

DIVERSITY OF WILD MEDICINAL PLANTS IN THE VEGETABLE CULTIVATION AREAS IN THUONG TIN DISTRICT, HANOI CITY

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Abstract. Evaluation of the diversity of wild medicinal herbs contributes to creating the basis for the effective management, exploitation, and usage of medicinal plant resources in ecosystems. This study has listed 170 species of wild plants belonging to 119 genera, 50 families, 28 orders, and 2 phyla, Pteridophyta, and Magnoliophyta with medicinal value. Whole plants or up to 10 parts of local wild medicinal plants are used in the prevention and treatment of 20 common diseases.

Keywords: diversity, wild medicinal plants, vegetable cultivation areas, Thuong Tin.

1. Introduction

From ancient times, many species of wild plants have played an important role in providing nutrients and health care for humans. Today, many researchers have confirmed the use of many plants in supporting the treatment of diseases, making tonics to help improve health. Using wild plants as medicine not only brings certain therapeutic effects but also helps reduce treatment costs. This is even more significant for low-income communities with little access to modern medicine in developing countries such as Myanmar [1], Ethiopia [2]. According to the World Health Organization (WHO), more than 80% of the world's rural population use traditional wild plants as an important source of medicine for health care due to their effectiveness, availability, and low cost [3].

Vietnam is in the tropical monsoon humid belt with diverse flora and medicinal flora. Ethnic medicine has a long history with a wealth of knowledge about using plants as folk medicine, traditional remedies of famous doctors, or indigenous knowledge of many ethnic minorities. "Dictionary of Medicinal Plants in Vietnam" (V.V. Chi, 2012) [4] listed 4,700 species of medicinal plants. In 2016, the National Institute of Medical Substances introduced the List of Vietnamese medicinal plants with 5,117 species and subspecies, belonging to 1,823 genera, 360 families of 8 phyla of vascular plants, along with several taxa belonging to the group of Bryophyta, Algae, and Fungi [5]. The increasing number of medicinal plant species demonstrates the potential for the exploitation of medicinal plants.

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Researches on wild medicinal plants often focuses on their natural habitats, mainly forest ecosystems, nature reserves, and high mountainous areas [6-9], as well as the experience of using medicinal plants of local ethnic minorities [10, 11]. There is few literature on wild medicinal plants in agricultural ecosystems. In these habitats, wild plants are often removed because they compete for nutrients with cultivated vegetables. Moreover, the use of herbicides destroys wild plants, including beneficial ones. When studying vegetable cultivation areas in Thuong Tin, Hanoi, we have recorded that many species of wild plants are used as tonics or supplements for disease prevention and treatment. Therefore, this research aims to determine local medicinal plant species has scientific and practical meaning. In order to contribute to creating a basis for management, exploitation, and rational use in order to develop medicinal plant resources as well as preserving biodiversity in the vegetable farming ecosystem in Thuong Tin district, Hanoi.

2. Content

2.1. Materials and methods

* *Materials*

This study focused on the vascular plants for medicinal use in the vegetable cultivation areas in Tan Minh, Van Phu, Nguyen Trai, Ha Hoi, and Le Loi communes, Thuong Tin district, Hanoi.

* *Methods*

- *Field research:*

Field research was performed using the typical standard selection method in the biome [12]. Fifty standard plots were established at the survey site. Each plot has an area of 20 m x 20 m, containing vegetable beds and paths between beds in Ha Hoi, Tan Minh, Nguyen Trai and Van Phu commune. Particularly in Le Loi commune, only 20 standard plots can be established due to the small area for organic vegetable cultivation (about 2 hectares). The fields for typical crops in the area were selected for sampling. Sample collection period is from October 2021 to July 2022.

Sampling: All samples were collected with complete stems, branches, leaves, and reproductive organs such as flowers and fruits, and sufficiently preserved.

Sample photographing: It is crucial to preserve sample photos for classification and further preservation. A standard sample photo must meet the following requirements: (1) Samples are observed completely and naturally; (2) All plant parts are shown clearly; (3) Every abnormality or specialty is captured.

Sampling principle: Every sample must be a whole plant. Three to ten samples are collected for each species.. Samples are numbered by research areas from the first to the last. Easily recognizable natural characteristics are recorded such as bark characteristics, size, flower color, fruit, gum, odor. Each sample is placed in a separate sack with a complete information of the plants.

- *Lab research:*

Sample handling in the laboratory: Each sample was placed neatly on a large newspaper folded into quarters of about 30 x 40 cm with so that each leaf, flower, fruit

were kept separately by small pieces of newspapers to avoid adhesion during drying. Particularly for large fruits: were sliced vertically and horizontally. The newspapers were wet with alcohol. Paper bags were stacked, pressed tightly and put into large polyethylene bags and transferred to the drying room.

Sample identification, and scientific name searching by comparative morphological methods, according to Pham Hoang Ho (1999-2003) [13], Nguyen Nghia Thin (2008) [14], Vo Van Chi (2007) [15].

Angiosperms are categorized according to Takhtajan (2009) [16]. Plant nomenclatures are determined according to The Plant List [17]. Species names in the family are sorted in alphabetical order.

The diversity of medicinal plant resources was evaluated: based on target diseases and medicinal parts according to Vo Van Chi (2012) [4], Do Tat Loi (2004), [18] and National Institute of Medicinal Materials (2016) [5].

2.2. Results and discussion

2.2.1. Diversity in species composition

Wild plants with medicinal value are mostly herbaceous plants, and a few are shrubs, small trees growing on the edge of fields, or perennial trees for shade (field banks or in the middle of vegetable fields). The number of small wild plants growing in vegetable fields is often low because they are heavily influenced by farmers' weed management measures.

Total 170 species of wild plants with medicinal value were identified in the vegetable cultivation areas in Thuong Tin district, Hanoi. They belong to 119 genera, 50 families, and 28 orders of 2 phyla Polypodiophyta and Magnoliophyta (Table 1).

Table 1. Taxonomic distribution at phylum level for wild medicinal plants in vegetable cultivation areas in Thuong Tin district, Hanoi

Phylum	Class		Order		Family		Genus		Species	
	Qty	%	Qty	%	Qty	%	Qty	%	Qty	%
Polypodiophyta	1	33.33	3	10.71	5	10.00	5	4.21	5	2.94
Magnoliophyta	2	66.67	25	89.29	45	90.00	114	95.79	165	97.06
Total	3	100	28	100	50	100	119	100	170	100

(Qty: quantity)

According to the result, the Magnoliophyta is predominant with 165 species compared to the 5 species of the Polypodiophyta; in which Magnoliopsida has 139 species and Liliopsida has 26 species.

Among medicinal plants of vegetable cultivation areas in Thuong Tin district, Asteraceae is the most popular family with the largest number of 25 species accounting for 14.70% of total identified species (Table 2). Ten most species-rich families taking up 20% of total families consist of 60 genera (50.42% of genera), and 97 species (57.06% of species).

Table 2. Specise-rich families of wild medicinal plants in Thuong Tin's vegetable cultivation areas, Hanoi

No.	Family	Genus		Species	
		Qty	Percentage (%)	Qty	Percentage (%)
1	Asteraceae	22	18.49	25	14.71
2	Euphorbiaceae	6	3.53	12	7.01
3	Poaceae	10	5.88	10	5.88
4	Moraceae	3	1.76	10	5.88
5	Cyperaceae	3	1.76	8	4.71
6	Amaranthaceae	4	2.35	7	4.12
7	Scrophulariaceae	4	2.35	7	4.12
8	Polygonaceae	3	1.76	7	4.12
9	Fabaceae	3	1.76	6	3.53
10	Solanaceae	2	1.12	5	2.94
Total		60	35.29	97	57.06

For any flora, the analysis of the ratio between total species number of the ten richest families and the total species of the community is crucial to distinguish ecological characteristics and species diversity of the flora. Most reports on medicinal plant diversity showed that the diversity of the ten richest families is less than 50%. In Thuong Tin vegetable cultivation areas, this value is 57.06%, so it has a high prepotency. Among the above 10 families, 6 families including Asteraceae, Fabaceae, Euphorbiaceae, Poaceae, Cyperaceae, Amaranthaceae are also among the 10 richest medicinal families in Go Thap National Monument, Dong Thap province [19]. There are 4/10 families including Asteraceae, Fabaceae, Poaceae, Amaranthaceae listed among the 10 richest medicinal families in Cam Mountain, An Giang [9]. In Cam Mountain area, there are a few species-rich families, but in Thuong Tin's vegetable cultivation areas, there are no species of these families, which are the Dioscoreaceae, Apocynaceae, Annonaceae. Compared with rich families of medicinal plants in Phu Luong district, Thai Nguyen, 5 out of 10 families are also rich in vegetable cultivation areas in Thuong Tin, Hanoi including Asteraceae, Fabaceae, Euphorbiaceae, Poaceae, and Moraceae [7]. Thereby, we can see the richness of medicinal plants in the Asteraceae, Moraceae, Fabaceae, Euphorbiaceae families. These are all species-rich plant families e.g. Asteraceae is the richest family, Fabaceae ranks the third, Euphorbiaceae ranks the fifth [20]; while Moraceae ranks the second to the eighth in tropical habitats [21]. Species-rich families are important for biodiversity preservation. Research and exploitation of species belonging to rich families and genera can be expanded when they are closely related to species with medicinal value, thereby reducing exploitation pressure, and increasing production.

Besides the families that have many plant species with medicinal value, there are 22/50 families (44.00%) with only 1 species. This shows the significance of monotypic families in the biodiversity of medicinal flora here. The loss of any species in these families will significantly reduce the diversity of plants in this area.

Among the families, Asteraceae is the richest family with 22 genera, of which 3 genera have 2 species: *Ageratum*, *Erigeron*, *Gnaphalium*, and the rest are monotypic genera. The second richest family is Poaceae with 10 genera and 10 species. Among the genera, *Ficus* has the highest number of medicinal plant species with 8 species, followed by *Cyperus* with 5 species; then *Ludwigia* and *Lindernia* with 4 species each.

Table 3. Genera rich in medicinal plant species in the vegetable cultivation areas, Thuong Tin district, Hanoi

No.	Genus	Family	Number of species	Percentage (%)
1	<i>Ficus</i>	Moraceae	8	4.71
2	<i>Cyperus</i>	Cyperaceae	5	2.94
3	<i>Lindernia</i>	Lamiaceae	4	2.35
4	<i>Ludwigia</i>	Onagraceae	4	2.35
5	<i>Amaranthus</i>	Amaranthaceae	3	1.76
6	<i>Cleome</i>	Capparaceae	3	1.76
7	<i>Acalypha</i>	Euphorbiaceae	3	1.76
8	<i>Euphorbia</i>		3	1.76
9	<i>Phyllanthus</i>		3	1.76
10	<i>Persicaria</i>	Polygonaceae	3	1.76
11	<i>Rumex</i>		3	1.76
12	<i>Solanum</i>	Solanaceae	3	1.76
13	<i>Commelina</i>	Commelinaceae	3	1.76

2.2.2. Diversity of used parts

Researches on used parts of medicinal plants are important to determine methods of harvesting, processing, and making use of wild medicinal plants, along with rationally exploiting, conserving, as well as sustainably developing valuable resources for the locality. For the 170 species of wild medicinal plants recorded in this research, each species has one, two, or more different parts or the whole plant to cure various diseases.

There are 99 species, of which the whole plant is used to make medicine, accounting for 58.24% of total recored medicinal plant species. There are 58 species whose leaves are used (34.11%). There is only one species whose essential oil is used as medicine - *Chenopodium ambrosioides* L.

Table 4. Plant organs used for medicine

No.	Plant organ*	Number of species	Percentage %
1	Whole plant	99	58.25
2	Leaf	58	34.12
3	Root	32	18.82
4	Stem	13	7.65
5	Seed	13	7.65
6	Fruit	10	5.88
7	Tuber	6	3.53
8	Resin	6	3.53
9	Flower	5	2.94
10	Bark	5	2.94
11	Oil	1	0.59

(* Each species can have more than one medicinal part)

2.2.3. Diversity of medicinal plants according to the groups of diseases

According to the documents of Vo Van Chi (2012) [4], Do Tat Loi (2004) [18] and the experience of local people, it is possible to divide medicinal plant species in the study area into 20 major groups of diseases, for which they are traditionally used. Among them, the group of plants for the liver, bile, and urologic diseases have the largest number (85 species); followed by those for cold, fever, headache, detoxification (81 species), and skin diseases (77 species). Among the medicinal plants, there are 2 poisonous species that need to be used with caution, which are: *Typhonium blumei* Nicolson & Sivad and *Chenopodium ambrosioides* L.; and two species not recommended for pregnant women including *Chenopodium ambrosioides* L. and *Peristrophe bivalvis* (L.) Merr.).

Table 5. The number of medicinal plants for different disease groups

No.	Disease group	Number of species	Percentage %
1	Liver, kidney, bile, urinary tract	85	50.00
2	Cold, fever, headache, detoxification	81	47.65
3	Skin disease	77	45.29
4	Digestive system, metabolism, hemorrhoids	65	38.24
5	Respiratory system, cough, asthma	59	34.71
6	Eyes, ears, nose, teeth, throat	57	33.53
7	Rheumatoid arthritis, joint pain, swelling	54	31.76
8	Women gynaecology	52	30.59
9	Dysentery	49	28.82
10	Animal bites, stings	32	18.82
11	Indigestion, constipation	23	13.53
12	Stomach pain	16	9.41
13	Bleeding control	12	7.06
14	Sexually transmitted diseases	11	6.47

15	Worms	11	6.47
16	Sedatives	10	5.88
17	Pregnancy and breastfeeding	9	5.29
18	Tonic	9	5.29
19	Hypertension, heart disease	7	4.12
20	Men gynaecology	4	2.35

(* One species can be used as medicine to cure some different diseases)

Among them, the species used for the treatment of most diseases were *Erigeron canadensis* L. of Asteraceae and *Alternanthera sessilis* (L.) R.Br. ex DC. of Amaranthaceae with ten groups of diseases. There are six species that only participate in the treatment of one single group of diseases, namely *Parthenium hysterophorus* L., *Acalypha brachystachya* Hornem, *Leonurus japonicus* Houtt, *Peperomia pellucida* (L.) Kunth., *Fimbristylis aestivalis* (Retz.) Vahl., *Echinochloa crus-galli* (L.) Beauv.

Table 6. List of wild medicinal plants in vegetable cultivation areas, Thuong Tin district, Hanoi

No.	Plants	Disease group (a)	Used parts (b)	Note
	POLYPODIOPHYTA			
	Polypodiopsida			
	Aspleniaceae			
1	<i>Diplazium esculentum</i> (Retz.) Sw.	1, 2, 5, 11	A	
	Marsileaceae			
2	<i>Marsilea quadrifolia</i> L.	1, 2, 3, 6, 8, 10, 16	C, D	
	Parkeriaceae			
3	<i>Ceratopteris thalictroides</i> (L.) Brongn.	1, 3, 8	A	
	Pteridaceae			
4	<i>Pteris vittata</i> L.	9, 10	A	
	Thelypteridaceae			
5	<i>Cyclosorus parasiticus</i> (L.) Fawell.	10, 13	D	
	MAGNOLIOPHYTA			
	Magnoliopsida			
	Acanthaceae			
6	<i>Clinacanthus nutans</i> (Burm.f.) Lindau	7, 8	D	
7	<i>Dicliptera chinensis</i> (L.) Juss.	1, 3, 4	D	
8	<i>Justicia gendarussa</i> Burm.f.	1, 2, 3, 4, 5, 7, 8	B, D	
9	<i>Peristrophe bivalvis</i> (L.) Merr.	1, 4, 5, 7, 9	A, D	Do not use for pregnant
	Amaranthaceae			

10	<i>Achyranthes aspera</i> L.	1, 2, 6, 7, 8, 9	B	
11	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	1, 2, 3, 4, 5, 6, 8, 9, 10, 17	A	
12	<i>Amaranthus lividus</i> L.	9, 10	A	
13	<i>Amaranthus spinosus</i> L.	1, 3, 8, 9, 14	A	
14	<i>Amaranthus tricolor</i> L.	2, 6, 8, 9, 10, 11, 18	A, G	
15	<i>Celosia argentea</i> L.	1, 4, 6, 8, 9, 13	A	
16	<i>Celosia argentea</i> L. var. <i>cristata</i> L.	1, 8, 10, 13	E, G	
	Apiaceae			
17	<i>Centella asiatica</i> (L.) Urb	1, 2, 3, 4, 5, 6, 9	A	
18	<i>Hydrocotyle sibthorpioides</i> Lam.	1, 2, 4, 5, 6	A	
	Asclepiadaceae			
19	<i>Calotropis gigantea</i> (L.) Dryand.	3, 4, 5, 6, 10, 14, 15, 19	D	
	Asteraceae			
20	<i>Acmella paniculata</i> (Wall. Ex DC.) R.K.Jansen	2, 5, 6	D	
21	<i>Ageratum conyzoides</i> (L.) L.	6, 8	A	
22	<i>Ageratum houstonianum</i> Mill.	2, 3, 6, 13	A	
23	<i>Bidens pilosa</i> L.	2, 3, 4, 6, 9, 10	A, E	
24	<i>Blumea lacera</i> (Burm.f.) DC.	1, 2, 8, 11, 13, 16	A	
25	<i>Centipeda minima</i> (L.) A.Braun & Asch	2, 4, 5, 6, 7, 9, 15	A	
26	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	2, 3, 4, 6, 7	B, D	
27	<i>Conyza japonica</i> (Thunb.) Less.	2, 5, 6, 16	A	
28	<i>Crassocephalum crepidioides</i> (Benth.) S. Moore	4, 11	D	
29	<i>Cyanthillium cinereum</i> (L.) H.Rob.	2, 3, 4, 8, 12, 18	A, D	
30	<i>Eclipta prostrata</i> (L.) L.	5, 6, 13	A	
31	<i>Emilia sonchifolia</i> (L.) DC.	2, 3, 5, 6	A	
32	<i>Erigeron canadensis</i> L.	1, 2, 3, 4, 5, 7, 8, 9, 12, 13	A, D	
33	<i>Erigeron crispus</i> Pourr.	2, 7, 10	A	
34	<i>Gnaphalium luteo-album</i> L.	5, 6, 7	A, D	
35	<i>Gnaphalium polycaulon</i> Pers.	2, 3, 5, 6, 7, 8, 9, 11	A	
36	<i>Gynura procumbens</i> (Lour) Merr.	1, 5, 8	A	
37	<i>Lactuca indica</i> L.	2, 3, 8, 10, 12, 18	A	

38	<i>Parthenium hysterophorus</i> L.	3	C, D	
39	<i>Pluchea indica</i> (L.) Less.	5, 7	D	
40	<i>Sonchus wightianus</i> DC.	1, 2, 4, 5, 6, 9, 17	A	
41	<i>Sphagneticola calendulacea</i> (L.) Pruski	3, 6, 7, 8	A	
42	<i>Synedrella nodiflora</i> (L.) Gaertn.	2, 3, 6, 7, 12	A, D	
43	<i>Xanthium strumarium</i> L.	3, 6, 7	F	
44	<i>Youngia japonica</i> (L.) DC.	1, 2, 3, 6, 9	A	
	Bombacaceae			
45	<i>Bombax ceiba</i> L.	1, 4, 7, 8, 9, 11,12, 13, 14	B, E, I, K	
	Boraginaceae			
46	<i>Heliotropium indicum</i> L.	2, 3, 4, 5, 6, 7, 9, 20	A	
	Brassicaceae			
47	<i>Cardamine hirsuta</i> L.	4, 9	A, B, D	
48	<i>Rorippa dubia</i> (Pers.) H.Hara	1, 2, 4, 5, 6, 7	A, G	
49	<i>Rorippa indica</i> (L.) Hiern	1, 2, 3, 4, 5, 6, 7, 8,10	A	
	Capparaceae			
50	<i>Cleome gynandra</i> L.	2, 3, 7, 10	D, G	
51	<i>Cleome rutidosperma</i> DC.	1, 2, 5, 10, 11	A, B, D	
52	<i>Cleosome viscosa</i> L.	2, 6	D	
	Caryophyllaceae			
53	<i>Stellaria aquatica</i> (L.) Scop.	3, 9, 17	A	
	Chenopodiaceae			
54	<i>Chenopodium ambrosioides</i> L.	5, 12, 15, 16	D, L	- Poisonous - Do not use for pregnant
55	<i>Chenopodium ficifolium</i> Sm.	1, 4, 9, 10, 11, 14, 20	B, C, D	
	Convolvulaceae			
56	<i>Ipomoea digitata</i> L.	1,3, 7, 8 , 11, 17	B	
57	<i>Ipomoea obscura</i> (L.) Ker Gawl.	3, 4	D	
58	<i>Merremia hederacea</i> (Burm.f.) Hallier f.	3, 6, 11	A, D, G	
	Cucurbitaceae			
59	<i>Zehneria indica</i> (Thunb.) H.Y.Liu	1, 2	A	
	Cuscutaceae			
60	<i>Cuscuta japonica</i> Choisy	1, 6, 7, 9,20	G	

	Elaeocarpaceae			
61	<i>Muntingia calabura</i> L.	1, 8	D	
	Euphorbiaceae			
62	<i>Acalypha australis</i> L.	1, 3, 4, 5, 7, 8, 9, 10	A	
63	<i>Acalypha brachystachya</i> Hornem.	9	A	
64	<i>Acalypha indica</i> L.	3, 5, 10, 11	A, D	
65	<i>Euphorbia antiquorum</i> L.	2, 3, 4, 6, 12	C	
66	<i>Euphorbia hirta</i> L.	3, 5, 9	A, D	
67	<i>Euphorbia thymifolia</i> L.	3, 9	A	
68	<i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt.	3, 10	B, C, D, I	
69	<i>Phyllanthus amarus</i> Schum.	1, 2, 4	A	
70	<i>Phyllanthus reticulatus</i> Poir.	2, 3, 7	B, D	
71	<i>Phyllanthus urinaria</i> L.	1, 2, 4	A	
72	<i>Ricinus communis</i> L.	2, 4	D	
73	<i>Triadica sebifera</i> (L.) Small	1, 3, 10	B, D	
	Fabaceae			
74	<i>Desmodium styracifolium</i> (Osbeck) Merr.	1, 2, 3, 5, 8	A	
75	<i>Desmodium triflorum</i> (L.) DC.	2, 4, 8, 9	A, D	
76	<i>Mimosa pudica</i> L.	1, 5, 7, 8, 16	B	
77	<i>Senna tora</i> (L.) Roxb.	3, 6, 11, 16, 19	G	
78	<i>Senna hirsuta</i> (L.) H.S. Irwin & Barneby	1, 3, 7, 9	D, G	
79	<i>Senna occidentalis</i> (L.) Link	1, 3, 4, 7, 8, 9, 11	C, D, G	
	Lamiaceae			
80	<i>Leonurus japonicus</i> Houtt.	8	A	
81	<i>Ocimum gratissimum</i> L.	2, 3, 7, 12	A	
82	<i>Salvia plebeia</i> R. Br.	1, 3, 5, 6, 8, 14, 19	A	
	Lythraceae			
83	<i>Ammannia baccifera</i> L.	1, 3, 7, 8	A	
	Malvaceae			
84	<i>Abelmoschus moschatus</i> Medik.	1, 3, 10, 12	B, D, G	
85	<i>Abutilon indicum</i> (L.) Sweet	1, 2, 3, 6, 8, 9	C, D, F	
86	<i>Sida rhombifolia</i> L.	1, 2, 5, 7, 12	A	
87	<i>Urena lobata</i> L.	2, 3, 4, 6, 7, 8, 9, 10	A, B	
	Menispermaceae			
88	<i>Stephania japonica</i> (Thunb.) Miers.	1, 3, 5, 9	A	

89	<i>Stephania longa</i> Lour.	1, 2, 7	A	
	Moraceae			
90	<i>Broussonetia papyrifera</i> (L.) L'Her. Ex Vent.	2, 5, 9, 11, 13	D, F, I	
91	<i>Ficus auriculata</i> Lour.	4, 9, 15	F, K	
92	<i>Ficus benghalensis</i> L.	1, 4, 7, 9, 14	B, I, K	
93	<i>Ficus benjamina</i> L.	3, 5, 7	A	
94	<i>Ficus elastica</i> Roxb. ex Horn.	1, 2, 3	B, D	
95	<i>Ficus heterophylla</i> L. f.	7, 8, 18	F	
96	<i>Ficus hispida</i> L. f.	2, 18	B, D	
97	<i>Ficus racemosa</i> L.	1, 2, 4, 5, 7, 11, 17, 18	A, E	
98	<i>Ficus religiosa</i> L.	4, 9	K	
99	<i>Morus nigra</i> L.	4, 6, 11, 18	B, I	
	Onagraceae			
100	<i>Ludwigia hyssopifolia</i> (G.Don) Exell	2, 3, 4, 6, 7, 9, 14	A	
101	<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	1, 2, 3, 4, 6, 8, 9, 15	A	
102	<i>Ludwigia perennis</i> L.	1, 2, 4, 9	A	
103	<i>Ludwigia prostrata</i> Roxb.	1, 3, 4, 5, 6, 7, 9	A	
	Oxalidaceae			
104	<i>Oxalis corniculata</i> L.	2, 7, 11, 19	B, C, D	
105	<i>Oxalis debilis</i> Kunth.	1, 2	A	
	Passifloraceae			
106	<i>Passiflora foetida</i> L.	3, 5, 8, 16	A, D	
	Piperaceae			
107	<i>Peperomia pellucida</i> (L.) Kunth	2	A	
	Plantaginaceae			
108	<i>Plantago asiatica</i> L.	1, 5, 9	A	
	Polygonaceae			
109	<i>Persicaria chinensis</i> (L.) H. Gross	3, 4, 10	A, D	
110	<i>Persicaria hydropiper</i> (L.) Delarbre	3, 4, 7, 9, 10, 11, 13, 15, 19	A	
111	<i>Persicaria maculosa</i> Gray	4, 5	B	
112	<i>Polygonum plebeium</i> R.Br.	1, 2, 7, 10	A	
113	<i>Rumex crispus</i> L.	1, 3, 4, 7	B, D	
114	<i>Rumex japonicus</i> Houtt	1, 2, 3, 4, 13	A	
115	<i>Rumex maritimus</i> L.	3, 4, 11	B, D	
	Portulacaceae			
116	<i>Portulaca oleracea</i> L.	1, 3, 14, 15	C, D	
117	<i>Portulaca quadrifida</i> L.	1, 15	D, G	

	Ranunculaceae			
118	<i>Ranunculus sceleratus</i> L.	2, 3, 6, 7, 8, 17	A	
	Rubiaceae			
119	<i>Oldenlandia corymbosa</i> L.	2, 5, 7, 10	A	
120	<i>Paederia foetida</i> L.	1, 4, 7, 9, 12	D	
	Rhamnaceae			
121	<i>Berchemia lineata</i> (L.) DC.	1, 2, 4, 5, 7, 8, 12, 14, 20	B	
	Sapindaceae			
122	<i>Cardiospermum halicacabum</i> L.	1, 2, 3, 4, 5, 6	A	
	Solanaceae			
123	<i>Physalis angulata</i> L.	1, 2, 3, 5	A	
124	<i>Physalis peruviana</i> L.	2, 3, 5, 6, 8	A, F	
125	<i>Solanum americanum</i> Mill.	1, 4, 5, 7, 11	D	
126	<i>Solanum torvum</i> Sw.	3, 6, 8, 10, 12	B, F	
127	<i>Solanum viarum</i> Dunal.	1, 2, 5, 6	A, C, D, F, G	
	Scrophulariaceae			
128	<i>Bacopa monnieri</i> (L.) Wettst	1, 2, 3, 4, 5, 6, 7, 9, 16	A	
129	<i>Lindernia anagallis</i> (Burm. f.) Penn.	1, 3, 4, 6, 8, 9, 14	A, D	
130	<i>Lindernia antipoda</i> (L.) Alston.	4, 5, 6, 10, 15	A	
131	<i>Lindernia crustacea</i> (L.) F. Muell.	1, 4, 6, 8, 9, 10	A	
132	<i>Lindernia ruellioides</i> (Colsm.) Spreng	3, 6	D	
133	<i>Scoparia dulcis</i> L.	1, 2, 3, 5, 8	A	
134	<i>Mazus pumilus</i> (Burm. f.) Steen	1, 2	A	
	Urticaceae			
135	<i>Boehmeria nivea</i> (L.) Gaudich	1, 8, 13, 17	B, D	
136	<i>Pilea microphylla</i> (L.) Liebm	4, 12	A	
137	<i>Pouzolzia hirta</i> Blume ex Hask.	4, 6, 9, 11, 16	A	
138	<i>Pouzolzia zeylanica</i> (L.) Benn	1, 5	A	
	Verbenaceae			
139	<i>Clerodendrum chinense</i> (Osbeck) Mabb.	2, 4, 6, 7, 8, 19	D, E	
140	<i>Duranta erecta</i> L.	1, 2, 3, 4	D, E, F	
141	<i>Stachytarpheta jamaicensis</i> (L.) Vahl.	1, 2, 3, 4, 6, 7 9, 14, 15	B, D	
	Violaceae			
142	<i>Viola inconspicua</i> Blume.	6, 8	A	
	Vitaceae			
143	<i>Ampelopsis heterophylla</i> (Thunb.)	3, 7	C, D	

	Sieb. & Zucc.			
144	<i>Cayratia japonica</i> (Thunb.) Gagnep.	1, 4, 10	B, D	
	Liliopsida			
	Araceae			
145	<i>Alocasia macrorrhizos</i> (L.) G.Don			
146	<i>Colocasia esculenta</i> (L.) Schott.			
147	<i>Typhonium blumei</i> Nicolson & Sivad.			- Poisonous
	Cannaceae			
148	<i>Canna indica</i> L.	2, 6, 11	B, G	
	Commelinaceae			
149	<i>Commelina benghalensis</i> L.	1, 2, 5, 11	A	
150	<i>Commelina communis</i> L.	2, 4, 5, 6, 7, 9	A	
151	<i>Commelina diffusa</i> Burm.f.	1, 2, 3, 7	A, B	
	Costaceae			
152	<i>Cheilocostus speciosus</i> (I. Koenig) C.D. Specht	1, 2, 5	C	
	Cyperaceae			
153	<i>Cyperus difformis</i> L.	2, 4	A	
154	<i>Cyperus esculentus</i> L.	4, 5, 8, 18	H	
155	<i>Cyperus iria</i> L.	1, 7, 8, 18	A, B	
156	<i>Cyperus malaccensis</i> Lam.	1, 4, 8	H	
157	<i>Cyperus rotundus</i> L.	2, 4, 5, 8, 12	H	
158	<i>Fimbristylis aestivalis</i> (Retz.) Vahl.	3	A	
159	<i>Fimbristylis miliacea</i> (L.) Vahl.	2, 17	A	
160	<i>Kyllinga brevifolia</i> Rottb.	1, 2, 5, 6, 7, 9	A	
	Poaceae			
161	<i>Chloris virgata</i> Sw.	1, 15	A	
162	<i>Chrysopogon aciculatus</i> (Retz.) Trin.	1, 2	B	
163	<i>Cynodon dactylon</i> (L.) Pers.	1, 2, 4	A	
164	<i>Echinochloa crus-galli</i> (L.) Beauv.	3	A	
165	<i>Eleusine indica</i> (L.) Gaertn.	5, 19	A	
166	<i>Eragrostis cilianensis</i> (All.) Janch.	1, 3, 6	A	
167	<i>Imperata cylindrica</i> (L.) P.Beauv.	1, 2, 8	H	
168	<i>Leptochloa chinensis</i> (L.) Nees.	1, 5	A	
169	<i>Lophatherum gracile</i> Brongn.	1, 2, 5	B	
170	<i>Panicum repens</i> L.	1, 8, 10	H	

a: disease groups in Table 5; b: A: whole plant; B: root; C: stem; D: leaf; E: flower;
F: fruit; G: seed; H: tuber; I: bark; K: resin; L: oil.

3. Conclusions

Vascular plants for medicinal purposes in vegetable cultivation areas of Thuong Tin district, Hanoi were identified including 170 species belonging to 119 genera, 50 families, 28 orders, and 2 phyla: 5 species of Polypodiophyta and 165 species of Magnoliophyta. The ten most species-rich families account for 57.06% of the species. Among medicinal plant family, the richest is Asteraceae with 25 species; The most species-rich genus is *Ficus* (Euphorbiaceae) and there are 22/50 plant families with only one species having medicinal value.

Local wild medicinal plants are partly or as a whole used to prevent and treat 20 common disease groups. There are two species which poisonous and need to be used with caution and two species are not able to be used for pregnant women.

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