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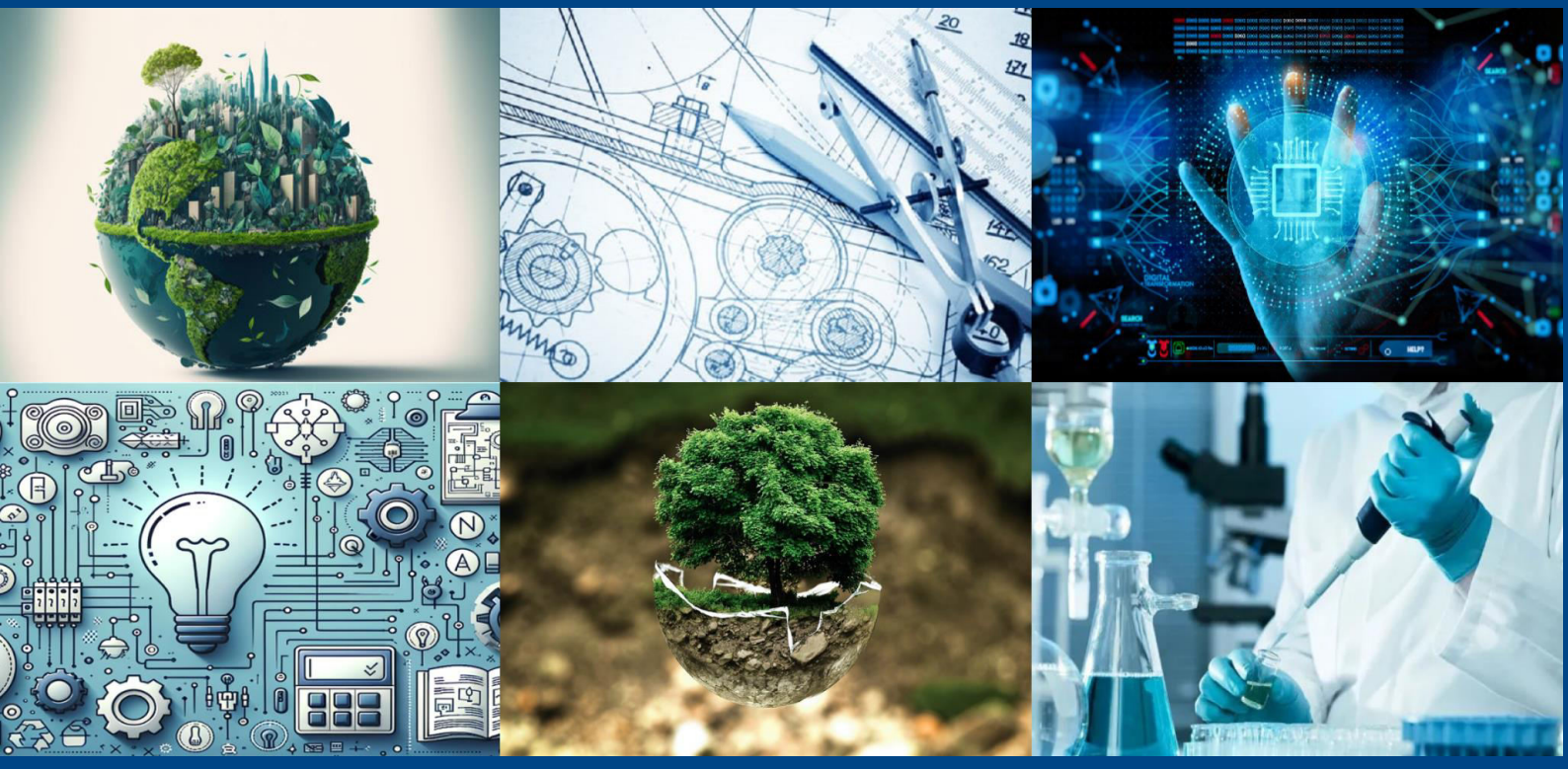

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International Seminar on Green Trends-Pioneering Environmental Sustainability (ISGTPES – 2025)

Organized by

Department of Botany, Babu Jagjivan Ram Government Degree College (Autonomous), Hyderabad, Telangana, India

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Agroecology and Zero Budget Natural Farming: A Sustainable Approach to Agriculture

Dr. Rachana

Assistant Professor, Department of Botany, Government Degree College, Ibrahimpatnam, Telangana, India

ABSTRACT: Agroecology is the study of ecology of agricultural farms which include various biotic and abiotic components that influence the agricultural production system. Zero budget natural farming is a farming practice in which external inputs are minimized like pesticides, insecticides and chemical fertilizers replaced by bio fertilizers, biopesticides and insect repellents etc and it aims of enriching the soil to sustain The diseases and pests as well as providing nourishment to the crops. Many natural methods like crop mulching, crop rotation with leguminous plants, Jeevamrutam, Agniastra, Neemastra and Brahmastra are employed to enrich the soil nutrition and maintain the sustainability of agroecosystem.

KEYWORDS: Agroecosystem, Natural farming , sustainability, Jeevamrutham etc.

I. INTRODUCTION

Agroecology is an ecological approach to agriculture that views agricultural areas as ecosystems and considers the ecological impact of agricultural practices. It is a holistic and integrated approach that applies ecological and social concepts to design and manage sustainable agriculture and food systems. Agroecology aims to optimize interactions between plants, animals, humans, and the environment while ensuring socially equitable food systems that provide people with choices regarding what they eat and how it is produced.

Zero Budget Natural Farming (ZBNF)

Zero Budget Natural Farming is a practice that minimizes the use of external inputs such as pesticides, insecticides, and chemical fertilizers. Instead, ZBNF promotes the use of bio-fertilizers, bio-pesticides, and insect repellents to enrich soil health and sustain crops. ZBNF also aims to enrich soil quality to resist diseases and pests while enhancing crop nourishment. Methods such as crop mulching, crop rotation with leguminous plants, and the use of Jeevamrutam, Agniastra, Neemastra, and Brahmastra play vital roles in achieving these goals.

Objectives

1. Promote environment-protected and climate-tolerant natural farming practices to increase soil fertility.
2. Reduce the cost of cultivation through minimal irrigation, sustainable organic methods, and better resource management to enhance farmers' incomes.

II. KEY TECHNIQUES IN ZBNF

Crop Rotation

Crop rotation helps replenish essential nutrients like nitrogen and potassium while maintaining soil structure and fertility. By rotating crops such as cereals and legumes, farmers can reduce soil depletion and mitigate the buildup of pests and diseases. Crop rotation also helps manage weed growth and improves water retention.

Mulching

Mulching involves covering the soil surface with organic or inorganic materials like straw, compost, wood chips, or plastic. This technique provides numerous benefits:

- Moisture retention
- Weed suppression

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- Temperature regulation
- Prevention of soil erosion
- Improved soil structure and fertility

Mulching feeds soil life, fostering the growth of microorganisms that improve soil structure by forming passageways for air and water. This results in better root growth, enhanced nutrient absorption, and improved crop yields.
Mulching is especially effective during dry periods as it reduces evaporation rates. Organic mulches like straw and compost slowly decompose, adding essential nutrients to the soil and enhancing overall fertility. In hot climates, mulching reflects sunlight, keeping the soil cooler and improving water retention. Additionally, mulching helps control invasive weeds that can otherwise hinder crop growth.

Jeevamrutha
Jeevamrutha is a natural liquid fertilizer made from cow dung, cow urine, jaggery, and flour. It enriches the soil with beneficial microbes that promote crop growth. This traditional Indian practice has seen renewed interest in sustainable agriculture.Preparation involves mixing 10 kg of cow dung, 10 liters of cow urine, 2 kg of jaggery, and 2 kg of chickpea flour with 200 liters of water. This mixture is fermented for 5-7 days before being applied to crops. Jeevamrutha not only enhances soil microbial activity but also boosts plant immunity and growth.

Urine-Based Biopesticides
Urine-based biopesticides are prepared by fermenting crushed green plant materials with cow urine. This bio-pesticide acts as a natural pest deterrent with disinfectant properties. The filtered liquid helps control eggs, larvae, and adult pests effectively.
Preparation includes mixing 5 kg of green plant biomass with 10 liters of cow urine and fermenting the mixture for 2 weeks. This biopesticide contains around 10% alcohol by volume, making it effective against various crop pests. In addition to pest control, the sludge obtained from the fermentation process can be used as an organic fertilizer.

Agniastra
Agniastra is a natural pesticide made from cow urine, tobacco, chili, garlic, and neem leaves. It effectively controls pests such as leaf rollers, stem borers, and pod borers. Agniastra also acts as manure, enriching the soil and enhancing plant vitality.
To prepare Agniastra, mix 10 liters of cow urine with 1 kg of crushed tobacco, 500 g of crushed green chili, 500 g of crushed garlic, and 5 kg of neem leaf pulp. This mixture is boiled thoroughly and fermented for 24 hours before use. Dilute 300-400 ml of Agniastra with 100 liters of water for large-scale application.

Neemastra
Neemastra is an organic pesticide prepared using neem leaves, cow urine, and cow dung. It controls pests like mealybugs and sucking pests. Neemastra is cost-effective, environmentally safe, and suitable for use in various farming environments.
To prepare Neemastra, crush 5 kg of neem leaves and mix with 5 liters of cow urine and 2 kg of cow dung. The mixture is fermented for 24 hours before being diluted with 100 liters of water for spraying. Neemastra acts as a powerful deterrent for common agricultural pests without harming beneficial organisms.

Brahmastra
Brahmastra is a powerful natural pesticide made from cow urine and leaves from various trees such as neem, karanj, custard apple, and castor. It effectively targets hidden caterpillars and sucking pests. Brahmastra is easy to prepare, cost-effective, and beneficial for organic farming.
Preparation involves crushing 2 kg each of neem, karanj, custard apple, castor, dhatura, and bael leaves. This paste is mixed with 20 liters of cow urine, boiled until the liquid volume is reduced by half, and fermented for 48 hours. The resulting mixture is diluted with 200 liters of water for crop spraying.

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Benefits of Agroecology and ZBNF

- Cost Efficiency: ZBNF drastically reduces costs by minimizing the need for expensive fertilizers and pesticides.
- Environmental Sustainability: Agroecological practices improve biodiversity and maintain soil health, ensuring long-term productivity.
- Enhanced Soil Fertility: Techniques like mulching, Jeevamrutha, and crop rotation enrich the soil with essential nutrients.
- Pest and Disease Control: Natural biopesticides like Agniastra, Neemastra, and Brahmastra are effective alternatives to chemical treatments.
- Climate Resilience: By improving soil structure and enhancing water retention, these practices make crops more tolerant to drought and extreme weather conditions.

III. CONCLUSION

Agroecology and Zero Budget Natural Farming offer sustainable solutions to modern agricultural challenges. By incorporating eco-friendly practices like mulching, crop rotation, and natural pest control methods such as Jeevamrutha, Agniastra, Neemastra, and Brahmastra, farmers can achieve higher yields while preserving soil health and reducing environmental impacts. Embracing these techniques will promote sustainable agriculture and ensure food security for future generations. As global environmental challenges increase, transitioning to sustainable practices like ZBNF will play a crucial role in securing food supplies and improving farmers' livelihoods.

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