

Evaluation of the Flora of the Muş Alparslan University Campus with Regard to Beekeeping

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Abstract

Honey bees (*Apis mellifera* L.) are the most common and active pollinator insects on earth. Bees are needed to pollinate flowers, and bees need the flowers as food. Bees obtain nectar and pollen, the most important food sources, from flowers. Bees visit different flowers to collect these nutrients. Factors that influence the bees' visits include the plant species, the proximity and density of the plant, the flower structure, the quality of nectar and pollen and the bees' needs. When bees visit flowering plants, the quality of the pollen and nectar they receive from the flower and the structure of the flower are important. Some flowers may be pleasant to humans but are not at all preferred by bees. In this study, an attempt was made to determine which flower species, belonging to which family, are intensively visited by bees. As a result of the study, 263 plant taxa belonging to 47 families were identified. Asteraceae (47), Fabaceae (32), Poaceae (30), Lamiaceae (24) and Apiaceae (12) are the most densely populated families. During field studies, it was observed that bee density was high in yellow sweet clover, white sweet clover, false acacia, purple clover, and small burnet flowers. It is expected that this research will contribute to future studies and beekeeping activities.

Keywords: Apis, beekeeping, foraging, flowers, province

1. Introduction

Covering an area of 814,578 km², Türkiye has various geographical features. Turkey, which has a very rich plant diversity due to its different geographical structure, has not only a diverse flora but also a diverse fauna (Doğaroğlu and Genç, 1994). This flora comprises 11,707 plant taxa (Güner, 2012). The Türkiye flora contains 75% of the honey plants important for beekeeping (Sıralı, 2010). Beekeeping has a great economic importance among agricultural enterprises in the world and in our country. Beekeeping in our country has developed well in the last ten years and has managed to take first place in the world ranking (Güneşdoğdu and Akyol, 2019).

The health of honey bees and the development of the bee colony depend on the nutrients in the hive. Bees generally obtain their nutrients from nature. Honey bees obtain their carbohydrate requirements from nectar and all other nutrients, especially protein, from pollen (Brodschneider and Crailsheim, 2010). Knowing the nutritional requirements of honey bees (*A. m. L.*) and implementing colony management strategies according to correct feeding models greatly contribute to making colonies more resistant to diseases, achieving high product yield and avoiding colony losses (Sabir et al., 2000). Beekeepers draw up plans depending on the flowering plant flora of a region. These plans include phases such as the relocation of colonies, the renewal and production of queen bees and the extraction of various bee products (Liolios et al., 2023). Honeybees visit many plants to collect nectar and pollen. However, it is still controversial which characteristic of the flower (e.g. shape, smell, color) is decisive for the visit (Sıralı, 2010). It is emphasized that this depends on the density and diversity of flowering plants in the apiary (Sandal and Kan, 2013).

The effects of global climate change are being felt in all parts of the world. It also has a negative impact on the flowering time of plants that are particularly useful for bees.

Irregularities in precipitation lead to changes in flowering time and duration (Öztürk and Erkan, 2010). Knowing the flowering time of flowering plants in a region and the preferences of bees is important for beekeepers when planning (Behçet and Yapar, 2019).

Muş is located in the upper Murat-Van section of the Eastern Anatolia region. It has an area of about 8116 km². It borders Erzurum to the north, Bitlis, Diyarbakır, and Batman to the south and southwest, Bingöl to the west and Ağrı and Bitlis to the east. The region consists of rugged mountainous terrain with an altitude of no more than 3000 meters and lowlands with an altitude of 1200-1500 meters. Muş has a continental climate with a large temperature difference between day and night and frosty, cold, and long winters. Annual temperatures average -10 °C in winter and over 25 °C in summer. The average annual rainfall is 765 mm (Sönmez, 2010) and the vegetation of Muş province consists of steppe plants, meadow grasses and oak forests (Karadağ et al., 2020). The total number of beekeeping enterprises, number of colonies, honey production (tons) and honey yield (kg/colony) in Muş are 366, 59,219, 446 and 7.54, respectively (Anonymous, 2022).

2. Materials and Methods

This study was conducted between April and November 2023 at the campus of Muş Alparslan University / Turkey (38°46'26"N 41°25'09"E). Of course, bee visits to the campus and crops used for scientific studies were investigated. The books "Plant Species in Muş Alparslan University" (Karadağ et al., 2020) and "Flora of Turkey and The East Aegean Islands" (Davis, 1975-1985; Davis et al., 1988) were used to identify the plants in the field. In the study, all flowering and non-flowering plants were assessed. Whether there were bee visits was determined by observing the plants in the field during the hours when the weather conditions were suitable for bee flight. The identified plants are arranged alphabetically by family name. If a bee visit took place, it is indicated as "Yes", otherwise as "No".

The area of the campus is approximately 1.330.000 m². At the time of the study, there were 250 honey bee colonies on the campus.

3. Results and Discussion

As a result of the study conducted on the premises of Muş Alparslan University, 263 plant taxa belonging to 47 families were identified. In addition, 139 of these taxa were found to be visited by bees (Table 1). It is seen that the plant taxa on the Muş Alparslan University campus are generally concentrated in the Asteraceae, Fabaceae, Lamiaceae, Apiaceae, Rosaceae, Brassicaceae, Caryophyllaceae and Boraginaceae families (Figure 1). In a study conducted in Solhan (Bingöl/Türkiye), one of the districts of Bingöl bordering Similar and Muş, it was reported that the most abundant bee plants belong to the Asteraceae, Lamiaceae, and Fabaceae families (Polat et al., 2020). Plants from the Asteraceae, Lamiaceae, and Fabaceae families ranked first in studies conducted in neighboring provinces (Behçet & Yapar,

2019; Bakoğlu et al., 2013; Öztürk and Erkan, 2010). Tanfer and Yener (2020) reported that the families Rosaceae (47), Fabaceae (31), Cupressaceae (28), Poaceae (25) and Lamiaceae (18) were densely represented on campus. The most frequently identified families in the Pozantı (Adana/Türkiye) region are Asteraceae (98), Fabaceae (72), Brassicaceae (60), Lamiaceae (54), Caryophyllaceae (53), Poaceae (33), Boraginaceae (30), Apiaceae (28), Rosaceae (19) and Caprifoliaceae (18) (Akıncı et al., 2018).

Muş is characterized above all by the different and wide altitudes in terms of beekeeping. In this regard, it is important to study the plant diversity at different altitudes such as 1500-3000 m and to evaluate the species and taxa that are important for beekeeping. Conducting future researchs not only on the grounds of Muş Alparslan University campus but also in the vegetation at different altitudes will contribute to beekeeping and honey yields of Muş province.

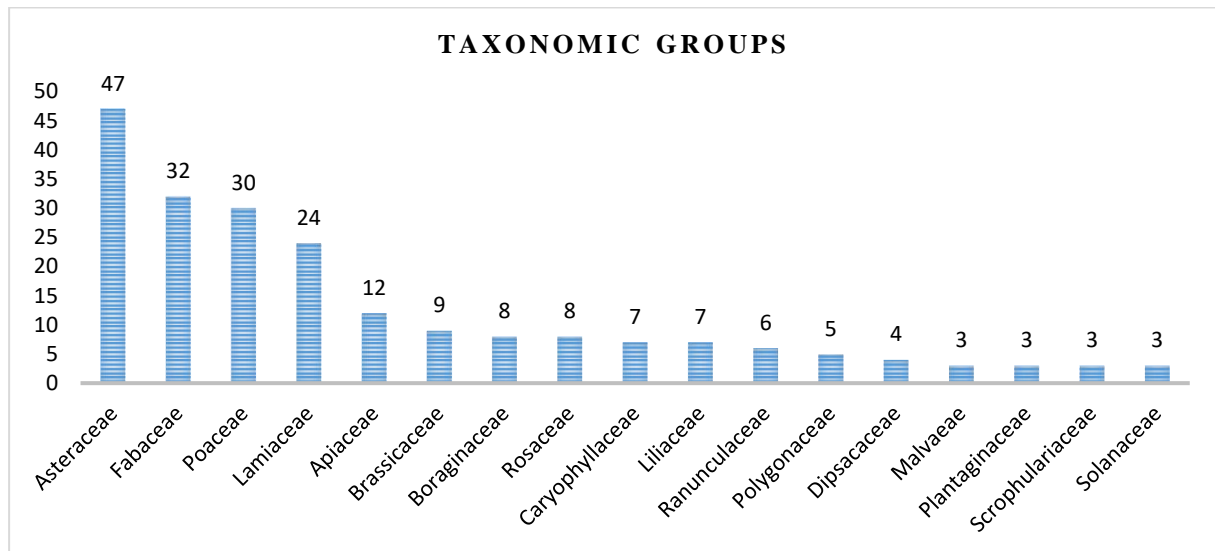


Figure 1. Families with the most taxa on campus

Table 1. Plant taxa detected on campus and bee visits

No.	Scientific Name	Family	English Name	Turkish Name	Bee Visit
1	<i>Celosia cristota</i> L.	Amaranthaceae	Cockscomb, Coxscomb	Horozibiği	No
2	<i>Celosia argentea</i> L.	Amaranthaceae	Plumed cockscomb, Celosia	Tüylü horozibiği	No
3	<i>Amaranthus albus</i> L.	Amaranthaceae	White pigweed	Ak horozibiği, Töreme	Yes
4	<i>Foeniculum vulgare</i> L.	Apiaceae	Fennel	Rezene, Arapsaçı	Yes
5	<i>Conium maculatum</i> L.	Apiaceae	Poison hemlock	Benekli Zehirli Baldıran	Yes
6	<i>Malabaila dasyantha</i> (K.Koch) Grossh.	Apiaceae	-	Dudak Patlatan, Kelemen Keçir	Yes
7	<i>Ferula arientalis</i> L.	Apiaceae	Oriental Fennel	Doğu Çaçırı	Yes
8	<i>Eryngium campestre</i> L.	Apiaceae	Field Eryngo	Boğa Dikeni	Yes
9	<i>Tordylium maximum</i> L.	Apiaceae	Great hartwort	Koca Davulotu	Yes
10	<i>Carum carvi</i> L.	Apiaceae	Caraway	Kır Kimyonu, Tarak Otu	Yes
11	<i>Coriandrum sativum</i> L.	Apiaceae	Coriander	Kişniş, Aşotu	Yes
12	<i>Cuminum cymimum</i> L.	Apiaceae	Cumin	Kimyon	Yes
13	<i>Anethum graveolens</i> L.	Apiaceae	Dill	Dere Otu	Yes
14	<i>Pimpinella anisum</i> L.	Apiaceae	Anise	Anason	Yes
15	<i>Amni visnago</i> (L.) Lam.	Apiaceae	Tootpick-Plant, Visnaga	Dişotu, Kaşni, Hıltan	Yes
16	<i>Gundelia tournefortii</i> L. var. <i>tournefortii</i>	Asteraceae	Tumbleweed	Kenger, Sakız Otu	Yes
17	<i>Senecio vernalis</i> Waltds. & Kit.	Asteraceae	Ragwort	Kanarya Otu	Yes
18	<i>Senecio vulgaris</i> L.	Asteraceae	Groundsel	Adi Kanarya Otu, İmam Kavuğu	Yes
19	<i>Taraxacum andrassavii</i> Schischkin	Asteraceae	Dandelion	Çayır Aslandışı	Yes
20	<i>Crepis sancta</i> (L.) Babcock	Asteraceae	Hawk's Beard	Tatlı Hindiba	Yes
21	<i>Crapis foetida</i> L.	Asteraceae	Stiking Hawk's Beard	Hindiba	Yes
22	<i>Artemisia austriaca</i> Jacq.	Asteraceae	Sagebrush	Yavşan	Yes
23	<i>Helichrysum arenarium</i> (L.) Maench.	Asteraceae	Straeflower	Altın Otu, Ölmez Çiçek	No
24	<i>Centaurea iberica</i> Trev. Ex Sprengel	Asteraceae	Iberian Knapweed	Çakır Dikeni	Yes
25	<i>Centaurea salstitalis</i> L.	Asteraceae	Yellow Cockspur	Güneş Çiçeği, Yaz Gelin Düğmesi	Yes
26	<i>Centaurea depresssa</i> M. Bieb.	Asteraceae	Dark Blue Bottle	Mor Peygamber Çiçeği, Acımık	Yes
27	<i>Centaurea glastifalia</i> L.	Asteraceae	Conflower	Sarı Peygamber Çiçeği, Zerdali Dikeni	Yes
28	<i>Centaurea cyanus</i> L.	Asteraceae	Cornflower, Black Ball Cornflower	Mavi Kantaron	No
29	<i>Carduus nutans</i> L.	Asteraceae	Musk Thistle	Deve Dikeni	Yes
30	<i>Carduus pycnocephalus</i> L.	Asteraceae	Slender Thistle, Italian Thistle	Sık Başlı Kangal	Yes
31	<i>Echinops orientalis</i> Trautv.	Asteraceae	Globe-Thistle	Topuz Dikeni	Yes
32	<i>Echinops ritro</i> L.	Asteraceae	Globe Thistle	Tüysüz Kirpi Dikeni	Yes
33	<i>Xanthium spinosum</i> L.	Asteraceae	Spiny Cocklebur	Dikenli Pıtrak	No
34	<i>Xanthium strumarium</i> L.	Asteraceae	Common Cocklebur, Clotbur	Domuz Pitrağı	Yes
35	<i>Picnomon acarna</i> (L.) Cass.	Asteraceae	Soldier Thistle	Pamuk Dikeni	No
36	<i>Cirsium arvense</i> (L.) Scop. <i>Cirsium echinus</i> (M.Bieb.)	Asteraceae	Creeping Thistle	Tarla Köygöçüreni	Yes
37	Hand. Mazz. (Syn. <i>Carlina</i> <i>echinus</i>)	Asteraceae	Thistle	Köygöçüreni, Kırpikangalı	No
38	<i>Onopordum acanthium</i> L.	Asteraceae	Common Cotton Thistle	Adi Eşek Dikeni	Yes
39	<i>Tragopogon bupthalmoides</i> (DC.) Boiss.	Asteraceae	Goat's Beard	Öküzgözümsü Tekesakalı	Yes
40	<i>Tanacetum vulgare</i> L.	Asteraceae	Tansy	Solucan Otu	No
41	<i>Tanacetum parthenium</i> (L.) Schultz. Bip.	Asteraceae	Feverfew, Bachelor's Buttons	Pireotu, Beyaz Papatya	No
42	<i>Matricarica chamomilla</i> L.	Asteraceae	Chemomile	Papatya	No

43	<i>Anthemis tinctoria</i> L. var. <i>tinctoria</i>	Asteraceae	Yellow Chamimile	Sarı Papatya, Boyacı Papatyası	Yes
44	<i>Anthemis cotula</i> L.	Asteraceae	Dog Fennel, Stinking May Weed	Pis Kokulu Köpek Papatyası	No
45	<i>Bellis perennis</i> L.	Asteraceae	Daisy	Çayırüzeli, Koyungözü	No
46	<i>Achillea millefolium</i> L.	Asteraceae	Common Yarrow, Medical Milfoil	Beyaz Vivanperçemi, Binbir Yaprak	Yes
47	<i>Achillea biebersteinii</i> Afan.	Asteraceae	Yarrow	Sarı Civanperçemi, Pireotu	Yes
48	<i>Centranthus longiflorus</i> Stev.	Asteraceae	Long Flowered Valerian	Kediotu, Mahmuz Çiçeği	Yes
49	<i>Carthamus tinctorius</i> L.	Asteraceae	Safflower	Aspir	Yes
50	<i>Echinacea pallida</i> (Nutt.) Nutt.	Asteraceae	Pale Purple Coneflower	Suluk Mor Kirpiotu, Soluk Çiçekli Ekinezya	Yes
51	<i>Echinacea purpurea</i> (L.) Moench (Syn. <i>Brauneria purpurea</i> (L.) Britt.)	Asteraceae	Eastern Purple Coneflower, Purple coneflower	Ekinezya, Koni Çiçeği	Yes
52	<i>Inula helenium</i> L. var. <i>orgyalis</i>	Asteraceae	Elecampane, Horseheal	Koca Andızotu	Yes
53	<i>Calendula officinalis</i> L.	Asteraceae	Marigold	Aysısafa, Kandil Çiçeği, Kadife Çiçeği	Yes
54	<i>Cynara scolymus</i> L.	Asteraceae	Globe Artichoke	Enginar	No
55	<i>Cnicus benedictus</i> L.	Asteraceae	Cnicus	Şevketibostan, Mübarekdikeni, Akkız	Yes
56	<i>Togetes petula</i> L.	Asteraceae	French Marigold	Fransız Kadife Çiçeği, Cennetkuşu Çiçeği	Yes
57	<i>Zinnia elegans</i> L.	Asteraceae	Youth-and-age, Common Zinnia	Zinya, Kirli Hanım Çiçeği	Yes
58	<i>Cosmos bipinnatus</i> Cav.	Asteraceae	Garden Cosmos	Kozmos	Yes
59	<i>Erigeron canadensis</i> L.	Asteraceae	Fleabane, Butterweed	Şifaotu	No
60	<i>Lactuca serriola</i> L.	Asteraceae	Lectuce	Acı Marul	No
61	<i>Cichorium intybus</i> L.	Asteraceae	Withloaf Cichory	Yabani Hindiba	Yes
62	<i>Silybum marianum</i> (L.) Gaertn.	Asteraceae	Blessed milkthistle	Meryemana Dikeni	Yes
63	<i>Heliotropium europaeum</i> L.	Boraginaceae	Heliotrope	Siğilotu, Bambulotu	Yes
64	<i>Onosma bornmuelleri</i> Hausskn.	Boraginaceae		Dallı Altındamla	No
65	<i>Lithospermum officinale</i> L.	Boraginaceae	Gromwell	Dağ Sedefotu	No
66	<i>Myosotis alpestris</i> F.W. Schmict	Boraginaceae	Asian forget-me-no	Unutma Beni, Boncukotu	Yes
67	<i>Asperugo procumbens</i> L.	Boraginaceae	German-Madwort	Nevazilotu	Yes
68	<i>Anchusa azurea</i> Miller	Boraginaceae	Italian Bugloss	Mavi Sığirdili, Gürüz	Yes
69	<i>Echium italicum</i> L.	Boraginaceae	Italian Bugloss	Engerekotu	Yes
70	<i>Phacelia tonocetifolia</i> Benth.	Boraginaceae	Blue Tansy, Lacy Phacelia	Arıotu, Arıballığı	Yes
71	<i>Alyssum desertotum</i> Stapf.	Brassicaceae	Desert Madwort	Dumanotu	Yes
72	<i>Cordaria draba</i> (L.) Devs.	Brassicaceae	White-top, Hoary Cress	Ak Tere	No
73	<i>Lepidium virginicum</i> L.	Brassicaceae	Peppergrass	El Tere, Biberotu	No
74	<i>Erysimum cuspidatum</i> (M.Bieb.) DC.	Brassicaceae	-	Kuyruklu Zarife	Yes
75	<i>Isatis floribunda</i> Boiss. Ex Bornm.	Brassicaceae	Woad	Çivitotu	Yes
76	<i>Sinapis arvensis</i> L.	Brassicaceae	Wild Mustard	Yabani Hardal	Yes
77	<i>Sinapis nigra</i> L. (Syn. <i>Brossica nigra</i>)	Brassicaceae	Black Mustard	Siyah Hardal	Yes
78	<i>Capsella bursa-pastoris</i> (L.) Medik.	Brassicaceae	Shepherd's Purse	Çoban Çantası	No
79	<i>Alliaria petiolata</i> (M.Bieb.) Cavara&Grande	Brassicaceae	Garlic Mustard, Hedge Garlic	Sarımsakotu, Sarımsak Hardalı	Yes
80	<i>Valerianella locusta</i> (L.) Latter.	Caprifoliaceae	Lamb's Lettuce	Kuzu Marulu	Yes
81	<i>Viburnum opulus</i> L.	Caprifoliaceae	Wayfaring Tree	Kartopu, Geleboru	No

82	<i>Silene vulgaris</i> (Moench) Garcke	Caryophyllaceae	Bladder Campion, Maiden's Tears	Gelinparmağı	No
83	<i>Silene argaea</i> Fisch.&C.A. Mey.	Caryophyllaceae	Turkish Catchfly	Yapışkanot	No
84	<i>Silene cretica</i> L.	Caryophyllaceae	Cretan Catchfly	Ada Nakılı	No
85	<i>Vaccaria pyramidata</i> Medikus	Caryophyllaceae	Cow Soapwort	Arap Baklası, İnekotu	Yes
86	<i>Gypsophila arrostii</i> L.	Caryophyllaceae	Creeping Gypsophila	Çöven Otu	No
87	<i>Gypsophila pallida</i> Stapf	Caryophyllaceae	Creeping Gypsophila	Şark Çöveni	No
88	<i>Dianthus barbatus</i> L.	Caryophyllaceae	Sweetwilliam	Çin Karanfili, Hüsnüyusuf	No
89	<i>Chenopodium album</i> L.	Chenopodiaceae	White Gosefold, Fat Hen	Ak kazayağı, Sirken	No
90	<i>Chenopodium quinoa</i> Wild.	Chenopodiaceae	Quinoa	Kinoa	No
91	<i>Hypericum scabrum</i> L. (Syn. <i>Hypericum cymosum</i> , <i>H. galioides</i>)	Clusiaceae	St. Johnswort	Kaba Kuzukıran	No
92	<i>Hypericum perforatum</i> L.	Clusiaceae	Common st johns's, st peter's wort	Sarı Kantaron	No
93	<i>Convolvulus arvensis</i> L.	Convolvulaceae	Field Bindweed	Tarla Sarmaşığı	Yes
94	<i>Convolvulus galaticus</i> Rotsan ex Choisy	Convolvulaceae	Bindweed	Sarmaşık	Yes
95	<i>Carex oreophila</i> C.A. Meyer	Cyperaceae	-	Yelsaparna	No
96	<i>Bolboschoenus moritimus</i> (L.) Palla	Cyperaceae	Sea club-rush	Sandalye Sazı	No
97	<i>Scabiosa caucasica</i> M. Bieb.	Dipsacaceae	Caucasus Scabios, Pincusion Flower	Uyuzotu	Yes
98	<i>Scabiosa argentea</i> L.	Dipsacaceae	Ukranian Scabious	Uyuzotu	Yes
99	<i>Dipsacus lociniatus</i> L.	Dipsacaceae	Vut-Leaves Teasel	Çoban Tarağı	Yes
100	<i>Knautia integrifolia</i> (L.) Bert.	Dipsacaceae	Whole-Leaved Scabious	Bütün Yapraklı Eşekkulağı	No
101	<i>Equisetum arvense</i> L.	Equisetaceae	Horsetail	Atkuyruğu	No
102	<i>Ricinus communis</i> L.	Equisetaceae	Castor of Plant	Hintyağı Bitkisi	No
103	<i>Trigonella balansae</i> Boiss.&Reut.	Fabaceae	Sickle-Fruit Fenegreek	Orak Meyveli Çemen	Yes
104	<i>Medicago sativa</i> L.	Fabaceae	Alfaalfa, Lucerne	Adi Yonca	Yes
105	<i>Medicago truncatula</i> Gaertn.	Fabaceae	Barrel Medic	Fiçı Yoncası	Yes
106	<i>Bituminaria bituminosa</i> (L.) Stirton (Syn. <i>Psoralea bituminosa</i> (L.))	Fabaceae	Pitch Trefoil	Katran Yoncası	Yes
109	<i>Melilotus officinalis</i> (L.) Desr.	Fabaceae	Yellow Sweet Clover	Sarıtaş Yoncası	Yes
110	<i>Melilotus alba</i> Desr.	Fabaceae	White Sweet Clover	Aktaş Yoncası	Yes
111	<i>Astragalus onobrychis</i> L.	Fabaceae	Sainfoin Milk-Vetch	Korungamsı Geven	No
112	<i>Astragalus lagurus</i> Willd.	Fabaceae	Astragale	Tüybaşlı Geven	No
113	<i>Lathyrus sativus</i> L.	Fabaceae	Grass Pea	Adi Mürdümük	No
114	<i>Lathyrus roseus</i> Stev.	Fabaceae	Rosy-Flowered	Gül Mürdümüğü	No
115	<i>Lathyrus czeczottianus</i> Bassler	Fabaceae	Sweetpea	Çalı Mürdümüğü	No
116	<i>Lathyrus pratensis</i> L.	Fabaceae	Meadow Vetchling	Çayır Mürdümüğü	No
117	<i>Pisum sativum</i> L. subsp. <i>sativum</i>	Fabaceae	Pea	Bezelye	No
118	<i>Ononis pubescens</i> L.	Fabaceae	Restharrow	Tüylü Öküzçanı	No
119	<i>Vicia villosa</i> Roth	Fabaceae	Hairy Vetch	Tüylü Fiğ	Yes
120	<i>Vicia panonnica</i> Crantz	Fabaceae	Hungarian Vetch	Macar Fiğ	No
121	<i>Vicia cracca</i> L. subsp. <i>cracca</i>	Fabaceae	Bird Vetch	Kuş Fiği	Yes
122	<i>Vicia sativa</i> L.	Fabaceae	Common Vetch	Adi Fiğ	No
123	<i>Vicia narbonensis</i> L.	Fabaceae	Narbonne Vetch	Koca Fiğ	No
124	<i>Coronilla varia</i> L. subsp. <i>varia</i>	Fabaceae	Purple Crownvetch	Alaca Taçotu	Yes
125	<i>Trifolium resupinatum</i> L.	Fabaceae	Persian Clover	Anadolu Üçgülü	Yes
126	<i>Trifolium pratense</i> L.	Fabaceae	Red Clover	Çayır Üçgülü	Yes
127	<i>Trifolium repens</i> L.	Fabaceae	White Clover	Ak Üçgül	Yes
128	<i>Trifolium purpureum</i> Lois.	Fabaceae	Purple Clover	Mor Üçgül	Yes
129	<i>Trifolium arvense</i> L.	Fabaceae	Rabbitfoot Clover	Tarla Üçgülü	Yes
130	<i>Trifolium pilulare</i> L.	Fabaceae	Ball Cotton Clover	Boncuk Üçgül	No
131	<i>Trifolium campestre</i> Schreb.	Fabaceae	Large Hop Clover	İri Kır Üçgülü	Yes
132	<i>Lotus comiculatus</i> L.	Fabaceae	Bird's Foot Trefoil	Sarı Çiçekli Gazalboynuzu	Yes
133	<i>Lotus gebelia</i> Vent.	Fabaceae	Bird's Foot Trefoil	Gazalboynuzu	Yes
134	<i>Lotus herbaceus</i> (Vill.) Jauzein	Fabaceae	Herb Canary Clover	Zehirli Yonca	Yes

134	<i>Onobrychis viciifolia</i> Scop. (Syn. <i>Onobrychis sativa</i>)	Fabaceae	Sainfoin	Korunga	Yes
135	<i>Glycyhiza glabra</i> L. <i>Senna corymbosa</i> (Lam.) H.S.	Fabaceae	Licorice	Meyan	No
136	Irwis&Berneby (Syn. <i>Cossia corymbosa</i>)	Fabaceae	Senna Plant	Sinameki	Yes
137	<i>Wisteria sinensis</i> (Sims) DC.	Fabaceae	Chinese wisteria	Çin Mor Salkımı	Yes
138	<i>Geranium macrostylum</i> Boiss.	Geraniaceae	-	Turnagagası	Yes
139	<i>Geranium robertianum</i> L.	Geraniaceae	Herb robin	Robertotu	Yes
140	<i>Herniaria glabra</i> L.	Illecebraceae	Rupturewort	Kırıkotu	Yes
141	<i>Scleranthus annuus</i> L.	Illecebraceae	German Knotgrass	Yıllık Yumaklıot	No
142	<i>Gladiolus atraviolaceus</i> Boiss.	İridaceae	Gladiolus	Yabani Glayöl, Kıraç Süseni	No
143	<i>Gladiolus kotschyanus</i> Boiss.	İridaceae	Corn Falg	Karga Soğanı, Kılıçotu	No
144	<i>Marrubium parviflorum</i> Fisch.&C.A.Mey	Lamiaceae	Horehound	Küçük Çiçeli Sinek Otu	Yes
145	<i>Euphorbia virgata</i> Waldst. Et. Kit.	Lamiaceae	Leafy Spurge, Tithymal	Çubuksu Sütleşen	Yes
146	<i>Ziziphora capitata</i> L.	Lamiaceae	Ziziphora	Dağ Reyhanı	Yes
147	<i>Stachys cretica</i> L. (Syn. <i>Stachys salviifolia</i>)	Lamiaceae	Creten Hedgenettle	Girit Karabaşotu	Yes
148	<i>Lavandula officinalis</i> L.	Lamiaceae	Lavander	Lavanta	Yes
149	<i>Mentha pulegium</i> L.	Lamiaceae	European Pennroyal	Yarpuz	No
150	<i>Mentha longifolia</i> (L.) Hudson	Lamiaceae	Wildmint	Tüylü Nane, İt Nanesi	No
151	<i>Lamium amplexicaule</i> L.	Lamiaceae	Henbit	Ballibaba	Yes
152	<i>Melissa officinalis</i> L.	Lamiaceae	Common Balm	Oğul Otu	Yes
153	<i>Salvia officinalis</i> L.	Lamiaceae	Kitchen Sage	Tıbbi Adaçayı	Yes
154	<i>Salvia sclorea</i> L.	Lamiaceae	Clary Sage	Misk Adaçayı	Yes
155	<i>Salvia triloba</i> L.	Lamiaceae	Sape Clary	Anadolu Adaçayı	Yes
156	<i>Salvia virgata</i> Jacq.	Lamiaceae	Southern Meadow Sage	Fatmanaotu, Yıllancık	Yes
157	<i>Ocimum basilicum</i> L.	Lamiaceae	Sweet Basil	Fesleşen	Yes
158	<i>Sideritis perfoliata</i> L.	Lamiaceae	Mountain Tea	Dağ Çayı	Yes
159	<i>Origanum anites</i> L. (Syn. <i>Origanum smyrneum</i>)	Lamiaceae	Turkish Oregano, Smyrna Thyme	İzmir Kekikği, Mecanköşk	Yes
160	<i>Origanum majorana</i> L.	Lamiaceae	Sweet Marjoram	Mercanköşk	Yes
161	<i>Origanum vulgare</i> subsp. <i>gracile</i>	Lamiaceae	Russian Oregano	Kuş Zemulu	Yes
162	<i>Hyssopus officinalis</i> L.	Lamiaceae	Hyssop	Çördük	Yes
163	<i>Leonotis nepetifolia</i> L.	Lamiaceae	Lion's Tail	Aslan Kuyruğu	Yes
164	<i>Nepeta cataria</i> L.	Lamiaceae	Catnip	Kedi Nanesi	Yes
165	<i>Satureja hortensis</i> L.	Lamiaceae	Cibreska	Zahter	Yes
166	<i>Prunella vulgaris</i> L.	Lamiaceae	Common Selfheal	Acı Fesleşen	Yes
167	<i>Salvia splendens</i> L.	Lamiaceae	Annual Scarlet Sage	Ateş Çiçeği	No
168	<i>Ornithogalum narbonense</i> L.	Liliaceae	Star of Bethlehem	Akbaldır	Yes
169	<i>Ornithogalum oligophyllum</i> E.D. Clarke	Liliaceae	Star-of-Bethlehem	Sakarca, Akyıldız	Yes
170	<i>Muscari comosum</i> (L.) Miller	Liliaceae	Tassel Hyacinth	Arap Sümbülü	No
171	<i>Tulipa sintenisii</i> Baker	Liliaceae	Muş Tulip	Muş Lalesi	No
172	<i>Allium atroviolaceum</i> Boiss.	Liliaceae	Broadleaf Wild Leek	Top Başlı Yabani Sarımsak	No
173	<i>Allium ampeloprasum</i> L.	Liliaceae	Pearl Leek	Yabani Pırasa	No
174	<i>Allium nigrum</i> L.	Liliaceae	Ornamental Onion	Geniş Yapraklı Soğan	No
175	<i>Linum usitatissimum</i> L.	Linaceae	Flax, Linen	Keten	Yes
176	<i>Alcea calverti</i> Boiss.	Malvaceae	Queen Purple	Hatmi Çiçeği	Yes
177	<i>Alcea apteracarpa</i> (Fenzi) Boiss.	Malvaceae	Hollyhock	Hatmi Çiçeği	Yes
178	<i>Malva neglecta</i> Wallr. (Syn. <i>Malva rotundifolia</i>)	Malvaceae	Dwarf Mallow	Ebe Gümececi	Yes
179	<i>Paris quadrifolia</i> L.	Melanthiaceae	Herb Paris	Karga Gözü	No
180	<i>Syringa vulgaris</i> Madame Lemoine	Oleaceae	Lilac	Beyaz Çiçekli Leylak	No
181	<i>Oenothera biennis</i> L.	Onagraceae	Evening Primrose	Ezan Çiçeği, Işıkotu	Yes
182	<i>Oenothera lindheimeri</i> L.	Onagraceae	Beeblossom	Pembe Gaura Çiçeği	No
183	<i>Orobanchae cernua</i> L.	Orobanchaceae	Nodding Broomrape	Canavar Otu	No
184	<i>Fumaria officinalis</i> L.	Papaveraceae	Common Fumitory	Şahtere Otu	No
185	<i>Fumaria asepala</i> Boiss.	Papaveraceae	Fumitory	Ak Şahtere	No

186	<i>Papaver rhoeas</i> L.	Papaveraceae	Corn Poppy	Gelincik	No
187	<i>Papaver somniferum</i> L.	Papaveraceae	Opium Poppy	Haşhaş	No
188	<i>Plantago lanceolata</i> L.	Plantaginaceae	Ribwort Plantain	Mızrak Yapraklı Sınır Otu, Yılanotu	Yes
189	<i>Plantago media</i> L.	Plantaginaceae	Sweet Plantain	Orta Yapraklı Sınır Otu	No
190	<i>Antirrhinum majus</i> L.	Plantaginaceae	Common Snapdragon	Aslanagzı	No
191	<i>Acantholimon caryophyllaceum</i> Boiss.	Plumbaginaceae	Prickly Thrift	Kar Dikeni, Çoban Yastığı	No
192	<i>Koeleria cristata</i> (L.)	Poaceae	Crested Hairgrass	Adi Parlak Ot	No
193	<i>Polypogon manspeliensis</i> (L.) Desf.	Poaceae	Annual Rabbit Footgrass	Tavşan Ayağı	No
194	<i>Bromus danthanae</i> Trin.	Poaceae	Oat Brome	Yulafı Brom	No
195	<i>Bromus hordeaceus</i> L.	Poaceae	Soft Brome	Arpamsı Brom	No
196	<i>Bromus tectorum</i> L.	Poaceae	Cheatgrass	Püsküllü Brom	No
197	<i>Bromus sterilis</i> L.	Poaceae	Barren Brome	Kısır Brom	No
198	<i>Bromus lanceolatus</i> Roth	Poaceae	Mediterranean Brome	Akdeniz Bromu	No
199	<i>Phragmites australis</i> (Cav.) Trib. Ex Steudel.	Poaceae	Common Reed	Adi Kamış	No
200	<i>Lolium perenne</i> L.	Poaceae	Perennial Ryegrass	İngiliz Çimi	No
201	<i>Lolium multiflorum</i> Lam. (Syn. <i>Lolium italicum</i>)	Poaceae	Italian Ryegrass	İtalyan Çimi	No
202	<i>Agropyron repens</i> (L.) P. Beauv.	Poaceae	Couch Grass	Tarla Ayırığı	No
203	<i>Alopecurus aucheri</i> Boiss.	Poaceae	Foxtail	Kaba Tilkikuyruğu	No
204	<i>Alopecurus pretensis</i> L.	Poaceae	Meadow foxtail	Çayır Tilkikuyruğu	No
205	<i>Alopecurus myosuroides</i> Hudson	Poaceae	Slender Foxtail	Yabani Tilkikuyruğu	No
206	<i>Dactylis glomerata</i> L.	Poaceae	Orchardgrass	Domuz Ayırığı	No
207	<i>Festuca arundinacea</i> Schreber	Poaceae	Tall Fescue	Kamışsı Yumak	No
208	<i>Festuca rubra</i> var. <i>rubra</i>	Poaceae	Red Fescue	Köksaplı Kırmızı Yumak	No
209	<i>Festucaovina</i> L. (Syn. <i>Festuca airoides</i>)	Poaceae	Sheep Fescue	Koyun Yumağı	No
210	<i>Poa pratensis</i> L.	Poaceae	Kentucky Bluegrass	Çayır Salkım Otu	No
211	<i>Poa bulbosa</i> L.	Poaceae	Bulbous luegrass	Yumrulu Salkım Otu	No
212	<i>Hordeum murinum</i> L.	Poaceae	Mouse Barley	Pisipisi Arpası	No
213	<i>Hordeum bulbosum</i> L.	Poaceae	Bulbous Barley	Yumrulu Arpa	No
214	<i>Taeniatherum çaput medusae</i> (L.) Nevski	Poaceae	Medusa Head	Kılçıklı Otlak Arpası	No
215	<i>Aegilops geniculata</i> Roth (Syn. <i>Aegilops avata</i> L.)	Poaceae	Ovate Goaygrass	Bodur Buğdayotu	No
216	<i>Aegilops triuncialis</i> L. (Syn. <i>Triticum triunciale</i>)	Poaceae	Barb Goatgrass	Sakalotu	No
217	<i>Aegilops cylindrica</i> Host	Poaceae	Jointed Goatgrass	Yuvarlak Buğdayotu	No
218	<i>Cynadan dactylan</i> (L.) Pers.	Poaceae	Bermudagrass	Köpekdişi	No
219	<i>Digitalis sanguinalis</i> (L.) Scop.	Poaceae	Factsheet	Tüylü Şeytanotu	No
220	<i>Echinachlae crus-galli</i> (L.) P. Beauv.	Poaceae	Barnyardgrass	Darıcan	No
221	<i>Sorghum halepense</i> (L.) Pers.	Poaceae	Johnsongrass	Halep Darısı	No
222	<i>Rumex acetosella</i> L. (Syn. <i>Rumex acetoselloides</i>)	Polygonaceae	Sheep's Sorrel	Küçük Kuzukulağı	No
223	<i>Rumex crispus</i> L.	Polygonaceae	Curied Dock	Kıvırcık Labada	No
224	<i>Polygonum arenastrum</i> Bor.	Polygonaceae	Common Knotweed	Çorak Çobandeğneği	No
225	<i>Polygonum aviculare</i> L.	Polygonaceae	Knotweed	Kuşmadımağı	No
226	<i>Fagopyron esculentum</i> L.	Polygonaceae	Buckwheat	Karabuğday	Yes
227	<i>Portulaca oleracea</i> L.	Portulacaceae	Purslane	Semizotu, Soğukluk	Yes
228	<i>Ranunculus demissus</i> DC.	Ranunculaceae	Buttercup	Düğün Çiçeği	Yes
229	<i>Adonis flammea</i> Jacq.	Ranunculaceae	Pheasant's Eye	Kandamlası, Kır Lalesi	No
230	<i>Cossonida orientalis</i> (Gay) Schröd	Ranunculaceae	Locket Larkspur	Titrek Çiçeği	No
231	<i>Deiphinium cyphoplectrum</i> Boiss.	Ranunculaceae	Larkspur	Heseran	No
232	<i>Nigelia sativa</i> L.	Ranunculaceae	Black Caraway	Çörekotu	Yes
233	<i>Nigelia damascena</i> L.	Ranunculaceae	Love in a Mist	Şam Çörekotu	Yes
234	<i>Potentilla argentea</i> L.	Rosaceae	Silvery Cinquefoil	Gümüşü Beş Parmakotu	Yes
235	<i>Sanguisorba minor</i> Scop.	Rosaceae	Small Burnet	Küçük Çayır Düğmesi	Yes

236	<i>Geum urbanum</i> L.	Rosaceae	Wood Avens	Meryen Otu	Yes
237	<i>Rosa canina</i> L.	Rosaceae	Dog Rose	Kşburnu	Yes
238	<i>Rosa multiflora</i> Thunb. (Syn. <i>Rosa polyantha</i>)	Rosaceae	Multiflora Rose	Çok Çiçekli Gül, Bebek Gülü	Yes
239	<i>Spiraea japonica</i> L.	Rosaceae	Japanese Meadowsweet	Keçi Sakalı	No
240	<i>Rosa centifolia</i> L.	Rosaceae	Cabbage Rosa	Okka Gülü	No
241	<i>Rosa hybrida</i> L.	Rosaceae	Hybrid Rose	Gül	No
242	<i>Galium aparine</i> L.	Rubiaceae	Catchweed Bedstraw	Yoğurtotu, Yapışkanotu	No
243	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Balloon Vine	Balonotu	No
244	<i>Digitalis ferruginea</i> L. subsp. <i>ferruginea</i>	Scrophulariaceae	Foxglove	Yüksükotu, Mayasılotu	Yes
245	<i>Veronica anagallis aquatica</i> L.	Scrophulariaceae	Speedwell	Yavşanotu	Yes
246	<i>Verbascum cheiranthifolium</i> Boiss.	Scrophulariaceae	Mullein	Sıgırkuyruğu	Yes
247	<i>Nicotiana tabacum</i> L.	Solanaceae	Tobacco	Talgar Tütünü	No
248	<i>Hyoscyamus niger</i> L.	Solanaceae	Henbane	Siyah Banotu	Yes
249	<i>Petunia hybrida</i> L.	Solanaceae	Petunia	Kırmızı Petunya	No
250	<i>Urtica dioica</i> L.	Urticaceae	Large Nett	Acı Isırgan	No
251	<i>Peganum harmola</i> L.	Zygophyllaceae	Harmel	Üzerlik	Yes
252	<i>Tribulus terrestris</i> L.	Zygophyllaceae	Maltese Cross	Demirdikeni	Yes
253	<i>Acer platanoides</i> L.	Aceraceae	Norway Maple	Çınar Yapraklı Akçağaç	No
254	<i>Betula pendula</i> Roth.	Betulaceae	Birch Tree	Huş Ağacı	No
255	<i>Thuja orientalis</i> var. <i>aurea</i>	Cupressaceae	Arbor-vita	Altuni Mazı	No
256	<i>Elaeagnus angustifolia</i> L.	Elaeagnaceae	Wild Olive, Oleaster	İğde	Yes
257	<i>Robinia pseudoacacia</i> L.	Fabaceae	False Acacia, False Locust	Yalancı Akasya	Yes
258	<i>Colutea cilicica</i> Boiss. & Ball.	Fabaceae	Blander Senna	Patlangaç	Yes
259	<i>Cercis siliquastrum</i> L.	Fabaceae	Judas Tree	Erguvan	Yes
260	<i>Salix alba</i> L.	Salicaceae	White Willow	Ak Söğüt	No
261	<i>Paulownia tomentosa</i> Thunb.	Scrophulariaceae	Princess Tree	Pavlonya	No
262	<i>Tilia cordata</i> Mill.	Tiliaceae	Littleleaf Linden	Küçük Yapraklı Ihlamur	Yes
263	<i>Ulmus campestris</i> L.	Ulmaceae	Elm Tree	Karağaç	No

4. Conclusion

It is possible to describe the province of Muş as an important plant area with its significant plains and highly variable and local habitats. For this reason, nomadic beekeepers move their colonies to different areas of the region between May and October. This research is pioneering work on bee plants in the province. It is expected that this research will help growers visiting the region. It is expected that more detailed research of this type will be conducted at various locations within the provincial boundaries and will serve as a guide for beekeepers.

Declaration of Author Contributions

The authors declare that they have contributed equally to the article. All authors declare that they have seen/read and approved the final version of the article ready for publication.

Declaration of Conflicts of Interest

All authors declare that there is no conflict of interest related to this article.

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