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Evaluation of Na, K and Ca from some palatable grasses of Melghat Tiger Reserve, Amravati, Maharashtra State.

Kokate VR, Muradkar GD and Chavan BS

Department of Botany, Arts, Science & Commerce College Chikhaldara Dist. Amravati.

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ABSTRACT

The aim of study to evaluate Na, K and Ca of some palatable grasses from Melghat Tiger Reserve, Dist. Amravati, Maharashtra State. Early bloomed and Matured stage leaves and stem of 14 species of grasses are selected from various divisions of Melghat Tiger Reserve Dist. Amravati Maharashtra State was studied. Study carried out by the selection of early blooming stage and mature stage of grasses leaves and stem it's shows fluctuation in the Na, K and Ca content in the early blooming stage and mature stage of grasses leaves and stem.

Keywords: Wild some palatable grasses, Evaluation of Na, K and Ca. Melghat Tiger Reserve Maharashtra State.

INTRODUCTION

Minerals are inorganic elements found in small amounts in the body. Inorganic means that the substance does not contain carbon. To prevent mineral deficiencies, minerals are included in livestock feed rations and are provided through free access to mineral and salt blocks. Mineral deficiencies can result in poor weight gain, poor feed efficiency, and poor reproductive traits (Garg *et al.* 2008). Minerals are classified as macro-minerals or microminerals. Macro- mineralsare minerals needed in the diet in relatively large amounts (Sharma and Prasad, 2018). Requirements can range from a few tenths of a gram to one or more grams per day. Macro -minerals include calcium, chlorine, magnesium, phosphorus, potassium and sodium. Sodium (Na.)are necessary in small amounts for some types of plants but sodium as a nutrient is more generally needed in larger amounts by animals, due to their use of it for generation of nerve impulses and for maintenance of electrolyte balance and fluid balance. Potassium (K) is the major intracellular mineral ion in humans and animals. Feedstuffs derived from plants constitute an important source of K in most animal diets. Regulation of the extracellular K level, including the plasma, is critical for normal body health and cellular function.

Many nutritionists have seen marked improvement in appetite and increased milk production when dairy feeds that were assumed to contain enough K were supplemented Variability of K in feed sources should also address bioavailability. Calcium and phosphorus are needed in a certain ratio for bone growth and repair and for other body functions.

Grasses are the most important group of monocotyledonous plants. They are distributed every soil, in all kind of situations and under all climatic conditions. As grasses do not like shade but some grasses species are grow on shady places, they are not usually abundant within the forest. But in open places they grow very well and sometimes whole tracts become grasslands. The grass family, scientifically known as Poaceae or Gramineae is a 5th largest family of flowering plants in the world, coming after Asteraceae, Fabaceae, Orchidaceae and Rubiaceae. Grasses range from tiny inconspicuous herbs less than an inch to the giant bamboos that grow up to 130 feet tall. Poaceae consists of 10,300 species belonging to 898 genera. In India, it is represented by about 1200 species belonging to 268 genera.

Grasses are classified into two main parts annual and perennials, palatable and non-palatable. Grasses with more moisture content and less silica content in the upper aerial parts like stem, leaves are considered as the palatable grasses. Grasses with low moisture content and high percentage of silica are considered as non-palatable grasses. On the basis of morphological characters grasses are also classified palatable and non-palatable grasses.

The Melghat Tiger Reserve is one of the most important Tiger reserves of Vidarbha region of Maharashtra in, India with 2747 Square Km. area. The Melghat Tiger reserve is divided into five division i) Googamal wildlife division ii) Melghat wildlife iii) Sipna wildlife division and iv) Akot wildlife division and v) Akola wildlife division

The Melghat Tiger Reserve comprises herbivorous animals like Barking deer's, Spotted deers , Sāmbar , Bison ,Nil gai and omnivorous like sloth Bear. The dominant grasses are *Dichanthium annulatum* (Forssk.) Stapf., *Dichanthium caricosum* (L.) A. Camus., *Dichanthium pertusum* (L.) Clayton., *Dichanthium tuberculatum* (Hack.) Cope., *Themeda quadrivalvis* (L.) Kuntze., *Themeda triandra* Forssk., *Heteropogon contortus* (L.) Beauv. ex Roem. & Schult.), *Chloris virgala* Sw., *Chloris gyana* Kunth *Cynodon dactylon* (L). Pers., *Eragrostis uniolides* (Retz.) Nees ex Steud., *Eragrostis. Viscose* (Retz.) Trin. These grasses show the association with the wild leguminous plant. The grasslands in Melghat Tiger Reserve are of three types taller grassland, Intermediate grassland and smaller grassland. On the basis of grasses distribution and composition grasslands are of two types Homogenous grasslands and Heterogeneous grasslands.

MATERIAL AND METHODS

The grasses species like *Apluda mutica* L. *Chloris barbata* Sw., *Chloris virgata* Sw., *Cynodon dactylon* (L.) Pers., *Dichanthium annulatum* (Forssk.) Stapf., *Dichanthium caricosum* (L.) A. Camus., *Digitaria bicornis* (Lam.) Roem. & Shult., *Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult., *Iseilema laxum* Hack., *Paspalidium flavidum* (Retz.) A. Camus., *Setaria pumila* (Poir.) Roem. & Schult., *Spodiopogon rhizophorus* Trin., *Themeda triandra* Forssk, and *Themeda quadrivalvis* (L.) Kuntze. collected from selected areas of Melghat Tiger Reserve especially from Gugamal Wildlife division, Melghat wildlife division and Akot wildlife division. The area/ site selected from different grassland of Melghat Tiger Reserve, the visits are arranged in month of August, September and October of every year of the span of research work. Collected grasses specimens from selected areas of Melghat Tiger Reserve are identified by using National flora of Bombay Presidency by Cooke (1908), Grasses of Maharashtra Potdar and Yadav (2012).

The plant material washed thoroughly 2-3 times with running tap water and dried. Dried samples were grind and homogenized using grinder and stored in polythene bottles until analysis. The Na, K and Ca content of grasses samples determined by the flame photometer, Atomic absorption spectrometer and AOAC (2005).

RESULTS AND DISCUSSION

Sodium content (Na): Sodium (Na) (Table 1) concentration of early bloomed grasses leaves revealed different values ranging from 0.017% (*Cynodon dactylon* (L). Pers.) to 0.28% (*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.), whereas matured stage sodium

content varied from 0.034% (*Cynodon dactylon* (L). Pers. and *Setaria pumila* (Poir.) Roem. & Schult.) to 0.19% (*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.). In case of early bloomed grasses stem, sodium concentration varied between 0.054% (*Spodiopogon rhizophorus* Trin.) to 0.23%. (*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.), while at matured stage Na content ranged from 0.035% (*Setaria pumila* (Poir.) Roem. & Schult.) to 0.095% (*Iseilema laxum* Hack.).

Generally, in some grasses the Na contents were higher at early bloomed stage, which, gradually decreased at matured stage. This fluctution of sodium content with advancing age by different plant may due to different capabilities for Na absorption and Na content in the soil. Sodium associated with body fluid and regulates acid base balance. It is a major electrolyte of blood and help in hydration (Hari Babu and Savithramma 2013). These results were disagreed with the results findings Hameed and Hussain (2015) reported the Na content ranged from 46.39 to 119.3 ppm at reproductive stage and 0.161 to 1.09 ppm at post reproductive stage. Khan *et al.* (2017) reported the high sodium (Na) content at pre-reproductive stages in *Phalaris minor* Retz. 0.35% and *Pennisetum orientale* Rich 0.67%, this is in the line with present study. Fadel *et al.* (2011) represented fluctuation in Na content from early and late period, this report parallel with our findings.

Potassium content (K):

The K content of (Table 2) early bloomed grasses leaves varied from 0.23% (*Spodiopogon rhizophorus* Trin.) to 0.62% (*Dichanthium caricosum* (L.) A. Camus.). At matured stage, it ranged from 0.31% (*Spodiopogon rhizophorus* Trin.) to 0.68% *Dichanthium caricosum* (L.) A. Camus.). In case of stem, the K content at early bloomed ranged between 0.24% (*Chloris virgata* Sw., *Digitaria bicornis* (Lam.) Roem. & Shult. and *Setaria pumila* (Poir.)

Table 1 Sodium (Na) content of early bloomed & matured staged of grasses leaves & stem (culm).

Sr. No.	Name of Grasses	Early bloomed staged of Sodium (Na) content in %		Matured staged Sodium (Na) content in %	
		Leaves	Stem (culm)	Leaves	Stem (culm)
1	*Apluda mutica* L.	0.21	0.17	0.096	0.083
2	*Chloris barbata* Sw.	0.036	0.083	0.036	0.081
3	*Chloris virgata* Sw.	0.098	0.059	0.088	0.091
4	*Cynodon dactylon* (L.) Pers.	0.017	0.079	0.034	0.089
5	*Dichanthium annulatum* (Forssk.) Stapf.	0.065	0.075	0.078	0.078
6	*Dichanthium caricosum* (L.) A. Camus.	0.036	0.081	0.074	0.094
7	*Digitaria bicornis* (Lam.) Roem. & Shult.	0.025	0.078	0.067	0.061
8	*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.	0.28	0.23	0.19	0.087
9	*Iseilema laxum* Hack.	0.098	0.071	0.095	0.095
10	*Paspalidium flavidum* (Retz.) A. Camus.	0.048	0.062	0.078	0.078
11	*Setaria pumila* (Poir.) Roem. & Schult.	0.031	0.064	0.034	0.035
12	*Spodiopogon rhizophorus* Trin.	0.21	0.054	0.044	0.070
13	*Themeda triandra* Forssk.	0.027	0.081	0.097	0.088
14	*Themeda quadrivalvis* (L.) Kuntze.	0.19	0.18	0.098	0.094

Table 2 Potassium (K) content of early bloomed & matured staged of grasses leaves & stem (culm).

Sr. No.	Name of Grasses	Early bloomed staged of Potassium (K) content in %		Matured staged Potassium (K) content in %	
		Leaves	Stem(culm)	Leaves	Stem(culm)
1	*Apluda mutica* L.	0.45	0.31	0.47	0.41
2	*Chloris barbata* Sw.	0.46	0.28	0.45	0.34
3	*Chloris virgata* Sw.	0.51	0.24	0.48	0.31
4	*Cynodon dactylon* (L.) Pers.	0.38	0.38	0.51	0.40
5	*Dichanthium annulatum* (Forssk.) Stapf.	0.60	0.34	0.56	0.39
6	*Dichanthium caricosum* (L.) A. Camus.	0.62	0.39	0.68	0.40
7	*Digitaria bicornis* (Lam.) Roem. & Shult.	0.61	0.24	0.57	0.29
8	*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.	0.41	0.41	0.54	0.42
9	*Iseilema laxum* Hack.	0.46	0.39	0.34	0.34
10	*Paspalidium flavidum* (Retz.) A. Camus.	0.58	0.37	0.63	0.46
11	*Setaria pumila* (Poir.) Roem. & Schult.	0.34	0.24	0.39	0.28
12	*Spodiopogon rhizophorus* Trin.	0.23	0.27	0.31	0.28
13	*Themeda triandra* Forssk.	0.48	0.33	0.47	0.37
14	*Themeda quadrivalvis* (L.) Kuntze.	0.53	0.41	0.59	0.43

Table 3 Calcium (Ca) content of early bloomed & matured staged of grasses leaves & stem (culm).

Sr. No.	Name of Grasses	Early bloomed staged of Calcium (Ca) content in %		Matured staged Calcium (Ca) content in %	
		Leaves	Stem (Culm)	Leaves	Stem(Culm)
1	*Apluda mutica* L.	0.47	0.36	0.55	0.41
2	*Chloris barbata* Sw.	0.45	0.39	0.42	0.28
3	*Chloris virgata* Sw.	0.44	0.24	0.45	0.33
4	*Cynodon dactylon* (L.) Pers.	0.32	0.21	0.35	0.29
5	*Dichanthium annulatum* (Forssk.) Stapf.	0.40	0.37	0.37	0.34
6	*Dichanthium caricosum* (L.) A. Camus.	0.38	0.34	0.48	0.32
7	*Digitaria bicornis* (Lam.) Roem. & Shult.	0.29	0.24	0.21	0.27
8	*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.	0.67	0.43	0.71	0.44
9	*Iseilema laxum* Hack.	0.42	0.38	0.47	0.28
10	*Paspalidium flavidum* (Retz.) A. Camus.	0.46	0.36	0.55	0.42
11	*Setaria pumila* (Poir.) Roem. & Schult.	0.22	0.21	0.34	0.19
12	*Spodiopogon rhizophorus* Trin.	0.29	0.24	0.31	0.27
13	*Themeda triandra* Forssk.	0.55	0.39	0.57	0.38
14	*Themeda quadrivalvis* (L.) Kuntze.	0.69	0.41	0.61	0.41

Roem & Schult) to 0.41% (*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult. and *Themeda quadrivalvis* (L.) Kuntze.) At matured stage, the concentration of K ranged from 0.28% (*Setaria pumila* (Poir.) Roem. & Schult. and *Spodiopogon rhizophorus* Trin.) to 0.46% (*Paspalidium flavidum* (Retz.) A. Camus.).

The results indicated that the potassium contents gradually increased from early bloomed to matured stage of grasses leaves and stem. The variation in K content across some grasses might be due to its availability K content in soil. Our results were disagreed with the results obtained by Rahim *et al.* (2008) and reported the K concentration in marginal land grasses at early bloomed varied from 0.33% (*Rottboellia exaltata* (L.)) to 0.95% (*Panicum turgidum* Forssk.). The K concentration in these grasses at maturity varied from 0.25% (*Rottboellia exaltata* (L.)) to 0.75% (*Panicum turgidum* Forssk.)., it was observed that lower K content found at matured stage, whereas in present study it is reversed at matured stage. Our results is in agreement with Sultan *et al.* (2008), who reported the K concentration in free grazing rangeland grasses at early bloom varied from 0.39% (*Cymbopogon iwarancusa* (Jones) Schult) to 1.62% (*Aristida adscensionis* L.). At maturity K concentration varied from 0.40% (*Themeda anathera* (Nees ex Steud.) Hack) to 1.63% (*Aristida adscensionis* L.). The K concentration increased with age in grasses. Zaidi *et al.* (2010) observed higher K content in plants during summer than spring season. This findimgs supports our study. Khan *et al.* (2016) reported the increased potassium (K) content from vegetative towards reproductive and post-reproductive stages and this is in the line with present study.

Calcium content:

The Ca concentration of early bloomed grasses leaves varied from 0.22% (*Setaria pumila* (Poir.) Roem. & Schult.) to 0.69% (*Themeda quadrivalvis* (L.) Kuntze.). The concentration matured grasses leaves ranged from 0.21% (*Digitaria bicornis* (Lam.) Roem. & Shult.) to 0.71% (*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.). In case of early bloomed stem, Calcium (Ca) ranged between 0.21% (*Setaria pumila* (Poir.) Roem. & Schult.) to 0.43% (*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.), whereas at matured stage Ca concentration varied from 0.27% (*Spodiopogon rhizophorus* Trin.) to 0.44% (*Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.).

The finding of present study shown that Ca content of selected grasses leaves and stem (culm) generally increased with maturity. This result is agreement with Rahim *et al.* (2008), who study mineral profile of marginal land grasses, they also presented that Ca concentration at early bloomed stage ranged from 0.18% (*Saccharum spontaneum* L.) to 0.74% (*Arthraxon prionodes* (Steud.) Dandy), whereas at matured stage Ca concentration varied from 0.14% (*Rottboellia exaltata* (Lour.) Clayton) to 0.72% (*Arthraxon prionodes* (Steud.) Dandy). They was observed the marginal land grasses generally increased the Ca content at maturity. Ali *et al.* (2011) examined the elemental analyses of some selected fodder species and reporting higher Ca content in *Amaranthus viridis* L. (3.52%), *Chenopodium album* L. (3.85%), *Medicago denticulata* Willd (3.93%), Setaria viridis (L.) P. Beauv (3.16%) and *Sonchus arvrnsis* L. (4.00%) which are higher than the our findings. Bendre and Rathod (2017) study performance of some popular fodder grasses, they documented calcium concentration in *Dichanthium annulatum* Forsk Stapf (0.27% to 0.83%), *Panicum antidotale* Retz. (0.80% to 0.91%), *Pennisetum Pedicellatum* Trin. (0.42% to 0.74%) and *Sorghum sudanensis* Piper Stapf (0.60% to 0.70%) with increased from Kharif season to Rabi season, this results is in the line with our study.

CONCLUSIONS

The major minerals analyses results showed that the early bloomed and matured staged of selected grasses leaves and stem revealed fluctuation in Na, K and Ca content. All the investigated parameters are within the permissible range. The Ca and K had increased from early bloomed stage to the matured stage. The fluctuation in crude protein, and Na content was recorded at early bloomed and matured staged leaves and stem of grasses. It was concluded that various chemical parameters either increased or decreased at early bloomed and matured staged, it may be due to seasonal changes, rain fall, growing age, pH of soil and accumulation capabilities of grasses.

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