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Change in Physico-Chemical Properties of Soil and Nutrients in *Desmodium triflorum* in Case of Seasonal Variation in Ratnanagar-11, Jirauna, Chitwan, Nepal

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Abstract

a) Background: Physico-chemical change is described in case of seasonal variation. The plant became grazed in different seasonings; Nitrogen, phosphorus and potassium are estimated. The aim of paper is the nutrient uptake of *Desmodium triflorum* due to the change in season.

b) Methods: the sample is collected as four month interval period the grass is tolerate as low ph.N 1.67 - 2.04%, P 0.34 - 0.61 % and K 1.46 - 4.15 %.

c) Result: Soil had lowest concentrations of nitrogen (0.096%), phosphorus (0.004%), and potassium (0.027%) in the rainy season. The highest concentration of nitrogen (0.22%) occurred in summer season, phosphorus (0.005%) in winter and summer seasons, and potassium (0.073%) in the winter season. The carbon / nitrogen (C/N) ratio was highest (15.22: 1) in summer and lowest (13.96: 1) in the rainy season.

d) Conclusion: Present study will be valuable in evaluation and management of the middle land pastures in Nepal.

Keywords: Seasonal variation; Desmodium triflorum; Pastures; Nutrient uptake

Introduction

Desmodium triflorum is known as Jungali-Methi in Nepal. It is a small trailing herb, rooting and spreading over the ground and forming a close mat. Branches are hairy and the leaves are 3-foliate with 0.5 cm long petioleIt resists drought and grazing very well [1]. The legume has high feed value [2], and is palatable to baby chicks also included it as a suitable component of pasture ley in Fiji. Mandal [3] reported the range of crude proteins between 6.8 to 15.6% in the shoots of some tropical grasses of eastern Nepal. Joshi et al. [4] found highest concentration of nitrogen followed by potassium, calcium, phosphorus and magnesium at vegetative stage in the standing crop of certain grasses and forbs of Garhwal Himalaya. Dhaubhadel and Tiwari [5] estimated 10.2% crude proteins and 1.6% fat in an alpine pasture (3800 m altitude) of Kaski district of Nepal. Bhattarai reported 11.9% crude proteins and 14.1% total sugar [6].

Material and Methods

The shoot samples of *Desmodium triflorum* were taken at the intervals of four months from all the three marked zones of the study site and were dried in oven at 80o C to a constant weight and ground in mortar for various analyses. Nitrogen was estimated by Nessler's reagent method. Phosphorus was estimated by the method suggested by Furman [7]. Potassium was estimated by titration method [8]. Amount of potassium (mg) in the aliquot was calculated as follows: Total amount of 0.02N $KMnO_4$ (ml) - Oxalic acid (ml) × 0.1086; Hence, percentage of potassium = Amount of potassium in the aliquot (g) × aliquot factor × 100/weight of sample. The methods and procedures for the estimation of nitrogen, phosphorus and potassium in soil samples were similar to plant nitrogen (2.2.1.1), plant phosphorus (2.2.1.2) and plant potassium (2.2.1.3) respectively except that the sample weights were ten times greater than the plant samples (Table 1).

Results

The soil samples of the pasture of Ratnanagar-jirauna supporting the growth of *Desmodium triflorum* population had soil with p^H 5.8 in winter (January) and 4.8 in rainy (September)

season, whereas organic carbon was higher in amount (3.35%) in summer (May) and winter (2.68%) in comparison to the rainy season (1.34%) (Table 2). Soil had lowest concentrations of nitrogen (0.096%), phosphorus (0.004%), and potassium (0.027%) in the rainy season. The highest concentration of nitrogen (0.22%) occurred in summer season, phosphorus (0.005%) in winter and summer seasons, and potassium (0.073%) in the winter season. The carbon / nitrogen (C/N) ratio was highest (15.22: 1) in summer and lowest (13.96: 1) in the rainy season (Table 2). Highest (2.04%) and lowest (1.67%) concentrations of nitrogen were recorded in summer and winter season, respectively in the shoots of Desmodium triflorum. On the other hand, highest (0.61%) and lowest (0.34%) concentration of phosphorus occurred in rainy and winter season, respectively, whereas this trend was opposite in the case of potassium content in the shoots of Desmodium triflorum. *Desmodium triflorum* as many tropical grasses and herbaceous legumes are tolerant to low p^H [9]. The organic carbon in the pasture soils (1.34 to 3.35%).

Table 1: Climatic features of Ratnangar (Jirauna) (Lat N 26°20', Long E 87°16', altitude 90 m msl).

Months	Temperature (oc)		Rainfall (mm)	Relative humidity (%)
	Maximum	Minimum		
January	22.5	7.9	0.0	96.7
February	24.8	12.8	55.0	92.2
March	30.1	15.0	2.8	78.6
April	33.7	21.8	24.9	74.5
May	35.6	24.3	240.0	74.1
June	32.7	25.5	309.7	86.7
July	32.0	26.2	382.2	91.2
August	33.3	25.9	672.6	88.3
September	32.1	24.4	417.7	91.2
October	32.6	24.4	1.6	85.8
November	30.9	16.2	0.9	85.0
December	26.3	10.0	0.0	84.5

Table 2: Seasonal variations in percentage nutrients on oven dry Weight basis in the shoots of *Desmodium triflorum*.

	January (winter)	May (summer)	September (Rainy)
P^H	5.6	5.1	4.7
Nitrogen (%)	1.67	2.04	1.79
Phosphorous (%)	0.34	0.41	0.61
Potassium (%)	4.15	1.54	1.46
Organic carbon (%)	2.68	3.35	1.34

Discussion

In the present study was much higher than the farm soils (0.64 to 1.22%) of Ratnanagar-jirauna .It may be due to the fact that in continuous cropping systems there is a steady depletion of organic carbon whereas under pasture a higher equilibrium content of soil carbon is maintained which is in balance with gains from net primary production and losses from decomposition. Further, on the annual basis, the concentration of nitrogen, phosphorus and potassium in the pasture soil were lower than that of typical tropical grassland (N 0.26%, P 0.03% and K 0.11%) [9] Suggested that the reason for the low representation of legumes in tropical American savanna might result from the low levels of soil phosphorus which hinder the formation of N- fixing symbiosis with soil Rhizobium strains. The nutrient ranges in the shoot samples of *Desmodium triflorum* were: N 1.67 - 2.04%, P 0.34 - 0.61 % and K 1.46 - 4.15 %, whereas reported N - content in shoots of *Desmodium triflorum* is 2.17%. It might have occurred due to differences in *Desmodium triflorum* ecotypes, as well as variations in climatic and edaphic conditions.

In general, contribution of roots to total dry weight was higher in unclipped than clipped individuals of *Desmodium triflorum*. The decreases in root biomass following clipping (defoliation) presumably occur because of decreased translocation of carbohydrates to belowground parts as a result of reduced photosynthetic capacity and an increase in the proportion of current photosynthetic allocated to synthesize new leaves. Further, more leaf content was recorded in twice - clipped individuals than unclipped and once - clipped individuals. In general, green and leafy materials are preferred for animal performance because they contain more nitrogen, soluble carbohydrates phosphate and less fiber than the older materials.

The soil samples of pasture of Ratnanagar, jirauna supporting the growth of Desmodium triflorum population had pH 5.8 in winter (January) and 4.6 in rainy (September) season, whereas organic carbon was higher in amount (3.35%) in summer (May) and winter (2.68%) in comparison to the rainy season (1.34%). Soil had lowest concentrations of nitrogen (0.096%), phosphorus (0.004%), and potassium (0.027%)in the rainy season. Highest (2.04%) and lowest (1.67%) concentrations of nitrogen were recorded in summer and winter season, respectively in the shoots of Desmodium triflorum

Present study will be valuable in evaluation and management of the middle land pastures in Nepal.

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