Table 1. Summary of hypothesized effects of seaweed amendment on soil physical, biological, and chemical quality parameters. Relationships between soil parameters and soil productivity were determined based on information from the Cornell Soil Health Assessment Guide (Gugino *et al.*, 2009) and the USDA ARS Soil Quality Assessment Manual (1999).

Soil Quality Parameter	Hypothesized effect of seaweed amendment	Relationship to soil productivity
PHYSICAL		
Aggregate stability	Increased stability as a result of higher organic matter inputs and fungal biomass	High aggregate stability improves water infiltration and air exchange by decreasing the formation of surface crusts
AWC	Increased AWC by addition of seaweed moisture-retaining compounds and increased soil organic matter (SOM)	Represents the capacity of soil to store water between rainfall events, especially important during drought periods
Infiltration	Greater infiltration from increased aggregate formation and stability	Limited infiltration can cause long periods of surface saturation, resulting in limited plant nutrient availability and oxygen availability to roots, and increased susceptibility to erosion
Bulk density	Lower bulk density resulting from higher SOM, aggregate formation and stability	High bulk density can limit root growth, and associated plant nutrient and water uptake
BIOLOGICAL		
SOM	Increased SOM due to addition of seaweed biomass	Provides nutrients and energy to plants and soil microbial communities
Active C	Increased active carbon due to promotion of microbial activity	Indicates readily available carbon and energy source for the soil microbial community
Soil respiration	Increased respiration due to increased microbial activity	Soil microorganisms decompose organic materials, regulate nutrient cycling, and influence other soil properties such as aeration and composition of soil atmosphere
PMN	Increased N mineralization due to promotion of microbial activity	Indicates capacity of soil microbial community to transform organic nitrogen into plant-available forms
Earthworm abundance	Decreased earthworm abundance due to toxic effects	Through their feeding, burrowing and casting

	of seaweed (e.g. high levels of osmolytes, sulfur)	activities, earthworms improve aggregation, soil drainage, aeration, and soil nutrient availability
CHEMICAL		
Sulfur/sulfate	Increased sulfur/sulfate due to high levels in seaweed	S oxidation may reduce pH, but S can also be a plant nutrient
pH	Reduction in pH as a combination of S oxidation, nitrification, and C mineralization processes	Soil solution pH affects availability of plant nutrients
Primary nutrients (N, P, K)	Increased primary and secondary nutrients (released during decomposition from nutrient-rich seaweed biomass)	Levels and timing of plant nutrients are essential for plant growth and grain production processes
Other nutrient elements (Ca, Fe, Mo, Al, Mn, Zn, Cu)	Increased nutrient elements (released during decomposition from nutrient-rich seaweed biomass)	For trace elements small quantities are required, and excessive amounts may have toxic effects.
Heavy metals (Pb, Hg, Ni, Cd, Cr, As)	Increased heavy metals in soil, due to possible high levels in seaweed material	High levels of heavy metals may accumulate in soil, which can increase levels in crops and be toxic to soil microflora and fauna
Salinity (electrical conductivity)	Increased salinity due to residual salt content	High levels of salts (esp. sodium) in soil can limit plant growth