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Abstract: The present experiment entitled "Studies on tree-soil interaction on different species in Arboretum of Faculty of Forestry, Birsa Agricultural University, Ranchi planted in the year 2006. The experiment is planned with the objectives such as to study the physicochemical properties of soil in the selected tree species, growth parameter of different tree species, and to know the interrelationship between soil properties and tree growth. The plantation in the arboretum is about 11 years old planted in block. Since the blocks are not equal, random sampling method has been adopted to conduct the experiment. The five tree species like Mahogany (*Swietenia mahogoni*), Sheesham (*Dalbergia sisso*), Gamhar (*Gmelina arborea*), Jamun (*Syzygium cumini*) and Ber (*Ziziphus jujube*) have been selected in the present studies. The physical properties of the soil like soil texture, bulk density, soil porosity, water holding capacity and particle density has been taken into consideration; whereas the chemical properties such as soil pH, soil organic carbon, available nitrogen, available phosphorous and available potassium have been analysed. Besides these, the growth parameter such as height, diameter and crown width have been recorded to find out the growth performance of the concerned trees. The maximum value (1.66 gm cm⁻³) of Bulk Density has been found in *Ziziphus jujube* followed by *Gmelina arborea*, *Syzygium cumini*, *Dalbergia sisso* and minimum (1.55 gm cm⁻³) *Swietenia mahogoni*; whereas in case of Particle Density, the maximum value (2.68 gm cm⁻³) was observed in *Syzygium cumini* followed by

Swietenia mahogoni, Dalbergia sissoo, Gmelina arborea and minimum (2.56 gm cm⁻³) in Ziziphus jujube. In Soil Porosity, the maximum value (43.50%) has been shown in Dalbergia sissoo followed by Swietenia mahogoni, Gmelina arborea, Syzygium cumini and minimum (35.42%) in Ziziphus jujube; while the maximum value (34.39ml/100cm³) of water holding capacity was recorded in Dalbergia sissoo followed by Gmelina arborea, Ziziphus jujube, Syzygium cumini, and minimum (21.30ml/100cm³) in Swietenia mahogoni. Percentage of sand has been found maximally (54.67%) in Syzygium cumini followed by Gmelina arborea, Dalbergia sissoo, Swietenia mahogoni and minimum (51.31%) in Ziziphus jujube; whereas the maximum value (25.3%) of silt has been found in Swietenia mahogoni followed by Dalbergia sissoo, Syzygium cumini, Gmelina arborea and minimum (22.7%) in Ziziphus jujube; while percentage of clay has been found maximum (26.61%) in Ziziphus jujube followed by Gmelina arborea, Dalbergia sissoo, Swietenia mahogoni, and minimum (22.74%) in Syzygium cumini. Statistically bulk density has been shown significantly higher in Gmelina arborea followed by Syzygium cumini, Swietenia mahogoni, Ziziphus jujube and non-significant in Dalbergia sissoo; whereas particle density has been observed significantly higher in Syzygium cumini followed by Swietenia mahogoni, Dalbergia sissoo, Gmelina arborea and Ziziphus jujube has been found nonsignificant. The soil porosity has been found significantly higher in Syzygium cumini followed by Gmelina arborea, Swietenia mahogoni, Ziziphus jujube and Dalbergia sissoo; while the water holding capacity has been observed significantly higher in Gmelina arborea followed by Dalbergia sissoo, Ziziphus jujube, Syzygium cumini and Swietenia mahogoni; whereas in case of percentage of sand, silt and clay it has been found non-significant in all the species. Thus, it indicates that the physical properties of the soil have been found improved in planted area. The findings of the experiment indicated that Soil pH, Organic Carbon (OC), Available Nitrogen (N), Available Potassium (K) increased in planted areas than non planted areas while Available Phosphorous (P) has been found higher in unplanted areas than planted area. The maximum value (6.07) of soil pH has been observed higher in Dalbergia sissoo followed by Gmelina arborea, Swietenia mahogoni, Syzygium cumini and minimum (5.32) in Ziziphus jujube. The maximum value (0.45) in soil organic carbon has been found higher in Gmelina arborea followed by Dalbergia sissoo, Swietenia mahogoni, Syzygium cumini and minimum (0.40) in Ziziphus jujube. The maximum value (496.64) of available nitrogen has been recorded in Dalbergia sissoo followed by Syzygium cumini, Ziziphus jujube, Gmelina arborea and minimum (419.54) in Swietenia mahogoni; whereas maximum value (760.62) of available potassium has been shown in Swietenia mahogoni followed by Syzygium cumini, Gmelina arborea, Ziziphus jujube and minimum (714.38) in Dalbergia sissoo. On contrary unplanted area has been found maximum value (15.22kg/ha) of available phosphorous in Dalbergia sissoo followed by Swietenia mahogoni, Ziziphus jujube, Gmelina arborea, and minimum (14.5kg/ha) in Syzygium cumini. Overall, the nutrient status in all the species has been found in the sequential order as K>N>P. As per statistical analysis the soil pH, has been found significantly higher in Dalbergia sissoo followed by Syzygium cumini, Ziziphus jujube, Gmelina arborea and Swietenia mahogoni; whereas soil organic carbon depicts significantly higher in Syzygium cumini followed by Gmelina arborea, Swietenia mahogoni, Dalbergia sissoo, and Ziziphus jujube. Available nitrogen has been observed significantly higher in Syzygium cumini followed by Gmelina arborea, Ziziphus jujube, Dalbergia sissoo and Swietenia mahogoni; while Available phosphorous has been shown significantly higher in Swietenia mahogoni followed by Syzygium cumini, Dalbergia sissoo, Gmelina arborea, and Ziziphus jujube. The Available potassium has been found significantly higher in Syzygium cumini followed by Ziziphus jujube, Swietenia mahogoni, Dalbergia sissoo and Gmelina arborea. As per the growth parameter of the tree is concerned, the both diameter and height have been found maximum (13.33 cm & 10.55 m respectively) in Swietenia mahogoni, which is a fast growing species. But, in case of diameter, it has been followed by Gmelina arborea, Dalbergia sissoo, Syzygium cumini and minimally (9.23 cm) Ziziphus jujube; while in case of height it has been followed by Gmelina arborea, Dalbergia sissoo, Syzygium cumini, and minimum (7.62 m) in Ziziphus jujube. The crown width has been recorded maximum (5.62m) growth in Swietenia mahogoni followed by Dalbergia sissoo, Syzygium cumini, Ziziphus jujube and minimum (3.67m) in Gmelina arborea. Therefore it may be concluded from the present investigation that physical properties of soils was improved considerably in planted area than that of unplanted area; the Soil pH, Soil Organic Carbon (OC), available nitrogen (N) and available Potassium (K) were found significantly higher in planted area compared to unplanted area. On contrast, the available Phosphorous (P) showed reverse finding being significantly higher in unplanted area. The finding of the results show an increasing tendency in the soil pH which indicates conducive for the tree growth.

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