Leaf Litter Production Rate & Decomposition in Deohana Sub- tropical Forest Division, Pooranpur Range of Pilibhit districts (U.P.)

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ABSTRACT

Rate of litter production & decomposition in a forest can be considered as an estimate of net production of plant community. Sal leaf, litter decomposition of litter fall in forest in Deohana, Pooranpur range of Pilibhit District. Season wise succession changes in litter fall were determined for four main seasons of the year namely, March-May, June-August, September-November and December-February. The physiological properties of soil for two different types of forests (A. pure Shorea robusta B. Mixed Shorea robusta) were analyzed Litter fall and leaf litter decomposition were studied in Deohana forest, North parts of Pilibhit district, stand dominated forest by Shakhu leaf (Shorea robusta) common Names of Shakhu. There is considerable amount of litter fall annually in tropical dry deciduous forests of total litter fall 78% was contributed by leaves. The trend of litter fall decomposition of different components was in the order: Leaves with petiole > Twig > Floral parts + seeds/ Fruits > Bark. Total annual litter fall was 980gm-2 of which there has been a seasonal variation in litter production. Shorea robusta produced 785gm-2 the total litter fall was found to be maximum in spring and minimum in rainy seasons. Annually nutrients in the form of Sal leaf litter and biomass from the larger number of Sal trees and their saplings 87.7% of Sal tree leaf litter was decomposed. The higher levels of soil nutrients in the forest were due partly to reduction in the loss of top soil and partly to the increased supply maximum rate of leaf litter decomposition was observed in spring season.

Keywords: Litter production, Leaf litter decomposition, Shorea robusta, Litter fall, Litter biomass.

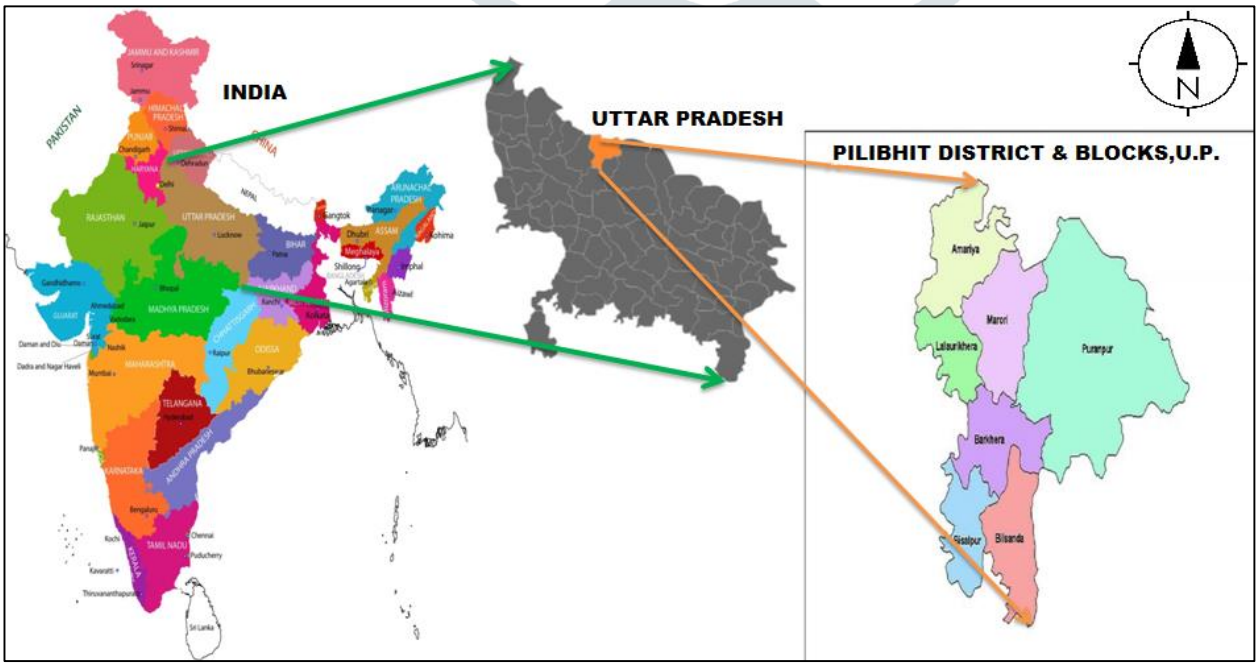
INTRODUCTION:

Litter fall, decomposition plant litter, leaf litter, tree litter, soil litter & production of litter or duff, is dead plant materials leaves, twig, barks to the ground. Forest soils influence the composition of the forest stand and ground cover, rate of tree growth, vigor of natural reproduction and other important factors (Bhatnagar 1965).Sal (*Shorea robusta*) occurs gregariously on the southern slopes distributed in India. Its presence is indicated in Sal's natural range lies between the longitudes of 80° and 85° E and the latitudes of 28° to 18° N. Within this range, the distribution is controlled firstly by climate and then by tropical factors. However, forest

exploitation alters the flows of matter and energy in forest systems, and sometimes, the effects can be irreversible, leading to significant changes in productivity, efficiency of their use, among other effects. In tropical and deciduous forests most of the nutrient stock is in the form of biomass and relatively little in soil. Major portion of organic matter in soil comes from plant material in the form of litters of Shakhu leaf in these ecosystems, organic matter constitutes one of the main ways of energy flow. Substantial portion of nutrients accumulated by plants is returned to the soil as litter fall followed by its decomposition, the integrity of an forest ecosystem is maintained by these transfers of matter and nutrients. In tropical deciduous Sal forest of Deohana forest ecosystem, maintenance of soil organic pool achieved by high and rapid circulation of nutrients through the litter fall and decomposition of litter. As a results of Sal leaf decomposition and activity the litter fall is subjected to biological change. The soil is regarded as a heterogeneous collection of minerals and organic materials standing of leaf litter fall acts as an input output systems of nutrients and the rate of litter decomposition at which forest of Sal litter falls. Nutrient cycling rates in forests are usually inferred from a comparison of nutrient concentration and amounts of litter fall, forest floor litter and crown drips. The present study was deals with litter fall and leaf litter decomposition in a,Sal forest stand at Deohana forest Pooranpur range, Pilibhit (U.P).

STUDY AREA:

The study area of Deohana forest is located in Pooranpur Kurraiya Range in south side of Pilibhit district. It lies from 28°23' - 30°11' N latitude and 79°58'55E' -- 80°12' E longitude. The Shorea robusta forest has specific geographical situation, comprises of treasures of forest plants used by all sections of society. The climate is low- hot dry humid in summer and dry-cool seasons in winters. The annual rainfall ranges from 1000-1260 mm mainly received with June to September month of the year. Average of maximum and minimum temperatures ranges from 20-30.5°C in summerand18-28°cinwinterespectively.



MATERIAL AND METHODS:

Total forest Litter fall was measured in 10 traps (50cm×50cm each) randomly placed in forest floor. The trap fitted with nylon net base at bottom to facilitate drainage, were set up 30 cm above the ground of area (Visalakshi N.1993). The Litter fall from each trap was collected fortnightly / monthly intervals from January 2018 to December 2018. Though the study area has a tropical and sub-tropical monsoon climate and receives a great deal of rain, the area seems somewhat dry- wet arid because most of the rainfall flows away quickly as surface run-off, allowing the soil to dry quickly. The litter bag may also be used to study leaf decomposition of the litter fall of layer. The sorted material was oven dried at 80°C for 72 hrs and weighed Leaf litter fall decomposition in Sal leaf was studied by enclosing 10g air dried fresh litter samples in nylon bags. A total collected sample 120 bags (40 bags in each of three different locations, upper crust, slopes and low lying area) were put in the forest floor on 15 July,2018. On each sampling date, at an interval of about 30 days, 5 litter bags were recovered and brought to laboratory in separate polythene bags. The leaf litters material from each sample was washed under a five jet of water by using a fine mesh screen to remove all adhering soil particles. The washed litter material was dried 80°C in oven to constant weight. Litter bulk samples of fresh air & dried litter samples were oven dried at 80°C to constant weight to adjust initial dry weight in the bags.

RESULTS:

Litter fall:

Forest vegetation of the study area was dominated by the Sorea robusta Maximum leaf litter fall followed by March 2018 occurred during February (158±80 gm-2 month-1). floral biomass, BH leaf biomass, woody material biomass and non-identifiable material biomass total amount leaf litter fall decomposition amounted to the pure Shorea robusta & mixed Shorea robusta was forest composed predominantly of S. robusta, in association with Trevia nudriflora , Pongamia piñnata, Pithecellobium dulce, Ficus Sps. and other species. In the mixed S. robusta forest and Terminalia arjuna were equally high dominant. Other associated species included Syzygium cumini, Bombax ceiba, Acacia catechu, cassia fistula and Tectona grandis 620 gm-2 which was distributed as: Shorea robusta 70.5%, Butea Monosperma 3.2%,Pongamia pinnata 4.2%,Acacia nilotica 2.5%, Ficus benghalensis 2.7%, Rhus semialata 4.2%, Alianthus excelsa 2.6%, Holoptelea integrifolia 3.3%, Syzigium cumini 4.5% and others 0.5%. Total annual twig litter fall was highest in December (27.5± 25.2gm-2). Twig litter fall was 130 gm-2, bark litter fall was highest in March (5.2±3.5 gm-2) and its annual litter fall production was 32.5 gm-2. Floral parts and seed / fruits were maximum during March (5.2±3.5 gm-2) and again during December (7.5±6.2 gm-2).The total production of this category was 67.5 gm-2 the total litter fall amounted to 1125 gm-2 yr-1. The peak in litter fall observed during March. Litter fall components (gm-2 month-1) Total monthly litter fall (gm-2month). Shorea robusta showed maximum rate of litter fall during June and July.

Litter fall by Species: The most litter fall dominant species of Shorea robusta plant showed peak litter fall during March and April which amounted to respectively 85 % and 74 % of total dominant Species other than.

Leaf litter decomposition: The pattern of leaf litter decomposition indicated the most rapid weight loss during the maximum litter fall decomposition in rainy season (20 July to 31 August 2018) & minimum Litter fall during the winter season January to February.

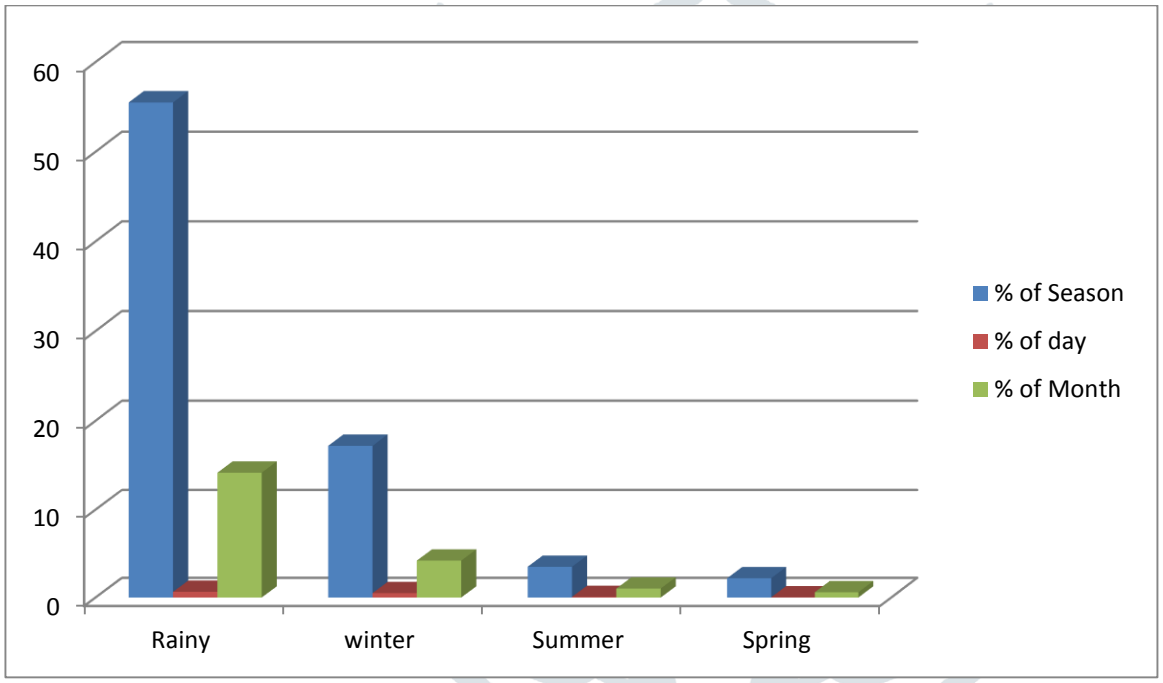


Fig.1. Contributions of the different leaf litter Production rate in the Forest and total decomposition rate (A) Season (B) Month (C) Day

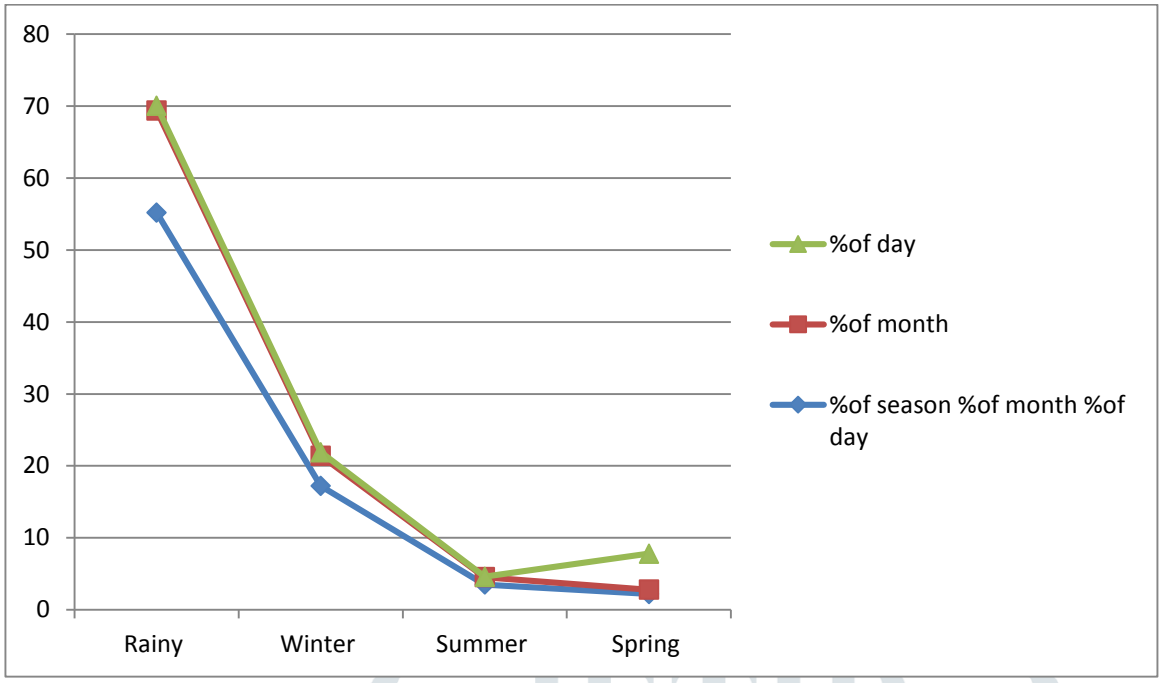


Fig.2.Leaf litter decomposition & seasonal variation in Sal forest Deohana, Pooranpur range, (Pilibhit).

DISCUSSION:

Litter fall decomposition rates of all tropical & sub- tropical vegetation types have been reviewed by proctor (1984), while Bray & Gorham (1964) reviewed Litter fall by measurements rates in vegetation type throughout the Indian forest. The total litter fall production studied did not indicate seasonal equitability however the rate of total litter fall decomposition on per day rate basis was higher is Summer, spring, winter & rainy season. The High litter fall in summer was followed by spring and rainy seasons. Pragasan and Parthasarthy (2005) recorded maximum litter fall during summer season in case study of dry deciduous forest of Deohana forest site Pooranpur range districts of Pilibhit. The biomass quantities of the plant formations in the high, low and medium section corresponding to the 12 months of sampling. The distribution of rainfall and litter fall have an inverse relationship low rainfall period and high tropical & sub- tropical dry-wet evergreen forest in India tropical mixed dry forest stand and Shorea Robusta plantation stands in north Pilibhit. The process of litter fall decomposition continues to occur throughout the year due to evergreen nature of vegetation, this is conformity with the nature to Tropical & sub- tropical dry forest of Shorea robusta. However, the range in the litter fall production with in different climatic zones is rater wide. Thus the results reviewed by Jenson (1974), indicate rang in total annual litter fall of 1.5 - 9.9t ha-1 in cool temperate regions and 5.5 - 15.3t ha-1 in tropical region. The current value of total litter fall decomposition recorded for the present Deohana forest stands of Shorea Robusta plants (9.3t ha-1 yr-1) is higher than the tropical forest area.

CONCLUSION:

Sal litter decomposition on forest floor throughout the year and most of them showed seasonal variations. The study was showed that decomposition of litter rate continuously takes place throughout the season, year, however, the process intensified during the rainy, spring and summer season. Although the lack of information about the behavior of litter on the banks of lotic systems similar to those studied here does not allow for generalizations, it seems reasonable to conclude that in moisture saturated media leaf litter falls decomposition unrelated to moisture. The fresh litter fall production & Decomposition in forest ecosystem. The majority during May-June in high Litter fall decomposition rate of Shorea robusta forest. Amount of time litter fall = *k* (detrital mass for study various groups from edaphic fauna you need a different mesh sizes in the litter bags Sal forest Litter decomposition rate in forests ecosystem. The pure Shorea robusta forest had relatively the mixed Shorea robusta forest On the whole the Decomposition found under these forests represents the degraded status of the forest.

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