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Determination Proximate Composition of the Wild Abyssinian Thyme Herb (Thyme Schimperi L.) Grown in High Lands of Southern Tigray, North Ethiopia

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Abstract
A study was conducted at southern zone of Tigray, North Ethiopia, with the objective of knowing the nutritive value of the wild Abyssinian thyme herb aerial parts. Different aerial parts of the plant were considered for the experiments and consisted in a completed randomized design of comparison test. The proximate composition and gross energy value of the plant parts were analyzed using AACC (2000) and the data were analyzed by SAS software version 9.1. The results revealed that Abyssinian thyme herb aerial parts the Flower, Leaf and Whole plant contained ash (11.32, 11.0 and 10.2%), crude protein (11.08, 9.97, and 9.6%), crude fat (6.1, 2.75 and 6.14%), crude fiber (15.1, 15.5 and 18.7%), moisture (11.13, 11.13 and 10.6%) and total carbohydrate (56.38, 60.75and 55.33%), respectively. Among the proximate composition of Abyssinian thyme herb found in this work has a high carbohydrate content and it was low in fat and protein levels. From the three aerial parts of the Abyssinian thyme herb found in this work, the flower has a high protein and ash content and leaf aerial part has the lowest crude fat content. Among the three Abyssinian thyme herb aerial parts, the whole plant shows the lowest content of ash and protein.
Keywords: Thyme, protein, flower, leaf, proximate

1. INTRODUCTION

The name thyme, in its Greek form, was first given to the plant by the Greek's as a derivative of a word which meant "to fumigate", either because they used it as incense, for its balsamic odor, or because it was taken as a type of all sweet smelling herbs. Others say the name derives from the Greek words, *Thymon*, meaning perfume or famous, signifying courage, the plant being held in ancient and medieval days to be a great source of invigoration, its pleasant qualities inspiring courage.The genus *Thymus L.* belongs to the family *Lamiaceae*, and consists of about 215 to 350 species, according to different literature data (Cronquist, 1988; Zaide, 2005; Crow, 2005). They are usually herbaceous perennials, small shrubs occurring within the Mediterranean region, which is a center of the entire genus, and are also characteristic of Asia, Southern Europe and North Africa (Maksimovic *et al*., 2008).

Thymus schimperi L. (Labiatae), known by the local language name "*Tossign"* is indigenous into northern Ethiopia, which is a small perennial herb shrub of very high altitude areas. The herb which is wild, though not yet cultivated, is a useful condiment. It is also reportedly used in the control of gonorrhea (Demsew, 1993). Furthermore, when it is added to boiling water and drunk, it helps against cough and liver disease (Demsew, 1993). As a spice, *Tossign* is dried, ground and mixed with other spices that are used in the preparation of "*Berber (*ripen, dried and ground pepper*)*" and "*Shirro (*powder form of roasted and ground legume grains*)*". In some provinces, it is used to flavor tea or drunk alone as tea (Demsew, 1993).

Traditionally, from the wild Abyssinian thyme herb aerial parts of the leaf; people in the central and northern highlands are used to make flavored tea and spices condiments and consumed for a long time till now. It has no yet studied the proximate composition and is all traditional preparation and usage in Ethiopia. Emba Alagi *(*mount Alagi) was one of the highland Woreda's of southern Tigray, northern Ethiopia which is also known for wild thyme herb leaves used for preparation of S*hiro, Berbere* and herbal tea. This study aimed to investigate the proximate composition of the aerial parts of wild Abyssinian thyme plant.

2. MATERIALS AND METHODS

2.1. Collection of Plant material

Samples of Abyssinian thyme herb were collected in August, (2015) during the flowering period in northern Ethiopia, Tigray southern highland (mount Alagi). The thyme aerial parts were dried under shade of the house over the plastic sheet covered with muslin cloth and then spread over the samples. The dry samples were packed in black polyethylene plastic bags; transported to Haramaya University and stored in dry, dark and cool area in the laboratory until required for laboratory tasks and analysis.

2.2. Grinding

The three separated thyme herb aerial parts were taken and ground to powdered form by using a grinder.

2.3. Proximate composition

After bringing the samples to uniform size by a sieve, they were analyzed for moisture, protein, fat, ash, fiber and utilizable carbohydrate by the methods of AOAC (2000).

2.3.1. Moisture

Moisture was determined according to Method number 44-15A) by oven drying method. 5 g of well-mixed sample was accurately weighed in clean, dried crucible (W_1) and the weight of both recorded (W_2). The crucible was placed in an oven at 100-105^{o}C for 6-12 h until a constant weight was obtained. Then the crucible was placed in the desiccators for 30 min to cool. After cooling, it was weighed again (W_3). The percent moisture was calculated by following formula:

$$MC = \left(\frac{W_2 - W_3}{W_2 - W_1}\right) \times 100$$

Where: MC = Moisture content of sample (%), W_1 = Mass of dish (g), W_2 = Mass of Sample and dish before drying (g), W_3 = Mass of sample and dish after drying (g)

2.3.2. Crude protein

The protein content of the sample was determined on the basis of total nitrogen content by the micro kjeldhal method of crude nitrogen determination (AOAC, 2000) using the official method 979.09. The Percent crude protein content of the sample was calculated by using the following formula:

$$N = \frac{(S - B) * N_{HCl} \times D * 14}{M * V} \times 100$$

$$P = F \times N$$

Where; M= mass of sample,S = Sample titration reading, B = Blank titration reading
N = Normality of HCl, D = Dilution of sample after digestion, V = Volume taken for distillation
0.014 = Milli equivalent weight of Nitrogen. P= percent of protein and F= conversion factor, 6.25.

2.3.3. Crude fat

Ether extract as an estimate of crude lipid was determined using soxhlet extraction method (AACC, 2000) official method 30.10. The solvent, then was evaporated by heating on a steam bath. The flask containing the extracted fat was dried on a steam bath to a constant weight. The percent crude fat was determined by using the following formula:

$$Fat(\%) = \left(\frac{m_f - m_i}{m}\right) \times 100 \qquad (4)$$

Where: m_f is dried mass of fat with beaker (g), m_i is a mass of the beaker (g) and m is sample mass (g, db).

2.3.4. Ash

Ash content of the products was determined according to AACC (2000) Method No.08-01. The total ash was expressed as percentage on dry matter basis as: Percent ash was calculated by following formula:

$$Ash(\%) = \left(\frac{m_3 - m_1}{m_2 - m_1}\right) \times 100$$

Where: m_1 is the mass of the crucible (g), m_2 is sampled mass with crucible (g) and m_3 is final mass of sample with crucible (g).

2.3.5. Crude fiber

Procedure: The crude fiber content was determined by the non enzymatic gravimetric method as described in AACC (2000) method No. 32-10. The total crude fiber was expressed in percentage as: Calculations were done by using the formula:

$$F = \frac{(m_2 - m_3)}{m_1} \times 100\%$$

Where: F is total crude fiber (%), m_1 is mass of sample (g, db), m_2 is a mass of the sample before ashing (g), and m_3 is mass of sample after ashing (g, db.)

2.3.6. Utilizable carbohydrate

Total carbohydrate was calculated by difference after analysis of all the other items method in the proximate analysis.

CHO= (100 -% moisture + % crude protein + % crude fat + % ash+%crude fiber)

2.3.7. Grass Energy content

The percent calories in selected samples were calculated by multiplying the percentage of crude protein and carbohydrate with 4 and crude fat by 9. The values were then converted to kilo calories per 100 gm of the sample.

3. RESULTS AND DISCUSSIONS

This study was done to know the nutritive value of the locally available Abyssinian thyme herb by using standard procedures, the proximate composition of the Abyssinian thyme herb was determined and presented in Table 1. The results obtained are discussed in the sections that follow.

3.1. Proximate composition of Abyssinian thyme herb aerial parts

Table 1 shows proximate analysis data of Abyssinian thyme herb plant which indicated that flower parts, leaf and whole parts contained ash content of 11.32, 11.0 and 10.2%; crude protein of, 11.08, 9.9 and 9.6%; crude fat of 6.11, 2.75 and 6.13%; crude fiber of 15.1,15.53 and 18.74%; moisture content of 11.13, 11.13 and 10.6% and Utilizable carbohydrate of 56.4, 60.75 and 55.3%, respectively. These data were the average of the three replications and the result obtained showed that the Abyssinian thyme herb has a high carbohydrate content. It was low in fat and protein contents as compared to carbohydrate content. This study exhibited that the highest (11.08%) protein content was recorded for flower parts, followed by a 9.9 and 9.6 % of the leaf and whole plant. The fat content of flower parts, 6.11 %, was almost the same as the 6.13 % of the whole plant with no significance ($P>0.05$) difference between them, but both are statistically higher than the 2.75 % shown by the leafy part. The whole plant exhibited significantly higher 18.7 % fiber content as compared to the 15.5 % of the leaves and 15.1% of the flower parts, respectively. Higher percentages of the fiber contents are indications of the high structural carbohydrates present in the plant. The data also showed relatively high content of ash with values of 11.3, 11.0 and 10.2 %, for the flower, the leaf and the whole plant, respectively. These are indications of the presence of high mineral contents. The utilizable carbohydrate contents of the three aerial parts exhibited significant ($P<0.05$) differences among them with values of 60.75, 56.4 and 55.3 %, for leaf, flower and the whole plant, respectively. The protein, fat, ash and carbohydrate percentage of thyme leaf found in this work was higher than 3.3, 4.2, 2.2 and 50.7 % reported by (Ereifeji *et al*., 2010) and the only fiber percentage of leaf obtained in this work was lower than the 18.1 reported by (Ereifeji *et al*., 2010)

Table 1. Proximate composition (%) of raw Abyssinian Thyme herb aerial parts products (db)

A.P.	MC	C.Protein	C.Fat	C.Fiber	Ash	CHO	Energy Kcal/100g
F	11.13 ± 0.1^{a}	11.08 ± 0.1^{a}	6.11 ± 0.01^{a}	15.1 ± 0.8^{b}	11.3 ± 0.3^{a}	56.4 ± 0.8^{b}	324.6 ± 2.9^{a}
L	11.13 ± 0.1^{a}	9.9 ± 0.2^{b}	2.75 ± 0.01^{b}	15.5 ± 0.7^{b}	11.0 ± 0.0^{a}	60.75 ± 0.6^{a}	307.6 ± 2.9^{c}
W	10.6 ± 0.3^{b}	9.6 ± 0.4^{b}	6.13 ± 0.01^{a}	18.7 ± 0.2^{a}	10.2 ± 0.5^{b}	55.3 ± 0.8^{c}	315.0 ± 2.8^{b}

Data are mean±std of triplicate analysis in dry basis, except moisture (wb). Values in a column with the same letter are not significant differences ($P>0.05$), F= thyme flower- leave, L= thyme leaves and W= whole thyme aerial parts, AP= thyme herb aerial parts; C= crude.

4. Conclusions

The present study showed that proximate compositions are available and they are significantly affected by the Abyssinian thyme herb aerial parts (flower, leaves and whole plant). The flower parts have high protein and ash content as compared to the leaves and whole plant part. Among the proximate composition of Abyssinian herb only crude fiber and fat are high in whole thyme plant. The Abyssinian thyme herb aerial parts (flower, leaf and whole plant) had significantly influenced to the inorganic content of the three aerial parts flower part has the highest inorganic content as compare to the rest parts.

5. Recommendations

- It is advisable to study the refreshing compound, anti-nutritional factors and anti oxidant contents of the Abyssinian thyme herb aerial parts
- Further studying is needed to investigate the essential oil , amino acid and inorganic contents of Abyssinian thyme aerial parts.

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