Fig. 1 Monthly average values of weather parameters during January 2017 to December 2020

Fig. 2 Sapota tree and SMSTs in degraded ravines. (a) Sapota tree on bench terrace, (b) runoff and soil loss measurement facility, (c) Tillage operations in SCCBT, (d) Cow pea and castor crops in SCCBT, (e) staggered trenches in SSTS.
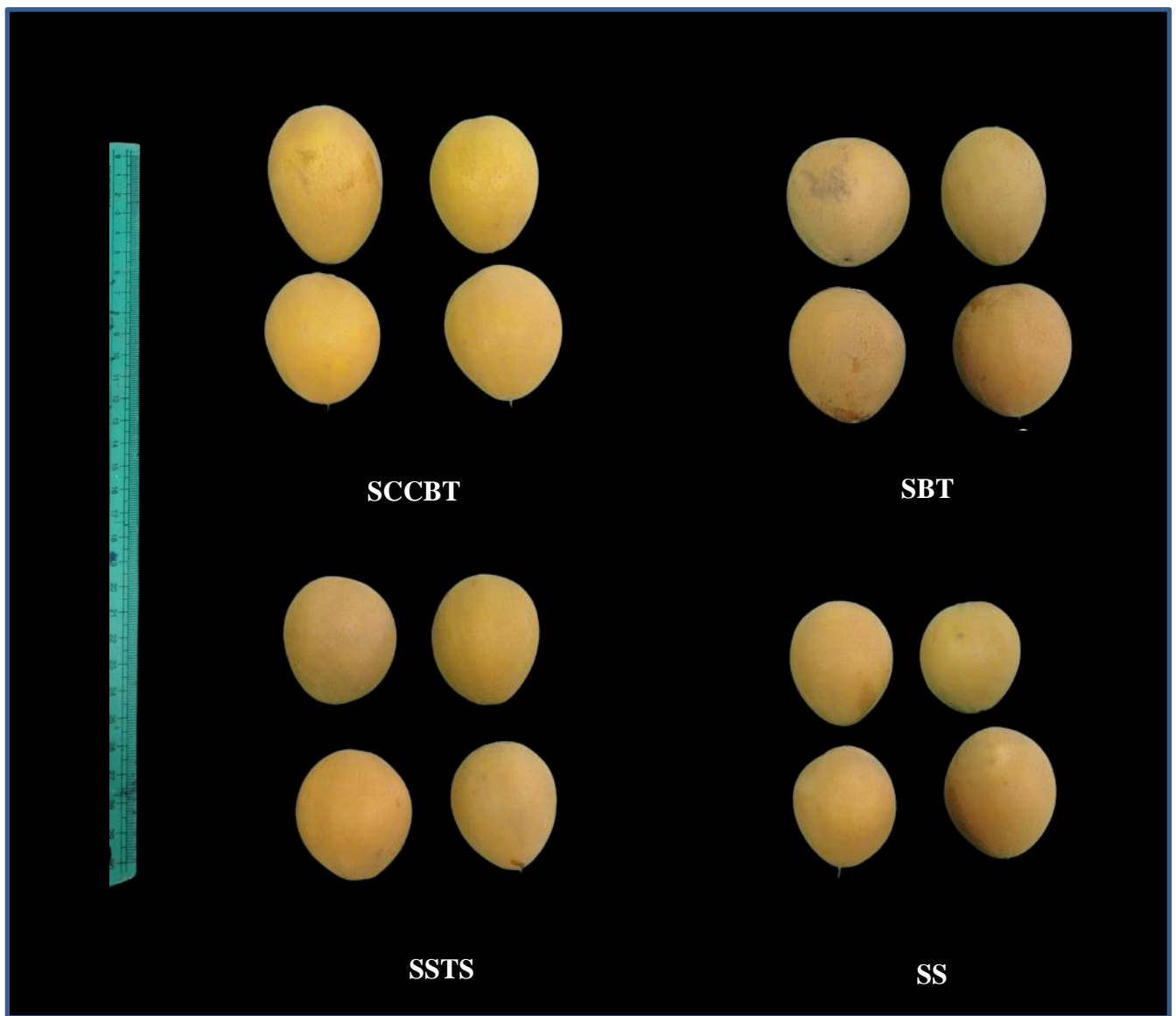
Fig. 3 Comparison of sapota fruit size influenced by SMSTs.

SCCBT = intercropping of sapota with cowpea and castor on bench terrace; SBT = sapota on bench terrace; SSTS = sapota with staggered trenches on slope; SS = sapota on slope
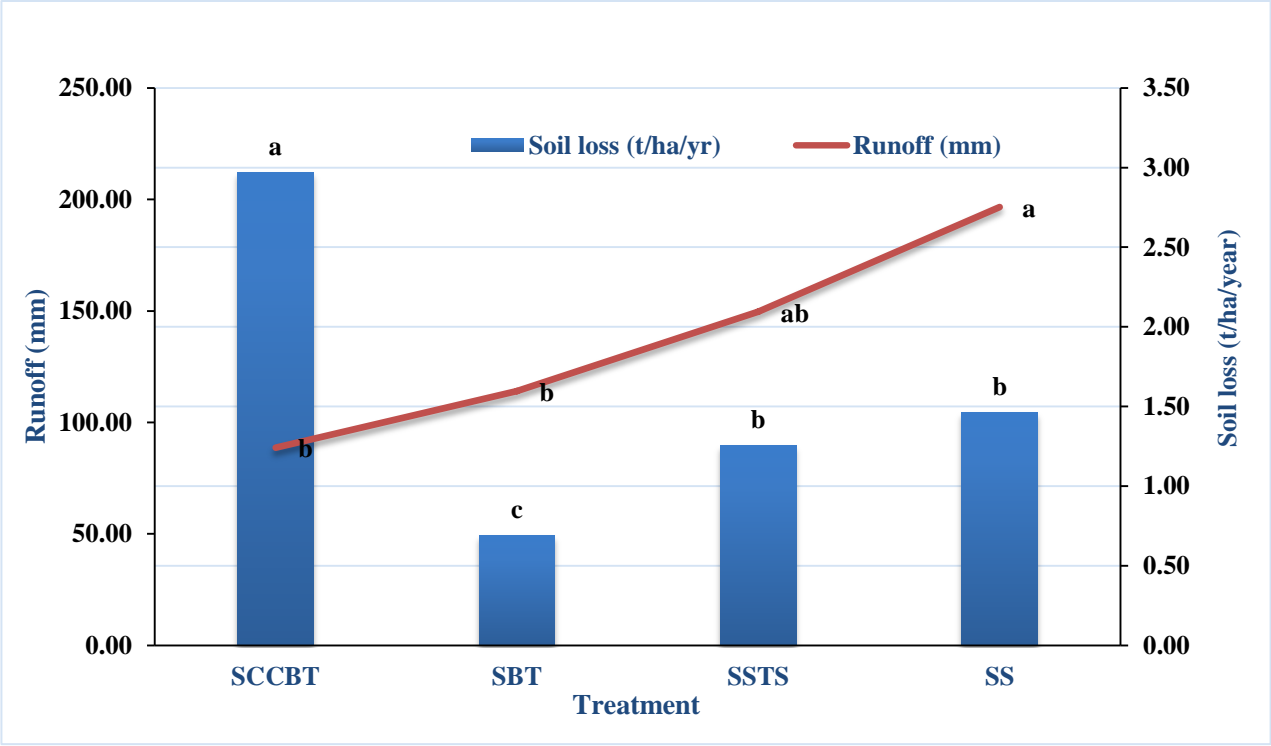
Fig. 4 Average runoff and soil loss in different SMST$_S$ under degraded ravine lands
Values followed by different letters are significantly different (P < 0.05). SCCBT = intercropping of sapota with cowpea and castor on bench terrace; SBT = sapota on bench terrace; SSTS = sapota with staggered trenches on slope; SS = sapota on slope
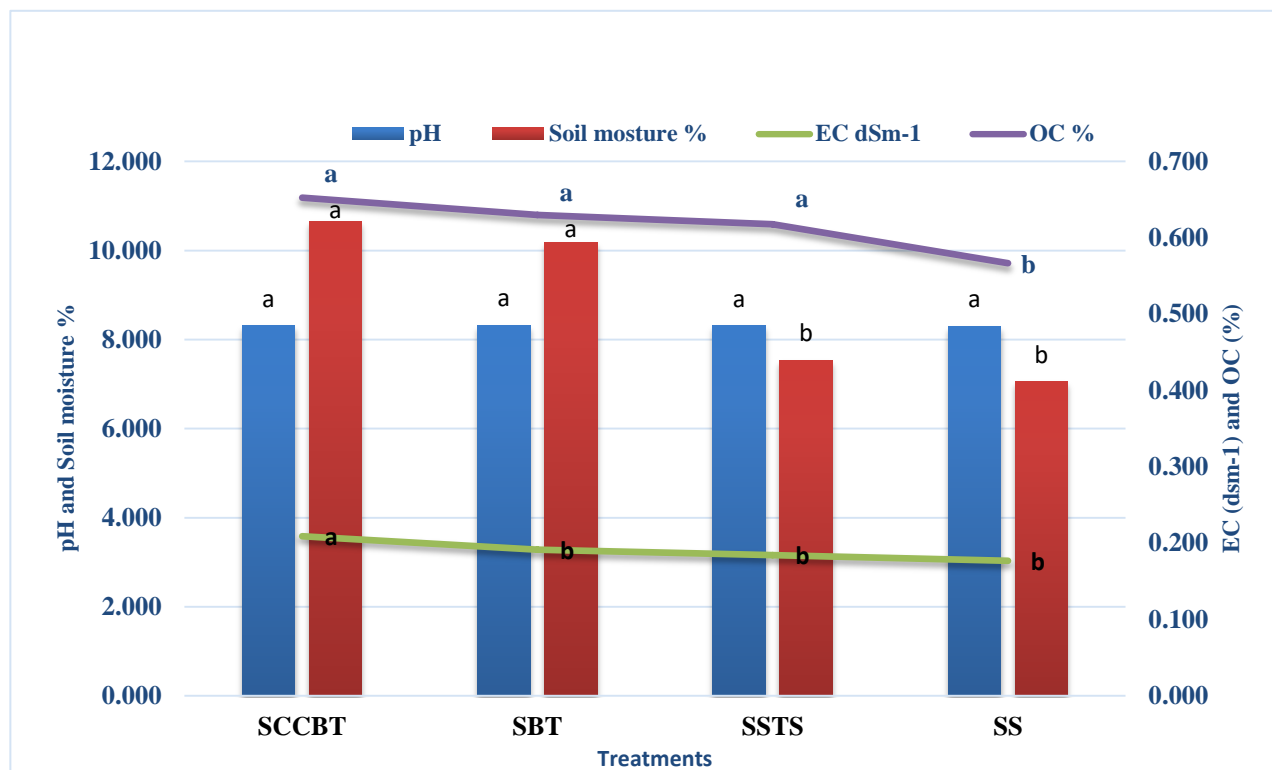
Fig. 5 Influence of SMSTs on soil properties (pH, EC, OC % and soil moisture %) in degraded ravine lands. Values followed by different letters are significantly different (P < 0.05). CCBT = intercropping of sapota with cowpea and castor on bench terrace; SBT = sapota on bench terrace; SSTS = sapota with staggered trenches on slope; SS = sapota on slope
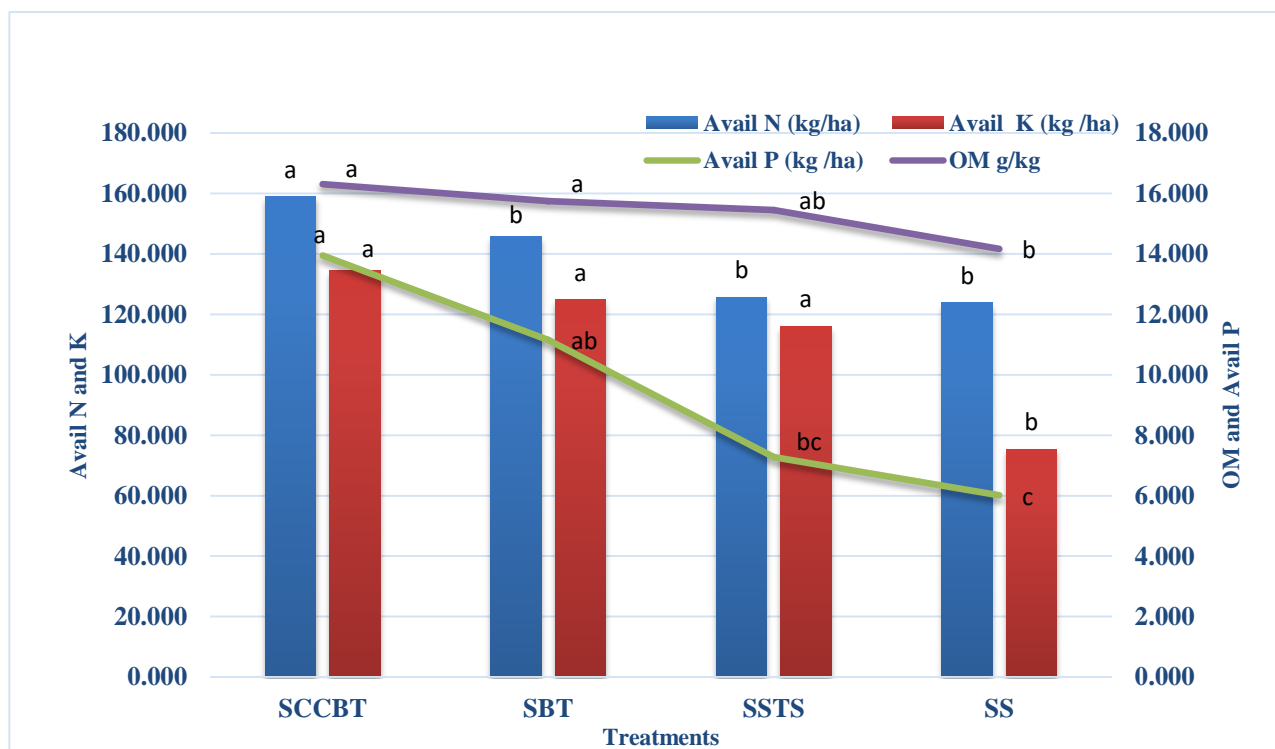

Fig. 6 Influence of SMSTs on soil properties (OM, available major nutrients) in degraded ravine lands Values followed by different letters are significantly different (P < 0.05). CCBT = intercropping of sapota with cowpea and castor on bench terrace; SBT = sapota on bench terrace; SSTS = sapota with staggered trenches on slope; SS = sapota on slope
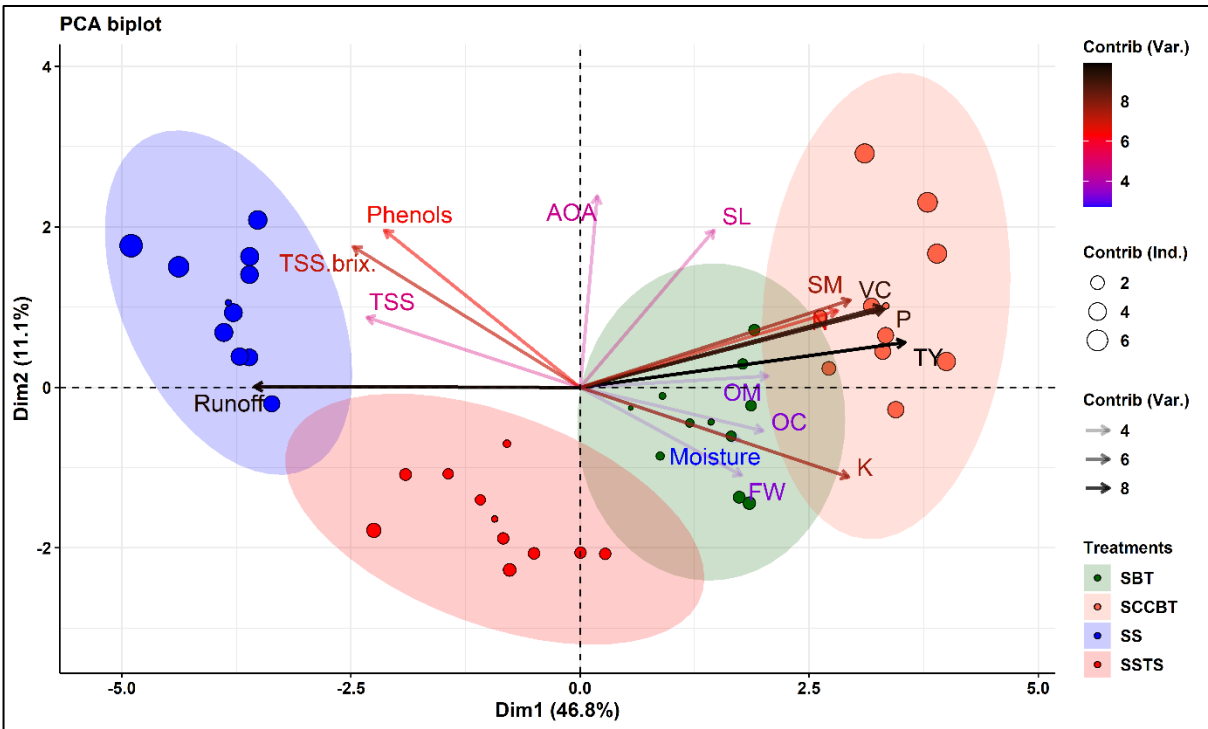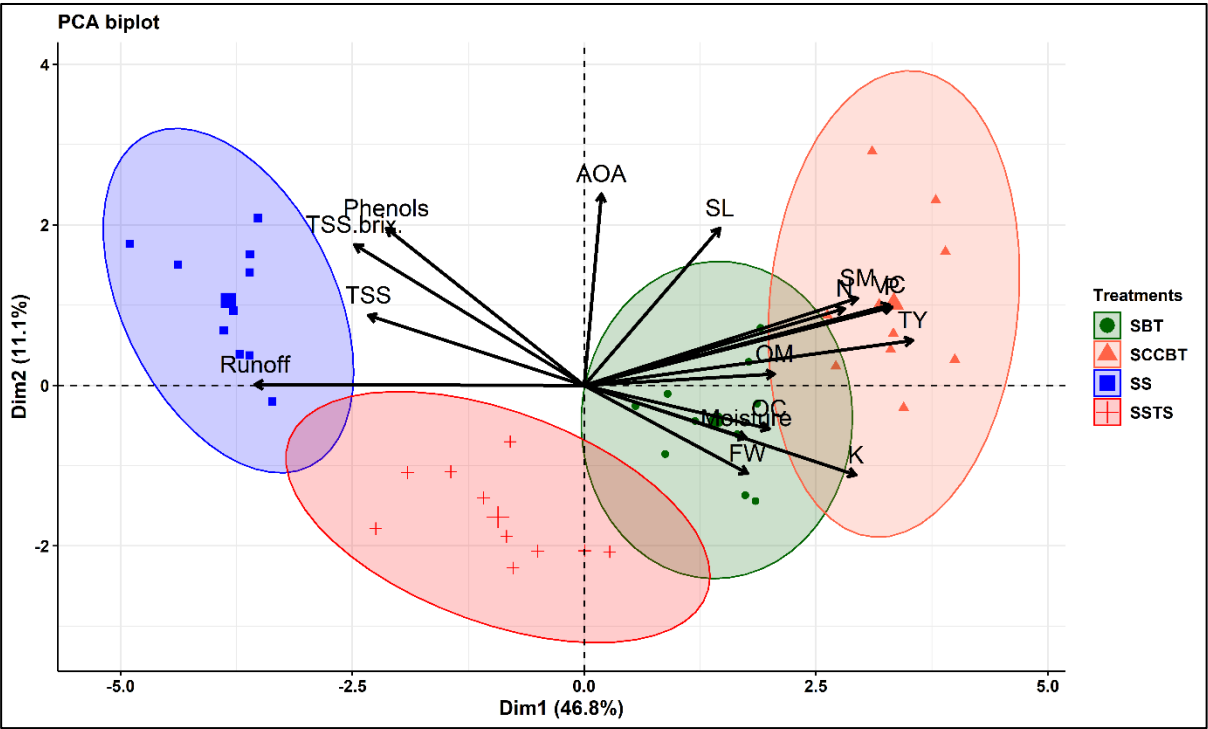
Fig. 7 Ordination diagram of principal component analysis showing the effect of soil moisture saving techniques on fruit quality, runoff, and soil loss.

The small angle between vectors (arrow) and higher length represent greater correlation between the variable; SBT = sapota on bench terrace; SCCBT = intercropping of sapota with cowpea and castor on bench terrace; SS = sapota on slope; SSTS = sapota with staggered trenches on slope
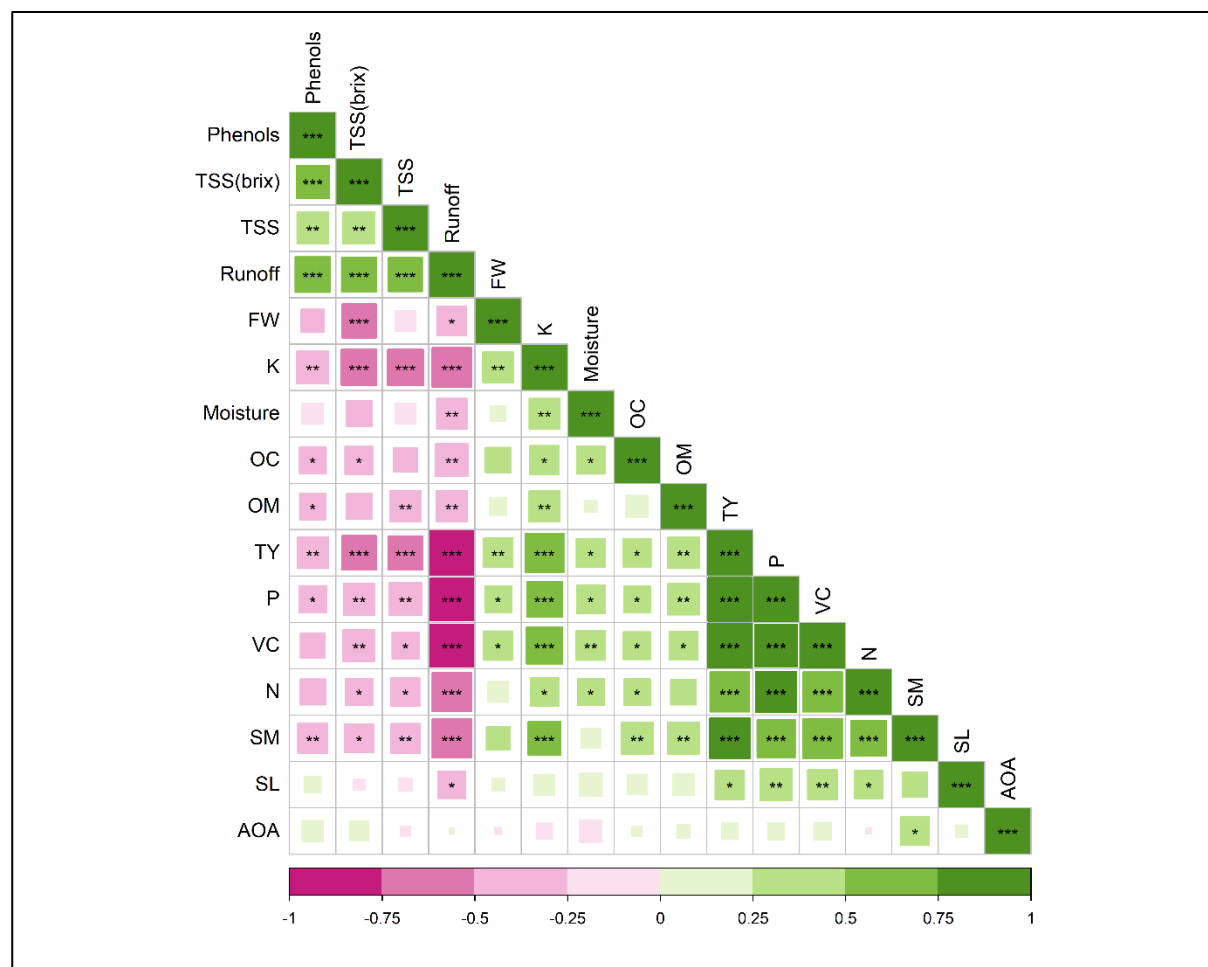
Fig. 8 Correlation matrix among different variables. the green colour corresponds to (+) positive interaction and pink colour correspond to (−) negative interaction and white correspond to neutral interaction between variables. Significance codes: * p ≤ 0.05; ** p ≤ 0.01; *** p ≤ 0.00.