Wetting and drying cycles, organic matter and gypsum play a key role in structure formation and stability of sodic Vertisols

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Supplementary data

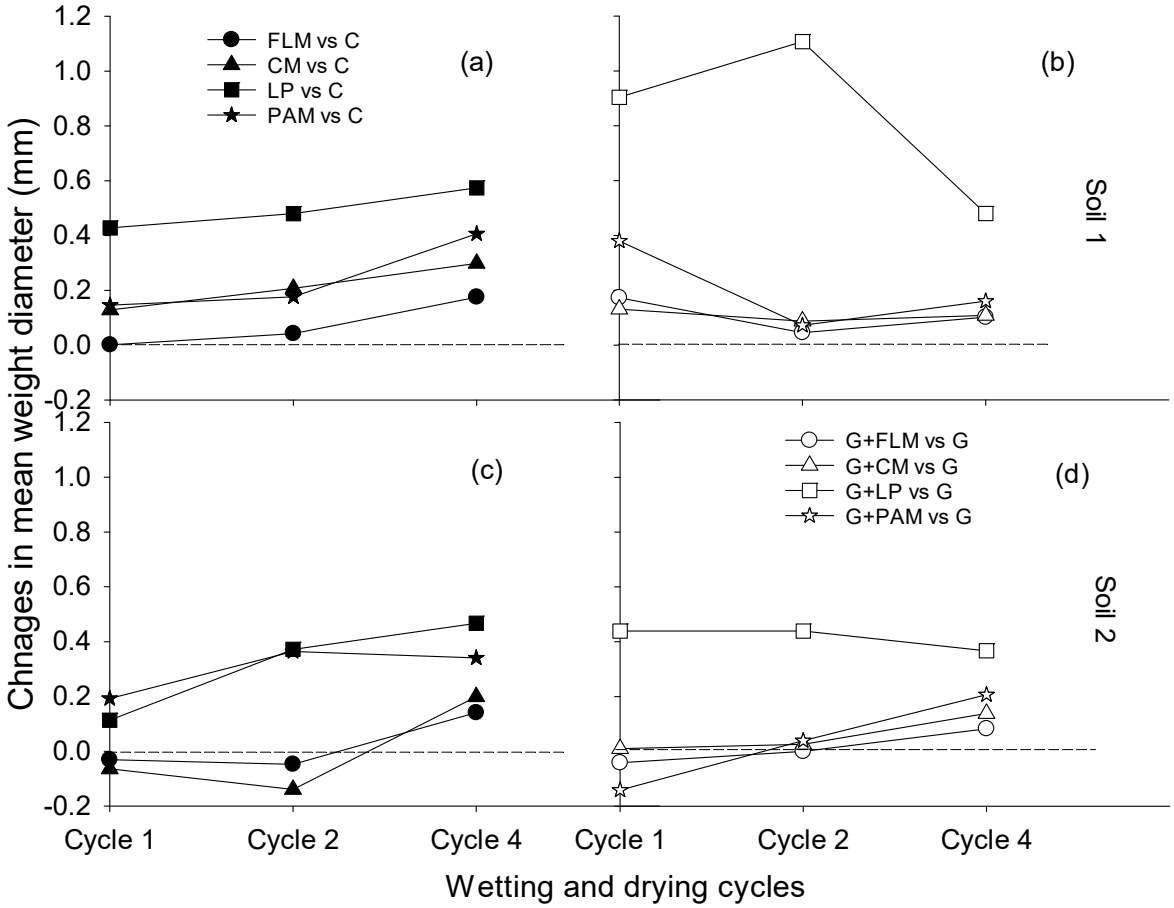

Fig. S1. Changes in mean weight diameter (MWD) of soil samples after addition of amendments during four alternate WD cycles in Soil 1 (a, b) and, Soil 2 (c, d). The treatments are C: control, G: gypsum, PAM: anionic polyacrylamide, FLM: feedlot manure, CM: chicken manure, LP: lucerne pellets. Data in graphs A and C refer to changes in MWD of Soil 1 and Soil 2 as compared to C (MWD compared to C =0), and data in graphs B and D refer to changes in MWD of Soil 1 and Soil 2 as compared to G (MWD compared to G=0).

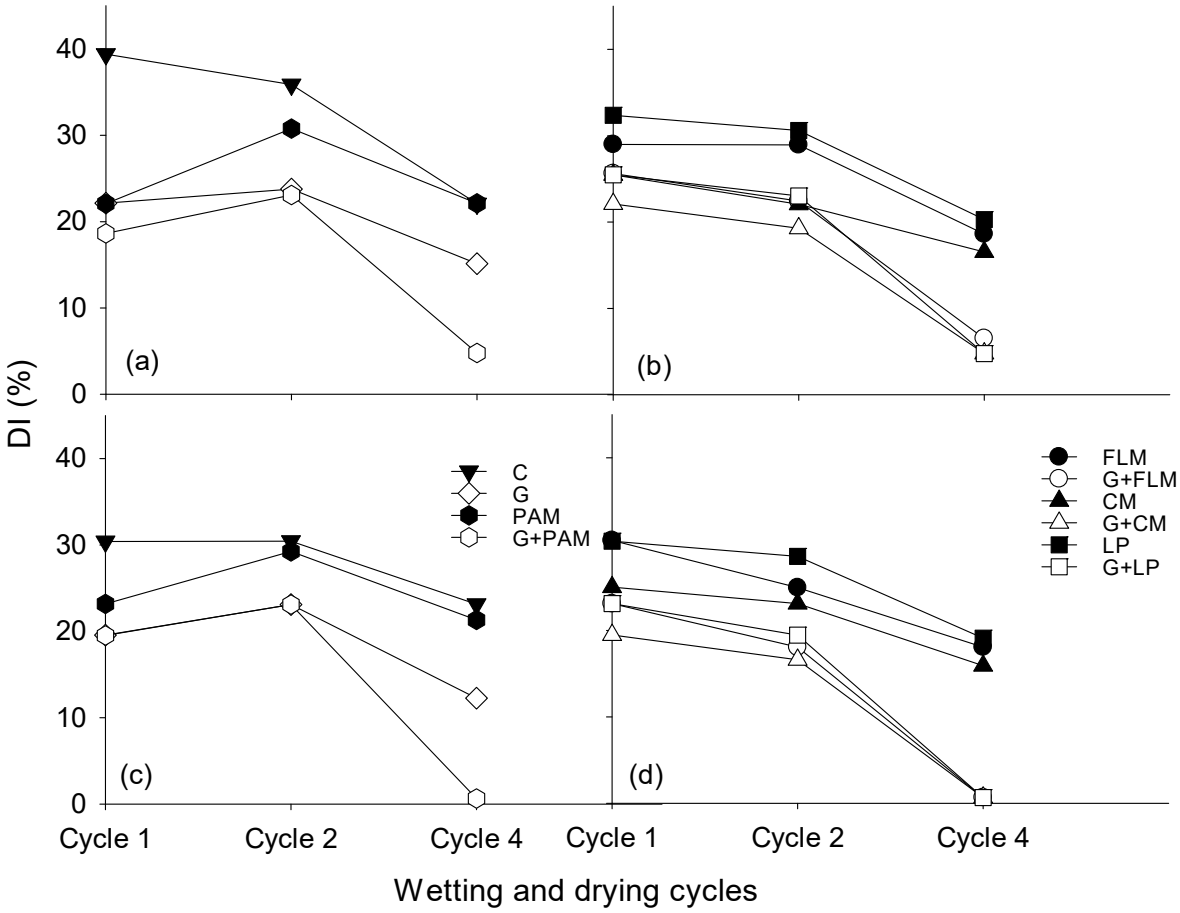

Fig. S2. Dispersion Index of soil samples after addition of amendments during four alternate WD cycles in Soil 1 (a, b) and, Soil 2 (c, d). The treatments are C: control, G: gypsum, PAM: anionic polyacrylamide, FLM: feedlot manure, CM: chicken manure, LP: lucerne pellets.

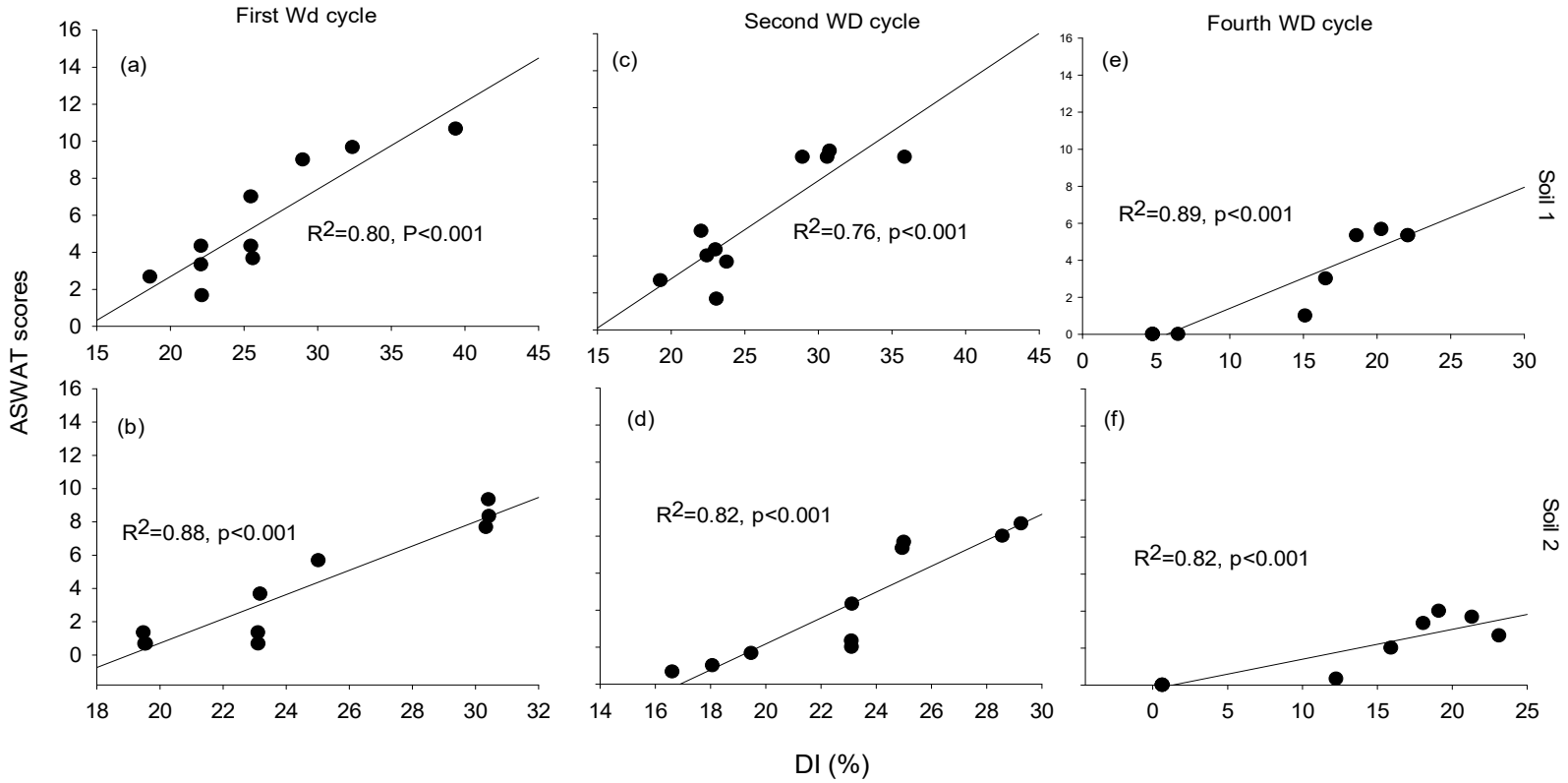

Fig. S3. Relationship of clay dispersion as measured by ASWAT with DI; Soil 1 (a, c, and e) Soil 2 (b, d, and f). Graph (a) and (b) represents the relationship between ASWAT, and DI after first wetting and drying (WD) cycle. Graph (c) and (d) represents the relationship between ASWAT and DI after second WD cycle, and graph (e) and (f) represents the relationship between ASWAT and DI after fourth WD cycle. The line on each graph is showing the linear regression line. Each point on graph represents the means of three replicates of each of ten treatments.

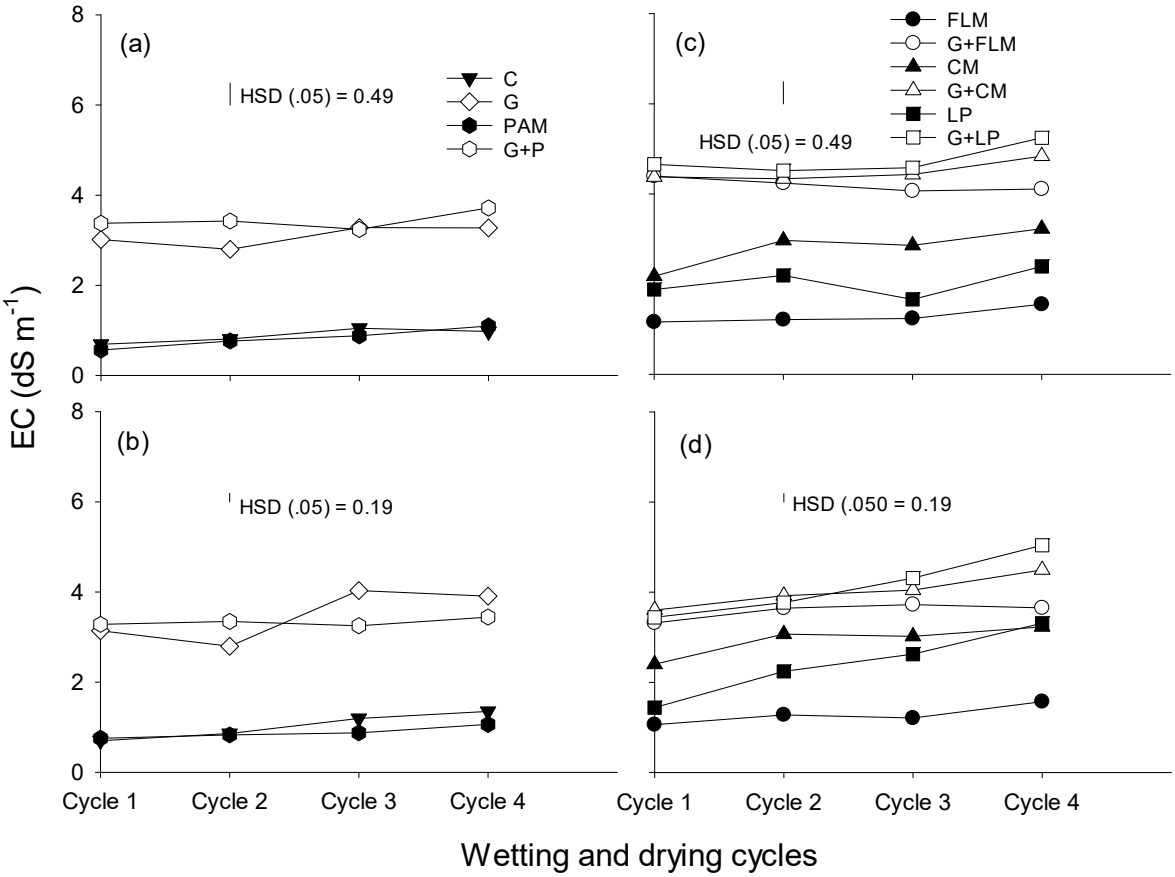

Fig. S4. The electrical conductivity (EC) of soil solutions after addition of amendments during four alternate WD cycles Soil 1 (A, C) and, Soil 2 (B, D). The treatments are C: control, G: gypsum, PAM: anionic polyacrylamide, FLM: feedlot manure, CM: chicken manure, LP: lucerne pellets. Vertical bars represent Tukey's honest significant difference (HSD) values at P=0.05 for pairwise treatment comparisons among four WD cycles

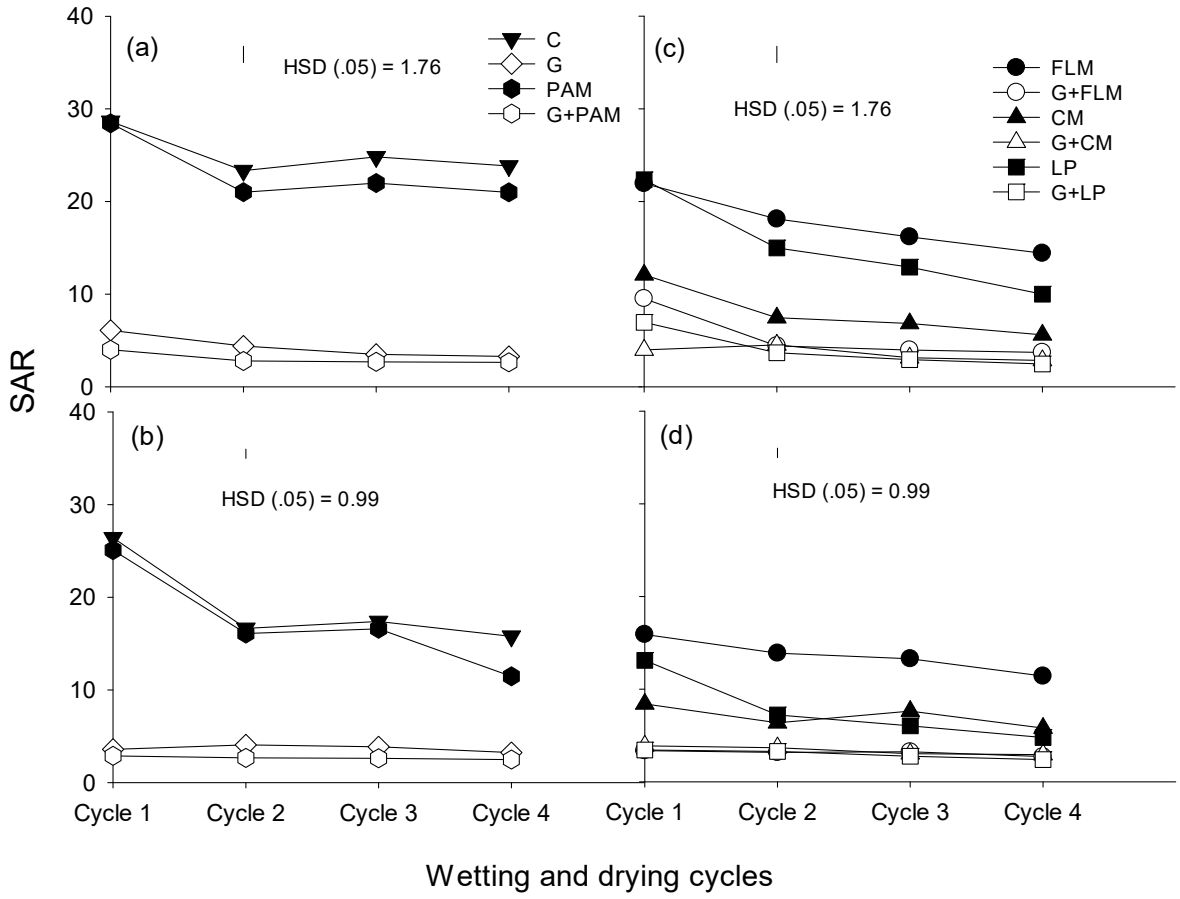

Fig. S5. The sodium adsorption ratio (SAR) of soil solutions after addition of amendments during four alternate WD cycles in Soil 1 (A, C) and, Soil 2 (B, D). The treatments are C: control, G: gypsum, PAM: anionic polyacrylamide, FLM: feedlot manure, CM: chicken manure, LP: lucerne pellets. Vertical bars represent Tukey's honest significant difference (HSD) values at P=0.05 for pairwise treatment comparisons among four WD cycles.

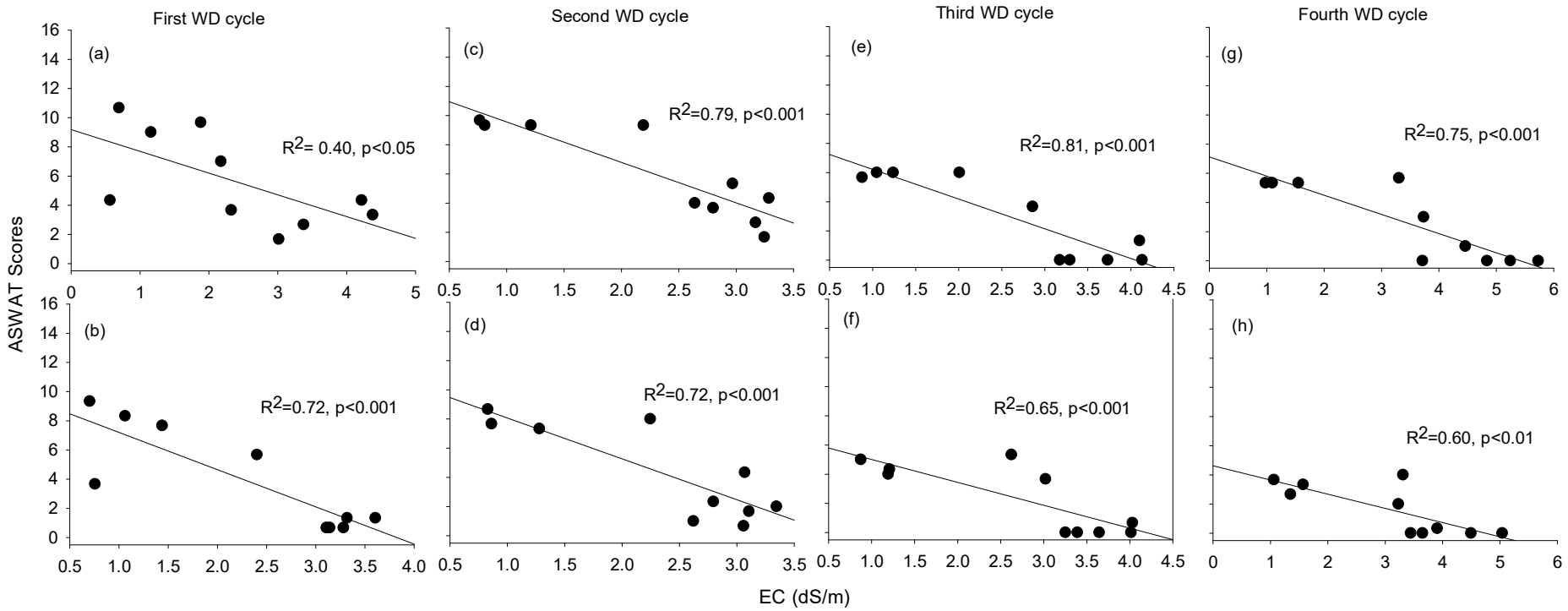

Fig. S6. Relationship of clay dispersion as measured by ASWAT with EC; Soil 1 (a, c, e, and g) Soil 2 (b, d, f, and h). Graph (a) and (b) represents the relationship between ASWAT, and EC after first wetting and drying (WD) cycle. Graph (c) and (d) represents the relationship between ASWAT and EC after second WD cycle. Graph (e) and (f) represents the relationship between ASWAT and EC after third WD cycle, and graph (g) and (h) represents the relationship between ASWAT and EC after fourth WD cycle. The line on each graph is showing the linear regression line. Each point on graph represents the means of three replicates of each of ten treatments.

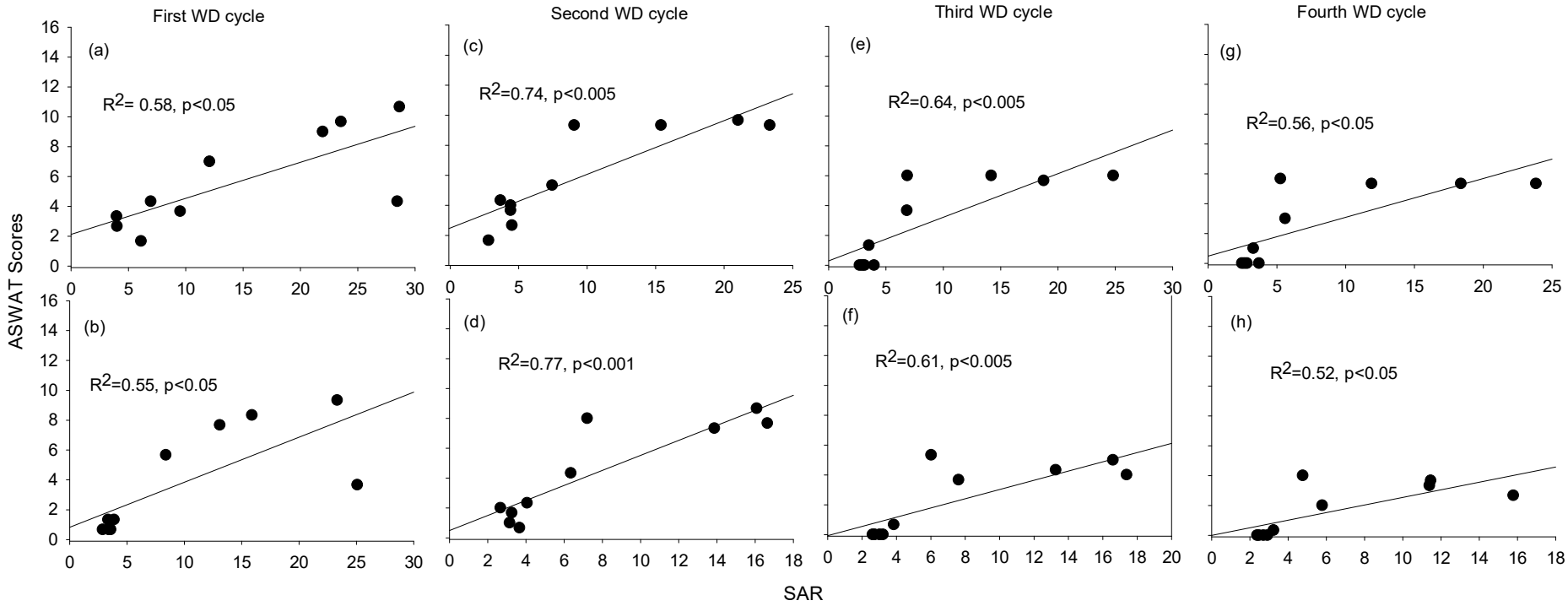

Fig. S7. Relationship of clay dispersion as measured by ASWAT with SAR; Soil 1 (a, c, e, and g) Soil 2 (b, d, f, and h). Graph (a) and (b) represents the relationship between ASWAT, and SAR after first wetting and drying (WD) cycle. Graph (c) and (d) represents the relationship between ASWAT and SAR after second WD cycle. Graph (e) and (f) represents the relationship between ASWAT and SAR after third WD cycle, and graph (g) and (h) represents the relationship between ASWAT and SAR after fourth WD cycle. The line on each graph is showing the linear regression line. Each point on graph represents the means of three replicates of each of ten treatments.

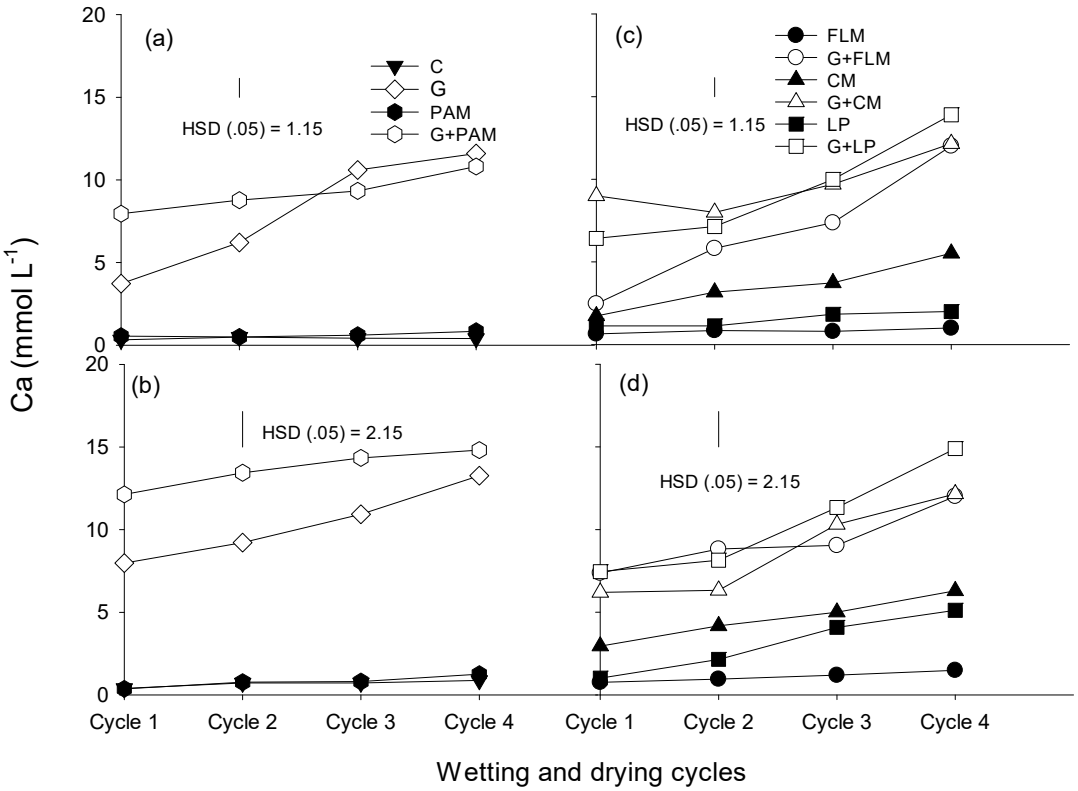

Fig. S8. The soil solutions Ca concentration after addition of amendments during four alternate WD cycles in Soil 1(a, c), and Soil 2 (b, d). The treatments are C: control, G: gypsum, PAM: anionic polyacrylamide, FLM: feedlot manure, CM: chicken manure, LP: lucerne pellets. Vertical bars represent Tukey's honest significant difference (HSD) values at P=0.05 for pairwise treatment comparisons four WD cycles.

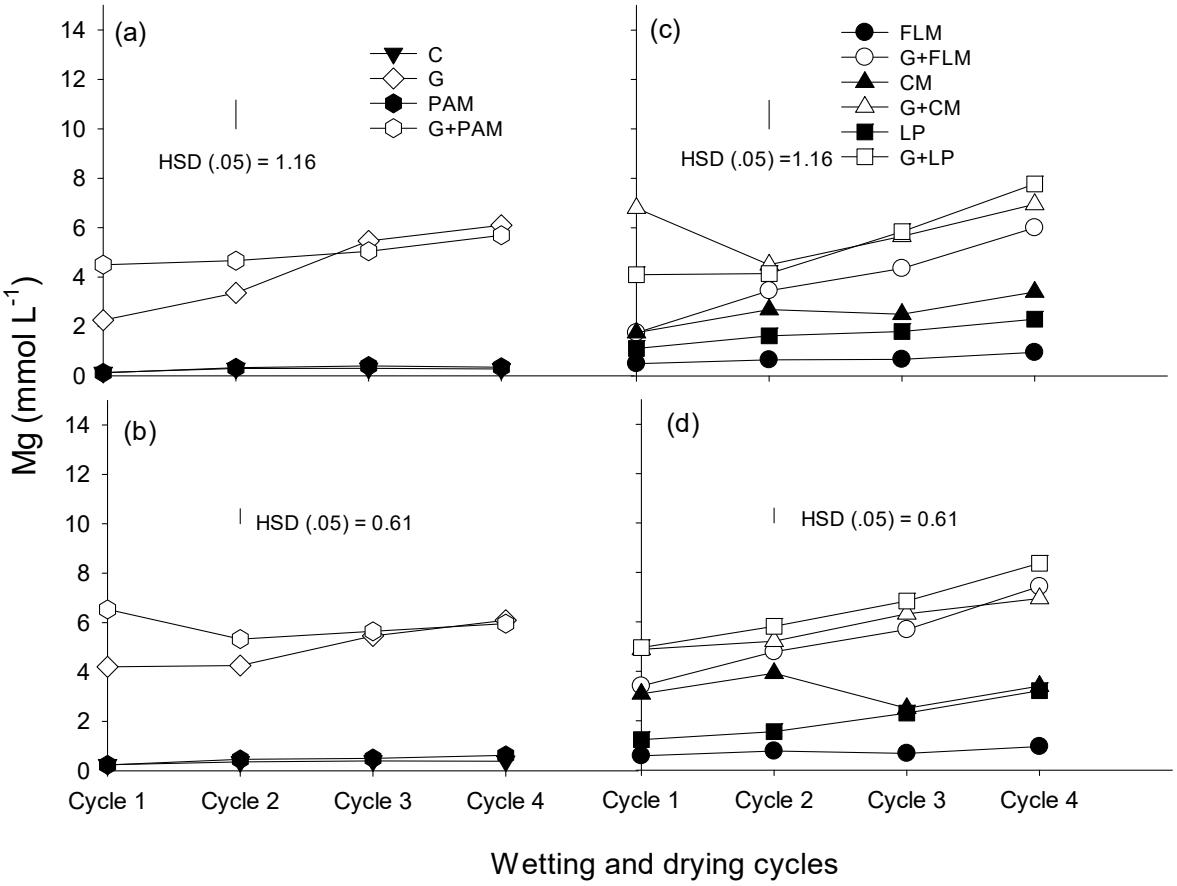

Fig. S9. The soil solutions Mg concentration after addition of amendments during four alternate WD cycles in Soil 1(a, c), and Soil 2 (b, d). The treatments are C: control, G: gypsum, PAM: anionic polyacrylamide, FLM: feedlot manure, CM: chicken manure, LP: lucerne pellets. Vertical bars represent Tukey's honest significant difference (HSD) values at P=0.05 for pairwise treatment comparisons among four WD cycles.

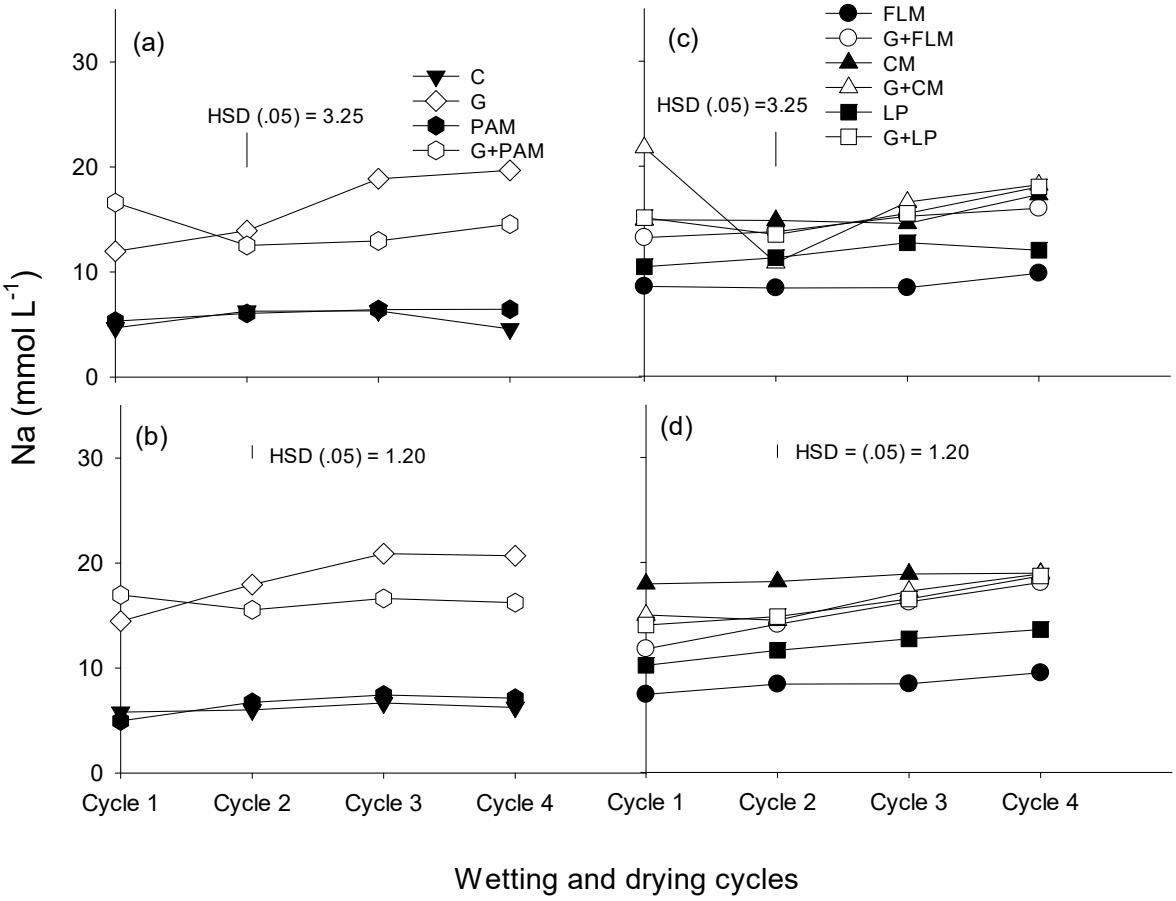

Fig. S10. The soil solutions Na concentration after addition of amendments during four alternate WD cycles in Soil 1(a, c), and Soil 2 (b, d). The treatments are C: control, G: gypsum, PAM: anionic polyacrylamide, FLM: feedlot manure, CM: chicken manure, LP: lucerne pellets. Vertical bars represent Tukey's honest significant difference (HSD) values at P=0.05 for pairwise treatment comparisons among four WD cycles.

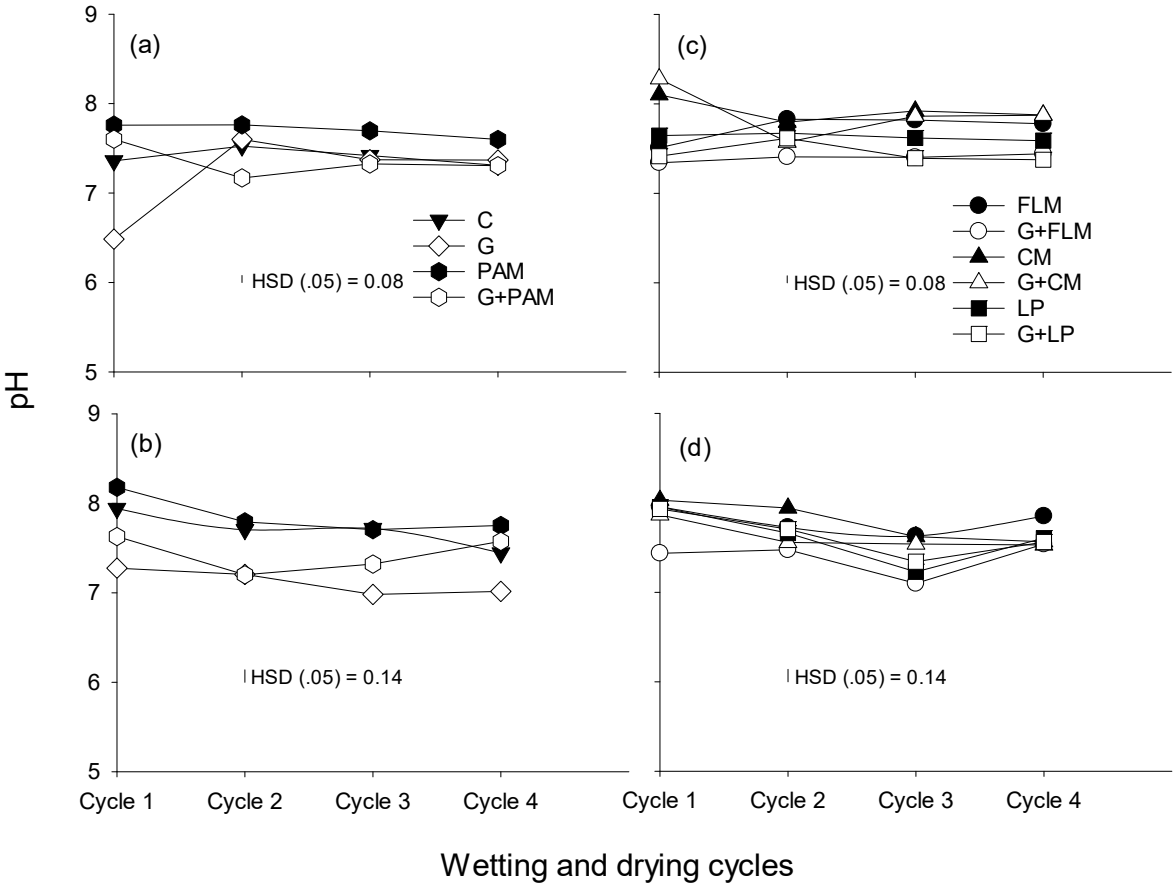

Fig. S11. The soil solutions Ca concentration after addition of amendments during four alternate WD cycles in Soil 1(a, c), and Soil 2 (b, d). The treatments are C: control, G: gypsum, PAM: anionic polyacrylamide, FLM: feedlot manure, CM: chicken manure, LP: lucerne pellets. Vertical bars represent Tukey's honest significant difference (HSD) values at P=0.05 for pairwise treatment comparisons among four WD cycles.

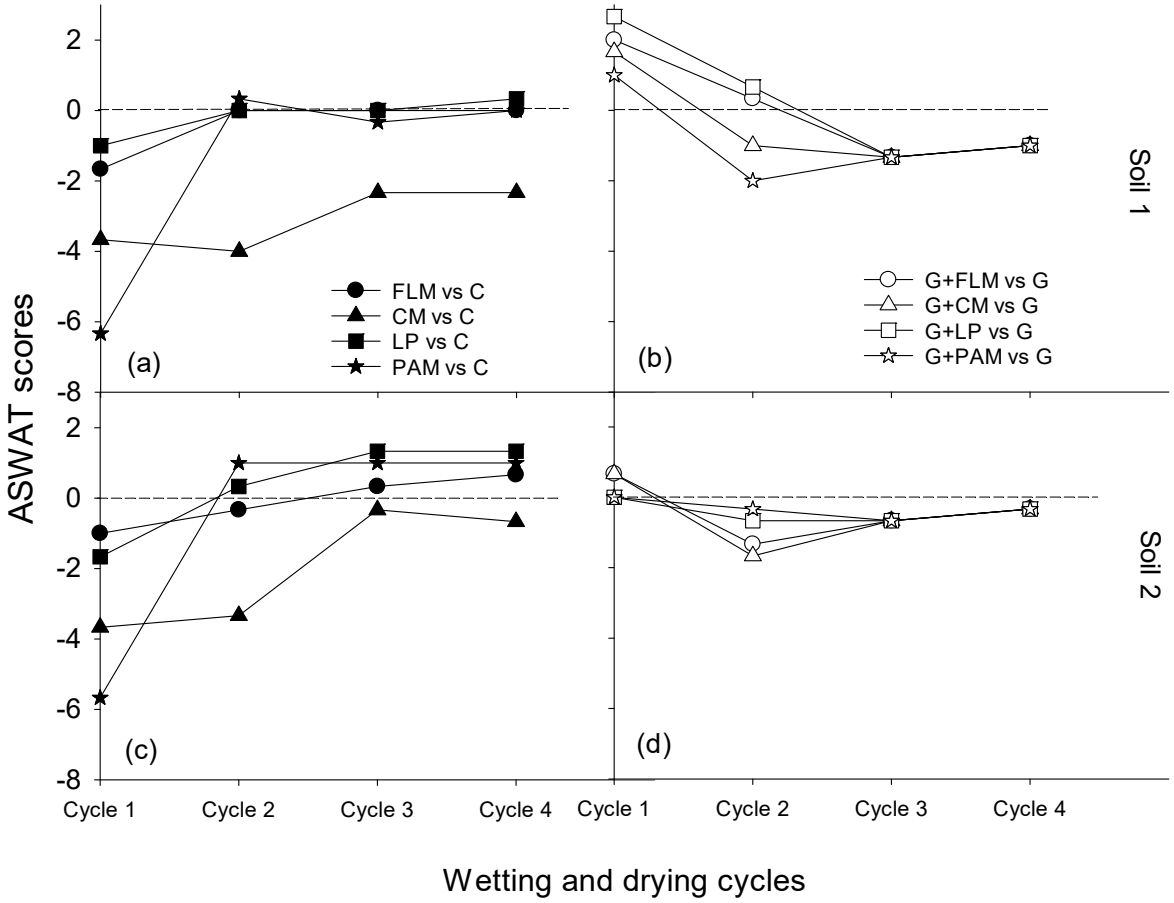

Fig. S12. Changes in ASWAT scores of soil samples after addition of amendments during four alternate WD cycles Soil 1 (a, b) and, Soil 2 (c, d). The treatments are C: control, G: gypsum, PAM: anionic polyacrylamide, FLM: feedlot manure, CM: chicken manure, LP: lucerne pellets. Data in graphs A and C refer to changes in ASWAT scores of Soil 1 and Soil 2 as compared to C (ASWAT score compared to C =0), and data in graphs B and D refer to changes in ASWAT score of Soil 1 and Soil 2 as compared to G (ASWAT score compared to G=0).