

Phytochemical Survey of Saudi Arabian Plants

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Phytochemical survey has been made of the occurrence of alkaloids, saponins, terpenoids and flavonoids in 43 Saudi Arabian plants. The result is presented in Table I.

Introduction

For thousands of years man has relied upon plants for a proportion of his daily food, and in periods of suffering he has used the healing and pain-relieving properties of medicinal plants. Therefore, the plants have received the greatest attention with regard to possible future medicinal applications and numerous papers have been published describing the search for plants and plant products of pharmacological and chemical interest. It has, however, been estimated that only 5-6% of the world's flora has been studied chemically in any detail, and then the prospects of such investigations are promising.

Present paper describes the results of preliminary phytochemical testing of plants grown in desert area of Saudi Arabia for selection of plant material for further study. This survey comprises 43 species, belonging to 41 genera and 25 families, which were screened for the presence of alkaloids, saponins, terpenoids and flavonoids.

The number of alkaloid positive tests was 13 or 30.2%. Since the distribution of alkaloids found usually in random surveys has been placed between 10-20%¹⁻⁴⁾, a high incidence is worth noting. Of the plants tested, 35 gave positive test for saponin. It has been observed in several plants that the surface activity of saponins may be responsible for accelerating their water absorption⁵⁾. It is therefore of interest that saponins are very widely distributed(81.4%) in

the plants grown in arid zones.

Experimental

Preparation of Crude Extracts

The various parts of plants were air dried, and extracted with 90% methanol, and the extracts were concentrated in vacuo to dryness.

Alkaloid Test

The extract (50mg) was placed in a 30ml beaker and 3ml of 2N-HCl was added. The mixture was heated on a water bath, with stirring, for 5-10 minutes. After cooling to room temperature, a small amount of Celite was added. This mixture was briefly shaken and filtered. The filtrate was then made alkaline to litmus paper with 5% NH₄OH and extracted twice with 5ml portions of chloroform. These solutions were combined and the chloroform evaporated on a water bath. To the residue 2.5ml of 2N HCl was added the mixture, was then stirred briefly, and filtered. A few drops of Mayer's reagent was added to one-half of the filtrate and a few drops of Wagner's reagent was added to the other half. If a positive result was obtained with this test, we considered that alkaloids having a nitrogen function were present.

Saponin Test

A solution of the extract (20mg) in water was vigorously shaken. Presence of saponins was indicated if a characteristic honey-comb froth, which persisted for 30min, was produced.

Terpenoid and Steroid Test

About 10mg of the extract was dissolved into 1ml of acetic anhydride, and the appearance of red-green color on the bordering surface when a few drops of conc. sulfuric acid was added was considered a positive test.

Flavonoid Test

A solution of the extract (20mg) in 95% ethanol (5ml) was treated with a few drops of conc. hydrochloric acid and 0.2g of magnesium powder. The presence of flavonoid was indicated if a pink or magenta color developed within 3 minutes.

Table I. Phytochemical Tests of Some Saudi Arabian Plants.

Plants name (Family)	Used parts	Collected data	Location	Alkaloid		Saponin	Terpenoid steroid	Flavonoid	Compound reported
				Wagner	Meyer				
Amarantaceae									
<i>Aerva persica</i> MERILL	lf.	'76.2.	South Hijaz	-	-	+	+ -	+	
Apocynaceae									
<i>Rhazya stricta</i> DECNE	hb.	'76.1.	Easter Najd	+	+	+	+	-	a
Asclepiadaceae									
<i>Calotropis procera</i> R. Br.	lf.	'76.1.	Horaimela	-	-	-	-	+	b
<i>Leptadenia pyrotechnica</i> DECNE	wp.	'76.1.	Riyadh	+	-	+	-	+	
<i>Pergularia tomentosa</i> L.	hb.	'76.1.	Riyadh	+	+	-	-	+	c
Boraginaceae									
<i>Heliotropium ramossimum</i> DC.	wp.	'76.1.	Riyadh	-	-	+	-	-	d
Capparaceae									
<i>Caparis cartilaginea</i> DECNE	lf.	'76.1.	Horaimela	-	-	-	-	+	
<i>Cleome trinervia</i> FRES.	wp.	'76.1.	Horaimela	-	-	-	-	+	
<i>Dipterium glaucum</i> DECNE	wp.	'76.2.	Riyadh	-	-	+	+	+	
Caryophyllaceae									
<i>Gymnocarpus decandrum</i> FORSSK	wp.	'76.1.	Horaimela	-	-	-	-	-	
Chenopodiaceae									
<i>Atriplex tarinosa</i> FORSSK	wp.	'76.2.	South Hijaz	-	-	+	-	+	
<i>Beta vulgaris</i> L.	lf.	'76.2.	South Hijaz	+	-	+	+	+	e
<i>Halogeton alopecuroides</i> MOQ	wp.	'76.2.	South Hijaz	-	-	+	-	+ -	
<i>Salsola baryosma</i> DARELY	hb.	'76.1.	Riyadh	-	-	+	-	-	
<i>Salsola</i> sp. (-SH)	wp.	'76.2.	South Hijaz	+	-	+	+ -	+	
<i>Suaeda</i> sp. (-SH)	wp.	'76.2.	South Hijaz	-	-	+	-	+ -	
Compositae									
<i>Anvilla garcini</i> DC.	hb.	'76.1.	Eastern Najd	-	-	+ -	+	+	
<i>Publicaria crispa</i> BENTH et HOOK	hb.	'76.1.	Eastern Najd	-	-	+ -	-	-	
Convolvulaceae									
<i>Convolvulus lanatus</i> VAHL.,	hb.	'76.2.	South Hijaz	-	-	+	-	+	
Cruciferae									
<i>Diplotaxis harra</i> BOISS	wp.	'76.1.	Eastern Najd	-	-	+	+	-	
<i>Farsetia aegyptica</i> TURRA	wp.	'76.1.	Riyadh	- +	-	-	+	+	
<i>Zilla spinosa</i> PRAMTL	hb.	'76.1.	Riyadh	-	-	+	+	+ -	
Ephedraceae									
<i>Ephedra alata</i> DECNE	wp.	'76.2.	South Hijaz	-	-	+	-	+	
Euphorbiaceae									
<i>Euphorbia kahirensis</i> RAUSCH	wp.	'76.1.	Horaimela	-	-	+	+	+	
Gramineae									

<i>Aeluropus littoralis</i>	wp.	'76.2.	South Hijaz	+-	-	+	+-	+	
Leguminosae									
<i>Astragalus spinosus</i> MUSCHL	wp.	'76.1.	Horaimela	-	-	+	-	+	
<i>Cassia italia</i> MILL	hb.	'76.1.	Riyadh	-	-	+	-	+	
<i>Indigofera spinosa</i> FORSSK	wp.	'76.2.	South Hijaz	-	-	+	+	+	
Labiatae									
<i>Lavandula coronopifolia</i> LAM.	wp.	'76.1.	Eastern Najd	+	-	+	+	-	
<i>Salvia spinosa</i> L.	wp.	'76.1.	Horaimela	+	-	+	+	-	
<i>Teucrium oliverianum</i> GING	wp.	'76.1.	Eastern Najd	-	-	+	+	+	
Malvaceae									
<i>Abutilon pannosum</i> SCHL.	hb.	'76.2.	South Hijaz	+	+	+	-	+	
Moraceae									
<i>Ficus salicifolia</i> VAHL	hb.	'76.1.	Riyadh	-	-	+	+	-	f
Papaveraceae									
<i>Argemone mexicana</i> L.	hb.	'76.2.	South Hijaz	+	+	-	-	-	g
Plumbaginaceae									
<i>Limonium axillare</i> KTZE	wp.	'76.2.	South Hijaz	+	-	+	-	+	
Resedaceae									
<i>Ochradenus baccatus</i> DEL.	wp.	'76.1.	Riyadh	-	-	+	+-	+	
<i>Reseda stenostachya</i> BOISS.	hb.	'76.1.	Horaimela	-	-	-	-	-	
Solanaceae									
<i>Lycium arabicum</i> SCH. et BOISS	hb.	'76.1.	Horaimela	+	-	+	-	-	
Tiliaceae									
<i>Corchorus depressus</i> L.	wp.	'76.2.	South Hijaz	-	-	+	+	+	
Umbelliferae									
<i>Ducrosia ismaelis</i> ASCH	wp.	'76.1.	Horaimela	-	-	-	-	-	
Zygophyllaceae									
<i>Zygophyllum decumbens</i> DEL.	wp.	'76.2.	South Hijaz	-	-	+	+	+-	
<i>Zygophyllum</i> sp. (-SH)	lf.	'76.1.	Horaimela	-	-	+	-	-	
<i>Peganum harmala</i> L.	hb.	'76.1.	Horaimela	-	-	+	+	-	h

hb : herb, lf : leaf, wp : whole plant

a) rhazine,⁶⁾ rhazinine,^{7,8)} quebrachamine, 1,2-dihydroaspidospermidine, aspidospermidine, eburnamonine, eburnamenine⁹⁾; b) calotropin,¹⁰⁾ calotropagenin, calotoxin,¹¹⁾ calactin, vorusharin,¹²⁾ uscharidine,¹³⁾ frugosid,¹⁴⁾ corotoxigenin coroglaucigenin; c) coroglaucigenin;¹⁵⁾ d) helitrine;¹⁶⁾ e) ferulic acid,¹⁷⁾ allantoin, farnesol, oleonic acid,¹⁸⁾ betaine,¹⁹⁾ choline, hexosamine,²⁰⁾ betanin,²¹⁾ vulgaxanthin²²⁾; f) psoralene,²³⁾ bergapten, lupeol, β -sitosterol; g) allocryptopine,²⁴⁾ protopine, berberine, coptisine, sarguinarine, cholerythrine, isorhamnetin,²⁵⁾ isorhamnetin-3-glucoside, isorhamnetin-7-diglucoside; h) peganine, harmine,²⁶⁾ harmaline, harmalol,²⁷⁾ 2,3-trimethylene-4-quinazolone, 1,2,3- α -hydroxytrimethylene-4-quinazolone,²⁸⁾ pegaline,²⁹⁾ peganol,³⁰⁾ vasicinone, deoxypeganine, deoxyvasicinone,³¹⁾ dihydroruine.³²⁾

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