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Growth Habit, Life forms and Fruit Types of Ethnobotanically Explored Angiosperm Plants of Himachal Pradesh (North – West Himalaya)

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ABSTRACT

Himachal Pradesh also called 'Devbhoomi' is a holy land of Rishis and Munis. Most of the people are ethnic people living in small villages from time immemorial. These ethnic people use the plants for various purposes in their day-to-day life. So, this is little effort has been made to explore and document the ethnobotanically important angiosperm diversity with respect to the growth habit, life forms and fruit types. Besides this, medicinal, edible, magico-religious and fodder significance of these plant parts for the ethnic people is also documented.

INTRODUCTION

Angiosperms are plants that produce flowers and bear their seeds in fruits. Human civilization has been greatly influenced by plants growing in propinquity. Remedial properties of plants dates back to the ancient Vedic period (3500-1800BC). An exhaustive floristic treatise is published by several workers of the state of Himachal Pradesh. To mention a few, Atkinson (1882), Hooker (1872-1897), Nair (1977), Collett (1902) and Chowdhery and Wadhwa (1984). So, in this study, little effort has been made to explore ethnobotanically important angiosperm diversity with respect to their growth habit, life forms and fruit types.

MATERIALS AND METHODS

Study Area: Himachal Pradesh (HP) the Northern state of India occupying, is in the lap of the Northwest Himalaya between 30° 22ʼʼ 94ʼ N to 33° 12ʼʼ 40ʼ N and 75° 45ʼʼ 95 to 79° 04ʼʼ 20ʼ and altitudes varying between 150m and 6750m from mean sea level. Most part of the state lies on the foot Hills of Dhauladhar range with wide diversity in its weather conditions and covering a total area of 22,495 sq. mi. m2. The state is regarded as a rich repository of herbs and people are multireligious, multicultural, and multilingual. Due to these distinct differences in their cultural values, they have been protecting and practicing their cultural values from time immemorial. Most of the people of the state are traditional and belong to different ethnic groups. The entire population of the twelve districts of the state is around 68-64 lakhs as per the 2011 Census.

Collection of Data*:* For collecting information on the plants used for edible, magico-religious, medicinal, household articles, fodder, and fish food in Himachal Pradesh, India, intensive and extensive surveys were undertaken in different seasons of flowering and fruiting. The information was collected from different knowledgeable people (practitioner people, old and experienced people, practitioners, and farmers) of various communities. For the collection of data, the proforma designed by Jain and Goel, 1995 was used. Information of the native species was obtained from different sources, Agarwal, 1985; Ainslie, 1926; Arya, 2004; Asolkar et al., 1992; Bentley and Trimen, 2008; Bhattacharjee, 2001; Chauhan, 1984; Dastur, 1970; Dixit and Kumar, 2003; Dutta, 1985; Farroq, 2005; Khare, 2004; Martin, 1994; Tripathi and Goel, 2001 and Watt, 1889-1886 and all other available floristic works for the region.

Methodology of Study: The data collected from different places were dried, preserved and mounted on the herbarium sheets. According to herborizing practices designed by Jain and Rao, (1977), the present specimens were identified by using different floras (Chauhan, 1999; Chowdhery and Wadhwa, 1984; Collett, 1902; Dhiman, 1976; Polunin and Stainton, 1984) manuals and monographs. These specimens were authenticated by carefully matching the specimens at the herbaria of the Botanical Survey of India (BSI), Northern Circle Dehradun. For the identification of the nomenclature of plant species, Bennet (1986) and Wiegorskaya (1995) were used.

RESULTS AND DISCUSSION

The present study of ethnobotanically important angiosperm plants of HP reveals the occurrence of 122 species belonging to 95 genera under 41 families (Table 2). For the plant species of HP, habit-wise analysis indicates that the flora abounds in 77 annual herbs, 4 biennial herbs, 38 perennial herbs, 1annual/perennial herb, and 2 perennial/ annuals (Figure 1). Among these, the annual herbaceous elements predominate the floristic diversity. Dicotyledonous species contribute the maximum proportion (90 spp.), the flowering plant species grouped under 75 genera and 35 families (Table 1) followed by monocots (30 spp.) distributed in 25 genera and 10 families. Out of the 45 angiospermic families, Poaceae predominate. followed by Asteraceae and Fabaceae with (11) each, Amaranthaceae (7), Cyperaceae and Lamiaceae each (6), Acanthaceae (4), Chenopodiaceae and Zingiberaceae each (3), Araceae, Brassicaceae, Cucurbitaceae, Malvaceae, Moraceae, Rosaceae, Sapindaceae and Urticaceae (2) each

Cannaceae, Anacardiaceae, Apiaceae, Araliaceae, Asclepidaceae, Balsaminaceae, Bignoniaceae, Fumariaceae, Geraniaceae, Hydrocharitaceae, Liliaceae, Leeaceae, Martyniaceae, Meninspermaceae, Nyctaginaceae, Papaveraceae, Ranunculaceae, Rubiaceae, Sapindaceae, Solanaceae and Verbenaceae are represented by one species each.

Table 1: Statistical data of the Angiosperms of Himachal Pradesh

Plant Group	Number of Families	Number of Genera	Number of Species	Percentage of Plant Sp.
Dicots	35	70	90	73.77
Monocots	10	25	32	26.22
Total	45	95	122	100

Table 2: Ethnobotanically Important Angiosperm Plants of Himachal Pradesh

Name of Plant	Family	Life Form	Growth Habit	Divis-ion	Fruit Type	Purpose
Abelmoschus crinitus Wall.	Malvaceae	WL	A	D	Capsule	Edi, Med
Abrus precatorius Linn.	Fabaceae	WL	A	D	Pod	Edi
Abutilon indicum (Linn.) Sweet	Malvaceae	WL	P	D	Capsule	Med
Achyranthes aspera Linn.	Amaranthaceae	WL	A	D	Capsule	Med
Acorus calamus Linn.	Araceae	WL	P	M	Berries	Med
Aerva sanguinolenta (Linn.) Blume	Amaranthaceae	WL	P	D	Capsule	Mag-reli
Aeschynomene aspera Linn.	Fabaceae	WL	P	D	Pod	Edi
Ageratum conyzoides (Linn.)	Asteraceae	WL	P	D	Achenes	Med
Ajuga bracteosa	Lamiaceae	WL	A	D	Nutlets	Med

Wall. ex. Benth						
Amaranthus gangeticus (Linn.) Syst.	Amaranthaceae	WL	A	D	Capsule	Edi, Med
Amaranthus paniculatus Linn.	Amaranthaceae	WL	A	D	Capsule	Edi, Med
Amaranthus tricolor Linn.*)* var. *gangeticus* (Linn.) Fiori	Amaranthaceae	WL	A	D	Capsule	Edi, Med
Amaranthus viridis Linn.	Amaranthaceae	WL	A	D	Capsule	Edi, Fodd, Med
Andrographis paniculata (Burm. f.) Wall. ex Nees	Acanthaceae	WL	A	D	Capsule	Edi
Anisomeles indica (Linn.) O. Kuntze	Lamiaceae	WL	A	D	Nutlets	Mag-reli, Med
Apluda mutica Auct.	Poaceae	WL	P	M	Caryopsis	Fodd, Med
Argemone mexicana L.	Papaveraceae	WL	A	D	Capsule	Med
Artemisia indica Waldst. & Kit.	Asteraceae	WL	P	D	Achenes	Med
Artemisia scoparia Waldst. & Kit.	Asteraceae	WL	A	D	Achenes	Med
Bacopa monnieri (L.) Pennell	Scrophulariaceae	WL	P/A	D	Capsule	Med
Barleria cristata L.	Acanthaceae	WL	P	D	Capsule	Mag-reli, Med
Begonia picta Sm.	Begoniaceae	WL	A	D	Capsule	Edi, Med
Bidens pilosa Linn.	Asteraceae	WL	A	D	Achenes	Med
Blyxa auberti Rich.	Poaceae	SH	A	M	Capsule	Med
Boehmeria	Urticaeae	WL	P	D	Achenes	Med

platyphylla Don						
Bromus catharticus Vahl	Poaceae	WL	A	M	Caryopsis	Mag-reli, Med
Bryophyllum calycinum Salisb.	Crassulaceae	WL	P	D	Follicles	Med
Calamintha umbrosum (M.B.) C. Koch	Lamiaceae	WL	P	D	Nutlets	Med
Canna indica Linn.	Cannaceae	WL	P	M	Capsule	Hou-art, Med
Cannabis sativa L.	Cannabinaceae	WL	A	D	Achenes	
Capsella bursa-pastoris (Linn.) Medik.	Brasssicaeae	WL	A	D	Pod	Med
Cardiospermum halicacabum Linn.	Sapindaceae	WL	A	D	Capsule	Med
Cassia absus Linn.	Fabaceae	WL	A	D	Pod	Med
Cassia occidentalis Linn.	Fabaceae	WL	B	D	Pod	Edi, Med
Centella asiatica L.	Apiaceae	WL	A/P	D	Cremocarp	Edi, Med
Ceratophyllum demersum L.	Ceratophyllaceae	SH	P/A	D	Nutlets	Fish-food, Med
Chenopodium album L.	Chenopodiaceae	WL	A	D	Nut	Edi, Med
Chenopodium ambrosiodes L.	Chenopodiaceae	WL	A	D	Nut	Edi, Med
Chenopodium murale L.	Chenopodiaceae	WL	A	D	Nut	Edi, Med
Cissampelos pareira L.	Menispermaceae	WL	P	D	Drupe	Med
Clematis gouriana Roxb.	Ranunculaceae	WL	P	D	Achenes	Med
Coix lachryma - jobi	Poaceae	WL	A	M	Caryopsis	Edi, orn

L.						
Colocasia antiquorum Schott	Araceae	WL	B	M	Berries	Edi
Commelina diffusa Burm. f.	Commelinaceae	WL	A	M	Capsule	Edi
Commelina paludosa Burm.	Commelinaceae	WL	A	M	Capsule	Edi
Convolvulus arvensis Linn.	Convolvulaceae	WL	A	D	Capsule	Med
Conyza bonariensis Linn.	Asteraceae	WL	P	D	Cypsella	Med
Conyza stricta Willd.	Asteraceae	WL	A	D	Cypsella	Med
Costus speciosus Sm.	Zingiberaceae	WL	A	M	Capsule	Med
Crotalaria alata Buch. -Ham	Fabaceae	WL	P	D	Pod	Med
Crotalaria mysorensis Roth	Fabaceae	WL	A	D	Pod	Med
Cryptolepis buchanani Roem. & Schult.	Asclepiadaceae	WL	P	D	Pod	Med
Cucumis pubescens Willd.	Cucurbitaceae	WL	A	D	Berries	Edi
Curcuma longa Wall.	Zingiberaceae	WL	B	M	Capsule	Med
Cyathocline purpurea (Don) Kuntze	Asteraceae	WL	A	D	Achenes	Fodder, Med
Cymbopogon citratus Stapf	Poaceae	WL	P	M	Caryopsis	Fodder, Med
Cymbopogon martinii Stapf	Poaceae	WL	P	M	Caryopsis	Fodder, Med
Cynodon dactylon (Linn.) Pers.	Poaceae	WL	P	M	Caryopsis	Fodder, Med
Cyperus	Cyperaceae	WL	A	M	Achenes	Fodder

comperessus Linn.						
Cyperus distans L. f,	Cyperaceae	WL	A	M	Achenes	Fodder
Cyperus flabelliformis Rottb.	Cyperaceae	WL	P	M	Achenes	Fodder
Cyperus iria L.	Cyperaceae	WL	A	M	Achenes	Med
Cyperus rotundus L.	Cyperaceae	WL	A	M	Achenes	Med
Datura stramonium Linn.	Solanaceae	WL	A	D	Capsule	Mag-reli, Med
Debregeasia hypoleuca Wedd	Uritcaceae	WL	P	D	Achenes	Mag-reli,
Dicanthium annulatum Hack.	Poaceae	WL	P	M	Caryopsis	Mag-reli,
Dicliptera roxbughiana Nees	Acanthaceae	WL	A	D	Capsule	Med
Digitaria griffithii (Hook. f.) Henn.	Poaceae	WL	A	M	Caryopsis	Edi, Med
Dioscorea belophylla Voigt. *ex* Haines.	Dioscoreaceae	WL	A	M	Capsule	Edi, Med
Dioscorea bulbifera Linn.	Dioscoreaceae	WL	A	M	Capsule	Edi, Med
Echinochloa frumentacea Link	Poaceae	WL	A	M	Caryopsis	Edi, Mag-reli, Med
Eleusine indica Gaertn.	Poaceae	WL	A	M	Caryopsis	Mag-reli, House-Art.
Emilia sonchifolia (Linn.) DC	Asteraceae	WL	A	D	Achenes	Med
Eriophorum comosum Wall.	Cyperaceae	WL	A	M	Nut	House-Art., Med
Eupatorium adenophorum Sprengel	Asteraceae	WL	A	D	Achenes	Med
Euphorbia geniculata Ort. *ex*	uphorbiaceae	WL	A	D	Capsule	Med

Boiss.						
Euphorbia helioscopia Linn.	Euphorbiaceae	WL	A	D	Capsule	Med
Euphorbia hirta Linn.	Euphorbiaceae	WL	A	D	Capsule	Med
Euphorbia parviflora Linn.	Euphorbiaceae	WL	A	D	Capsule	Med
Ficus hispida Linn.f.	Moraceae	WL	P	D	Achenes	Edi, Med
Ficus roxburghii Wall	Moraceae	WL	P	D	Achenes	Edi, Mag-reli
Fragaria indica Andr.	Rosaceae	WL	A	D	Achenes	Edi, Med
Fragaria nubicola Lindl.	Rosaceae	WL	A	D	Achenes	Edi, Med
Fumaria indica (Hausskn.) Pugsley.	Fumariaceae	WL	A	D	Capsule	Mag-reli, Med
Galium aparine Linn.	Rubiaceae	WL	A	D	Capsule	Mag-reli, Med
Geranium nepalense Sweet	Geraniaceae	WL	A	D	Capsule	Med
Girardinia heterophylla Decne.	Urticaceae	WL	P	D	Achenes	House-Art, Med
Gloriosa superba Linn.	Liliaceae	WL	A	M	Capsule	Med, Orn
Gnaphalium pensylvanicum Willd.	Asteraceae	WL	A	D	Achenes	Med
Gomphrena celosioides Mart.	Amaranthaceae	WL	A	D	Capsule	Mag-reli,
Hedera helix Auct (non L.) Clarke	Araliaceae	WL		D	Berries	Edi, Mag-reli,Med
Hedychium spicatum Buch. -Ham. ex Sm.	Zingiberaceae	WL	B	M	Capsule	Mag-reli,Med
Heteropogon	Poaceae	WL	P	M	Caryopsis	Mag-reli,

contortus (Linn.) Beauv. ex Roem. & Schult.						House-Art, Med
Hydrilla verticillata (L.f.) Royle	Hydrocharitaceae	EA	A	M	Capsule	Fish-food
Impatiens balsamina Linn.	Balsaminaceae	WL	A	D	Capsule	Dye
Ipomoea cairica Linn.	Convolvulaceae	WL	P	D	Capsule	Fish-food,Fooder, Med
Ipomoea carnea Facq.	Convolvulaceae	WL	P	D	Capsule	Med
Ipomoea muricata Jacq.	Convolvulaceae	WL	A	D	Capsule	Med
Ipomoea nil (Linn.) Roth	Convolvulaceae	WL	A	D	Capsule	Med
Ipomoea quamoclit Linn.	Convolvulaceae	WL	A	D	Capsule	Med
Justicia simplex Don	Acanthaceae	WL	A	D	Capsule	Med
Lactuca dissecta Don	Asteraceae	WL	A	D	Achenes	Med
Lannea coromandelica (Houtt) Merrill	Anacardiaceae	WL	P	D	Drupe	House-Art., Med
Lantana camara L.	Verbenaceae	WL	P	D	Drupe	House-Art., Med
Lathyrus aphaca Linn.	Fabaceae	WL	A	D	Pod	Fodd, Med
Leea crispa Willd.	Leeaceae	WL	P	D	Berries	Fodd, Med
Lepidagathis cuspidata Nees	Acanthaceae	WL	P	D	Capsule	Fodd, Med
Lespedeza sericea Miq	Fabaceae	WL	P	D	Pod	Fodd
Lindernia ciliata	Scrophulariaceae	WL	A	D	Capsule	Fodd

Colsm.						
Macrotyloma unifloruma (Lam.) Verdc.	Fabaceae	WL	A	D	Pod	Med
Martynia annua Linn.	Martyniaceae	WL	A	D	Pod	Med
Medicago denticulata Willd.	Fabaceae	WL	A	D	Pod	Fodd
Melothria heterophylla Cogn.	Cucurbitaceae	WL	P	D	Berries	Edi,Med
Mentha longifolia Linn.	Lamiaceae	WL	P	D	Nutlets	Med
Mentha piperita Linn.	Lamiaceae	WL	P	D	Nutlets	Med
Micromeria biflora (Buch. -Ham.) Benth	Lamiaceae	WL	P	D	Nutlets	Med
Mirabilis jalapa Linn.	Nyctaginaceae	WL	A	D	Nutlets	Edi, Med
Momordica dioica Roxb. ex Willd.	Cucurbitaceae	WL	A	D	Berries	Edi, Med
Mucuna pruriens DC.	Fabaceae	WL	A	D	Pod	Med
Najas graminea Dd.	Naiadaceae	WL	A	M	Achenes	Fish-Food
Najas indica (Willd.) Cham.	Naiadaceae	WL	A	M	Achenes	Fish-Food
Nasturtium officinale R. Br.	Brassicaceae	WL	A	D	Pod	Fodd, Med

WL= Wetland; EA= Emergent Hydrophytes; SA=Anchored hydrophytes; SH=Suspended Hydrophytes; A=Annual; B=Biennial; A/P=Annual/Perennial; P/A= Perennial/ Annual; M= Monocot; D=Dicot; Edi=Edible; Med= Medicinal; Mag-rel= magico-religious; House-Art= House hold Articles; Fodd= Fodder.

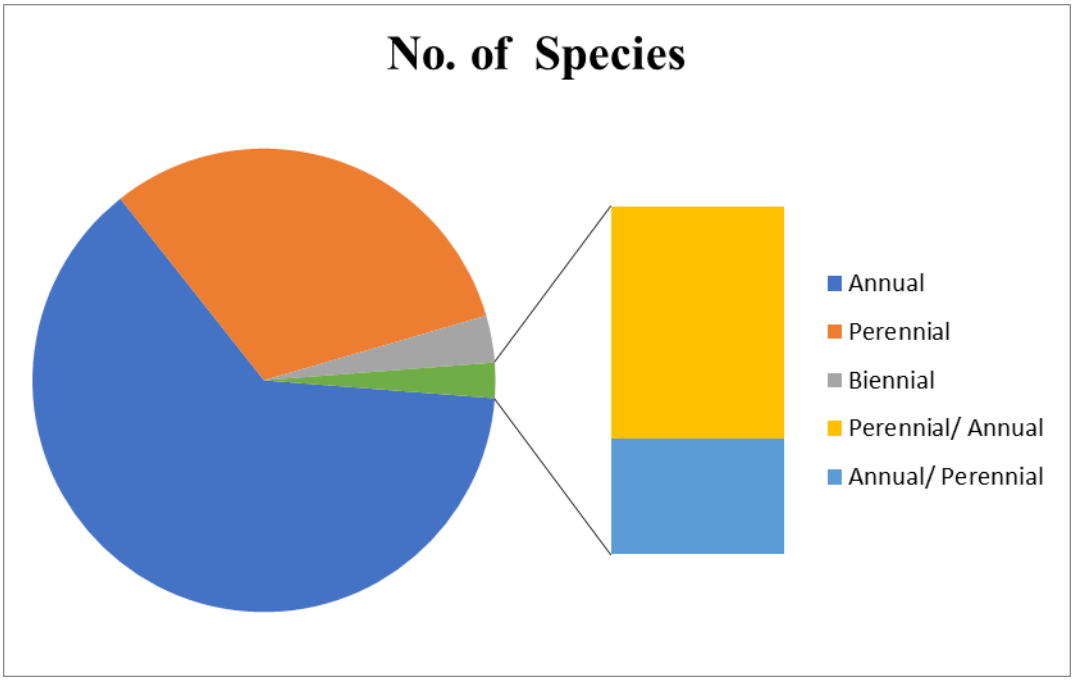

Figure 1: Growth habit of Ethnobotanically important angiosperm plants of Himachal Pradesh.

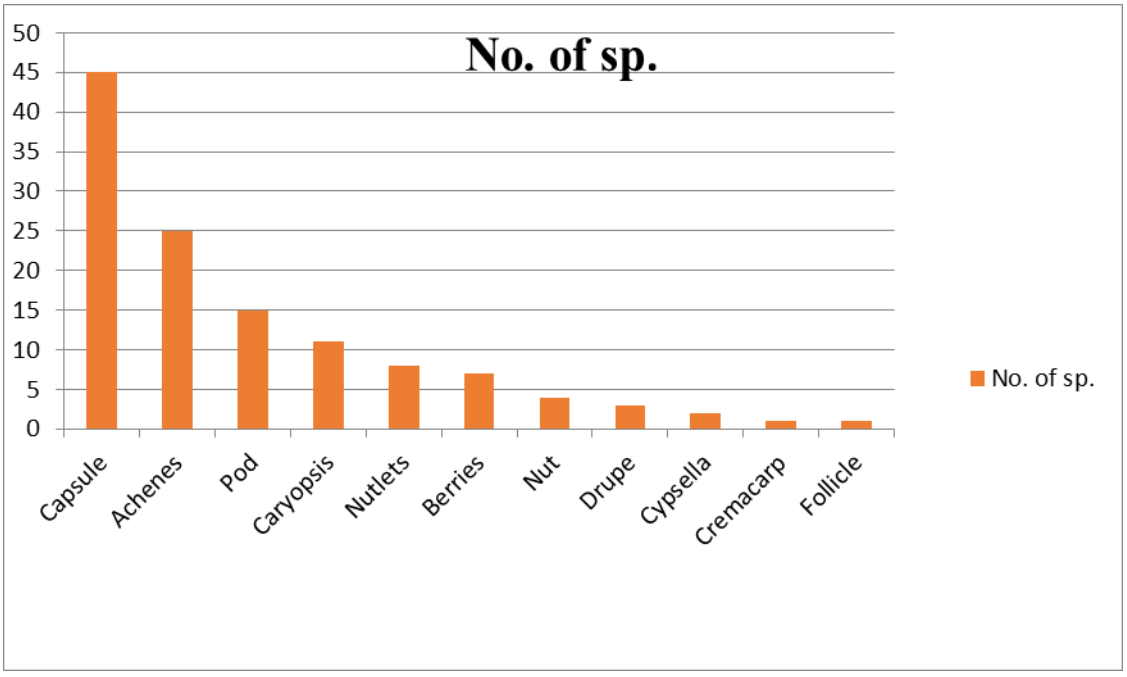

Figure 2: Fruit Types of Angiosperm Plants of Himachal Pradesh

The predominant genera with highest number of plants are *Amaranthus* and *Euphorbia* (4 each), *Chenopodium* (3), *Artemisia, Cassia, Commelina, Conyza, Crotalaria, Cymbopogon, Cyperus, Dioscorea, Euphorbia, Ficus, Fragaria, Ipomoea, Mentha and Najas* (2 each). With regard to the life form of ethnobotanically important angiosperm plants of Himachal Pradesh (Table1), present study revealed 118 wetland species, 2 anchored hydrophytes, 1 emergent hydrophyte and 1 suspended hydrophyte. The growth habit study revealed that 77 annuals, 38 perennials, 4 biennials, 2 perennial/annual and 1 annual/perennial and the fruit type study revealed that the (Table 2; Figure 2) capsule (45 sp. With 36.88%), achenes (25sp. With 20.49%), pods (15 sp.

with 12.29%), nutlets (8 sp. With 06.55%), berries (7sp. 05.73%), nut (4 sp., 03.27%), drupe (3 sp., 02.45%), cypsela (2sp., with 01.63%), cremocarp (1 sp., 00.81%), follicles (1 sp. 0081%). The angiosperm plant sp. used for medicinal purposes are 95sp., edible 29 sp., magico-religious 16 sp., fodder 15 sp., house articles 7 sp. and as fish food 5 sp. (Figure 2). There is a great ascent in the ethnobotanical study all over the world during the last five decades (Towel; 1961, Payee, 2000 and Idu; 2009).

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