

Plants Considered As Non-Wood Forest Products (NWFPs) Around Central Anatolia: Eskişehir Example

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Abstract: The purpose of this study, identification of medicinal plants, which spread in Central Anatolia forests, can be regarded as non-wood forest products and draw attention on the situation of endemic taxa. Literature study was made to determine the medicinal plants can be regarded as non-wood forest products, by using The Flora of Turkey, published articles, thesis and books about Eskişehir flora. It was found that there are 81 genera and 121 taxa (110 Dicotyledonous, 11 Monocotyledonous) belonging to 31 families under natural forest distribution in Eskişehir. 68 of these taxa were endemics and elements of different phytogeographic regions. 59 of these 121 plant taxa have medical importance. It is important to evaluate these taxa economically. Another important issue is that some of the endemic taxa have medical importance at the same time.

Keywords: Non-wood, Medicinal plant, Endemic, Forest, Eskişehir

1. Introduction

The harvest of non-wood forest products represents an important source of income to rural people (Özkan et al., 2011). According to FAO (1991), non-wood forest products and services (NWFPs) refers to “*market subsistence goods and services for human or industrial consumption derived from renewable forest resources and biomass bearing promise for augmenting real rural household incomes and employment. The products include the use of plants for food, forage, fuel, medicine, fiber, biochemical, as well as animals, birds, reptiles and fishes for food, fur and feathers. Wood used for handicrafts is included, as are the services derived from the standing forest that generate such benefits as tourism revenues and conservation of biodiversity*”.

Non-wood forest products play important roles in the daily life and well-being of both local and urban populations (Chupezi et al., 2009). They also have importance for foliage, forest tourism, alternative healthcare, oils, oleoresins, edible products grazing and etc.

The potential economic value of NWFPs, in terms of utilization and their market value, is often unknown (Ghanbari et al., 2011). Therefore, valuable resource management is impossible without recognition and valuation them (Ghanbari et al., 2011).

The development of market for NWFPs requires linking production basins which are generally far off rural areas (supply zone) to urban centers where the market demand exists (Samba and Gertrude, 2011). It should be noted that some of non-wood forest products are never in large quantities and making it difficult for local communities to actually depend on them for their livelihoods (Samba and Gertrude, 2011).

Elias et al. (2012) recommended that non-wood products such as legumes and fruit trees should use to build up mixed type forest. Today, biodiversity, has been one of the issues raised in this growing day by day in the local and global levels. In Turkey, and of approximately more than 350 plant species in the world are known to be the subject of intense international trade of medicinal plants. In Turkey, domestic and foreign trade is carried sourced numerous medicinal plants. This is a

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controversial subject that is not clear what the actual volume of trade. But the real point is that although many plant breeders heavily made trade is unclear. The reason is the nature of a large part of this type of crop production is often done in an uncontrolled manner. Turkey, which has a very rich plant sources of medicinal plants, and it is obvious that carry a large commercial potential. For now, we know about 100 non-wood forest product plants that we know exist in our country forests (Demirci, 2011).

Few works have been carried out on all known types of non-wood forest products in Turkey (Demirci, 2011). The production of non-wood forest products with highest level and variety should be performed and contributed to national economy by some legal arrangements and scientific studies to be carried out in potential and natural distribution areas of non-wood forest products (Demirci, 2011).

The purpose of this study, which spread in Central Anatolia, especially Eskisehir forests, identification of medicinal plants can be regarded as non-wood forest products and draw attention on the situation of endemic taxa.

2. Material and Method

Literature study was made to determine the medicinal plants can be regarded as non-wood forest products, by using The Flora of Turkey, published articles, thesis and books about Central Anatolia, especially flora of Eskişehir, and medicinal plants.

3. Results

It was found that there are eighty-one genera and one hundred and twenty-one taxa (one hundred and ten Dicotyledonous, eleven Monocotyledonous) belonging to twenty-one families under natural forest distribution in Eskisehir (Table 1). Asteraceae (twenty species) and Lamiaceae (seventeen species) are the most abundant families in this area.

Sixty-eight of these taxa were endemics. Fifty-nine of these one hundred and twenty-one plant taxa have medical importance. Sixty-two of taxa mentioned were endemic, fifty-three of them were medicinal and six of them were both endemic and medicinal plants (Figure 1).

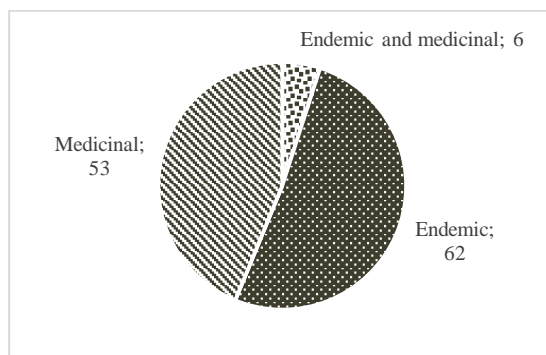


Figure 1. Endemism and medicinal conditions of plants

It is important to evaluate these taxa economically. Another important issue is that some of the endemic taxa have medical importance at the same time. Six taxa which are *Helianthemum nummularium* subsp. *lycaonicum*, *Gypsophila eriocalyx*, *Digitalis lamarckii*, *Origanum sipyleum*, *Salvia dichroantha* and *Gladiolus roviola* both endemics and have medicinal properties.

Table 1. Non-wood plant species which are endemic/have medicinal properties distributed in forests around Eskisehir

No	Family	Species	Endemism/Medicinal
1		<i>Delphinium venulosum</i>	+/-
2	Ranunculaceae	<i>D. fissum</i> subsp. <i>anatolicum</i>	+/-
3		<i>Consolida regalis</i> var. <i>paniculata</i>	-/+
4		<i>Anemone coronaria</i>	-/+
5		<i>Isatis fioribunda</i>	+/-
6	Brassicaceae	<i>Alyssum niveum</i>	+/-
7		<i>A. hirsutum</i>	+/-
8		<i>Helianthemum nummularium</i> subsp.	+/+
9	Cistaceae	<i>Cistus laurifolius</i>	-/+
10		<i>C. creticus</i>	-/+
11		<i>Minuartia anatolica</i> var. <i>arachnoidea</i>	+/-
12		<i>Gypsophila eriocalyx</i>	+/+
13	Caryophyllaceae	<i>Bolanthus minuartioides</i>	+/-
14		<i>Stellaria media</i> subsp. <i>media</i>	-/+
15		<i>Agrostemma githago</i>	-/+
16	Polygonaceae	<i>Polygonum bistorta</i> subsp. <i>bistorta</i>	-/+
17		<i>Rumex crispus</i>	-/+
18		<i>Hypericum organifolium</i>	-/+
19	Hypericaceae	<i>H. confertum</i> subsp. <i>confertum</i>	-/+
20		<i>H. montbretii</i>	-/+
21		<i>H. orientale</i>	-/+
22	Malvaceae	<i>Alcea pallida</i>	-/+
23	Linaceae	<i>Linum hirsutum</i> subsp. <i>anatolicum</i>	+/-
24		<i>L. cariense</i>	+/-
25	Rutaceae	<i>Haplophyllum myrtifolium</i>	+/-
26		<i>Genista parnassica</i>	+/-
27		<i>G. acanthoclada</i>	+/-
28		<i>Astragalus condensatus</i>	+/-
29	Fabaceae	<i>A. brachypterus</i>	+/-
30		<i>A. condensatus</i>	+/-
31		<i>A. macrocephalus</i> subsp.	+/-
32		<i>A. densifolius</i> subsp. <i>densifolius</i>	+/-
33		<i>Onobrychis paucijuga</i>	+/-
34		<i>Galega officinalis</i>	-/+
35		<i>Hedysarum cappadocicum</i>	+/-
36		<i>Eryngium bithynicum</i>	+/-
37	Umbelliferae	<i>Echinophora tournefortii</i>	-/+
38		<i>Bupleurum sulphureum</i>	+/-
39	Araliaceae	<i>Hedera helix</i>	-/+
40		<i>Sambucus nigra</i>	-/+
41	Caprifoliaceae	<i>S. ebulus</i>	-/+
42		<i>Viburnum opulus</i>	-/+
43		<i>Lonicea caucasica</i> subsp. <i>orientalis</i>	+/-
44		<i>Anthemis tinctoria</i> var. <i>tinctoria</i>	-/+
45		<i>A. tinctoria</i> var. <i>pallida</i>	-/+
46		<i>A. kotschyana</i>	+/-
47	Asteraceae	<i>A. wiedemanniana</i>	+/-
48		<i>Achillea wilhelmsii</i>	-/+
49		<i>A. phrygia</i>	+/-
50		<i>A. biebersteinii</i>	-/+
51		<i>Cousinia iconica</i>	+/-
52		<i>C. stapfiana</i>	+/-

53		<i>Onopordum tauricum</i>	-/+
54		<i>Cirsium sintenisii</i>	+/-
55		<i>Carduus nutans</i> subsp. <i>trojanus</i>	+/-
56		<i>Centaurea kotschyi</i>	+/-
57		<i>C. bornmuelleri</i>	+/-
58		<i>Scorzonera suberosa</i> subsp. <i>suberosa</i>	-/+
59		<i>S. eriophora</i>	+/-
60		<i>Taraxacum farinosum</i>	+/-
61		<i>Crepis macropus</i>	+/-
62		<i>Pulicaria dysenterica</i>	-/+
63		<i>Doronicum orientale</i>	-/+
64		<i>Convolvulus phrygius</i>	+/-
65	Convolvulaceae	<i>C. arvensis</i>	-/+
66		<i>C. galaticus</i>	+/-
67	Paeoniaceae	<i>Paeonia peregrina</i>	-/+
68	Berberidaceae	<i>Berberis crataegina</i>	-/+
69	Violaceae	<i>Viola odorata</i>	-/+
70	Campanulaceae	<i>Campanula rapunculus</i> var.	-/+
71	Gentianaceae	<i>Centaurium erythraea</i> subsp. <i>erythraea</i>	-/+
72		<i>Paracaryum ancyritanum</i>	+/-
73		<i>Onosma polioxanthum</i>	+/-
74		<i>O. isauricum</i>	+/-
75		<i>O. tauricum</i> var. <i>brevifolium</i>	+/-
76	Boraginaceae	<i>O. bornmuelleri</i>	+/-
77		<i>O. armenum</i>	+/-
78		<i>Nonea macrosperma</i>	+/-
79		<i>Alkanna orientalis</i> var. <i>orientalis</i>	-/+
80		<i>A. pseudotinctoria</i>	+/-
81		<i>Digitalis lamarckii</i>	+/+
82		<i>D. ferruginea</i> subsp. <i>ferruginea</i>	-/+
83		<i>Verbascum uschakense</i>	+/-
84		<i>V. tossiense</i>	+/-
85	Scrophulariaceae	<i>V. cheiranthifolium</i> var. <i>asperulum</i>	+/-
86		<i>V. deterrentile</i>	+/-
87		<i>Linaria iconia</i>	+/-
88		<i>Veronica multifida</i>	+/-
89		<i>Lathraea squamaria</i>	-/+
90		<i>Ajuga chamaepitys</i>	-/+
91		<i>Teucrium polium</i>	-/+
92		<i>Phlomis nissolii</i>	+/-
93		<i>P. russeliana</i>	+/-
94		<i>Stachys cretica</i> subsp. <i>anatolica</i>	+/-
95		<i>Nepeta caesarea</i>	+/-
96		<i>Origanum sipyleum</i>	+/+
97		<i>Salvia wiedemannii</i>	+/-
98	Lamiaceae	<i>S. yosgadensis</i>	+/-
99		<i>S. dichroantha</i>	+/+
100		<i>S. tchihatcheffii</i>	+/-
101		<i>S. sclarea</i>	-/+
102		<i>S. candidissima</i> subsp. <i>occidentalis</i>	-/+
103		<i>Melissa officinalis</i> subsp. <i>officinalis</i>	-/+
104		<i>Thymus longicaulis</i> subsp. <i>longicaulis</i>	-/+
105		<i>Sideritis gulendamae</i>	+/-
106		<i>Ballota larendena</i>	+/-
107	Thymelaeaceae	<i>Daphne oleoides</i> subsp. <i>oleoides</i>	-/+
108	Plantaginaceae	<i>Plantago scabra</i>	-/+

109	Aristolochiaceae	<i>Aristolochia bodamae</i>	+/-
110	Urticaceae	<i>Urtica dioica</i>	-/+
111		<i>Asparagus officinalis</i>	-/+
112		<i>Eremurus spectabilis</i>	-/+
113	Liliaceae	<i>Allium phrygium</i>	+/-
114		<i>Ruscus aculeatus</i>	-/+
115		<i>Ornithogalum pyrenaicum</i>	-/+
116		<i>O. alpigenum</i>	+/-
117	Iridaceae	<i>Gladiolus roviola</i>	+/+
118		<i>Orchis purpurea</i>	-/+
119	Orchidaceae	<i>O. simia</i>	-/+
120		<i>Dactylorhiza romana</i> subsp. <i>romana</i>	-/+
121	Gramineae	<i>Agropyron cristatum</i> subsp. <i>pectinatum</i>	-/+

4. Discussion and Conclusions

Collier et al. (2004) reported that there is a sizeable and growing demand for a number of wild species (non-wood forest products) like rhododendron, holly and ivy with berries; willow with catkins and cotoneaster are listed as potential growth areas. Aforementioned species are also grown in Turkey, but Netherlands' florists have the majority of flower market, even though Turkey's flora is richer than Netherlands in terms of both qualitatively and quantitatively.

Wild foods are typically associated with subsistence living but in developed countries such as Finland they are increasingly recognized for their preventative and curative properties (Collier et al., 2004). *Helianthemum nummularium* subsp. *lycaonicum*, *Gypsophila eriocalyx*, *Digitalis lamarckii*, *Origanum sipyleum*, *Salvia dichroantha* and *Gladiolus roviola* were both endemics and have medicinal properties which are spreading in forests of Eskişehir. Conservation and utilization of endemic species are very important for developing NWFPs around us. NWFPs which were endemic or medicinal must have harvest carefully for the future of populations.

Even though quantitative methods are recommended for future studies, we must keep in mind that quantitative techniques cannot replace the need for careful qualitative description and observations of how people use the plant species and the products (Belem et al., 2007).

For NWFPs, resource management, through enrichment planting and cultivation, and domestication can help overcome some challenges relating to supply, and results in the accumulation of larger quantities of a product (Marshall and

Chandrasekharan, 2009). Conservation biology is a crucial issue for our forests, NWFPs are also another point of view for emergency.

For Uzbekistan, by 2020, the Government plans to increase the forest food production up to 1000-1500 tons per year to meet the population's needs in forest food products (Çiftçi, 2011). Even though we have a very rich presence and potential in terms of non-wood forest products, it is a fact that Turkey's place in forestry and its importance can not be understood sufficiently in past years (Demirci, 2011). In Turkey, it needs to have more attention and information for local people to increase non-wood forest production.

It is necessary to accept that there are many unknown types of non-wood forest products in our country, Turkey, and it is clearly estimated that many of them are very valuable and have unknown importance (Demirci, 2011). With this study, we tried to put forward NWFPs belonging to forests of Eskişehir.

Chupezzi et al. (2009) reported that governments need to sustain the strengthening of current institutional arrangements and the revision of legal instruments governing non-wood forest products' production and marketing by rural people. Since local people do not have enough knowledge about endemic species, the future of species with both endemic and medical characteristics presented with this study, may be endangered.

Between 1990 and 2009, income from non-wood forest products was higher in all years than in round wood in Turkey (Kurt et al., 2011). Annual income from cumin, thyme and laurel accounts for more than 75% of spice exports (Kurt et al., 2011).

Especially, thyme and laurel are NWFPs which are important for trade.

Non-wood forest products may play a remarkable economic role in stabilizing income from forest ownership and are important niches in many rural contexts, especially in disadvantaged areas and in the Mediterranean regions, where forest productivity is lower as far as timber is concerned (Cesaro et al., 1995). Cesaro et al. (1995) introduced non-wood products of Europe and Mediterranean area like berries, honey, chestnut, medicinal herbs etc., but in this study Turkey was represented as using just fodder and resin. There is a lack of knowledge, studies on non-wood products of Turkey's forest must research expeditiously.

Benefits derived from non-wood forest products should not only be evaluated economically (Altunel, 2011). In addition to their healthy use as food and beverages, they are also important from the perspective of culturally perceiving the local people and the area of production (Altunel, 2011; Turner, Cocksedg, 2001).

According to Özkan et al. (2011), from ecological perspective, knowing to potential areas being rich in NWFPs is crucial due to evaluation of those areas as non-wood production instead of timber production. From this point of view, determining the current situation of NWFPs is very important for our forests.

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