LCB FERTILIZERS

LCB FERTILIZERS PRIVATE LIMITED

Proposal for how LCB Fertilizers Helps in Promotion Of Natural Farming

1. Executive summary:

Natural farming is a holistic, sustainable approach to agriculture that eliminates the use of synthetic inputs and promotes the use of on-farm biomass and natural processes to enhance soil fertility and crop productivity. In line with this philosophy, we are focused on developing single-use, crop-specific biofertilizers derived from natural biomasses such as bagasse, cow dung, and other agricultural residues. These formulations are tailored for a wide variety of crops, including cereals (wheat and paddy), sugarcane, pulses, spices, fruits, and vegetables.

Our research and development efforts integrate advanced yet eco-compatible technologies—biotechnology, nanotechnology, and chemical engineering—to create natural input solutions that include beneficial microorganisms, nanoparticles, bioreactor-based fermentation, and superabsorbent polymers made from agricultural waste. The process significantly enhances the availability of essential nutrients such as nitrogen, phosphorus, and potash.

These natural farming inputs offer three major advantages: a reduction in farming costs by up to 21%, a yield increase of 15% to 35% (depending on climatic and geographic conditions), and a 33% reduction in irrigation needs, these superabsorbent polymers derived from lignin found in lignocellulosic biomass. Beyond these quantifiable benefits, our products improve soil structure and fertility by boosting microbial populations, balancing the carbon-to-nitrogen (C/N) ratio, enhancing water retention, and promoting the development of stronger root systems.

2. Objectives:

- Achieve a 20%–25% reduction in overall farming expenditure by replacing chemical inputs with effective natural alternatives.

- Improve crop yields by 15%–35%, while increasing soil microbial populations, enhancing the carbon-to-nitrogen (C/N) ratio, and enriching humus content for long-term fertility.

- Minimize groundwater usage by at least 33% in the first crop cycle by applying superabsorbent polymers made from agricultural waste (parali), which can absorb up to 268 times their own weight in water.

- Create employment opportunities for at least 5 skilled and 25+ unskilled workers per production unit, while ensuring at least 35% participation of women, empowering rural communities and fostering gender equity.

- Transform low-nutrient agricultural residues into carriers for beneficial microbial consortia to develop crop-specific, eco-friendly biofertilizers using sustainable technologies.

3. Background and Motivation:

India's dependence on chemical fertilizers has led to a growing agricultural crisis. Beyond air pollution, the excessive application of synthetic fertilizers severely impacts soil health altering its pH, destroying beneficial microorganisms, and drastically lowering its natural water-holding capacity. This degradation has forced Indian farmers to rely on groundwater for 85% of their irrigation needs, leading to alarming levels of water stress.

Microorganisms are essential for healthy plant growth as they help decompose organic matter and make nutrients bioavailable. However, the loss of microbial life due to chemical overload has increased the dependency on synthetic inputs. Shockingly, over 80% of applied chemical fertilizers go unused, accumulating in the soil and entering the food chain, where they pose serious health risks including a sharp rise in cancer and chronic illnesses in farming regions.

The economic toll is equally severe. The rising cost of chemical fertilizers, pesticides, and irrigation is pushing farmers into debt, with many unable to recover from recurring losses. According to the National Crime Records Bureau (NCRB), more than 3,500 farmers in India die by suicide every year, many as a direct result of these pressures.

Natural farming offers a way forward. By eliminating chemical inputs and embracing biological soil management, composting, microbial consortia, and moisture-retaining practices, natural farming restores the health of the soil, reduces water usage, lowers input costs, and improves both yields and farmer wellbeing. It is not only a solution for sustainable agriculture but a lifeline for the future of Indian farming.

4. Conventional solutions:

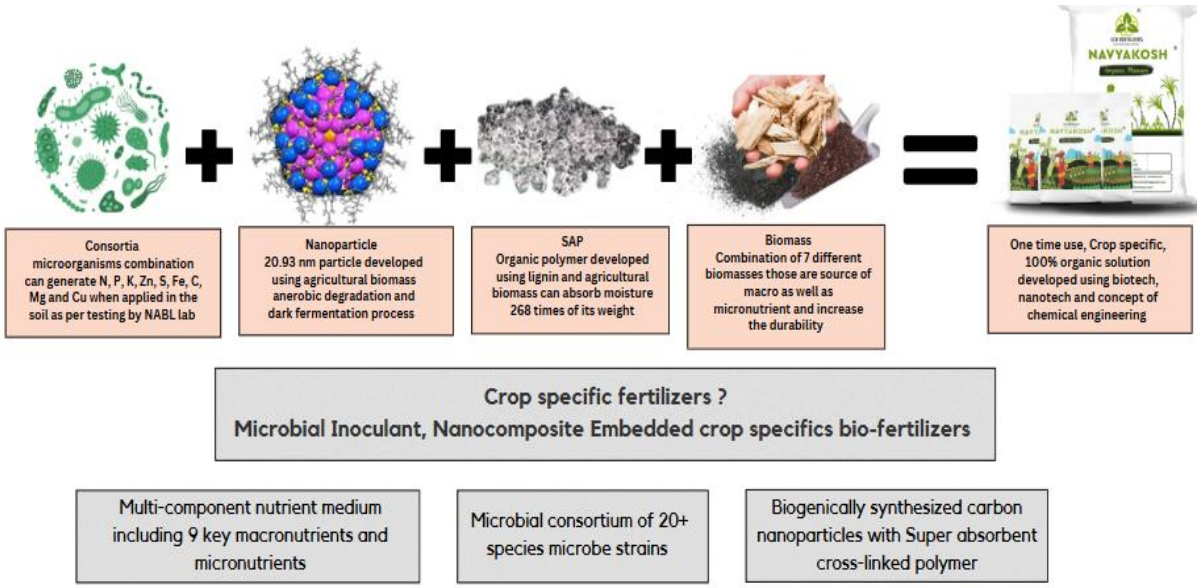
In the current agricultural landscape, farmers primarily rely on three categories of inputs chemical fertilizers, organic manures, and biofertilizers each of which comes with limitations that hinder the transition to sustainable, natural farming practices.

- Chemical Fertilizers (e.g., Urea, DAP, NPK, Zinc Sulphate) are widely used to supply essential nutrients to crops. While they may provide short-term yield benefits, their long-term use disrupts soil pH balance, reduces organic matter and humus, and deteriorates soil microbial life. This results in declining soil fertility, increased dependence on irrigation, and a rise in overall input costs making farming economically unsustainable over time.

- Organic Manures, including vermicompost and farmyard manure, improve soil structure and increase humus content. However, the quantities required to meet crop nutrient demands are often high. As a result, many farmers supplement organic manures with chemical fertilizers, which undermines the core principles of organic or natural farming and limits the true ecological benefits.

- Biofertilizers like Mycorrhiza, Azotobacter, and Rhizobium offer microbial support for nutrient fixation but are generally costly. Moreover, they are frequently used alongside both chemical and organic fertilizers to maintain average yields. This mixed approach complicates nutrient management, increases expenses, and fails to deliver fully sustainable outcomes.

Natural farming addresses these challenges by eliminating synthetic inputs altogether and restoring ecological balance through the use of biological soil enhancers, on-farm compost, microbial consortia, and natural moisture-retaining agents.



5. Novelty:

Our natural farming model stands out for its innovative blend of biotechnology, sustainable engineering, and eco-nanotechnology. By harnessing beneficial microbes, plant-based carriers, and moisture-retaining biopolymers, we create 100% natural, crop-specific inputs that enhance soil health, improve nutrient uptake, and reduce water usage without relying on synthetic chemicals. This integrated, science-backed approach ensures environmental safety, cost-efficiency, and long-term agricultural resilience.

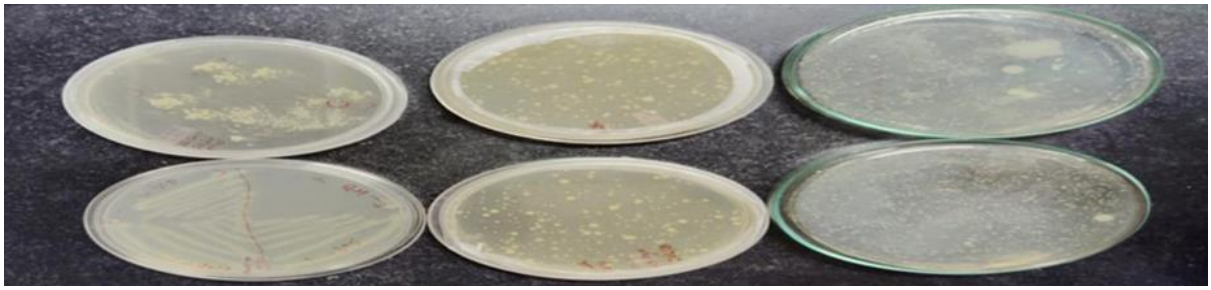
Biotechnology Part:

It serves as the biological foundation of our natural farming initiative, with a core focus on soil regeneration and plant nutrition through microbial intervention. We have developed a diverse microbial consortium consisting of 18 strains of beneficial bacteria and fungi, each selected for its ability to support specific functions related to plant growth and soil health. These microorganisms collectively produce and facilitate the availability of vital nutrients such as Nitrogen (N), Phosphorus (P), Potassium (K), Zinc (Zn), Iron (Fe), Sulphur (S), and

Carbon (C). These nutrients are released in bioavailable forms, ensuring plants receive a steady supply throughout the crop cycle.

Our microbial strains are isolated from natural ecosystems, including forest soils, organic farmlands, freshwater bodies, and well-decomposed composts, ensuring their adaptability to diverse agricultural environments. To support and transport these microbes, we use a carrier base made entirely from nutrient-rich agricultural biomass. This includes materials such as cow dung, residues from jaggery, dairy, and rice processing units, as well as crop waste. These biomass sources are rich in organic matter and micronutrients, acting as both a food source and protective environment for the microbes, allowing them to remain active and viable in soil conditions.

Field trials across Uttar Pradesh, Bihar, and Jharkhand show that our formulations not only support plant growth but also lead to a measurable rise in soil organic content up to 42%, affirming their regenerative impact.

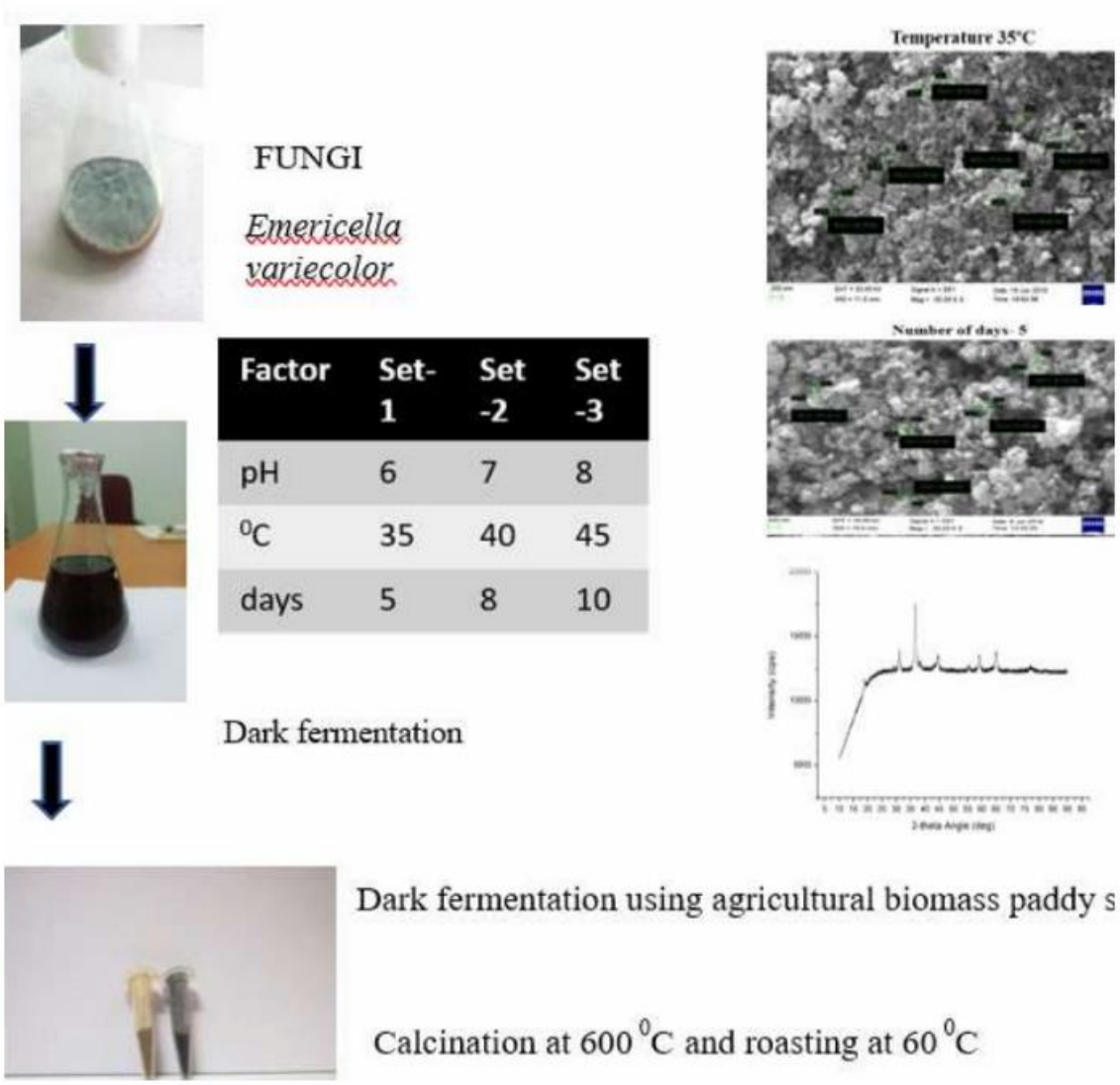


Nanotechnology Part:

In our natural farming approach, we employ organically synthesized nanoparticles that support the growth and performance of beneficial microorganisms by significantly increasing their surface area. These nanoparticles also enhance the heat tolerance of microbes up to 78°C, enabling them to remain active in diverse climatic conditions. Most importantly, they accelerate the decomposition of organic biomass, which improves soil structure and increases the organic matter content vital for healthy crop growth.

Through extensive research, we optimized this process by experimenting with key variables such as pH, temperature, fermentation duration, fermentation type, and roasting techniques. These refined parameters ensure maximum efficiency of microbial activity, contributing to more resilient, fertile, and biologically active soils without any chemical input.

LCB FERTILIZERS PRIVATE LIMITED



Chemical Engineering:

To accelerate the production of organic, crop-specific biofertilizers and insecticides, we have developed low-cost, climate-controlled fermenter tanks. These bioreactors support anaerobic solid-state fermentation and allow precise regulation of temperature, humidity, pH, and agitation ensuring consistent and efficient natural input formulation without synthetic chemicals.

Alongside this, we are innovating a fully biodegradable superabsorbent polymer (hydrogel) made from agricultural residues. This organic hydrogel can absorb up to 268 times its weight in water, reducing the need for repeated irrigation. Beyond water retention, this polymer naturally reduces plant stress indicators such as electrical conductivity, proline levels, hydrogen peroxide, MDA, and POD activity, fostering healthier and more resilient crops.

When applied at the seed or soil level, this integrated natural system not only replaces chemical inputs but also simplifies the crop cycle. Field trials have shown that this approach can increase yields by 15% to 40%, reduce irrigation needs by at least 33%, cut farmer input costs by up to 45%, and shorten crop duration by 5–8% all through a single, organic application. This technology offers a holistic, sustainable, and cost-effective pathway toward chemical-free agriculture.

6. LCB Fertilizers has tailored our innovations to develop the following:

- Lignin-Based Organic Superabsorbent Polymer: Formulated using plant-derived lignin and natural polymers, this eco-friendly hydrogel exhibits an excellent water-holding capacity retaining up to 268 times its weight. It ensures sustained soil moisture for up to 35 days, significantly reducing irrigation needs and supporting drought resilience in crops.

- Natural Enzyme Consortium: Our noble enzymes are derived through organic fermentation processes. They function across a wide pH range and accelerate the decomposition of crop residues and biomass, enhancing humus formation, microbial diversity, and soil organic carbon key pillars of natural soil fertility.

- Green-Synthesized Nanoparticles: Produced using green synthesis techniques from medicinal and local plants, these nanoparticles improve the thermotolerance of beneficial microbes enabling their survival and activity at high soil temperatures (up to 78°C). This leads to faster organic matter breakdown and improved nutrient availability without any chemical residues.

- Low-Cost Anaerobic Bioreactor: Designed for on-farm use, our bioreactor replicates controlled anaerobic conditions to nurture native microorganisms essential for natural farming. It efficiently handles cow dung, crop waste, and bio-enzymes, supporting the production of high-quality, climate-resilient biofertilizers without synthetic inputs.

7. Commercialization model:

To promote the widespread adoption of natural farming practices across India, we have developed a four-step commercialization model rooted in community engagement, sustainability, and rural empowerment. The first step focuses on building trust and scientific credibility through the distribution of free product samples for comparative trials across multiple districts. These trials will be conducted in collaboration with Krishi Vigyan Kendras, agricultural universities, and progressive farmers to demonstrate the effectiveness of our natural farming inputs in improving soil health, crop yield, and pest resistance without the use of synthetic chemicals. Once a positive impact is observed, the second step involves creating awareness and building capacity at the grassroots level. This includes organizing farmer training sessions, Kisan Chaupals, and village-level workshops, particularly engaging women and self-help groups. These programs not only educate

farmers on sustainable cultivation methods but also generate employment opportunities within the local ecosystem.

The third step aims to ensure last-mile delivery by setting up a decentralized distribution network. Local micro-entrepreneurs, farmer-producer organizations (FPOs), and rural youth will be encouraged to manage village-level natural farming resource centres or bio-input retail outlets, making products easily accessible to the farming community. The final step focuses on establishing small-scale, community-driven production units in partnership with local agro-industries and sugar factories. These units will utilize agricultural by-products for the eco-friendly manufacturing of bio-inputs, providing over 200 job opportunities per unit for both skilled and unskilled labourers, with a strong emphasis on women's participation. This comprehensive model not only fosters a self-reliant rural economy but also ensures sustainable farming, environmental restoration, and inclusive community development.

8. Benefits:

a) Environmental Benefits:

- By integrating plant-based Super Absorbent Polymers (SAPs), beneficial soil microbes, and humus-enhancing agents, we significantly improve the soil's water retention capacity. These eco-friendly hydrogels can absorb up to 268 times their weight in water, reducing the dependence on groundwater and lowering irrigation needs by up to 33%, promoting sustainable water use in farming.

- Our microbial formulations, derived from native and beneficial soil organisms, enhance organic matter levels by 32% to 74% within a single cropping cycle.
  This leads to better soil structure, improved aeration, and long-term fertility key components of natural soil regeneration.

- The consortium of microorganisms in our biofertilizers actively breaks down residual agrochemicals and synthetic toxins present in degraded soils. This bioremediation process supports the restoration of soil purity and health, aligning with the principles of zero-chemical natural farming.

- All our inputs are derived from natural, farm-based, and biodegradable resources ensuring no ecological harm or residue build-up. They work in harmony with the environment, enhancing soil vitality without compromising biodiversity or polluting water sources.

b) Social benefits:

- Through our natural farming initiatives, we aim to generate over 500 direct and 2,000 indirect employment opportunities across rural India. By focusing on local resource-based production, we create sustainable livelihoods for both skilled and unskilled workers, with a strong emphasis on empowering women and youth through skill development in eco-friendly practices.

- Our current team includes 28 dedicated members, among them 9 women and one female co-founder, reflecting our commitment to gender inclusivity. We are actively expanding women's participation at all levels encouraging their leadership in natural input production, farm-level training, and decentralized distribution networks.

- We work closely with Farmer Producer Organizations (FPOs), Self-Help Groups (SHGs), NGOs, and grassroots institutions to strengthen the community-led natural farming ecosystem. These collaborations enhance income generation for local communities through cost-effective inputs and higher profit margins, thereby ensuring economic self-reliance and reduced dependency on external chemical-based products.

c) Economic Advantages:

- Our natural inputs have demonstrated a consistent increase in crop yields by 15% to 35% across diverse agroclimatic zones proving that chemical-free cultivation can be both productive and sustainable.

- Farmers adopting our natural solutions have reported input cost savings ranging from 5% to 48%, depending on the crop and region. This is achieved through the replacement of costly agrochemicals with low-cost, organic, on-farm alternatives.

- With the integration of natural hydrogels and improved soil organic content, irrigation requirements are reduced by up to 33%. This contributes significantly to groundwater conservation, especially in drought-prone areas.

- Our formulations simplify input application and reduce the need for repetitive interventions, thereby lowering labour dependency and enabling farmers to manage larger areas with minimal manpower.

- Our scalable, community-led model aims to benefit over 2.5 lakh farmers across India, equipping them with cost-effective, eco-friendly farming solutions and building a nationwide natural farming ecosystem.

LCB FERTILIZERS PRIVATE LIMITED

CERTIFIED BY

PROUD PARTNERS

SUPPORTED BY