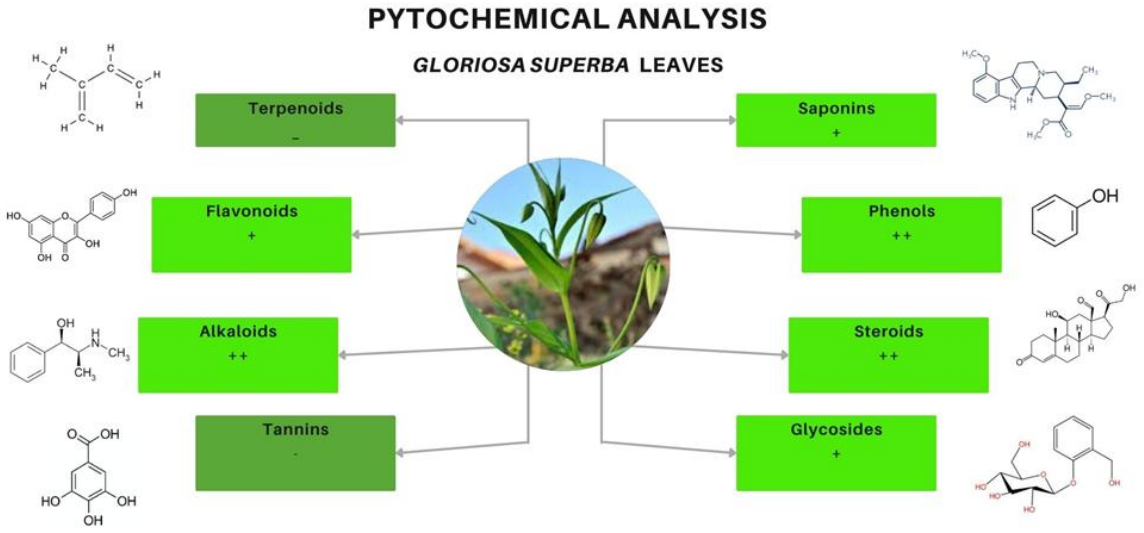


Fig: 2 Gloriosa Superba Leaves part – Pytochemical Analysis

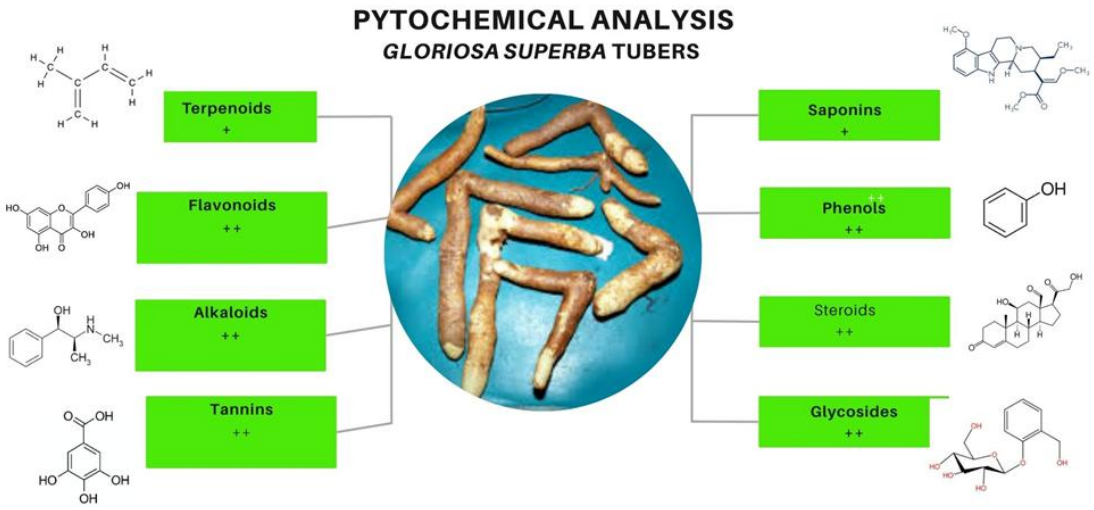


Fig: 2 Gloriosa Superba Tubers part – Pytochemical Analysis

VI. Antifungul Activity

Using the agar well diffusion method, the antifungal activity of the whole plant extracts of the shoots, flowers, and tubers in various solvents was investigated against five pathogenic fungal species. The zone of inhibition for each fungal strain was measured at different concentrations of 25, 75, and 125 µl/ml, as illustrated in Fig. 2.

While none of the shoot and flower extracts prepared with three different solvents displayed inhibition zones, the antifungal activity of the G. superba tuber extracts prepared with DMSO, ETOAC, and ETOH demonstrated zones of inhibition against all five fungal pathogens (C. albicans, C. krusei, A. niger, R. oryzae, and Mucor sp.) (Jothi uchimahali etal.,2019_).

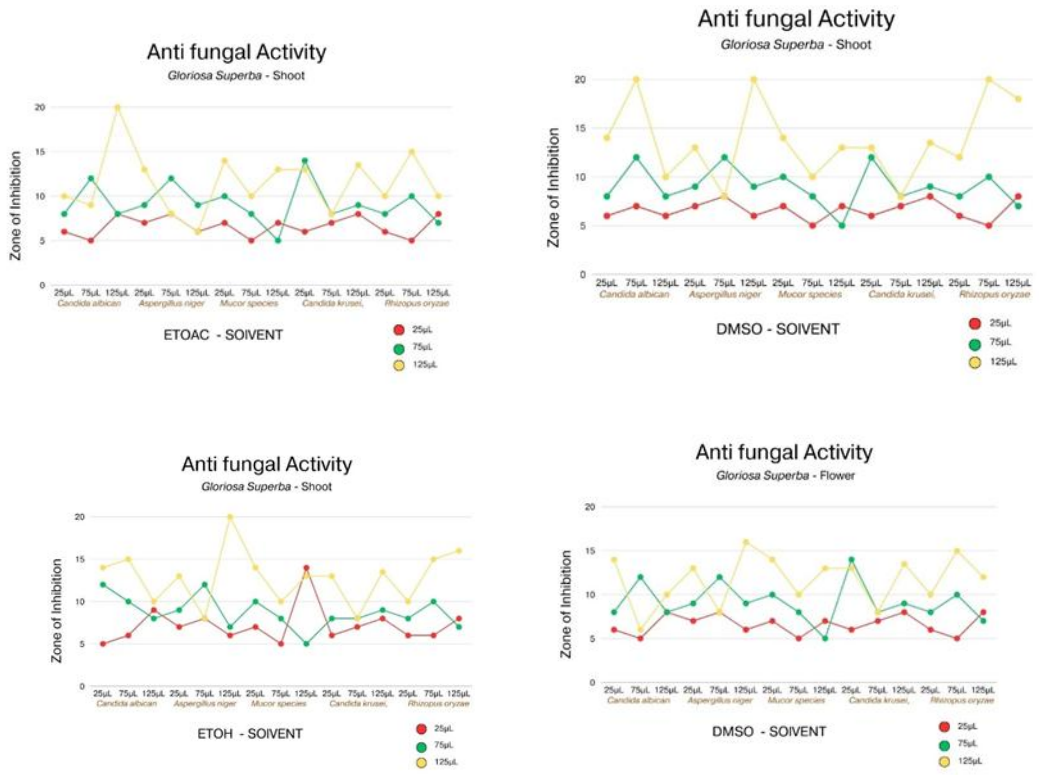


Fig: 3 Three solvent extracts of Gloriosa superba shoot, flower, and tuber extracts' inhibition zone against six distinct fungal infections

Credit Author ship
Dr. A. M. Ramachandran (Validation, Formal analysis)
Mr. G. Arivishnu (Writing orginal Draft)
Mrs. J. Paul Abia (Software visudization)

Ethical statement
There are no human or animal subjects in this article.

Declaration of competing interest
The authors declare no conflict of interest in this work.

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VII. Summary And Conclusion

In the end, *Gloriosa superba* an economically significant medicinal plant with a variety of therapeutic applications, is in danger of going extinct locally. The numerous pharmacological properties of *Gloriosa superba* and their uses in Ayurvedic therapy have been asserted. Gloriosa superba is the most threatened plant in the world due to low seed germination, tuber dormancy, the need for traditional treatments, overharvesting from natural forests, habitat degradation, and overexploitation.The seeds of *Gloriosa superba* are used as a muscle relaxant and to relieve rheumatic pain in humans. In Ethiopia, *Gloriosa superba* is traditionally used to treat tumors and gout. It was reported that the presence of colchicine in *Gloriosa superba* tubers caused them to exhibit mutagenic qualities according to the Ames Salmonella mutagenicity test.As a cytotoxic medication, colchicine has been used to treat inoperable cancer. Paralysis, rheumatism, snake and insect bites, lice, intermittent fevers, wounds, anti-fertility, gonorrhea, leprosy, piles, debility, dyspepsia, hemorrhoids, helminthiasis, and inflammations were all successfully treated with the tuber powder.Leaf extract from *Gloriosa superba* has just lately been employed in the creation of metal nanoparticles.Such gloriosasuperba value added plant can be used by agriculture students, un employed graduates to plant in their lands to double profits.

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