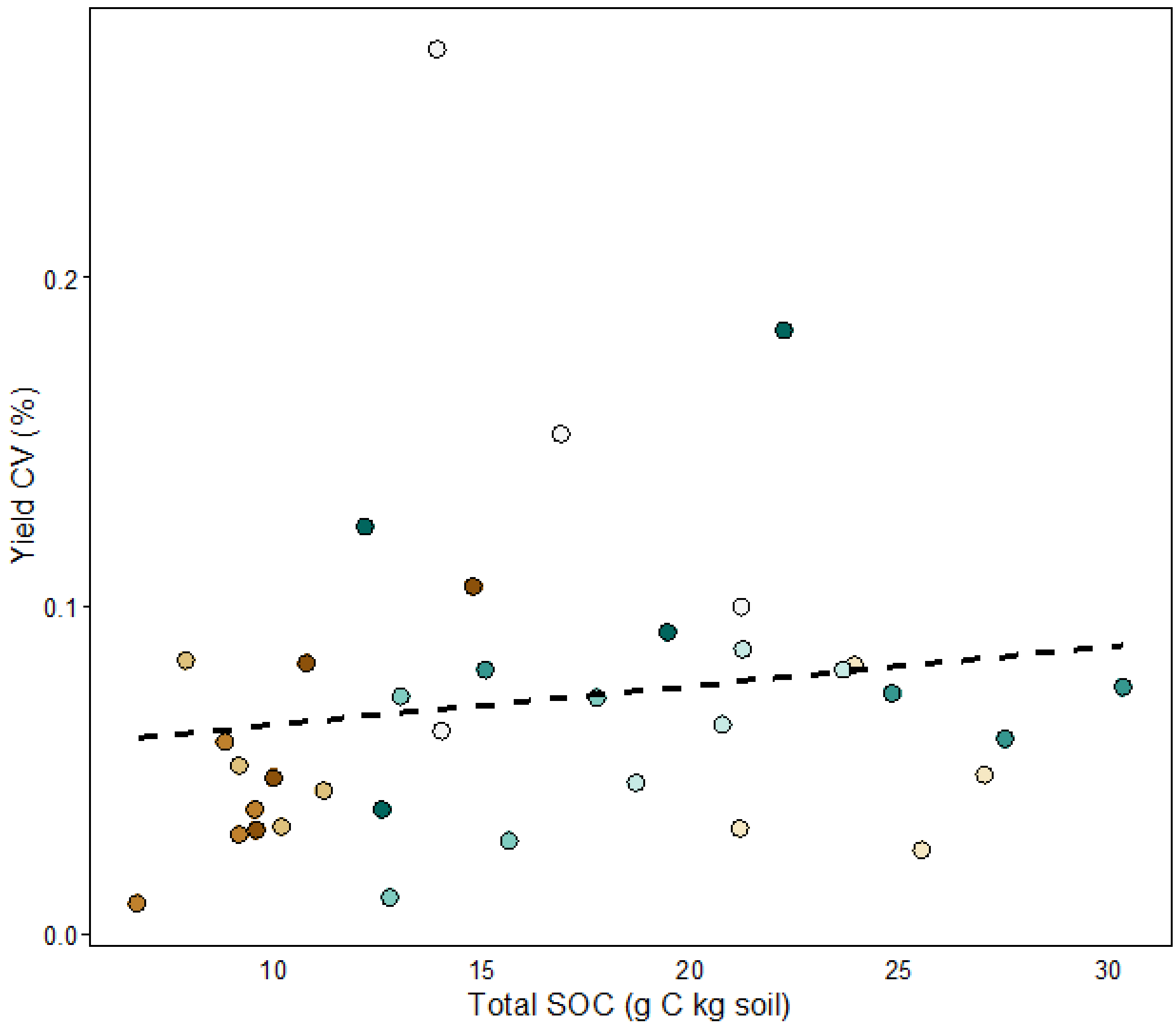
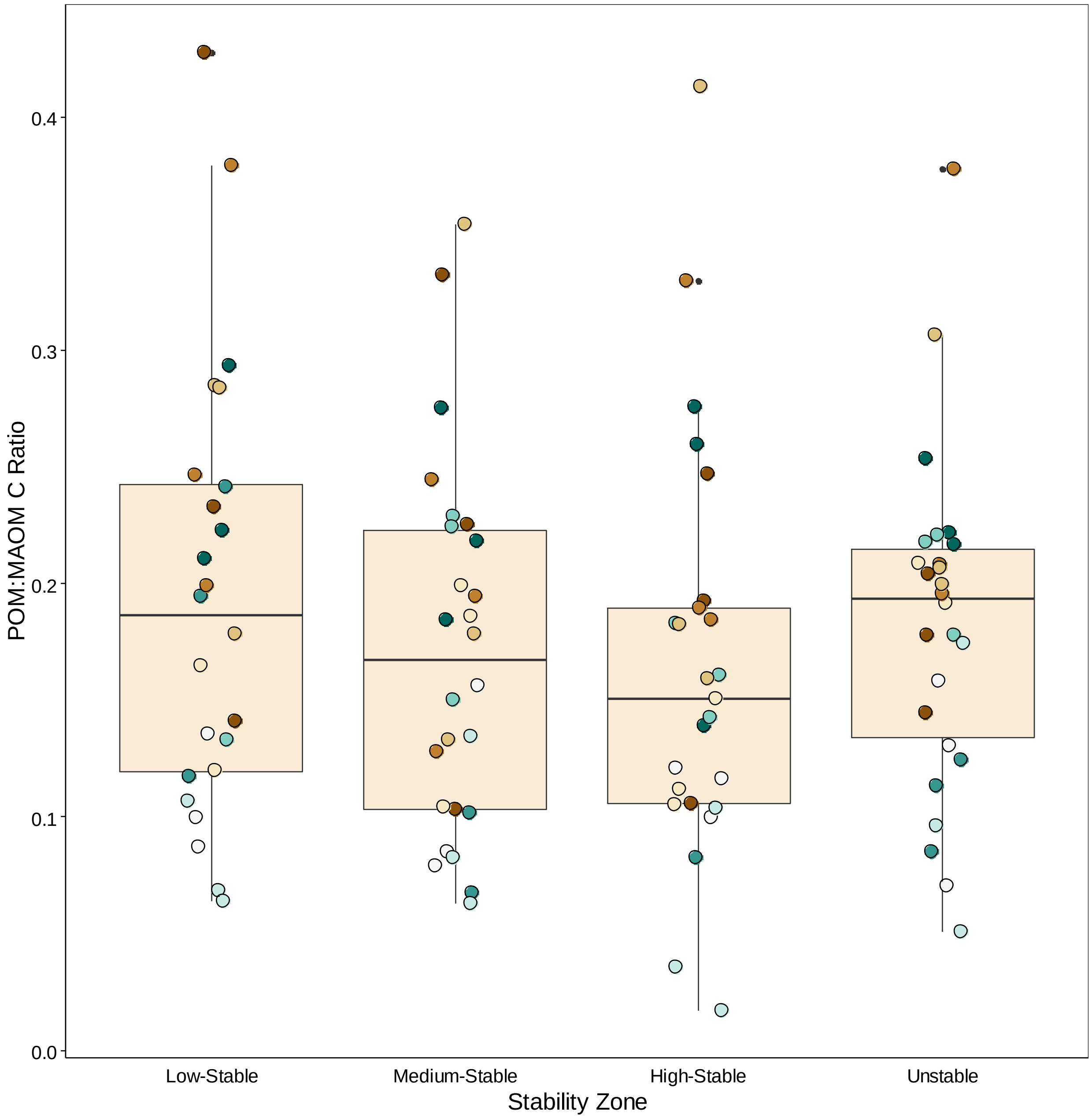
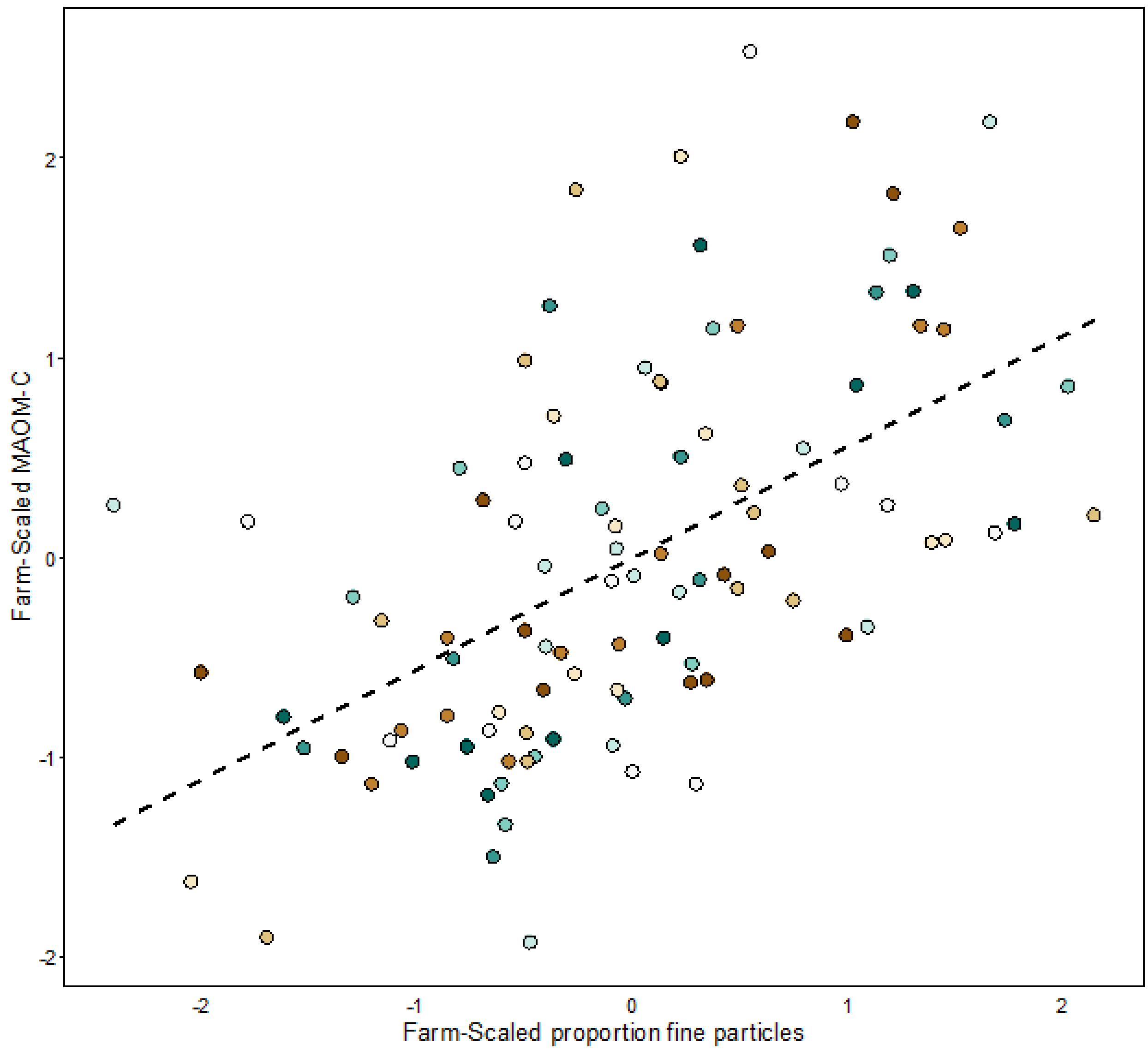


Supplemental Figure 1 – Linear regression of the coefficient of variation for crop yield at the stability zone level against total soil organic carbon (SOC) concentrations. Different colored points represent samples from different farms. Regression is marginally significant ($p = 0.096$, $r^2 = 0.02$).

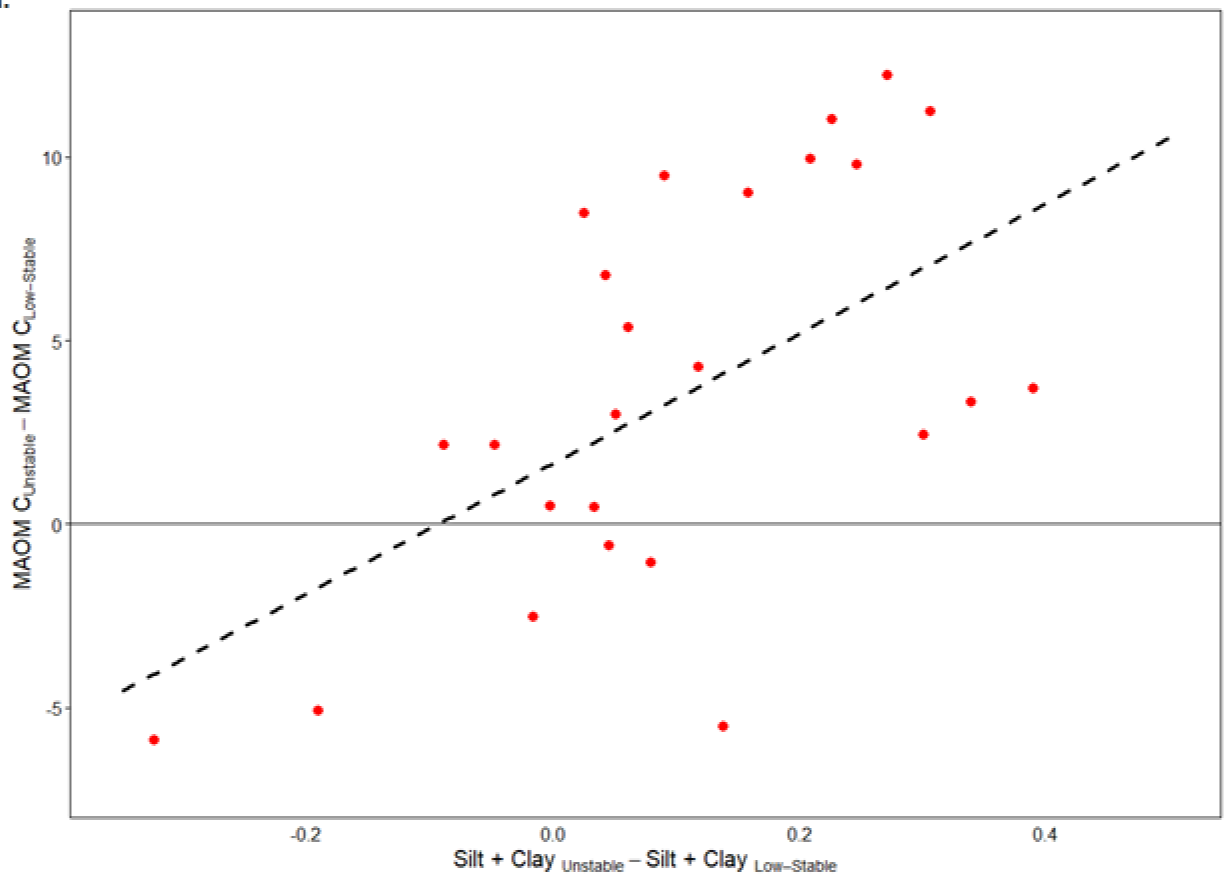


Supplemental Figure 2 – Ratio of POM-C to MAOM-C across the different stability zones. Different colored points represent different farms. Mixed linear models indicate no significant differences among stability zones ($p = 0.2778$).

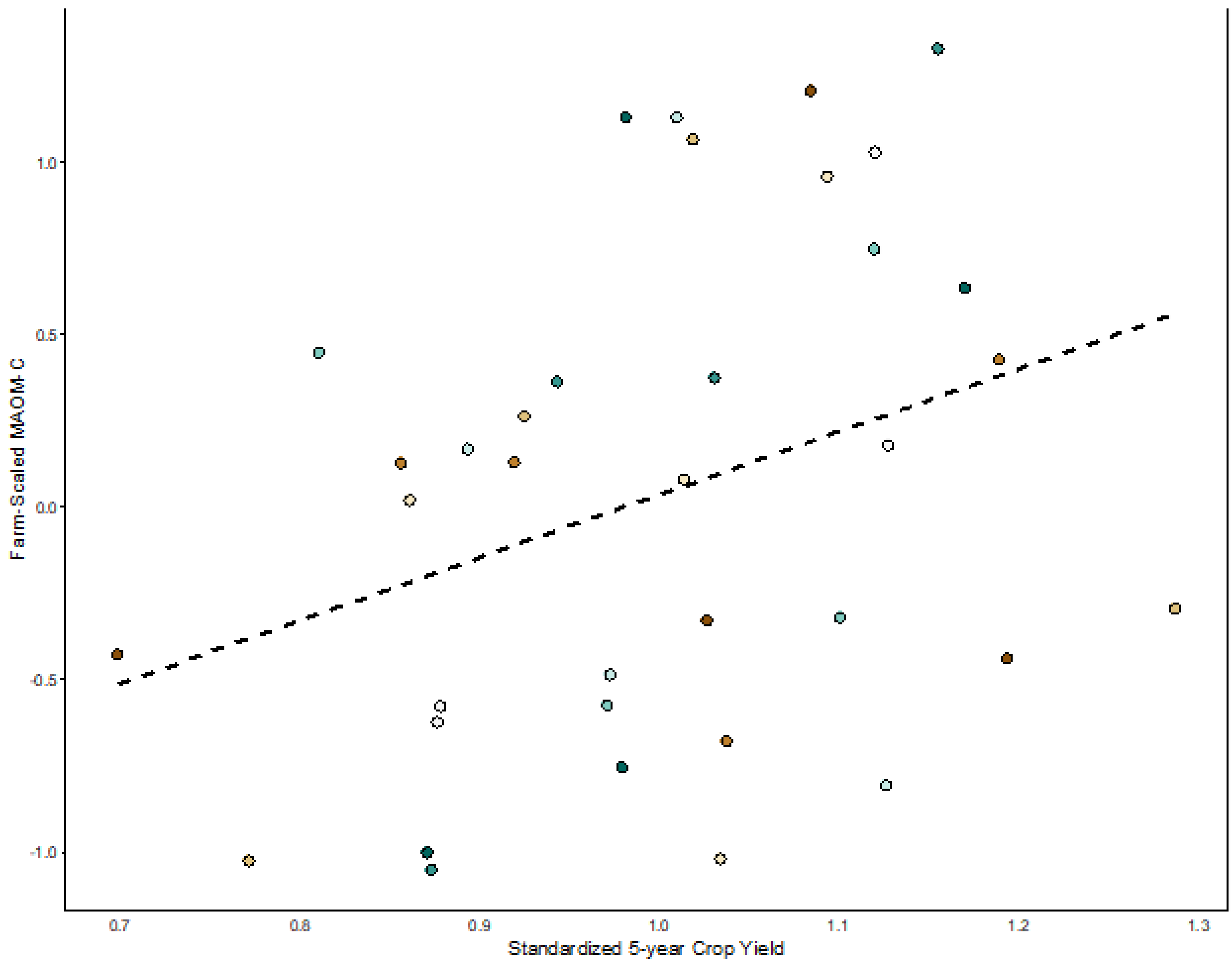


Supplemental Figure 3 – Regression between the farm-scaled (z-scored) mineral associated organic carbon (MAOM-C) content and the proportion silt and clay particles (the original data are reported in Leuthold et al., 2023). Regression is significant ($p < 0.001$, $r^2 = 0.3086$).

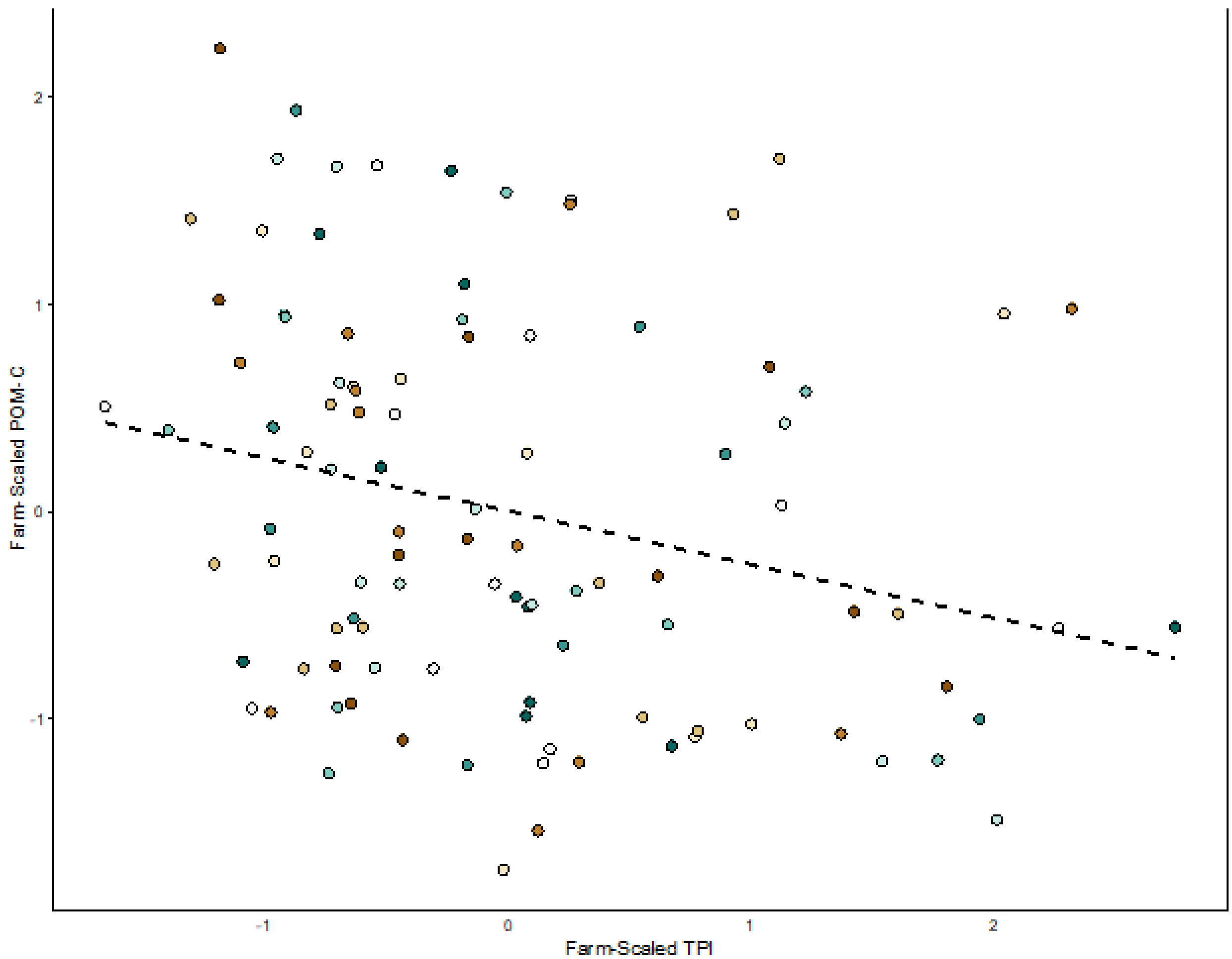
a.



Supplemental Figure 4 – Regression between the difference between the unaltered (i.e., not scaled) proportion of silt and clay particles and the difference in unaltered mineral associated organic carbon (MAOM C) between unstable and low-yielding, stable zones. Regression is signficant ($p = 0.001$, $r^2 = 0.37$).



Supplemental Figure 5 – Results of linear regression between average, standardized crop yield in each stability zone at each farm over the study period and z-scored mineral associated organic matter carbon (MAOM-C). Regression is significant ($p = 0.048$, $r^2 = 0.110$). Different colored points represent different sampled farms.



Supplemental Figure 6 – Results of linear regression the z-score of particulate organic matter carbon (POM-C) and the z-scored topographic position index (TPI). Regression is significant ($p = 0.020$, $r^2 = 0.053$). Different colored points represent samples from different farms.