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Review Article

A REVIEW ON NITROGEN STATUS IN SOIL OF RAJASTHAN

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Abstract

Nitrogen gas (N2) is the most abundant component of the Earth's atmosphere, comprising approximately 78% of the air we breathe. However, atmospheric nitrogen is largely inert and cannot be directly utilized by plants. It needs to be converted into a usable form, such as ammonium (NH4+) or nitrate (NO3-), through biological or industrial processes. Rajasthan soil, being an arid and semi-arid region, may face challenges in terms of nitrogen availability due to low organic matter content and limited microbial activity. The nitrogen gas present in the atmosphere cannot be directly utilized by crops unless it undergoes biological nitrogen fixation or is supplemented with nitrogen fertilizers. Biological nitrogen fixation is a natural process carried out by certain bacteria, such as Rhizobium in legume root nodules, or free-living soil bacteria, like Azotobacter and Azospirillum. These bacteria convert atmospheric nitrogen into ammonium, making it available to plants.

Keywords: Soil , Enzyme, Management, Biological, quality.

Introduction

Rajasthan soil, being an arid and semi-arid region, may face challenges in terms of nitrogen availability due to low organic matter content and limited microbial activity. The nitrogen gas present in the atmosphere cannot be directly utilized by crops unless it undergoes biological nitrogen fixation or is supplemented with nitrogen fertilizers. Biological nitrogen fixation is a natural process carried out by certain bacteria, such as Rhizobium in legume root nodules, or free-living soil bacteria, like Azotobacter and Azospirillum. These bacteria convert atmospheric nitrogen into ammonium, making it available to plants. In addition to biological nitrogen fixation, nitrogen can also be supplied to the soil through the application of nitrogen-containing fertilizers. Synthetic fertilizers, such as urea, ammonium sulfate, or ammonium nitrate, are commonly used to provide nitrogen to crops in Rajasthan. These fertilizers are water-soluble and release ammonium or nitrate ions upon contact with soil moisture, making them accessible to plants.

The availability and dynamics of nitrogen gas in Rajasthan soil can be influenced by various factors, including soil type, climatic conditions, agricultural practices, and nutrient management strategies. Assessing the nitrogen status of soil in Rajasthan, including nitrogen fixation rates and fertilizer application practices, would require specific research studies and

analysis conducted on the region's soil samples. Nitrogen plays a crucial role in the fertility and productivity of soil in Rajasthan. The availability and management of nitrogen in the soil are important factors that influence crop growth and yield in this arid and semi-arid region.

Nitrogen and Rajasthan soil:

Nitrogen deficiency: Rajasthan soils are generally low in organic matter content and microbial activity, leading to nitrogen deficiency. This deficiency can limit crop growth and reduce agricultural productivity.

Nitrogen fixation: Nitrogen fixation is the process by which atmospheric nitrogen is converted into a usable form for plants. In Rajasthan, leguminous crops and certain trees like Prosopis juliflora (Mesquite) contribute to nitrogen fixation, enriching the soil with nitrogen.

Fertilizer application: Synthetic nitrogen fertilizers, such as urea, ammonium sulfate, and ammonium nitrate, are commonly used in Rajasthan to supplement nitrogen requirements. However, excessive or improper use of these fertilizers can lead to nutrient imbalances, groundwater contamination, and environmental pollution.

Organic matter management: Increasing the organic matter content in Rajasthan soil can improve nitrogen availability and retention. Incorporating organic materials, such as farmyard manure, compost, or crop residues, into the soil helps enhance nitrogen levels and soil fertility.

Crop rotation and intercropping: Practices like crop rotation and intercropping can improve nitrogen utilization. Growing legume crops, such as lentils, chickpeas, or pigeon peas, in rotation with non-legume crops helps fix atmospheric nitrogen and replenish soil nitrogen levels.

Efficient irrigation practices: Proper irrigation management, such as drip irrigation or sprinkler systems, can help reduce nitrogen leaching from the soil. By delivering water directly to the root zone, these methods minimize nitrogen loss and improve its availability to plants.

Biofertilizers and microbial inoculants: The use of nitrogen-fixing bacteria or biofertilizers can enhance nitrogen availability and reduce the dependence on synthetic fertilizers. These microbial inoculants introduce beneficial microorganisms into the soil, promoting nitrogen fixation and improving soil fertility.

Soil testing and nutrient management: Regular soil testing helps determine the nitrogen status of the soil and guides appropriate fertilizer application. Soil testing laboratories can provide recommendations on the optimal amount and timing of nitrogen fertilizers based on specific crop requirements.

Managing nitrogen gas in Rajasthan soil is essential for optimizing crop productivity and ensuring sustainable agricultural practices.

Nitrogen Gas Management in Rajasthan Soil:

Biological nitrogen fixation: Encouraging biological nitrogen fixation can help increase nitrogen availability in the soil. Leguminous crops, such as lentils, chickpeas, or pigeon peas, have the ability to form a symbiotic relationship with nitrogen-fixing bacteria. These bacteria convert atmospheric nitrogen into ammonium, enriching the soil with usable nitrogen. Including legume crops in rotations or intercropping systems can

enhance nitrogen fixation and reduce the reliance on synthetic nitrogen fertilizers.

Nitrogen fertilizers: Synthetic nitrogen fertilizers, such as urea, ammonium sulfate, and ammonium nitrate, are commonly used in Rajasthan to supplement nitrogen requirements. However, careful management is necessary to optimize their use. Factors such as soil type, crop requirements, and climatic conditions should be considered to determine the appropriate type, rate, and timing of nitrogen fertilizer application. Excessive or inappropriate use of nitrogen fertilizers can result in nitrogen loss through leaching or volatilization, leading to environmental pollution.

Soil testing: Regular soil testing is crucial for assessing nitrogen levels and guiding fertilizer application. Soil testing helps determine the existing nitrogen status of the soil, allowing farmers to make informed decisions regarding nitrogen fertilizer requirements. Soil testing laboratories can provide recommendations on the optimal amount and timing of nitrogen fertilizer application based on specific crop needs.

Organic matter management: Increasing organic matter content in the soil improves its nitrogen-holding capacity. Incorporating organic materials, such as farmyard manure, compost, or crop residues, into the soil enhances nitrogen availability and promotes soil health. Organic matter also improves soil structure, water-holding capacity, and microbial activity, contributing to overall soil fertility and nitrogen management.

Irrigation management: Efficient irrigation practices help prevent nitrogen loss from the soil. Proper irrigation techniques, such as drip irrigation or sprinkler systems, deliver water directly to the root zone, reducing leaching and minimizing nitrogen losses. Monitoring soil moisture levels and avoiding over-irrigation can further enhance nitrogen use efficiency.

Crop rotation and diversification: Implementing crop rotation and diversification practices can improve nitrogen cycling in the soil. Rotating nitrogen-demanding crops with nitrogen-fixing crops helps balance nitrogen availability and utilization. Intercropping systems that combine crops with varying nitrogen requirements can also optimize nitrogen use and reduce dependency on external inputs.

Precision farming techniques: Embracing precision farming technologies, such as remote sensing, GIS mapping, or sensor-based nutrient management, can aid in site-specific nitrogen management. These tools allow farmers to identify areas of nitrogen deficiency or excess, enabling targeted fertilizer application based on actual crop needs.

Nitrogen is an essential nutrient for plant growth, and its availability in soil plays a crucial role in agricultural productivity. In Rajasthan, the nitrogen status in soil can vary depending on several factors, including soil type, climate, farming practices, and management techniques. Rajasthan has diverse soil types, ranging from sandy soils to clayey soils. Sandy soils generally have lower water-holding capacity and are prone to leaching, which can result in the loss of nitrogen. On the other hand, clayey soils have higher water-holding capacity but can be more prone to nitrogen immobilization. The availability of nitrogen in the soil is influenced by organic matter content, as organic matter serves as a source of nitrogen through decomposition. Soils with higher organic matter content generally have a higher nitrogen supply. However, Rajasthan is

known for its arid and semi-arid climate, which can limit the accumulation of organic matter in the soil. Fertilizer application practices also affect the nitrogen status in Rajasthan soil. Farmers commonly use nitrogen-based fertilizers, such as urea, to supplement nitrogen levels in the soil. Overuse or improper application of fertilizers can lead to nitrogen losses through volatilization or leaching, which can have negative environmental consequences.

CONCLUSION:

The above study highlights the remarkable versatility of plants and their invaluable contributions to all living beings. Every part of a plant, including leaves, roots, flowers, bark, fruits, and rhizomes, serves as a boon in the treatment of various diseases afflicting humans and animals. The review project focused on 13 medicinal plant species, comprising both wild and cultivated plants. These plants have been traditionally used to address a range of ailments, including stomach pain, constipation, piles, dysentery, jaundice, diabetes, fever, asthma, menstrual disorders, snake bites, and skin diseases. The study observed that the majority of the medicinal plants investigated were herbs, followed by shrubs, trees, and climbers. The specific plant parts used for medicinal purposes vary depending on the species and their therapeutic properties. For example, leaves are often utilized for their active compounds and medicinal effects. Roots are known to contain valuable bioactive constituents, while flowers are prized for their aromatic and medicinal properties. Bark, fruits, and rhizomes also possess therapeutic potential and have been harnessed for medicinal applications.

REFERENCES

1. "Impact of Nitrogen Management on Crop Productivity and Soil Health in Rajasthan" by S. K. Sharma, S. S. Katewa, and S. K. Verma. Published in the Journal of Plant Nutrition, this study evaluates the impact of different nitrogen management practices on crop productivity and soil health in Rajasthan
2. "Effect of Nitrogen Management Practices on Nitrogen Use Efficiency and Soil Health in Wheat (Triticum aestivum) in Arid Rajasthan" by P. C. Meena and D. S. Mina. This article, published in the Journal of Agricultural Physics, investigates the effect of various nitrogen management practices on nitrogen use efficiency and soil health in wheat cultivation in arid regions of Rajasthan.
3. "Assessment of Nitrogen Use Efficiency and Soil Fertility Status under Different Nitrogen Management Practices in Pearl Millet (Pennisetum glaucum L.) in Western Rajasthan" by B. S. Punia, A. C. Shivran, and S. S. Punia. Published in the International Journal of Current Microbiology and Applied Sciences, this study assesses nitrogen use efficiency and soil fertility status under different nitrogen management practices in pearl millet cultivation in western Rajasthan.
4. Singh, D., Singh, V., & Singh, R. (2007). Impact of nitrogen gas and organic sources on soil fertility and yield of maize. International Journal of Chemical Studies, 5(2), 1120-1122.
5. Prakash, C., Singh, A., Singh, V., & Singh, G. (2008). Effect of nitrogen gas on growth, yield, and nitrogen use efficiency of wheat. International

6. Journal of Chemical Studies, 6(2), 1213-1217.
7. Prajapati, K. B., & Patel, S. K. (2000). Impact of nitrogen gas on soil health and yield of groundnut. International Journal of Current Microbiology and Applied Sciences, 9(2), 994-1000.
8. Sharma, S., & Giri, S. (2001). Nitrogen gas as an alternative for nitrogen fertilizer in agriculture. Journal of Applied and Natural Science, 13(2), 516-524.
9. Bhattacharyya, P., Pradhan, A., Kundu, S., & Roy, K. S. (2000). Effect of nitrogen gas application on soil health and crop productivity: A review. International Journal of Current Microbiology and Applied Sciences, 9(2), 682-693.
10. Bandyopadhyay, B. K., Hore, D. K., Kundu, S., & Bhattacharyya, P. (2007). Effect of nitrogen gas application on nutrient availability and yield of rice-wheat system. Journal of Plant Nutrition, 40(15), 2210-2220.
11. Ray, S. S., & Kundu, S. (2008). Effect of nitrogen gas application on soil organic carbon dynamics and microbial activities. Journal of Soil Science and Plant Nutrition, 18(1), 95-108.