**Soil Test Report on the Status of Nutrient of Agricultural Soil**

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**Executive Summary**

This report provides a comprehensive analysis of soil conditions in Meherpur district, assessing the suitability of soils for six key crops: cauliflower, chili, garlic, tobacco, rice, and elephant foot yam. The study evaluates critical soil parameters, including pH, organic matter (OM), nitrogen (N), phosphorus (P), potassium (K), and sulfur (S). The findings reveal significant nutrient imbalances, which necessitate tailored fertilization and soil amendment strategies to enhance crop productivity and sustainability.

**Key Findings:**

* Soil pH across the district ranges from neutral to slightly alkaline, which may not be optimal for certain crops.
* Organic Matter (OM) and Nitrogen (N) levels are consistently low across all examined soil samples.
* Phosphorus (P) levels are excessively high, which can lead to nutrient imbalances and reduced uptake of other essential nutrients.
* Potassium (K) and sulfur (S) levels are notably low, impacting plant development and stress resistance.
* Tailored fertilization strategies, including ammonium sulfate for nitrogen enrichment, potassium-based fertilizers, and organic matter incorporation, are necessary to improve soil fertility.
* Proper soil amendments and pH adjustments are required to optimize growing conditions and enhance crop productivity.
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* Tailored fertilization strategies, including ammonium sulfate for nitrogen enrichment, potassium-based fertilizers, and organic matter incorporation, are necessary to improve soil fertility.
* Proper soil amendments and pH adjustments are required to optimize growing conditions and enhance crop productivity. This report presents a comprehensive analysis of soil conditions across Meherpur district for six key crops: cauliflower, chili, garlic, tobacco, rice, and elephant foot yam. The study evaluates critical soil parameters, including pH, organic matter (OM), nitrogen (N), phosphorus (P), potassium (K), and sulfur (S), to assess soil fertility and provide targeted improvement strategies.

Potassium availability with potassium-based fertilizers, and managing phosphorus levels to prevent antagonistic effects. Organic matter enrichment and slight pH adjustments are also suggested where necessary.

Implementing these recommendations will enhance soil fertility, promote healthier crop growth, and improve agricultural sustainability in the region.

**Implications**

The findings of this report have significant implications for agricultural practices in Meherpur district. Addressing soil fertility issues through targeted interventions will:

* Improve nutrient availability and plant uptake efficiency.
* Enhance crop yields and quality by addressing key nutrient deficiencies.
* Promote sustainable soil management practices to maintain long-term productivity.
* Reduce the risk of soil degradation and nutrient loss through informed fertilizer application.
* Support farmers in making evidence-based decisions for better resource allocation and soil health management.

**Introduction**

This report presents an in-depth analysis of farmers' field-level soil conditions in Meherpur district for six crops based on key parameters, including pH, organic matter (OM), nitrogen (N), phosphorus (P), potassium (K), and sulfur (S). The data provides insight into soil fertility, crop-specific requirements, and improvement strategies. According to the Soil Recommendation Guide, the analyzed soil conditions for different crops are detailed below:

**Summary of Soil Conditions**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Crop** | **pH** | **OM (%)** | **N (%)** | **P (μg/g)** | **K (meq/100g)** | **S (μg/g)** |
| Cauliflower | Neutral (7.26) | Low (1.27) | Very Low (0.065) | Very High (121.22) | Low (0.151) | Low (8.58) |
| Chilli | Slightly Alkaline (7.59) | Low (1.26) | Very Low (0.063) | Very High (98.90) | Low (0.179) | Low (8.47) |
| Garlic | Slightly Alkaline (7.67) | Low (1.46) | Very Low (0.073) | Very High (95.80) | Low (0.137) | Low (10.23) |
| Tobacco | Slightly Alkaline (7.80) | Low (1.58) | Very Low (0.078) | Very High (98.40) | Low (0.129) | Low (8.69) |
| Rice | Slightly Alkaline (7.75) | Low (1.54) | Very Low (0.075) | Very High (94.72) | Low (0.126) | Low (9.13) |
| Elephant Foot Yam | Neutral (7.24) | Low (1.44) | Very Low (0.071) | Very High (152.07) | Low (0.209) | Low (8.36) |

**Crop-Specific Observations and Recommendations**

**1. Cauliflower**

* **Observations:** The neutral pH is suitable for cauliflower cultivation, supporting nutrient availability and microbial activity. However, deficiencies in N, OM, K, and S are concerning, particularly the very low N levels affecting leaf development.
* **Recommendations:** Incorporate high-nitrogen fertilizers, organic compost, and potassium sulphate. Monitor phosphorus levels to avoid excessive nutrient antagonism.

**2. Chilli**

* **Observations:** Requires adequate N and S for proper fruit development. The very high P and K deficiency lead to an imbalance, affecting crop quality.
* **Recommendations:** Apply balanced fertilizers, including ammonium sulfate to lower pH slightly, potassium nitrate for K, and elemental sulphur to enhance S levels.

**3. Garlic**

* **Observations:** Requires better nitrogen and potassium levels and a reduction in soil alkalinity. OM content is slightly higher than for other crops but remains insufficient.
* **Recommendations:** Add ammonium sulphate to address N and S deficiencies and adjust pH. Incorporate potassium fertilizers like potassium chloride or potassium sulphate to improve bulb quality.

**4. Tobacco**

* **Observations:** Highly sensitive to soil nutrient imbalances, which affect leaf thickness, color, curing quality, and overall protein and amino acid synthesis.
* **Recommendations:** Apply potassium-based fertilizers to enhance leaf quality and introduce sulphur-based soil amendments. Consider using acidifying fertilizers to lower pH slightly.

**5. Rice**

* **Observations:** Prefers slightly acidic soil, so the alkaline pH may need adjustment. OM, N, K, and S levels are insufficient for optimal production.
* **Recommendations:** Incorporate organic matter to improve soil fertility and slightly acidify the soil. Apply nitrogen-rich and potassium-based fertilizers to enhance plant vigor and yield.

**6. Elephant Foot Yam**

* **Observations:** Neutral pH is suitable for its cultivation. Very low N levels can limit vegetative growth, and the extremely high P levels may reduce calcium and zinc uptake. K deficiency impacts tuber quality and stress resistance.
* **Recommendations:** Apply balanced fertilizers, emphasizing K and S. Introduce organic matter to improve overall soil fertility.

**Conclusion**

The analysis highlights significant nutrient imbalances and deficiencies in Meherpur's soils for different crops. Targeted fertilizer applications and soil amendments are necessary to optimize yield and crop quality. Farmers should follow the recommended strategies to improve soil health and sustain productivity.