

## Soil Fertility Assessment and Crop Suitability of TSG Block, Ladakh

<sup>1</sup>Mehboob Ali,<sup>2</sup>Rubaba Banoo,<sup>3</sup>Fatima Nissa,<sup>4</sup>Fatima Nissa,<sup>5</sup>Fatima Nissa

1.Lecturer Biology ,2.12<sup>th</sup> class student at HSS trespone ,3.12<sup>th</sup> class student at HSS trespone,4.12<sup>th</sup> class student at HSS trespone,5. 12<sup>th</sup> class student at HSS trespone. 1.Higher Secondary School Trespone ,1. School Education Department UT Ladakh.

### Abstract

Soil fertility is essential for agricultural productivity, particularly in cold-arid regions like Ladakh, where crop diversity is limited by climatic and topographical constraints. This study assesses soil parameters in TSG Block's five major zones: Tambis, Kanoor, Trespone, Saliskote, and G.M.pore. pH, Nitrogen (N), Phosphorus (P), and Potassium (K) were all measured. NPK ratios were calculated by categorizing nutrient levels as Low, Medium, or High and converting them into numerical values. The findings revealed significant differences in soil fertility status among Tambis (1:2:2), Kanoor (2:2:2), Trespone (1:1:3), Saliskote (1:2:3), and G.M.pore (2:2:3). Cereals, pulses, vegetables, and fruits were selected for each zone based on these findings and local climatic/topographic conditions. Histograms, bar graphs, and pie charts were used to visualize the results. Recommendations were also made to boost fertility and ensure long-term agricultural productivity.

### Introduction

Agriculture in the cold-arid region of Ladakh is primarily subsistence-based and heavily reliant on local soil fertility. Unlike the fertile Indo-Gangetic plains, Ladakh's soils are shallow, alkaline, and frequently deficient in organic matter due to harsh climatic conditions. As a result, soil fertility assessment is critical for guiding farmers and policymakers to make science-based agricultural decisions. The TSG Block in Kargil district, Ladakh, represents a variety of topographic and climatic zones. Each sub-region (Tambis, Kanoor, Trespone, Saliskote, and G.M.pore) has unique soil characteristics that influence crop selection and horticultural practices. While wheat, barley, and peas have traditionally been grown, recent trends indicate a shift to vegetables and fruits such as potatoes, cabbage, and apricot orchards.

This study aims to:

1. Evaluate soil fertility parameters in each of the TSG Block's five zones.
2. Determine each zone's NPK ratios.
3. Determine the appropriateness of crops, vegetables, and fruits according to soil and climate.
4. Offer suggestions for managing crops and soil in the future.

### Materials and Methods

Five villages in TSG Block—Tambis, Kanoor, Trespone, Saliskote, and G.M.pore—had their agricultural fields sampled for soil. Prior to analysis, samples were collected at a depth of 0–20 cm, allowed to air dry, and then sieved.

The following parameters were examined:

1. pH: measured with a digital pH meter.
2. There are three categories for nitrogen (N): Low (1), Medium (2), and High (3).
3. Phosphorus (P): Likewise categorized.
4. Potassium (K): In the same category.

NPK Ratio Calculation: To facilitate comparison, the nutrient categories were transformed into numerical values and presented as N:P:K ratios.

Data Analysis: Tables, bar diagrams, pie charts, and histograms were used to display the results.

## Results and Discussion

NPK ratios per zone:

Tambis: 1:2:2

Kanoor: 2:2:2

Trespone: 1:1:3

Saliskote: 1:2:3

G.M.pore: 2:2:3

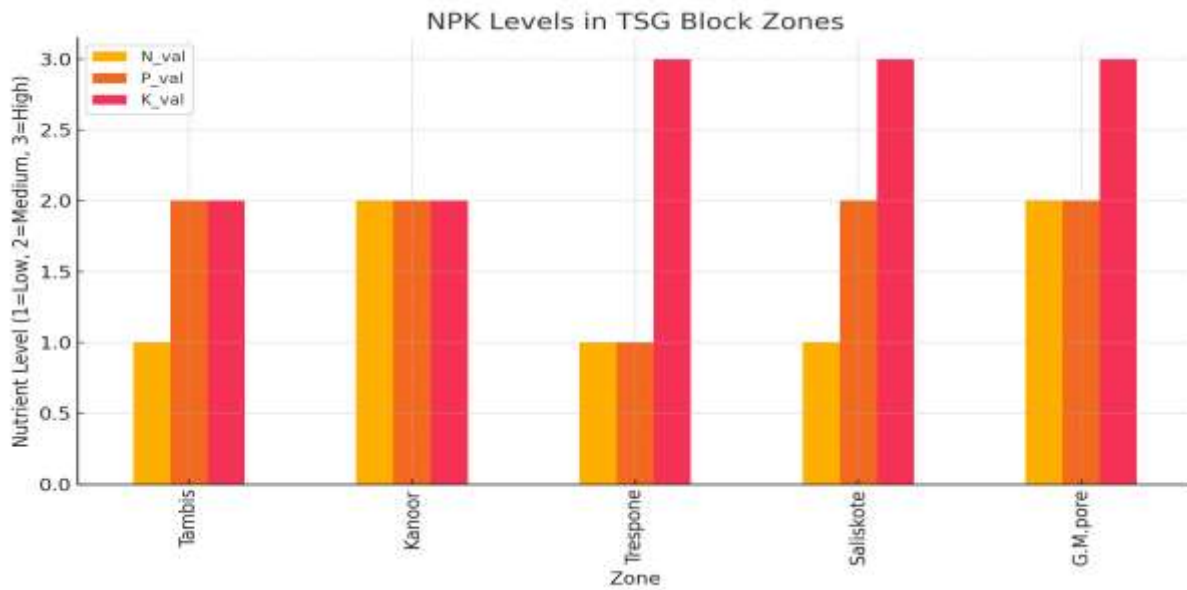
Zone	pH	Nitrogen	Phosphorus	Potassium	N_value	P_value	K_value	NPK Ratio
Tambis	7.5	Low	Medium	Medium	1	2	2	1:2:2
Kanoor	8.5	Medium	Medium	Medium	2	2	2	2:2:2
Trespone	7.5	Low	Low	High	1	1	3	1:1:3
Saliskote	8.5	Low	Medium	High	1	2	3	1:2:3
G.M.pore	7.5	Medium	Medium	High	2	2	3	2:2:3

Table 1. Soil fertility parameters and NPK ratios.

The analysis indicates clear variation in soil fertility across the block. Tambis and G.M.pore soils are moderately fertile, Kanoor soils are alkaline but balanced, while Saliskote and Trespone are deficient in nitrogen. Such variations necessitate zone-specific crop planning.

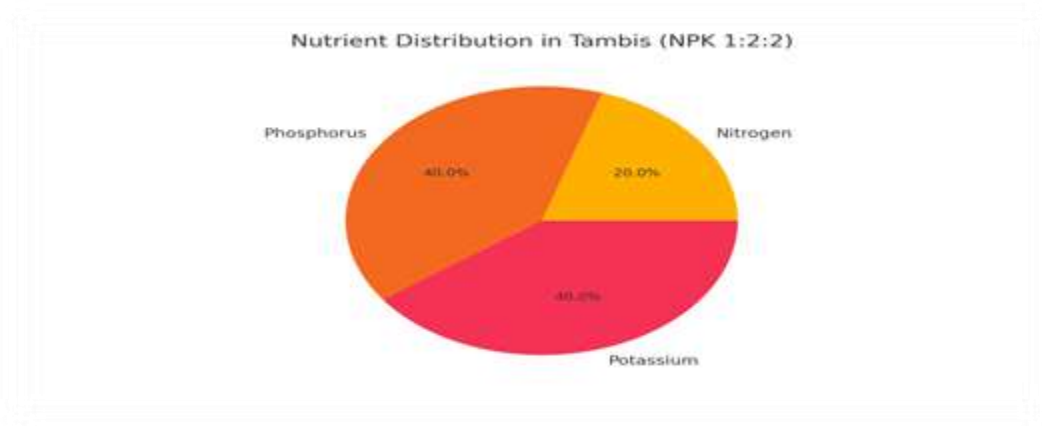
Crop, vegetable, and fruit suitability was determined based on both soil fertility status and microclimatic conditions. For example, cereals like wheat and barley are suitable for Tambis and Saliskote, maize thrives in Kanoor, and vegetables such as potato and onion are best suited for Trespone and G.M.pore. Horticulture crops such as apple and apricot show wide adaptability across the block.

## Bar chart showing NPK levels across zones:

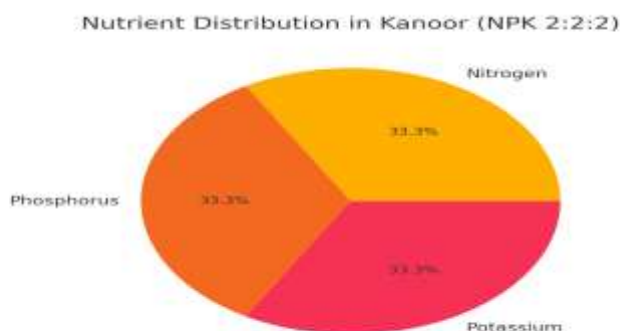


## Pie charts showing nutrient distribution in each zone:

### 1.Tambis

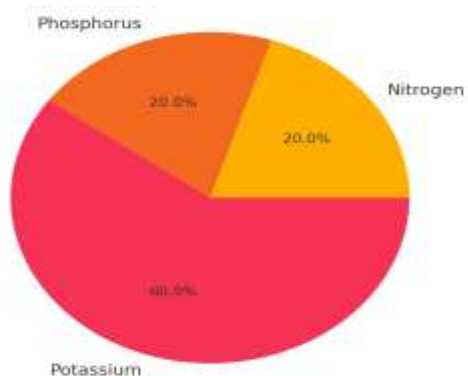


### 2.Kanoor



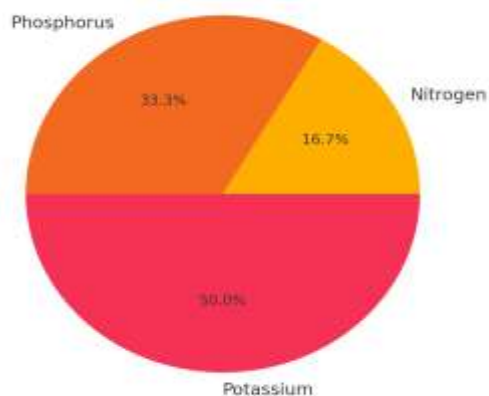
### 3.Trespone

Nutrient Distribution in Trespone (NPK 1:1:3)



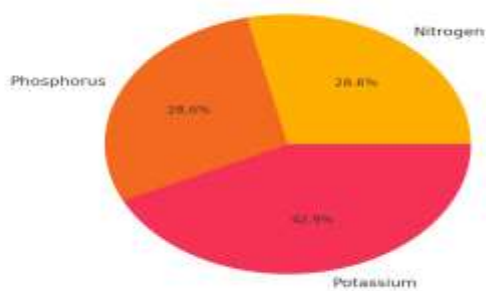
### 4.Saliskote

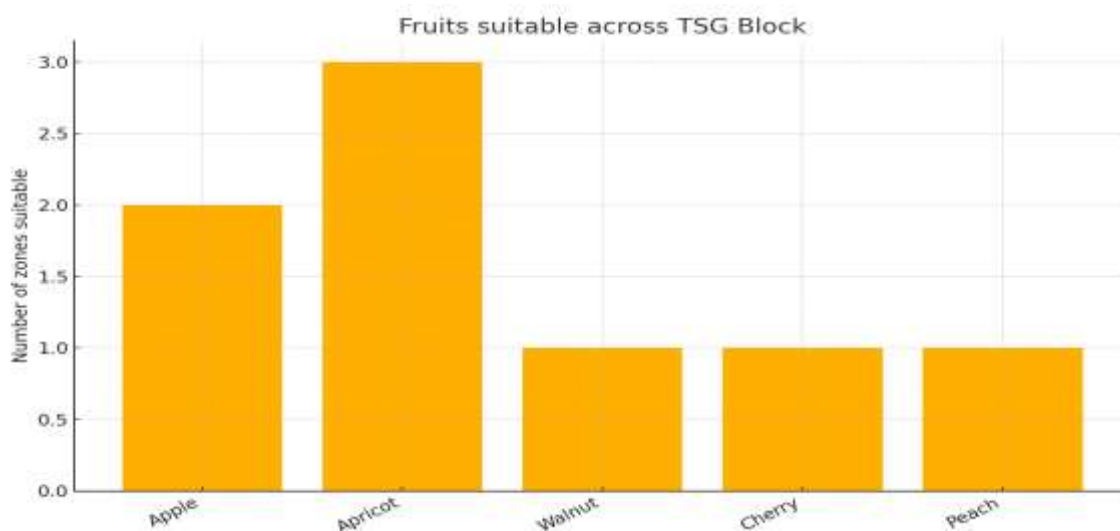
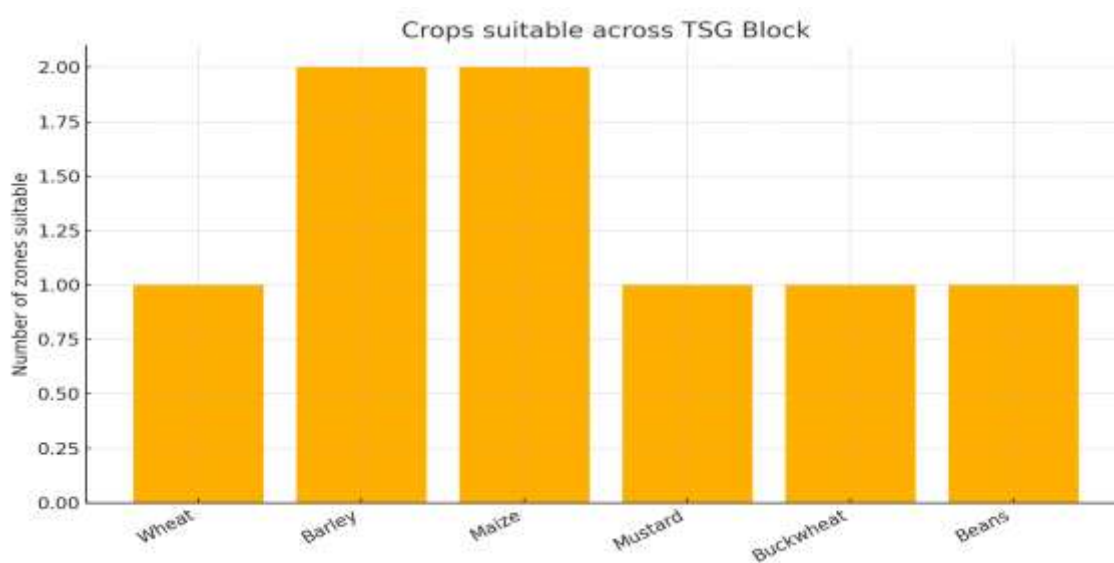
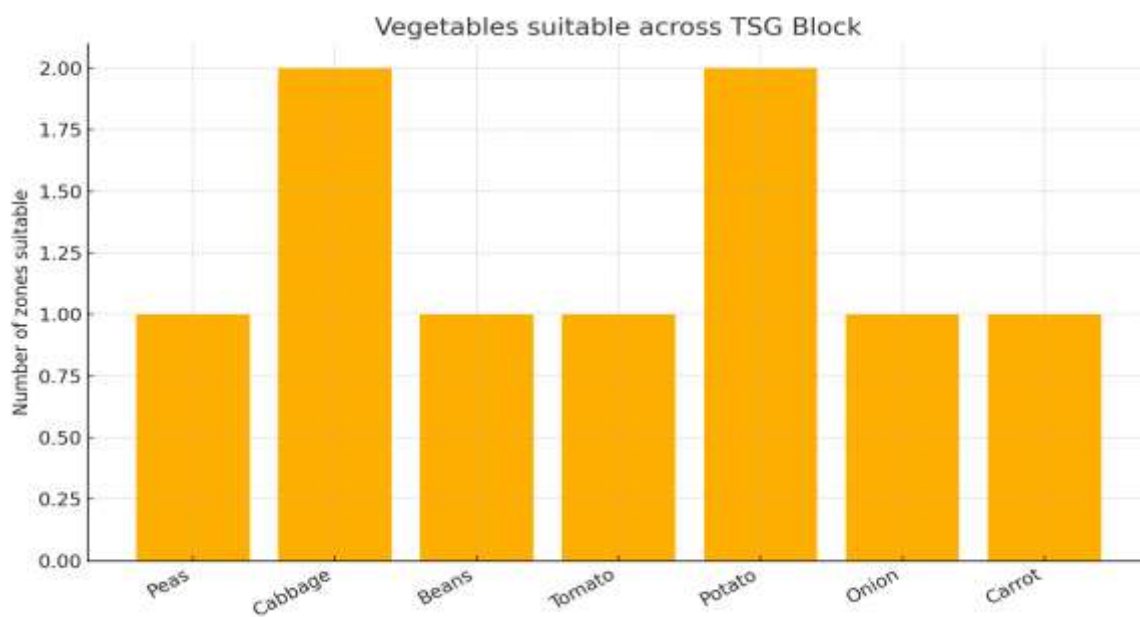
Nutrient Distribution in Saliskote (NPK 1:2:3)

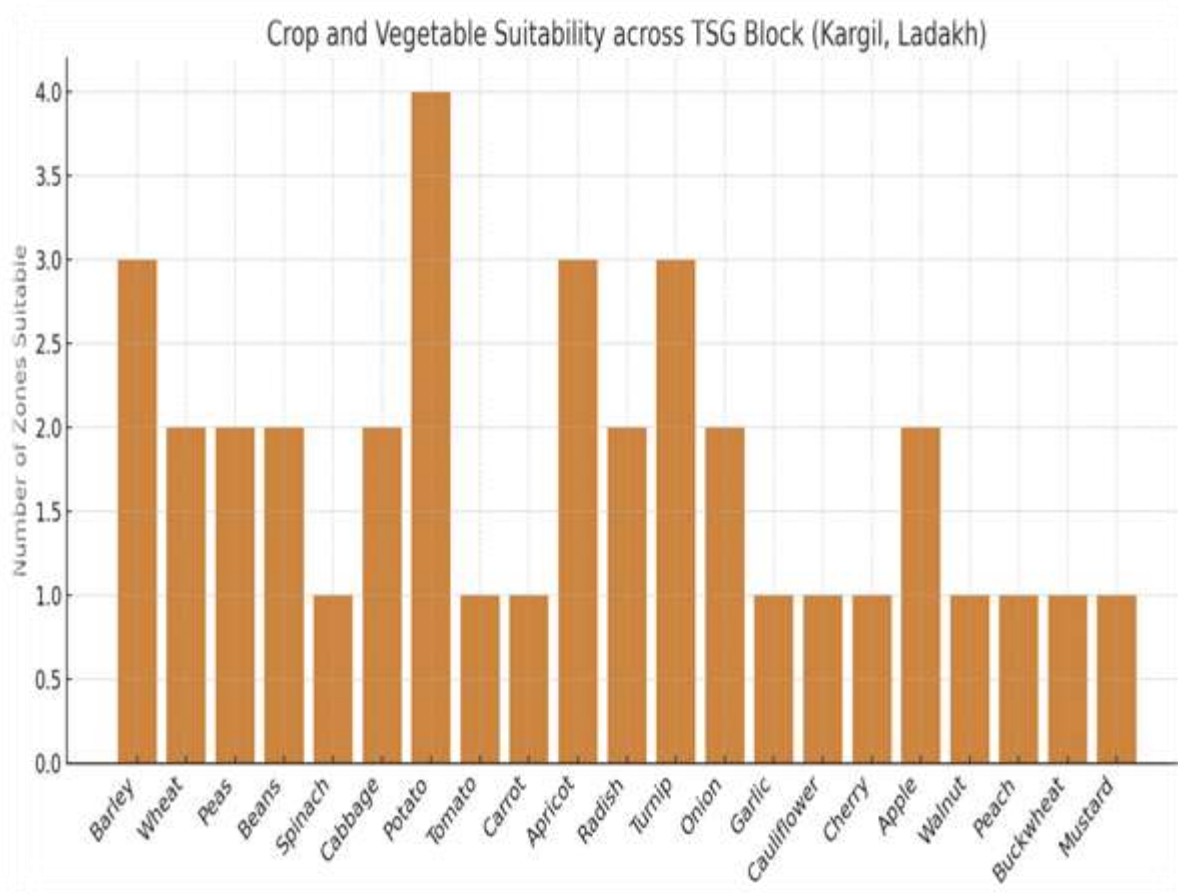


### 5.G.M.Pore

Nutrient Distribution in G.M.pore (NPK 2:2:3)



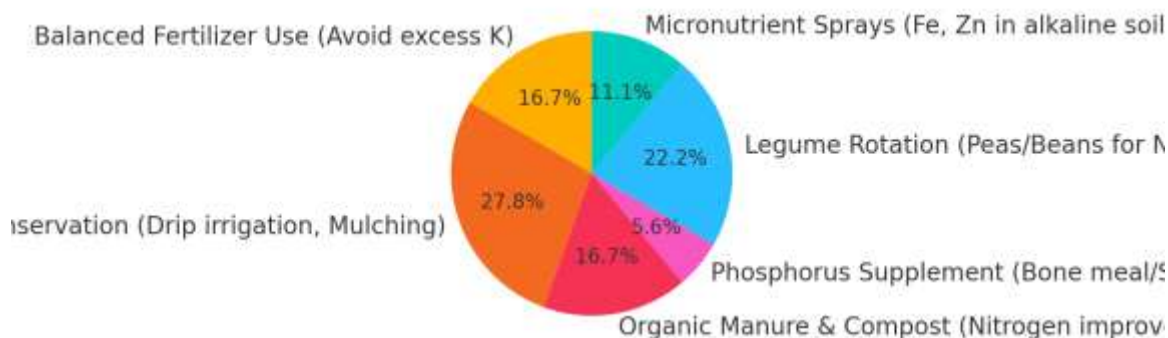
**Bar Graph Showing vegetables, Fruits and crops suitable across TSG Block**



## Recommendations

1. Apply vermicompost and organic manure to improve nitrogen-deficient soils (Trespone, Saliskote).
2. Use gypsum and organic matter in alkaline soils (Kanoor, Saliskote).
3. Promote crop rotation with legumes to improve soil fertility.
4. Expand horticulture, especially apple and apricot orchards, in suitable areas.
5. Adopt drip irrigation and water-saving technologies to cope with arid conditions.
6. Establish soil testing facilities in Kargil for regular monitoring. Pie chart representation of recommended agricultural strategies:

Strategic Focus Areas for Sustainable Agriculture in TSG Block



## Conclusion

The study reveals that soils of TSG Block are moderately fertile but highly variable across zones. While G.M.pore shows balanced fertility, Saliskote and Trespone are nitrogen-deficient and require soil amendments. Tambis is moderately fertile with potential for cereals, while Kanoor's alkaline soil requires corrective measures. Overall, careful soil management and crop diversification can transform TSG Block into a hub of sustainable agriculture in Ladakh.

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