PHYTOCHEMICAL AND PHARMACOGNOSTICAL EVALUATION OF EUPHORBIACEAE SPECIES FROM LAHORE REGION, PAKISTAN

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Abstract

Euphorbia prostrata, Euphorbia hirta, Euphorbia splendens, Ricinus communis and *Jatropha integearrima* (Family: Euphorbiaceae) were selected to explore the phytochemical and pharmacognostical properties. Species of Euphorbiaceae are extensivley used as remedies against several diseases and complaints such as cancer, diabetes, diarrhoea, heart diseases, hemorrhages, hepatitis, jaundice, malaria, ophthalmic diseases, rheumatism and scabies etc. The dried leaves of *Euphorbia splendens, Ricinus communis* and *Jatropha integearrima* and dried whole plants of *Euphorbia prostrata* and *Euphorbia hirta* extracted with methanol. The Phytochemical screenings was done to identify the presence of carbohydrates, proteins, alkaloids, phytosterol, phenol, flavonoids, tannins, saponins and phlobatannins that is helpful in the confirmation of the authenticity of the plants.

Key words: Euphorbiaceae, Phytochemical analysis, Fluorescence characters

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INTRODUCTION

The medicinal properties of a plant are due to the presence of certain chemical constituents. These chemical constituents, responsible for the specific physiological action, in the plant, have in many cases been isolated, purified and identified as definite chemical compounds. Quite a large number of plants are known to be of medicinal use remain uninvestigated and this is particularly the case with the Pakistani flora. Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties. It is well known that plants produce these chemicals to protect it self but recent research demonstrate that they can protect humans against diseases. Some of the well-known phytochemicals are lycopene in tomatoes, isoflavones in soy and flavanoids in fruits etc but these are not essential nutrients and are not required by the human body as a vital source of life (Wang, *et.al.,* 2004)

In recent years, the growing demand for herbal products has been increased and plant materials traded within and across the countries activley. The phytochemicals, previously with unknown pharmacological activities, have been extensively investigated as a source of medicinal agents (Krishnaraju *et al*., 2005). Following are the features of selected plants

Euphorbia prostrata This is an annual prostrate herb producing slender ,flattented prostrate stems up to about 20 centimeters long, sometimes purple-tinted in color,.leaves small ,obtuse,some time rounded.Cyathia have prominent glands. (Davis *et al.,* 2007). (Nasir & Ali.,1986)

Euphorbia hirta, A ascending pubescent, herbaceous annual, having a stem which forks at the base, bearing oblique, oblong-ovate, leaves, opposite, serrate, and acute at both ends, Cyathium aggregatted together into dense axillary pedunculate, glads very minute (Salatino *et al.,* 2007). (Nasir & Ali.,1986)

Euphorbia splendens . It is a succulent climbing shrub growing to 1.8 m tall, with densely spiny stems, the straight, slender spines up to 3 cm long, which help it scramble over other plants , Flower with bright red bracts with trilocular prominent ovary.(Ahmad, 1997). (Nasir & Ali., 1986)

Ricinus communis,. Annual wood herbaceous shrubs, up to 5 m tall; stem with abundant juices; leaves 7-9 lobed , and inflorescences often pruinate, male and female flower yellowish in colour ,Fruit greyish ,silvery color.(Shariff, 2001). (Nasir & Ali.,1986)

Jatropha integearrima is cultivated in Parks of Pakistan; Evergreen shrubs 1 - 3 m tall, with milky sap, glabrous, flower are scarlet red in color. (Thongtan et al., 2003) (Nasir & Ali., 1986). (Table-1

METHOD

E. prostrata, E.hirta, *E. splendens, R. communis* and *J. integearrima* were collected from Botanical Garden of Lahore College for Women University, Lahore in March 2009, and identified by Dr. Mrs. Tahira Aziz Mughal, Assistant professor of Botany Department and deposit the plant specimens as voucher specimen in Prem Madan Herbarium Lahore College for women University, Lahore.

The fresh leaves were taken for macroscopic and histochemical color reactions. The fresh leaves of *E. splendens, R. communis, J. integearrima* and whole plants of *E. prostrata* and *E. hirta were* dried in shade. Dry materials of the plants are grinded and measured amount of the powdered plant material were used to determinate the ash values and fluorescence study (Long /short wavelength 365-390/250-270). Furthermore, the Phytochemical and Pharmacognostical evaluation were evaluated.

RESULT AND DISCUSSION

Macroscopic characters of the leaves of *E. prostrata, E. hirta* (syn.*E.pilulifera*) , *E. splendens, R. communis* and *J. integearrima* were studied such as size, color, lamina, shape, margin, venation, apex, and surface were studied from the fresh leaves of all plants (See Table 1)

Table 1
Macroscopic Observations of selected plants of family Euphorbiaceae

Plant name	Leaf Characters							
	Size	**Color**	**Lamina**	**Shape**	**Margin**	**Venation**	**Apex**	**Surface**
E.prostrata	0.3-0.5cm	Purple-tinted	Simple	Oblong	Entire	Reticulate unicostate	Truncate	Glabrous
E. hirta	2.8-3.3cm	Green	Simple	Oblong-ovate	Serrate	Reticulate unicostate	Acute	Glabrous
E. splendens	2.5-4.2cm	Green	Simple	Obovate	Entire	Parallel unicostate	Cuspidate	Glabrous
R. communis	7.3-8.6cm	Green	Palmatipartite	Lanceolate	Serrate-crenate	Reticulate multicostate	Acute	Glabrous
J.integearrima	7.2-9.9cm	Dark green	Simple	Oblong-obovate	Entire	Reticulate unicostate	Acute	Glabrous

Histochemical Color Reactions

The histochemical color reactions were performed to study the presence of different chemicals in the plant leaves. The color tests were performed for the identification of major cell components (See Table 2).

Table 2
Histochemical (Tissue) studies for the presence of major plant constituents of selected plants of family Euphorbiaceae

Test for	Reagent used	Plant name	Nature of change	Histological zone	% of change
Lignin	Phloroglucinol + Hydrochloric acid	*E. prostrate*	Purple color	Vascular bundle	+
		E. hirta	Purple color	Vascular bundle	+
		E. splendens	Purple color	Vascular bundle and palisade cells	+
		R. communis	Purple color	Vascular bundle	+
		J. integearrima	Purple color	Vascular bundle	+
Suberin	Heating with strong Potassium hydroxide and Sulphuric acid	*E. prostrate*	Brown color	Vascular bundle	+
		E. hirta	Brown color	Vascular bundle and mesophyll cells	+
		E. splendens	Brown color	Vascular bundle and mesophyll cells	+
		R. communis	Brown color	Vascular bundle and palisade cells	+
		J. integearrima	Brown color	Vascular bundle	+
Protein	Millon's reagent	*E .prostrate*	No change	-	-
		E. hirta	No change	-	-
		E. splendens	No change	-	-
		R. communis	No change	-	-
		J. integearrima	No change	-	-

Ash Analysis

Ash values such as total ash, water insoluble ash, acid insoluble ash and sulphated ash were studied according to standard procedures (See Table 3)

Table 3

Loss of weight on drying and different ash values of selected plants of family Euphorbiaceae

Plant name	Particulars and their percentage values				
	Loss of weight on drying	Total ash	Water insoluble ash	Acid insoluble ash	Sulphated ash
E. prostrate	46.4	39.3	15.4	6.5	8.2
E. hirta	39.48	24.82	5.56	2.05	1.47
E. splendens	42.7	35.6	11.58	6.37	6.23
R .communis	32.4	21.75	8.95	4.07	4.19
J. integearrima	33.7	21.83	9.75	4.56	3.79

Fluorescence Analysis

It was carried out by mixing plant material with 1N Sodium hydroxide, 1N Hydrochloric acid, 50 percent Sulphuric acid and 50 percent Nitric acid and took plant extracts, the results are tabulated in Tables 4a-4e.

Table 4a

Fluorescence characters of plant powder and their extracts in different solvents of *Euphorbia prostrata*

S.No.	Treatment	Day light	Short UV 250-270	Long UV 365-390
1.	Powder as such	Dull green	Pale green	No fluorescence
2.	Powder + 1N Sodium hydroxide (Aqueous)	Dark green	Dark green	Pink
3.	Powder + 1N Hydrochloric acid	Pink	Pink	No fluorescence
4.	Powder + 50% Sulphuric acid	Dark green	Purple	Light blue
5.	Powder + 50% Nitric acid	Yellow	Black	No fluorescence
	Extracts			
6.	n-Hexane	Green	Light brown	Pink
7.	Ethyl acetate	Green	Dark green	Orange

Table 4b

Fluorescence characters of plant powder and their extracts in different solvents of *Euphorbia hirta*

S.No.	Treatment	Day light	Short UV	Long UV
1.	Powder as such	Light green	Green	No fluorescence
2.	Powder + 1N Sodium hydroxide (Aqueous)	Dark brown	Purple	No fluorescence
3.	Powder + 1N Hydrochloric acid	Light brown	Dark blue	No fluorescence
4.	Powder + 50% Sulphuric acid	Brown	Green	Purple
5.	Powder + 50% Nitric acid	Yellow	Black	Magenta
	Extracts			
6.	n-Hexane	Pale yellow	Dark green	Yellowish green
7.	Ethyl acetate	Dull green	Bright green	Orange red

Table 4c

Fluorescence characters of plant powder and their extracts in different solvents of *Euphorbia splendens*

S.No.	Treatment	Day light	Short UV	Long UV
1.	Powder as such	Light brown	Pale yellow	No fluorescence
2.	Powder + 1N Sodium hydroxide (Aqueous)	Dark brown	Light blue	No fluorescence
3.	Powder + 1N Hydrochloric acid	Light brown	Brown	Light blue
4.	Powder + 50% Sulphuric acid	Black	Brown	No fluorescence
5.	Powder + 50% Nitric acid	Orange	Brown	No fluorescence
	Extracts			
6.	n-Hexane	Pale yellow	Green	Orange
7.	Ethyl acetate	Pale yellow	Yellowish green	Pink

Table 4d
Fluorescence characters of plant powder and their extracts in different solvents of *Ricinus communis*

S.No.	Treatment	Day light	Short UV	Long UV
1.	Powder as such	Light green	Green	No fluorescence
2.	Powder + 1N Sodium hydroxide (Aqueous)	Dark green	Blue	Dark brown
3.	Powder + 1N Hydrochloric acid	Light brown	Dark green	No fluorescence
4.	Powder + 50% Sulphuric acid	Blackish brown	Dark brown	Blue
5.	Powder + 50% Nitric acid	Orange	Dark green	No fluorescence
	Extracts			
6.	n-Hexane	Yellowish green	Brown	Yellow
7.	Ethyl acetate	Pale yellow	Dark green	Orange

Table 4e
Fluorescence characters of plant powder and their extracts in different solvents of *Jatropha integearrima*

S.No.	Treatment	Day light	Short UV	Long UV
1.	Powder as such	Green	Yellow	No fluorescence
2.	Powder + 1N Sodium hydroxide (Aqueous)	Light green	Brown	Blue
3.	Powder + 1N Hydrochloric acid	Light brown	Dark green	No fluorescence
4.	Powder + 50% Sulphuric acid	Dark brown	Black	Dark purple
5.	Powder + 50% Nitric acid	Orange	Dark purple	No fluorescence
	Extracts			
6.	n-Hexane	Green	Dark green	Orange
7.	Ethyl acetate	Light green	Dark green	Pink

Phytochemical Analysis
Phytochemical screening of the plant extract was done as per standard methods. Methanol extract shows the presence of alkaloids, phytosterol, phenol, flavonoids, tannins and phlobatannins (See Table 5).

Table5
Phytochemical test for major ingredients selected plants of family Euphorbiaceae

Tests	Alcoholic extracts				
	E. prostrata	***E. hirta***	***E. splendens***	***R. communis***	***J. integearrima***
Carbohydrates:					
Fehling's Test	-	-	-	-	-
Benedict's Test	-	-	-	-	-
Protein:					
Ninhydrin's Test	-	-	-	-	-
Alkaloids:					
Mayer's Test	+	+	+	+	+
Phytosterol:					
Liebermann's Test	+	+	+	+	+
Phenol:					
Ferric chloride Test	+	+	+	+	+
Flavonoids:					
Ammonia Test	+	+	+	+	+
Tannins:					
Ferric chloride Test	+	+	+	+	+
Saponins:					
Foam Test	-	-	-	-	-
Phlobatannins:					
Hydrochloric acid Test	+	+	+	+	+

Authenticities of the plants under study are very important. Morphological studies are not enough to confirm the authenticity of any plants but phytochemical and pharmacological screening confirmed the plant authenticity. The current result will help and serve as standard parameters for the correct identification of the plant. In addition, these current investigated species will probably help the Pharmacologist, medicinal companies and Pharmacists to explore the medicinal properties.

CONCLUSION

The multidisciplinary approach to the study of *E. prostrata, E. hirta , E. splendens, R. communis* and *J. integearrima* does help in understanding, taxonomical determination and medicinal importance. The adulterants in drugs obtain from *E. prostrata, E. hirta , E. splendens, R . communis* and *J. integearrima* can be identified through current investigation.

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