

Some Quality Traits of Different Wild Plants

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Abstract

This research was carried out to determine quality properties of some pasture plant species. In this research, 10 different pasture plant species were used as materials which were collected from Diyarbakir pasture areas of Turkey. At the end of research, quality properties of pasture plants were ranged from lowest to highest for average dry matter 11.5-30.9%, average crude protein 12.6-26.6%, crude ash 5.5-21.2%, acid detergent fiber 22.0-43.0%, neutral detergent fiber 20.5-56.1%, digestible dry matter 55.4-71.8%, dry matter intake 2.1-5.9% and relative feed value 90.2-327.0. Among the pasture plants studied, higher crude protein level than averages of species following plants may have importance, respectively: *Centaurea iberica*, *Sinapsis arvensis*, *Convolvulus arvensis*, *Rumex conglomeratus*, *Crambe orientalis*, *Amaranthus retroflexus*, *Polygonum aviculare*, *Anchusa strigosa* and *Malva neglecta*. For relative feed value has been remarked: *Sinapsis arvensis*, *Rumex conglomeratus*, *Amaranthus retroflexus*, *Crambe orientalis*, *Centaurea iberica* and *Hypocoum imberbe*.

Keywords: pasture plants, acid detergent fiber, neutral detergent fiber, relative feed value, digestible dry matter, average crude protein

Introduction

There were a lot of plants in natural pasture areas. These plants have important role in feeding of animals. In addition to natural forage crops, these plants were preferred sometimes by animals. This kind of plants usually does not prefer in rangelands. However, the number of valuable plants decreases in pasture composition, animals prefer these kinds of plants as secondarily. Nutritional properties of these secondarily preferred plants are inadequate in literatures.

These plants which takes place in pasture composition can be preferred by different animal species. At the same time, these plants covering pasture areas prevent from soil erosion problems. Detailed and updated data about these plant species in the study were supplied from Flora of Turkey (Davis, 1965-1982). There are some literatures about our studied plants for some quality properties. Kamalak *et al.* (2005) have stated that *Sinapsis arvensis* in early, mid and late flowering stage; for dry matter, crude protein, ADF, NDF and crude ash values as 95.9-96.5%, 7.7-13.2%, 56.4-65.8%, 66.5-74.1% and 5.6-8.6%, respectively. Preston (2008) has stated that in *Crambe* meal; crude protein, ADF, NDF and crude ash percentages as 31, 35, 47 and 8%, respectively. Crude protein contents were changed from 12.12% (Acar and Guncan, 2002) to 20.65% (Kaya *et al.*, 2004) in *Polygonum aviculare*. Stordahl *et al.* (1999) have pointed out in *Amaranth* species (*A. cruentus* L. and *A. kypochondriacus* L.) at 8 weeks after planting, crude protein, ADF and NDF percentages were

found (23, 26 and 36%) respectively. In *Amaranthus retroflexus* dry matter, crude ash and crude protein percentage reach to 18.2%, 22.8%, 3.4% (Sekeroglu *et al.*, 2006). Bakoglu *et al.* (1999) have pointed that crude protein as 15.35% and crude fiber 30.48% in *Achillea biebersteini*. Alvarez *et al.* (2008) have pointed that crude protein as 12.9%, dry matter 21.7%, ADF 24.8% and NDF 39.8% in *Rumex lunaria*. Bakoğlu *et al.* (1999) have pointed that crude protein as 13.74% and crude fiber 42.31% in *Rumex patientia*. Sleugh *et al.* (2001) have stated that different *Amaranthus* ssp. at different growing stages for crude protein, ADF and NDF values were change between (8.0-28.5%, 15.0-35.4% and 26.0-47.0%), respectively. Crude protein contents have pointed that 13.06% in *Malva neglecta* (Acar and Guncan, 2002), 26.25% in *Malva sylvestris* (Kaya *et al.*, 2004). Acar and Guncan (2002), pointed out 17.70% crude protein content in *Convolvulus arvensis*. Acar and Guncan (2002), stated that 12.26% crude protein content in *Tragopogon latifolium*.

Materials and methods

The research was carried out for determining of some nutrient contents in some pasture plants (Tab. 1).

Plant species were collected from the campus area (altitude 655 m) of Dicle University, in Diyarbakir, in 2008, Turkey.

Generally, Mediterranean and East Anatolian continental climates are dominant in this region. The average annual temperature is 15.8°C, rainfall is 481.6 mm and the

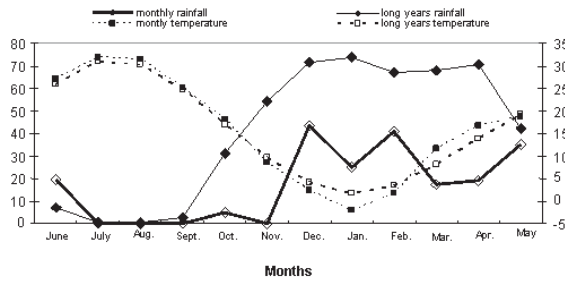


Fig. 1. Average air temperatures (°C) and the amount of rainfall (mm) of the research area

average relative humidity is about 53.8%. The average temperature can reach 30°C in July and August. The lowest average temperature can be 7°C in December and January. The earliest frost in the region is usually at the end of October and the last frost around end of April. Most rain falls in winter, and there is almost no rainfall from July to September. The highest humidity (70%) occurs in winter, lowest (27%) in summer. Weather conditions during the years when the research was carried out, are given in Fig. 1 (Anonymous, 2008).

Tab. 1. Latin, common and family names and ontogeny of plant species

Latin Name	Common Name	Family	Ontogeny
<i>Hypecoum imberbe</i> Sm.	Sicklefruit <i>Hypecoum</i>	<i>Fumariaceae</i>	Annual
<i>Sinapsis arvensis</i> L.	Wild Mustard	<i>Brassicaceae</i>	Annual
<i>Crambe orientalis</i> L.	Crambe	<i>Brassicaceae</i>	Perennial
<i>Polygonum aviculare</i> L.	Prostrate knotweed	<i>Polygonaceae</i>	Annual, Perennial (P)
<i>Amaranthus retroflexus</i> L.	Redroot amaranth	<i>Amaranthaceae</i>	Annual
<i>Achillea biebersteinii</i> Afan.	Yarrow	<i>Asteraceae</i>	Perennial
<i>Convolvulus arvensis</i> L.	Field bindweed	<i>Convolvulaceae</i>	Perennial
<i>Malva neglecta</i> Wallr.	Common mallow	<i>Malvaceae</i>	Annual, Biennial, P
<i>Anchusa strigosa</i> Labill.	Bugloss	<i>Borraginaceae</i>	Perennial
<i>Centaurea iberica</i> Trev. ex Spreng.	Iberian knapweed	<i>Asteraceae</i>	Perennial
<i>Rumex conglomeratus</i> Murray	Clustered dock	<i>Polygonaceae</i>	Perennial
<i>Tragopogon dubius</i> Scop.	Yellow salsify	<i>Asteraceae</i>	Annual, Biennial

All of the plants were collected at mid flowering stage. Common names of the plants were used according to Anonymous (2009a).

Plant samples were dried at 70°C in a drying cabin (Memmert ULM 800) for 12 hours. Acid detergent fiber (ADF), neutral detergent fiber (NDF) were determined by Ankom Fiber Analyzer (Model 220), crude protein (CP) were determined by Kjeldahl method, after samples were ground. Crude ash values were determined at 550°C for 6 hours in oven.

Digestible dry matter (DDM), dry matter intake (DMI) and relative feed value (RFV) were calculated by using following equations (Morrison, 2003):

$$DDM = 88.9 - (0.779 \times ADF)$$

$$DMI = 120 \div NDF$$

$$RFV = (DDM \times DMI) \div 1.29$$

Results and discussion

Average dry matter (DM), crude protein (CP), crude ash (CA), acid detergent fiber (ADF), neutral detergent fiber (NDF), digestible dry matter (DDM), dry matter intake (DMI) and relative feed value (RFV) contents of all investigated plants were obtained as follows; 18.9, 21.6, 14.0, 29.5, 32.0, 65.9, 4.1 and 215.3%, respectively (Tab. 2).

The highest DM, CP, CA, ADF, NDF, DDM, DMI and RFV values were obtained from *Achillea biebersteinii* (30.9%), *Centaurea iberica* (26.6%), *Amaranthus retroflexus* (21.2%), *Anchusa strigosa* (43%), *Anchusa strigosa* (56.1%), *Rumex conglomeratus* (71.8%), *Sinapsis arvensis* (5.9%) and *Sinapsis arvensis* (327.0%), respectively. However, the lowest values were obtained from *Anchusa strigosa* (11.5%), *Achillea biebersteinii* (12.6%), *Convolvulus arvensis* (5.5%), *Rumex conglomeratus* (22.0%), *Sinapsis arvensis* (20.5%), *Anchusa strigosa* (55.4%), *Anchusa strigosa* (2.1%) and *Anchusa strigosa* (90.2%), respectively.

Achillea biebersteinii: The lowest CP (12.6%), lower DDM (58.2%) and RFV (121.8) values were obtained in this plant. When we consider this quality properties it seems that this plant has not enough nutritional value as roughage. In previous research, crude protein 15.35% and crude fiber 30.48% were obtained in this plant (Bakoğlu et al., 1999). However, it can be grazed in early stage for ruminant animals. In addition, *Achillea* species have been using in traditional Turkish medicine (Konyalioglu and Karamenderes, 2005).

Amaranthus retroflexus: Higher CP (23.3%), DDM (70.4%), DMI (5.3%), RFV (289.2); the lower ADF (23.8%) and NDF (22.7%) values were obtained in this plant. This plant can be preferred as roughage because of its higher nutritional value. Our findings are similar with the results of Sleugh et al. (2001).

Anchusa strigosa: The lowest RFV (90.2); lower DDM (55.4%), DMI (2.1%), however the highest ADF (43.0%) and NDF (56.1%) values were obtained in this plant. But,

Tab. 2. Average Crude Protein (CP), Crude Ash (CA), Acid Detergent Fiber (ADF), Neutral Detergent Fiber (NDF), Digestible Dry Matter (DDM), Dry Matter Intake (DMI) (%) percentages and Relative Feed Value (RFV) of different plant species

Plant Species	DM (%)	CP (%)	CA (%)	ADF (%)	NDF (%)	DDM (%)	DMI (%)	RFV
<i>Achillea biebersteinii</i>	30.9	12.6	9.0	39.4	45.2	58.2	2.7	121.8
<i>Amaranthus retroflexus</i>	19.5	23.3	21.2	23.8	22.7	70.4	5.3	289.2
<i>Anchusa strigosa</i>	11.5	21.4	18.4	43.0	56.1	55.4	2.1	90.2
<i>Centaurea iberica</i>	15.0	26.6	17.4	27.1	23.5	67.8	5.1	268.1
<i>Convolvulus arvensis</i>	19.9	25.2	5.5	34.4	39.2	62.1	3.1	149.2
<i>Crambe orientalis</i>	20.3	24.7	14.9	24.5	23.8	69.8	5.0	270.5
<i>Hypocoum imberbe</i>	12.7	14.8	10.6	25.6	29.3	69.0	4.1	219.3
<i>Malva neglecta</i>	23.2	20.7	14.0	30.0	39.9	65.5	3.0	152.3
<i>Polygonum aviculare</i>	22.7	22.6	13.9	34.6	28.6	62.0	4.2	201.9
<i>Rumex conglomeratus</i>	16.7	24.8	12.9	22.0	22.4	71.8	5.4	300.6
<i>Sinapsis arvensis</i>	15.2	25.7	16.9	22.3	20.5	71.5	5.9	327.0
<i>Tragopogon dubius</i>	19.0	16.5	13.2	27.5	32.2	67.5	3.7	193.6
Average	18.9	21.6	14.0	29.5	32.0	65.9	4.1	215.3

protein content (21.4%) of the plant is high. It can be say that this plant has not enough nutritional values, except crude protein. In addition, this plant's roots (Palevitch *et al.*, 1986) and leaves (Dafni *et al.*, 1984) were used in medicine; the plant contains no tannin (Aynehchi *et al.*, 1985).

Centaurea iberica: The highest CP content (26.6%); higher DDM (67.8%), DMI (5.1%), RFV (268.1); lower ADF (27.1%) and NDF (23.5%) were obtained in *Centaurea iberica*. Despite, quite high nutrition values, this plant has been classified as a "noxious weed" of cultivated land (Anonymous, 2009c). At the same time, this plant can be grazed by animals in early stages because of it's thistle.

Convolvulus arvensis: Higher protein content (25.2%); moderate level of ADF (34.4%), NDF (39.2%); lower level of DDM (62.1%), DMI (3.1%) and RFV (149.2) were found in *Convolvulus arvensis*. The protein content is higher than other results (Acar and Guncan, 2002).

Crambe orientalis: Higher CP content (24.7%), DDM (69.8%), DMI (5.0%), RFV (270.5) parameters; but lower ADF (24.5%) and NDF content (23.8%) were determined in *Crambe orientalis*. It seems that this plant has important role in animal nutrition as forage. Additionally, Stock *et al.* (1993) pointed out crambe meal has been used as a protein source for feedlot cattle.

Hypocoum imberbe: Lower level of CP (14.8%); moderate level of ADF (25.6%), NDF (29.3%); higher DDM (69.0%), DMI (4.1%) and RFV (219.3) were found in *Hypocoum imberbe*. Because of it's succulent structure animals can prefer it.

Malva neglecta: Higher protein content (20.7%); moderate level of ADF (30.0%), NDF (39.9%); lower level of DMI (3.0%) and RFV (152.3) were found in *Malva neglecta*. The protein content is higher than the results of Acar and Guncan (2002). When we consider the nutrient contents of this plant, it can be used as secondary forage

crop. It has been used as forage for camel and in medicinal purposes. (Heshmati and Behmanesh, 2006).

Polygonum aviculare: Higher level of CP (22.6%); moderate level of ADF (34.6%), NDF (28.6%), DDM (62.0%), DMI (4.2%) and RFV (201.9) were found in *Polygonum aviculare*. Our results of CP are similar with the findings of Kaya *et al.* (2004). Nutrient composition of plant seems adequate for animals. However, this plant is classified as a "noxious weed" of cultivated land (Anonymous, 2009c).

Rumex conglomeratus: The highest DDM (71.8%); higher crude protein content (24.8%), DMI (5.4%), RFV (300.6); lower NDF (22.4%) and the lowest ADF (22%) contents were found in *Rumex conglomeratus*. Our findings for crude protein is higher than the results of some authors (Bakoğlu *et al.*, 1999; Sleugh *et al.*, 2001; Alvarez *et al.*, 2008), but for ADF and NDF are lower than Alvarez *et al.* (2008). These differences probably are the result of plant species and harvesting stage. When we consider higher CP content and RFV, this plant may has importance in ruminant nutrition.

Sinapsis arvensis: The highest DMI (5.9%), RFV (327.0) parameters; higher CP (25.7%), DDM (71.5%); lower ADF (22.3%) and the lowest NDF (20.5%) content were determined in *Sinapsis arvensis*. In addition, this plant is a serious weed of cultivated land (Anonymous, 2009b). Besides, it can be use in animal nutrition as forage by grazing or collected for winter use in Turkey (Kamalak *et al.*, 2005). Our findings about crude protein and crude ash contents are higher, but ADF and NDF values in *Sinapsis arvensis* are lower than the finding of Kamalak *et al.* (2005).

Tragopogon dubius: Moderate level of protein content (16.5%), ADF (27.5%), NDF (32.2%), RFV (193.6), DDM (67.5%) and DMI (3.7%) were found in *Tragopogon*

dubius. Our results of protein content is higher than the results of Acar and Guncan (2002).

As a result, if we consider higher crude protein level than averages of species following plants may have importance: *Centaurea iberica*, *Sinapsis arvensis*, *Convolvulus arvensis*, *Rumex conglomeratus*, *Crambe orientalis*, *Amaranthus retroflexus*, *Polygonum aviculare*, *Anchusa strigosa* and *Malva neglecta*; for RFV *Sinapsis arvensis*, *Rumex conglomeratus*, *Amaranthus retroflexus*, *Crambe orientalis*, *Centaurea iberica*, *Hypocoum imberbe*.

These species have importance as secondarily alternative forage crops in rangelands, especially in degenerated rangelands.

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