



ISSN (E): 2277- 7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.03  
TPI 2020; SP-9(12): 176-184  
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[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 11-09-2020  
Accepted: 29-11-2020

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## Economic utility of different plant species occurring in mid Himalayan region of Himachal Pradesh

**Dinesh Kumar Pal, B Dutt, Rajeev Dhiman and Varun Attri**

### Abstract

The present study “Economic utility of different plant species occurring in mid Himalayan region of Himachal Pradesh” was carried out to study the economic plant wealth of Theog Forest Division, with main emphasis on medicinal plants. The study area lies between 31°-5' and 31°-10' North latitudes and 77°-22'-30'' and 77°-30' East longitudes. The area is covering mostly the west of Shimla District and comes under Theog and Kotkhai Sub-divisions. A total of 448 plant species, belonging to 314 genera and 120 families, have been collected from the study area. Out of these, 353 species belong to Dicotyledons, 56 to Monocotyledons, 7 to Gymnosperms, 27 to Pteridophytes, 1 to Bryophytes, 3 to Fungi and 1 to Lichens. Out of the total collected plants, 244 species have been designated as having medicinal importance and 54 species are aromatic, based on the available authentic literature. These plants provide different benefits viz., fuel, fodder, fibre, gums, resins, tannins, dyes, timber, aromatic and medicinal benefits, which can be utilized economically all over the world. There is a great scope for further pharmacological research on some of these species. It is of prime importance to document the existing plant resources, which would be beneficial in formulating policies for their sustainable use, conservation and propagation. This fundamental approach of local inventory will help to enrich and strengthen the holistic approach of national and global biodiversity enumerations.

**Keywords:** Medicinal, aromatic, economic utility, etc.

### Introduction

Since time immemorial, Plants have been a major source of therapeutic agents. The increasing acceptance of traditional herbal systems of medicine, like Ayurveda, within India and outside has resulted in the revival of ancient traditions of medicine. Medicinal plants and their derivatives are thus looked upon not only as a source of affordable healthcare but also as an important commodity item of international trade and commerce. As per World Health Organization estimates, traditional medicines, mostly plant drugs, cater to the health needs of nearly 80 per cent of the world's population (Kurian and Sankar, 2007) [11]. India stands 10<sup>th</sup> among the plant genetic resource rich countries encompassing 16 agro-climatic zones and is one of the top mega diversity centres of the world with a unique wealth of 15,000-20,000 medicinal plant species. Around 70 per cent of medicinal species in India are found in the tropical forests spread across Eastern and Western Ghats, Vindhya, Chhota Nagpur Plateau and Aravalis. Although less than 30 per cent are found in temperate and alpine areas and in higher altitudes, they are more potent in their medicinal activity. There are 10 bio-geographical zones in India and it harbours two of the 25 hot spots of the world, i.e. Eastern Himalayas and Western Ghats. These zones are further grouped into 25 biotic provinces and 426 biomes. The forest areas of these bio-geographic zones are classified into 16 major forest types and more than 200 subtypes (Kurian and Sankar, 2007) [11]. Himachal Pradesh has been regarded as a veritable emporium of plant genetic resources majoring in medicinal and aromatic plants. It is a rich repository of medicinal wealth and occupies an important place in the Vedic treatises. As per the Ayurvedic Pharmacopoeia Committee, Government of India, out of around 1100 single drugs used as ingredients of indigenous medicines in India, there are 350 plants frequently used in Ayurvedic preparations. Out of these 350 plants, there are just over 225 species growing in Himachal Pradesh, which are available for commercial extraction and export to outside markets. However, no proper records are available for such transactions (Chauhan, 1999, 2003) [3, 4]. There is a great need to identify our natural wealth, study it and make the people aware to know their utilities and its repercussions if they extinct. The exploration is so much important otherwise many more unexplored species will disappear forever without knowing their existence in nature, (Singh and Mino, 2003) [17].

Since time immemorial, man has been dependent on nature, particularly on the plants for its sustenance and survival since his existence on the earth. In ancient times, he knew how to relieve his sufferings by using the plants growing around him. The civilizations' records shows that a number of drugs used today were already in use during ancient times. The credit goes to Indian Rishies and Physicians, who were acquainted with a large number of medicinal plants compared to the other countries in the world. The *Materia Medica* of the Greeks, Romans, Egyptians, Babylonians, Persians, Chinese and Arabians did not possess extensive uses and knowledge of medicinal plants and drugs as compared to Indian *Materia Medica* (Dhiman, 2005) [6]. The Ayurvedic system of medicine, which caters to the health needs of a major section of population, currently utilizes as many as 1000 single drugs and over 8000 compound formulations. Other systems of medicine, viz. Siddha, Unani and Amchi (Tibetan) together utilize about 1,800-1,900 medicinal species. Many medicinal plants are the source of clinically useful prescription drugs being used in modern systems of medicine. Also incredible knowledge on phyto-medicine is acquired in non-coded form by tribals and rural community, as is clear from evidences related to folklore medicine (Kurian and Sankar, 2007) [11]. Inventorisation of herbal drugs used in traditional and modern medicines appears to be a stupendous task for a country like India, where a number of well established indigenous or traditional systems, including Ayurveda, Unani, Siddha, Homoeopathy, Amchi, Yoga and Naturopathy are practised along with modern medicine for the management of total health care system. In all these systems, a large number of plant drugs are used, although there may be some common plants. The problem in correct identification of plants is that the plant drugs in these systems of medicine are known by their classical or vernacular names. Thus, one plant species can have many vernacular or classical names and one name may refer to different plant species. Himachal Pradesh has been regarded as a veritable emporium of plant genetic resources majoring in medicinal and aromatic plants. It is a rich repository of medicinal wealth and occupies an important place in the Vedic treatises. In ancient times, it has been the abode of saints and sages, who pursued their meditational and scholarly endeavours here. The first ever seminar to cure the sufferings and ailments of the people is reported to have been

held in some part of Himachal Pradesh at a place situated somewhere in the Shiwalik range. As per the Ayurvedic Pharmacopoeia Committee, Government of India, out of around 1100 single drugs used as ingredients of indigenous medicines in India, there are 350 plants frequently used in Ayurvedic preparations. Out of these 350 plants, there are just over 225 species growing in Himachal Pradesh, which are available for commercial extraction and export to outside markets. However, no proper records are available for such transactions (Chauhan, 1999, 2003) [3, 4].

### Material and Methods

The present study was carried out for making preliminary survey of medicinal and aromatic plant wealth of Theog Forest Division, located in district Shimla of Himachal Pradesh. The study area is situated between North latitudes 31°-5' and 31°-10' and East longitudes 77°-22'-30'' and 77°-30'. This area is mostly situated in the west of district Shimla and comes under Theog and Kotkhai Sub-divisions. The total geographical area of the division is 64000 ha (512 Km<sup>2</sup>), out of which 32045.10 ha, i.e. 50.07 per cent of the total geographical area is under tree cover. The altitudinal range of this area lies between about 900 m to 3150 m above mean sea level. The entire tract is mountainous. The area, on average, receives an annual rainfall of about 1200 mm. The main objectives of the study were collection, identification, classification and documentation of medicinal and aromatic plant wealth/economic utility. To achieve these objectives, extensive field surveys were carried out in the entire study area during flowering/fruitlet period to facilitate the process of identification, covering all seasons of the years 2009 and 2010. The collected specimens were pressed in blotting sheets in the wooden or iron presses and were oven-dried afterwards. The macroscopic characters were taken into consideration for the identification and description of plant specimens. The nomenclature has been made up to date with the help of recent taxonomic literature.

### Results and Discussion

The plant samples were collected from the study area, after which they were dried as per the prescribed procedure and information regarding their economic wealth was collected which is as under:

**Table 1:** Economic utility of different plant species of Theog forest Division

Sr. No.	Name of the species	Fodder	Fibres	Tannins	Dyes	Gums	Resins	Fuel wood	Edible	Timber	Medicinal	Aromatic	Ritual ceremonies	Ornamental/Landscape value	Pulp & Paper
			▲	▲	▲	▲	▲				▲	▲			▲
1	<i>Abies pindrow</i>									+				+	+
2	<i>Acacia catechu</i>	+			+	+		+		+	+				
3	<i>Acacia mearnsii</i>			+										+	+
4	<i>Acacia nilotica</i> subsp. <i>indica</i>	+		+	+	+		+		+	+				
5	<i>Acer caesium</i>	+						+		+				+	
6	<i>Achyranthes aspera</i>	+									+				
7	<i>Achyranthes bidentata</i>	+									+				
8	<i>Adiantum incisum</i>										+				
9	<i>Adiantum venustum</i>										+			+	
10	<i>Aerva sanguinolenta</i>										+				
11	<i>Aesculus indica</i>	+						+	+	+	+			+	+
12	<i>Agave angustifolia</i>		+								+			+	
13	<i>Agave cantula</i>		+								+			+	
14	<i>Agrimonia pilosa</i> var. <i>nepalensis</i>			+							+	+			
15	<i>Ailanthus altissima</i>			+						+	+	+			+
16	<i>Ainsliaea aptera</i>										+				
17	<i>Ajuga bracteosa</i>										+				
18	<i>Ajuga parviflora</i>														

19	<i>Albizia chinensis</i>	+					+			+	+				+	
20	<i>Albizia julibrissin</i>										+					+
21	<i>Alnus nitida</i>			+	+					+						
22	<i>Aloe barbadensis</i>		+		+					+	+					
23	<i>Altemanthera sessilis</i>	+								+	+					
24	<i>Amaranthus blitum</i> var. <i>Oleraceus</i>	+								+	+					
25	<i>Amaranthus paniculatus</i>	+								+	+					+
26	<i>Amaranthus spinosus</i>	+								+	+					
27	<i>Ampelocissus latifolia</i>	+									+					
28	<i>Anaphalis adnata</i>										+				+	
29	<i>Anaphalis busua</i>										+	+			+	
30	<i>Anaphalis contorta</i>										+	+			+	
31	<i>Andrachne cordifolia</i>										+					
32	<i>Androsace lanuginosa</i>															+
33	<i>Androsace rotundifolia</i>															+
34	<i>Androsace sarmentosa</i>															+
35	<i>Anemone obtusiloba</i>										+					+
36	<i>Anemone vitifolia</i>										+					
37	<i>Angelica glauca</i>										+	+				
38	<i>Anisomeles indica</i>										+	+				
39	<i>Apluda mutica</i>	+														
40	<i>Aquilegia fragrans</i>										+					+
41	<i>Arabis amplexicaulis</i>															
42	<i>Arctium lappa</i>										+					
43	<i>Argemone Mexicana</i>										+					+
44	<i>Argyrolobium flaccidum</i>															
45	<i>Arisaema flavum</i>									+						
46	<i>Artemisia indica</i>										+					
47	<i>Artemisia roxburghiana</i>											+			+	
48	<i>Artemisia vestita</i>										+	+			+	
49	<i>Arthraxon lanceolatus</i>	+														
50	<i>Arundinella bengalensis</i>															
51	<i>Arundinella nepalensis</i>	+									+					
52	<i>Asclepias curassavica</i>			+							+					+
53	<i>Asparagus adscendens</i>									+	+				+	
54	<i>Asplenium dalhousiae</i>															+
55	<i>Asplenium trichomanes</i>										+					
56	<i>Aster mollisculus</i>															
57	<i>Astilbe rivularis</i>															
58	<i>Athyrium flabellulatum</i>															+
59	<i>Atylosia scarabaeoides</i>										+					
60	<i>Avena fatua</i>	+									+					
61	<i>Barleria cristata</i>										+					+
62	<i>Bauhinia variegata</i>	+	+	+	+		+	+	+	+	+					+
63	<i>Berberis aristata</i> var. <i>aristata</i>				+		+	+	+	+					+	
64	<i>Berberis lyceum</i>	+					+	+	+	+					+	
65	<i>Bergenia ciliata</i>				+					+	+					
66	<i>Bergenia stracheyi</i>									+	+					
67	<i>Bidens biternata</i>	+								+						
68	<i>Bidens pilosa</i>									+	+					
69	<i>Bistorta amplexicaulis</i>	+									+					+
70	<i>Boehmeria platyphylla</i>			+						+						
71	<i>Boerhavia diffusa</i>										+					
72	<i>Bombax ceiba</i>	+	+					+	+	+	+					+
73	<i>Bromus mollis</i>	+									+					
74	<i>Buddleja asiatica</i>	+								+	+					+
75	<i>Buddleja crispa</i>	+								+						
76	<i>Bupleurum falcatum</i>										+					
77	<i>Bupleurum hamiltonii</i>															
78	<i>Callistemon citrinus</i>															+
79	<i>Cannabis sativa</i>			+						+	+					
80	<i>Capillipedium assimile</i>															
81	<i>Capsella bursa-pastoris</i>										+					
82	<i>Carduus nutans</i>	+								+	+					+
83	<i>Carex breviculmis</i>	+														
84	<i>Carex cardiolepis</i>	+														
85	<i>Carex remota</i> subsp. <i>Rochebrunii</i>	+														
86	<i>Carissa carandas</i>	+			+			+	+	+	+					+
87	<i>Caryopteris bicolor</i>	+								+						+
88	<i>Cassia floribunda</i>									+						+
89	<i>Cassia mimosoides</i>	+														+
90	<i>Catharanthus roseus</i>										+					+
91	<i>Cedrus deodara</i>						+			+	+	+				+

92	<i>Celtis australis</i>	+						+	+	+	+								+
93	<i>Cheilanthes albomarginata</i>																		
94	<i>Cheilanthes bicolor</i>																		
95	<i>Cheilanthes brevifrons</i>																		
96	<i>Cheilanthes dalhousiae</i>																		
97	<i>Chenopodium ambrosioides</i>											+	+						
98	<i>Chenopodium opulifolium</i>	+											+						
99	<i>Chrysanthemum leucanthemum</i> var. <i>leucanthemum</i>																		+
100	<i>Chrysopogon fulvus</i>	+																	
101	<i>Cirsium verutum</i>																		
102	<i>Cirsium wallichii</i>																		
103	<i>Cissampelos pareira</i>	+	+										+						
104	<i>Clematis barbellata</i>																		+
105	<i>Clematis b Buchananiana</i>																		+
106	<i>Clematis gouriana</i>												+						+
107	<i>Clematis grata</i>																		+
108	<i>Clematis montana</i>																		+
109	<i>Clinopodium vulgare</i>												+						
110	<i>Colebrookia oppositifolia</i>												+						
111	<i>Conyza japonica</i>																		
112	<i>Coriaria nepalensis</i>	+			+														+
113	<i>Corydalis govaniana</i>																		+
114	<i>Cosmos bipinnatus</i>																		+
115	<i>Cotinus coggygia</i>				+	+													+
116	<i>Cotoneaster bacillaris</i>																		+
117	<i>Cotoneaster microphylla</i>																		+
118	<i>Crepis sancta</i>																		
119	<i>Cryptolepis buchanani</i>				+														
120	<i>Cupressus torulosa</i>																		+
121	<i>Cuscuta reflexa</i> var. <i>reflexa</i>																		+
122	<i>Cyathula tomentosa</i>																		+
123	<i>Cymbopogon martinii</i>	+																	+
124	<i>Cynodon dactylon</i>	+																	+
125	<i>Cynoglossum glochidiatum</i>																		+
126	<i>Cyperus michelianus</i>																		
127	<i>Dalbergia sissoo</i>	+																	+
128	<i>Daphne papyracea</i>				+														+
129	<i>Datura stramonium</i>																		+
130	<i>Debregeasia salicifolia</i>	+	+																
131	<i>Deeringia amaranthoides</i>	+																	
132	<i>Delphinium denudatum</i>	+																	+
133	<i>Dendrocalamus hamiltonii</i>	+																	+
134	<i>Dendrocalamus strictus</i>	+																	+
135	<i>Deparia japonica</i>																		
136	<i>Desmodium concinnum</i>	+																	+
137	<i>Desmodium elegans</i>	+																	+
138	<i>Deutzia compacta</i>	+																	+
139	<i>Deutzia staminea</i>	+																	+
140	<i>Dichanthium annulatum</i>	+																	
141	<i>Dicliptera bupleuroides</i>	+																	+
142	<i>Dicliptera roxburghiana</i>	+																	+
143	<i>Digitaria sanguinalis</i>	+																	+
144	<i>Dioscorea deltoidea</i>																		+
145	<i>Dioscorea melanophyma</i>																		
146	<i>Dodonaea viscosa</i>				+														+
147	<i>Dryopteris caroli-hopei</i>																		+
148	<i>Dryopteris nigropaleacea</i>																		+
149	<i>Dryopteris xanthomelas</i>																		+
150	<i>Duchesnea indica</i>	+																	+
151	<i>Echinochloa crus-galli</i>	+																	+
152	<i>Echinops niveus</i>																		+
153	<i>Elaeagnus parvifolia</i>	+																	+
154	<i>Eleusine indica</i>	+																	+
155	<i>Elsholtzia fruticosa</i>	+																	+
156	<i>Eragrostis gangetica</i>	+																	
157	<i>Erigeron bellidioides</i>																		+
158	<i>Erigeron bonariensis</i>																		+
159	<i>Erigeron multicaulis</i>																		+
160	<i>Eriophorum comosum</i>	+	+																
161	<i>Erysimum hieracifolium</i>																		
162	<i>Eucalyptus umbellata</i>																		+
163	<i>Eulaliopsis binata</i>	+	+																+
164	<i>Euphorbia heterophylla</i>	+																	+
165	<i>Euphorbia hirta</i>	+																	+

166	<i>Euphorbia maddenii</i>	+													
167	<i>Euphorbia royleana</i>							+		+				+	
168	<i>Euphorbia thymifolia</i>	+								+					
169	<i>Fagopyrum dibotrys</i>	+								+					
170	<i>Fagopyrum esculentum</i>	+			+					+					
171	<i>Festuca arundinacea</i>	+													
172	<i>Ficus auriculata</i>	+						+	+	+					
173	<i>Ficus nerifolia var. nemoralis</i>	+						+	+						
174	<i>Ficus palmata</i>	+						+	+	+	+				
175	<i>Ficus religiosa</i>	+	+	+					+	+	+			+	+
176	<i>Ficus sarmentosa</i>	+								+					
177	<i>Flacourtia indica</i>	+			+			+	+	+					
178	<i>Flemingia macrophylla</i>	+				+				+				+	
179	<i>Fragaria nubicola</i>	+			+					+				+	
180	<i>Fumaria indica</i>				+									+	
181	<i>Funaria sp.</i>														
182	<i>Galinsoga parviflora</i>	+								+					
183	<i>Galium aparine</i>	+			+					+					
184	<i>Galium asperuloides</i>	+													
185	<i>Geranium lucidum</i>	+												+	
186	<i>Geranium mascatense var. himalaicum</i>	+												+	
187	<i>Geranium nepalense</i>	+			+	+								+	
188	<i>Geranium wallichianum</i>	+			+	+								+	
189	<i>Gerbera gossypina</i>				+									+	
190	<i>Girardinia diversifolia</i>				+					+					
191	<i>Glaphyroidopsis erubescens</i>													+	
192	<i>Glochidion velutinum</i>	+			+					+					
193	<i>Gnaphalium affine</i>													+	
194	<i>Gnaphalium hypoleucum</i>														
195	<i>Grevillea robusta</i>				+		+							+	+
196	<i>Grewia optiva</i>	+	+					+	+	+					+
197	<i>Gymnopteris vestita</i>													+	
198	<i>Gypsophila cerastioides</i>													+	
199	<i>Habenaria intermedia</i>													+	
200	<i>Halenia elliptica</i>													+	
201	<i>Hedera nepalensis</i>													+	
202	<i>Heracleum candicans</i>	+												+	
203	<i>Heteropogon contortus</i>	+												+	
204	<i>Hieracium vulgatum</i>													+	
205	<i>Hypericum dyeri</i>	+												+	
206	<i>Hypericum oblongifolium</i>	+												+	
207	<i>Hypodematum crenatum</i>													+	
208	<i>Ilex diplyrena</i>	+								+	+			+	
209	<i>Impatiens scabrida</i>	+								+				+	
210	<i>Imperata cylindrica</i>	+												+	+
211	<i>Indigofera atropurpurea</i>	+	+							+				+	
212	<i>Indigofera dosua</i>	+												+	
213	<i>Indigofera heterantha</i>	+												+	
214	<i>Inula cappa</i>													+	
215	<i>Inula cuspidata</i>													+	
216	<i>Ipomoea purpurea</i>													+	
217	<i>Iris nepalensis</i>													+	
218	<i>Jacaranda mimosifolia</i>													+	+
219	<i>Jasminum humile</i>					+								+	
220	<i>Jasminum mesneyi</i>													+	
221	<i>Jasminum officinale</i>													+	
222	<i>Juglans regia</i>	+			+	+				+	+	+		+	
223	<i>Justicia adhatoda</i>									+				+	
224	<i>Justicia japonica</i>														
225	<i>Kalanchoe integra</i>													+	
226	<i>Koeleria cristata</i>	+													
227	<i>Lamium album</i>													+	
228	<i>Lannea coromandelica</i>	+			+	+	+			+	+				+
229	<i>Lantana camara var. aculeata</i>									+	+			+	
230	<i>Lepidium apetalum</i>													+	
231	<i>Lespedeza gerardiana</i>	+													
232	<i>Lespedeza juncea</i>	+													
233	<i>Lespedeza stenocarpa</i>	+												+	
234	<i>Leucaena leucocephala</i>	+			+										+
235	<i>Leucas lanata</i>													+	
236	<i>Lonicera angustifolia</i>	+								+	+			+	
237	<i>Lonicera quinquelocularis</i>	+	+							+				+	





385	<i>Sisymbrium irio</i>	+							+		+				+	
386	<i>Skimmia laureola</i>									+	+	+			+	
387	<i>Smilacina purpurea</i>								+						+	
388	<i>Smilax aspera</i>			+							+				+	
389	<i>Smilax glaucophylla</i>	+							+		+					
390	<i>Smilax vaginata</i>	+														
391	<i>Solanum erianthum</i>										+					
392	<i>Solanum melongena</i>								+		+					
393	<i>Solanum myriacanthum</i>										+					
394	<i>Solanum nigrum</i>								+		+					
395	<i>Solena amplexicaulis</i>								+		+					
396	<i>Sonchus asper</i>								+		+					
397	<i>Sonchus oleraceus</i>	+							+		+					
398	<i>Sorbaria tomentosa</i>	+		+			+								+	
399	<i>Spiraea bella</i>	+									+				+	
400	<i>Spiraea canescens</i>	+					+				+				+	
401	<i>Stellaria media</i>	+							+							
402	<i>Strobilanthes atropurpureus</i>	+														
403	<i>Strobilanthes dalhousianus</i>	+														
404	<i>Swertia cordata</i>															
405	<i>Tagetes minuta</i>											+	+			
406	<i>Tagetes patula</i>											+	+		+	
407	<i>Taraxacum officinale</i>								+		+					
408	<i>Taxillus vestitus</i>														+	
409	<i>Taxus baccata subsp. wallichiana</i>								+	+	+				+	
410	<i>Tecoma stans</i>											+			+	
411	<i>Thalictrum foliolosum</i>	+										+				
412	<i>Thamnocalamus spathiflorus</i>	+	+												+	+
413	<i>Themeda anathera</i>	+														
414	<i>Thlaspi arvense</i>								+		+					
415	<i>Thlaspi cochleariforme</i>															
416	<i>Thymus linearis</i>											+	+			
417	<i>Toona ciliata</i>	+		+						+	+	+				
418	<i>Tragopogon gracilis</i>															
419	<i>Tricholepis elongata</i>															
420	<i>Trichosanthes bracteata</i>	+							+		+					
421	<i>Tridax procumbens</i>											+				
422	<i>Trifolium pratense</i>	+										+				
423	<i>Trifolium repens</i>	+										+				
424	<i>Urtica ardens</i>	+	+						+		+					
425	<i>Urtica dioica</i>	+	+						+		+					
426	<i>Valeriana jatamansi</i>											+	+			
427	<i>Valeriana pyrolaefolia</i>											+	+			
428	<i>Vallisneria spiralis</i>								+		+				+	
429	<i>Verbascum thapsus</i>											+	+		+	
430	<i>Verbena bonariensis</i>														+	
431	<i>Veronica persica</i>															
432	<i>Viburnum cotinifolium</i>	+	+					+	+		+					
433	<i>Viburnum foetens</i>	+						+	+							
434	<i>Viburnum mullaha</i>	+						+	+							
435	<i>Viburnum nervosum</i>	+		+					+							
436	<i>Vicatia conifolia</i>															
437	<i>Viola canescens</i>											+				
438	<i>Viscum album</i>						+					+				
439	<i>Vitex negundo</i>								+		+	+				
440	<i>Wikstroemia canescens</i>		+					+								+
441	<i>Woodfordia fruticosa</i>			+	+	+		+				+				
442	<i>Woodwardia unigenmata</i>														+	
443	<i>Xanthium strumarium</i>										+	+				
444	<i>Youngia japonica</i>															
445	<i>Yucca gloriosa</i>		+									+			+	
446	<i>Zanthoxylum armatum</i>										+	+	+		+	
447	<i>Zizyphus mauritiana</i>	+						+	+	+						
448	<i>Zizyphus oxyphylla</i>	+							+							
Total	186	29	43	26	9	6	82	134	63	244	54	18	185	32		

▲ Reference: Chopra *et al.*, 1956<sup>[5]</sup>, 1969; Ambasta, 1986<sup>[1]</sup> (All CSIR publications); Quattrocchi, 2006<sup>[13]</sup>; & Chauhan (1999, 2003)<sup>[3, 4]</sup>.

All the species have been classified on the basis of their economic utility (Table 1), and have been categorized as fodder (186 species), fibre (29 species), tannins (43 species), dyes (26 species), gums (9 species), resins (6 species), fuelwood (82 species), edible (134 species), timber (63 species), medicinal (244 species), aromatic (54 species), ritual ceremonies (18 species), ornamental and landscape value (185 species), and for pulp and paper (32 species).

Out of the total species, 244 species have been categorized as medicinal plants and 54 species as aromatic plants, based on the information available in the literature. The important ones are: *Adiantum venustum*, *Berberis aristata*, *B. lycium*, *Bergenia ciliata*, *Cannabis sativa*, *Dioscorea deltoidea*, *Jasminum humile*, *Juglans regia*, *Taxus baccata subsp. wallichiana*, *Valeriana jatamansi*, *Viola canescens*, *Xanthium strumarium*, *Vitex negundo*, *Vallisneria spiralis*



*solanacea, Tridax procumbens, Thymus linearis, Thalictrum foliolosum, Solena amplexicaulis, Solanum nigrum, Solanum myriacanthum, Solanum erianthum, Selinum vaginatum, Schisandra grandiflora, Skimmia laureola, Rubia cordifolia, Potentilla nepalensis, Polygonatum cirrhifolium, Polygonatum multiflorum, Polygonatum verticillatum, Podophyllum hexandrum, Plumbago zeylanica, Malva rotundifolia, Malva verticillata, Justicia adhatoda, Geranium nepalense, Geranium wallichianum, Galium aparine, Euphorbia hirta, Datura stramonium, Boerhavia diffusa, Anemone obtusiloba, Ainsliaea aptera, etc.*

Hooker (1875-97) <sup>[7]</sup> explored the plant wealth of India and published a monumental work 'Flora of British India' in seven volumes, which is a milestone in floristic history of India (Dhiman, 2005) <sup>[6]</sup>. Kala (2005) <sup>[8]</sup> multifaceted review indicates that the Valley of Flowers National Park (VOF) in the Uttarakhand Himalaya (India) harbours 520 vascular plant species, 13 large mammals and 40 bird species. Similarly, Kharkwal *et al.* (2005) <sup>[9]</sup> examined the plant species richness at altitudes between 200 to 5800 m, in relation to altitudinal gradient, in the Central Himalayan (Kumaun) region of India. They recorded a total of 2487 species, of which 276 were trees, 355 shrubs, 112 climbers and 1744 herbs. The study concluded that the distribution and species richness pattern in that region largely depend on the altitude and climatic variables like rainfall and temperature.

Verma *et al.* (2008) <sup>[14]</sup> carried out studies to evaluate the plant diversity and growth forms in alpine pasture of Talra Wildlife Sanctuary of District Shimla, Himachal Pradesh and recorded a total of 75 species of plants, comprising of 7 grasses, 4 sedges, 4 leguminous forbs and 60 non-leguminous forbs. Elsewhere, Krishan and Rawat (2008) <sup>[10]</sup> reported six species of angiosperms from Sirmour District which is the new additions to the flora of Himachal Pradesh. In addition, Chandra Sekar and Srivastava (2008) <sup>[2]</sup> found three new plant records for India from Pin Valley National Park, Himachal Pradesh.

## Conclusion

The study carried out in Theog Forest Division of Himachal Pradesh implies that a total of 448 plant species, belonging to 314 genera and 120 families, have been collected from the study area. Out of these, 353 species belong to Dicotyledons, 56 to Monocotyledons, 7 to Gymnosperms, 27 to Pteridophytes, 1 to Bryophytes, 3 to Fungi and 1 to Lichens. Out of the total species, 244 species have been categorized as medicinal plants and 54 species as aromatic plants, based on the information available in the literature. Altogether 186 species are used as fodder, 82 as fuel wood, 43 yield tannins, 26 are dye-yielding, 9 are the source of gums, 6 are resin-yielding, 63 are used for timber, 29 are the source of fibres, 32 species are employed in pulp and paper manufacturing, 134 species are edible, 18 species are used in various local ritual ceremonies, and 185 species are the plants of potential ornamental and landscape value. Some of these plants are exploited to a great extent from centuries by the tribals for various tangible and intangible benefits. So, it can be concluded that efforts should be done to protect these valuable plant species from the risk of extinction.

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