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Newsletter

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हरित दृष्टि Newsletter

BIOCHAR AS A SOIL AMENDMENT

FOR IMPROVED FERTILITY AND CARBON SEQUESTRATION

Source: https://www.harrodhorticultural.com/:

Nabina Bastakoti
Agriculture and Forestry University

Biochar is a charcoal-like substance produced by the pyrolysis of organic biomass under low-oxygen conditions to improve soil health and reduce carbon emissions. Although it looks like common charcoal, biochar is made through a specialized process designed to minimize contamination and safely store carbon. Biochar is a lightweight, black material with a fine-grained texture and a highly porous structure. It has a large surface area, and around 70% of its composition is carbon. The rest comprises elements like nitrogen, hydrogen, oxygen, and others. Its chemical composition can vary depending on the type of feedstock used and the heating method applied during production.

Biochar is produced through the process of pyrolysis, which involves heating organic materials, such as agricultural residues, forestry waste, or manure, in the absence of oxygen. When these materials burn, they produce minimal or no harmful fumes.

The temperature and feedstock used during pyrolysis influence the characteristics of the resulting biochar. Low-temperature pyrolysis (300–500°C) produces biochar with higher nutrient content, while high-temperature pyrolysis (≥600°C) produces biochar with a larger surface area and greater porosity. This is primarily because the intense heat removes volatile organic compounds, increasing the volume of micro-pores in the material. Although it resembles common charcoal in appearance, biochar is produced through a carefully controlled process designed to minimize contamination and effectively trap carbon. Biochar is an exceptionally effective way to convert carbon into a stable, long-lasting form and is cleaner than other forms of charcoal.

It offers a high cation exchange capacity, which helps improve soil fertility by retaining nutrients more effectively and reducing field runoff. Over time, biochar also fosters beneficial interactions with soil microbes, enhancing soil health. It is often recommended to mix biochar with compost or other organic materials to enrich it with nutrients and beneficial microorganisms.

Biochar serves as a soil amendment to increase plant growth and yield, enhance water quality, improve soil moisture retention and availability to plants, and reduce greenhouse gas emissions. It also helps prevent nutrient leaching, lowers soil acidity, and reduces irrigation and fertilizer requirements. These properties are very dependent on the properties of the biochar and may depend on regional conditions including soil type, condition, temperature, and humidity.

The characteristics of biochar vary significantly depending on feedstock type and pyrolysis temperature. In general, biochar has an alkaline pH, is porous, contains fixed and available carbon, and may contain some nutrients. The nutrient content of biochar for plant growth is negligible, but their high cation exchange capacity improves the effects of fertilizer applications. The most important characteristics for the improvement of soil properties, such as adsorption capacity and water retention are largely due to its porosity and surface area. When biochar is applied to the soil, it serves as a long-term carbon sink, securely storing carbon for potentially hundreds or even thousands of years. This unique characteristic makes it a promising tool for mitigating climate change while enhancing the resilience of agricultural systems. However, Biochar applied at high rates may negatively affect earthworm and other beneficial worm survival rates in the soil. This underscores the need for careful management and application strategies to maximize its benefits while minimizing potential risks. Although biochar offers great potential for mitigating climate change and improving the resilience of the agricultural sector, a significant knowledge gap exists regarding its costs and benefits. Further research and field trials are essential to fully understand its long-term effects and to guide its sustainable use in agriculture.

In conclusion, biochar offers exciting potential for tackling climate change and supporting sustainable agriculture. Its ability to improve soil health, boost fertilizer efficiency, and store carbon for the long term makes it a valuable resource for creating more resilient farming systems. Addressing the existing gaps, biochar could become a key part of the solution for building a more sustainable and productive future in agriculture.

AGROTOURISM IN GULMI

Nisha Bhandari
Agriculture and Forestry University

Agrotourism is the combination of agricultural activities and tourism. Agrotourism involves the various activities related to agriculture like feeding, milking of animals, production of the crop packaging, honey making, nursery management, rearing of earthworm, horse riding, etc. It is a type of vacation in which tourists visit farms and acknowledge the farming system and other ongoing activities by which tourists interested in agriculture are involved in local production and management. It is the fastest growing segment of the travel industry that offers visits to agricultural industries, working in farms, buying organic products, enjoying healthy and nutritious fruits, entertainment with local culture, education, relaxation, outdoor adventures, picking fruit, feeding animals, etc. Agro Tourism in Nepal is one of the most popular ways of doing tourism in Nepal to improve the economic condition of rural communities. The farmers of Nepal are getting a better chance to learn new techniques for agriculture from the farmers of other countries on Agrotourism Nepal programs. The hardworking farmers work in the field by singing the local songs (Asare geet). Rice, maize and wheat are the main crops in Nepal. Along with this, Nepal is rich in culture, nature and natural resources.

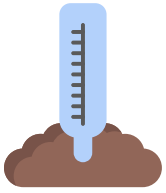
Gulmi, located in the hills of western Nepal, is well-known for its beautiful landscapes and rich farming traditions. The district combines traditional farming with stunning rural scenery, making it a great spot for agritourism. This unique blend helps promote tourism and agriculture while supporting the area's socio-cultural growth. One of Gulmi's main attractions is its coffee production, earning it the nickname "coffee capital of Nepal." Visitors can explore coffee plantations, watch the harvesting process, and enjoy freshly brewed coffee. In addition to coffee, tourists can take part in organic farming activities like harvesting vegetables, plowing fields with oxen, and planting seeds using traditional methods. These activities provide a hands-on experience of sustainable farming. Visitors can also enjoy cultural homestays, where they stay with local families, try traditional Nepali food, and join in festivals such as Maghe Sankranti. For adventure lovers, Gulmi offers scenic hiking trails through forests and terraced fields, showcasing amazing views and a variety of plants and wildlife.

The district's unique rice varieties and historical significance add to its appeal. Gulmi is home to several important religious and historical sites. Ruru, also known as Ridi, is a famous holy place and bustling market center. Resunga is another sacred location, known not only for its spiritual importance but also for its role in supporting the local ecosystem. Other popular spots include Wami, Aanpchar, Charpala Darbar, and Ismakot, which combine natural beauty with cultural history.

To fully develop agrotourism in Gulmi, better infrastructure is essential. Improved roads, communication systems, and accommodations will make visiting these agricultural and scenic places more convenient. With proper investment, Gulmi can become a top destination for agritourism, offering a perfect mix of nature, culture, and farming.

Factors responsible for soil fertility

Soil pH: Soil pH is a major factor affecting nutrient access and microbial action on the same. The pH scale that most crops grow best at fall between 6 and 7.5, while values that are on either sides affects the uptake of nutrients and minerals.



Organic Matter: Compost helps in water conservation, acting as a source of nutrients to plants and encourages the presence of soi life in the garden. But above all it is very important in the structure of soil and preventing its erosion.

Cropping Patterns: This means that the various cropping systems like crop rotation and intercropping that enhance nutrient cycling prevent nutrient depletion, check pests, and diseases and improve on the soil structure.

Soil Microorganisms: Favourable soil microorganisms encompass bacteria, fungi and actinomycetes, which has the duty of cycling nutrients, breaking down organic matter and improving plants nutrient intake thus promoting fertility.

PEST MANAGEMENT BY MODIFYING INSECT DEVELOPMENT AND BEHAVIOUR

Prativa Acharya
Agriculture and forestry university

In the realm of pest management, a paradigm shift towards sustainable and eco-friendly practices is gaining momentum. Innovative approaches involving modifying insect development and behaviour to tackle pest-related challenges effectively. Those methods not only prove beneficial for agriculture by safeguarding crop yields and quality but also aids in preserving the delicate balance of ecosystems. Through targeted insect behavior modification, we can address pest issues in a precise and environmentally responsible manner, minimizing the collateral damage often associated with conventional pest control methods.

PEST MANAGEMENT BY MODIFYING INSECT DEVELOPMENT

The principal hormones involved in these life processes include brain hormone, ecdysone, and juvenile hormone. Neurosecretory cells in the back of the insect brain (in the location of the secret brain hormone that links environmental stimuli with other hormone systems. When brain hormone is present in the blood, the prothoracic gland is stimulated to secrete ecdysone, which causes the insect to molt.

The body form of the insect after the molt is determined by the concentration of juvenile hormone from the corpora allata in the blood. Significant modifications in the balance among the principal hormones causes aberrations and malformations of body structures.

INSECT GROWTH REGULATORS: Insect growth regulators (IGRs) are also known as biorationals, or third-generation insecticides, to reflect their environmental safety and advanced development (first-generation insecticides are the stomach poisons, and second-generation insecticides are the contact poisons). IGRs interfere with embryonic, larval and nymphal development, and disrupt metamorphosis and reproduction. They are highly selective to insects and arthropods, but because they kill through disruption of growth and development, they take more time to reduce insect populations than conventional insecticides.

Examples of IGRS: Methropene, Hydropene, Kinopene, Pyriproxyfen, Diofenolan, diflubenzuron, lufenuron, buprofezin, Hexaflumuron, Tebufenozide, Methoxyfenozide, Halofenozide, etc.

PEST MANAGEMENT BY MODIFYING INSECT BEHAVIOUR

Behavior is the way in which organisms adjust to and interact with the environment. Insects engage in intricate interactions within their species and the environment, including mating, host finding, and avoidance of natural enemies. These

behaviors often involve attraction, repellency, stimulation, and deterrence, mediated by chemicals known as semiochemicals, which include pheromones and allelochemicals. Various strategies for pest management through behavioral manipulation, focusing on techniques involving sensory stimuli to control insect populations emphasizes the use of light traps, pheromones, allelochemicals, deterrents, repellents, stimulants, and genetic markers like the green fluorescent protein (EGFP) from jellyfish. These methods aim to disrupt mating, oviposition, feeding, and other behaviors crucial for pest survival and reproduction. By exploiting insects' sensory systems and genetic traits, such approaches offer environmentally friendly alternatives to traditional insecticides. The use of EGFP as a genetic marker highlights advancements in understanding and manipulating insect behavior for more effective pest management practices .

DIFFERENT KINDS OF PHEROMONES: Sex pheromones, Alarm pheromones, Trail pheromones, Aggregation pheromones , oviposition deterring pheromones etc.

MECHANISM: There are various hypotheses explaining how the use of synthetic pheromones disrupts insect sexual communication to prevent mating. these hypotheses include false-plume following, camouflage, desensitization, and sensory imbalance. False-plume following occurs when males are distracted by competing synthetic pheromone sources, reducing their visitation rate to calling females. Camouflage suggests that synthetic pheromones obscure the boundaries of female pheromone plumes. Desensitization involves decreased sensitivity to pheromones due to continuous exposure including adaptation and habituation. Sensory imbalance posits that altering the natural pheromone component ratio with synthetic ones disrupts the oriented response in males. This analysis is based on studies aiming to determine the operative mechanisms of mating disruption.

Application of Pheromones include detection and monitoring, mass trapping ,attract and kill , mating disruption. Using chemicals to alter insect development and behavior presents a novel strategy for controlling insect populations. These chemicals offer several benefits, notably environmental and human safety.

Consequently, significant research efforts are focused on enhancing their effectiveness. While many of these compounds are still in development, their widespread adoption remains uncertain. To be successful, they must meet established standards by effectively reducing insect populations, working well with other control methods, and being economically competitive with traditional insecticides

SUCCESS STORY OF VERMI VISION

Mr. Ekraj Giri, a hardworking farmer from Haldibari Rural Municipality, has always had a deep connection with nature and an unwavering love for the soil he works with. However, he grew increasingly anxious about the rising use of chemical fertilizers in agriculture. Concerned about their detrimental effects on soil health and the environment, he often pondered the need for a change in farming practices. Yet, he felt helpless and lacked the resources and knowledge to initiate the transformation he envisioned for his community.

A ray of hope appeared when he came across a notice about the Vermi Vision Program. Excited by the opportunity, he eagerly joined the program, which introduced farmers to the art of producing nutrient-rich vermicomposting using nature's little helpers—earthworms, often called "the farmer's best friends." The program turned out to be a life-changing experience for Ekraj. He not only learned the scientific methods of vermicomposting but also realized its potential to revolutionize traditional farming practices. Inspired and equipped with practical knowledge, he embraced this eco-friendly alternative to chemical fertilizers.

He said, "Our land has been degraded and lost its natural form. Our soil was once very productive, but now it feels lifeless. I am delighted to learn about vermicomposting, which is something I have been eager to learn. I think of Earthworm as a friend, and I enjoy when it converts waste into enriched fertilizer."
Ekraj wasn't just alone. Along the way, sixteen more farmers established vermi-compost pits and adopted sustainable farming practices. Ekraj cultivated spinach, garlic, and cole vegetables in his kitchen garden using vermi-compost. His expectations were exceeded by the outcome, saplings grew swiftly and healthily than ever before.

"This is just the beginning", he said, his eyes gleaming with hope. "I plan to expand my vermi pits to further reduce the need for chemical fertilizers. I want to bring life back to my farm and show others that we don't need to harm the soil to grow good crops."
Today, Ekraj stands as a proud advocate for sustainable farming. He often shares his knowledge and experience with neighboring farmers, spreading the benefits of vermicomposting. Through his determination and the power of vermicomposting, Ekraj is proving that change is small sometime; with just a one step forward and just with a tiny earthworm.

HOW ANCIENT AGRICULTURAL TECHNIQUES CONTRIBUTE TO SOIL HEALTH AND CLIMATE ADAPTATION?

Samiksha Pathak
Agriculture and forestry university

While the modern agricultural techniques focus on commercialization of agriculture and practices of monoculture on a large scale, ancient agricultural practices believed in mixed cropping, subsistence agricultural practice that included all types of crops being managed in a given piece of land.

The ancient agricultural practices not only include intercropping and polyculture but also mixed cropping, relay cropping and such. Intercropping refers to multiple cropping practice in which two or more crops are simultaneously grown in different rows in the same field at the same time. Polyculture is the system where two or three crops are grown either in succession or sequence or association for entire period of their lifecycle on the same piece of land by using high input without affecting basic fertility of soil.

The modern technique of commercial agriculture that practices monoculture is not proving to be better for the soil health and also not so applicable from climate adaptation point of view. The single crop grown repeatedly over a large area absorbs same type of nutrients each time they are grown. This leads to continuous depletion of some kind of nutrients while the others are not used or utilized by the plant. The plant roots penetrate the soil to the single or same soil depth range and the tillage and soil manipulation practices are also practiced on the same depth as per the plant requirement which may lead to soil structure deterioration at certain soil depth while hardpan formation below that soil level. There is also imbalance in water absorption as the same crops are continuously grown. The practice of multiple cropping, mixed cropping or relay cropping utilises the soil moisture as the plants with higher water requirement can be followed by lower water requiring crops.

Plants that are grown together in polycultures and intercropping have different root systems, penetrate different root zones and create diverse soil channels, improving aeration and water infiltration. Plants with varied nutrient requirements and nutrient contribution (by legumes fixing nitrogen) reduce the risk of soul nutrient depletion while enriching the soil with organic matter.

Planting different crops together reduces the risk of complete failure of crop due to climate mishaps, disease or pest outbreak; reduces the risk of pest incidence, naturally distrupts the pest cycle and also minimise the chemicals used to control these insects, pests, diseases saving money, protecting soil, water and environment.

Polyculture provides a safety net against crop failure due to extreme weather, as different plants respond differently to climate stressors. Intercropping also shades the soil, reducing evaporation and optimize water use by different root depth. Polyculture also allows crops with low moisture requirement to thrive on residual moisture. Diverse cropping systems can sequester more carbon in the soil, helping mitigate climate change.

The traditional Native American practice of Three Sisters Agriculture (Maize, Beans, Squash) combines nitrogen fixing beans, tall maize and ground covering squash to build healthy resilient soils. Intercropping trees with crops stabilizes soil, enhances organic matter and reduces wind and water erosion.

These ancient practices remain relevant today, offering sustainable solutions to modern agricultural and environmental challenges.

DID YOU KNOW?

Soil has a memory. It holds traces of past environments, organisms, and climate changes, acting as the Earth's living archive of history

DID YOU KNOW?

The soybean oil from one bushel of soybeans will make 2,112 crayons.

DID YOU KNOW?

A single earthworm can process up to 1 ton of soil annually, enriching it with nutrients and improving plant growth.

VEDIC ORGANIC FARMING FOR SUSTAINABLE SOIL MANAGEMENT

Satya Bhattarai
Permaculturist
MSc. Agriculture (soil science)

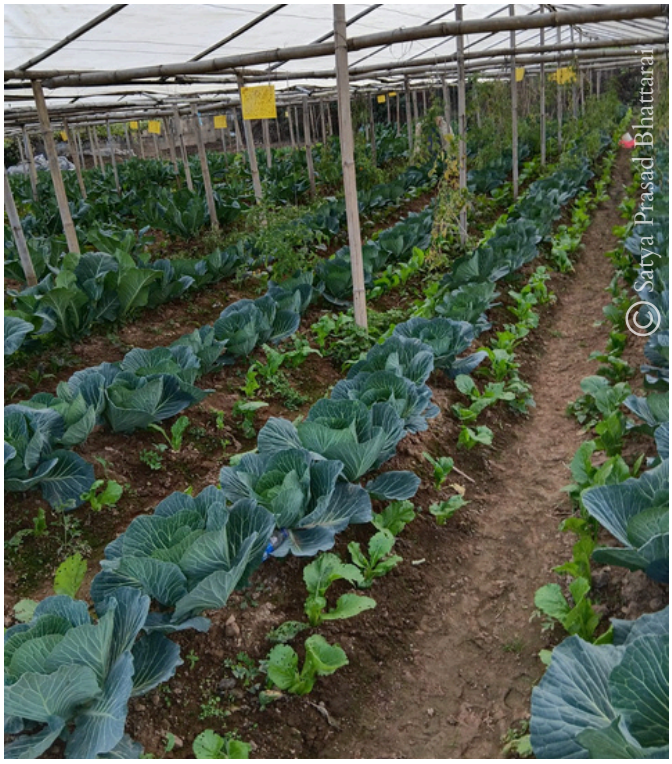
Vedic Farming" is a holistic approach aimed at purifying the ecosystem. It emphasizes the important roles of plants and animals as basic inputs in the farming process. Items like ghee, milk, honey, dung, and botanical extracts are derived from them. The concept of Vedic Farming is found in various scriptures written by prominent sages such as Kashyapa Maharishi, Maharishi Parashara, Maharishi Vashishtha, and Acharya Charaka, who recognized the divine interconnectedness of nature and its elements. References to Vedic Farming can be found in ancient texts like Krishi Parashara by Maharshi Parashara, a grandson of Maharshi Vashishtha (which consists of 243 verses), and Vrikshayurveda by Surapala. The significance of crops, their classification, and their uses are discussed in texts such as Susruta Samhita, Taittreeya Samhita, Ayurveda Mahadodhi, Charaka Samhita, Brahman Samhita, and Atharvaveda. These ancient works provide a comprehensive theory of agriculture, designed to benefit farmers when properly implemented. They cover all aspects of farming, including meteorological observations, farm management, livestock care, agricultural tools, seed collection and preservation, ploughing, and every process involved from field preparation to harvesting and storing crops(Guduru, n.d.)

Features of Vedic organic farming

1. Environmental Purity: Vedic Organic Farming stresses the preservation of the environment by eliminating harmful chemicals and promoting eco-friendly practices. This system encourages biodiversity, reduces soil erosion, and fosters a balanced ecosystem (Rao, 2006).
2. Purity of Soil: The practice ensures the fertility and health of the soil by using natural methods such as composting, mulching, and crop rotation, which enhance the soil's nutrient content without degrading its structure (Bisht & Chauhan, 2011).
3. Purity of Water and Air: By refraining from using synthetic agrochemicals, Vedic Organic Farming helps to maintain clean water and air, preventing contamination of natural resources (Jadhav, 2012).
4. Purity of Food Quality: Vedic Organic Farming produces food free from artificial additives, pesticides, and herbicides, ensuring high-quality, nutrient-rich food for consumers (Bhatt et al., 2015).
5. Societal Purity: This approach fosters social responsibility by promoting fair trade practices, sustainable livelihoods for farmers, and the ethical treatment of labor (Pachauri, 2014). It emphasizes the importance of community welfare and supports sustainable rural development.
6. Adherence to Natural Laws: The system follows the natural laws of nature, aligning agricultural practices with the rhythms of the Earth, such as lunar and solar cycles. This method, based on balance and respect for nature, ensures sustainable agriculture and ecological health (Saxena, 2009).

Role of Vedic farming for sustainable soil management

Vedic organic farming plays a vital role in sustainable soil management by utilizing eco-friendly practices to maintain soil health and agricultural productivity. Unlike conventional farming, which depends on synthetic fertilizers and pesticides, organic farming integrates natural methods such as composting, green manuring, crop residue recycling, bio insecticide, bio pesticide and the use of bio-fertilizers and vermicomposting. These techniques enhance the physical, chemical, and biological properties of soil, ensuring its long-term fertility and sustainability (Bordoloi, 2021). A critical principle of Vedic organic farming is the enhancement of soil organic matter, which improves soil structure, water retention, and nutrient availability. Organic amendments like farmyard manure (FYM) and composted animal waste enrich the soil with essential nutrients while minimizing nitrate leaching and increasing microbial biomass. For instance, the application of FYM in Meghalaya has been shown to improve crop yield and soil nutrient status significantly compared to conventional practices (Bordoloi & Islam, 2020). Green manuring and crop rotation, which involves incorporating green plant material into the soil, is another vital practice in vedic organic farming. It boosts soil organic matter, enhances nitrogen fixation, restricts weed growth, and promotes soil tilth. Leguminous crops such as cowpea and mung bean are particularly effective, contributing to nitrogen enrichment and serving as excellent sources of mulch (Bordoloi, 2021). Bio-fertilizers, such as PSB and rhizobium which contain beneficial microorganisms, are fundamental to Vedic organic farming. These microorganisms aid in nutrient cycling, organic matter decomposition, and improving the soil's



carbon-to-nitrogen (C/N) ratio. Additionally, they enhance plant growth by secreting growth hormones and vitamins, increasing tolerance to drought, and inducing resistance to diseases. These features make bio-fertilizers an essential tool for sustainable soil management (Singh et al., 2015). Vermicomposting complements these practices by converting organic waste into nutrient-rich compost through earthworm activity. This method provides essential macro- and micronutrients to the soil, enhances aeration, and boosts microbial activity. In Northeastern India, vermicompost applications have demonstrated significant improvements in crop yields and soil health (Bordoloi, 2020).

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धान खेतमा माछा पालन सदिगो कृषि प्रवर्द्धनको एक नमूना

निमेश गिरी

धान खेतमा माछा खोज्दै मार्दै हिड्ने चलन नेपालमा नौलो होइन तर व्यवसायिक रुपमा धान खेतीसंगै माछा पालन भने अझै नौलो रुपमा लिइन्छ । चिनको सान्धी प्रोभिन्सको उत्खनन्मा भेटिएको पुरातात्विक लिखित दस्तावेजले धान खेतमा माछा पालनको इतिहास २००० वर्ष पुरानो (वान डाइनेस्टि) रहेको देखाएको छ । भारत लगायत दक्षिण पुर्वी एशियाली मुलुकह रुमा १५०० वर्ष अगाडी देखी नै धान-माछा खेतिको सुरुवात भएको देखिन्छ । यस्को इतिहास धेरै पुरानो भएता पनि नेपालमा भने यो प्रविधी वि.स. २०२९ साल तिर भित्रीएको हो । हाल नेपालको चितवन, कास्की , भक्तपुर, धादिङ, गोरखा, नुवाकोट, तनहुँ, स्याङ्जा, मकवानपुर जिल्लाहरुमा अभ्यास गरिदै आएको छ ।

धान खेतमा माछा पालन भन्नाले धान खेतमा माछा राखी धान बालीसंगै गरिने माछा खेतिलाई जनाउँछ । यस परिभाषा भित्र माछा भन्नाले खेतमा बढ्न र हुर्कन सक्ने सबै प्रकारका खाना योग्य जलचरहरु जस्तै माछा ,ताजा पानीको प्राउन , गंगटा, कछुवा, भ्यागुता , र केहि कीरा फट्याङ्गा समेतलाई बुझ्नुपर्छ । यो प्रणालीमा एकैपटकमा धान सँगै माछा खेती वा एउटै जग्गामा धान पछी माछा खेती पर्दछ । वा एउटै पानीलाई उपायोग गर्ने गरी भिन्दा भिन्दै जमिनमा धान र माछा खेती समेतलाई यस खेती भित्र राखिन्छ । “जहाँ पानी त्यहाँ माछा” को अवधारणा अनुसार धान खेतिमा खेर जाने पानीलाई प्राकृतिक आहारा र ठाउँको अझ बढी सदुपयोग गर्न धान खेतिमा माछा पालन एक निर्विकल्प खेती प्रणाली को रुपमा लिन सकिन्छ ॥ धान -माछा खेती प्रणाली मार्फत धान उत्पादन वृद्दी गर्न सकिन्छ । अध्ययन अनुसार यस प्रणाली मार्फत धानको उत्पादकत्व १५% सम्म वृद्दी हुन्छ ।

माछाले धानमा लाग्ने केहि किरा फट्याङ्गाको लार्भा खाएर रोगको प्रकोपलाइ कम गर्छ । कृषि क्षेत्र रासायनिक विषादिको विकल्प खोजिमा रहेको बेला यो जैविक किट नियन्त्रण पद्दति वातावरण मैत्री अभ्यास हो जसले उत्पादन लागत र स्वस्थकर खाद्यन उत्पादनमा टेवा पुर्याउँदछ । माछाले माटो तथा धानको बोट चलाइराख्ने हुँदा धानको बोटमा गोड्ने काम भै उर्बरा शक्ति बढाइ बोट गाँजिलो र माछाको बिस्टा तथा माछालाइ दिइ खेर गएको दाना मलको रुपमा प्रयोग भै धानको उत्पादन वृद्दि हुन्छ । माछाले लेउ र् झारपात नियन्त्रण गरि बालिको लागि आवश्यक पर्ने प्रकाश र पोषण तत्वको उपलब्धतामा अभिवृद्दि गराउँछ ।

ठाउँको छनोट र पानिको व्यवस्थापन

माछा पालन गर्ने धान खेतको छनौट गर्दा आफुले निगरानि राख्न सक्ने ठाँउ हुन् पर्दछ । पानि अड्ने लिसाइलो,मोलिलो र ६.५ देखि ९ पि.एच भएको माटो हुनु पर्दछ । पानिको स्थायि श्रोत र सिचाइको राम्रो व्यवस्था भएको हुनु पद्छ । पानिको तापक्रम २५-३० डि.से हुनुपर्दछ र् स्थिर तापक्रम उपयुक्त हुन्छ। सबै भन्दा महत्वपुर्ण कुरा बाढि आउने खेतमा मत्स्यपालन गर्न हुदैन् किनकि बाढिले पालिएका माछा र सम्पुर्ण धान नै बगाई दिन सक्छ ।

आलिको निर्माण

धानखेतमा पानिको गहिराई बढाउन डिल वा आलि चौडा र अग्लो गरि मजबुत बनाउन पर्छ । माछा पाल्ने धानखेतको आली ४०-५० से मी सम्म अग्लो र ३०-४० सिमी चौडा हुनु पर्दछ।यसो हुदा आलि मजबुत हुनुका साथै अग्लो डिलबाट खेतका माछाहरु उचाइ नाघेर जान सक्दैनन् । आलि बनाउने माटो हामिले माछाको आश्रय स्थल बनाउदा निस्कने माटोलाइ प्रयोग गर्न सक्छौं।

ट्रेन्चको निर्माण

ट्रेन्च भनेको धान खेत भित्र माछालाइ विभिन्न जोखिमको बेला सुरक्षित राख्न निर्माण गरिने एक प्रकारको नाला वा कुलो हो । पोखरीको चारैतिर आलिको करिब २ फिट पर १ फिट गहिरो र २ फिट जति चौडाई भएको ट्रेन्च खन्नु पर्दछ अथवा खेतको कुनै एक स्थानमा खाल्डो खने पनि हुन्छ जसले गर्दा खेतमा पानि सुक्दा वा बाली भित्र्याउँने बेलामा खेतको पानी सुकाउँदा उक्त ट्रेन्च अथवा खाल्डोमा पानी सुकेको हुदैन र त्यहाँ माछा सुरक्षित किसिमले रहन्छ ।ट्रेन्चको एक छेउमा सिंचाइको प्रवेश र अर्को छेउमा पानि निकासको व्यवस्था मिलाउन पर्दछ ।नेपालको विभिन्न स्थान्मा गरिएको अध्ययन बाट धान् खेतको लम्बाई समानान्तर हुने गरि बनाइएका ट्रेन्च हरु धान र माछा उत्पादनको दृष्टिकोणले सबैभन्दा उपयुक्त पाइएको छ।

पानीको प्रवेश तथा निकास

धान खेतमा माछा पालन गर्दा पानी को व्यवस्था का लागि प्रवेश ढोका र निकास हुन पर्छ तर ध्यान दिन पर्ने के छ भने यो सिधा हुनु हुदैन जसले गर्दा खेतमा लगाएको पानी सिधै बाहिर नगई खेतको पानी सँग मिसिएर चारैतिर घुम्न पाउँछ ।त्यसैगरी खेतमा उत्पन्न भएको प्राकृतिक आहाराहरु पनि सिधै बगेर जान सक्दैन । धान खेतमा राखेको माछालाई बाहिर भाग्न नदिन तथा वर्षायाममा थुप्रै स्थानिय माछा लगायत कीरा फट्याङ्ग्रा,भ्यागुताको प्रवेशलाई नियन्त्रण गर्न र कुलोमा बगि आउने झारपातको अनावश्यक आवत जावतलाई नियन्त्रण गर्न पानीको प्रवेश र निकाशद्वारमा जालि लगाउनु पर्दछ ।

धान खेतको तयारी

माछा पाल्ने धानखेत माछा राख्नु १०-१५ दिन अगावै तयार गर्नु पर्दछ र कम्पोष्ट बनाएको गोबरमल,रसायनिक मल,बंगुर तथा कुखुराको मल आदि बिशेषज्ञ ले सिफारिस गरे अनुसार खेतमा प्रयोग गर्दा धान् र माछा दुबै खेतिलाई लाभदायक हुन्छ ।यि मलको प्रयोगले माछालाई प्राकृतिक आहाराको उत्पादन हुन्छ।

धान रोप्ने तरिका

ब्याड बाट उखेलेको धानको विरुवाको जरालाई धान रोप्न भन्दा १ घण्टा अगाडि विभिष्टिन (द्यभखष्कतष्लभ) को झोलमा (१ ग्राम प्रति लिटर पानीमा) डुबाइ राख्न् पर्छ। ति विरुवालाई बोट देखि २०-२५ से.मी को दुरिमा सिधा लाइनमा रोप्नु पर्दछ । प्रत्येक गाभामा ३- ४वटा मात्र विरुवा रोप्नु पर्दछ । धानको विरुवालाइ राम्ररी सप्रन दिन धान रोपेको दिन देखि १ महिना सम्म पानीको सतह ८-१० से.मी राख्न पर्दछ । त्यसपछि विस्तारै पानिको सतह १५-२० से. मी सम्म पुर्याउनु पर्छ ।

धानको उपयुक्त प्रजाति

धान सँग माछा पालन गर्दा धानको प्रजाति धेरै पानी खप्न सक्ने, पानी जमिरहेको ठाउँमा नढल्ने कडा

डाँठ भएको हुनुपर्छ ।यिनिहरु ढिलो पाक्ने ,मध्यम होचो र पातहरु नलत्रने र कम छायाँदार भएको जात हुनु पर्दछ । उपयुक्त धानका जातहरु: सावित्री,मसुलि, राधा,वर्षे-२, वर्षे-४,जानकि , कंचन

धान खेतमा पालिने माछाको जात

नेपालमा कमनकार्प र टिलापिया जातका माछा धान खेतमा माछा पालन को लागि सिफारिस गरिएको छ। धान खेतमा पानीको गहिराई कम हुने हुँदा पानीको तापक्रम बढ्न जाने र अक्सिजन कम हुने समस्या हुन्छ । कमनकार्प यि समस्या विच पनि छोटो अवधिमै विक्री गर्ने गरि तयार हुन्छ । यसका अतिरिक्त यो माछाले आहाराको खोजिमा धानको बोट चलाउने हुदा गोड्ने काम भै बोट पनि फस्टाउछ ।

माछाको भुरा कहिले छोड्ने?

धान रोपेको १५- २० दिन पछि २५-५० ग्राम साइजक भुराहरु खेतमा छोड्न सकिन्छ ।धान रोप्ना साथ माछा धान खेतमा राख्न हुन्न किनभने माछाले चलाएर धानको बोट ढाल्न सक्छन्। माछा ल्याएको भुराको प्याकेटलाइ ल्याउने बित्तिकै भुराहरु खेतमा छोड्दा तापक्रमको फरकले भुराहरु मर्न सक्छन् तसर्थ माछाको भुराको प्याक खेतको पानीमा करिव १० मिनेट जति राख्न् आवश्यक छ ।

माछाको आहारा

कमन कार्पले जे पनि खाने भएकाले यसलाई दिने दाना विशेष प्रकारको हुदैन। खेतमा रसायनिक र कम्पोष्ट मल प्रयोग गर्दा प्राकृतिक आहारा उत्पन्न हुन्छ ।रसायनिक मल ४० किलो र कम्पोस्ट मल अथवा प्राङ्गरिक मल ८००-१२०० किलो प्रति हेक्टरको दरले प्रयोग गर्न पर्छ ।हामिले माछाको लागि दाना घर मै तयार पार्न सक्छौं। दाना बनाउंदा धानको ढुटो ५०% गहुँ को चोकर १०% तोरिको पिना ४०% एकै ठाउँमा मिलाई १०० % को दाना बनाउन् सकिन्छ। यसको अतिरिक्त मकैको ढुटो, कनिका , भट्मासको पिठो, जाडको छाक्रा आदि कृत्रीम आहारा दिन सकिन्छ। माछाको आहारा दिदा माछाको तौलको २-४% प्रतिशतको हिसाबले पानीमा मुछि डल्लो बनाई प्रत्येक दिन सधै एकै समयमा र एकै ठाउँमा दिनु पर्दछ।

माछा झिक्ने तरिका

साधरणतय माछा ठुलो भएपछि धान काट्न १०-१५ दिन अगाडि माछा झिकिन्छ तर पानीको राम्रो सँग व्यवस्था भएमा राम्रो सँग रेखदेख पुर्याउन सकेमा केहि दिनको लागि माछालाई खाल्डो वा ट्रेन्च मा राखि धान काटिसके पछि पुन: धान खेतमा पानी राखी त्यसमा माछा पालन गर्न् सकिन्छ ।

प्रचुर सम्भावना बोकेको यस खेति प्रणाली नेपाली किसानको आर्थिक उपार्जनको आकर्षक श्रोत बन्न सक्छ । तर धान रोप्नै कै निम्ति आकाशे पानीको भर पर्नु पर्ने बाध्यता, विपन्न किसानलाई भुरा र दानाको अतिरिक्त आर्थिक भार, कीटनाशक विषादिको जथाभावी प्रयोग, भु-खण्डिकरण र राज्यको उदाशिनता यस खेति प्रणालीका प्रमुख चुनौति हुन्। यसलाई सम्बोधन गरि धान-माछा खेती प्रविधिको विकास आजको आवश्यकता हो।

Poems

THE PULSE OF THE EARTH: SOIL AND INNOVATION

Anup Khatri

Beneath the vast expanse of verdant seas,
The soil murmurs to the roots and trees.
A tapestry woven through time's embrace,
The cradle of life, our sacred space.

For centuries, hands weathered and wise,
Harmonized with the earth and skies.
They heeded the soil's unspoken plea,
To nurture its health, to let it be free.

Terraced hills kissed by the sun,
Fields where ancient dances were spun.
Crop rotations, a cycle divine,
Each plant restoring the earth's lifeline.

With composted gifts, they enriched the ground,
Cultivating resilience, a truth profound.
Their crops shielded the land from despair,
A verdant shield, a farmer's prayer.

Yet now, the climate turns fierce and strange,
Its erratic rhythms demand we change.
Technology answers, bold and bright,
To guide our efforts and sharpen our sight.

Drones ascend in the morning haze,
Mapping fields in intricate ways.
Sensors decode the soil's secret tongue,
Echoes of nutrients where life has sprung.

Algorithms chart the farmer's course,
Merging knowledge with a digital force.
Biotech seeds, resilient and strong,
Bear the promise of righting the wrong.

Irrigation flows with precision and care,
Conserving each drop in the arid air.
Geospatial tools unveil the land's story,
Charting paths to sustainable glory.

But amid this progress, let us recall,
The wisdom of those who answered the call.
To live with the land, not take it for gain,
To honor the earth, through joy and pain.

For in this union of old and new,
Lies the promise of a world renewed.
Tradition grounds us; innovation inspires,
Together, they kindle the earth's sacred fires.

So let us tread with care and grace,
On this soil that sustains the human race.
To protect its pulse, its boundless worth,
Is to safeguard the future of our shared earth.

Educate the young, the stewards to be,
On the secrets of soil, its vitality.
Teach them to cherish the ground beneath,
For in its health lies our future's wreath.

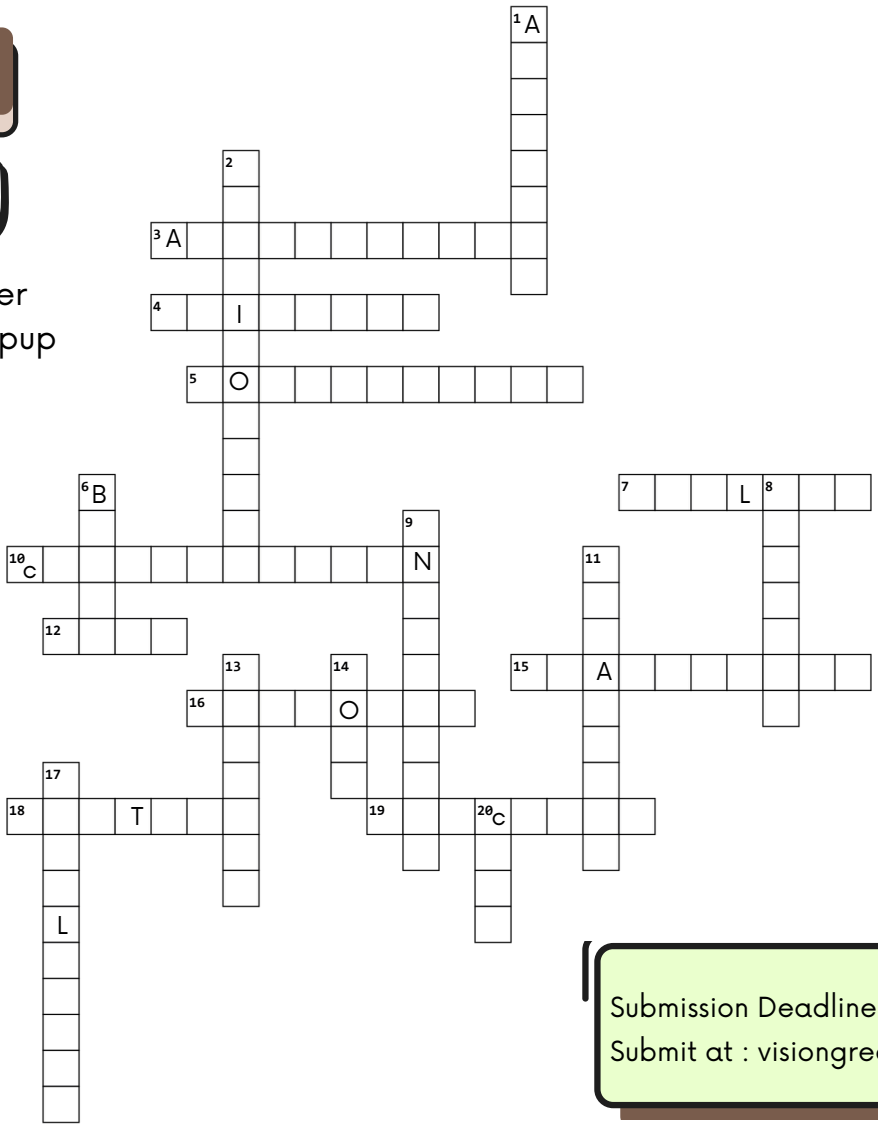
FACTS

Soil can trap DNA! Researchers have found ancient DNA in soil, offering a non-invasive way to study past ecosystems and extinct species.

- Red soil is used during Maghe Sankranti in Nepal to draw symbols of good luck and health on homes and in rituals.
- The color of soil tells its story! Bright red soils indicate iron oxides, while black soils are rich in organic matter and highly fertile.
- Antibiotics come from soil! Over 70% of the antibiotics we use today, including penicillin and streptomycin, were originally derived from soil microbes.
- One handful of healthy soil can contain up to 10 billion microorganisms, including bacteria, fungi, and nematodes—more living organisms than the entire human population on Earth

think & win!

One lucky winner will get Rs 50 Topup



Submission Deadline: January 11, 2025
Submit at : visiongreennepal@gmail.com

Across

3. Involves any agriculturally based operation that brings visitors to a farm

4. Presence of water in soil or the air

5. Agricultural practice of growing multiple crop species together

7. Study of interactions between living organisms and their environment

10. Practice of alternating crops in a field

12. A destructive insect or other animal that attacks crops, food, livestock, etc

15. Process of collecting mature crops or resources from plants

16. An organisms of microscopic size

18. Branch of engineering focuses on behavior of earth materials

19. Covering the soil with organic or inorganic material

Down

1. Science of soil management and crop production.

2. Product of the decomposition process using various species of worms, usually red wigglers, white worms, and other earthworms

6. Area classified according to the species that live in that location

8. Derived from living matter

9. Any group of people native to a specific region

11. Creating stepped levels on slopes

13. Charcoal-like material made by burning organic matter

14. Layer of the earth where plants grow

17. Capacity to withstand

20. Cultivated plants grown for food, fiber, or other uses

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