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Effect of seasonal burning on biomass, net primary productivity and recovery in *Iseilema* grassland community of Bundelkhand region (U.P.), India

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Abstract

Present study was undertaken to assess the recovery in terms of biomass following seasonal burning of protected *Iseilema laxum* grassland at Orai (Jalaun), India over a period of one year. The experimental site was divided into three equal plots. Plot I was burnt twice (January and May), plot II was burnt once (January) and plot III was kept unburnt and was used for comparison. Burning stimulated the growth of shoot and root components of the plant but disfavoured the growth of rhizomes. However, average total plant biomass of burnt plots (1284 gm^{-2} and 1446 gm^{-2} in plot I and II respectively) could not return to the level of control plot (2196 gm^{-2} in plot III). Productivity of rhizome declined with the frequency of burning whereas it increased for shoot and root. The concomitant decline in the productivity of rhizome, the most critical component of perennial grassland commands caution. Long-term studies are necessary to establish the critical limit to which rhizome productivity and biomass can decrease yet the grassland can still be maintained for sustained increased level of production. Summer burning prior to rains showed promising result for higher production and thereby the greater recovery rate of biomass as compared to winter burning.

Key words: Burning, Grassland, Production, Protected, Recovery, Sprouting, Stimulus.

Introduction

Annual burning constitutes an important aspect of the ecology of tropical grasslands. Fire can be a significant component of the biotic environment. The importance of burning in determining the distribution and form of many species as well as the composition, production and recovery has been recognised. A considerable amount of work on vegetation burning has been done (Ahlgren, 1960; Wright and Klemmedson, 1965; Old, 1969; Pandey, 1974a, b and Wright et al. 1976).

Plant communities when subjected to fire take considerably long time for restoration of their original composition and structure. According to Thorhaug (1980), recovery of disturbed ecosystems is influenced by the geographical and climatic factors and the ecological conditions of the site. Pandey and Singh (1985) suggested that system-level properties such as biomass, nutrient regeneration, etc., are better indicators of recovery than transient species composition. The present study deals with the pattern of recovery of biomass in a tropical grassland over a period of one year following controlled seasonal burning.

Materials and Methods

Study site: The study site, Bohadpura Sheep Farm, Orai (Jalaun) is located in a protected area which lies between $25^{\circ} 29' \text{ N}$ latitude and $79^{\circ} 37' \text{ E}$ longitude at an elevation of 141.6m above mean sea level. The climate of the site is dry sub-humid. Mean monthly maximum temperature ranged between 13.9 to 34.2°C and mean monthly minimum between 7.6 to 27.7°C . Lowest temperature occurred in January and highest in May. The mean annual rainfall was 1070 mm with maximum rainfall in August and minimum in November. Out of total annual rainfall, 86% occurred in the rainy season. The year is divisible into three distinct seasons, viz., cool and dry winter (November to February), hot and dry summer (March to June) and warm and wet rainy (July to October).

The experimental site was homogeneously dominated by a perennial grass species, *Iseilema laxum* (Hack.). For the experimental purpose, three equal plots (each $24 \times 12 \text{ m}$) were demarcated within the study site. Plots I and II were selected for controlled burning and plot III was kept unburnt (control) for comparison. Four subplots, each of $5 \times 5 \text{ m}$ size, were marked randomly in each of the three plots. In plots I and II, the vegetation

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