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Medicinal plants of the Meinit ethnic group of Ethiopia: An ethnobotanical study

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ABSTRACT

Ethnopharmacological relevance: The majority of the Ethiopian people, including the Meinit ethnic group, are highly dependent on medicinal plants for their day-to-day public healthcare and veterinary needs. The existence of medicinal plants and the associated knowledge is, however, currently being threatened mainly due to deforestation, environmental degradation and acculturation. Thus, there is an urgent need to document and analyse the knowledge.
Aim of study: The aim of this study was to record and analyse local knowledge of the Meinit people of Ethiopia on the use of plants to treat or cure diseases of humans and domestic animals.
Materials and methods: Ethnobotanical data were gathered through series of individual interviews conducted with selected informants representing different social groups within the Meinit Community. Fidelity Level (FL) values were calculated to estimate the healing potentials of claimed medicinal plants.
Results: The study revealed 51 medicinal plants, most of which were herbs. Root was the most frequently used part in remedy preparation. The majority of medicinal plants were not cultivated. Significantly higher numbers of medicinal plants were cited by men than women, by older people than younger ones and by illiterate people than literate ones. *Rumex nepalensis* Spreng., *Leucas deflexa* Hook.f. and *Embelia schimperi* Vatke were the medicinal plants that scored the highest FL values.
Conclusions: Acculturation of the young generation has been found to be the major treat to the continuation of traditional medical knowledge and practice in the study area. Efforts should, therefore, be made to incorporate traditional medicine in school curricula so that younger people could appreciate its usefulness. Priority for further Pharmaco-chemical investigation should be given to plants that scored highest FL values, as such values could indicate better efficacy.

1. Introduction

Despite the significant role of medicinal plants in supporting the Ethiopian national primary healthcare, little work (Abate, 1989; Abbink, 1995; Abebe and Ayehu, 1993; Giday et al., 2003; Giday et al., 2007; Lulekal et al., 2008; Tadesse and Demissew, 1992; Teklehaymanot and Giday, 2007; Wondimu et al., 2007; Yineger et al., 2007; Yineger and Yewhalaw, 2007; Yineger et al., 2008) has so far been made to properly document the associated knowledge and promote its practices. On the other hand, medicinal plants and the associated knowledge are being seriously depleted due to deforestation, environmental degradation and acculturation that have been taking place in the country for quite a long time, which could ultimately result in the weakening of primary healthcare services in Ethiopia, as most of the people are highly dependent on plant-based traditional medical practices. As more and more medicinal plants and the associated knowledge are lost, the potential for the future development of modern herbal drugs could also be compromised. Urgent ethnobotanical studies and subsequent conservation measures are, thus, needed to salvage the medicinal plants and the associated knowledge from further loss.

Abbink (1993) attempted to document medicinal plant knowledge of the Meinit people. His data, however, were of qualitative nature, unsuitable for statistical analysis. Many of the medicinal plants he recorded were also not identified by their scientific names. Hence, the purpose of this ethnobotanical study was to record and analyse medicinal plant knowledge of the Meinit people in Southwest Ethiopia using formal approaches (both qualitative and quantitative) that are suitable for descriptive and quantitative analyses as well as hypothesis testing. The study also tried to produce a more complete and scientifically authenticated list of Meinit medicinal plants.

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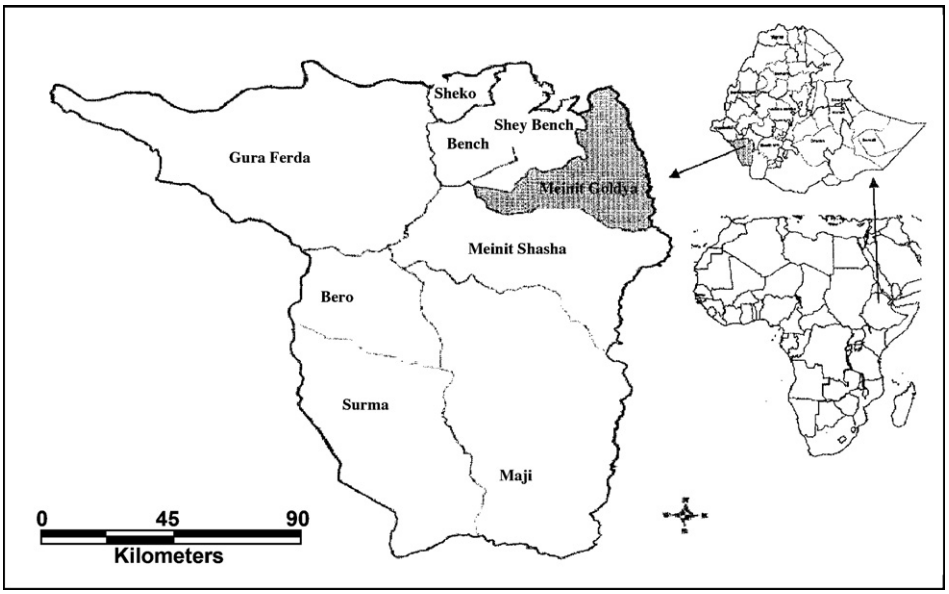

Fig. 1. Map of Bench-Maji Zone divided into nine districts: shaded area shows Meinit-Goldya District.

2. Materials and methods

2.1. Description of the people and their area

The Meinit (Me'en) people predominantly reside in Meinit-Goldya and Meinit-Shasha districts of Bench-Maji Zone in southwest Ethiopia, distributed over semi-highland and lowland areas. Bench-Maji is endowed with diverse and relatively intact traditional cultures and relatively better forest cover as compared to other parts of the country. Mizan Teferi (7°04′N, 35°30′E) is an administrative town for the Zone and is located at 561 km southwest of the capital, Addis Ababa. According to the 1994 national census report (CSA, 1996), the Meinit population reaches 52,808. The Language of the Meinit people, called after their name, belongs to the greater Nilotic languages group (Ethiopian Mapping Authority, 1988). Meinit people living in semi-highland areas are settled farmers while those that inhabit lowland areas are either semi-pastoralists or pastoralists. The Meinit commonly cultivate field crops such as maize, sorghum, beans, peas, teff and wheat. In homegardens, they grow cabbage peppers, pumpkin, root crops such as taro and various spice plants. They also raise cattle, goat and sheep.

This study involved Meinit people residing in the Meinit-Goldya District (Fig. 1). According to the 1994 national census report (CSA, 1996), the District supports a population of 35,541 people, the majority of which belong to the Meinit ethnic group. The District is largely a semi-highland area with an annual rainfall ranging between 900 mm and 1400 mm (Westphal, 1975). Meinit-Goldya is divided into 28 sub-districts (kebeles). Bachuma town, located at 87 km east of Mizan Teferi, town is the seat of the District's administration.

Intestinal parasitic infections, skin-related diseases, malaria, respiratory tract infections and typhoid fever are the major health problems in the District. Currently, one health centre, two clinics and two health posts are available in the District, accessible to about 38% of the population (Hamus Mekuria, Health Desk, Bench-Maji Zone, personal communication). Blackleg, pasteurellosis and internal parasitic infections are diseases of major veterinary importance in the District. At present, the District has two veterinary clinics and five animal health posts.

2.2. Selection of study area and informants

For the ethnobotanical study, four sub-districts (Goma, Chat, Adey Abeba and Teramaj) with varying distances from main road/modern healthcare facilities and vegetation cover were sampled from the Meinit-Goldya District. The study involved 100 informants, from the age of 18 to 70, encountered in houses during random walks made in the selected sub-districts and willing to participate in the study. Traditional medicine apprenticeship among the Meinits begins at the age of 10. At the age of 18, the transfer of the knowledge is expected to be more or less complete. For comparative purpose, 10 more informants from each sub-district, identified as knowledgeable by local residents, were included in the study. Quota sampling method was employed to balance the numbers of male and female informants. Oral consent was sought from each informant before interview.

2.3. Data collection methods

Ethnobotanical data were collected between April 2004 and October 2006 mainly through individual interviews with the selected informants using semi-structured interview format following the approach of Martin (1995). Interviews were conducted in Meinit language with the help of a translator and responses were recorded in English. Data collection focused mainly on the kind of ailments (of human and livestock) treated or prevented and medicinal plants used, ways of remedy preparations, route of administration and dosage. Information on local marketability, cultivation practices, habitat and abundance of medicinal plants was also recorded. Specimens for most of the reported medicinal plants were collected, dried, properly identified and vouchers deposited at the National Herbarium of the Addis Ababa University.

2.4. Data analysis

Microsoft Excel spreadsheet software (Microsoft Corporation, 2001) was employed to organise and analyse the data. One-way analysis of variance (ANOVA) tests were performed to test significant differences (at 95% confidence level) between average

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numbers of medicinal plants reported by different social groups within the Meinit community.

Relative Importance Value (RI), a measure of the diversity of medicinal application, was calculated for each claimed medicinal plant using the formula RI = NP + NCS (Bennett and Prance, 2000), where NP is obtained by dividing the number of properties (reported specific ailments) attributed to a species divided by the total number of properties attributed to the most versatile species (species with the highest number of properties). NCS is the number of body systems (ailment categories) treated by a given species divided by the total number of body systems treated by the most versatile species. Species with RI value of 2.0 (the highest possible value) are those with the highest diversity of medicinal application.

The relative healing potential of each reported medicinal plant used against human ailment was estimated using an index called Fidelity Level (FL). Its formula is given as $FL = I_p/I_u \times 100$, where I_p is the number of informants who independently indicated the use of a species for the same major ailment and I_u the total number of informants who mentioned the plant for any major ailment (Friedman et al., 1986). Prior to the calculation of FL, reported ailments were grouped into major disease categories following the approach of Heinrich et al. (1998). According to Trotter and Logan (1986), plants which are used in some repetitive fashion are more likely to be biologically active.

Preference ranking exercise was conducted by 10 informants (6 males and 4 females) randomly drawn from the list of people who already participated in the interviews following the approach of Martin (1995). All the 10 informants were illiterate ones between the ages of 35 and 57. Each informant was asked to rank six medicinal plants (*Bersama abyssinica* Fresen., *Croton macrostachyus* Del., *Indigofera garckeana* Vatke, *Ritichiea albersii* Gilg, *Tephrosia vilossa* (L.) Pers. and *Vernonia auriculifera* Hiern.) according to their perceived degree of scarcity: the most scarce medicinal plant assigned with the highest number '6' and the least scarce with the least number '1'. The numbers were finally summed for all respondents to give an overall ranking; plants with the highest score were considered as the most scarce ones. The compared plants were selected based on scarcity reports by informants during interviews as well as observation and vegetation studies.

3. Results

3.1. Medicinal plants reported

A total of 51 medicinal plant species belonging to 45 genera and 27 families were recorded from the study area. Of these, 28 (55%) were herbs, 10 (20%) were shrubs, 9 (18%) were trees and 4 (9%) were climbers (Table 1). The Family *Asteraceae* contributed the highest number of medicinal plants (8 species), followed by the *Fabaceae* (5 species) and *Lamiaceae* (5 species) and *Euphorbiaceae* (4 species). Six families (*Ranunculaceae*, *Solanaceae*, *Rubiaceae*, *Boraginaceae*, *Menispermaceae* and *Malvaceae*) had two medicinal plant species each and 17 families had one medicinal plant each (Table 2)

3.2. Ailments treated

Of the reported medicinal plants, 98% were used to treat human ailments and 16% against livestock ailments. Concerning human ailments, the highest proportions of Meinit medicinal plants were used to treat gastro-intestinal complaints (47%), skin-related diseases (29%) and respiratory system problems (16%). Some were used against toothache (10%), retained placenta (10%), eye diseases (8%), evil eye (6%), tonsillitis (6%), headache (4%), rabies (4%), snakebite (4%) and malaria (4%).

3.3. Plant parts used and modes of remedy preparation

Roots and leaves were the most frequently sought plant parts accounting for 49% and 43% of the claimed medicinal plants, respectively. Few were harvested for their stems/barks (8%), fruits/seeds (6%) and bulbs/rhizomes (4%). The majority of remedies were harvested for immediate uses: 58% prepared and administered while fresh and 38% prepared and administered after quick drying. Small proportions (5%) were indicated to be dried and stored for future uses.

The majority (85%) of remedies were applied in the form of juice or paste. Other modes of preparation included poultice (4%), infusion (4%), smoke (3%), powder (2%), decoction (1%) and exudates/sap (1%). Sixty one percent of the remedies were prepared without the use of diluents while 40% were processed with the addition of water.

3.4. Route of administration and dosage

Great proportion of Meinit remedies (72%) were taken orally, while 16% were taken cutaneously. Four percent were applied locally in the mouth or on the tongue, 3% were administered in the eyes. Eighty five percent of the treatments were completed within 1 or 2 days. Eleven percent of the treatments were indicated to take 3–8 days and 4% were given until complete cure. More than half of the daily doses were administered once. If patients did not show any sign of improvement over the treatment period, they were referred to nearby modern health centres.

It was noted that dosage was influenced, among others, by the type of ailment, seriousness of the illness and age of the patient. Doses of liquid remedies administered to humans were usually measured using tea or coffee glasses or plastic cups, or by number of drops. In many cases, amounts of plant part/parts to be processed and doses to be used were roughly estimated and therefore, lacked precision.

3.5. Marketability of medicinal plants

Only one (*Nicotiana tabacum* L.) Meinit medicinal plant was reported to be sold at local market though it was mainly marketed for its use as a stimulant. The rest of the remedies were freely harvested from the immediate environment by those who needed them.

3.6. Habitat and abundance of medicinal plants

Great majority of Meinit medicinal plants were uncultivated ones, largely weedy species, which grew in disturbed habitats, mainly in fallowlands, crop fields and roadsides (Table 3). Only 5 (*Dicliptera laxata* C.B.Clarke, *Lepidium sativum* L., *Nicotiana tabacum* L., *Vernonia amygdalina* Del. and *Zingiber officinale* Roscoe) were cultivated, four of which grown primarily for other purposes. *Dicliptera laxata* C.B.Clarke was the only species reported to be occasionally cultivated primarily for its medicinal value.

Little time (15 min on average) was required to gather 88% of the claimed medicinal plants due to their abundance in close proximity to houses. Favoured by the ever-increasing habitat disturbance, the abundance of most weedy medicinal plants was reported to have even been increasing during the past years. Twenty to thirty minutes, on average, was needed to harvest *Croton macrostachyus* Del., *indigofera garckeana* Vatke and *Tephrosia villosa* (L.) Pers. However, longer time (40 min on average) was required to collect three medicinal plants (*Bersama abyssinica* Fresen., *Ritchiea albersii* Gilg

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Table 1
Medicinal plants of the Meinit people.

Scientific and family names	Family name	Local name	Growth form	Ailment treated[a]	Part used	Application route	Mixed with	Voucher no.
1. *Acalypha villicaulis* A.Rich., Euphorbiaceae	Euphorbiaceae	Zibute-kemun	Herb	Diarrhoea	Root	Oral		MG-M19-2006
2. *Acalypha volkensii* Pax, Euphorbiaceae	Euphorbiaceae	Kirija, zibute-morenshi	Climber	Wound	Leaf	Topical		MG-M28-006
3. *Ajuga integrifolia* Buch.-Ham. ex D.Don	Lamiaceae	Zibute-kurijun, qilqilia, qilqilich	Herb	Retained placenta	Root	Oral		MG-M3-2006
				Diarrhoea (child), evil eye, retained placenta, ascariasis	Leaf	Oral		
4. *Amorphophallus gallaensis* (Engl.) N.E.Br.	Araceae	Wunut	Herb	Wound (cattle, horses)	Root	Topical		MG-M58-2006
5. *Ardisiandra sibthorpioides* Hook.f.	Primulaceae	–	Herb	Cataract	Leaf	Local (eye)		MG-M59-2006
6. *Bersama abyssinica* Fresen.	Melianthaceae	Foso	Tree	Tonsillitis	Stem bark	Oral		MG-M89-2006
7. *Bothriocline schimperi* Oliv. & Hiern ex Benth.	Asteraceae	Dosut	Herb	Stomachache	Root	Topical		MG-M90-2006
8. *Carissa spinarum* L.	Apocynaceae	Mukakerech	Shrub	Evil eye	Root	Nasal		MG-M91-2006
9. *Cirsium englerianum* O.Hoffm.	Asteraceae	Bur	Herb	Cough (cattle), diarrhoea (cattle)	Root	Oral		MG-M50-2006
				Respiratory tract problem	Root	Oral, nasal	33	
				Stomachache, headache	Root	Oral, nasal		
10. *Cissampelos mucronata* A.Rich.	Menispermaceae	Shamtit, ra, zibute-kemun	Climber	Stomachache, retained placenta	Root	Oral	37, 46	MG-M20-2006
				Respiratory tract problem	Root	Oral		
11. *Clematis hirsuta* Perr. & Guill.	Ranunculaceae	Shiete-girnajun, ra	Climber	Cataract	Leaf	Local (eye)		MG-M61-2006
				Diarrhoea (child)	Leaf	Nasal		
12. *Clerodendrum myricoides* (Hochst.) Vatke	Lamiaceae	Dumdumach	Shrub	Stomachache	Root	Oral		MG-M17-2006
13. *Cordia africana* Lam.	Boraginaceae	Oshwoch	Tree	Wound	Leaf	Topical		MG-M92-2006
14. *Conyza bonariensis* (L.) Cronq.	Asteraceae	Qilqilia	Herb	Diarrhoea (child)	Leaf	Oral		MG-M41-2006
15. *Croton macrostachyus* Del.	Euphorbiaceae	Kombelit	Tree	Snake bite	Root	Oral		MG-M93-2006
16. *Cynoglossum amplifolium* Hochst. ex A.DC.	Boraginaceae	Perpert, girshu, marest	Herb	Wound	Leaf	Topical		MG-M8-2006
				Diarrhoea (child)	Root, leaf	Oral		
17. *Cyperus* sp.	Cyperaceae	Bitroch	Herb	Cough	Rhizome	Oral, topical		MG-M10-2006
				Stomachache, cough (cattle)	Rhizome	Oral		
18. *Datura stramonium* L.	Solanaceae	Bolute-rosun	Herb	Toothache	Root	Local (mouth)		MG-M94-2006
19. *Dicrocephala integrifolia* (L.f.) O.Kuntze	Asteraceae	–	Herb	Cataract	Leaf	Local (eye)		MG-M80-2006
20. *Dicliptera laxata* C.B.Clarke	Acanthaceae	–	Herb	Headache	Above ground	Nasal		MG-M45-2006
21. *Dissotis senegambiensis* (Guill. & Perr.) Triana	Melastomataceae	–	Herb	Cutaneous leishmaniasis	Leaf	Nasal		MG-M1-2006
				Wound	Leaf	Topical		MG-M1-2006
22. *Embelia schimperi* Vatke	Myrsinaceae	Qamjach	Shrub	Ascariasis, taeniasis	Fruit	Oral		MG-M4-2006
23. *Ficus vasta* Forssk.	Moraceae	Padut	Tree	Itching skin	Sap	Topical		MG-M95-2006
24. *Galinsoga quadriradiata* Ruiz & Pavon	Asteraceae	Zibute-kono	Herb	Snake bite	Leaf	Topical		MG-M96-2006

25. *Gardenia ternifolia* Schumach. & Thonn.	Rubiaceae	Bodut	Tree	Malaria	Stem bark	Oral		MG-M97-2006
26. *Hoslundia opposita* Vahl	Lamiaceae	Dumdumach	Shrub	Stomachache, diarrhoea	Root	Oral		MG-M35-2006
27. *Indigofera arrecta* Hochst. ex A.Rich.	Fabaceae	Shersherit	Herb	Stomachache	Root	Oral		MG-M54-2006
28. *Indigofera garckeana* Vatke	Fabaceae	Shersherit, gimay	Shrub	Diarrhoea (cattle), stomachache, headache	Root	Oral		MG-M27-2006
29. *Indigofera spicata* Forssk.	Fabaceae	Gimay, shersherit, sherit, shamtit	Herb	Diarrhoea, cough, malaria, stomachache, toothache, retained placenta, evil eye, headache, cough (cattle and sheep)	Root	Oral		MG-M2-2006
				Blackleg (cattle)	Root, leaf	Oral		
30. *Lepidium sativum* L.	Brassicaceae	Silfa	Herb	Wound	Seed	Topical		-
31. *Leucas deflexa* Hook.f.	Lamiaceae	Qilqilich, chodut, qilqilia, chilka, limut	Herb	Diarrhoea (child), ascariasis,	Leaf	Oral		MG-M11-2006
				Stomachache	Leaf	Nasal, topical		
32. *Microglossa pyrifolia* (Lam.) O.Kuntze	Asteraceae	Orgulach	Shrub	Hard swell on skin	Leaf	Oral, topical		MG-M12-2006
				Tonsillitis	Leaf, stem	Oral, topical		
33. *Nicotiana tabacum* L.	Solanaceae	Timbaho	Herb	Respiratory tract problem	Leaf	Oral, nasal	9	–
				Cough (cattle)	Leaf	Oral, nasal		
34. *Ocimum lamiifolium* Hochst. ex Benth.	Lamiaceae	–	Herb	Cutaneous leishmaniasis	Leaf	Nasal		MG-M49-2006
35. *Pentas lanceolata* (Forssk.) Deflers	Rubiaceae	–	Herb	Diarrhoea (child)	Leaf, root	Nasal		MG-M48-2006
				Ascariasis (cattle)	Leaf	Oral		
				Stomachache, retained placenta	Root	Oral	46, 10	
				Ascariasis	Root	Oral		
36. *Phytolacca dodecandra* L'Hérit.	Phytolaccaceae	Lochinit	Shrub	Rabies	Root	Oral		MG-M96-2006
37. *Plantago lanceolata* L.	Plantaginaceae	–	Herb	Eye infection	Leaf	Local (eye)		MG-M97-2006
38. *Ranunculus multifidus* Forssk.	Ranunculaceae	Sherit	Herb	Toothache, cold	Root/leaf	Local (tooth), nasal		MG-M57-2006
39. *Rhus ruspolii* Engl.	Anacardiaceae		Shrub	Wound	Leaf	Topical		MG-M98-2006
40. *Ricinus communis* L.	Euphorbiaceae	Bolut	Tree	Stomachache	Root bark, seeds	Topical		MG-M99-2006
41. *Ritchiea albersii* Gilg	Capparidaceae	Dalsach	Tree	Wound	Leaf	Topical		MG-M5-2006
		Kularit		Respiratory tract problem	Leaf	Topical		
				Tonsillitis	Stem bark	Oral		
42. *Rubus steudneri* Schweinf.	Rosaceae	Gormach	Shrub	Stomachache with diarrhoea	Root	Oral		MG-M46-2006
43. *Rumex nepalensis* Spreng.	Polygonaceae	Girshu	Herb	Stomachache	Root	Oral		MG-M47-2006
44. *Sida collina* Schlechtend.	Malvaceae	Sese	Herb	Wound	Leaf	Topical		MG-M100-2006
45. *Sida urens* L.	Malvaceae	Sese	Herb	Wound	Leaf	Topical		MG-M26-2006
46. *Stephania abyssinica* (Dillon. & A.Rich.) Walp.	Menispermaceae	–	Climber	Stomachache, retained placenta	Root	Oral	10, 37	MG-M71-2006
47. *Tephrosia elata* Deflers	Fabaceae	Kashabach	Shrub	Respiratory tract problem	Root	Oral		MG-M101-2006
48. *Tephrosia villosa* (L.) Pers.	Fabaceae	Kashabach, zangalech	Herb	Respiratory tract problem, Stomachache, cough (cattle), trypanosomiasis (cattle)	Root	Oral		MG-M9-2006
49. *Vernonia amygdalina* Del.	Asteraceae	Buzut	Tree	Wound	Leaf	Topical		MG-M64-2006
50. *Vernonia auriculifera* Hiern.	Asteraceae	Garut, garsach	Tree	Toothache	Root	Local (tooth)		MG-M74-2006
				Dysentery	Root	Oral		
51. *Zingiber officinale* Roscoe	Zingiberaceae	Gamchalech	Herb	Respiratory tract problem with cough	Rhizome	Oral		–

[a] Unless specified, the given disease is that of humans.

Table 2
Distribution of medicinal plant genera and species across the different families.

Family name	Genus name	Species[a]
Asteraceae	*Bothriocline*	7
	Cirsium	9
	Conyza	14
	Dicrocephala	19
	Galinsoga	24
	Microglossa	32
	Vernonia	49, 50
Lamiaceae	*Ajuga*	3
	Clerodendrum	12
	Hoslundia	26
	Leucas	31
	Ocimum	34
Fabaceae	*Indigofera*	27, 28, 29
	Tephrosia	47, 48
Euphorbiaceae	*Acalypha*	1, 2
	Croton	15
	Ricinus	40
Ranunculaceae	*Clematis*	11
	Ranunculus	38
Solanaceae	*Datura*	18
	Nicotiana	33
Brassicaceae	*Lepidium*	30
Capparidaceae	*Ritchiea*	41
Rubiaceae	*Gardenia*	25
	Pentas	35
Boraginaceae	*Cordia*	13
	Cynoglossum	16
Acanthaceae	*Dicliptera*	20
Menispermaceae	*Cissampelos*	10
	Stephania	46
Rosaceae	*Rubus*	42
Zingiberaceae	*Zingiber*	51
Malvaceae	*Sida*	44, 45
Polygonaceae	*Rumex*	43
Anacardiaceae	*Rhus*	39
Apocynaceae	*Carissa*	8
Araceae	*Amorphophallus*	4
Cyperaceae	*Cyperus*	17
Melastomataceae	*Dissotis*	21
Melianthaceae	*Bersama*	6
Moraceae	*Ficus*	23
Myrsinaceae	*Embelia*	22
Phytolaccaceae	*Phytolacca*	36
Plantaginaceae	*Plantago*	37
Primulaceae	*Ardisiandra*	5

[a] Each species is assigned with a number as shown in Table 1.

Table 4
Ranking of six Meinit medicinal plants using the procedure of preference ranking based on the degree of local scarcity (plant with the highest score is the most scarce one).

Medicinal plant name	Informants (coded A to J)										Total score	Ranking
	A	B	C	D	E	F	G	H	I	J		
Bersama abyssinica	3	4	3	4	6	3	3	6	4	4	40	c
Croton macrostachyus	1	1	1	2	3	1	1	2	1	1	14	f
Indigofera garckeana	2	3	2	3	1	2	2	3	3	2	23	e
Ritchiea albersii	6	5	6	6	4	5	6	5	5	6	54	a
Tephrosia villossa	4	2	4	1	2	4	4	1	2	3	27	d
Vernonia auriculifera	5	6	5	5	5	6	5	4	6	5	52	b

Table 5
FL values of medicinal plants cited by three or more informants for being used against a given ailment category.

Medicinal plant	Ailment	I_p	I_u	FL value (%)
Rumex nepalensis	Gastro-intestinal complaints	10	10	100
Leucas deflexa	Gastro-intestinal complaints	7	7	100
Embelia schimperi	Gastro-intestinal complaints	4	4	100
Cissampelos mucronata	Gastro-intestinal complaints	9	11	82
Pentas lanceolata	Gastro-intestinal complaints	4	5	80
Cynoglossum amplifolium	Cutaneous/subcutaneous diseases	3	4	75
Tephrosia villosa	Respiratory problems	4	6	67
Indigofera spicata	Gastro-intestinal complaints	11	23	48
Cirsium englerianum	Respiratory problems	3	7	43
Indigofera spicata	Retained placenta	7	23	30

and *Vernonia auriculifera* Hiern.) which were found as remnant trees scattered in some cultivation fields or in forest in faraway places. Result of scarcity ranking exercises using the procedure of preference ranking revealed *Ritchiea albersii* Gilg, *Vernonia auriculifera* Hiern. and *Bersama abyssinica* Fresen. as the most scarce plants (Table 4).

3.7. Informant consensus

Fidelity Level (FL) was calculated for each Meinit medicinal plant and *Rumex nepalensis* Spreng., *Leucas deflexa* Hook.f. and *Embelia schimperi* Vatke (all used against gastro-intestinal complaints) were the ones scoring the highest values (Table 5).

Indigofera spicata Forssk. was the species that scored the highest RI value (2.0), followed by *Cyperus* sp. (1.1). *Indigofera spicata* Forssk. was prescribed to treat retained placenta, abdominal pain, cough, diarrhoea, malaria, toothache, evil eye, headache, blackleg (cattle) and cough (cattle and sheep). *Cyperus* sp. was used against abdominal pain, coughing, boil and coughs of cattle and horses (Table 6).

Table 3
Proportion (%) of uncultivated and cultivated Meinit medicinal plants growing in different habitats.

	Habitat	Species[a] encountered	Proportion (%)
Uncultivated medicinal plants	Fallowland	5, 10, 14, 18, 24, 31, 34, 35, 37, 40, 44, 45	25.4
	Crop field	9, 12, 13, 15, 16, 23, 25, 41, 43, 47, 48	21.5
	Roadside	1, 3, 4, 7, 17, 19, 27, 38, 46	17.6
	Live fence	2, 11, 22, 26, 36, 42, 50	13.7
	Forest margin	8, 32	3.9
	Woodland	28, 39	3.9
	Grazing land	21	1.9
	Homegarden	29	1.9
	Forest	6	1.9
Cultivated medicinal plants	Homegarden	20, 30, 33, 49	7.8
	Farm plots	51	1.9

[a] Each species is assigned with a number as shown in Table 1.

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Table 6
RI values for Meinit medicinal plants used against three or more specific ailments.

Scientific name	NP	NCS	Relative importance (RI) values
Indigofera spicata	1	1	2.0
Cyperus sp.	0.5	0.6	1.1
Cirsium englerianum	0.4	0.5	0.9
Pentas lanceolata	0.5	0.4	0.9
Ajuga integrifolia	0.4	0.4	0.8
Indigofera garckeana	0.3	0.4	0.7
Tephrosia villosa	0.3	0.3	0.6
Leucas deflexa	0.3	0.1	0.4

3.8. Comparison of knowledge between different informant groups

Significantly higher averages ($p < 0.05$) were reported by men than women, by informants belonging to age group of 18–40 years than those belonging to above 40 years and by illiterate people than literate ones. However, there was no significant difference ($p = 0.068$) between the averages reported by informants identified as knowledgeable and those encountered during random visits to houses. There was also no significant difference ($p = 0.55$) between the averages reported by informants who live near roads and health centres (at less than 1 km distance) and those who reside far away from roads and health centres (at more than 3 km distance).

3.9. Traditional medical practice and secrecy

The majority of informants agreed that most ailments were treated at a family level with self-prepared remedies. When needed, people could consult other people in their respective local community with little or no charge. The majority of the interviewees (70%) responded that they keep their medicinal plant knowledge secret; its free transfer could only take place within family members. The knowledge owner in a family (mostly a father or mother) selects one of his or her children (usually a son) as an apprentice. Apprenticeship begins at the age of 10 and mostly goes on through up to the age of 18. Most informants agreed that transfer of knowledge to people outside the family circle could only take place on substantial payment. Eight five percent of the Meinit informants expressed their concern that vertical transfer of knowledge on traditional medicine was currently not taking place very effectively unlike it was before due to the lack of interest by the younger generation to learn and practice it mainly due to acculturation.

4. Discussion and conclusions

The families *Asteraceae*, *Fabaceae* and *Lamiaceae* have accounted for the highest number of Meinit medicinal plants, which could probably be due to their high species. Other studies conducted in different parts of the country (Asfaw, 1999; Giday and Ameni, 2003; Tanto et al., 2003; Tadesse et al., 2005) also revealed the highest contribution of these families to the Ethiopian medicinal flora. *Fabaceae*, *Asteraceae* and *Lamiaceae* are among the largest dicotyledonous families in the Ethiopian flora (Ryding, 2006; Tadesse, 2004; Thulin, 1989).

The high usage of herbs as medicinal plants among the Meinit people could indicate their better abundance as compared to trees and shrubs. Studies conducted in other parts of Ethiopia (Asfaw, 1999; Giday et al., 2003; Giday and Ameni, 2003; Tanto et al., 2003), Argentina (Hilgert, 2001), Nepal (Shrestha and Dhillion, 2003), Uganda (Tabuti et al., 2003) and India (Muthu et al., 2006; Uniyal et al., 2006) also indicated the common use of herbs as sources of medicine.

The high use of medicinal plants by the Meinit people to cure gastro-intestinal complaints and skin-related ailments could be attributed to the high preponderance of these disorders in the area. According to information obtained from the Bench-Maji Zone Health Office, skin-related disorders and gastro-intestinal complaints are among the major health problems in Meinit-Goldya District.

Generally, local knowledge of Meinit people regarding plants used to treat livestock ailments was found to be low which might be related to the availability of modern veterinary services. Currently, there are seven veterinary centres in Meinit-Goldya District.

Literature survey shows that some of the Meinit medicinal plants are used in different parts of the world to treat same or similar ailments. *Embelia schimperi* Vatke (used against taeniasis) (Abera, 2003; Asfaw, 1999; Wolde and Gebre-Mariam, 2002), *Phytolacca dodecandra* L'Hérit. (used against rabies) (Abera, 2003; Addis et al., 2001; Giday and Ameni, 2003) and *Ricinus communis* L. (used against gastro-intestinal complaints) (Asfaw, 1999; Muthu et al., 2006; Weimann and Heinrich, 1997) are the species that were reported at least three times for being used against the same ailment. The fact that medicinal plants are used for the same purpose by more than one community might indicate their pharmacological effectiveness.

Previous laboratory studies conducted in Ethiopia and other parts of the world indicated the activity of some medicinal plants reported by the current study. These include *Croton macrostachyus* Del., *Lepidium sativum* L., *Embelia schimperi* Vatke and *Plantago lanceolata* L. (anthelmintic), *Phytolacca dodecandra* L'Hérit. and *Ricinus communis* L. (anthelmintic and antibacterial), *Vernonia amygdalina* Del. (antibacterial and antimalarial), and *Bersama abyssinica* Fresen. and *Zingiber officinale* Roscoe (antimalarial) (Abegaz and Dagne, 1978; Ashebir and Ashenafi, 1999; Bogale and Petros, 1996; Desta, 1995; Etkin, 1997; Kassa et al., 1996; Nostro et al., 2000). Different active principles have also been isolated and identified by other researchers from *Datura stramonium* L., *Embelia schimperi* Vatke, *Ocimum lamiifolium* Hochst. ex Benth., *Phytolacca dodecandra* L'Hérit., *Ricinus communis* L. and *Zingiber officinale* Roscoe (Abebe et al., 2003; Ahmad and Ismail, 2003; Elujoba et al., 2005; Ghazanfar and Al-Sabahi, 1993).

Meinit remedies are mostly prepared from newly harvested plant parts which could indicate the availability of copious plant materials in the vicinity to be picked at any time. But still shortage of harvestable parts might be encountered during the dry season when many of the annual herbs dry out or vanish. Studies conducted in central and northern Ethiopia (Giday et al., 2003; Giday and Ameni, 2003), Ecuador (Bussmann and Sharon, 2006) and India (Ignacimuthu et al., 2006) also revealed the frequent use of fresh materials. In some other communities, however, people have designed mechanisms to overcome the shortage of materials. In studies conducted in Fentalle area, central Ethiopia, (Balemie et al., 2004) and in Gondar, northwest Ethiopia, (Abebe, 1984), it is indicated that people dry and store remedies in order to have as many drugs as possible all the year round. Fresh materials could also be more preferred when remedies contain volatile oils, the concentration of which could deteriorate on drying.

The majority of the Meinit remedies are applied in the form of juice or paste which is also a common practice in different parts of Ethiopia and (Giday et al., 2003; Giday and Ameni, 2003) and other countries (Ignacimuthu et al., 2006; Kunwar et al., 2006; Muthu et al., 2006; Seifu et al., 2006). As the majority of Meinit remedies are prepared from fresh materials, it is much easier and quicker to prepare them in juice or paste form. Most remedies are prepared from single plant species, in agreement with results of similar studies conducted in Ethiopia (Abera, 2003; Balemie et al., 2004; Hunde et al., 2004) and other parts of the world (Ignacimuthu et al., 2006; Manandhar, 1995; Milliken and Albert, 1996; Muthu et al., 2006). Other reports, however, indicated the fairly common use of concoctions in Ethiopia (Abebe, 1984, 1986) and different parts of the

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world (Kamatenesi-Mugisha, 2003; Lal and Yadav, 1983). The frequent use of concoctions could be attributed to the belief by many healers of synergic reactions (Abebe and Ayehu, 1993; Lal and Yadav, 1983). Lack of precision of doses among informants on certain remedies was frequently noted, which is also a frequent phenomenon in other parts of Ethiopia (Balemie et al., 2004; Giday et al., 2003; Giday and Ameni, 2003; Tadesse et al., 2005).

Interview results showed that very few of the Meinit medicinal plants were available for sale at local markets because of their little market demand. Medicinal plants are rather harvested freely from the immediate environment in which they are abundantly found. Results of studies in other parts of Ethiopia, however, revealed a wide domestic trade of medicinal plants (Dessissa, 2001; Kloos, 1976/1977; Kloos et al., 1978; Mander et al., 2006).

Many of the medicinal plants used by Meinit people are weedy species that commonly grow in fallowlands, crop fields and roadsides. However, the increasing trend of using herbicides and the continued use of farming plots without leaving some fallowlands due to the increasing shortage of agricultural plots appear to be the potential threats to the Meinit's medicinal flora.

Interview and ranking exercise results revealed *Ritchiea albersii* Gilg and *Bersama abyssinica* Fresen. as the most scarce medicinal plants. Deforestation and selective cutting are the main factors for their depletion. In the study area, deforestation is taking place at alarming rate due to agricultural expansion. *Ritchiea albersii* Gilg is frequently felled to be used for house construction and as firewood. *Bersama abyssinica* Fresen. serves as source of firewood.

The fact that the plants *Rumex nepalensis* Spreng., *Leucas deflexa* Hook.f. and *Embelia schimperi* Vatke (all used against gastrointestinal complaints) had the highest FL values could be an indication of their good healing potential. According to Trotter and Logan (1986), plants which are used in some repetitive fashion are more likely to be biologically active. The high RI value of the medicinal plant *Indigofera spicata* Forssk. could partly be a reflection of its abundance. The medicinal plants *Bersama abyssinica* Fresen. and *Ritchiea albersii* Gilg which were ranked by Meinit informants as the most scarce species were found to be among the ones scoring low RI values. High versatility of medicinal plants could also indicate higher diversity of active compounds contained by the species.

The study revealed that men have better medicinal plant knowledge than women and this could probably be due to the reason that boys are usually more preferred than girls in the study area in the transfer of the knowledge. Other studies conducted in Ethiopia (Berhe et al., 1995), Brazil (Begossi et al., 2002) and East Timor (Collins et al., 2006) demonstrated similar results. The study further indicated that younger people in the study area have less medicinal plant knowledge as compared to older ones. Results of many studies conducted in different parts of the world revealed similar findings (Begossi et al., 2002; Caniago and Siebert, 1998; Fassil, 2003; Gedif and Hahn, 2003; Hilgert, 2001; Hunde et al., 2004; Manandhar, 1995; Tsehay, 1971; Uniyal et al., 2006). The great majority of the Meinit informants consider acculturation of the young generation as the main factor for the loss of traditional medicinal knowledge. Study conducted in central Ethiopia (Giday et al., 2003) revealed similar results.

Literate people in the study area were found to be less knowledgeable on the use of medicinal plants as compared to illiterate ones due to the better exposure of the former to modernization. Similar results were reported in studies conducted in Thailand (Wester and Yongvanit, 1995) and Ethiopia (Gedif and Hahn, 2003).

It was revealed that many ailments are diagnosed and treated at household or family level which is in agreement to findings of other studies conducted in Ethiopia (Deribe et al., 2006; Fassil, 2003). The majority of the Meinit informants agreed that they kept their medicinal plant knowledge secret. The secrecy of medicinal plant knowledge is also a common practice in different parts of the country (Balemie et al., 2004; Gedif and Hahn, 2002; Giday et al., 2003).

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