International Letters of Natural Sciences *Online: 2014-04-29*
ISSN: 2300-9675, Vol. 14, pp 1-11
doi:10.56431/p-s3u2tc

Phytopharmacological study of Red, White and Black variety of *Abrus precatorius* L.

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ABSTRACT

Abrus precatorius L. is a leguminous plant of family fabaceae. Plant parts are widely used for medicinal purpose in different region of the world. Seed behavior and phytochemical evaluation of different solvent extracts (i.e. Petroleum ether, Ethyl acetate, Methanol & Water) of leaf and seed of red, white and black varieties of *Abrus precatorius* L. is carried out in the present study. This study indicates presence of different phytoconstituents i.e. alkaloids, steroids, glycosides, proteins, etc. the present study concludes that the plant parts can be used as very good natural remedy to diagnosed variety of dieses.

***Keywords*:** *Abrus precatorius*; Phytopharmacology; Flavanoids; Steroids; Soxhlet extraction

1. INTRODUCTION

Medicinal plants are part and parcel of human society to combat diseases, from the dawn of civilization [1]. India is one of the largest producers of herbs and herbal products. Nature around us provided everything of necessity of mankind. The large resources of vegetables, medicinal plants have been used continuously for the treatment of various diseases [2]. Medicinal plants can be important source of previously unknown chemical substances with potential therapeutic effects. Herbal medicines are in great demand in the developed as well as developing countries for primary healthcare because of their wide biological and medicinal activities, higher safety margins and lesser costs [4].

Abrus precatorius is a medium sized tree distributed throughout India which is reputed to possess medicinal properties [5]. *Abrus precatorius* L. is a weedy subtropical vine with leaves that are known to be sweet-tasting [6]. Sweetness of the plant is due to the presence of sweet-tasting oleanane glycoside, glycyrrhizin, cycloartane glycosides, designated abrusosides A-D. Last four compounds have been rated as being 30-100 times more potently sweet than sucrose on a weight basis [7,8].

Several groups of secondary compounds have been isolated from the species including alkaloids [9,10], steroids and other triterpenoids [11,12], isoflavanoquinones [13], anthocyanins [14-17] and the flavones luteolin, abrectorin, orientin, isoorientin and desmethoxycentaureidin 7-0-rutinoside [18]. The current report concerns the phytochemical

study and identification of phenolic compound by thin layer chromatography from methanolic extract of red, white and black *Abrus precatorius.*

2. MATERIAL & METHOD

2. 1. Collection, Identification and Authentication of Plant Material

Materials for the study i.e. Leaf & seeds of Red, white and Black *Abrus precatorius* were harvested from the Girnar forest and chorvad region of Junagadh district, Gujarat (India) in the month of September. The materials were identified and authenticated as *Abrus precatorius* from Department of Biotechnology, Junagadh Agricultural University, Junagadh, Gujarat.

2. 2. Preparation of different solvent Extracts

The materials of all *Abrus precatorius* varieties were washed with tap water, dried and powdered. These powdered materials were then used for extraction with different solvents, ranging in polarity i.e. petroleum ether, ethyl acetate, methanol and water in the soxhlet apparatus at 60 ºC to 70 ºC for about 9 hours. After the completion of extraction, the extract was concentrated and allowed to evaporate at room temperature for overnight and for water extracts are allowed to evaporate in an oven at 50 ºC for overnight to get colored viscous gummy residues. These residues were then used for subsequent experiments.

2. 3. Soxhlet Extraction

The powdered material (15.0 g) was collected in the thimble and extraction started with petroleum ether for 9 h. At the end, the solvent was collected in a Petri dish allowed it to evaporate to dryness. Remaining residues are further extracted similarly with Ethyl acetate, Methanol and water for 9 h. The final residues were used for subsequent experiments.

Table 1. Percentage Yield of Various Extracts/Fractions of *Abrus Precatorius*.

Sr. No.	Variety	Solvent used	Plant parts	Total weight for extraction	Final extract weight	% recovery
1	Red	Pet. Ether	Leaf	15.0 gm	382.0 mg	2.55
2			Seed	15.0 gm	230.5 mg	1.54
3		Eth. Acetate	Leaf	15.0 gm	344.7 mg	2.30
4			Seed	15.0 gm	75.7 mg	0.50
5		Methanol	Leaf	15.0 gm	509.0 mg	3.39
6			Seed	15.0 gm	815.9 mg	5.44
7		Water	Leaf	15.0 gm	1321.9 mg	8.81
8			Seed	15.0 gm	495.2 mg	3.30
9	White	Pet. Ether	Leaf	4.0 gm	106.7 mg	2.67

10			Seed	10.0 gm	28.0 mg	0.28
11		Eth. Acetate	Leaf	4.0 gm	47.8 mg	1.20
12			Seed	10.0 gm	93.7 mg	0.94
13		Methanol	Leaf	4.0 gm	163.2 mg	4.08
14			Seed	10.0 gm	349.6 mg	3.50
15		Water	Leaf	4.0 gm	98.7 mg	2.47
16			Seed	10.0 gm	140.8 mg	1.41
17	Black	Pet. Ether	Leaf	15.0 gm	741.0 mg	4.94
18			Seed	15.0 gm	136.0 mg	0.91
19		Eth. Acetate	Leaf	15.0 gm	2314.8 mg	15.43
20			Seed	15.0 gm	736.6 mg	4.91
21		Methanol	Leaf	15.0 gm	835.5 mg	5.57
22			Seed	15.0 gm	90.4 mg	0.60
23		Water	Leaf	15.0 gm	165.0 mg	1.10
24			Seed	15.0 gm	79.4 mg	0.53

Figure 1. *Abrus precatorius*.

2. 4. Phytochemical investigations

Behavior of seed powder with different chemical reagents [19], the preliminary phytochemical group test of the Petroleum ether, ethyl acetate, methanol and water extracts of dried leaves and seeds of Red, White & Black *Abrus precatorius* L. was performed by the standard methods [20].

2. 4. 1. Test for Carbohydrate

- Molisch's test: Few drops of alcoholic solution of α-naphthol + extract+ few drops of conc. Sulphuric acid through sides of test tube gives Purple or violet colored ring appear at the junction.
- Fehling's test: Equal amount of Fehling's A and B solution + extract, heated at boiling water bath, Brick red precipitation of cuprous oxide is formed, if reducing sugar is present.
- Benedict's test: Benedict reagent + extract + heated at boiling water bath will produce red precipitation.

2. 4. 2. Test for alkaloids

- Dragendroff's test: Few drops of potassium bismuth iodide + Extract give reddish brown precipitation.
- Mayer's test: Few drops of mercuric iodide + extract shows cream colored precipitation.
- Wagner's test: Few drops of iodine solution in potassium iodide + extract will form reddish brown precipitation.
- Hager's test: Few drops of saturated solution of picric acid + extract. Gives yellow colored precipitation.

2. 4. 3. Test for steroids and sterols

- Lieberman-Burchard test: Extract + 2 ml chloroform in dried test tube + 10 drops acetic anhydride + 2 drops conc. sulphuric acid will produce changes in color from red to blue and blue to bluish green.
- Salwoski test: Extract + few drops of concentrated sulphuric acid. Gives bluish red to cherry red color in chloroform layer.

2. 4. 4. Test for glycosides

- Legal test: Extract + pyridine + sodium nitroprusside will form pink red color.
- Baljet test: Extract + picric acid gives orange color.

2. 4. 5. Test for saponins

- Foaming test: Foams produces when extract shake with water.

2. 4. 6. Test for flavanoids

- Shinoda test: Extract + magnesium turnings + 1-2 drops of conc. HCl gives red color.
- Zinc hydrochloride test: Extract+ zinc dust + 1-2 drops of conc. HCl gives red color forms.

2. 4. 7. Test for tannin and phenolic compounds

- Ferric chloride test: Extract + ferric chloride forms greenish black color.
- Potassium dichromate test: Extract + potassium dichromate solution produce brown precipitation.
- Gelatin test: Extract + 1 % gelatin solution containing 10 % NaCl gives white Precipitation.

2. 4. 8. Testfor protein and amino acid

- Biuret test: Extract + 4 % sodium hydroxide + few drops of 15 % copper sulphate gives pink color.
- Ninhydrin test: Bluish violet color forms when solution of ninhydrin and extract mixture heated.
- Heat test: Protein doagulation observed when test solution heated on a boiling water bath.

2. 4. 9. Test for fixed oil

- Copper sulphate test: Extract + 1 ml 1 % $CuSO_4$ + 10 % NaOH gives blue color.

3. RESULT & DISCUSSION

Table 2. Behavior of seed powder of Red, White and Black forms of *Abrus precatorius* L. with different chemical reagents.

		Observation			Inferences		
Sr. No.	**Tests**	**Red**	**White**	**Black**	**Red**	**White**	**Black**
1	Powder + Picric acid	Yellow color	Yellow color	Yellow color	Presence of alkaloids	Presence of alkaloids	Presence of alkaloids
2	Powder + conc. H_2SO_4	Reddish brown color	No Reddish brown color	No Reddish brown color	Presence of steroids	Absence of steroids	Absence of steroids
3	Powder + Aqueous $FeCl_3$	Green inflorescence	Green inflorescence	Green inflorescence	Presence of flavanoids	Presence of flavanoids	Presence of flavanoids
4	Powder + Iodine solution	Blue color	Blue color	Blue color	Presence of starch	Presence of starch	Presence of starch
5	Powder + Ammonia solution	No blood red color	No blood red color	No blood red color	Absence of Anthraquinones	Absence of Anthraquinones	Absence of Anthraquinones
6	Powder + Aqueous 5%KOH	Yellow color	Yellow color	Yellow color	Absence of Anthraquinones	Absence of Anthraquinones	Absence of Anthraquinones
7	Powder + NaOH	Yellow color	Yellow color	Yellow color	Presence of flavanoids	Presence of flavanoids	Presence of flavanoids
8	Powder + Aqueous $AgNO_3$	White precipitation	White precipitation	White precipitation	Presence of proteins	Presence of proteins	Presence of proteins

Table 3. Phyto-constituents present in different extract of Red, White & Black *Abrus precatorius* L. seeds.

			Red				White				Black			
Sr. No.	**Phyto-constituents**	**Test Methods**	**Pet. ether**	**Eth. acetate**	**Metol**	**Water**	**Pet. ether**	**Eth. acetate**	**Metol**	**Water**	**Pet. ether**	**Eth. acetate**	**Metol**	**Water**
1	Carbohydrates	Molisch's test	+	-	+	+	+	-	+	+	+	-	+	+
		Fehling's test	+	-	+	-	+	-	+	-	+	-	+	-
		Benedict's test	+	+	+	+	+	+	+	-	+	+	+	-
2	Alkaloids	Dragendroff's test	-	+	+	+	-	+	+	+	-	+	+	+
		Mayer;s test	-	+	+	+	-	-	+	+	-	+	+	+
		Wagner's test	-	+	+	-	-	+	-	-	-	+	+	-
		Hager's test	-	-	+	+	-	+	-	+	-	-	-	+
3	Steroids & Sterols	Lieberman-Burchard test	+	-	+	-	-	-	+	-	-	-	+	-
		Salwoski test	+	+	+	-	+	+	+	-	+	+	+	-

4	Glycosides	Legal test	-	-	+	-	-	-	+	-	-	-	+	-
		Baljet test	-	-	+	-	-	-	+	-	-	-	+	-
5	Saponins	Foaming test	-	-	-	-	-	-	-	+	-	-	-	+
6	Flavanoids	Shinoda test	+	+	+	+	+	+	+	-	+	+	+	-
		Zinc hydrochloride test	-	-	+	-	-	-	+	+	-	-	+	-
7	Tannin & Phenolic compounds	Ferric chloride test	-	+	-	-	-	+	-	-	-	+	-	-
		Potassium dichromate test	-	-	-	-	-	-	-	-	-	-	-	-
		Gelatin test	-	+	-	-	-	+	-	-	-	+	-	-
8	Proteins and Amino acids	Biuret test	+	+	+	+	+	+	+	+	+	+	+	+
		Ninhydrin test	-	-	+	+	+	-	+	+	+	-	+	+
		Heat test	-	-	+	+	-	-	+	-	-	-	+	-

9	Fixed oils	Copper sulphate test	+	+	-	-	+	+	+	+	+	+	+	+

Table 4. Phyto-constituents present in different extract of Red, White & Black *Abrus precatorius* L. leaves.

			Red				**White**				**Black**			
Sr. No.	**Phyto-constituents**	**Test Methods**	**Petroleum ether**	**Ethyl acetate**	**Methanol**	**Water**	**Petroleum ether**	**Ethyl acetate**	**Methanol**	**Water**	**Petroleum ether**	**Ethyl acetate**	**Methanol**	**Water**
1	Carbohydrates	Molisch's test	+	+	+	+	+	+	+	+	-	+	+	+
		Fehling's test	+	+	+	-	+	+	+	+	+	+	+	+
		Benedict's test	-	+	+	+	+	+	+	+	+	+	-	+
2	Alkaloids	Dragendroff's test	-	-	+	+	+	-	+	-	-	+	+	-
		Mayer;s test	+	+	+	+	-	+	+	+	+	-	+	+
		Wagner's test	-	-	-	-	-	-	-	-	-	-	-	-
		Hager's test	+	+	+	+	+	+	-	+	+	+	+	+

3	Steroids & Sterols	Lieberman -Burchard test	-	-	-	+	+	-	-	+	-	-	-	+
		Salwoski test	+	+	+	-	+	+	+	-	+	+	+	-
4	Glycosides	Legal test	-	-	-	-	-	-	-	-	-	-	-	-
		Baljet test	-	-	-	-	-	-	-	-	-	-	-	-
5	Saponins	Foaming test	-	-	+	-	+	-	+	-	-	-	-	-
6	Flavanoids	Shinoda test	+	+	+	+	+	-	+	+	+	+	+	+
		Zinc hydrochloride test	-	-	-	+	-	-	-	+	-	+	+	+
7	Tannin & Phenolic compounds	Ferric chloride test	-	+	+	-	+	+	+	-	+	+	+	-
		Potassium dichromate test	+	-	-	+	-	-	+	+	-	-	-	+
		Gelatin test	-	-	-	-	-	-	-	-	-	+	-	-
8	Proteins and Amino acids	Biuret test	+	+	+	+	+	+	+	+	+	+	+	+

		Ninhydrin test	-	+	+	+	-	-	+	+	-	-	+	-
		Heat test	+	+	+	-	+	+	+	-	+	+	+	-
9	Fixed oils	Copper sulphate test	+	+	-	-	+	+	+	-	+	+	-	-

Behavior of seed powder of all three varieties with different chemical reagent shows presence of alkaloids, flavanoids, steroids and protein in the red seed powder while in white and black seed, steroids were absent. It also shows absence of anthraquinones in all the varieties (Table 2). Qualitative analysis for the phytochemicals indicates presence and absence of carbohydrates, alkaloids, steroids/sterol, glycosides, saponins, flavaoids, tannin & phenolic compounds, proteins/amino acids and fixed oil in the leaf and seed extracts (i.e petroleum ether, ethyl acetate, methanol & water) of red, white & black *Abrus precatorius* (Table. 3 & 4).

4. CONCLUSION

In the present study, preliminary phytochemical analysis and seed behavior has been studied. These analysis shows presence of alkaloids, flavanoids, steroids, proteins, glycosides etc. these phytoconstituents are very effective against many diseases. The presence study concludes that as it contains many potent phytochemicals, this plant can be used as natural remedy against many diseases.

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(Received 09 April 2014; accepted 17 April 2014)