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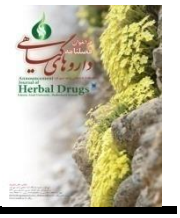

Folk Herbal Veterinary Medicines of Zilberchay Watershed of East Azerbaijan (Iran)

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ABSTRACT

Background & Aim: Ethnoveterinary medicinal plants of Iran are not scientifically well known, but they have been using traditionally especially in rural areas. This study was carried out to identify the Folk Herbal Veterinary Medicines (FHVM) of ZilberChay watershed in east Azerbaijan province in northwest of Iran.

Experimental: FHVM plants were identified by collecting plant species from the study area and comparing them with previous studies to identify the plant with FHVM value. Overall, 493 plant species that were belong to 243 genera and 59 families were collected. From those, 42 species belong to 37 genera and 23 families were identified as FHVM.

Results: These plants can be used for treatment of different disease and syndromes in livestock, such as internal parasites, mastitis, burns, skin disease, gastrointestinal tract problems, diarrhea, etc. Results showed that most of the FHVM belong to the families including: Fabaceae (14.29%), Asteraceae (14.29%), Apiaceae (7.14%), Poaceae (7.14%), Rosaceae (7.14%), Cupressaceae (4.76%), Lamiaceae(4.76%) and Moraceae (4.76%). Moreover, results showed that chrotypes of identified FHVM belong to IT (Irano-Toranian) with 49.1%, Plur (Plural) with 27.27%, ES (Euro-Siberian) with 18.18 % and M (Mediterranean) regions with 5.45%, respectively. Furthermore, identified FHVM belong to life forms of He (Hemicryptophytes) with 55%; Ph (Phanerophytes) with 26.19%; Th (Therophytes) with 14.28% and Ch (Chamaephytes) with 4.76%, respectively.

Recommended applications/industries: Identifying FHVM of ZilberChay and their application in treating domestic animals can give us opportunity to increase our knowledge about FHVM and attempt to conserve the area and its plant species.

1. Introduction

Studying of Folk Herbal Veterinary Medicines (FHVM) and traditional methods for health, hygiene and treatment of animal diseases is called Ethnoveterinary (Bahmani *et al.*, 2011). History of the ethnoveterinary refers to the time that humans domesticated the animals. Information of this knowledge, like others is achieved with trial and error (Bahmani *et al.*, 2011). Even in developed countries, veterinary care and animal welfare in rural populations is based on ethnomedical veterinary practices, particularly when access to chemical drugs is difficult or too expensive for the local farmer (Nyamanga *et al.*, 2008). Traditional veterinary knowledge is comprised by a collection of beliefs and practices regarding animal welfare that involves the use of natural resources (plants and animals) and other materials. This knowledge is generally transmitted orally from generation to generation and, as other traditional beliefs, is currently threatened by technological development, sociocultural and environmental changes (McCorkle *et al.*, 1998; Tabuti, 2003). However, within the industrialized and urban society there is an increasing interest in alternative or complementary medicine which, together with other natural therapies, is based on the use of FHVM. Thus, the use of homeopathic and phytotherapeutic remedies in veterinary medicine has gained interest, among other reasons, due to increasing demands on the quality of meat and milk products such as the requirements for producing organic food goods, (Pieroni *et al.*, 2004). FHVM often provides cheaper options than comparable western drugs, and the products are locally available and more easily accessible too (Selvaraju *et al.*, 2011). Based on the facts, there is an interest to identify and increase the application of FHVM in different countries and researchers are identifying and introducing different species of these plants. Some FHVM have been introduced in the studies such as Masika *et al.* (2000); Takar (2004); Fajimi and Taiwo (2005); Ishtiaq *et al.* (2006); Lans *et al*. (2006); Guarrera and Lucia (2007); Lans *et al.* (2007); Pande *et al.* (2007); Lulekal et al. (2008); Davidović *et al.* (2011); Khan (2009); Martínez and Luján (2011); Selvaraju *et al.* (2011); Bahmani *et al.* (2012); Chakraborty and KantiPal (2012); Ul Islam *et al*. (2012); Manoj *et al.* (2012); Laudato and Capasso (2013); Adnan *et al.* (2014); Panda and Dhal (2014); Rajkumari *et al.* (2014); Verma (2014). Iran's flora consists of more than 7500 plant species that most of them are classifying as medical plants (Omid Beigi 1993; 1997). Based on these variations in climate condition and plant flora, application of herbal plants were common in Iran for years and nowadays, these plants are applying for different aims according to the culture and faith of people in each area. Based on above, Iranian researchers in their studies have been introduced FHVM of different regions but number of these studies is not adequate to introduce all of them. For example, Bahmani *et al.* (2010) studied medical plants in treating disease and syndromes in small ruminants in southern areas of Ilam province, west of Iran. They have studied 35 disease and syndrome in small ruminants and 35 FHVM of these areas. This study found that 24 disease and syndrome were treating with identified medicinal plants and 13 disease and syndrome were found without herbal treating. Moreover, they introduced some plants with new remedy effects. Plants such as *Phoenix dactylifera: poisones*; *Triticum* aestivum: mastitis; *Peganum harmala:* Snake bite*; Astragulus golicucanthus, Nerium indicum, Amygdalus lycioides* and *Marsdenia erecta for* respiratory signs of *Oestrus ovis* larva and their ethnoveterinary effects were introduced for the first time. Malek Mohammadi and Mirzavash Azar (2010) have identified medical utilization and domestication of some wild edible plants in west Azerbaijan. Kouhpayeh *et al.* (2011) studied the FHVM in Kerman province in south of Iran. They have stated that 42 plants as FHVM value in this region. Toupchi (2011) have identified FHVM in Arshad Chamani rangelands of East Azerbaijan. Bahmani *et al.* (2012) introduced FHVM used by Kurdish owners of Ilam province. Based on their findings, 46 different plant species were identified as beneficial plants in curing 36 animal diseases and syndromes in this area. Chalechale *et al.* (2013) studied the anthropology and antiparasitic remedies in Kurdish Ethno (veterinary) medicines. They introduced plant species like *Andropogon nardus, Artemisia absinthium, Cucurbita verrucosa, Cinchona officinalis, Gossypium herbaceum, Marrubium vulgar* and *Hippophae rhamnoidesas* herbal medicine in Kurdistan province of Iran. However it seems, there is little attempt on the FHVM studies in northwest of Iran, especially in east Azerbaijan and ZilberChay flora. Thus, this study aimed to identify the FHVM of ZilberChay watershed in the east Azerbaijan of Iran to

conserve and revive this treasure and apply them as replacement for veterinary chemical drugs.

2. Materials and Methods

2.1. Study area

ZilberChay watershed with 261437 ha is located in 45°,04´,44´´ to 55°,33´,55´´ E and latitude of 38°,18´,09´´ to 37°, 40´,57´´ N in East Azerbaijan, Iran. Elevation of this area varies between 937 to 3207m. Average precipitation in northern and southern slopes varies from 123 to 787 mm. In ZilberChay watershed July is the hottest month of year with the average temperature of 24˚C and coldest month is December with the average temperature of -4˚C. Due to this climate variation verity of plant species are growing in this area (Ghorbani *et al*., 2013).

2.2. Data collection and Identification

Plants were collected by considering the affective ecological factors in plants distribution such as elevation, slope, aspect, temperature, precipitation, soil, etc. Mainly, two west-east elevation profiles from low elevation to the highest and 6 north-south profile were applied for collecting plants. Information of each plant (date of collection, number, ecological condition and elevation, etc) was recorded. Samples were transferred to the lab and all collected species were identified using reference flora, such as: Flora Iranica (Rechinger, 1963-1998), Iraq (Townsend and Guest, 1966-1985), Palestine (Zohary, 1966-1972), Turkey (Davis, 1965-1988), East (Boissier, 1867-1888), Soviet union (Komarov, 1934-1954), Iran (Assadi *et al*., 1988-2013), Colored flora of Iran (Ghahreman, 1979-1992), Iranian *Astragalus* (Maassoumi, 1986-2005), Cromophites of Iran (Ghahreman, 1996), plants of Iran (Mobayen, 1975-1996). Scientific names of species were assigned using International Plant Name Index (IPNI, 2013). For determining life forms, Raunchier (1934)'s classification method was applied. Published article and references, such as Takhtajan (1986), Ghorbani *et al.* (2013), Sokhanvar *et al.* (2013), etc. were used for determining chorology of the identified FHVM species.

3. Results & Discussion

In this study, for identifying FHVM species at ZilberChay watershed, initially 493 plant species that were belong to 243 genera and 59 families were collected. Although there is high disturbance on the watershed, this area is rich from flora of FHVM species perspective. However, because of the lack of references in identifying FHVM species we were unable to record all ethnoveterinary species. Identified FHVM species are presented in Table 1. As can be seen from Table, 42 FHVM species were identified, which were belonging to 23 plant families and 37 genera.

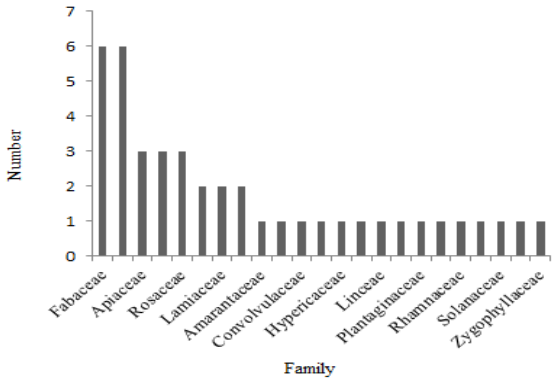

Fig 1. Number of ethnoveterinary medical species families in ZilberChay watershed.

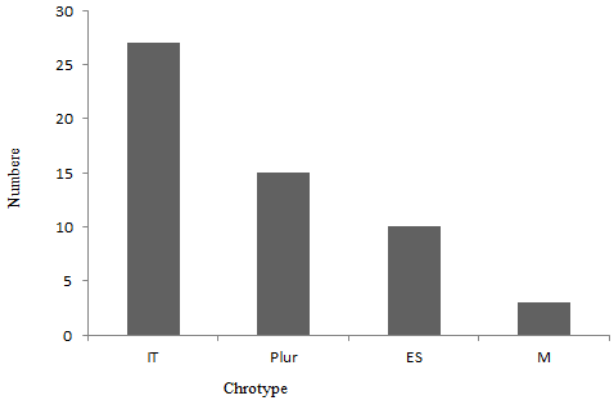

Fig 2. Comparison of chrotypes among ethnoveterinary medical species in ZilberChay watershed.

Main FHVM families are presented in Fig. 1. According to this Figure, the most common FHVM species belonged to the families of Fabaceae, Asteraceae, Apiaceae, Poaceaeand Rosaceae, respectively. These species were used for treating different disease and syndromes like endoparasites, mastitis, burns, bloat, Gastro Intestinal diseases, swelling, skin infection, digestive problem, wounds, Ectoparasites, diarrhea, and some other disease and syndromes in livestock. Identified FHVM species can be

used as powder, past, decoction or even mixture of two or more. Moreover, different parts of species such as leaves, flower, roots, bark, fruits, seeds, mucilage, aerial part, bulb and whole plant can be used in the cure of each disease.

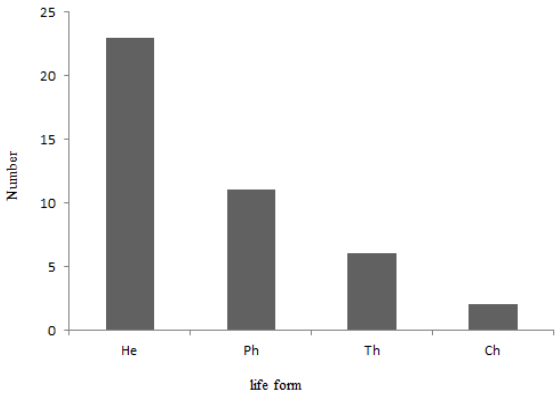

Fig 3. Comparison of life forms number among ethnoveterinary medical species in ZilberChay watershed.

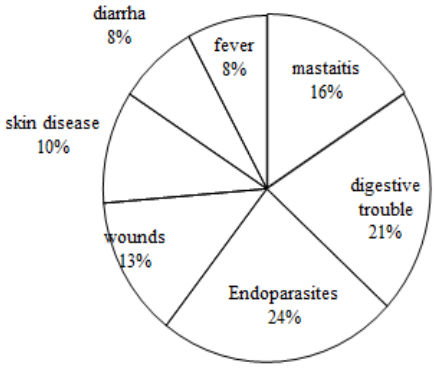

Fig 4. Most common treated disease and syndromes with ethnoveterinary species in ZilberChay watershed

Number of chrotypes among the studied FHVM are compared presented in Fig. 2. These chrotypes included IT (Irano-Toranian) with 49.1 %, Plur (More than 2 chrotypes) with 27.27 %, ES (Euro-Siberian) with 18.18 %M (Mediterranean) with 5.45 %. According to the table, the most common chrotype among the ZilberChay watershed FHVM are belong to Irano-Toranian chrotype.

Comparison of different life forms (i. e. He= Hemicryptophytes with 55%; Ph= Phanerophytes with 26.19 %; Th= Therophytes with 14.28 % and Ch= Chamaephytes with 4.76 %) among the studied plant species of ZilberChay watershed are given in Fig. 3. This figure represents that the most common life form among the FHVM of this area is hemicryptophytes.

Additionally, Fig. 4 shows the most common disease and animal health problems which have been treating with identified FHVM species in the study area. According to the results, endoparasites with 24 percent and skin disease with 16 percent are the most common treated disease by identified FHVM species and the less treated disease with medicinal plants are fever and diarrhea. These FHVM species are distributed on 900 to 3200m asl elevation.

Some of the identified ethnoveterinary species from the study area have already been reported in other studies. For example, Lautado and Capasso (2013) in ethnoveterinary study of useful plants in animal therapy showed that latex of *Achille amillefolium* is useful for fever treatment. Kouhpayeh *et al.* (2011) in the study of ethnoveterinary plants in Kerman province of Iran have reported that therapeutic potential of *Achille awilhelmsii* can cure wounds. Chalechale *et al.* (2013) found that *Amygdalus lycioides* which is growing in Kurdistan province of Iran can be mixed and grounded with the bark of brinjl (egg-plant) in vinegar and used as paste during 10 days to treat ulcerative lesions of leishmaniasis. Khan (2009) has reported that decoction of leaves and thorns of *Cichorium intybus* is used in impaction in cattle, sheep, goats and camels. Pande *et al.* (2007) and Ul Islam *et al*. (2012) have demonstrated the application of *Cynodon dactylon* to treat mastitis, gastric troubles, internal injury, food poisoning, wounds and as tonic, antiseptic and analgesic. Kouhpayeh *et al.* (2011) have also found that the leaves of *Gundelia tournefortii* is using against scabies in sheep and goat by local people of Kerman province in Iran. Laudat and Capasso (2013) and Lans *et al*. (2007) found that *Juniperus communis* affords in treating skin diseases, Ectoparasites, Endoparasites and liver fluke. Ul Islam *et al.* (2012) and Lans *et al.* (2007) respectively reported *Morus alba* and *Salix alba* as ethnoveterinary plants in mastitis. Some of herbal plants are being used by local people for curing indigestion like *Punicagranatum* and *Triticum aestivum* in the study of Pande *et al*. (2007). Some plants are useful for treating mineral elements deficiencies like *Urtica dioica* for treating zinc deficiencies and *Medicago sativa*in selenium deficiency (Lans *et al*., 2007).

Table 1. List of ethnoveterinary species of ZilberChay watershed in northwest of Iran. IT= Irano-Toranian; M= Mediterranean; Plur= More than 2 chorotypes; ES= Euro-Siberian; Th= Therophytes; He= Hemicryptophytes; Ch= Chamaephytes; Ph= Phanerophytes.

No.	Family& Scientific name	Elevation	Chrotype	Life forms	Application
	1. Amarantaceae				
1	*Amaranthus viridis* L.	2000-3000	IT	Th	Emollient
	1. Apiaceae				
2	*Carum carvi* L.	2000-3200	IT	He	Ectoparasites, Digestive &Gastric troubles, Skin diseases, Fever, Dehydration, Mouth infection
3	*Daucus carota* L.	900-2000	IT	He	Endoparasites
4	*Prangosferulacea* (L.) Lindley.	900-2200	IT,M	He	Treatment of thick and louse (Ruminants)
	2. Asteraceae				
5	*Achillea millefolium* L.	1500-2000	Plur	He	Fever, Mastitis, Wounds, Sternal abscess
6	*Achillea wilhelmsii* C.Koch	1500-3200	Plur	Ch	Wound relief in cattle, sheep and camel
7	*Arctium lappa* L.	900-2000	IT,ES	He	Mastitis
8	*Cichorium intybus* L.	900-2000	Plur	He	Endoparasites
9	*Gundelia tournefortii* L.	1500-2000	IT,M	He	Scabies in sheep &goat
10	*Taraxacum officinalis* Webber.	1500-2500	IT	He	Gastrointestinal diseases
	3. Brassicaceae				
11	*Sisymbrium officinale* L.	900-2500	IT	Th	Febrifuge, Expectorant
	4. Convolvulaceae				
12	*Convolvulus arvensis* L.	1000-2000	Plur	He	Purgative
	5. Cupressaceae				
13	*Juniperus communis* L.	1500-3200	Plur	Ph	Skin diseases, Ectoparasites, Endoparasites, Liver fluke
14	*Juniperus excels* M. B.	1500-3200	IT	Ph	Topical pain of motion organs in camel
	6. Elaeagnaceae				
15	*Hippophaerhamnoides*L.	900-1500	IT	Ph	Gastrointestinal endoparasites
	7. Fabaceae				
16	*Alhagi camelorum* Fisch.	900-2500	IT	He	Impaction in cattle, sheep, goats and camels
17	*Glycyrrhiza glabra* L.	900-2000	IT,ES	He	Reducing pain and swell in strains bruise, Stomach swell in horse
18	*Lotus corniculatus* L.	900-2000	M,IT	Th	Endoparasites
19	*Medicago sativa* L.	900-2000	Plur	He	Growth and enhancing camel and weak &young sheep, Selenium deficiency, Nutrition after calving
20	*Melilotus officinalis* (L.) Desr.	900-2000	Plur	He	Increase the milk production in ruminants
21	*Trifolium repens* L.	1200-2300	ES, IT	He	Nervous disease
	8. **Hypericaceae**				
22	*Hypericum perforatum* L.	1500-3200	Plur	Ch	Wounds, Proud flesh
	9. **Juglandaceae**				
23	*Juglance regia* L.	900-2000	ES,IT	Ph	Rape leaf and fruit for worm excretion
	10. Lamiaceae				
24	*Mentha longifolia* L.	1500-2500	Plur	He	As (stomachic) and (febrifuge)Commonly
25	*Prunella vulgaris* L.	900-2000	Plur	He	Wounds
	11. Linceae				
26	*Linumus itatissimum* L.	900-2500	Plur	He	Mastitis, tonic
	12. Malvaceae				

27	*Malva neglecta* Wallr.	900-1500	IT, ES	He	Digestive problem , For food poisoning, As fodder, But excess amount cause loose motion
	13. Moraceae				
28	*Morus alba* L.	900-1500	ES, IT	Ph	Leaves are used as fodder. In excess amount cause loose motion. It is also laxative and tonic, mastitis
29	*Morusnigra*L.	900-1500	IT	Ph	The leaves are used as fodder for sheep, goats and cows. These are also tonic and laxative
	14. Plantaginaceae				
30	*Plantago major L.*	900-2000	IT	He	Hits or Inflammations
	15. Poaceae				
31	*Cynodon dactylon* (L.) Press.	900-2500	Plur	He	As fodder for veterinaries. As tonic, antiseptic and analgesic, wounds for blood clouting, relieving pain mastitis, gastric troubles, internal injury, sprains, bone fracture, food poisoning, sunstroke, broken horn, clotting of blood
32	*Hordeum vulgar* L.	900-2000	IT	Th	Anemia, Post calving care, Itching, Haematuria, Strength, Density, Skin disease, Heat stroke, Cough, Regulate fertility, Lactation
33	*Triticum aestivum* Lamk.	900-1200	IT	Th	Bloat in goats, Skin infection, Stomachache, Indigestion, Anemia, Throat infection, Ricket, Remove serility, scabies, Tympany, Gas problem of goat
	16. Punicaceae				
34	*Punica granatum* L.	1200-2200	IT, ES	Ph	Diarrhea, fever, Dehydration, Indigestion, Gastric troubles, Tonic, Internal parasite, Burn, Paralysis, Flatulence, Tympany
	17. Rhamnaceae				
35	*Rhamnus virgata* Roxb.	2000-3000	IT	Ph	Swelling
	18. Rosaceae				
36	*Amygdalus lycioides* Spach.	1500-2500	IT	Ph	Ulcerative lesions of leishmaniasis
37	*Rosa canina* L.	900-2500	IT, ES	Ph	Inflammation
38	*Sanguisorba minor* Scop.	1500-3200	IT, ES	He	Joint troubles in camel
	19. Salicaceae				
39	*Salix alba* L.	900-1500	ES,IT	Ph	Eye disease, Diarrhea, Scours, Mastitis, Pain, Unknown illness
	20. Solanaceae				
40	*Datura stramonium* L.	900-1500	Plur	Th	Burns, Infected wounds, Parasite in cattle &sheep
	21. Ulmaceae				
41	*Urtica dioica* L.	900-3200	Plur	He	Endoparasites, Diarrhea, Pre-show protection, Zinc deficiency
	22. Zygophyllaceae				
42	*Peganum harmala* L.	900-1700	Plur	He	Snake bite(in all species)

Some of the identified ethnoveterinary plants are good against parasaites. Species such as *Carum carvi* and *Juniperus communis* for Ectoparasites, *Cichorium intybus*, *Daucus carota*, *Punica granatum* and *Urticadioica* in treating endoparasites and *Hippophae rhamnoides*is using for gastrointestinal endoparasites (Lans *et al*., 2007; Kouhpayeh *et al*., 2011; Chalechale *et al*., 2013; Lautado and Capasso, 2013). Moreover, in different studies some of the ethnoveterinary plants are reported for applying in specific disease, syndromes or problems. Plants such as *Peganum harmala* for snake bite (Bahmani *et al*., 2012); *Trifolium repens* for nervous disease (Pande *et al*., 2012); *Salix alba* for eye disease (Martínez and Luján, 2011); *Gundelia tournefortii* for scabies in sheep and goat (Kouhpayeh *et al*., 2011); *Juniperus communis* for skin diseases (Lautado and Capasso, 2013).

4. Conclusion

Forty two ethnoveterinary plant species with their medical effects were identified in ZilberChay watershed as the results of this study. Traditional knowledge of medical plants varies according to the culture and faith of different tribes all around the world, but because of the lack of previous studies, most of the ethnoveterinary plants are still unknown. Thus, there is a need to widespread study of ethnoveterinary medical plants and documentation of traditional knowledge of using them in treating domestic animals for conservation of medicinal flora and regional biodiversity that is particularly threatened around the world especially in Iran and east Azerbaijan.

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