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Effect of varying land uses on important soil properties and their co-relation with organic carbon in soils of Navsari Agricultural University, Main Campus, Navsari (Gujarat)

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SUMMARY

An investigation was carried out with an objective to study the effect of varying land uses on some important properties of soils (organic carbon, EC, pH, available major nutrients, available sulphur, available micronutrients, bulk density and water stable aggregates > 0.5 mm) of Navsari Agricultural University main campus, Navsari and also to find out the their co-relations with SOC as to varying land uses. Ten different land uses namely, Oil palm plantation**,** Sapota plantation, Mango plantation, Sugarcane crop, Rice crop, Pulses and oilseed crops, Banana plantation, Vegetable crops, Floriculture crops and Barren land (LU_{10}) covering an area of 333.42 hectares of NAU main campus were selected for the present study. The results revealed that soil organic carbon(SOC) under different land uses varied from 2.4 to 9.7 g kg^{-1} with the order: Oil palm > mango > sapota > sugarcane > pulses and oil seeds > banana > rice > vegetables > floriculture > barren land. Soil salinity irrespective of land uses varied from 0.27 to 0.52 dS m^{-1} and was below problematic limit. Soil pH varied from 5.82 to 8.00 with no appreciable difference amongst land uses, barring rice soil with acidic pH (5.82). Available nitrogen varied from low to highly medium status ((494 kg ha^{-1})) following the order : Pulses and oil seeds > oil palm > mango > sapota > sugarcane > banana > rice> floriculture > barren > vegetables. Available phosphorus varying from 33.29 to 60.30 kg P_2O_5 ha^{-1} maintained the following order: Sugarcane > oil palm > mango > sapota > pulses and oilseeds > vegetables > banana > floriculture > rice > barren land, while available potassium was high, except rice soil with 143.2 kg K_2O ha^{-1}. Available sulphur varying from 15.03 to 23.25 mg kg^{-1} portrayed medium to high status. Available zinc was deficient in most soils, except rice and oil palm soil. Available iron and manganese exhibited low to high status. Available copper indicated deficient to marginal status. Bulk density of soils varied from 1.45 to 1.83 Mg m^{-3} following descending order: Barren > floriculture > vegetable > rice > banana > pulses and oilseed > sugarcane > oil palm > sapota > mango. Water stable aggregates of size > 0.5mm (macro aggregates) varied from 24.19 (rice)to 66.53 per cent(sapota), Some significant or highly significant correlations of soil properties with SOC were observed with bulk density, available nitrogen, sulphur and water stable aggregates. The overall results suggest that land should not be kept barren and efforts should be made for improving SOC having low status. Soils having low to marginally medium status of available nitrogen, phosphorus and potassium and deficient in available Zn, Fe, Mn, Cu, call for proper management and corrective measures through avoiding excessive cultivation practices, application of organics and following crop rotation to sustain crop yield and soil quality.

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The ability of soil to supply nutrients in available form varies with the change in soil properties and conditions. The climate and the soil of a region have great bearing on sources, availability and degree of organic materials in soil, while the land use pattern significantly influences the soil organic carbon (SOC) content, nutrient status and also physical, physico-chemical properties of soil to certain extent. SOC is a good indicator of soil productivity potential. It affects physical, chemical and biological properties of soil and plays a crucial role in sustaining soil quality, agricultural production and environmental quality (Zhang *et al*., 2003 and Andrews *et al*., 2004). SOC is very stable but is very reactive and a large quantity can be lost through changes in agricultural

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