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Phytochemical analysis and habitat analysis of some rare and endangered plant species growing in Girnar region

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Abstract: **The present study is based on rare and endangered plant species growing in and around region of Junagadh in Gujarat. Due to several biotic, abiotic and enthropogenic activities, the plant taken for the present work has been categorized under the rare and endangered species in many of the literatures. The girnar hill is considered to be highly rich in terms of biodiversity of plants, animals as well as microorganisms. The aim of the current study was to find out the phytochemicals constituents present in the some selected rare and endangered species growing in the region. The study was carried for five endangered and rare plants *viz. Adansonia digitata, Adenanthera pavonina, Spondias pinnata, Madhuca indica,* and *Commiphora wightii* growing in and around Girnar hill of Junagadh. The qualitative analysis of phytochemical components parameters were carried out from leaves and stem samples collected during December 2018.Presence and absence of steroids, tannin, alkaloids, protein, flavanoids, carbohydrates in leaves and stem of these five plants were recorded, as these phytochemical components are considered to be natural bioactive compounds found in plants which act as a defense system against diseases. The work gives us the novel idea about the future perspective on research on these endangered species. Furthermore analysis of soil samples collected from rhizosphere of these plants for analyzing the quality of soil as soil is most important factor for plant growth.**

Keywords: **phytochemical, endangered plants, diversity, quality of soil.**

I. INTRODUCTION

Men are always connected with nature for their health and live hood. Girnar, mountain range located in junagadh district is full of a medicinal plant. Girnar mountain hill is dominant in herbs, shrubs and trees throughout the region and the vegetation has a great impact of seasonal changes, soil habitat and other various abiotic factors. It has been found that is a decline in diversity of plants as. Specially of medicinal plants there are different species of plant kingdom which can be categorized under rare and endangered species like gugad, ratanjali, mahudo, ambeda, jeemkanda, jangali haldar, safed musali, jal agiyo, gadinijat, dhao, etc. (R.N. Nakar et al-2014).These rare and endangered species is having a great medicinal value for curing variety of diseases in human being. For studying these species Ethanobotany of the local area, habitat and other abiotic factors are being understood. Ethnobotannical study is of immense importance with medical science. Globally, about 85% of the traditional medicines used for primary health care and derived from plants. (M. pavun kumar et al -2011).The climatic region of the study area (Girnar- Junagadh) is a diverse in terms of its habitat. Conservation and developing agro-technologies on rare and endangered medicinal plant generate employment opportunity and income to the farmers. Rare and endangered plant species are to be maintained and conserved not only for its medicinal properties but also for ecological purpose. The phytochemical analysis of any plant species determines its presence of various secondary metabolites like alkaloids, protein, carbohydrates, flavonoids, steroids, tannins, phenol, and phytostetols. These phytochemical compounds have specific functions and roles for different metabolic activities in

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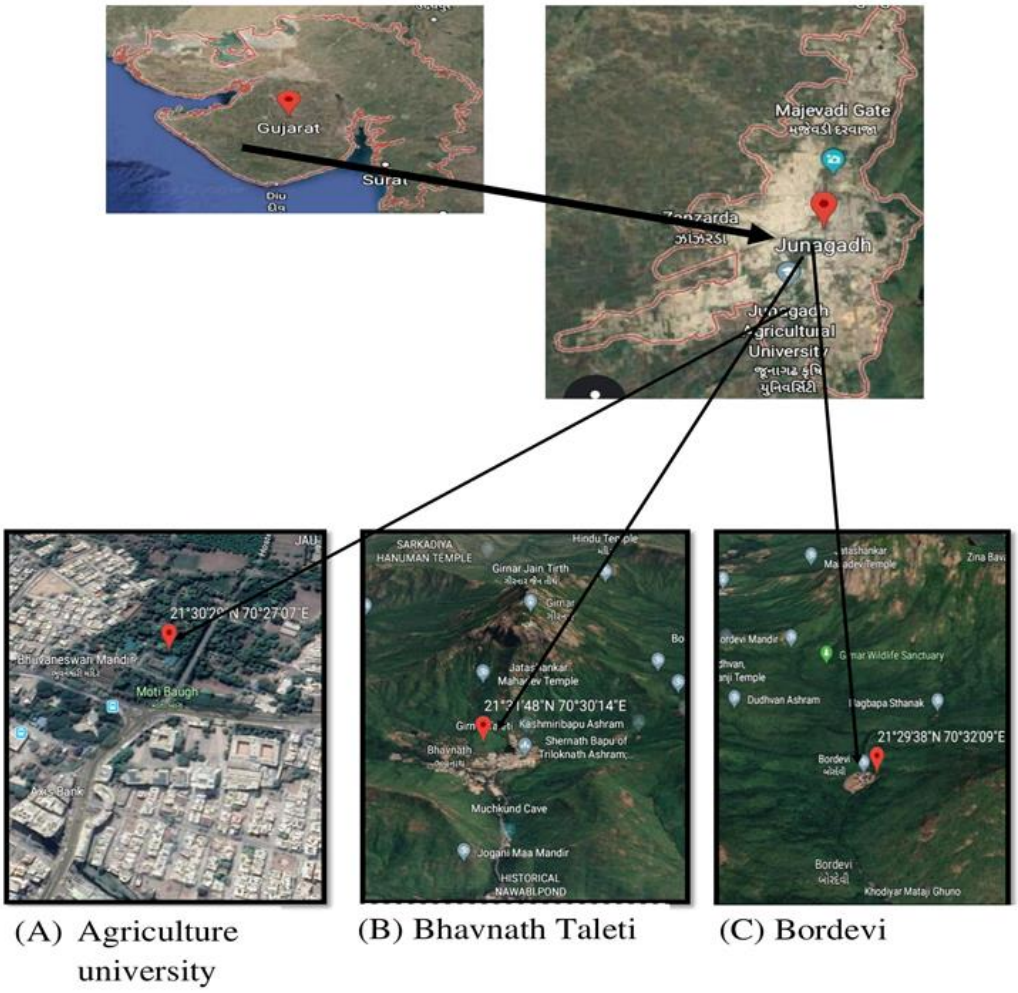
plants. These phytochemical mechanisms but also it gives the aesthetic value to the plant (Ashish kumar et al-2016). Phytochemical is natural bioactive compounds found in plants which as act as a defense system against diseases. A part from the phytochemical constituents in plants, there adaphic conditions i.e. nutrients content, anions, cations and pH also places a vital role in the development and physiological mechanism of plants. it also relieves the relationship of soil and plant in the habitat. The present study gives a wide picture of qualitative phytochemical compounds and its relation to the habitat. The importance of the present work is about the scientific study of rare and endangered species.

II. METHODOLOGY

1. Study area



(A) Agriculture university (B) Bhavnath Taleti (C) Bordevi

2. Plant sample preparation

Stem and leaves were collected for conducting qualitative phytochemical analysis of rare and endangered five plant species namely *Adansonia digitata*, *Adenanthera pavonina*, *Spondias pinnata*, *Madhuca indica*, and *Commiphora wightii*. Leaves and stems were crushed by mortar pestle grinded to powder. The powders were used for preparing extract in chloroform and acetone. The sample prepared were subjected to different phytochemical qualitative analysis of various parameters like steroids (Nidal Jaradat et al-2015), tannin (Mercy Gospel Ajuru et al-2017), Coumarin (Mercy Gospel Ajuru et al-2017), Phytostetol (Ashok Kumar et al-2012), Phenolic compounds (Mercy Gospel Ajuru et al-2017), Flavonoids (Abdul Wadood et al-2013), carbohydrates (NidalJaradat et al-2015) and Proteins (Nidal Jaradat et al-2015).

Phytochemical analysis

Steroids were analyzed by dissolving 1 ml extract in 10ml of chloroform & equal volume of concentrated H_2SO_4 acid was added from the side of test tube. Tannin analysis was performed by adding 2ml leaves extract to 1% lead acetate. Coumarins were analyzed by addition of 3mg of 10% NaOH to 2 ml of aqueous extract. Phytostetol (Salkowski's

analysis) was performed by treating the extract with chloroform and was filtrate. The filtrate was treated with few drops of concentrated H_2SO_4 and was put on shaker. Phenolic compound (Phiobatannins analysis) was analyzed when 2ml sample is boiled with 1% aqueous HCl. Flavonoids (Alkaline reagent test) was noted by treating extract with 10% NaOH solution. Proteins (Xanthoprotein analysis) were estimated by preparing extract which was treated with few drops of concentrated HNO_3.

3. Soil sample preparation

Soil samples collected from rhizosphere of the plant.10g of soil sample was taken in a conical flask and 20 ml of distilled water was added to prepare (1:2) soil:water suspension (Chopra and Kanwar, 1991); The suspension was thoroughly shaken and kept overnight. The solution was filtered was made up to 90ml for further analysis.Calcium (Ca^{2+}) and magnesium (Mg^{2+}) were estimated by EDTA (ethylene di-amine tetra acetic acid) method (Vogel-1987). Organic carbon was estimated as given in S. L. Chopra et. al-1980. Whereas, Chloride was analyzed by Argentometric method (Carmen lacoban-2005).

The pH of soil measured by EUTE instruments pH meter.$Ca^{2+}$and $Mg^{2+}$was performed by EDTA titration method (S.L.Chopra et al-1980).Total organic carbon was analyzed by walkley and black titration method. (S.L.Chopra et al-1980).Chloride was estimated by Argenometric Titration method (Carmen lacoban-2005).

III. RESULTS & DISCUSSION

Leaves

In acetone water extract

In leaves of *Adenanthera pavonina*, out of major qualitative phytochemical compounds studied in leaf extract in acetone water mixture, it was noticed that tannin, phytostetol and carbohydrates were present. Where, steroid, xanthoprotein, phenol, coumarins and flavanoids were not observed during qualitative analysis of phytochemical in leaf of *Adenanthera pavonina*. In leaves of *Adensonia digitata* out of major qualitative phytochemical compounds studied in leaf extract in acetone water mixture, it was noticed that tannin was present. Where, steroid, protein, phytostetol, phenol, coumarins, flavanoids and carbohydrates were not observed during qualitative analysis of phytochemical in leaf of *Adensonia digitata*. In leaves of *Madhuka indica* out of major qualitative phytochemical compounds studied in leaf extract in acetone water mixture, it was noticed that steroids, tannin, phytostetol, phenol, coumarins, and flavanoids were present. Where, protein and carbohydrates were not observed during qualitative analysis of phytochemical in leaf of *Madhuka indica*. In leaves of *Spondias pinnata* out of major qualitative phytochemical compounds studied in leaf extract in acetone water mixture, it was noticed that steroids, tannin, phytostetol, phenol, coumarins, and flavanoids were present. Where, protein and carbohydrates were not observed during qualitative analysis of phytochemical in leaf of *Spondias pinnata*. In leaves of *Commiphora wightii* out of major qualitative phytochemical compounds studied in leaf extract in acetone water mixture, it was noticed that steroids, tannin, phytostetol, coumarins, and flavanoids were present. Where, phenol, protein and carbohydrates were not observed during qualitative analysis of phytochemical in leaf of *Commiphora wightii*.

In Chloroform extract

In leaves of *Adenanthera pavonina* out of major qualitative phytochemical compounds studied in leaf extract in chloroform, it was noticed that tannin, coumarins, flavonoids and carbohydrates were present. Where, steroid, protein, phytosteol and phenol were not observed during qualitative analysis of phytochemical in leaf of *Adenanthera pavonina*. In leaves of *Adensonia digitata* out of major qualitative phytochemical compounds studied in leaf extract in chloroform, it was noticed that tannin, phytosteol, coumarins, flavonoids and carbohydrates were present. Where, steroid, protein and phenol were not observed during qualitative analysis of phytochemical in leaf of *Adensonia digitata*. In leaves of *Madhuka indica* out of major qualitative phytochemical compounds studied in leaf extract in chloroform, it was noticed that steroids, tannin, phytostetol, coumarins and flavanoids were present. Where, protein, phenol, and carbohydrates were not observed during qualitative analysis of phytochemical in leaf of *Madhuka indica*. In leaves of *Commiphora wightii* out of major qualitative phytochemical compounds studied in leaf extract in chloroform, it was noticed that steroids and phytostetol were present. Where, phenol, coumarins, tannin, protein, flavanoids and carbohydrates were not observed during qualitative analysis of phytochemical in leaf of *commiphora wightii*. In leaves of *Spondias pinnata* out of major qualitative phytochemical compounds studied in leaf extract in chloroform, it was noticed that steroids, tannin, phytostetol, coumarins, and flavanoids were present. Where, phenol, protein and carbohydrates were not observed during

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qualitative analysis of phytochemical in leaf of *Spondias pinnata*.

Table 1: Qualitative analysis of phyto-chemical in leaves of different rare plants.

Sr No	Qualitative Phytochemicle	*Adenanthera pavonina*		*Adensonia digitata*		*Madhuka indica*		*Spondias pinnata*		*Commiphora wightii*	
		AWE	CE	AWE	CE	AWE	CE	AWE	CE	AWE	CE
1.	Steroids	-	-	-	-	+	+	+	+	+	+
2.	Tannin	+	+	+	+	+	+	+	+	+	-
3.	Protein (Xanthoprotein)	-	-	-	-	-	-	-	-	-	-
4.	Phytostetol (Salwoski)	+	-	-	+	+	+	+	+	+	+
5.	Phenolic (Phiobatannis)	-	+	-	-	+	-	+	-	-	-
6.	Coumarins	-	+	-	+	+	+	+	+	+	-
7.	Flavanoids (Alkaline)	-	-	-	+	+	+	+	+	+	-
8.	Carbohydrates (Fehlings)	+	+	-	+	-	-	-	-	-	-

Stem

In acetone water extract

In stems of *Adenanthera pavonina* out of major qualitative phytochemical compounds studied in stem extract in acetone water mixture, it was noticed that steroid, tannin and phytosteol were present. Where, xanthoprotein, phenol, coumarins, flavanoids and carbohydrates were not observed during qualitative analysis of phytochemical in stem of *Adenanthera pavonina*. In stems of *Adensonia digitata* out of major qualitative phytochemical compounds studied in stem extract in acetone water mixture, it was noticed that tannin, phytosteol, phenol, coumarins and flavanoids were present. Where, steroid, protein and carbohydrates were not observed during qualitative analysis of phytochemical in stem of *Adensonia digitata*. In stems of *Madhuka indica* out of major qualitative phytochemical compounds studied in stem extract in acetone water mixture, it was noticed that steroids, tannin, protein, coumarins, and flavanoids were present. Where, phytostetol, phenol, and carbohydrates were not observed during qualitative analysis of phytochemical in stem of *Madhuka indica*. In stems of *Commiphora wightii* out of major qualitative phytochemical compounds studied in stem extract in acetone water mixture, it was noticed that steroids, tannin, coumarins, and flavanoids were present. Where, phytostetol, phenol, protein and carbohydrates were not observed during qualitative analysis of phytochemical in stem of *Commiphora wightii*. In stems of *Spondias pinnata* out of major qualitative phytochemical compounds studied in stem extract in acetone water mixture, it was noticed that tannin and protein were present. Where, steroids, phenol, phytostetol, coumarins, flavanoids, and carbohydrates were not observed during qualitative analysis of phytochemical in stem of *Sapindias pinnata*.

In chloroform extract

In stems of *Adenanthera pavonina* out of major qualitative phytochemical compounds studied in stem extract in chloroform, it was noticed that steroid, phytostetol, coumarins, flavonoids and carbohydrates were present. Where, tannin, protein, and phenol were not observed during qualitative analysis of phytochemical in stem of *Adenanthera pavonina*. In stems of *Adensonia digitata* out of major qualitative phytochemical compounds studied in stem extract in chloroform, it was noticed that steroid and phytostetol were present. Where, tannin, protein, coumarins, flavonoids, carbohydrates and phenol were not observed during qualitative analysis of phytochemical in stem of *Adensonia digitata*. In stems of *Madhuka indica* out of major qualitative phytochemical compounds studied in stem extract in chloroform, it was noticed that steroid, carbohydrates and phytostetol were present. Where, tannin, protein, coumarins, flavonoids, and phenol were not observed during qualitative analysis of phytochemical in stem of *Madhuka indica*. In stems of *Commiphora wightii* out of major qualitative phytochemical compounds studied in stem extract in chloroform, it was noticed that steroids, tannin, phytostetol, coumarins, and flavanoids were present. Where, protein, phenol and carbohydrates were not observed during qualitative analysis of phytochemical in stem of *Commiphora wightii*. In stems of *Spondias pinnata* out of major qualitative phytochemical compounds studied in stem extract in chloroform, it was noticed that steroids, tannin, phytostetol, coumarins, and flavanoids were present. Where, protein, phenol and carbohydrates were not observed during qualitative analysis of phytochemical in stem of *Sapindias pinnata*.

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Table 2: Qualitative analysis of phyto-chemical in stems of different rare plants.

Sr No	Qualitative Phytochemicle	*Adenanthera pavonina*		*Adensonia digitata*		*Madhuka Indica*		*Commiphora wightii*		*Spondias pinnata*	
		AWE	CE	AWE	CE	AWE	CE	AWE	CE	AWE	CE
1.	Steroids	+	+	-	+	+	+	+	+	-	+
2.	Tannin	+	-	+	-	+	-	+	+	+	+
3.	Protein (Xanthoprotein)	-	-	-	-	+	-	-	-	+	-
4.	Phytostetol (Salwoski)	+	+	+	+	-	+	-	+	-	+
5.	Phenolic (Phiobatannis)	-	-	+	-	-	-	-	-	-	-
6.	Coumarins	-	+	+	-	+	-	+	+	-	+
7.	Flavanoids (Alkaline)	-	+	+	-	+	-	+	+	-	+
8.	Carbohydrates (Fehlings)	-	+	-	-	-	+	-	-	-	-

Habitat of *C.wightii* was noted that total organic carbon was found of 1.5%, which consist Ca^{2+} (40 mg/l) was observed to be less then Mg^{2+} (170 mg/l),Chloride content in soil of *C.wightii* was observed 124.07 mg/l and The pH is 3.1 in this soil.Habitat of *S. pinnata*was noted that total organic carbon was found of 1.89%, which consist Ca^{2+} (32 mg/l) was observed to be less then Mg^{2+} (138 mg/l), Chloride content in soil of *S. pinnata*was observed 92.17 mg/l and The pH is 6.8 in this soil.Habitat of *A. pavonina*was noted that total organic carbon was foud of 2.4%, which consist Ca^{2+} (64 mg/l) was observed to be less then Mg^{2+}(106 mg/l). Chloride content in soil of *A. pavonina* was observed 121.59 mg/l and pH is 7.2 in this soil. Habitat of *A. digitata* was noted that total organic carbon was found of 1.65%, which consist Ca^{2+} (126 mg/l) was observed to be less then Mg^{2+} (110 mg/l). Chloride content in soil of *A. digitata* was observed 113.44 mg/l and pH is 7.1 in this soil. Habitat of *M.indica* was noted that total organic carbon was found of 1.8%, which consist Ca^{2+} (24 mg/l) was observed to be less then Mg^{2+} (106 mg/l). Chloride content in soil of *M.indica* was observed 124.07 mg/l and pH is 6.9 in this soil.

Table 3: Soil analysis.

Sr.No.	Species Name	Organic Carbon (%)	Chloride Mg/l	Mg+ Mg/l	Calcium Mg/l	pH
1	*Commiphora wightii*	1.5%	124.07	170	40	3.1
2	*Spondias pinnata*	1.89%	92.17	138	32	6.8
3	*Adenanthera pavonina*	2.4%	121.59	106	64	7.2
4	*Adensonia digitata*	1.65%	113.44	110	126	7.1
5	*Madhuka indica*	1.8%	124.07	106	24	6.9

IV. CONCLUSION

The study of qualitative analysis of these rare plants concluded that the source of secondary metabolites like alkaloids, protein, carbohydrates, flavonoids, steroids, tannins, phenol and phytosterols in selected five plants which growing in Junagadh region. Status of these plants is rare and endangered but plants have high healing potentials. Mostly steroids and tannins present in selected plants leaves. Carbohydrates mostly absent in stem of these five rare plants. Soil is affecting plant growth with different parameters.

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