



Ethno Veterinary Medicine and Common Diseases of Chicken Producers in Western Zone of Tigray, Northern Ethiopia

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

A survey was conducted in three agro-ecologies of western zone of Tigray from June to September 2019 with the aim of identification of common poultry diseases and ethno veterinary practices. Multi stage sampling procedures were employed to select were das, sample kebeles and respondents in which three rural were das were selected by purposive sampling technique; stratified purposive techniques were employed to select nine sample kebeles, purposive random sampling techniques were used to select a total of 385 respondents and random sampling was employed to select chickens for ectoparasites identification. A pretested semi-structured questionnaire was employed to generate data. Descriptive statistics of frequency procedures of SPSS version 22 was used to analyze the survey data. Kruskal- Wall's test option of Non-parametric test of SPSS 22 was employed to test proportion difference of each qualitative variable among the altitudes. Newcastle disease (27.79%), salmonella pullorum (25.45%), Coccidiosis (22.08%), fowl typhoid (10.95%), fowl cholera (7.53%), fowl pox (4.68%) and infectious Coryza (1.56%) were the major economically important infectious diseases that devastate village chicken production in the study area. A chicken mite (54.3%) was the most prevalent ectoparasites followed by lice (25.2%) and fleas (14.5%) while tick (6%) was the least prevalent ectoparasites. Forty-three medicinal plant species belonging to 30 families were identified and documented. Fabaceae and Rutaceae, the most dominant plant families, were represented by seven (16.28%) and four species (9.3%), respectively. Herbs

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(41.38%) and tree (47.4%) were the major growth forms of the medicinal plant species used for chicken diseases' treatment and ectoparasites prevention, respectively. Leaf was the most frequently used plant parts for the preparation of remedies for chicken diseases' treatment (41.38%) and ectoparasites' prevention (57.9%). In conclusion, chicken producers used ethno veterinary medicine plant species for chicken health management in the study area. Further studies should be conducted to evaluate safety, toxicity, standardize dose and efficacy of the medicinal plant species. Moreover, species composition of the identified infectious diseases and parasites and its associated risk factors should be conducted.

Keywords: Chicken; diseases; ectoparasites; ethno veterinary practices; medicinal plant.

1. INTRODUCTION

Keeping poultry particularly domestic chickens is the backbone economy base of poor households in developing countries like Ethiopia and the world as a whole. Village chicken production is globally recognized as a strategy for capital build up, food security attainment and malnutrition, poverty and hunger reduction among small scale households owing to their short reproduction cycles and low input requirement for production [1]. They also have social, cultural and religious importance, along with their role in improving growth and mental development, school performances and labor productivity and reduce the likelihood of illness among the small-scale farmers' children through diversification of consumable foods [2]. On top of these merits, poultry serves as a scaling-up enterprise to larger livestock species [3] and considered as the entry point for poverty reduction" and gateway to national food security [4].

Ethiopia has approximately 56.06 million indigenous chicken of non-descriptive breeds accounting for 88.19% of total poultry population, hybrid chicken for 5.36% and exotic breeds for 6.45% [5]. 99% of them are raised under the traditional backyard system of management, while 1% is under intensive management system [6,7]. About 62.8% of total annual egg production comes from village chickens [5]. However, their contributions to farm households and rural economies are disproportional compared to their figures. This is mainly due to poor management systems and other constraints. The high incidence of disease is one of the principal constraints that hinder chicken productivity in Ethiopia.

Ethno veterinary medicine is an indigenous animal health care system that includes the traditional beliefs, knowledge, skills, methods and practices of a given society [8]. The conventional veterinary medicines are not well

developed in Ethiopia, and the modern drug supply and services are very limited. Nowadays, ethno veterinary medicine is widely practiced by poor village farmers in different corners of Ethiopia as it is economical, culturally acceptable and ecological sound, and the coverage of modern medical services is limited.

Assessment and documentation of ethno veterinary medicines and practices are very crucial for ensuring sustainable utilization and conservation, and development of guidelines on ethno veterinary medicine usage and dosages; this can be used as input for further pharmacological and phytochemical studies. Few ethno veterinary studies have been conducted in Ethiopia [9,10,11,12,13,14,15,16,17,18,19]. However, management and health care situations as well as ethno veterinary medicines and practices of chicken producers of western zone of Tigray are not studied and compiled. Therefore, this study was designed with the aim of identification of common poultry diseases and ethno veterinary medicines and practices used in the rural districts of western zone of Tigray.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in three agro-ecologies (lowland, midland and highland) represented by three rural districts (Kafta Humera, Welkait, and Tsegede) of western zone of Tigray Regional State of Ethiopia. The altitudes of lowland, midland and highland are <1500, 1500-2500, and >2500 masl, respectively. The geographical location of the zone is 13°42' to 14°28' north latitude and 36°23' to 37°31' east longitude. The annual rainfall of the zone ranges from 600 to 1800 mm, while the annual temperature ranges from 27°C to 45°C in lowland and 10°C to 22°C in midland and highland. The study zone has an area of 1.5 million hectares and its altitude ranges from 500 to 3008 masl.

2.2 Sampling Techniques

Three rural (welkait, Tsegede & Kafta Humera) weredas were purposely selected. Stratified random sampling was employed to stratify kebeles (smallest administrative unit in Ethiopia) into lowland, midland, and highland. Based on the village poultry population density, chicken production potential and road accessibility, four, three and two kebeles were purposely selected from lowland, midland and highland agro-ecological zones, respectively. A total of 385 farmers who keep a minimum of three and above local chickens were selected from household package beneficiary's registration book of each selected kebele using purposive random sampling technique. The number of respondents per each sample kebele was determined by proportionate sampling technique based on the households' size of the sample kebeles. A total of 385 chickens (one per a household) were selected randomly from chickens of selected farmers to study chicken ectoparasites' prevalence.

2.3 Sample Size Determination

The required total respondents were determined using the formula by Cochran [20] for infinite population (infinite population $\geq 50,000$).

$$N_o = \frac{Z^2 pq}{e^2}$$

Where

N_o = required sample size

Z^2 = is the abscissa of the normal curve that cuts off an area at the tails $(1-\alpha)$ (95%=1.96)

e = is the margin of error (eg. $\pm 0.05\%$ margin of error for confidence level of 95%)

p = is the degree of variability in the attributes being measured refers to the distribution of attributes in the population

$$q = 1 - p.$$

$$N_o = \frac{Z^2 pq}{e^2} = \frac{[(1.96)^2 \times (0.5) (0.5)]}{(0.05 \times 0.05)} = \frac{[3.8416 \times 0.25]}{(0.0025)} = 0.9604 / 0.0025 = 385 \text{ farmers}$$

The numbers of respondents (farmers) per single selected kebele were determined by proportionate sampling technique as follows:

$W = \frac{A}{B} \times N_o$, where A = Total number of households (farmers) living per a single selected kebele, B = Total sum of households living in all selected sample kebeles and N_o = the total required calculated sample size

2.4 Data Collection

Data on common diseases and ectoparasites of village chicken productions, availability and access to veterinary services and ethno veterinary medicines and practices were collected through individual interviews using pretested well -structured questionnaire consisting of open and close -ended questions. The collected data on ethno veterinary practices included local names of plant used, application methods, parts of the plant used, growth habit, plant families, conditions of the plant used (dry or fresh) and other non- plant materials used for treatments. The scientific names of the identified plants were identified in consultation with experienced forestry professionals. Identified symptoms of each poultry disease during individual interview was translated in to its respective common name based on the case book records of poultry diseases in the prevailing Animal Health Clinics of the study area. This was done with the involvement of the experienced veterinarians. Ectoparasites were collected from different body parts of the sampled chickens and classified according to the book "Helminthes, Arthropods and Protozoa of Domestic Animals" [21].

2.5 Data Analysis

Descriptive statistics of frequency procedures and cross-tabulation of SPSS version 22 was used to analyze the collected survey data. The Kruskal-Wallis Test option of the non-parametric tests of SPSS was employed to test the effects of the agro-ecology on the proportion of each qualitative survey data.

3. RESULTS

3.1 Poultry Diseases and Treatment Practices of Chicken Producers

Seven economically important diseases of chickens identified in the study zone (Table 1). Among these two viral, four bacteria and one protozoal disease of chickens were identified in the study area. Newcastle disease, *Salmonella pullorum* and Coccidiosis were the principal chicken diseases that hindered chicken production in the study zone (Table 1).

The result indicated that 87.27% of the respondents had practices of treating diseased chickens while 12.73% of them did not practice. Out of the respondents who had chicken treating practices, 75.58% of them treated their chickens

using traditional treatment types (Table 2). Overall, access to veterinary (either governmental or private) clinics seemed to be very adequate (88.8%) but limited to providing diagnosis and drug provision services of chickens in the study area (Table 2). The respondents replied that they always ask any veterinarian to give drugs and diagnosis services for chickens but they do not still get feedback of both services in the prevailing veterinary clinics of the study area. Respondents considered these veterinary clinics of the study area as center of advisory services for chickens. Almost all respondents (99.7%) had not vaccinated their chickens while the remaining 0.3% of them had recently vaccinated chickens against Newcastle disease and fowl pox in the study area.

Sixteen percentage of the respondents used Oxytetracycline 20% powder as drug of choice which was directly purchased from either private or governmental clinics to treat chickens (Table 3). However, none of the respondents who used Oxytetracycline were aware of appropriate dose rate and they simply adjusted according to their perception of the severity of the diseases. Furthermore, uses of human antibiotic preparations including Tetracycline, Amoxicillin, and Ampiciline and chloroquine tablet to treat different chicken diseases were also observed (Table 3). Oxytetracycline *leshlesh* injection prepared for treatment of large animals was also used to treat chicken in the study zone. However, the dose rates of the human antibiotics and Oxytetracycline prepared for large animals used for treating chicken diseases based on the dose rates adjusted for human and large animals.

3.2 Ethnoveterinary Medicinal Plants

Different medicinal plant species used for treatment of chicken diseases were identified with in details on their traditional application methods, plant parts used, growth habit, local name, scientific name, family name and disease treated (Table 4). The study revealed that Western Tigray harbor about 29 medicinal plant species used against seven chicken diseases, which were distributed across 22 families (Table 4). About 37.9% of these traditional medicinal plant species belong to four families, and the family *Rutaceae* took the lion's share with four plant species (13.8%). *Fabaceae* had three plant species (10.3%) while *Alliaceae* and *Myrtaceae* each had two plant species (6.9%). The remaining 18 families were represented by one plant species each. Chicken producers used table salt for treating diseased chickens with

Salmonella pullorum, Newcastle disease, Coccidiosis, fowl typhoid, fowl cholera, infectious Coryza and fowl pox through dissolving with water and given as drinking water (Table 5). Different non-plant materials such as butter, benzene, human hairs' oils and edible oils were frequently used to paint both the eyes and faces of the affected chicken by Newcastle disease, fowl cholera, infectious Coryza and fowl pox (Table 5).

3.3 Growth Habit and Parts of the Medicinal Plant Species

Analysis of the growth habits of the identified medicinal plant species indicated that herbs constitute the highest number of plant species (12 species, 41.38%) followed by trees (10 species, 34.48%), shrubs (4 species, 13.79%) and climbers (3 species, 10.34%) (Fig. 1 and Table 4). The analysis of the Ethnoveterinary preparations also showed that fresh leaves (41.38%) were the most frequently sought medicinal plant parts followed by fruits and all parts (17.24%), seed and bulb (10.34%) and rhizome (3.45%).

3.4 Chicken External Parasites and Traditional Prevention Mechanisms

Four external parasites of chickens were identified in the study zone (Table 6). Red chick mite (54.3%) was the most predominant external parasites followed by chicken lice (25.2%) and chicken fleas (14.5%) while chicken tick (6.0%) was the least predominant chicken external parasites that hindered chicken production in the study zone (Table 6). The study also indicated that nineteen medicinal plant species belonging to 14 families used for prevention of chicken external parasites were identified. About 36.8% of these medicinal plant species belong to two families and the family *Fabaceae* took the leading share with five plant species (26.3%). *Combretaceae* had two plant species (10.5%) while the remaining 12 families were represented by one plant species each (Table 6). Village chicken producers mainly used fresh leaves followed by both fresh leaves and stems and all parts of the medicinal plants to prevent chicken external parasites through smoking the poultry houses after cleaning (Table 6). The result of the study also indicated that chicken producers use fresh leaves of the plant species *Azadirachta indica*, *Combretum Molle/Collinum*, *Cometes abyssinica* and *Petrolobium Stellatum* as bedding material in addition to external parasite prevention through smoking.

4. DISCUSSION

Newcastle disease, salmonella pullorum and Coccidiosis were the major chicken diseases that hindered chicken production in the study zone. This agrees with the findings of Meseret [22] who reported Newcastle disease (34.42%), infectious bronchitis (27.92%), external parasites (25.97%) and Coccidiosis (11.69%) were the most economically important poultry diseases in Gomma wereda of Jimma zone. Similar results have been reported from Fogera district [23] and rift valley of Oromia [24] that Newcastle disease was found to be the most economically important poultry disease in both areas. Besides, Mazengia [25] also reviewed that Newcastle diseases, infectious bursal disease and Marek's diseases become serious threats to poultry production in Ethiopia. Yalelet et al. [26] also reported Newcastle disease (43.5%), Coccidiosis (30%), Ectoparasites (11%), Infectious Coryza (3%) were the most common chicken diseases south Wollo zone of Amhara region. In Nigeria, Adedeji et al. [27] also reported that Coccidiosis and Newcastle disease were the major diseases affecting poultry keeping in Ilesha west local government area of Osun state. In the same way, Zahradden et al. [28] also reported fowl pox (17.6%), fowl cholera (17.6%), Gumboro (11.8%), Newcastle disease (23.5%), fowl typhoid (23.5%) and Coccidiosis (5.9%) were the reported causes of disease incidences among farmers in the Taraba state of Nigeria. Chicken mite was the most predominant ectoparasites that affected chicken productivity in the study area. This disagreed with the findings of Assefa et al. [29], Firaol et al. [30], Belihu et al. [31] and,

Mekuria and Gezahagn [32] from Ethiopia and Sabuni et al. [33] from Kenya, and Lawal et al. [34] and Sadiq et al. [35] from Nigeria reported that lice was the most prevalent chicken ectoparasites. The difference between the current and previous findings may be due to variations in agro-climatic and geographic conditions, husbandry management practices, season of study, implemented methods of parasitic control practices, chicken breed or ecotypes and ectoparasites adaptability [29,32,36,37].

A total of **43** medicinal plant species belonging to **30** plant families have been documented in the current study. Among these, **24** of them have been only used to treat seven chicken diseases, **14** of them have been used for the prevention of four chicken ectoparasites and **5** of them have been used for both diseases' treatment and external parasites' prevention through smoking. Similar ethno veterinary studies conducted in Khyber Pakhtunkhwa, Pakistan [38], Central Anatolia, Turkey [39], in and around Gondar town [40], Enarji Enawga district of Amhara region [41], South Wollo zone of Amhara region [26], Selected districts of Ethiopia [42], Ada'a district of Afar region [43], Dabo Hana district, Borena zone, Ethiopia [44], selected four districts of Jimma zone, Ethiopia [17] and Ankober district , North Shewa zone, Ethiopia [45] documented 50, 26, 68, 34,23, 49, 49, 106, 74 and 51 medicinal plant species respectively. These findings clearly showed the importance of plant based ethno veterinary remedies in the treatment of diseases of different livestock species in different corners of the world.

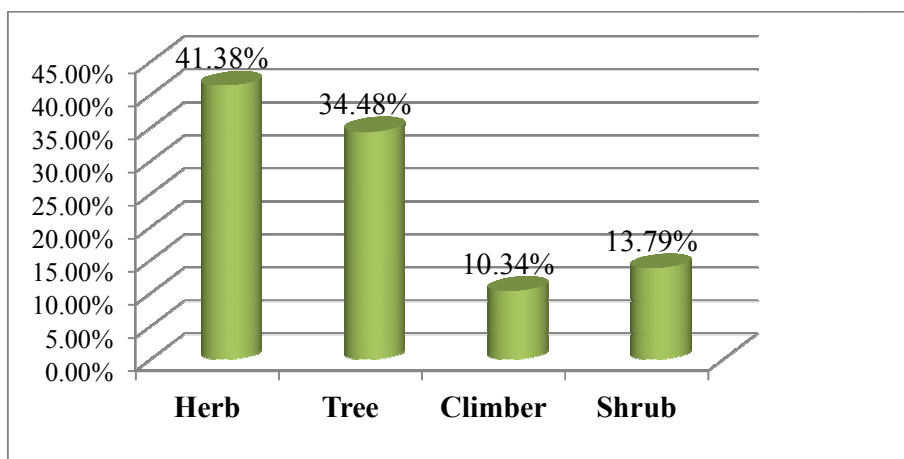


Fig. 1. Growth habit of ethnoveterinary medicinal plants identified in Western Tigray

Table 1. Common diseases of local chicken producers in Western Zone of Tigray

Disease name	Symptoms	Disease type	Agro ecology				X ² -test	P-value
			Lowland n (%)	Midland n (%)	Highland n(%)	Total n (%)		
Prevalence of diseases								
<i>Salmonella pullorum</i>	Yellowish green droppings (diarrhea)	Bacteria	45 (28.13)	34(25.95)	19 (20.21)	98 (25.45)	4.07(ns)	0.126
Newcastle Disease	Upward neck erection, greenish diarrhea, star grazing, dullness	Viral	42(26.25)	37 (28.24)	28 (29.29)	107 (27.79)		
Fowl Typhoid	Loss of appetite, thirsty, yellowish diarrhea, respiratory difficulty	Bacteria	18(11.25)	13 (9.92)	11(11.70)	42 (10.91)		
Coccidiosis	Reddish diarrhea, loss of appetite	Protozoa	33(20.63)	30 (22.90)	22(23.40)	85 (22.08)		
Fowl Cholera	Greenish diarrhea, discharge from eye, swelling of wattle	Bacteria	13 (8.13)	8 (6.11)	8 (8.51)	29 (7.53)		
Infectious Coryza	Face swelling, discharge from mouth and noise	Bacteria	2 (1.25)	3 (2.29)	1 (1.06)	6 (1.56)		
Fowl Pox	Swelling of eye, become blind, highly communicable	Viral	7 (4.38)	6 (4.58)	5 (5.32)	18 (4.68)		

Table 2. Chicken treating practices, treatment types, access to veterinary services, vaccination practices and distance of veterinary services to farmers' homestead

Variable	Agro-ecology				X ² -test	P-value
	Lowland n (%)	Midland n (%)	Highland n (%)	Total n (%)		
Chicken Treating practices						
Yes	142(88.75)	115(87.79)	79(84.04)	336(87.27)	5.46 (ns)	0.062
No	18 (11.25)	16(12.21)	15(15.96)	49 (12.73)		
Types of Treatment practices						
Modern	6(3.75)	2 (1.53)	0(0)	8 (2.08)	4.67 (ns)	0.172
Traditional	116 (72.50)	102(77.86)	73(77.66)	291(75.58)		
both	20 (12.50)	11 (8.4)	6 (6.38)	37 (9.61)		
no treatment at all	18 (11.25)	16(12.21)	15(15.96)	49 (12.73)		
Access to veterinary services						
Yes	136(85)	119(90.8)	87(92.6)	342(88.8)	4.201(ns)	0.122
No	24(15)	12(9.2)	7(7.4)	43(11.2)		
Vaccination practice						
Yes	1(0.6)	-	-	1(0.3)	1.406(ns)	0.495
No	159(99.4)	131(100)	94(100)	384(99.7)		
Distance of governmental veterinary clinics to farmers' homestead						
<1 km	21(13.1)	1(0.8)	1(1.1)	23(6)	123.505(*)	0.00
1-5 km	76(47.5)	24(18.3)	12(12.8)	112(29.1)		
5-8 km	24(15)	29(22.1)	16(17)	69(17.9)		
8-10 km	11(6.9)	20(15.3)	14(14.9)	45(11.7)		
>10 km	1(0.6)	45(34.4)	42(44.7)	88(22.9)		

Variable	Agro-ecology				X ² -test	P-value
	Lowland n (%)	Midland n (%)	Highland n (%)	Total n (%)		
Distance of private veterinary clinics to farmers' homestead					5.113(ns)	0.078
<1 km	3(1.9)	-	-	3(0.8)		
1-5 km	3(1.9)	1(0.8)	2(2.1)	6(1.6)		
5-8 km	1(0.6)	2(1.5)	-	3(0.8)		
8-10 km	-	1(0.8)	-	1(0.3)		

Table 3. Traditional farmers' application of modern drugs for treating diseased chickens in Western Zone of Tigray

Medicine Type	Formulation	Application method	N (%)	Diseases treated
Oxytetracycline 20% poultry drug	Powder	Dissolved with water and added to drinking water	62 (16.1%)	Salmonella Pullorum, Coccidiosis, Newcastle disease and fowl pox
Human Tetracycline	Powder	Dissolved with water and added to drinking water	267 (69.4%)	Salmonella Pullorum, Coccidiosis, Newcastle disease and fowl pox
Human Amoxicillin	Powder	Dissolved with water and added to drinking water	197 (51.2%)	Salmonella Pullorum, Coccidiosis, Newcastle disease and fowl pox
Human Chloroquine Tablet	Solid	Dissolved with water and added to drinking water	136 (35.3%)	Salmonella Pullorum, Fowl cholera, Coccidiosis, Newcastle disease and fowl pox
Human Ampicillin	Powder	Dissolved with water and added to drinking water	133 (34.5%)	Coccidiosis, Newcastle disease and fowl pox
Large Animal Prepared Oxytetracycline /leshlesh/	Liquid	Added to drinking water	258 (67.0%)	Salmonella pullorum, Coccidiosis, Newcastle disease and fowl pox

NB: N (%) - indicates number (percentage) of respondents using each drug as a drug of choice

Table 4. Medicinal plants used for treating diseased chickens in Western Zone of Tigray

Local name of plant	Scientific name	Family	Habit	plant parts	Application method	Diseases treated
Lemon	<i>Citrus limon</i>	<i>Rutaceae</i>	Tree	fruit	Extracted juice mixed with little water and then given	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, infectious Coryza, Newcastle disease, Fowl pox
Nim	<i>Azadirachta indica</i>	<i>Meliaceae</i>	Tree	leaf	Fresh leaf chopped and added to drinking water	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, infectious Coryza, Newcastle disease, fowl pox
Shiferaw	<i>Moringa stenopetala</i>	<i>Moringaceae</i>	Tree	leaf	chopped fresh leaf mixed drinking water and then given	<i>Salmonella pullorum</i> , fowl cholera, Coccidiosis, fowl typhoid, Newcastle disease
Shinfae	<i>Lepidium sativum</i>	<i>Brassicaceae, Cruciferae</i>	Herb	seed	Seed grounded and added to drinking water	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Infectious Coryza, Newcastle disease, Fowl pox
Shigurti Keih	<i>Allium cepa</i>	<i>Alliaceae</i>	Herb	Bulb	Crushed bulb and then given	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Newcastle disease, Fowl pox
Shigurti Tsaeda	<i>Allium sativum</i>	<i>Alliaceae</i>	Herb	Bulb	Crushed bulb and then given	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Newcastle disease

Local name of plant	Scientific name	Family	Habit	plant parts	Application method	Diseases treated
Berbere	<i>Capsicum frutescens</i>	<i>Solanaceae</i>	Herb	Fruit	Fresh hot pepper chopped & given with feed	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Infectious Coryza, Newcastle disease, Fowl pox
Selit /Sesame	<i>Sesamum indicum</i>	<i>Pedaliaceae</i>	Herb	seed	Sesame seed given as feed	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Newcastle disease
Alqe	<i>Cissus quadrangularis</i>	<i>Vitaceae</i>	climber	All parts	Crushed fresh parts mixed with drinking water and then given	<i>Salmonella pullorum</i> , Fowl cholera, Fowl typhoid, Infectious Coryza, Coccidiosis
Buna	<i>Coffee arabica</i>	<i>Rubiaceae</i>	Shrub	Fruit	Roasted and powdered coffee mixed with drinking water	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Infectious Coryza, Newcastle disease, Fowl pox
Eindadie/semok/ kentib	<i>Acacia senegal/ Acacia mellifera</i>	<i>Fabaceae</i>	Tree	leaf	Chopped fresh leaf mixed with drinking water and then given	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Newcastle disease, Fowl pox
Shibti	<i>Phytolacca dodecandra</i>	<i>Phytolaccaceae</i>	Shrub	leaf	Fresh leaf chopped and added to drinking water	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Newcastle disease, Fowl pox
Eikka Talian	<i>Agave sisalana, Agave americana</i>	<i>Asparagaceae</i>	Herb	All parts	Fresh branch chopped and juice squeezed and collected and then given	Fowl cholera and Coccidiosis
Hafaflo	<i>Cucumis dipsaceus</i>	<i>Cucurbitaceae</i>	climber	All parts	Chopped fresh parts mixed with drinking water and then given	Fowl cholera and Coccidiosis
Habbi Tselim	<i>Jasminum abyssinicum</i>	<i>Oleaceae</i>	Climber	leaf	Chopped fresh leaf mixed with drinking water and then given	Fowl cholera, fowl typhoid and Newcastle disease
Geso	<i>Rhamnus prinoides</i>	<i>Rhamnaceae</i>	shrub	leaf	Chopped leaves mixed little water, filtered and then given	Fowl cholera, Coccidiosis, fowl typhoid & Newcastle disease
Jinjibl	<i>Zingiber officinale</i>	<i>Zingiberaceae</i>	Herb	Rhizome	Crushed rhizome and then given	Coccidiosis, fowl typhoid & Newcastle disease
Chenaadam	<i>Ruta chalepensis</i>	<i>Rutaceae</i>	Herb	leaf	Crushed leaves mixed little water, filtered and then given	Coccidiosis, fowl typhoid & Newcastle disease
Serawer/seraw	<i>Acacia etbaica</i>	<i>Fabaceae</i>	Tree	leaf	Chopped fresh leaf mixed with drinking water and then given	Newcastle disease
Hamba- hambo	<i>Senna singueana</i>	<i>Fabaceae</i>	Shrub	leaf	Chopped fresh leaf mixed with drinking water and then given	Newcastle disease, salmonella Pullorum, Coccidiosis
Habbi	<i>Hagenia abyssinica</i>	<i>Rosaceae</i>	Tree	leaf	Chopped leaves mixed with water and sieved and then given	Fowl cholera, fowl typhoid and Newcastle disease
Papaya	Carica Papaya	<i>Caricaceae</i>	herb	seed	Drying and grinding seeds and then given	Coccidiosis, Newcastle disease
Ere	<i>Aloe secundiflora</i>	<i>Asphodelaceae</i>	herb	All parts	Juice squeezed and collected and then given	Newcastle disease, Coccidiosis, <i>Salmonella pullorum</i> , fowl typhoid
Tsaeda Kelamitos	<i>Eucalyptus globulus</i>	<i>Myrtaceae</i>	Tree	leaf	Chopped fresh leaves mixed water and given as drinking water	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Infectious Coryza, Newcastle disease, Fowl pox

Local name of plant	Scientific name	Family	Habit	plant parts	Application method	Diseases treated
Keih Kelamitos	<i>Eucalyptus camaldulensis</i>	Myrtaceae	Tree	leaf	Chopped fresh leaves mixed water and given as drinking water	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Infectious Coryza, Newcastle disease, Fowl pox
Shiguerti Zibie	<i>Kniphofia isoetifolia</i>	Asphodolaceae	Herb	Bulb	Crushed bulb and then given	<i>Salmonella pullorum</i> , Coccidiosis, Newcastle disease and fowl pox
Brtukan	<i>Citrus sinensis</i>	Rutaceae	Tree	Fruits	Extracted juice mixed with little water and then given	Fowl typhoid, <i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Newcastle disease
Manderin	<i>Citrus reticulata</i>	Rutaceae	Tree	Fruits	Extracted juice mixed with little water and then given	<i>Salmonella pullorum</i> , Fowl cholera, Coccidiosis, Fowl typhoid, Newcastle disease
Chomer	<i>Ocimum forskolei</i>	Lamiaceae	herb	All parts	Chopped plant mixed water and given as drinking water	Newcastle disease, <i>Salmonella pullorum</i> , fowl typhoid

Table 5. Non plant materials used for treating diseased chickens in Western Zone of Tigray

Materials name	Application method	Treated diseases
Table salt	Dissolved with water and given as drinking water	<i>Salmonella pullorum</i> , Newcastle disease, Coccidiosis, Fowl typhoid, fowl cholera, Infectious Coryza, fowl pox
Butter	Painting the eyes and faces of affected chickens	Newcastle disease, fowl cholera, infectious Coryza, fowl pox
Fuel (Benzene)	Painting the eyes and faces of affected chickens	Newcastle disease, fowl cholera, infectious Coryza, fowl pox
Gris	Painting the eyes and faces of affected chickens	Newcastle disease, fowl cholera, infectious Coryza, fowl pox
Human hairs' oils	Painting the eyes and faces of affected chickens	Newcastle disease, fowl cholera, infectious Coryza, fowl pox
Edible Oils	Painting the eyes and faces of affected chickens	Newcastle disease, fowl cholera, infectious coryza, fowl pox

Table 6. Common external parasites of chicken producers in Western Zone of Tigray

Local name	Common name	Agro ecology				X ² -test	P-value
		Lowland n (%)	Midland n (%)	Highland n (%)	Total n (%)		
Prevalence of external parasites						2.33(ns)	0.317
<i>Gozguz</i>	Mites	87(54.4%)	70(53.4%)	52(55.3%)	209(54.3%)		
<i>Kumal Derahu</i>	Chicken lice	40(25%)	33(25.2%)	24(25.5%)	97(25.2%)		
<i>Kunchi Derahu</i>	Chicken fleas	24(15%)	19(14.5%)	13(13.8%)	56(14.5%)		
<i>Kurdid Derahu</i>	Chicken tick	9(5.6%)	9(6.9%)	5(5.4%)	23(6.0%)		

Table 7. Medicinal plants used for prevention of red chick mite, lice and fleas of local chicken in Western Zone of Tigray

Local name of plant	Scientific name	Family	Habit	plant parts	Application method
Hitsawits	<i>Calpurnia Aurea</i>	<i>Fabaceae</i>	<i>Shrub Or Small Tree</i>	leaf + stem	Smoking after cleaning the chicken house
Nim	<i>Azadirachta indica</i>	<i>Meliaceae</i>	Tree	leaf	Smoking after cleaning the chicken house and then use as bedding
Mebtie	<i>Acokanthera Schimperi</i>	<i>Apocynaceae</i>	Tree	leaf	Smoking after cleaning the chicken house
Habbi	<i>Hagenia Abyssinica</i>	<i>Rosaceae</i>	Tree	leaf	Smoking after cleaning the chicken house
Akuma	<i>Comparetum species</i>	<i>Comparetum Spp.</i>	Tree	Leaf	Smoking after cleaning the chicken house
Kerets	<i>Osyris Quadripartita</i>	<i>Santalaceae</i>	Shrub	leaf	Smoking after cleaning the chicken house
Alqe	<i>Cissus quadrangularis</i>	<i>Vitaceae</i>	climber	All parts	Smoking after cleaning the chicken house
Hot pepper	<i>Capsicum frutescens</i>	<i>Solanaceae</i>	Herb		Smoking after cleaning the chicken house
Tambok	<i>Croton Macrostachyus</i>	<i>Euphorbiaceae</i>	Tree	leaf +stem	Smoking after cleaning the chicken house
Hamba- hambo	<i>Senna singueana</i>	<i>Fabaceae</i>	Shrub or small tree	leaf and stem	Smoking after cleaning the chicken house
Chimda/Qemida	<i>Clematis Simensis</i>	<i>Ranunculaceae</i>	Tree	leaf	Smoking after cleaning the chicken house
Weyba	<i>Combretum Molle, Combretum Collinum</i>	<i>Combretaceae</i>	Tree	leaf	Smoking after cleaning the chicken house and then use as bedding
Gonok	<i>Dichrostahys Cinerea</i>	<i>Fabaceae</i>	Shrub or small tree	All parts	Smoking after cleaning the chicken house
Atat	<i>Maytenus Obscure, Maytenus Arbutifolia</i>	<i>Celesteraceae</i>	Shrub	leaf and stem	Smoking after cleaning the chicken house
Chewcheway sari/saerosaero	<i>Cometes abyssinica</i>	<i>Carryphyllaceae</i>	Herb	All parts	Smoking after cleaning the chicken house and then use as bedding
Tenkeliba	<i>Combretum Fragrans</i>	<i>Combretaceae</i>	Tree	leaf	Smoking after cleaning the chicken house
Chindog	<i>Otostegia Integrifolia</i>	<i>Lamiaceae</i>	Shrub	leaf+ stem	Smoking after cleaning the chicken house
Zibbe	<i>Delberigia melanoxyton</i>	<i>Fabaceae</i>	Tree	leaf	Smoking after cleaning the chicken house
kontefetefe	<i>Petrolobium Stellatum</i>	<i>Fabaceae</i>	Climber	Leaf	Smoking after cleaning the chicken house and then use as bedding

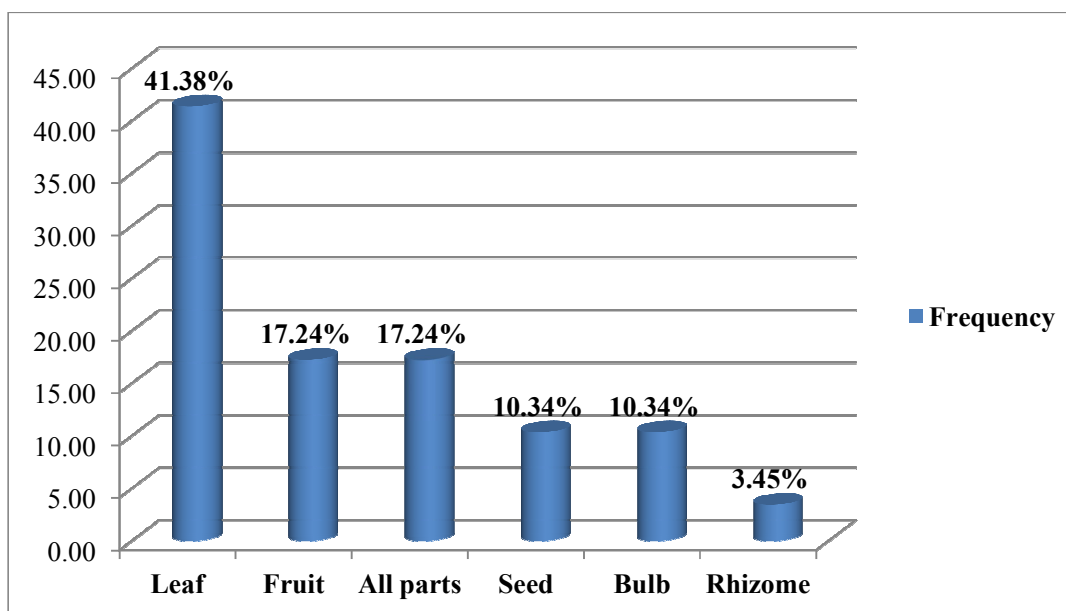


Fig. 2. Parts of the medicinal plants used for treatment of chicken diseases

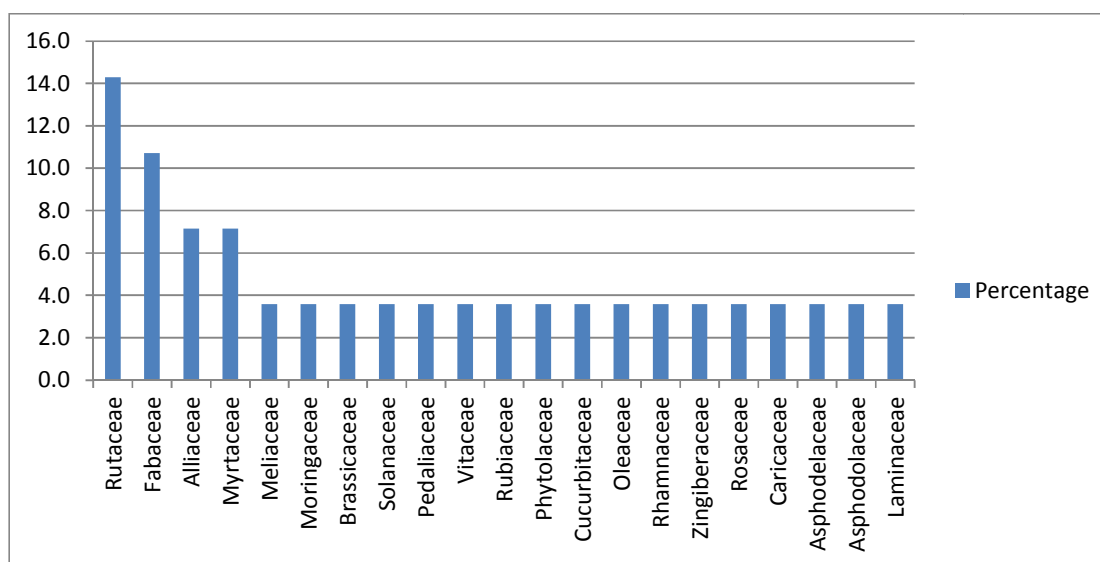


Fig. 3. Plant families used for treatment of chicken diseases

Among the total 43 medicinal plant species identified in this study, 13 species in south Wollo zone of Amhara region by Yalelet et al. [26], 8 species in and around Gondar town by Ayehu and Debebe [30] and 2 species in Enarji Enawga district of East Gojam of Amhara region by Birhan et al. [41]. This implies that the wide use of ethno veterinary traditional remedies in the treatment of diseases of different livestock species in Ethiopia and the presence of diverse Ethnoveterinary knowledge among different

communities of Ethiopia. *Rutaceae*, *Fabaceae*, *Alliaceae* and *Myrtaceae* were the dominant plant families used for remedy preparations to treat chicken diseases while *Fabaceae* and *Combretaceae* were the two most dominant plant families used for prevention of chicken ectoparasites in the study area. This is somewhat similar to the findings of Yalelet et al. [26] who reported that *Solanaceae*, *Rutaceae*, *Meliaceae* and *Alliaceae* were the main plant families used for treatment of major diseases of

chicken in south Wollo zone of Amhara region. Minyahel Tilahun et al. [46] also reported that *Solanaceae* and *Fabaceae* were the most frequently utilized Ethno veterinary medicine plant families.

The majority of the identified medicinal plant species used for prevention of chicken ectoparasites belong to trees while the identified medicinal plant species used for treatment of chicken diseases belong to herbs in the current study. This may be due to herbaceous' relative better abundance and accessibility in nearby areas as compared to other life forms, which is in

agreement with previous studies conducted in different corners of Ethiopia [41,47,48]. Yigezu et al. [17] also reported that tree was the major life forms of ethno veterinary plant species. In contrast, other studies documented shrubs as the most frequently used life forms in Ethnoveterinary practices [45,49,43]. Most of the Ethnoveterinary practitioners in the study area prefer fresh plant materials to prepare effective and efficient remedies. The use of fresh plant materials for remedy preparations is well documented elsewhere in Ethiopia [41,47,50,51] as most of the bioactive chemicals are retained in fresh plant materials as compared to dry ones.

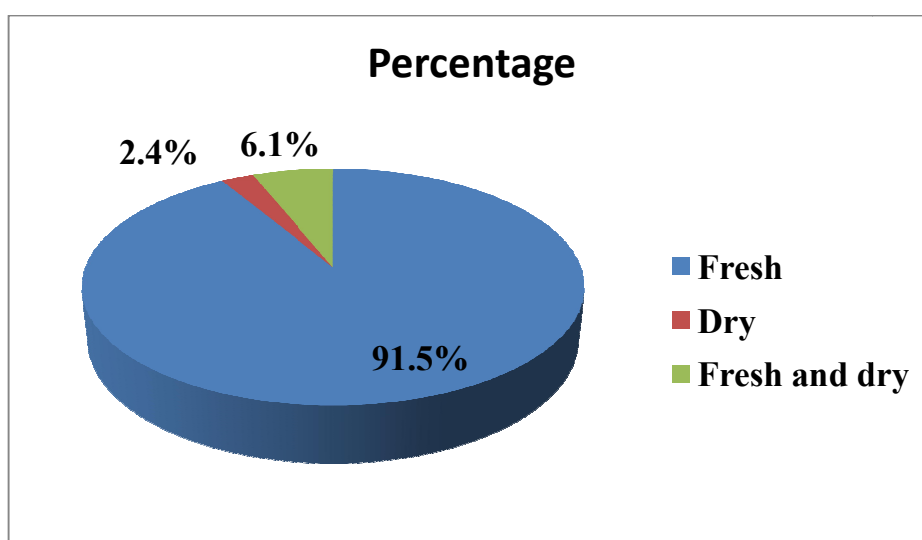


Fig. 4. Conditions of EVM plant species treating chicken diseases

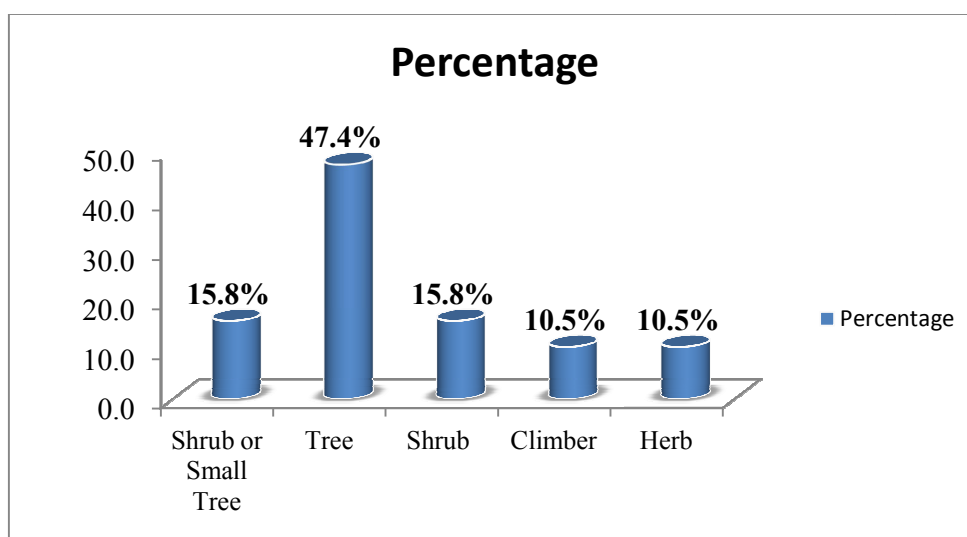


Fig. 5. Growth forms of medicinal plants used for controlling chicken ectoparasites

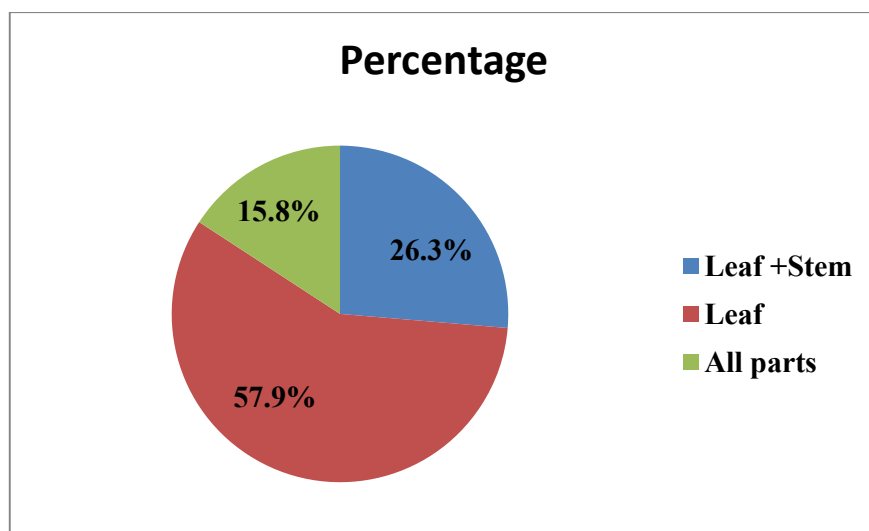


Fig. 6. Parts of the medicinal plants used for controlling chicken ectoparasites

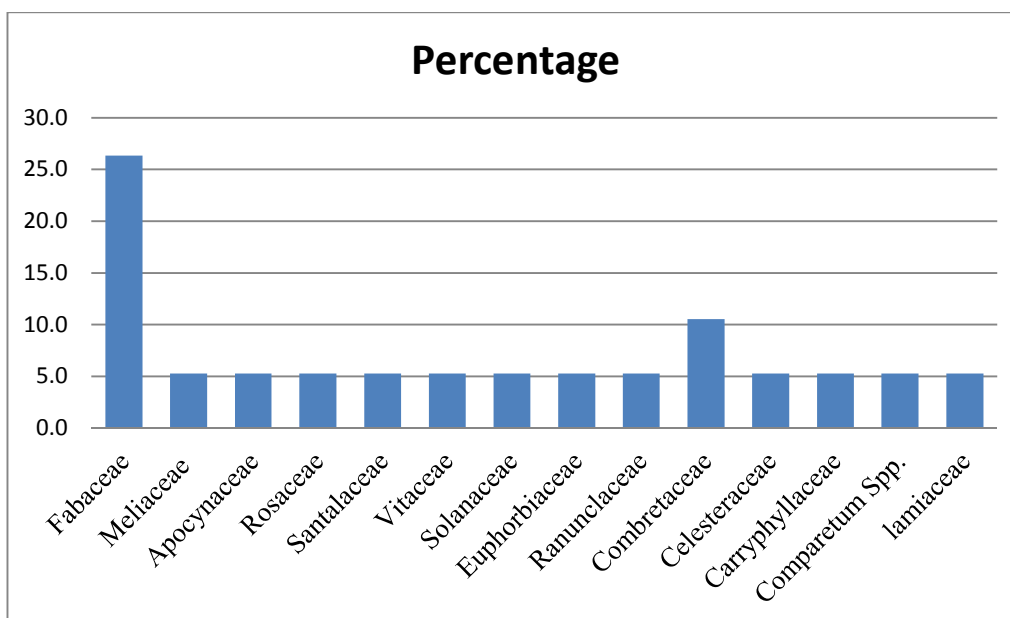


Fig. 7. Plant families used for controlling chicken ectoparasites

Leaf was the most frequently used plant part of the reported medicinal plant preparations in the current study which is in agreement with other results reported previously [17,49,52]. The preference of leaves to other plant parts seems may not cause a plant death and also for the presences of pharmacologically active Phytochemicals which are capable of eliciting the intended biological activity. However, in studies conducted elsewhere in Ethiopia, roots were indicated to be the most frequently sought

plant part to treat livestock diseases [10,41,45,53].

Majority of the respondents confirm that most of the remedies for both chicken diseases and ectoparasites were prepared from fresh plants. This finding was consistent with previous finding [26] which had the largest proportion (78.3%) of the remedy is processed in a fresh form. Many healers believed that fresh preparations are effective in healing the supposed ailment.

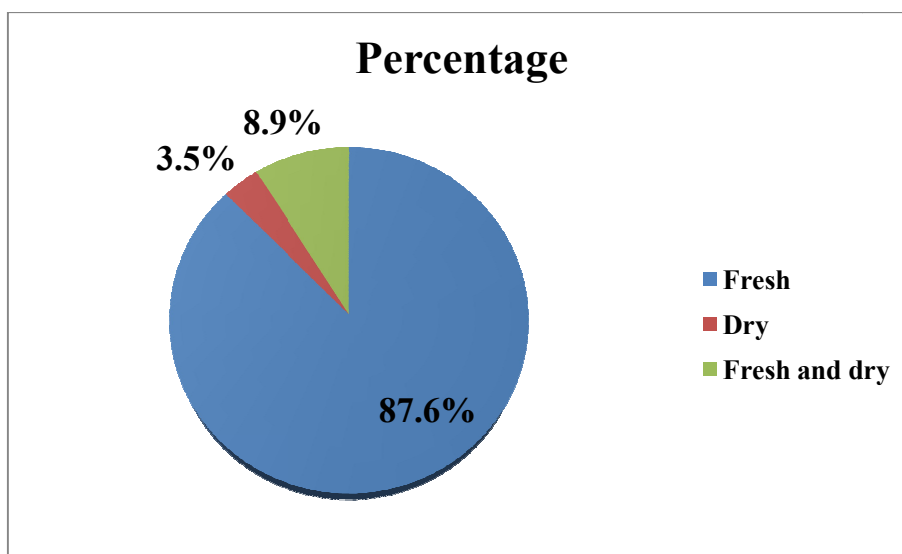


Fig. 8. Conditions of EVM plant species used for controlling chicken ectoparasites

5. CONCLUSION AND RECOMMENDATION

The study revealed that Newcastle disease, *Salmonella pullorum* infection and Coccidiosis were the main poultry diseases devastating chicken production in western zone of Tigray. Chicken producers used Ethnoveterinary plant species, none plant materials, and human and large animal drugs to treat chicken diseases in the study area. 29 medicinal plant species found in 22 plant families were the identified ethno veterinary medicines used for treating mainly Newcastle disease, *Salmonella pullorum* infection, Coccidiosis, fowl typhoid, fowl cholera, fowl pox and infectious Coryza. *Rutaceae*, *Fabaceae*, *Alliaceae* and *Myrtaceae* were the main plant species families used for treatment of chicken disease in the study area. Herbaceous and trees were the main growth habit of ethno veterinary medicinal plant species identified in the study area. Leaves, fruit and all parts were the most frequently parts of the medicinal plant species used for treatment of chicken diseases.

Chicken mite was the most predominant external parasites that hindered chicken productivity in the study area. Nineteen plant species belonging to 14 families were the identified ethno veterinary plants used for prevention of chicken external parasites through smoking of poultry houses. *Fabaceae* and *Combretaceae* were the main plant families used for prevention of chicken external parasites. Trees and leaves were the main growth habit and parts of the ethno

veterinary plants, respectively used for prevention of chicken external parasites.

Further studies are needed to determine the safety, toxicity, standardize dose and efficacy, and to characterize the plant chemical compounds as well as to assess the species composition of the identified chicken disease and external parasites.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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