



EVALUATION OF MINERAL COMPOSITION OF *Anthyllis sericea* FOR GRAZING RUMINANTS IN TUNISIA

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ABSTRACT

Objective: The study was aimed to determine the mineral nutritive potential of *Anthyllis sericea* in arid pasture in the south of Tunisia. This native plant was used for cattle feeding and as a helminthagogue for sheep.

Method: An experiment, using wet nitric Acid (HNO₃) digestion followed by an atomic absorption spectroscopy (AAS), was carried out to measure the levels of mineral elements in the leaves of *Anthyllis sericea*.

Results: the results showed that *Anthyllis sericea* had a higher contents in Ca, K, Mg and Na necessary for the ruminants. The grazed forage had a lower content of micro minerals. The forage had lower concentrations of Zn than the recommended requirements for animal nutrition. Also, the results of vitamin analysis showed the presence of the vitamin A, vitamin C and vitamin E in the leaves.

Conclusion : we conclude that this shrub has been found to contain some nutrients and this supports its ethno-medicinal uses and therefore makes it a good source of nutrients in livestock nutrition in ruminants fed on the pasture in south of Tunisia.

Keywords: *Anthyllis sericea*, Minerals, Feed, Vitamin.

INTRODUCTION

Anthyllis belongs leguminosea family. It grows up for 5 to 45 cm of height. The genus distributed in Europe and North Africa. *Anthyllis sericea* is a wild plant, of papiollonaceae family, found in the south of Tunisia, in arid region.

It is know for a medicinal purposes. Its flowers used in hair growth and its leaves for cattle and sheep feeding. Many studies are carried out in *Anthyllis* species to determine some antioxidante activities and chemical composition. Several studies have been made to determine the macro and micro-nutrient contents of some herbal and medicinal plant from south of Tunisia.

Minerals and proteins in medicinal plants have been determined to enhance their importance in feedstuffs such as pasture plants and harvested forages. The dietary nutrients of livestock have been usually derived from the feed they eat. The highest quantities of minerals may be influenced by some characteristics of soil and the availability quantities of water.

Many efforts have been made to decrease the cost of mineral nutrients for ruminants to know the necessary mineral elements for feed and forages [1]. The concentration of the minerals and their availability in the feed varied among animal species as well as among different feedstuffs. These factors makes difficult for the producers to know the real mineral level of their coats and sheeps for optimal production [2].

A number of essential minerals are accumulated in different parts of plant. The ruminants body requires a number of minerals in order to obtain a good production.

The current research on the assessment of mineral composition of *Anthyllis* for grazing ruminants was carried out. The aim of this study was to determine and collect data on the mineral contents of this shrub in pastures that is harvested and used in animal nutrition in the region.

MATERIELS AND METHODS

Reagents

Nitric acid, hydrochloric acid(HNO₃) and methanol were used. Standard sample solutions of Fe, Zn, Cu, Mn, Ca, Na, Mg and K (mg/g) were obtained.

Plant materiel

The leaves of *Anthyllis sericea* were collected from Arid area in south-eastern of Tunisia, that is located by an arid climat that receives a low rainfall of 88-157 mm per annum. The soil type is sandy and loamy. Vegetation is mostly characterised by short grasses and shrubs. The leaves of this study were harvested and conserved.

Mineral analysis

Accurately (5g) powdered samples were transferred into a porcelain capsule and ashed at 550°C for four hours. Then a mixture of 5ml ultrapure water and 1 ml of hydrochloric acid were added to boiling. The solution was filtered through a filter paper and adjusted by ultrapure water to a final volume of 50 ml. The final liquid will be used for the mineral analysis.

The micro and macro elements (Zn, Fe, Ca, K, Mn, Mg, Na...) were detected with the flame atomic absorption method.

Determination of Vitamin A, C and E Contents of *Anthyllis sericea* leaves

The assay for vitamins was performed using Pearson (1976) method [3].

Statistical analysis

The data of this study were analysed. The measurements were obtained in triplicates.

RESULTS AND DISCUSSIONS

Table 1 : Micro and macro elements investigated in *Anthyllis sericea*.

Element	Levels (g/Kg)
Zn	0,088±0,32
Fe	0,48±0,6
Mn	0,14±0,1
Na	2,9±0,04
Ca	6,21±0,03
Mg	1,75±0,03
K	10,3±0,1

Table 2 : Vitamin constituents of *Anthyllis sericea*.

Vitamin A	Vitamin C	Vitamin E
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0,33µg/g	1,029mg/100g	2,09mg/100g
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Analysis of Vitamin Constituents in Anthyllis sericea

The leaves were also screened for the presence of vitamins. The leaves were found to be relatively rich in vitamins A, E and C as shown in Table 2 below. Vitamin E was found to be in relatively higher amount than other vitamins analyzed (2.091mg/100mg). While vitamin A was found to be the least in concentration of the three vitamins analyzed (0.323ug/g).

The reasonable values obtained for vitamins A, C and E suggest that the plant may be of help in solving or reducing the prevailing micronutrient deficiency diseases such as blindness, cancer, and heart diseases, etc. Tocopherol (vitamin E), ascorbic acid (Vitamin C) and carotenoids (pre-cursor of vitamin A) are antioxidants which have been associated with prevention of nutritionally related diseases such as cancer, diabetes mellitus, coronary heart diseases and obesity. Ascorbic acid is essential for the healthy formation of teeth. It is a powerful antioxidant whose deficiency results in scurvy with swelling of the joints and gums, loosening of the teeth. Evidence of vitamin C playing a key role in decreasing of degenerative diseases is considered to be strong.

Analysis of mineral elements in leaves of Anthyllis sericea

The mean concentration levels of mineral elements in Anthyllis sericea are summarized in Table 1.

Sodium : The Na requirement for ruminant is although from 1-4g/kg has been reported [4]. Sodium in leaves forage was 2,9g/Kg was similar than the recommended values for excellent animal production. Forage Na concentrations were adequate and sufficiently higher than those normally required by ruminants.

Potassium : In the present study, the level of K in this specie was over 10g/Kg. However, ruminants with high production may require a higher level of potassium. Forage K concentrations appeared similar than those reported by Tiffany & al, [5] in North Florida and Prabowo et al, 1990 in Indonesia [6].

Calcium : Ca requirements for grazing ruminants are influenced by the type of animal, age and weight of the animal [7]. Some studies showed that concentrations Ca necessary for good production and good lacting, for cattle and sheep, were in the range of 2-6 g/Kg. Furthermore, in the present evaluation, Ca values were similar to those required (6,21g/Kg).

Magnesium : The variations in the level of Mg for grazing pasture were explained by the differences between the type of soil, influences of locality and climate and growth stage. Mg values in this study had been in similar levels than the recommended in the literature [8]. This forage would therefore meet the theoretical requirement of Mg for beef cattle [9,10]. The native forage have similar levels in Mg than that recommended for ruminants.

Relative to animal requirements, Anthyllis sericea specie had a higher contents in Ca, K, Mg, Na necessary for the nutrition.

Manganese: The determination of forage Mn level was lower than the critical concentrations requirements for the ruminants.

Iron : Forage Fe content appeared similar to the required 50 mg/kg, an adequate level for grazing animals [11,12]. These results may show that this forage can be considered an adequate for the ruminants nutrition. This concentration of forage Fe in the present evaluation may support the findings of some reports, in Guatemala [13], North Florida [14], Nicaragua [15] and Indonesia [16].

Zinc : Zn concentrations above 12-20 mg/Kg were reported the adequate values for good production [17]. Forage Zn level was also lower than the recommended requirements for animal nutrition. A number of factors including, plant species, pasture management, soil, and climate, may affect the content of Zn²⁺ deficiency in ruminants. Cox (1973) [18] reported the low level of Zn²⁺ in soil and plants. Plant maturity has also been reported to affect Zn²⁺ concentration of forage and it also depends upon the tissue type of plants [19,20].

CONCLUSION

Anthyllis forage harvested from arid area of Tunisia had almost adequate levels of minerals for grazing ruminants. This specie had a higher levels of vitamins and macro minerals ; Mg, Ca, Na, K, However, it contained lower contents of Cu, Fe and Zn than the dietary requirements for most ruminants. Various investigators have addressed the levels of essential, non essential, micro and macro elements from various medicinal plants. This is the first report on mineral and trace elements in Anthyllis sericea. These findings may open interval for interesting for a good conservation of the native plant.

CONFLICT OF INTEREST STATEMENT

We declare that we have no conflict of interest

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