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ANALYSIS OF PHYTOCHEMICAL CONSTITUENTS OF SELECTED MEDICINAL WEED PLANTS OCCURRING IN CENTRAL REGION OF RAJASTHAN

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ABSTRACT

North western region of India, particularly, Rajasthan state is well known for its rich biodiversity. The vast diversity includes not only the cultivated plants but weed plants also. These weed plants are a great source of phytochemicals with medicinal properties. This study focused with four medicinal weed plants including *Datura stramonium, Oxalis corniculata, Tridax procumbens*, and *Phyllanthus niruri*. Phytochemical compounds contribute as an important source of nutrition which makes the plants a great source of medicinal values. This research aimed to analyze the chemical compounds including alkaloids, flavonoids, terpenoids, tannins, glycosides, saponins, and carbohydrates which are well known to contain antifungal properties against microorganisms including bacteria and fungi. The research includes the medicinal weed plants from the state of Rajasthan located towards the northwestern region of India. Leaves, stem, and roots of selected medicinal weed plants were processed under aseptic conditions for the plant extraction process using three different solvents including aqueous, ethanol, and methanol. Phytochemicals are known for curing various plant diseases and hence could play an important role in agriculture and crop protection. Our analysis provided evidence that aqueous and other two organic solvents tested with the medicinal plant extracts showed positive results of the presence of important phytochemical constituents which are known to cure several diseases of plants.

KEYWORDS

Phytochemicals, Weed plants and Extracts.

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INTRODUCTON

Weed plants are well known as the invader plants that occupy the agricultural lands and holds a high competition of basic resources including water, minerals, light, and soil of crop plants¹. The weed plants not only competing with the crop plants but reduce their productivity also. Several kinds of research have been conducted on studying alternate methods to control the growth of weeds and

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eradicate them from the agricultural fields. On the contrary, several weed plants are known to produce a positive impact on the agriculture sector. These plants possess medicinal properties with high phytochemical constituents that help in crop productivity as well as reduce the growth of microbial pathogens. These pathogens including bacteria and fungi cause several plant diseases and destruction to the agricultural sector.

The phytochemical compounds can be broadly categorized into two categories of primary and secondary. The primary metabolites perform the main functions of the plants whereas, secondary metabolites help the plants to survive and improve their functionality. The secondary compounds do not directly contribute to the growth and development of the plant and hence play the secondary role^{2,3}. Singh and Singh (2013) researched phytochemistry the of Datura stramonium. The study focused on the medicinal properties of this plant showing the presence of phytochemicals including several alkaloids, carbohydrates, tannins, amino acids. The research covered the location of North-eastern India known as Manipur⁴. Similarly, Srikanth *et al*, (2012) studied the phytochemistry of Oxalis corniculata and highlighted the medicinal importance of the possessing antifungal, plant antioxidant. antidiabetic, anticancer, antimicrobial activity and many more. The phytochemical study showed the presence alkaloids, of tannins. flavonoids. glycosides, and several other secondary metabolites in O. corniculata.

The objective of this research focusses on the study of various phytochemical constituents present in the selected four medicinal plants. This study also supports understanding the mechanism of plants possessing the antimicrobial properties and curing the diseases that destroy the plants. The selection of weeds as medicinal plants will further help in utilizing the unwanted competitors of healthy crops in the growth and production of plants.

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MATERIAL AND METHODS Plant materials

The four selected medicinal weed plants including *Phyllanthus niruri, Oxalis corniculata, Tridax procumbens,* and *Datura stramonium* and were aseptically collected from locations of Ajmer city, located in the center part of Rajasthan.

Plant extractions

The plant parts of selected medicinal weed plants were carefully collected and washed thoroughly with autoclaved distilled water followed by alcohol for a few minutes. They were dried and powdered in individual solvents including ethanol, methanol, and aqueous with different concentrations of 50ml, 100ml, and 150ml. The plant materials were centrifuged for 10-15minutes and the supernatant was filtered to a volume. The filtered plant extracts were further used for screening the antifungal properties of the individual plants.

RESULTS AND DISCUSSION

Standard methods of plant extraction process were used for the analysis of phytochemical constituents of the four medicinal weed plants (Table No.1). Three results obtained from three different solvents including organic and aqueous are described in Table No.2, 3, and 4. Several phytochemical compounds have been seen present from the study conducted. These compounds play an important role in the growth and development of plants. Moreover, they play a key role in improving the productivity and metabolic activities of the plants.

This research was conducted to study the various phytochemical constituents present in the four medicinal weed plants from the central region of Rajasthan state. The location selected was Ajmer city. The weed plants are known to possess medicinal properties and antifungal properties which might be of great importance to the agricultural sector. Preliminary phytochemical screening of the medicinal weed plants revealed the presence of several known metabolites including glycosides, alkaloids, saponins, flavonoids, tannins, carbohydrates, terpenoids. and These phytochemicals fall into the category of secondary metabolites which are known to maintain the

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various biological processes of the plant including antioxidant, antimicrobial, and anti-inflammatory.

The majority of phytochemicals tested showed positive results for the weed plants. However, tannins and flavonoids were found present in all the four plants tested with the solvents. Tannins are categorized in phenolic class which is primarily known for their defense mechanism in plants. Tannins are well known to decrease the protein content in plants thereby protecting the plants especially the weeds from the grazing animals⁵. Terpenoids are also known as isoprenoids representing the largest class of chemicals produced by plants. Even the weed plants known as invaders in agriculture have been seen to possess this chemical⁶. Tholl (2015), studied the phytochemistry of terpenoids and stated that this class of chemical not only supports the plant in growth but also provide basic strength in favorable and unfavorable conditions of temperature and light.

Flavonoids as another class of important secondary metabolites have long been known as a strong provider of color and odor to the plants.

Recent studies have highlighted several other vital roles of flavonoids as germinator of spores and seedling growth. Additionally, like terpenoids, flavonoids also help the plant to fight against adverse conditions. Moreover, the secondary metabolites tested in weed plants play an important role as antimicrobial agents⁷. Carbohydrates found in many of the weed plants provide strength to the plant and improves the immune system⁸.

The four weed medicinal plants showed positive to neutral results for the screening of the phytochemical constituents. However, *Phyllanthus niruri* showed the presence of a majority of the metabolites followed by *Tridax procumbens*. All four medicinal plants are found in large quantities all over Rajasthan and possess great antimicrobial properties to cure several fungal and bacterial diseases and help plants in growth and crop protection.

| C NI | | | | | | | | | | | |
|------|-----------------------------------|--|--|--|--|--|--|--|--|--|--|
| S.No | Phyto-compounds | Test | Observation and results | | | | | | | | |
| 1 | Alkaloids | 1ml plant extract+ few drops hexane+ 1ml HCl+1ml C6H3N3O7 | Yellow precipitate | | | | | | | | |
| 2 | Saponins | 5.0ml distilled water + aqueous plant extract + few drops olive oil | Vigorously foam | | | | | | | | |
| 3 | Flavonoids | 1ml extract+1ml H2O+2ml NH3+ few drops conc. H2SO4 | Yellow precipitate | | | | | | | | |
| 4 | Terpenoids | 1ml extract + 1ml CH3OH +few drops conc. H2SO4 | Reddish brown precipitate | | | | | | | | |
| 5 | Glycosides | 2.0ml acetic acid + 2ml chloroform +aqueous plant extract +few drops conc. H2SO4 | Green Color precipitate | | | | | | | | |
| 6 | Carbohydrates (Molisch's test) | 1ml extract + 1 dropethanolic α- naphthol+1ml conc. H2SO4 | Reddish violet ring towards the junction | | | | | | | | |
| 7 | Tannins | 10ml bromine water + 0.5 g aqueous plant extract | Discoloration of bromine water | | | | | | | | |

| Table No.1: Phy | vtochemical screening | conducted for th | e medicinal | weed plants |
|---------------------|---------------------------|------------------|-------------|-------------|
| 1 4010 1 10010 1 11 | y coeffernieur ser cennig | conducted for th | c mcurcmu | meeu planto |

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| | Medicinal plants | | | | | | | | | | | | 5 m av | luco | us su | nvent | | | |
|---|----------------------------|----------------------------|--------------------------------------|--------|-------------------|---------|-------|-------|--------------|--------------------|--------------------|-----------|--------|----------------------|-------------------|---|----|---|--|
| S.No | Phytochemical compounds | (cor | Oxalis niculo | nta | Tridax procumbens | | | | | Phyllanthus niruri | | | | | Datura stramonium | | | | |
| | | L | S | R | L | | S | F | 2 | L | S | | R | I | L S | | Т | R | |
| 1 | Glycosides | _ | _ | _ | + | | + | + | - | - | | - | + | - | | _ | | _ | |
| 2 | Saponins | - | _ | _ | + | - | + | 4 | - | + | _ | | + | + | | <u> </u> | | + | |
| 3 | Flavonoids | + | + | + | + | | + | + | - | + | + | | + | - | | <u> - </u> | | _ | |
| 4 | Tannins | _ | _ | - | + | | + | + | - | + | + | F | + | _ | | _ | | _ | |
| 5 | Terpenoids | - | _ | - | _ | - | _ | _ | - | _ | - | - | _ | | | _ | | _ | |
| 6 | Carbohydrates | - | — | - | + | - | + | + | - | - | - | - | _ | | | _ | | _ | |
| 7 | Alkaloids | - | — | - | _ | | | - | - | + | + | | + | - | | _ | | _ | |
| 8 | | L= Leaf; S= Stem; R= Root. | | | | | | | | | | | | | | | | | |
| 9 | | Present= +; Absent= – | | | | | | | | | | | | | | | | | |
| Table No.3: Phytochemical constituents of four medicinal weed plants in ethanol solvent | | | | | | | | | | | | | | | | | | | |
| | Phytochemical | | Medicinal plants | | | | | | | | | | | | | | | | |
| S.No | compounds | Oxalis corniculata | | | Tridax procumben. | | | | es Phyllanth | | | us niruri | | Datura stramonium | | | | | |
| | | L | S | ŀ | R | L S | | 5 | R |] | L | | 5 | R I | | | \$ | R | |
| 1 | Glycosides | - | - | - 1 | - | + | + | - | + | - | ł | + | | + | - | | - | _ | |
| 2 | Saponins | - | - | - | - | - | _ | - | _ | - | - | | - | + + | | · 4 | - | + | |
| 3 | Flavonoids | + | + | 4 | F | + | + | - | + | - | + - | | - | + | - | . – | - | - | |
| 4 | Tannins | + | + | 4 | F | + | + | - | + | - | + + | | - | + - | | - - | | - | |
| 5 | Terpenoids | - | - | - | - | - | - | - | - | - | + + | | - | + - | | | | - | |
| 6 | Carbohydrates | + | + | - | F | + | + | - | + | - | · | | | | | | - | - | |
| 7 | Alkaloids | - | - | - | - | + | + | - | + | - | | | - | | | | - | | |
| 8 | | | | | | | L= | = Lea | af; S= | Stem | ; R= | Roo | t. | | | | | | |
| 9 | | | | | | | | Pre | sent= | +; Ab | sent | = - | | | | | | | |
| | Table No.4: Ph | ytoche | emica | l cons | stitue | ents of | f fou | r me | edicin | al wee | ed pl | lants | in me | ethar | 10l s | olvent | | | |
| S.No | Phytochemical | | | | | | | N | Iedic | inal pl | ants | 5 | | - | | | | | |
| 54110 | compounds | Oxal | Oxalis corniculata Tridax procumbens | | | | | | | Phy | Phyllanthus niruri | | | | | Datura stramonium | | | |
| 1 | | L | S | k | ł | L | | 8 | R | L | _ | S | R | | L | S | ╇ | R | |
| l | Glycosides | - | - | | - | - | | - | _ | + | _ | + | + | · · | - | - | ╇ | - | |
| 2 | Saponins | _ | - | | - | - | - | - | - | + | | + + | | • | ł | + | | + | |
| 3 | Flavonoids | + | + | + | - | + | - | ł | + | + | | + | + | + + | | + | ╇ | + | |
| 4 | Tannins | + | + | + | - | + | + | ł | + | + | | + | + | · | + | + | | + | |
| 5 | Terpenoids | _ | - | | - | _ | | - | - | + | | + | + | <u> </u> | - | _ | ╇ | _ | |
| 6 | Carbohydrates | + | + | + + | - | + | - | ł | + | <u> -</u> | | - | _ | <u> </u> | - | | | _ | |
| 7 | Alkaloids | | | | | | | | | | | | | | | | | | |
| 8 | | L= Leaf; S= Stem; R= Root. | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | Pre | sent= | +; Ab | sent | = - | | | | | | | |

Table No.2: Phytochemical constituents of four medicinal weed plants in aqueous solvent

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Phyllanthus niruri Oxalis corniculata Tridax procumbens Datura stramonium Figure No.1: Medicinal weed plants for analysis of phytochemical compounds

CONCLUSION

The four weed medicinal plants having medicinal presence of values showed the seven phytochemicals in the preliminary examinations. Although the metabolites were found positive in the majority of the plants, Phyllanthus niruri and Tridax procumbens showed the presence of most of the phytochemicals tested. These phytochemicals are known to cure several plant diseases specifically the fungal pathogens causing crop destruction and plant growth retardations. The research conducted on the study of phytochemical constituents may provide a wide range of opportunities for development agricultural sector and crop improvement. In addition to this study, the selected medicinal weed plants can also be evaluated qualitatively and quantitatively for several other metabolites present in the weed plants.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

BIBLIOGRAPHY

1. Sahu T R. Less known uses of weeds as medicinal plants, *Ancient science of life*, 3(4), 1984, 245-249.

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- 2. Thirumurugan D, Cholarajan A, Raja S S and Vijayakumar R. An Introductory Chapter: Secondary metabolites, secondary metabolites-sources and applications, Ramasamy Vijayakumar and Suresh S.S.Raja, *Intech Open*, 2018. DOI:10.5772/intechopen.79766.
- 3. Ojha S and Goyal M. Preliminary phytochemical screening of plant extracts prepared from traditional medicinal plants of Rajasthan, *Asian Journal of Research in Chemistry and Pharmaceutical Sciences*, 7(3), 2019, 819-823.
- 4. Singh L R and Singh O M. Datura stramonium: An overview of its phytochemistry and pharmacognosy, *Research Journal of Pharmacognosy and Phytochemistry*, 5(3), 2013, 143-148.
- 5. Hassanpour S, Maheri-Sis N, Eshratkhah B, Mehmandar F B. Plants and secondary metabolites (Tannins): A Review, *International Journal of Forest, Soil, and Erosion*, 1(1), 2011, 47-53.
- 6. Tholl D. Biosynthesis and biological functions of terpenoids in plants, *Advance Biochemical Engineering and Biotechnology*, 148, 2015, 63-106.
- 7. Samanta A, Das G, Das S K. Roles of flavonoids in plants, *International Journal* of *Pharmaceutical Sciences and Technology*, 6(1), 2011, 12-35.
- 8. Yadav M, Chatterji S, Gupta S K and Watal G. Preliminary phytochemical screening of six medicinal plants used in traditional

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medicine, International Journal of Pharmacy and Pharmaceutical Sciences, 6(5), 2014, 539-542.

- 9. Senguttuvan J, Paulsamy S and Karthika K. Phytochemical analysis and evaluation of leaf and root parts of the medicinal herb, Hypochaerisradicata L. for *in vitro* antioxidant activities, *Asian Pacific journal of tropical biomedicine*, 4(1), 2014, 359-367.
- Morsy N M. Phytochemical analysis of biologically active constituents of medicinal plants, *Main Group Chemistry*, 13(1), 2014, 7-21.
- 11. Srikanth M, Tadigotla S and Veeresh B. Phytochemistry and Pharmacology of Oxalis corniculata Linn. A Review, International Journal of Pharmaceutical Sciences and Research, 3(11), 2012, 4077-4085.

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