e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 4, April 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.521

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| Monthly Peer Reviewed & Referred Journal |

| Volume 7, Issue 4, April 2024 |

| DOI:10.15680/IJMRSET.2024.0704053 |

A Comparative Analysis of Fertilizer Practices in Soybean Farming: Organic vs. Chemical Approaches in Washim region Shubham

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ABSTRACT: This study compares organic and chemical fertilizer practices in soybean farming in the Washim region. Through mixed-methods research, including field surveys and interviews. Preliminary findings suggest that while chemical fertilizers may yield higher short-term productivity, organic methods offer long-term benefits in soil health and environmental sustainability.

I. INTRODUCTION

Fertilizer application is essential for enhancing soil fertility, promoting plant growth, and maximizing crop yields. In the Washim region, farmers traditionally relied on chemical fertilizers to meet the nutritional needs of soybean crops. However, in recent years, there has been a growing interest in organic farming practices, driven by concerns about the environmental impact of chemical fertilizers, soil health degradation, and a desire for sustainable and ecologically friendly agriculture.

This comparative analysis aims to shed light on the two predominant approaches to fertilizer practices in soybean farming within the Washim region: the conventional use of chemical fertilizers versus the adoption of organic methods. By examining key parameters such as yield, soil health, environmental impact, and economic considerations, this study seeks to provide valuable insights into the effectiveness and sustainability of each approach.

The overarching goal is to contribute to informed decision-making for soybean farmers in the Washim region, offering a nuanced understanding of the trade-offs between organic and chemical fertilizer practices. As global agricultural practices evolve, it is crucial to assess and adapt local approaches to ensure a balance between productivity, environmental stewardship, and long-term soil health. This analysis serves as a foundation for a comprehensive evaluation of the impacts of fertilizer practices on soybean farming in the Washim region, guiding future strategies for sustainable agricultural development.

Organic farming relies on natural inputs such as compost, manure, and cover crops to enhance soil fertility and promote sustainable agricultural practices. On the other hand, chemical farming involves the use of synthetic fertilizers to provide essential nutrients to crops, aiming for increased yields. The choice between these two approaches involves considerations of environmental impact, soil health, cost-effectiveness, and overall sustainability.

Soybean farming plays a crucial role in the agricultural landscape, serving as a primary source of protein and oil for both human and animal consumption. In the pursuit of maximizing soybean yield, farmers often face the decision of choosing between organic and chemical fertilizer practices. The Washim region, with its diverse agricultural profile, provides an interesting context for a comparative analysis of these two approaches.

This study, titled "A Comparative Analysis of Fertilizer Practices in Soybean Farming: Organic vs. Chemical Approaches in Washim Region," aims to investigate and compare two primary approaches to fertilization in soybean farming: organic and chemical. The research seeks to shed light on the benefits, drawbacks, and overall impact of these two fertilizer practices, offering valuable insights to both farmers and policymakers in the Washim region and similar agricultural areas.

Soybean farming is a vital component of agriculture in the Washim region, holding significant economic importance. The choice of fertilizer practices in soybean cultivation plays a pivotal role in crop yield, economic

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profitability, and environmental sustainability. This study aims to conduct a comprehensive comparative analysis of two primary fertilizer approaches in soybean farming: organic and chemical.

Economic Contribution:
Soybeans are a major cash crop, contributing substantially to the region's agricultural revenue. The cultivation of soybeans provides income for local farmers and supports the livelihoods of numerous families in the area.

Diversification of Agriculture:
Soybean farming adds diversity to the crop portfolio of the region, helping farmers manage risk and stabilize their income. Crop diversification is crucial for sustainable and resilient agricultural practices.

Nutritional Value:
Soybeans are a rich source of protein and essential nutrients. The cultivation of soybeans in the Washim region contributes to local and regional food security by providing a valuable source of nutrition for both human and animal consumption.

Crop Rotation and Soil Health:
Soybeans are often integrated into crop rotation systems, promoting sustainable farming practices. The nitrogen-fixing properties of soybeans enhance soil fertility, benefiting subsequent crops in the rotation cycle and supporting overall soil health.

Livestock Feed Production:
Soybeans are a key ingredient in livestock feed. The cultivation of soybeans in Washim not only supports the local dairy and livestock industry but also contributes to the production of high-quality animal feed.

Market Demand:
The market demand for soy-based products, including cooking oil, protein-rich foods, and industrial applications, further underscores the significance of soybean farming in the Washim region. Meeting this demand contributes to regional economic growth.

Employment Opportunities:
Soybean farming activities generate employment opportunities at various stages, including planting, cultivation, harvesting, and processing. This helps in addressing rural unemployment and fostering economic development.

Nutrient Enrichment:
Fertilizers provide essential nutrients such as nitrogen, phosphorus, and potassium, which are vital for plant growth and development.
These nutrients are often deficient in natural soils, and fertilizers help supplement the soil's nutrient levels, ensuring that crops receive the necessary elements for optimal growth.

Increased Crop Yield:
Adequate nutrient supply from fertilizers results in increased crop yields. Plants require specific nutrients at different stages of their life cycle, and fertilizers help meet these nutritional demands, leading to higher productivity.

Improved Quality of Crops:
Fertilizer application contributes to the improved quality of crops by enhancing their nutritional content, size, and overall market value.
Balanced nutrient supply through fertilization positively influences the biochemical composition of crops, making them more desirable for consumption or processing.

Crop Resilience and Stress Tolerance:
Fertilizers support the development of robust and resilient plants that are better able to withstand environmental stresses, such as drought or disease.
Adequately nourished crops are more resistant to pests and diseases, leading to a more stable and reliable harvest.
Optimized Water and Nutrient Use.

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Efficiency:
Fertilizers can enhance the efficiency of water and nutrient use by improving nutrient uptake by plant roots.
This is particularly important in regions facing water scarcity, as efficient nutrient utilization ensures that crops can thrive with reduced water inputs.

Support for Sustainable Agriculture:
Fertilizers play a key role in sustainable agriculture by maintaining soil fertility over successive cropping seasons.
Proper fertilization practices contribute to the conservation of arable land and prevent soil degradation, ensuring the long-term viability of agricultural activities.

Global Food Security:
Fertilizer use is a critical factor in meeting the growing global demand for food.
As the world's population increases, efficient fertilizer application becomes essential to maximize food production and address the challenges of food security.

Economic Impact on Farmers:
Improved crop productivity resulting from fertilizer use can significantly enhance the economic well-being of farmers.
Higher yields often translate into increased income for farmers, supporting their livelihoods and contributing to rural development.

Organic Fertilizer Practices:
Organic soybean farming in Washim often involves the use of natural fertilizers such as compost, manure, and organic amendments. Farmers may employ crop rotation and cover cropping to enhance soil fertility. The emphasis on organic practices is driven by the desire for sustainable agriculture and reduced environmental impact.

Chemical Fertilizer Practices:
Conventional soybean farming in the Washim region relies on synthetic fertilizers to provide essential nutrients to the crops. Chemical fertilizers are chosen for their precise nutrient composition and immediate availability to plants. However, concerns regarding environmental pollution and long-term soil health have prompted a closer examination of their impact.
This study conducts a comprehensive comparative analysis of fertilizer practices in soybean farming, focusing on contrasting organic and chemical approaches in the Washim region. The research examines key factors, including environmental impact, cost-effectiveness, crop yield, soil health, and long-term sustainability. By investigating these aspects, the study aims to provide insights into the most viable and sustainable fertilizer practices for soybean cultivation in the specific agro-climatic context of Washim.

II. LITERATURE REVIEW

1. NN Chavan, NR Koshti studed Profile of organic vegetable growers conducted by Organic farming represents a deliberate attempt to make the best use of local natural resources and is an environmental friendly system of farming it relies much on ecosystem management which excludes external inputs, especially the synthetic ones.
2. Wani, S P and Chander studied Soil Health Mapping and Direct Benefit : Transfer of Fertilizer Subsidy conducted by Sustainable soil health management is a critical challenge for India and studies have shown that soils in many parts of the country suffer from widespread multiple nutritional deficiencies.
3. Dr. I V Malhan studied Impact of Globalization and Emerging Information Communication Technologies on Agricultural Knowledge Transfer to Small Farmers in India conducted by Globalization and growing competition have accelerated the need for knowledge intensive work performance in all the sectors of economy.
4. Ki Song Lee a studied Environmental performance of organic farming: Evidence from Korean small-holder soybean production conducted by Organic farming has shown better environmental performance than conventional farming in many studies; however, no systematic study into intensive, smallholder farming practices in Asia has been conducted.
5. Michael Burgess studied An Environmental, Energetic and Economic Comparison of Organic and Conventional Farming Systems conducted by Various organic technologies have been utilized for about 6,000 years to make agriculture sustainable while at the same time conserving soil, water, energy and biological resources.

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III. RESEARCH OBJECTIVES

• To assess and compare the effectiveness, sustainability, economic viability, environmental impact of organic and chemical fertilizer practices in soybean farming within the Washim region
• To provide evidence-based recommendations for optimizing soybean cultivation methods.
• To Analyse related opinions of farmers
• To study satisfaction level of farmers.

IV. RESEARCH METHODOLOGY

Research Design:

- Randomly select soybean farms for the study.
- Specify the type and quantity of fertilizers used in each group.
- Ensure uniformity in other farming practices and conditions.

Area of the study:

The responders are from Washim City and Washim District Village Also. The majority of data is collected from Farmer and Agriculture Students.

Data collection method:

Through online questionnaires using the Google Form Platform. Survey a technique is employed to obtain a sample of people through the questionnaire in Washim District .

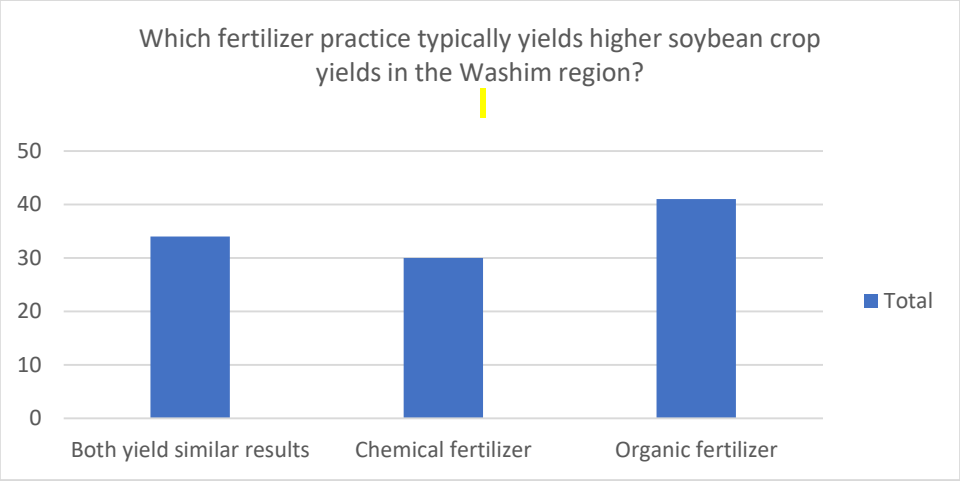
Sampling Technique:
Simple Random Sampling. A questionnaire was administered to different Farmar and Agriculture Students to obtain data for the purpose of analysis

Research Type:
Descriptive type of research.

Sample unit:
Farmar , Student , Agriculture Shops.

Sample Size:
Data is collected using a sample of 100 Respondents.

V. RESULTS AND DISCUSSION



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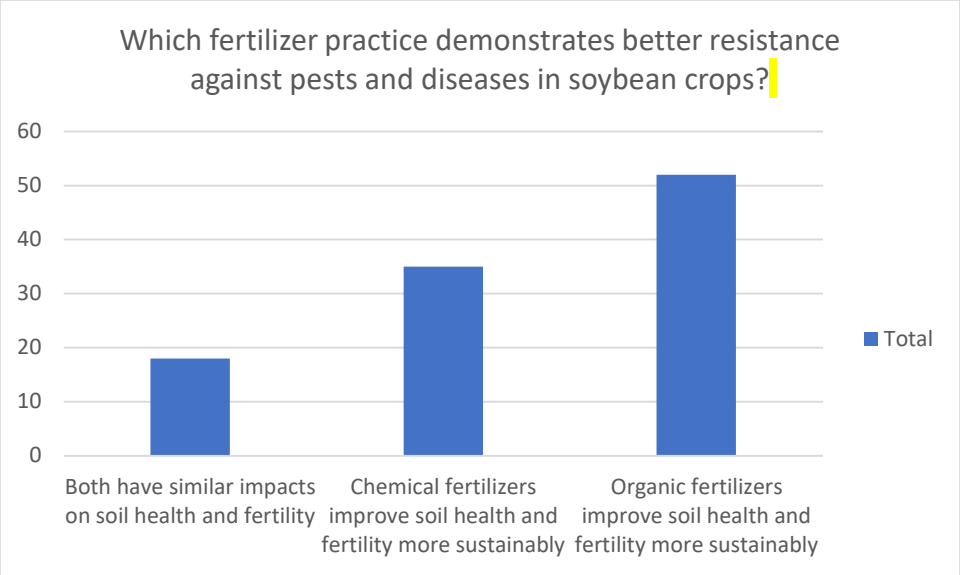
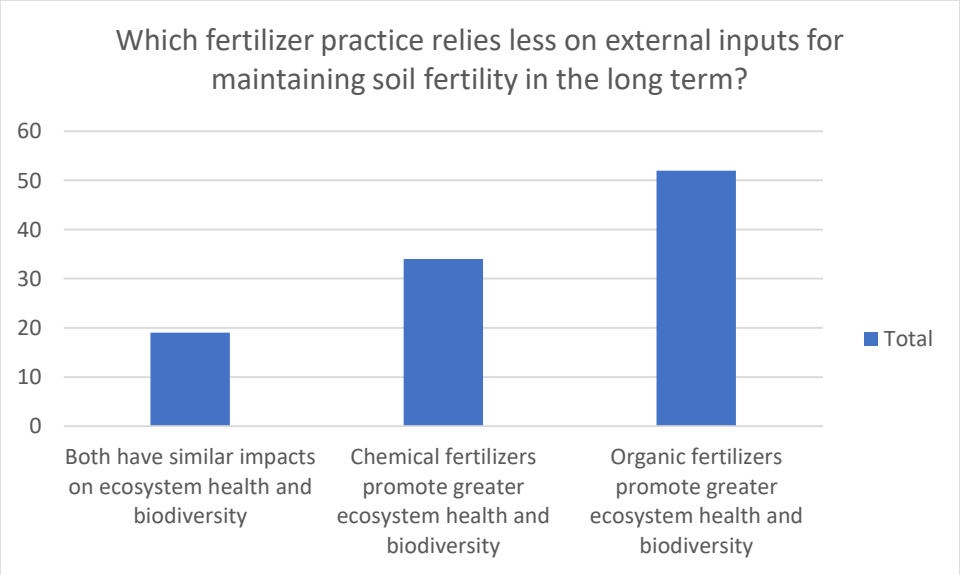
- 41 farmers prefer using organic fertilizers in their soybean farming practices.
- 30 farmers opt for chemical fertilizers.
- 34 farmers perceive both organic and chemical fertilizers to yield similar results in soybean cultivation.



- 52 farmers believe that organic fertilizers improve soil health and fertility more sustainably in soybean farming.
- 35 farmers advocate for chemical fertilizers, perceiving them to improve soil health and fertility more sustainably.
- 18 farmers perceive both organic and chemical fertilizers to have similar impacts on soil health and fertility in soybean cultivation.



- 52 farmers believe that organic fertilizers promote greater ecosystem health and biodiversity in soybean farming.
- 34 farmers endorse chemical fertilizers, perceiving them to promote greater ecosystem health and biodiversity.
- 19 farmers perceive both organic and chemical fertilizers to have similar impacts on ecosystem health and biodiversity in soybean cultivation.

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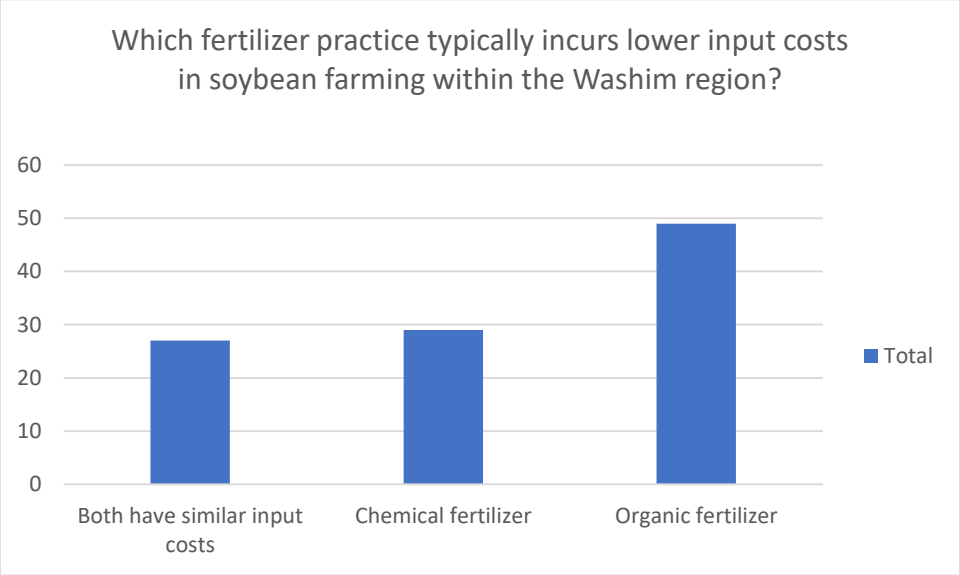
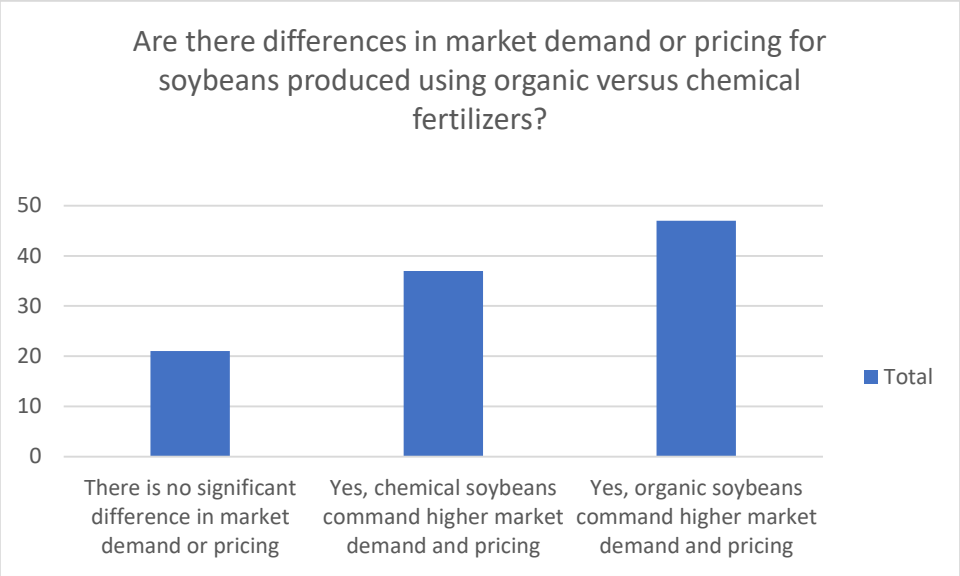


- 49 farmers believe that organic fertilizers have similar input costs or are more cost-effective compared to chemical fertilizers in soybean farming.
- 29 farmers opt for chemical fertilizers, possibly due to factors such as perceived effectiveness or convenience, despite potential higher input costs.
- 27 farmers perceive both organic and chemical fertilizers to have similar input costs, indicating a lack of significant cost differentiation between the two options in their perception.



- 47 farmers believe that organic soybeans command higher market demand and pricing compared to chemical soybeans.
- 37 farmers endorse chemical soybeans, perceiving them to have higher market demand and pricing.
- 21 farmers perceive no significant difference in market demand or pricing between organic and chemical soybeans.

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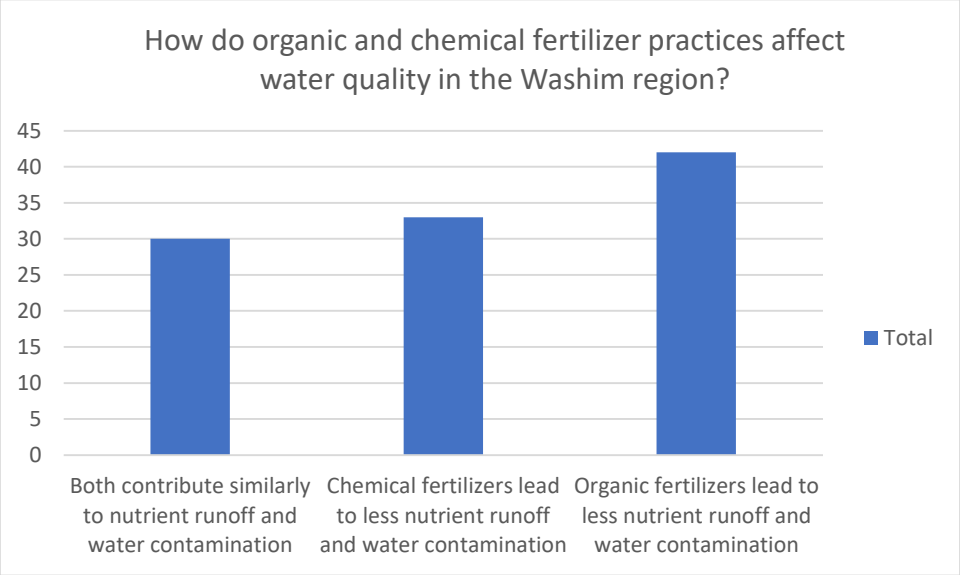
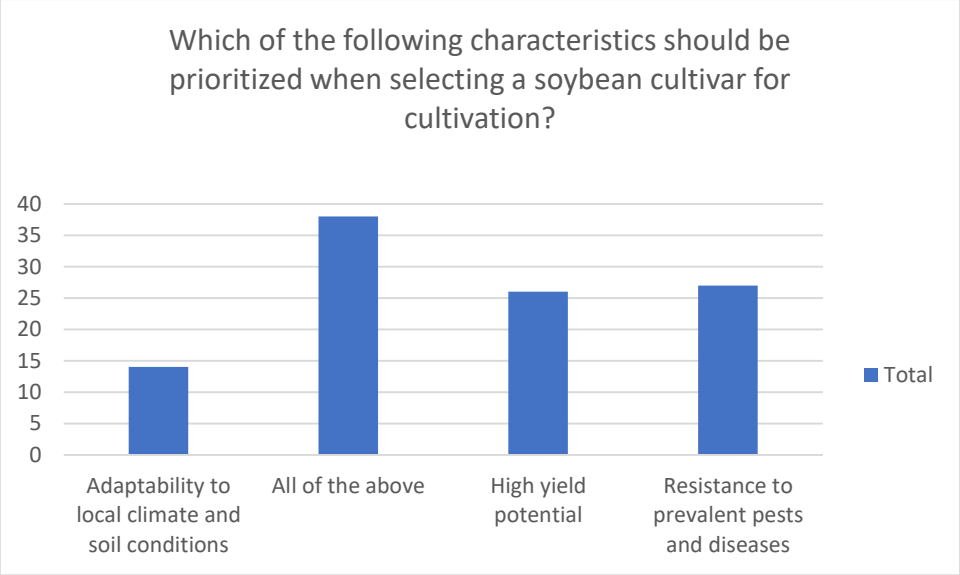


- 42 farmers believe that organic fertilizers lead to less nutrient runoff and water contamination compared to chemical fertilizers.
- 33 farmers endorse chemical fertilizers, perceiving them to lead to less nutrient runoff and water contamination.
- 30 farmers perceive both organic and chemical fertilizers to contribute similarly to nutrient runoff and water contamination.



- 38 farmers consider all of the listed factors (adaptability to local climate and soil conditions, high yield potential, and resistance to prevalent pests and diseases) when selecting soybean varieties or cultivars.
- 27 farmers prioritize resistance to prevalent pests and diseases in their selection process.
- 26 farmers prioritize high yield potential.
- 14 farmers prioritize adaptability to local climate and soil conditions.

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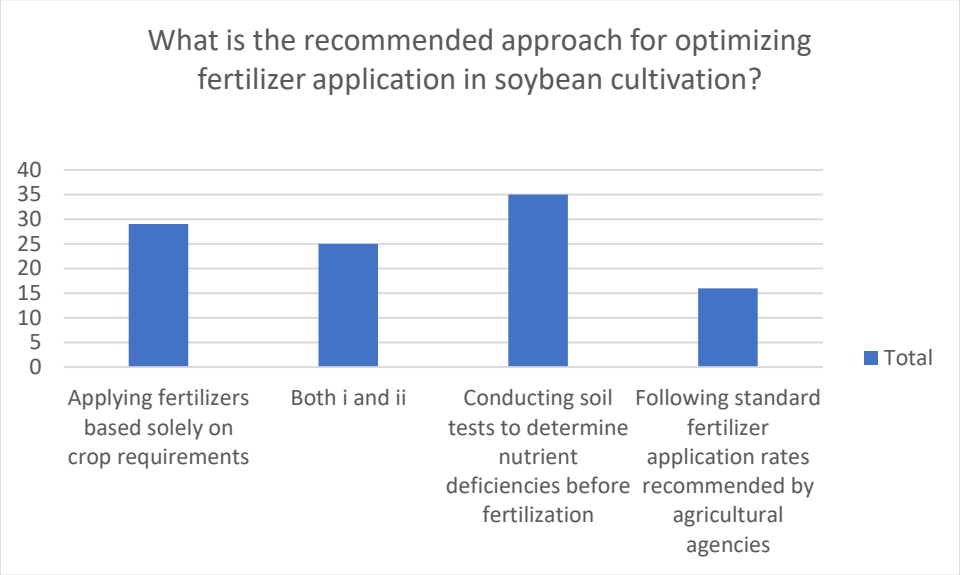
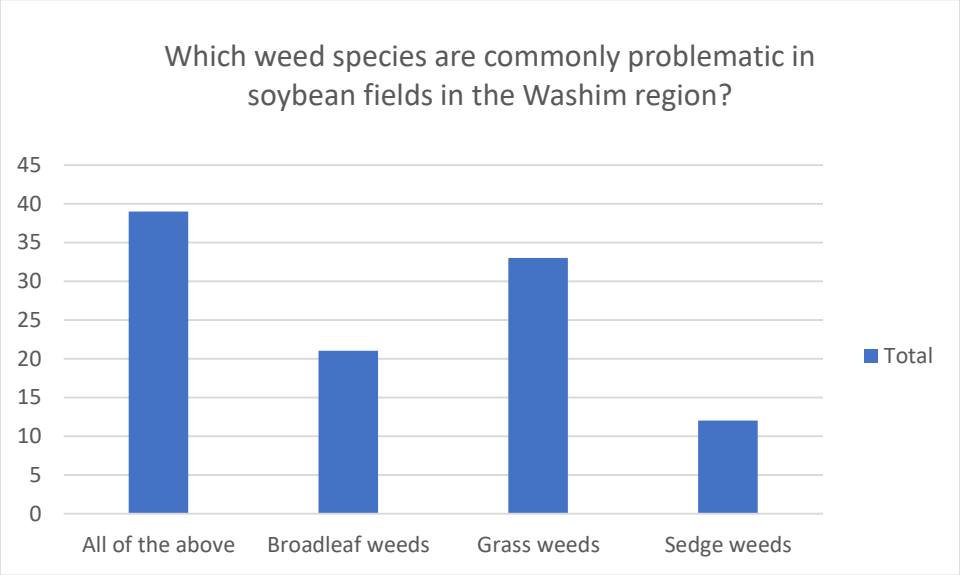


- 35 farmers conduct soil tests to determine nutrient deficiencies before fertilization.
- 29 farmers apply fertilizers based solely on crop requirements.
- 25 farmers employ both approaches of applying fertilizers based on crop requirements and conducting soil tests.
- 16 farmers follow standard fertilizer application rates recommended by agricultural agencies.



- 39 farmers employ weed management strategies targeting all types of weeds listed (broadleaf weeds, grass weeds, and sedge weeds).
- 33 farmers primarily focus on managing grass weeds.
- 21 farmers primarily target broadleaf weeds.
- 12 farmers primarily address sedge weeds.

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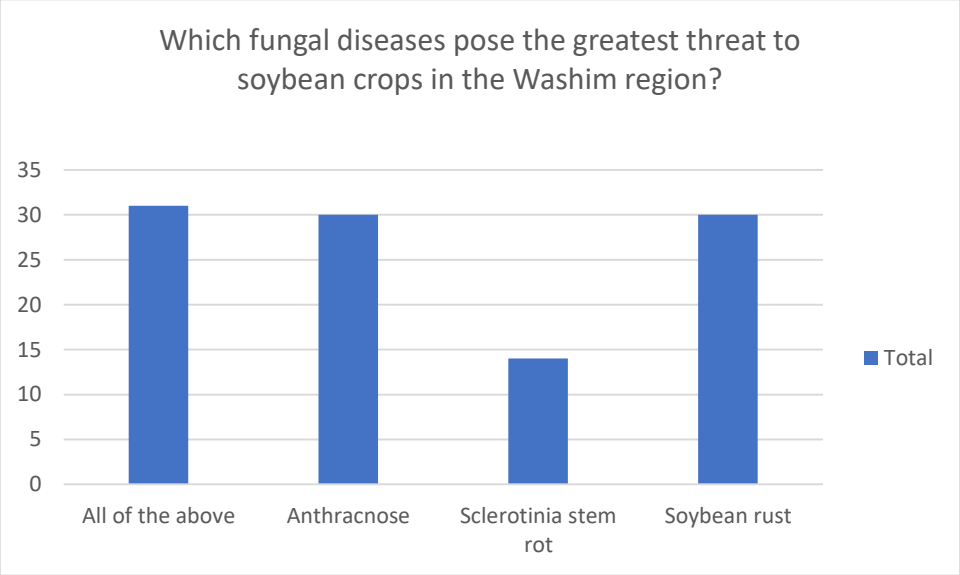
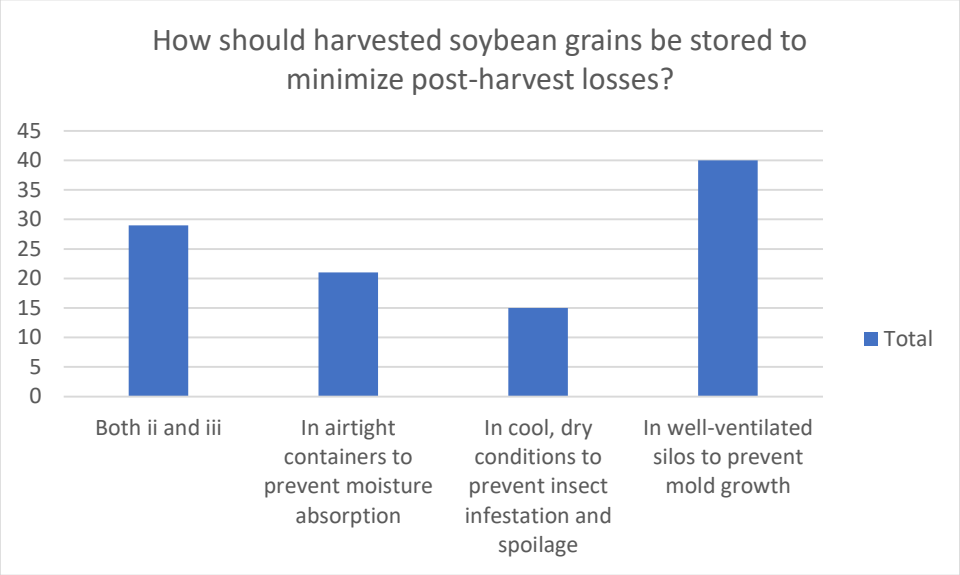


- 31 farmers employ disease management strategies targeting all types of diseases listed (anthracnose, sclerotinia stem rot, and soybean rust).
- 30 farmers primarily focus on managing anthracnose and soybean rust.
- 14 farmers primarily address sclerotinia stem rot.



- 40 farmers prioritize storing grains in well-ventilated silos to prevent Mold growth, indicating a recognition of the importance of air circulation in mitigating moisture buildup and Mold proliferation.
- 29 farmers employ grain storage methods that target both preventing insect infestation and reducing spoilage, suggesting a holistic approach to grain preservation that addresses multiple potential threats to grain quality.
- 21 farmers opt for storing grains in airtight containers to prevent moisture absorption, indicating a focus on minimizing moisture exposure and maintaining grain quality during storage.
- 15 farmers choose to store grains in cool, dry conditions to prevent both insect infestation and spoilage, highlighting the importance of environmental factors in grain storage management.

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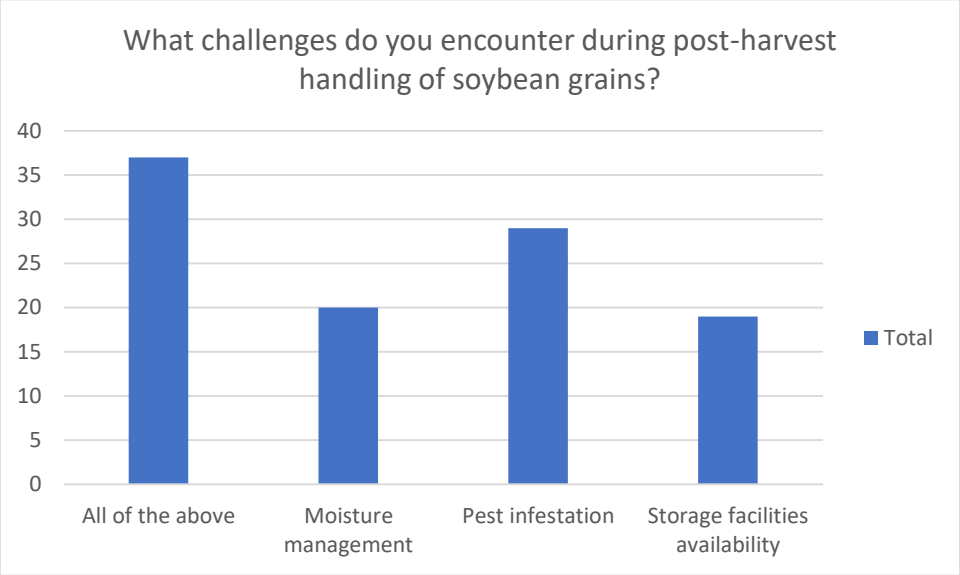
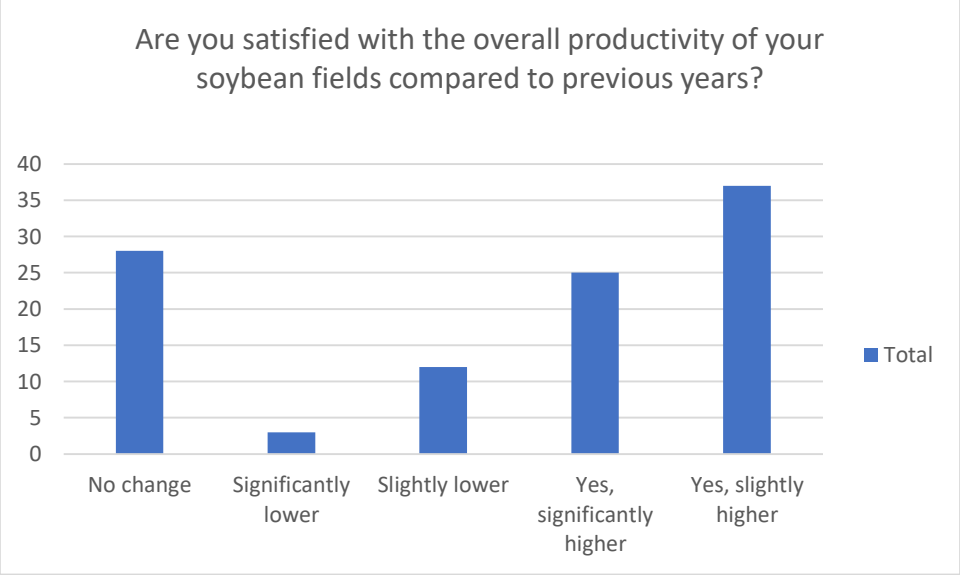


- 37 farmers prioritize addressing all listed factors, indicating a comprehensive approach to grain storage management that considers moisture management, pest infestation, and storage facilities availability.
- 29 farmers express concerns about pest infestation, highlighting the significance of pest control measures in preserving grain quality during storage.
- 20 farmers focus on moisture management, underscoring the importance of controlling moisture levels to prevent Mold growth, grain spoilage, and associated quality deterioration.
- 19 farmers are concerned about the availability of storage facilities, suggesting challenges or limitations in accessing suitable storage infrastructure for grain preservation.



- 37 farmers perceive slightly higher crop yields compared to the previous year.
- 25 farmers perceive significantly higher crop yields compared to the previous year.
- 28 farmers report no change in crop yields compared to the previous year.
- 12 farmers report slightly lower crop yields compared to the previous year.
- 3 farmers report significantly lower crop yields compared to the previous year.

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VI. CONCLUSION

In conclusion, our comparative analysis of fertilizer practices in soybean farming in the Washim region highlights the contrasting approaches of organic and chemical methods. While chemical fertilizers offer immediate nutrient availability, organic practices promote soil health and long-term sustainability. The choice between these approaches ultimately depends on factors such as cost, environmental impact, and farmer preferences, suggesting the importance of tailored strategies for maximizing yield while minimizing ecological footprint in soybean cultivation.

Suggestions

- Farmers must Transition gradually to organic practices by incorporating organic fertilizers into their existing regimen. Farmers should Experiment with different organic fertilizers and application methods to find what works best for their farm.
- Farmers should Attend workshops, seminars, or training sessions on organic farming techniques specific to soybean cultivation. They must Learn about composting, crop rotation, and other organic practices that can enhance soil health and reduce reliance on chemical inputs.
- Agriculture Universities and local government mechanism should Allocate resources towards research and development of organic fertilizer formulations optimized for soybean cultivation in the Washim region.
- Companies in Agriculture (Organic and Micro Nutrient) domain should Launch marketing campaigns to raise awareness about the benefits of organic farming practices among soybean farmers in the Washim region. They may Organize educational workshops, field demonstrations, and farmer training programs to facilitate the transition towards organic agriculture.
- Companies and their field executives may Ensure availability and accessibility of organic fertilizer products to farmers in the Washim region. Farmers could be Offered convenient purchasing options, delivery services, and bulk discounts to incentivize adoption and support the transition towards sustainable agriculture.

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