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Salinity Impact on Plant Growth and Management

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SUMMARY

Salinity is the concentration of salt in land and water to a degree that influences the built environment and the natural environment. Salinity is indeed a measure of how salty or how much dissolved salt is present in a water body. Today farms, irrigation zones, wetlands, rivers, drinking water, and infrastructure are all affected by the expansion of salinity. Changes in the environment's natural salinity can have an impact on both the plants that grow naturally and the ones we plant, often negatively, especially for more delicate species. In this, we learned about salinity and how it affects plant growth.

INTRODUCTION

The soil's top layer, which was covered in white salt efflorescence, was referred to as "saline" which means salty. This might be Nacl, NaHCO3, or Na2CO3, which geologists referred to as "Reh" in the middle of the nineteenth century. According to estimates by Hassani et al. (2021) more than 100 countries are thought to be affected by salinization and alkalization, which has become one of the greatest environmental and socio-economic problems in the world (Zahra et al., 2021). Arable land salinity is a growing issue in many irrigated, arid, and semi- arid regions of the world where rainfall is insufficient to remove salts from the root zone. It also has a key role in crop productivity. According to FAO (1997), the most used definition of a saline soil is one with an electrical conductivity of the saturation extract (EC) of 4 dSm-1 or greater; soils with EC's above 15 dSm-1 are classified as strongly saline. Na+, Ca2+, and Mg2+ are the most frequent cations connected to salinity, whereas Cl-, SO42-, and HCO3- are the most prevalent anions. However, Na+ and Cl- ions are thought to be the most significant since Na+ damages the soil's physical structure and both Na+ and Cl- are poisonous to plants. The concept of salinity in rivers, lakes and the ocean are straightforward, but it is difficult to define and measure properly on a scientific level. The number of dissolved salts in the water is conceptually what determines its saltiness. Seawater becomes salty due to a variety of substances. Rivers that carry chemicals that have been dissolved out of rock and soil are where most of them arrive. Salt, also known as sodium chloride, is the most important one. Minerals from across the Earth's surface have been dissolved into the ocean's water, creating a soup-like mixture. The whole volume of the oceans on Earth is made up of these minerals to a degree of 3.5%. The kinds of creatures that exist in a body of water are influenced by salinity, an ecological aspect that is of great significance.

Soil Salinity

The salt content of the soil determines its salinity, and the process of raising the salt content is known as salinization. In comparison to healthy soils, saline soils will have a disproportionately high concentration of salt ions. Excessive salt attracts water and prevents itfrom being absorbed by plant roots, in addition to destroying the structure of the soil. Becauseof this, plants may show signs of drought even in damp or soggy soil. Water that pools on the surface but doesn't penetrate could be another symptom of salt damage. When the water table is two to three metres below the soil's surface in drylands, salinity can develop. By means of capillary action, the salts from the groundwater are brought to the soil's surface. Natural geological, hydrological and pedological processes are responsible for the development of mostsaline-sodic soils. Intermediate igneous rocks like phonolites, basic igneous rocks like basalts,undifferentiated volcanic rocks, sandstones, alluvium, and sand deposits are some of the parentmaterials of these soils.

Salt Stress

Salts are a naturally occurring substance in water and soil. The ions Na^+, K^+, Ca^{2+}, Mg^{2+}, and Cl^- oversee salination. Soil can become sodic when the sodium concentration increases.Sodic soils provide difficulties since they frequently have a very weak structure that restricts or prohibits drainage and water infiltration. Osmotic imbalances in the plant tissues are broughton by water stress much like by salt stress. But in the case of salt stress, the presence of too much salt (often Na^+ and Cl^-) has both harmful and direct nutritional effects.

Salinity effects on plants growth

During growth and development, plants frequently encounter abiotic stress conditions as salinity, dehydration, cold, and freezing. Stress-related conditions can hinder a plant's growth and development, lower its output, and, in severe situations, even kill it. Because the osmotic potential of the soil solution is low and there are nutritional imbalances, salinity has anegative impact on plant growth. Secondary stresses, such oxidative damage, frequently happen because of these fundamental effects of salt stress, which are brought on by its hyperosmotic action. Most of the water on the Earth contains about 30 g of sodium chloride per litre. This can make the Earth a salty planet. The salt stresses affect badly to the plant morphology, functioning and homeostasis, and decrease the plant biomass. High levels of soil salinity can significantly inhibit seed germination and seedling growth, due to the combined effects of high osmotic potential and specific ion toxicity. Salt stress had adverse effects on thefunctioning and metabolism of plants considerably hinders the productivity.

Soil Salinity Problems

Sodium is transported to deeper soil depths by water. A foot or more beneath the surface, the deeper soil may occasionally be absorbing sodium and turning sodic at that depth.If this occurs, the water stops travelling downward at the impacted level and starts moving horizontally. The deeper soil levels may not be affected by the gypsum for some time. Beforethe building, the ground water level had changed, allowing soil erosion and a high concentration of salts in the water table.

Salt tolerant and sensitive crops

Highly salt tolerant crops- Date palm, Barley, Spinach, Sugarcane, Sugar beet moderately salt tolerant crops- Wheat, Rice, Flax, Oats, Tomato
Sensitive crops- Clover, Apple, Beans, Apricot, Pear

Management

- Land development
- Leaching
- Use of amendments
- Proper use of fertilizer and manures
- Drainage
- Irrigation practices
- Growing high tolerant crops

CONCLUSION

Despite being the scourge of agriculture, salt ads flavour to food. Overuse destroys the developing plants. Plant damage caused by salinized soils is not a major issue. By making wise management choices, this can be decreased. Salt stress is a problem for many ecosystems and plants in addition to the agriculture industry. Most of the plants water comes from the soil, where it takes more energy for the plant to draw it up through its roots as the water's salinity rises. As a result, plants can occasionally become dehydrated even when water is present because they cannot keep up with the effort needed to replenish their water supply.

REFERENCES

FAO, 1997. Soil map of the world. Revised Legend. *World Soil Resources Report*. FAO, Rome.

Hassani, A., Azapagic, A., & Shokri, N. (2021). Global predictions of primary soil salinizationunder changing climate in the 21st century. *Nature communications*, *12*(1), 1-17.

Zahra, N., Wahid, A., Shaukat, K., Hafeez, M. B., Batool, A., & Hasanuzzaman, M. (2021). Oxidative stress tolerance potential of milk thistle ecotypes after supplementation of different plant growth-promoting agents under salinity. *Plant Physiology andBiochemistry*, *166*, 53-65.