Exhangeable cations and anions capacity of soil experiencing mortility of shisham (*Dalbergia sissoo*) in semi-arid regions of Haryana, India

M.K. SINGH AND RAVI KUMAR*

Department of Forestry, C.C.S Haryana Agricultural University, HISAR (HARYANA) INDIA

ABSTRACT

In order to study the chemical properties of soils under healthy as well as dead trees of *Dalbergia sissoo* six different locations selected in Chaudhary Charan Singh Haryana Agricultural University, Hisar and nearby places with an objective to ascertain whether the mortality is caused by any chemical properties of soils . Soil samples from six different depth upto 150 cm were collected and analysis for pH, E.C, Exchangeable cations and anions of soil. The concentration of exchangeable cations were found higher in the soils under healthy trees as compared to dead trees while the pH, E.C and exchangeable anions were higher under dead trees and its concentration increased with the increase in the soil depth at all the six locations.

Key words : *Dalbergia sissoo,* Mortality Exchangeable cations and anions, Semi-arid

INTRODUCTION

Dalbergia sissoo (shisham) is one of the few important broad-leaved leguminous trees. It is grows in the entire sub-Himalayan tract and also in the Himalayan valleys upto an elevation of about 1500m. It is grown throughout Indo-gangetic plain and Rajasthan. It is a large deciduous tree and it has been widely used for afforestation, soil conservation, ravine reclamation etc. in many parts of the country. It has a good atmospheric N_2-fixing ability, therefore, it is extensively planted in social and agro-forestry programmes.

After been grown successfully for hundreds of years, trees of *Dalbergia sissoo* in their natural and man-influenced ecosystem are adversely affected by various biotic and abiotic factors. Since a number of stress factors such as changing climatic conditions, stagnation of soil water, longer dry spell, soil compaction, salt accumulation, imbalance of soil nutrients and improper site for plantation, adversely affects tree health which invite the secondary pathogen and insects that attack the weakened tree and finally leads to death of tree. So keeping in view above points, present study was undertaken to know whether the chemical properties of soil responsible for decline of *Dalbergia sissoo.*

MATERIALS AND METHODS

Healthy and dead trees of *Dalbergia sissoo* were selected from the campus CCS HAU, Hisar (Lat. 29°10¢ N, Long. 75°46¢ E and Alt. 215.2 m above mean sea level) and nearby places. The distances between healthy and dead trees were about 4-5 m. The trees were about 10-15 years of age, their girth varied from 68 to 69 cm

and height 8-14 m. From each location, two trees one healthy and one dead were selected. Four points at a distance of 1.5 meter from the base of trees in East, West, North and South directions were marked. From these points with the help of an auger, soil sample were drawn at a depth of 0-15, 15-30, 30-60, 60-90, 90-120 and 120-150 cm from these directions. Samples from each direction and depth were mixed together and one composite sample was drawn. In this way samples were collected from six different locations under dead and healthy trees. Soil sample were air dried, ground with pestle and mortar and passed through 2mm sieve and analyzed, pH (Kalra and Maynard,1991), Exchangeable cations like $Ca^{2+,}$ Mg^{2+} (Kanwar and Chopra,1976) Na^+ and K^+ on Elico flame photometer, E.C, Water soluble anions like Bicarbonate and chloride , (Richards, 1954) and Sulphate (Chesnin and Yien, 1951).

RESULTS AND DISCUSSION

Soil pH :

The soil pH values (1:2 soil water ratio) at different depth and at various locations are presented in Table-1. In general the soil pH values were higher in soils under dead trees as compared to healthy trees at all the locations and depth. Among healthy trees the lowest pH values i.e. 7.5 was recorded at the surface layer of location L3 and highest 9.1 at lowest depth at location L_6. In case of dead trees pH values varied from 7.9 (in surface level at location L_3) to 9.3 in the soil sample at lower most depth at location L_6. In both the cases the pH values increased with the increasing in soil depth.

The low pH values of upper surface layer may be

* Author for correspondence.