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Effect of different horti-pastoral systems in ameliorating soil compaction in Shivalik region

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ABSTRACT

Long term effects of different horti-pastoral systems viz., *Embllica officinalis* (aonla) alone, aonla + *Chrysopogon fulvus* (dholu), aonla + *Pennisetum purpureum* (hybrid napier) and aonla + *Cajanus cajan* (perennial arhar) were evaluated in comparison to agricultural cropping system on soil compaction in degraded lands of Shivaliks. The cultivated agricultural field with traditional cropping and tillage system over the years had a compacted sub-surface layer of 10 cm thickness within 10-20 cm depth with compaction values in the range of 1821 to 1973 kpa at field capacity. Under horti-pastoral systems, magnitude of compaction at various depths varied with the system. Cultivation of aonla alone for 14 years reduced the maximum level of soil compaction in 5 to 20 cm depth range from 1973 to 1610 kpa. Cultivation of perennial grasses as intercrops in aonla had synergetic effect based on their rooting system and caused further reduction in compaction values up to 784 kpa in 10-30 cm deep layers. Aonla + perennial arhar had the lowest soil resistance to penetration in 7.5 to 20.0 cm depth while hybrid napier based system was effective beyond 20 cm depth also. Hybrid napier had more vigorous and deep root system than other grasses. Technique of pit making before transplantation of aonla proved very effective in maintaining soil compaction at optimum level and offset any adverse on aonla growth due to sub-surface compaction. Horti-pastoral systems proved better than field crops in conserving and rehabilitation of degraded soils. The biological systems are more effective than mechanical measures like chisel ploughing due to long duration effects

Key words :

Aonla,
Cajanus cajan,
Chrysopogon fulvus,
Horti-pastrol systems,
Penetrometer,
Pennisetum purpureum,
Soil compaction