SCREENING OF IRANIAN PLANTS FOR ANTIFUNGAL ACTIVITY: PART 2

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ABSTRACT

In this study, 278 species from 37 families of native Iranian plants were screened for in vitro antifungal activity against 19 fungal strains. Initially, the crude extracts in concentration of 100 µg/ml were tested. Among 278 plant extracts, 201(71.27%) of them showed antifungal activity against at least one fungal strain. A wide range of total extracts of different species were shown to have potentially noticeable antifungal effects. The outstanding species were: *Mentha longifolia, Salvia multicaulis, Thymus transcaspicus, Zataria multiflora, Glycyrrhiza glabra, Hulthemia persica, Heracleum persicum, Pimpinella anisum, Pragnos ferulacea, Pragnos uloptera, and Viola odorata.*

Keywords: Iranian plants, Antifungal activity, *Legominosae* family, *Labiateae*

INTRODUCTION

As a result of a joint project on medicinal plants between the Department of Pharmacognosy, and Department of Medical Parasitology and Mycology, the biological activities of some native Iranian plants have previously been reported (1-3). In continuation of this project, antifungal activity of a number of other native Iranian plants is reported in this paper. The plants of this investigation were gathered from different locations of Iran since 1984 and some of them are usually used by rural inhabitants as herbal medicine.

MATERIALS AND METHODS

Plant material:

The plants materials were collected from different regions of Iran and dried under laboratory condition. The voucher specimens were prepared and authenticated (4-7).

The herbarium samples are kept at the Herbarium of Department of Pharmacognosy, School of Pharmacy, Tehran University of Medical Sciences.

Extraction procedure:

The air-dried plant materials were grounded into fine powders and extracted in a soxhlet extractor with 80% methanol. After filtration of total extracts, the solvents were removed under reduced pressure and residues were kept in sterile vials with certain codes at 4°C.

Table 1. The microorganisms that were used in the antifungal activity screening of plants

No.	Microorganisms	No.	Microorganisms
1	Candida albicans	11	Epidermophyton floccosum
2	Aspergillus niger	12	Saccharomyces cerevisiae
3	Aspergillus fumigatus	13	Sporotrix schenckii
4	Microsporum canis	14	Cladosporium verbegeii
5	Microsporum gypseum	15	Penicillium notatum
6	Trichophyton violaceum	16	Cryptococcus neoformans
7	Trichophyton verrucosum	17	Mucor ramosissimus
8	Trichophyton schoenleinii	18	Pseudoallesheria boydii
9	Trichophyton mentagrophytes	19	Candida parapsilosis
10	Trichophyton rubrum		

Antifungal screening:

The crude extracts were tested in concentration of 100 µg / ml against organisms listed in table 1,by the general procedure described previously (8). The fungi were cultured on Sabouroud Dextrose Agar and the growth of fungi was achieved at 25-

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Table 2. Iranian plants tested for antifungal activity (Wa: Whole above ground, Fr: Fruit, Fl: Flower, B: Bulb, L: Leaves, W: Whole plant)

Family Name	Botancial Names	Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Labiatae	Ajuga Chamaecistus Ging. ex Benth.	Wa	-	-	-	+	-		-	+	-	-	+				-		-		
Labiatae	Dracocephalum Moldavica L.	Wa	-	+		+											+				
Labiatae	Eremostachys labiosiformis (M. Pop.) Knorring	Wa	-	-	-	+	-				-		-	-	-	-	-		-		-
Labiatae	Eremostachys macrophylla Montbr. & Auch.	Wa			-									-	-			+			
Labiatae	Hymenocrater bituminosus Fisch. & C.A.Mey.	Wa			-		-	+	+	+	-	-	-				-		-		-
Labiatae	Hymenocrater elegans Bunge.	Wa	-	-		+	+				-		+				-				
Labiatae	Lallemantia Royleana (Benth. in Wall.) Benth.	Wa	-		-	-					-		-								
Labiatae	Leonurus cardiaca L.	Wa	-	+		+	-		+	-	-	-	-				+				
Labiatae	Marrubium anisodon C.Koch.	Wa	-	+	-	+	+	+	-	+	+	-	+				-		-		
Labiatae	Marrubium astracanicum Jacq.	Wa	-	-		+	+		+	+	+	+	+								
Labiatae	Marrubium crassidens Boiss.	Wa	-	-		+	-		+	+	-	-	+				-				
Labiatae	Mentha longifolia (L.) Hudson.	Wa	-	+	-	+	+		+	+	+	+	+	-	-	-	-	-	-		-
Labiatae	Mentha pulegium L.	Wa	+																		
Labiatae	Micromeria persica Boiss.	Wa	-		-	-					-		-								
Labiatae	Nepeta crassifolia Boiss. & Buhse	Wa	-	-	-	-	-	+	+	+	+	-					-		-		
Labiatae	Nepeta fissa C.A.Mey.	Wa	-	-		-	-		+		+	-									
Labiatae	Nepeta glomerulosa Boiss.	Wa			-		+	+	-	-	-	-					-		-		
Labiatae	Nepeta racemosa Lam.	Wa	-	+		+	+				+		+				-				
Labiatae	Origanum vulgare L.	Wa	-	-		-											-				
Labiatae	Otostegia persica (Burnm.) Boiss.	Wa	-		-	-					-		-								
Labiatae	Perovskia abrotanoides Karel.	Wa	-	-		-							-				-				
Labiatae	Phlomis anisodonta Boiss.	Wa	-	-		-											-				
Labiatae	Phlomis herba-venti L.	Wa			-	+	+	-	-	-	-	-	-	-	-			-		-	
Labiatae	Phlomis olivieri Benth.	Wa	-	-		+	-		+	-	-	-	+				-				
Labiatae	Salvia aegyptiaca L.	Wa	-	-		+	-		-	+	+	-	+								
Labiatae	Salvia atropatana Bunge.	Wa	-	-		+	+		+	+	+	-	-								
Labiatae	Salvia hypoleuca Benth.	Wa	-	-		+	+		+	-	-	-	+				-				
Labiatae	Salvia leriifolia Benth.	Wa	-	-		-											-				
Labiatae	Salvia limbata C.A.Mey.	Wa	-	-	-	+	-		+	+	-	-	+		-	-	-			-	
Labiatae	Salvia macrosiphon Boiss.	Wa	-	-	-	+	-		-	-	-		-		-	-	-			-	-
Labiatae	Salvia mirzayanii Rech.f. & Esfand.	Wa	-	-	-	+					+		-				-				
Labiatae	Salvia multicaulis Vahl.	Wa	-	-	-	+	+	+	+	+	+	+	+		-	-	-		-	-	-
Labiatae	Salvia nemorosa L.	Wa	-	-	-	+	-		+	-	-	-	+		-	-	-			-	-
Labiatae	Salvia palaestina Benth.	Wa	-			-	-			-										-	

Table 2. Continued

Family Name	Botancial Names	Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Labiatae	Salvia Reuterana Boiss.	Wa	-	-		-											-				
Labiatae	Salvia santolinifolia Boiss.	Wa	-	-	-	+	-	-		-			-	-	-	-	-	-	-		-
Labiatae	Salvia verticillata L.	Wa	-	-		-	-		-		-	-									
Labiatae	Scutellaria pinnatifida A.Hamilt.	Wa	-	-		+	-		-	-	-	-	-				-				
Labiatae	Scutellaria Tournefortii Benth.	Wa	-	-		+											-				
Labiatae	Sideritis montana L.	Wa	-	-		+											-				
Labiatae	Stachys acerosa Boiss.	Wa	-	-		-	-		-		-	-									
Labiatae	Byzantina C.Koch	Wa	-	-		-	-		-	-	-	-	-				-				
Labiatae	Stachys inflata Benth.	Wa	-	-	-	+	+		-	-	-	-	+		-	-	+			-	-
Labiatae	Stachys lavandulifolia Vahl.	Wa	-	+		+	+		+	-	-	+	+				+				
Labiatae	Stachys laxa Boiss. & Buhse.	Wa	-	-		-											-				
Labiatae	Stachys pilifera Benth.	Wa	-	-		+	-		+		+	+									
Labiatae	Stachys setifera C.A.Mey. subsp. iranica (Rech.f.) Rech.f.	Wa	-	-		-											-				
Labiatae	Stachys spectabilis Choisy ex DC.	Wa	-	-		+											-				
Labiatae	Teucrium orientale L. subsp. glabrescens (Hausskn. ex Bornm.) Rech.f.	Wa	-	-	-	-	-		-	-	-	+	-				-				
Labiatae	Teucrium Polium L. var. gnaphalodes Benth.	Wa	-	-	-	+	+	-	-	+	+	+	+	-	-		-	-		-	
Labiatae	Thymus fallax Fisch. & C.A.Mey.	Wa	-	-	-	+											+				
Labiatae	Thymus transcaspicus Klokov	Wa			-	+	+	+	+	+	+	+	+							-	
Labiatae	Zataria multiflora Boiss.	Wa	-		+	+	+		+	+	+		+	+	-	-	-	+	+		-
Labiatae	Ziziphora clinopodioides Lam. subsp. rigida (Boiss.) Rech.f.	Wa	-	-		+	-		-		+	-	+				-				
Labiatae	Ziziphora tenuior L.	Wa	-	-	-	+	-		-	+	+	-	+	-	-		-	+	-		
Leguminosae	Acacia farnesiana (L.) Willd.	Wa	-	-																	
Leguminosae	Acacia nilotica Delile	Wa	-	-		+	+		+	+	+	+	+								
Leguminosae	Alhagi persarum Boiss. & Buhse	Wa	-	-		+							+				-				
Leguminosae	Argyrolobium roseum (Camb.) Jaub. & Spach	Wa	-	-		-	-		+	-	-	-	-								
Leguminosae	Astragalus adscendens Boiss.& Hausskn.	Wa	-	-		-	-		-		-	-					-				
Leguminosae	Astragalus callistachys Boiss. et Buhse	Wa	-	-		-	+		+	+	+	-	-								
Leguminosae	Astragalus chrysostachys Boiss.	Wa	-	-		-											-				
Leguminosae	Astragalus dactylocarpus Boiss.	Wa	-				-				-			-					-		
Leguminosae	Astragalus effusus Bunge	Wa			-		+	+	+	-	-	-					-		-		
Leguminosae	Astragalus eremophilus Emend	Wa	-	-		-	-		-	+	+	+	-								
Leguminosae	Astragalus grammocalyx Boiss. et Hohen.	Wa	-	-		+	+		+	+	-	-	-								
Leguminosae	Astragalus mercklinii Boiss. & Buhse.	Wa	-	-		-	+		-	-	-	-	-								

Table 2. Continued

Family Name	Botancial Names	Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Leguminosae	Astragalus mollis Bieb.	Wa	-	-		+	-			-			-	-			-		-		
Leguminosae	Astragalus tribuloides Delile. var. thapsacenus Handel	Wa	-			-	-			-			-				-			-	
Leguminosae	Cicer anatolicum Alef.	Wa			-		-		+	-				-	-	-	-	-	-		-
Leguminosae	Cicer oxyodon Boiss. & Hohen.	Wa	-	-		-	-		+		-	-	+				-				
Leguminosae	Colutea persica Boiss.	Wa	-	-	-	-	-		-	-	-		+		-	-	-			-	-
Leguminosae	Coronilla cornata L.	Wa	-	-		-	-		-	-	-	-	+								
Leguminosae	Coronilla varia L.	Wa	-	-		+	+		+	-	+	+	+				-				
Leguminosae	Crotalaria persica (Burm. f.) Merrill	Wa	-	-		-											-				
Leguminosae	Ebenus stellata Boiss.	Wa	-	-	+	+					+		+				-				
Leguminosae	Glycyrrhiza glabra L. var. glabra	W	+	+	+	+	+	-	+	+	+	+	+	+	+	-	-	+	+	-	-
Leguminosae	Indigofera articulata Gouan.	Wa	-	-		+	+		-	-	+	+	+								
Leguminosae	Indigofera intricata Boiss.	Wa	-	-		+	-		-	+	+	-	+								
Leguminosae	Lathryus roseus Stev.	Wa	-	-		-	+		-	-	+	-	-								
Leguminosae	Lotus corniculatus L.	Wa	-	-		-	-		-	-	-	-	-				-				
Leguminosae	Medicago sativa L.	Wa	-	-		-	-		+	+	-	-	-				-			-	
Leguminosae	Melilotus officinalis (L.) Pall.	Wa	-	-	-	+	+		-	+	+	+	+	-	-		-	-			
Leguminosae	Onobrychis Gaubae Bornm.	Wa	-	-		+	-		-	-	+	-	+				-				
Leguminosae	Onobrychis ptolemaica (Del.) DC.	Wa	-	-		-	-		-	-	-	+	-								
Leguminosae	Ononis spinosa L.	Wa	-	-		+	+		-		+	-					-				
Leguminosae	Pithecollobium dulce Benth.	Wa	-	-		+											+				
Leguminosae	Propsopis farcta (Banks & Soland.) Macbr.	Wa	+	-	-	-							-	-	-		-	-			
Leguminosae	Propsopis juliflora (Swartz.) DC.	Wa	-	-		-	-		-	-	-	+	+								
Leguminosae	Sophora alopecuroides L.	Wa	+	-	-	+	+		+	-	+	+	-	-	-		-	-	-		
Leguminosae	Trifolium pratense L.	Wa	-	-		+	-		-	-	-	+	-				-				
Leguminosae	Trifolium repens L. var. macrorrhizum (Boiss.) Boiss.	Wa	-	-		+	-		-	-	-	+	+								
Leguminosae	Trigonella coerulescens (M.B.) Halacsy.	Wa	-	-		-	-		-	-	-	-	+								
Leguminosae	Vicia peregrina L.	Wa	-	-		-	-		-	+	+	-	-								
Leguminosae	Vicia pseudocassubica Rech. f.	Wa			-		-	+	-	-	-	-					-		-		
Liliaceae	Asphodelus tenuifolius Cav.	Wa	-		-	-					-		-								
Liliaceae	Bellevalia longistyla (Miscz.) Grossh.	Wa	-			-	-			-										-	
Liliaceae	Eremurus kopetdaghensis M.Pop. ex B.Fedtsch.	Wa	+	-			+				+		+	-			+		+		
Liliaceae	Eremurus luteus Baker.	Wa	-	-	-	-	-				+		+	-	-		-	-			

Table 2. Continued

Family Name	Botancial Names	Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Liliaceae	Eremurus spectabilis M.B.	Wa	-	-	-	-	-		-	-				-	-	-	-	-	-		-
Liliaceae	Fritillaria imperialis L.	Wa	+	-		+	-		-	-	-	-								-	
Liliaceae	Fritillaria persica L.	Wa	+																		
Liliaceae	Urginea maritima (L.) Baker.	Wa				-		+			+	-	+								
Linaceae	Linum austriacum L.	Wa	-	-		+	-		-	-	+	-	+								
Lythraceae	Lawsonia inermis L.	L				+	+	+	+		+	+	+								
Lythraceae	Lythrum salicaria L.	Wa	+	-		-											-				
Malvaceae	Alcea Aucheri (Boiss.) Alef.	Wa			-									-	-			-			
Malvaceae	Alcea ficifolia L.	Wa	-	-		-	-		+	-	-	-	+								
Malvaceae	Alcea kurdica (Schlecht.) Aleff.	Wa	-			-	-			-										-	
Malvaceae	Alcea sulphurea (Boiss. & Hohen.) Aleff.	Wa	-	-		-	-		-	-	+	-	-	-							
Malvaceae	Malva sylvestris L. var. mauritiana (L.) Boiss.	Wa	-	+	-	+	-				-		-	-	-		-	-	-		
Moraceae	Ficus benghalensis L.	Wa	-	-		-	-		-	+	-	+	+				-				
Moraceae	Ficus carica L. subsp. rupestris (Hausskn. ex Boiss.) Browicz.	Wa	-	-	-	+	-		-	+	-	-	+	-	-	-	-		-		-
Myrtaceae	Eucalyptus astringens Maiden.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus camaldulensis Dehnh.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus dalrympleana Maiden.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus fruticeturum F.Muell. ex Miq.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus gillii Maiden.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus lansdoweana F.V.M. et S.E.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus largiflorens F. Muell.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus longicornis F. Meull.	Wa	-	-		+											-				
Myrtaceae	Eucalyptus loxophleba Benth.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus occidentalis Endl.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus oleosa F.Muell.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus rubia Deane. et Maiden.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus salubris F.Muell.	Wa	-	-		-											-				
Myrtaceae	Eucalyptus sargentii Maiden.	Wa	-	-		+											-				
Myrtaceae	Eucalyptus sideroxylon A. Cunn.ex Woblls	Wa	-	-		-											-				
Myrtaceae	Eucalyptus viridis R.T. Baker.	Wa	-	-		-											-				
Myrtaceae	Myrtus communis L.	Wa	-	-		+	+			+	+	+	+				+				
Nyctaginaceae	Commicarpus stenocarpus (Chiov.)Cufod.	Wa	-	-		-	-		-	+	-	+	+								
Onagraceae	Epilobium minutiflorum Hausskn.	Wa	-	-		+	+		+		+	+									

Table 2. Continued

Family Name	Botancial Names	Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Orobanchaceae	Cistanche eremodoxa Bornm.	Wa	-	-		-	-		+	+	-	+	-								
Orobanchaceae	Cistanche tubulosa (Schrenk) R. Wight	Wa	-	-		+	-		-	+	+	-	+								
Paeoniaceae	Paeonia wittmanniana Hartw. ex Lindl.	Wa	-	-		-											-				
Papaveraceae	Glaucium contortuplicatum Boiss.	Wa	-	-	-	+	+		-	+	+	-	+		-	-	-		-	-	-
Papaveraceae	Glaucium elegans Fisch. & C.A.Mey.	Wa	-		-		-				-			-	-		-	-	-		
Papaveraceae	Glaucium fimbrilligerum Boiss.	Wa	-	-		-	+				+		-				-				
Papaveraceae	Glaucium grandiflorum Boiss. & Huet	Wa	-	-	+	-	+		+	+			-	-	+	-	-	-	+		-
Papaveraceae	Glaucium oxylobum Boiss. & Buhse	Wa	-	+		-											-				
Papaveraceae	Glaucium vitellinum Boiss. & Buhse	Wa	+	+		+	+		+		+	+									
Papaveraceae	Hypecoum pendulum L.	Wa	-	-		+	-				-		-	-			-		-		
Papaveraceae	Papaver argemone L.	Wa	-	-		-	-		-	-	-	-	+								
Papaveraceae	Papaver bracteatum Lindl.	Wa	-	-		-	-		-	-	+	-	-								
Papaveraceae	Papaver dubium L.	Wa	-	-	-	+	-		-		-	-	-				-				
Papaveraceae	Papaver lacerum Popov.	Wa	-				+				+										
Papaveraceae	Roemeria hybrida (L.) DC.	Wa	-	-		+	-		-	-	+	-	-	-			-		-		
Papaveraceae	Roemeria refracta DC.	Wa	-		-		-				-			-	-			-	-		
Paronychiaceae	Paronychia kurdica Boiss. var. kurdica	Wa	-		-	-					-		-								
Paronychiaceae	Spergularia diandra (Guss.) Heldr. et Sart.	Wa	-	-		-	+		+	-		+	+								
Plantaginaceae	Plantago lanceolata L.	Wa	-	-	-	+	+	-	+	-	+	-	+				-		-	-	
Plantaginaceae	Plantago major L.	Wa			-		-		-	-				-	-	-	-	-	-		-
Plantaginaceae	Plantago ovata Forssk.	Wa	-		-	-					-		-								
Plantaginaceae	Plantago psyllium L.	Wa	-	-	-	+					-		-				+				
Plumbaginaceae	Acantholimon talagonicum Boiss.	Wa	-	-		+	-		-	-	-	-	-								
Plumbaginaceae	Limonium Thouini (Viv.) O.Kuntze	Wa	-		-	+					-		-								
Plumbaginaceae	Plumbago europaea L.	Wa	-	-		-											-				
Polygonaceae	Polygonum aviculare L.	Wa	-			-								-	-		-	-			
Polygonaceae	Polygonum hydropiper L.	Wa	-	-		-											-				
Polygonaceae	Pteropyrum Aucheri Jaub. & Spach	Wa	-	-	-	+					-		+				-		-		-
Polygonaceae	Pteropyrum Olivieri Jaub. & Spach	Wa	-	+		+	+		+	-	-	+	+				-				-
Polygonaceae	Rheum Ribes L.	Wa	-	-		+	+			-							-			-	
Polygonaceae	Rumex pulcher L.	Wa					+	+	+	+	+	-									
Portulacaceae	Portulaca oleracea L.	Wa	-	-	-	+			-	+			-		-	-	-			-	-
Primulaceae	Primula auriculata Lam.	Wa	-			+	+			+										+	
Ranunculaceae	Adonis aestivalis L.	Wa	-	-		-											-				

Table 2. Continued

Family Name	Botancial Names	Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Ranunculaceae	Clematis isphahanica Boiss.	Wa	-	-	-	-			-	+	-		-		-	-	-			-	-
Ranunculaceae	Clematis orientalis L.	Wa	-	-		+	+		+	+	+	+	+				-				
Ranunculaceae	Consolida oliveriana (DC.) Schrad	Wa	-	-		+	-		+	+	-	-	-								
Ranunculaceae	Consolida orientalis (Gay.) Schrad.	Wa	-	-	-	-			-	-	-		-		-	-	-			-	-
Ranunculaceae	Ranunculus arvensis L.	Wa	-	-		-	-		-		-	-									
Ranunculaceae	Ranunculus brachylobus Boiss. et Hohen. var. major Bomm.	Wa	-			+	+			-										-	
Ranunculaceae	Ranunculus oxyspermus M.B.	Wa	-	-	-	-	-		+	+	+			+	-	-	-	-	-		-
Ranunculaceae	Ranunculus pichleri Freyn.	Wa	-			+	+			+										-	
Ranunculaceae	Ranunculus polyanthemos L.	Wa	-	-		-	+		-	+	-	-	+								
Ranunculaceae	Thalictrum minus L.	Wa	-	-		-	-		-	-	-	-	-								
Resedaceae	Ochradenus baccatus Delile.	Wa	-	-	-	-	-		-	-	-	+	-								
Resedaceae	Ochradenus ochradeni (Boiss.) Abdallah	Wa			-									-	+			-			
Resedaceae	Reseda Aucheri Boiss. subsp. Auchrei	Wa	-	-		+	+		-	+	+	+	+		-	-	-			-	-
Resedaceae	Reseda lutea L.	Wa	+	-	-	+	+		-	-	-	-	+	-	-	-	-	-	-		-
Rhamnaceae	Paliurus spina-christi Miller	Wa	-	-		-											-				
Rhamnaceae	Rhamnus pallasii Fisch. & C.A.Mey.	Wa			-		+	+	+	-	-	-					-		-		
Rhamnaceae	Ziziphus spina-christi (L.) Willd.	L,Fr	-	-	-	+	+	+	-	+	+	+	+			-	-				
Rosaceae	Agrimonia eupatoria L.	Wa	-	-		-	-		-	-	-	-	-								
Rosaceae	Amygdalus communis L.	Wa			-		-		-	-				-	-	-	-	-	-		-
Rosaceae	Amygdalus eburnea Spach	Wa	-		-	+					-		-								
Rosaceae	Amygdalus lycioides Spach var. horrida (Spach) Browicz	Wa	-	-		+	+		+	-	-	-	+				-				
Rosaceae	Amygdalus scoparia Spach	Wa			-		-		-	-				+	-	-	-	-	-		-
Rosaceae	Cotoneaster nummularia Fisch. & C.A.Mey.	Wa	-		-		+	+	-	-	-	-	-				-		-		
Rosaceae	Hulthemia persica (Michx. ex Juss.) Bomm.	Wa	+	-	-	+	+		-	+	+	+	+	-	+		-	+			
Rosaceae	Rosa canina L.	Wa	-	+		+	-			-	-	+	+				+				
Rosaceae	Rosa persica Michx. ex Juss.	Wa	-	-		-	+		-	+	-	+	+				-				
Rosaceae	Sanguisorba minor Scop.	Wa	-	-		+	+				+		+	-			-		-		
Rubiaceae	Callipeltis cucullaris Stev.	Wa			-		-	+	+	-	-	-					-		-		
Rubiaceae	Cruciata taurica (Pallas.& Willd.) Ehrend.	Wa	-	-		-	-		-	+	+	+	-								
Rubiaceae	Galium coronatum Sibth. et Sm.	Wa	-	-	-	+	+	+	+	+	+	+	-				-		-		
Rubiaceae	Galium humifusum Bieb	Wa	-	-		-	-		-	-	+	-	-								
Rubiaceae	Galium verum L.	Wa	-	-	-	+	+	+	+	-	+	-	-		-	-	-		-	-	-
Rubiaceae	Phuopsis stylosa (Trin.) Hook. f.	Wa	-	+		+											-				
Rubiaceae	Rubia florida Boiss.	Wa			-		+	-	+	-	-	-					-		-		

Table 2. Continued

Family Name	Botancial Names	Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Rubiaceae	Rubia tinctorum L.	W	-	+	-	+	+	-	-	-	-	-					-		-		
Rutaceae	Citrus aurantifolia Swingle	Wa	-	-		-	-		+	+	-	+	+								
Rutaceae	Citrus aurantium Rissa.	Wa	+																		
Rutaceae	Citrus bigardia Loisel.	Wa	+																		
Rutaceae	Haplophyllum perforatum (M.B.) Kar. & Kir.	Wa	-	-	-	+	-		-	+	+	+	+	-	+		-	+			
Rutaceae	Haplophyllum robustum Bge.	Wa	-	-	-	-								-	-		-	-			
Sapindaceae	Dodonaea viscosa (L.) Jacq.	Wa	-	+		+	+		-	+	+	+	+								
Sapindaceae	Stocksia brahuica Benth.	Wa	-	-		-											-				
Scrophulariaceae	Bungea trifida (Vahl) C.A.Mey.	Wa			-		-	+	+	-	-	-					-		-		
Scrophulariaceae	Linaria longipes Boiss. et Heldr.	Wa	-	-		+	-				-		-	-			-		-		
Scrophulariaceae	Rhynchocorys elephas (L.) Griseb.	Wa	-	-		-											-				
Scrophulariaceae	Scrophularia crenophila Boiss.	Wa	-	+		+											-				
Scrophulariaceae	Scrophularia deserti Del.	Wa	-	-		-	-		-	-	-	+									
Scrophulariaceae	Scrophularia nervosa Benth. subsp. Boissierana (Jaub. & Spach) Grau	Wa	-	-		-	-		-		-	-									
Scrophulariaceae	Scrophularia striata Boiss.	Wa	-	-	-	+	-		-		-	-	-	-	-		-	-			
Scrophulariaceae	Verbascum cheiranthifolium Boiss.	Wa	-	+		-	-		-		-	-					-				
Scrophulariaceae	Verbascum erianthum Benth. in DC.	Wa			-		-		+	+				-	-	-	-	-	+		-
Scrophulariaceae	Verbascum farsistanicum (Murb.) Hub.-Mor.	Wa	-		-	-					-		-								
Scrophulariaceae	Verbascum speciosum Schrad.	Wa	-	-	-	-								-	-		-	-			
Scrophulariaceae	Veronica arvensis L.	Wa	+		-	+					+		+								
Solanaceae	Datura innoxia Miller	Wa	-	-	-	-				-	-		-		-	-	-			-	
Solanaceae	Datura stramonium L.	Wa	-	-		-											-				
Solanaceae	Hyoscyamus niger L.	Wa	-	-	-	+	-		-	-	+	-	-	-	-	-	-		-	-	-
Solanaceae	Hyoscyamus reticulatus L.	Wa	-	-		-	-		+	-	+	-	-								
Solanaceae	Lycium depressum Stocks subsp. depressum	Wa	-		-									-	-		-	-			
Solanaceae	Lycium ruthenicum Murray	Wa	-	-	-	+								-	-		-	-			
Solanaceae	Lycium shawii Roemer et Schultes	Wa	-	-		-	-		-	+	-	+	+								
Solanaceae	Solanum incanum L.	Wa	-	-		+	+		-	+	+	+	+								
Solanaceae	Solanum nigrum L.	Wa	-																		
Solanaceae	Solanum persicum Willd. ex Schultes	Wa	-	-		-	-		-	-	-	-	-								
Tamaricaceae	Reaumuria cistoides Adam.	Wa	+	-		-							-				-				
Tamaricaceae	Reaumuria squarrosa Jaub. & Spach	Wa	-	-	-	+			-	-	+		-		-	-	+			-	+
Tamaricaceae	Tamarix ramosissima Ledeb.	Wa	-	-		+	+		+	+	+	+	+				-				

Table 2. Continued

Family Name	Botancial Names	Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Thymeleaceae	Daphne mucronata Royle	Wa	-	-	-	-	-		+		+	+	+								
Thymeleaceae	Daphne oleoides Schreb.	Wa	-	-		-	+		+		+	+								-	
Thymeleaceae	Daphne oleoides Schreb. var. kurdica Bornm.	Wa	-			-	+			-										-	
Thymeleaceae	Dendrostellera lessertii (Wikstr.) Van Tiegh.	Wa	-	-	-	-			-	+	-		-	-	-	-	-			-	-
Typhaceae	Arum elongatum Stev.	Wa	-			-	-			-										-	
Typhaceae	Typha latifolia L.	Wa	-	-		+											-				
Ulmaceae	Celtis caucasica Willd.	Wa	-	-		-											-				
Umbelliferae	Anethum graveolens L.	Wa	-	-		+							+				+				
Umbelliferae	Artedia squamata L.	Wa	-	-	-	-	-		-	-	-	+	-								
Umbelliferae	Bunium cylindricum (Boiss. & Hohen.) Drude	Wa	-	-		+							+				-				
Umbelliferae	Bupleurum falcatum L.	Wa	-	-		-	-		-		-	-					-				
Umbelliferae	Daucus carota L.	Wa	-	-		-	-		-	-	-	-	+								
Umbelliferae	Ducrosia anethifolia (DC.) Boiss.	Wa	-	-	-	+	+		+	+	+	+	+	-	-		-	-			
Umbelliferae	Echinophora platyloba DC.	Wa	-	+		+	+		+		+	+	+				-		-		
Umbelliferae	Eryngium Bungei Boiss.	Wa			-		-		-					-		-	-	-	-		-
Umbelliferae	Eryngium thyrsoideum Boiss.	Wa	-	-		-	-		-		-	-									
Umbelliferae	Ferula gumosa Boiss.	Wa	-	-	-	+							-		-	-	-			-	-
Umbelliferae	Ferulago angulata (Schlecht.) Boiss.	Wa	-	-		-	-		-		-	-									
Umbelliferae	Foeniculum vulgare Miller	Wa	-	-		+							+				+				
Umbelliferae	Heracleum persicum Desf. ex Fischer.	Fr	+	+	+	+	+		+	+	+		+	+	+	+	+	+	+		-
Umbelliferae	Pimpinella anisum L.	Wa	+	+		+	+				+	-	+	+			+		+		
Umbelliferae	Pimpinella aurea DC.	Wa	-	-		+							+				-				
Umbelliferae	Pimpinella Kotschyana Boiss.	Wa	-	-		-											-				
Umbelliferae	Pimpinella puberula (DC.) Boiss.	Wa	-	-	-	-			-	-	-		-		-	-	-			-	-
Umbelliferae	Prangos cheilanthifolia Boiss.	Wa	-	-		-											-				
Umbelliferae	Prangos ferulacea (L.) Lindl.	Wa	+	+	-	+	+		+	+	+	+	+		-	-	-			-	-
Umbelliferae	Prangos uloptera DC.	Wa	-	-		+	+		+		+	+	+	+			+		+		
Umbelliferae	Psammogeton canescens (DC.) Vatke.	Wa	-	-		+	+		+	+	+	+	+	-			-		-		
Umbelliferae	Pycnocycla spinosa Decne. ex Boiss.	Wa	-	-	-	-	-	+	-	-	+	-	+				-			-	
Umbelliferae	Scandix stellata Banks & Soland.	Wa	-				+				-			-					-		
Umbelliferae	Seseli peucedanoides (M.B.) Kos.-Pol	Wa	-	-		+	+		-	+	-	-	-								
Umbelliferae	Smyrniopsis Aucheri Boiss.	Wa	-	-		-											-				
Umbelliferae	Torilis arvensis (Huds.) Link	Wa	-	-		-											-				

Table 2. Continued

Family Name	Botancial Names	Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Umbelliferae	Turgenia latifolia (L.) Hoffm.	Fl,Fr	-	-		+	+		+	+	+	+	+	-			-		-	-	
Urticaceae	Parietaria judaica L.	Wa	-	-		-											-				
Urticaceae	Urtica dioica L.	Wa	-	-		+	-		-	-	-	-	+								
Verbenaceae	Verbena officinalis L.	Wa	-	-		-											-				
Violaceae	Viola odorata L.	Wa	+	-	+	+	+		+	+			+	+	+	+	-	+	+		-
Zygophyllaceae	Fagonia indica Burm. var. Schweinfurthii. Hadidi.	Wa	-	-	-	+	-		-	+	+	+	+								
Zygophyllaceae	Peganum Harmala L.	Wa	-	-	-	+	+		+	-	+	-	-	-	-		-	-	-		-
Zygophyllaceae	Tribulus terrestris L.	Wa	-	-	-	+	-	-	+	-	-	-	-				-		-		
Zygophyllaceae	Zygophyllum atriplicoides Fisch. & C.A.Mey.	Wa	-			-					-		-								
Zygophyllaceae	Zygophyllum eurypterum Boiss. & Buhse.	Wa	-	-	-	-			-	-	-		-		-	-	-			-	-
Zygophyllaceae	Zygophyllum Fabago L. subsp. orientale Boriss. ex Hadidi.	Wa	-	-	-	+	+		+	-	-	-	+	-	-		-	-			
Zygophyllaceae	Zygophyllum propinquum Decne.	Wa	-	-		-	-		-	+	-	-	-								
	Number of (+)		20	22	6	125	78	19	67	65	79	56	91	9	7	2	16	8	9	1	1
	Blank		22	57	182	32	97	255	121	130	97	138	115	225	221	243	102	242	224	241	242
	Number of (-)		240	203	94	125	107	8	94	87	106	88	76	48	54	37	164	32	49	40	39
	Sum		282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282

35 °C after 72-168 hr of incubation. The antifungal activity of the extracts were expressed by two symbols as "-" (no effect), and "+" (complete growth inhibition)(8). For dermatophytes strains, Grisofulvin and for the rest of the strains Amphotericin B, were used as positive control and as negative control methanol was used in the antifungal assay (9).

Microorganisms

The used strains are shown in Table 1. All strains were isolated from local patients and were identified and classified by the medical mycologists in the School of Public Health of Tehran University of Medical Sciences. The strains were recultured and used for this study.

RESULT AND DISCUSSION

Scientific name of the identified plant species and the results of their antifungal activity are listed in Table 2 and have arranged alphabetically according to their botanical names of plant families. As shown in Table 2, of the 278 extracts of Iranian native species belonging to 37 plant families, 201 extracts have antifungal effects against one or more fungal strains.

The most effective plants were: *Mentha longifolia, Salvia multicaulis, Thymus transcaspicus, Zataria multiflora, Glycyrrhiza glabra, Hulthemia persica, Heracleum persicum, Pimpinella anisum, Pragnos ferulacea, Pragnos uloptera, and Viola odorata* that exhibit activity against at least 50% of fungal strains. The most sensitive fungal strains were: *Trichophyton violaceum* (70.3%), *Epidermophyton floccosum* (54.49%), *Microsporum canis* (50%), *Trichophyton schoenleinii* (42.76%), *Trichophyton mentagrophytes* (42.70%), *Microsporum gypseum* (42.16%), *Trichophyton verrucosum* (41.61%) and *Trichophyton rubrum* (38.88%).

Of all the plants investigated, the *Leguminosae* family with 34 active species (82.92%) was highly ranked. The second and third most effective families were, *Labiateae* and *Umblliferae*, which exhibited 42 (76.36%) and 19 (67.85%) bioactive members, respectively.

Reviewing the literature (9-15) revealed that, the noticeable species of this investigation have not been reported previously. These worth attending results are due to specific geobotanical and climatical conditions of Iran that may facilitate production of active substances in comparison with the same species growing wild in the other lands. We wish these results may provide a basis for the isolation of active compounds from these medicinal plants.

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