From Soil to Sky: Unravelling the Nutrient Cycle

Defining the Ecological Processes

What Are the Four Ecological Processes?

The four ecological processes are crucial in understanding the systemic and holistic approach that regenerative organic agriculture takes. The ecological processes are not divisible; they always interact and are inseparable. When one of the processes is failing, they are all failing. That is why it is important to ensure the processes are fulfilled on your farm so that your crop yield and soil health are augmented. We obtain energy through the food that we eat, and crops are the primary source of nutrition. However, studies show that our food is hugely lacking in nutrients today, and this indicates that the soil is not functioning as it used to.

What Are Nutrients?

The nutrient cycle is all about the transfer of nutrients between living organisms and nonliving materials. There are two types of nutrients. Non-mineral nutrients are found in air and water, and these are hydrogen, oxygen, and carbon. Mineral nutrients can be found in the soil as macro- (nitrogen, phosphorus, potassium, calcium, magnesium, sulfur) and micro- (boron, copper, iron, manganese, chlorine, zinc, molybdenum) nutrients. These are the elements that plants absorb through their roots. All nutrients that are essential for plant metabolism come from mineral rocks, rainfall, and the atmosphere.

How Do Nutrients Cycle?

The atmosphere contains nitrogen, oxygen, hydrogen, and carbon in the form of gas and water - these are deposited into the soil through rain and wind. Dead and decaying plants and animals degrade into the soil, releasing carbon and other nutrients. Rocks in the environment and bedrock break down and deposit calcium and other minerals into the soil. Livestock contribute to nutrient cycling via manure, urine, and trampling plant materials. Plants take up nutrients with the help of microbes, and they release oxygen back into the atmosphere through photosynthesis.

Optimal Nutrient Cycling

Optimal nutrient cycling depends on plant diversity and soil cover. Plant diversity contributes to nutrient cycling by having roots of different lengths penetrate deeper soil, thereby allowing microbes to descend deeper and aggregate soil better. Different plants also interact and exchange with different microbes that accumulate unique minerals. Soil cover promotes nutrient cycling by protecting the soil from erosion, degradation, and nutrient leaching. If the soil is not covered, it is susceptible to run off, where the soil is eroded and crucial nutrients are stripped out of the ground.

How Does Livestock Cycle Nutrients?

Livestock are key players in cycling nutrients in the environment. They walk through the fields, trampling and crushing plant matter as they go. They tug up on plants, which stimulates massive releases of sugars into the soil so that microbes exchange nutrients for sugar. Livestock, specifically ruminants, chew up plant material, and the carbon matter sits in their rumen which breaks apart cell walls made of cellulose. The rumen continues to degrade the plant material until the animals regurgitate and deposit it back into the field. Livestock defecate and urinate, returning the consumed minerals back into the soil.

Conclusion

Nutrients are all around us, being utilized by every organism. If the nutrient cycle is failing in one area, then it affects all aspects of the cycle, and all living things are impacted. Knowing the principles and mechanics of the nutrient cycle is important in preserving its integrity, and using this knowledge will improve the health of your soil and inevitably, increase your crop yield.