CHAPTER - 4

RESULTS

The study was carried out to compare the growth of forest trees raised in two different plantation sites and find out the extent of influence of soil properties on the growth of four tree species with twelve soil parameters as variables.

The results obtained after statistical analysis are summarized under the headings:

4.1 Growth of Dalbergia sissoo

The mean height of Dalbergia sissoo at Okhairagara plantation area was 6.28 m while at Sadma plantation area, it was found 5.46 m. Statistically the variance in height was found highly significant. Similarly - mean girth, basal area, tree volume and MAI at Okhairagara and Sadma were found 0.36 m & 0.28 m, 27.5 m$^2$ ha$^{-1}$ & 15.0 m$^2$ ha$^{-1}$, 170 m$^3$ ha$^{-1}$ & 87.5 m$^3$ ha$^{-1}$ and 28.33 m$^3$ ha$^{-1}$ year$^{-1}$ & 14.58 m$^3$ ha$^{-1}$ year$^{-1}$ respectively. All the growth parameters of Dalbergia sissoo have significantly higher numerical values in Okhairagara plantation area than Sadma plantation area (Table - 4.1).

4.2 Soil properties at Dalbergia sissoo plantation area

The chemical properties of soil, i.e. pH, organic carbon, nitrogen, phosphorous and potassium in Dalbergia sissoo plantation area at Okhairagara were found to be 5.7, 0.38%, 271.00 kg ha$^{-1}$, 15.03 kg ha$^{-1}$ and 74.68 kg ha$^{-1}$ while at Sadma plantation area these were found to be 5.7, 0.43%, 267.55 kg ha$^{-1}$, 14.01 kg ha$^{-1}$ and 73.68 kg ha$^{-1}$ respectively. Statistically the pH, nitrogen and potassium level are found at par with each other, organic carbon was significantly higher at Sadma plantation area.
area and phosphorous level was significantly higher at Okhairagara plantation area. The physical properties of soil, i.e. bulk density, particle density, porosity, water holding capacity, sand, silt and clay percentages at Okhairagara plantation area were found 1.528 gm cm$^{-3}$, 2.465 gm cm$^{-3}$, 37.98%, 28.0 ml /50 cm$^3$, 61.4%, 28.4% and 10.2% while in Sadma these were 1.516 gm cm$^{-3}$, 2.526 gm cm$^{-3}$, 39.96%, 30.3 ml /50 cm$^3$, 61.3%, 27.2% and 11.5% respectively. Out of these parameters - bulk density, porosity and clay percentage were statistically at par with each other in both the plantation areas. Particle density and water holding capacity were significantly higher at Sadma plantation area, whereas sand and silt percentages were significantly higher in Okhairagara plantation area (Table – 4.2).

4.3. Growth of Cassia siamea

The mean height of Cassia siamea at Okhairagara plantation area was 14.54 m while at Sadma plantation area it was found 15.25 m. Statistically the variance in height was found significant. In Okhairagara and Sadma plantation area, mean girth, basal area, tree volume and MAI were found 0.60 m & 0.66 m, 72.5 m$^2$ ha$^{-1}$ & 87.5 m$^2$ ha$^{-1}$, 1050 m$^3$ ha$^{-1}$ & 1332.5 m$^3$ ha$^{-1}$ and 175 m$^3$ ha$^{-1}$ year$^{-1}$ & 222.08 m$^3$ ha$^{-1}$ year$^{-1}$ respectively. All the growth parameters of Cassia siamea have significantly higher numerical values in Sadma. However, statistically the variance in mean girth was found highly significant (Table – 4.3).

4.4 Soil properties at Cassia siamea plantation area

The chemical properties of soil, i.e. pH, organic carbon, nitrogen, phosphorous and potassium in Cassia siamea plantation area at Okhairagara were found to be 5.7, 0.36%, 228.52 kg ha$^{-1}$, 14.24 kg ha$^{-1}$ and 70.48 kg ha$^{-1}$ while at Sadma plantation area these were found to be
5.9, 0.43%, 242.46 kg ha\(^{-1}\), 15.54 kg ha\(^{-1}\) and 71.26 kg ha\(^{-1}\) respectively. Statistically pH and potassium level are found at par with each other, while other parameters are significantly higher at Sadma plantation area. The physical properties of soil, i.e. bulk density, particle density, porosity, water holding capacity, sand, silt and clay percentages at Okahairagara plantation area were found 1.590 gm cm\(^{-3}\), 2.301 gm cm\(^{-3}\), 30.91%, 35.8 ml /50 cm\(^3\), 62.3%, 26.3% and 11.5% while at Sadma plantation area these were 1.500 gm cm\(^{-3}\), 2.339 gm cm\(^{-3}\), 35.89%, 34.0 ml /50 cm\(^3\), 62.8%, 25.2% and 12.0% respectively. Out of these parameters particle density, sand percentage and clay percentage were statistically at par with each other in both the plantation area. Bulk density, water holding capacity and sand percentage were significantly higher at Okhairagara plantation area, while porosity was significantly higher at Sadma plantation area (Table – 4.4).

4.5 Growth of *Gmelina arborea*

The mean height, mean girth, basal area, tree volume and MAI at Okhairagara plantation area were 12.24 m, 0.72 m, 102.5 m\(^2\) ha\(^{-1}\), 1265 m\(^3\) ha\(^{-1}\) and 210.8 m\(^3\) ha\(^{-1}\) while at Sadma plantation area these values were 12.73 m, 0.79 m, 122.5 m\(^2\) ha\(^{-1}\), 1567.5 m\(^3\) ha\(^{-1}\) year\(^{-1}\) and 261.25 m\(^3\) ha\(^{-1}\) year\(^{-1}\) respectively. Statistically the variances in all the parameters were found significant except in the height. At Sadma plantation area, all the parameters have higher numerical value than as observed Okhairagara plantation area (Table – 4.5).

4.6 Soil properties at *Gmelina arborea* plantation area

The chemical properties of soil, i.e. pH, organic carbon, nitrogen, phosphorous and potassium in *Gmelina arborea* plantation area at
Okhairagara were found to be 5.9, 0.39%, 226.37 kg ha\(^{-1}\), 14.11 kg ha\(^{-1}\) and 74.24 kg ha\(^{-1}\) while at Sadma plantation area these were found to be 6.0, 0.45%, 246.46 kg ha\(^{-1}\), 15.01 kg ha\(^{-1}\) and 69.51 kg ha\(^{-1}\) respectively. Statistically all parameters are significantly higher at Sadma plantation area except potassium level, which is significantly higher at Okhairagara plantation area. The physical properties of soil, i.e. bulk density, particle density, porosity, water holding capacity, sand, silt and clay percentages at Okahairagara were found 2.007 gm cm\(^{-3}\), 2.345 gm cm\(^{-3}\), 14.43%, 39.8 ml /50 cm\(^3\), 60.5%, 24.0% and 15.5% while at Sadma plantation area these were 1.612 gm cm\(^{-3}\), 2.384 gm cm\(^{-3}\), 32.37%, 36.4 ml /50 cm\(^3\), 59.1%, 25.1% and 15.8% respectively. Out of these parameters – bulk density, water holding capacity and sand percentage were significantly higher in Okhairagara, while particle density, porosity and silt percentage were significantly higher in Sadma. Clay percentage was found to be at par at both the plantation area (Table – 4.6).

**4.7 Growth of *Acacia auriculiformis***

The mean height, mean girth, basal area, tree volume and MAI at Okhairagara plantation area were 9.33 m, 0.66 m, 87.5 m\(^2\) ha\(^{-1}\), 815 m\(^3\) ha\(^{-1}\) and 135.8 m\(^3\) ha\(^{-1}\) while at Sadma plantation area these values were 10.78 m, 0.75 m, 110.0 m\(^2\) ha\(^{-1}\), 1200 m\(^3\) ha\(^{-1}\) year\(^{-1}\) and 200 m\(^3\) ha\(^{-1}\) year\(^{-1}\) respectively. Statistically the variances in all the parameters were found highly significant. At Sadma plantation area, all the parameters have higher numerical value than recorded in Okhairagara plantation area (Table – 4.7).
4.8 Soil properties at *Acacia auriculiformis* plantation area

The chemical properties of soil, i.e. pH, organic carbon, nitrogen, phosphorous and potassium in *Acacia auriculiformis* plantation area at Okhairagara were found to be 5.5, 0.46%, 225.62 kg ha\(^{-1}\), 15.43 kg ha\(^{-1}\) and 67.84 kg ha\(^{-1}\) while at Sadma plantation area these were found to be 5.5, 0.42%, 239.16 kg ha\(^{-1}\), 14.60 kg ha\(^{-1}\) and 63.50 kg ha\(^{-1}\) respectively. Statistically pH and phosphorus levels are found at par with each other, while organic carbon level and phosphorous levels are significantly higher at Okhairagara plantation area and nitrogen level was significantly higher at Sadma plantation area. The physical properties of soil, i.e. bulk density, particle density, porosity, water holding capacity, sand silt and clay percentages at Okhairagara plantation area were found 1.744 gm cm\(^{-3}\), 2.381 gm cm\(^{-3}\), 26.73%, 35.2 ml /50 cm\(^{3}\), 62.3%, 23.9% and 13.8% while at Sadma plantation area these were 1.547 gm cm\(^{-3}\), 2.395 gm cm\(^{-3}\), 35.35%, 31.8 ml /50 cm\(^{3}\), 58.2%, 27.9% and 13.9%. Out of these parameters - particle density and clay percentage were statistically at par with each other. Bulk density, water holding capacity and sand percentage were significantly higher at Okhairagara, while porosity and silt percentage were significantly higher at Sadma plantation area (Table – 4.8).