Cho's Global

Natural Farming

Rohini Reddy

" You cannot lead the agricultural industry with a civilization that revolve around opportunism and also cannot depend on practical reasoning, scientific findings, analysis and calculations. Conventional method of farming which is simply imitation of agricultural administration and science is not the key to farming. It disregards each region's particular characteristics"..... Dr. Cho Han-kyu

Cho's Global Natural Farming

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JANONG : Established in 1960s by Dr. Cho Han-Kyu in South Korea. Janong's education is well-known for its expertise. Lectures are held intensively to train the farmers in capacity building to produce agricultural products that is equivalent to global standards. Janong has acquired the ISO 9001/14001 certification. We sustain a quality management and environment management that satisfy the global standards.

As an organization with long history, competent technology and international activity. Janong is doing its best to rehabilitate the environment to develop and disseminate alternative agricultural practice and to build a healthy nation.

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SARRA : Established in 1984. SARRA is working in the field of land rights and land health management activities, organizing training programmes in South Asia. It also experimenting SIMPLE, PRACTICAL INNOVATIVE and REPLICABLE technologies and strategies for the benefit of the disadvantaged people propogating through different networks in Asia. SARRA also published many posters, books, articles, materials related to agriculture development activities for the small and marginal farmers.

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Dr. Cho's Global

Natural Farming


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SELF GOVERNMENT
SARRA

SARRA

I dedicate this book as a humble
token of my deep gratitude
to the farmer community
that sustains the country with
a spirit of sacrifice……Rohini Reddy

DR. CHO'S NATURAL FARMING

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My family members uma maheswar reddy my brother who is a farmer, Kuraparthi Vishnuvardan, my most exacting critic and my nephew and Rahul my son who is always by my side with his love and support.

My efforts would not have been possible with out moral support and fruitful association from Michio Ito san, Suzukima of ACC 21 and Hirowaka san and The Toyota Foundation for collaborating with us.

Above all affectionately calld as "**Line Papa**" Dr. Cho Han Hue who shared his knowledge and helped me what I am to day in spreading Global Natural Farming.

All the staff members of SARRA and organization who have been associated with me and have provided encouragement and support to my Endeavour and whose names do not find mention here **……Thank you.**

Sri Venkateswara University
Tirupati

Prof. N. Prabhakara Rao
Vice-Chancellor

PREFACE

I am immensely delighted to know that Rohini Reddy of SARRA, Bangalore has written, compiled and prepared the book entitled "Dr. Cho's Global Natural Farming (CGNF)" and releasing the book on 04-11-2011 by me which is useful for farming community, academia, research institutes and agricultural scientists as a new dimension in a traditional and sustainable way of farming.

Natural Farming was founded by Dr. Cho Han Kyu in the 1960's at a time when environment was not even as an issue. Dr. Cho tried to show an alternative way of farming that assured both high yield and good quality, a nature-respecting farming that superceded the chemical intensive agriculture which had just begun to spread in South Korea at that time.

Natural Farming is an innovative new method of farming that utilizes the nature's powers for maximum performance rather than human intervention. Natural Farming uses natural materials instead of chemicals to make its unique inputs. Materials are locally available and cheap, and the farming inputs are made by the farmers instead of being purchased from the market, thus lowering cost for the farmers and converting waste as resources.

Now a day's natural farming is provided to over 15 countries, recognized of its strength to produce more, at a better quality, with lower cost. It is also practiced in the underdeveloped countries and communities to give them a self supporting tool that can improve their living. South Korea, Japan, China, Malaysia, Thailand, Vietnam, Philippines, Mongolia, USA and India.

SAARA has MoU with Department of Virology, S.V. Univeristy, Tirupati to validate the role of IMOs in helping the farming community to enhance the capacity in promoting food security through agriculture for small and marginal farmers. I have great pleasure in releasing the book on CGNF technology for farming and livestock. I congratulate the author and editors for their endeavor and wish them all success in spreading the CGNF technology to make this world a better place to live in and for the benefit of the future generations.

(N. Prabhakara Rao)

FORWARD

South Asia Rural Reconstruction Association (SARRA) Bangalore, had an extraordinary opportunity to work with Dr. Cho Han Kyu of South Korea from 2006 onwards. Unlike the main stream agriculture scientists, Dr. Cho was able to think out of the Box. Even as a final year graduate student of agriculture and veterinary technology (1965), he had the unusual courage and conviction about the irrelevance of green revolution Technologies (GRT) for Asia region. He and his friends boycotted the special paper on GRT. They decided to promote 4-H clubs in his native province and dedicated themselves to examine the best practices adopted by the farming community for three generations in S.Korea and Japan. Dr. Cho treated enlightened farmers as his real GURUS. His systematic and scientific inquiry enabled him to identify the great potentials of the concept and strategy of Farming with Indigenous micro-organisms (IMO).

Dr. Cho was able to demonstrate significant superiority of this method as compared to GRT. Farming with IMO is highly economical and practicable in terms of production and productivity of crops and livestock. Multi National Companies (MNC) dominating and controlling Green Revaluation Technology (GRT) could not digest the Challenge posed by Dr. Cho during 1970. They pressurized the Government authorities to treat Dr. Cho treated as anti national. He was jailed for several times. But, he had the indomitable courage to continue his crusade for science simplification. Dr. Chos experiments related to pollution free **Poultry, Piggery** and **Dairy** are simply superb and beyond the imagination of main stream agriculture scientists.

Due to the blessings of almighty. I had the rare opportunity to collaborate with Dr. Cho in organizing workshops and training programmes on Natural Farming with IMO's, in India and other Asian Countries.

Dr. Cho helped SARRA to promote a demonstration and a training center at Pulicherla, near Tirupathi, Andhara Pradesh. He also encouraged SARRA to publish the rare document on Cho's natural farming systems and technologies in Telugu and Hindi.

SARRA has the mandate to awaken the policy markers, scientists-activists and farmers networks in South Asia to re-examine the need and relevance of highly advanced organic, natural and eco-friendly farming practices which are suitable to the small and marginal farmers.

It is high time that we depart ourselves from blindly aping the west in the field of agriculture, live stocks, forestry and livelihood sectors. We need to discover and rediscover Asian wisdom related to sustainable livelihood systems and technologies which are simple and practicable for accomplishing household food security.

SARRA feels happy that the edited and published english document is unveiled by Dr. Prabhakar Rao, the distinguished Vice-Chancellor of SVU University, Tirupati on 4 November 2011.

Rohini Reddy,
Executive Director,
SARRA.

A WORD OF APPRECIATION

Rohini Reddy pursued with her characteristic vigour and ensured my participation in the training program on Dr. Cho's Global Natural Farming (CGNF). The chief resource person was to be none other than Dr. Cho Han- kyu, founder and promoter of the of Natural farming since 1965. His novel and amazing package of practices meant for raising agricultural production and simultaneously improving the quality of the produce is revolutionary and much ahead of our jeneration . This method with its emphasis on Indigenous Micro Organisms (IMOs) is attracting worldwide attention because of its simplicity, cost effectiveness and its harmony with nature. Dr. Cho belongs to the pantheon of post-modern Krishi Rishis (saints or sages of post-modern agriculture) and he is ranked with Masanobu Fukuoka, Rudolf Steiner and Bill Mollison.

Dr. Cho, a short, stocky, ebullient, energetic and humorous octogenarian is gifted with the rare foresight who can see beyond the familiar beacon light. He developed this simple technology when he found that the conventional / chemical agriculture is patently and ineptly

ECOLOGICALLY NOT SUSTAINABLE

ECONOMICALLY ALSO NOT VIABLE

ENVIRONMENTALLY RUINOUS

Pursuit of present agricultural practices, assiduously promoted by chemical industry, scientific establishment and bureaucracy has forced hundreds of thousands of farmers to end their lives besides degrading environment and wreaking havoc to human health. Diabetes, cancer, hypertension, renal failure, multi-organ failure etc. have acquired epidemic

proportions. And now **Crop Holiday**! Government is finding it difficult to continue to provide subsidy and without subsidy, the inputs are unaffordable for the farmers and food will be too expensive to be accessible to people.

It is in this context Dr. Cho's IMO technology provides a ray of hope to millions of farmers and consumers worldwide in general and India in particular. The microbes can be multiplied billion or trillion fold in various medium which can be prepared from locally available materials or which can be arranged from the neighborhood without much difficulty. They not only meet all the nutritional requirements of plants, also some of the preparations provide a protective shield from the pests and diseases. And still others can make sour fruits sweet and small fruits bigger! And credit goes not to the magic of chemicals, but to the microbes! No wonder Darwin said that civilization owes its existence to the microbes.

The other beauty of Dr. Cho's revolutionary technology is that not only agriculture, also dairy and poultry sector will benefit in a remarkable manner.

Dr. Cho's insistence that farmers are free to experiment on their own and alternative local materials should be found as ingredients for various preparations lends flexibility and scope for farmers to innovate. This makes his system more acceptable and accessible to farmers which will be very rewarding for the farmers indeed.

When Dr. Cho Han promoted this technology in his home country South Korea, it appeared too subversive and Dr. Cho Han earned the ire of the chemical lobby and the government.

One unforgettable moment. We were in SAARA's Pulicherla experimental demo farm where practical demonstration of various aspects of IMO technology was being given by Rohini

Reddy & Dr. Cho. During a break when I asked Dr. Cho why he was sent to prison several times? He embraced me tightly and tears rolled in an emotional outburst. His daughter who was standing besides, captured the moment in her camera. He simply said he was dubbed as a communist and therefore jailed. Actually it was the handiwork of the deeply entrenched vested interests who felt threatened by Dr. Cho Han's methods which appeared too appealing to farmers.

This of course is the **fate of all path breakers who think ahead of their time.**

Undauntedly, he carried on his experiments and when the results were too transparent for everybody to see, truth prevailed finally and the Korean government accepted the technology and now it has gone beyond the borders of Korea to reach Japan, Mongolia, China, Thailand, Malaysia, Philippines, USA and now in India. He may not live so long to see his revolutionary IMO technology reach all corners of the world, but one day it will.

SAARA's efforts to publish Dr. Cho Han's amazing ideas in the form of a book are a significant and a laudable step to take the ideas to the people. And hopefully the organisation will also try to bring the book in regional languages which will help spread the technology to all corners of the country. No doubt, everybody who is concerned about the people and the planet will appreciate this rare initiative.

Radhamohan
An organic former
Ex. Commissioner of RTI Act.
Bhubaneswar – 19, Odisha, India

MESSAGE

Dr Cho's natural farming system connects seed to an in alienating part of the microbial world of nature. Very life on earth is said to be of microbial ministration and to think of life without microbes is next to impossible. Human body for example consists of 100 trillion cells and 90 trillion cells belong to microbes. So is the case in terms of the earth's bio-diversity of species whether seed or breed can co-exist in the midst of teaming microbial millions. Dr. chos Natural farming technologies emphasizing on IMO's multiplication in various ways. The technologies are relevant to preserve the native varieties and bio diversity by farming community.

"If you can see the world in the grain of the sand,
Heaven in the wild flower,
eternity in the palm of your hand,
And infinity in an hour.." ..... -**William Blake**

When man rather woman realized that a seed can be sown outside the cave and thus grow food, it was the dawn of civilization and the end of hunter – gatherer phase of human history. It was an end to chase, risk, uncertainty and insecurity of human survival and existence.

This was about 10,000 yrs ago. Agriculture thus initiated giving rise to human settlement, culture and civilization. Countless varieties of seeds were adopted for agriculture and a plethora of the plant edible world got cultivated. Plants changed man and vice-versa. As migration and mobility caught on adaptation of varieties into our cultivable world and bread-basket got added. Genesist's like Vavilov from Russia accomplished an enormous task of mapping this adopted seed diversity which threw light on a myriad range of diverse seeds

and subspecies of each one of them. This adopted seed variety and diversity is the summit of human civilization and excellence in being able to survive under various conditions. This is the real tangible and intangible human history.

Seed diversity is what stood humanity in good stead through cosmological and climatic troubles and turmoil's.

Post Green Revolution the world experienced death of diversity. Death of diversity in terms of seed varieties, germplasm, indigenous poultry and cattle occurred. In fact the age we live in is the age of mass extinction of species and loss of bio-diversity and culture. It is said that 100 yrs back we inherited 10,000 languages which have been reduced to 6000 languages today. Loss of 4000 languages in just 100 yrs is one of the greatest losses to human heritage, ethos and legacy.

Unfortunately be it loss of seed diversity or the cultural diversity, these do not seem to apparently affect us. As we are termed to be Homo economicus the intangibles and the real asset of humanity doesn't get counted and valued. As Oscar Wilde rightly put it the cynical age that we live in know the price of everything but the value of nothing. For the calculating mind which cannot understand the invaluable aspect of seed diversity let us examine the tangible benefits which could be of selfish interest to each one of us.

Native seed varieties which got acclimatized to ecological conditions have far more superior adaptability to adverse climatic conditions and a better immunity. This means that they can survive with less or no external input in the form of chemical fertilizers, pesticides, hormones and antibiotics. Traditional seed varieties are of better keeping quality and pest resistance capacity. Thus they do take a longer time for

maturation which from the nutrition point of view is very substantial and is of real functional benefit.

Today Nutrition Science recognizes that the starch which gives us majority of Energy, should be of a certain composition in order to keep us healthy. A healthy composition of starch means a wide balance of its components amylose and amylopectin which depends on whether the crop is short term or long term. As Matt Ridley puts it the rise of amylopectin in the starch of short term crops and seed varieties is abnormally high hence flooding our blood with glucose. Probably this could be one of the reasons which have not drawn enough attention from an epidemiological angle to the epidemic of Diabetes.

Conservation of seed diversity from the point of view of Agricultural survival in the emerging climatic changes and prevention of lifestyle diseases is the need of the hour and of paramount importance in the state, and the society needs to focus its attention on the real issues of conserving our heritage. In this direction sage advice of Cho – Han Kyu and its legacy being carried on by SAARA's is laudable, for the philosophy adopted by them connects to the dynamic ever changing and living nature of seed and agriculture.

Raghu K.C.
Founder of Pristine Organic foods,
Bangalore

CHAPTER - 1

INTRODUCTION

Natural Farming uses methods that observe the laws of nature and utilizes natural materials and products. It is based on the principle of interdependence among all living things. It aims to have a nurturing impact on the environment, in sharp contrast to the disadvantageous effects that often accompany modernized and commercialized agriculture.

The observance of the natural cycle and environment-friendly agricultural practices applied in a modern setting refreshes the established perspectives on farming and provides an alternative to technology-intensive agriculture.

HOW NATURAL FARMING BEGAN

Natural Farming **(NF)** was developed by Dr. Cho Han Kyu at the Janong Natural Farming Institute in South Korea. It was originally intended to change the chemical-based and harmful farming methods that were being practiced in South Korea. Together with like-minded farmers, he converted his lifelong studies and his own experiences into an innovative farming system that not only promotes respect and care for the environment, but also produces more with less cost and labour.

Natural Farming recognizes the abundance of nature and utilizes indigenous resources for production. Its basic philosophy is to maximize the inborn potential of a life form and its harmony with the environment by not interfering with their growth and development or forcing the crops to yield more than what they can. Natural Farmers believe that the best way to achieve top quality yield is to respect the nature of life.

The NF methodology is based on the Nutritive Cycle Theory, that guides the Natural Farmer on what inputs to apply, how much and how often. Natural Farming applies the principle of interdependence in which people should nature, instead of surmounting it or undermining it.

Natural Farming is also envisioned so as to contribute to the alleviation of poverty, disease and environmental destruction by providing an alternative means of livelihood and food production.

As a farming method that goes back to basics using materials from nature and without force or chemicals. Natural Farming guarantees its farmers healthy and strong products needed to provide for their families and society. Natural farming respecting the natural cycle of life is more than a farming technique. It is a philosophy, a new economics and a way of life.

STRENGTHS AND BENEFITS

Environment-Friendly: Its inputs are made from natural materials, protecting the crops from harmful chemicals used as fertilizers in modern agriculture. In livestock raising, Natural Farming is considered a revolutionary breakthrough, accomplishing the dream method of "**Zero emission**". No wastewater is emitted. Also wastes are recycled and converted to resources.

Higher Yield: It strictly follows the **Nutritive Cycle Theory**, using accurate amounts of substances at the precise moment, nourishing the soil with right amounts of nutrients when the plants or animals need it.

Low Cost: It helps lessen the farmers financial burden with the use of homemade materials and making use of resources from the farm.

High Quality: Better-quality crops and livestock is the result of non-usage of chemicals those are harmful to their production as well as the environment.

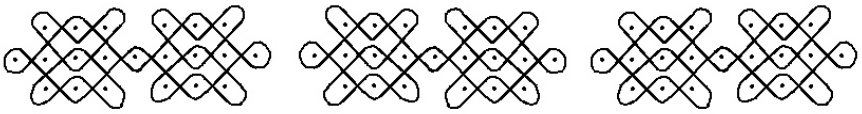
Adaptable: NF can be replicated in any region ingredients and products used by Janong Natural Farming Institute in South Korea can be substituted with the natural resources distinct to each region or ecosystem.

Farmer / User Friendly: Methods are free of toxic and poisonous chemicals, which are dangerous to a user's health. With Natural Farming, farmers cultivate their own substances that truly provide the nutrients to the crops and animals, it also helps without harming the plants, animals and humans.

Respect for Life: Natural Farming gives utmost respect and care to the crops and animals following the natural cycle of life. Better productivity and even better harvest can be made when one nurses and gives attention to its environment.

WHAT IT IS vs WHAT IT IS NOT

Natural Farming is similar to organic farming in the sense that both the methods use non-chemical ingredients to grow crops or raise animals. However, Natural Farming strictly relates to the Janong Farming Institute in which the said method was developed by Dr. Cho Han Kyu. Only farmers who have been educated in the institute or have been trained by Janong Natural Farming Institute in South Korea or by authorized personnel are **called Natural Farmers**. Natural Farming has its own system ranging from theory and practice of farming necessities and is set at a much lower cost.



WHAT IS NATURAL FARMING

What is **NOT** Natural Farming	What **is** Natural Farming	**Benefits** of Natural Farming
Use of imported or artificial micro-organisms	Uses "indigenous" microorganisms or IMOs	Safe, cheap and easy to make and very effective. It strengthens the crops with out being affected from all kinds of weather.
Use of chemical fertilizers	Use of Nutritive Cycle Theory	Nurtures and strengthens the crop in a natural way
Mechanical tillage (conventional farming with deep ploughing)	Use of Nature's Tillers (aerobic and anaerobic bacteria, fungi, mole crickets, earthworms and moles etc.)	Soil clusters that are lumped in aggregates are fostered, which will provide air and good water drainage, a good habitat for microorganisms and other soil biota.
Tilling land arduously (laborious/ strenuous) every year	Grass mulching as remedy for weeds (using brown rice vinegar)	Holds moisture, provides good habitat for micro-organisms and prevents soil erosion. Using natural inputs helps dwarf the weeds.
Expensive state-of the art technology needed for treatment facilities in livestock management	The use of microbes (IMOs) as simple and cost effective in livestock management	All wastes are recycled and made use of for cost-cutting techniques. The livestock housing itself is a waste treatment facility, fertilizer producer and feed mixer.
Planting more crops in a limited area	Planting with proper distance in crops and plants	More yield because it emphasizes on formless nutrients such as sunlight and air.
The use of pesticides to kill pests	Use of natural inputs to "distract" the pests from the fruits/crops (Eg. Fermented Fruit Juice)	Pest attractants are placed away from the fruits to divert the pests. It is cheaper and it focuses more on co-existence and co-relation with the pests.

CHAPTER - 2

THE NUTRITIVE CYCLE THEORY

Dr. Cho is of the view that providing nutrients in excess to plants is not needed as it will only bring disease. Natural Farming follows the scientific approach of correctly using the right material at the right amount and at the right stage. So that crops or livestock can reach their optimum growth. To do this NF relies on the Nutritive Cycle Theory.

THE NUTRITIVE CYCLE THEORY

The Nutritive Cycle Theory states that plants and livestock need different nutrients during different stages of growth. Like humans, plants also need different kinds of food at different stages. Just as a baby can only eat baby food, young plants or animals can only be fed with nutrients that are appropriate for their age. The Nutritive Cycle guides farmers in obtaining the best results from their crops and avoiding disease to their crops through proper nutrient management.

GROWTH STAGES AND MORNING SICKNESS

The Growth and development of a plant takes a certain course along with the passage of time. All crops go through the stages of growth according to the qualitative changes that occur and mature with flowering and fruiting.

VEGETATIVE GROWTH STAGE

The vegetative growth stage is the period when plants develop their roots and shoots through time till they mature. It is when plants consume Carbohydrates **(C)** and convert them to Nitrogen **(N)**, which is their main growth requirement at this stage.

CROSS-OVER PERIOD or MORNING SICKNESS

This is the stage in which the plants begin flowering in preparation for reproduction. The term **"Morning Sickness"** is used to liken the state of plants in the cross-over period to pregnant women who crave for **"Sour Foods"** during pregnancy. Plants also undergo a similar phase in which they need **"Sour Nutrients"** which come in the form of Phosphoric (P) compounds.

REPRODUCTIVE GROWTH STAGE

Reproductive growth is the period from flowering to ripening of the fruits when the plant begins storing Carbohydrates in fruits or other storage organs (accumulative growth). For proper color development of fruits, Potassium **(K)** is also needed.

The same argument holds good to the fertility of soils. Even though soils are proper in one growth stage, the degree of fertility may change in the next.

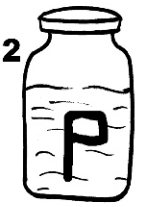
This means the crops are generally deprived of the same qualitative and physiological requirements for their growth stages namely **Young**, **Adult** and **Old**.

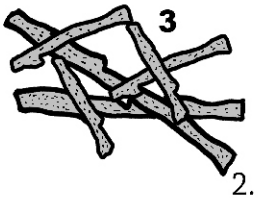
Current agricultural commonsense and cultivation methods unilaterally emphasize only the external conditions and underestimate the inner conditions intrinsic factors (IF) of plants. We cannot expect the best harvest when we only emphasize the external conditions (extrinsic factors) that constantly change every year.

What is more important for the farmers is to understand the exact growth physiology of each stage and to encourage plants to fully take advantage of the most proper conditions.

THE CHANGEOVER PERIOD

1. Plants become "morning sickness" when floral differentiation. Sour things are good morning sickness





2. Sesame stems or soyabean stems are excellent for source of Nutrients
3. Calcium phosphate good for plants during morning sickness

I need an additional nutrient (P) when i get Pregnant. A week before floral differentiation should be applied

I am so... happy my babies are growing well

- ☞ The changeover period treatment responds to **"Morning Sickness"** of plants
- ☞ Apply for Leafy crops such as spinach etc when 2 - 3 leaves appeares

CHAPTER - 3 - A

NATURAL FARMING INPUTS

Natural Farming (NF) has a concrete approach as to how best to practice farming while observing and respecting the laws of nature utilizing only what nature provides. NF has farming inputs that are proven to be very effective in the cultivation of crops. These inputs can increase yields better than the harmful commercial fertilizers and pesticides. This chapter explain / deals with the Natural Farming Inputs their preparations and applications.

IMPORTANCE OF IMOs

Natural Farming produces a good yield when the land cultivated has an excellent soil condition for crops. Microorganisms play an important role in making soil good for growing plants. These microorganisms can also be collected and cultured.

Natural Farming promotes the use of Indigenous Microorganisms (IMOs). The microorganisms that have been living in the local area for a long time are best for farming because they are very powerful and effective. They have survived and can survive the extreme climatic conditions of the local environment much better than artificially produced microorganisms, which are cultured in some foreign or artificial environment. And since they are already available in the field, they are considered the best inputs for conditioning the land.

Organisms that are found under the heat of the sun are largely different than those found in shaded areas such as under the bamboo trees. Dr. Cho advocates that it is better to culture microorganisms from different areas in order to collect different kinds of microorganisms **(Microbial Diversity)**.

It is also good to culture microorganisms at different weather conditions and to mix different types of microorganisms.

In **"Non-Chemical"** agriculture practices we do not feed the plant. We nurture the soil and the soil nurtures the plant through the IMOs.

Microorganisms have two major functions in farming:

1. Microorganisms decompose complex organic compounds such as dead bodies of plants and animals and wastes into nutrients, making them easily absorbable by plants.

2. They can create compounds such as antibiotic substances, enzymes and lactic acids that can suppress various diseases and promote healthy soil conditions.

IMOs are used primarily to create fertile and healthy soil condition that is ideal for farming and to prevent plant diseases. In Natural Farming, IMOs are used in treatments applied to the soil in order to improve its fertility and health.

The best material that can be used in culturing IMOs is **steamed rice**. The rice should not be too soft or too sticky since aerobic micro organisms do not prefer to live on it. Hence, it is best to use left-over rice. In making IMOs using plastic as containers should be avoided. Containers made of Wood or Bamboo is recommended.

Collecting IMOs: Indigenous Microorganisms can be collected in many ways and in many places. They can be collected from surrounding hills and mountains. It is also possible, to a certain extent, to collect specific types of microorganisms.

COLLECTION OF IMO

Method - I

COLLECTION FROM NATIVE SOIL

Materials / ingredients needed

1. Wooden box **(made of Natural wood / bamboo / cedar, etc)**
2. Hard-cooked rice **(Less moisture to collect aerobic microbes)**
3. Porous Paper (paper Towel)
4. Rubber band / Thread
5. Container Box / Basket made out of Bamboo
6. Jaggery / Brown sugar (Unrefined sugar)
7. Glass jar / Clay pot

How to collect IMOs

1. A wooden box of Length 12 inches x Width 8 inches Height 4 inches is made with ½ an inch thickness wood.
2. Fill the wooden box with steamed rice. Its moisture content will attract the indigenous microorganisms living in the local soil.

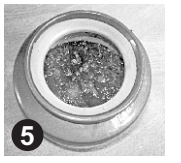
   Allow adequate air supply by not stuffing the rice higher than 3 inches **(do not press hard the rice in the box)**. Without sufficient supply of air, the anaerobic IMOs will get collected. Aerobic IMOs are more commonly recommended.
3. Cover the wooden box with white plain paper **(avoid news paper)** and use a rubber band or thread to hold the paper to the box. Paper allows air to pass through.
4. Mark an area 12 inches x 8 inches in the soil and excavate 2 inches of soil. Place the rice-filled wooden box in this pit, where IMOs abound, such as in a forest / field or at the site where many decomposed leaf molds are found. Cover the box with leaves.

5. The container box or basket is placed on this set-up to protect the wooden box from stray animals.
6. Prevent rain from getting through by covering with leaves. **(use plastic sheet only if necessary during excess rains)**

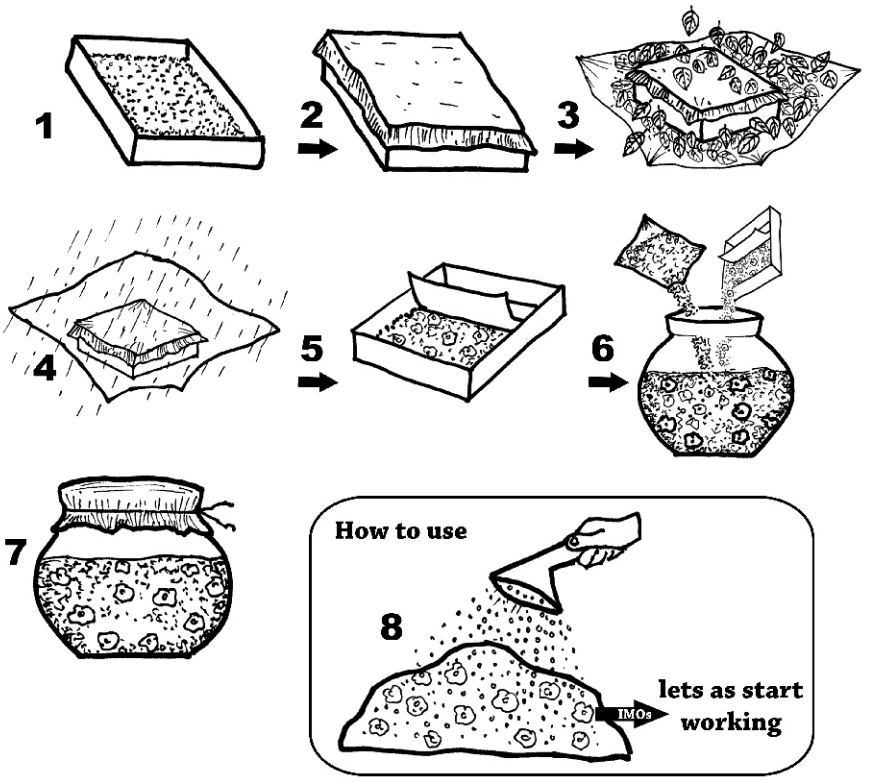
   At 20˚C, it will take about 5 to 6 days to grow the microbes in the box filled with IMOs. Collection will be faster if the temperature is higher than 30˚C to 35˚C it will take 2 to 3 days
7. After 3 days the rice will be covered with microorganisms. Move the IMO formed rice to a clay pot / glass jar. The IMOs thus collected is called as **IMO-1.**
8. Mix jaggery with the IMO-1 in 1:1 ratio. For Eg 1 Kg of jaggery should be mixed with 1 Kg of IMO-1. This mixture of brown sugar and IMO-1 is called as **IMO-2.**

   The closer the state of sugar is to nature, the better. The less process the sugar has undergone, the more effective it is. Therefore, white refined sugar is not recommended. Brown sugar is advisable, but crude and unrefined sugar (jaggery) is better.
9. Cover the container using paper and hold in position using a rubber band or thread.

NOTE : It will take 3 days in summer and 5 days in winter. You can experiment based on the climate of the place where you live. Black molds on the steamed rice indicate that you have exceeded the number of days



INDIGENOUS MICROORGANISMS FROM NATIVE SOIL



1. Steamed Rice
2. Cover a woden box with a sheet paper and tie with a string
3. Bury the box into leaf mold deeply
4. Cover it with plastic sheet to prevent from rain
5. After 3days in hot area 5days in cool area when you open it looks like white mold it is called as **IMO - 1**
6. Mix jaggery and IMO-1 equal quantity and put in a jar
7. Now it is called as **IMO-2**. Cover and keep the pot in a cool place
8. 2 : 1000 ratio can be used to apply on rice bran along with FPJ & FFJ same ratio to make **IMO - 3**

Method - 2

COLLECTION IMO's FROM BAMBOO STUMP

Materials / Ingredients needed

1. Wooden box **(made of Natural wood / bamboo / cedar, etc)**
2. Hard-cooked rice **(Less moisture to collect aerobic microbes)**
3. Knife / sharp cutting tool
4. Plastic Sheet
5. Porous Paper (paper towel)
6. Rubber band / Thread
7. Jaggery / Brown sugar
8. Glass jar / Clay pot

How to collect IMO-1

1. Choose a bamboo bush in the center of a bamboo grove.
2. Cut a healthy bamboo shoot at about 10 cm from the ground and trim the edges of the cut stump in such a way that the inner edge slants towards the hollow end. This prevents the bamboo juice from leaking out.
3. Fill the bamboo cavity with boiled rice **(low moisture content)**. The level of rice should be higher than the edge.
4. Cover this rice-filled stump with the wooden box.
5. Cover the box with dry leaves.
6. Cover with plastic sheet to protect from rain, and then place a weight on top to secure it in position.

   In 3 to 5 days, red, white, yellow, black and all sorts of microorganisms will be collected. Juice from bamboo will also be gathered.
7. Cut the stump. Transfer the rice in the jar or clay pot. This is also IMO-1.

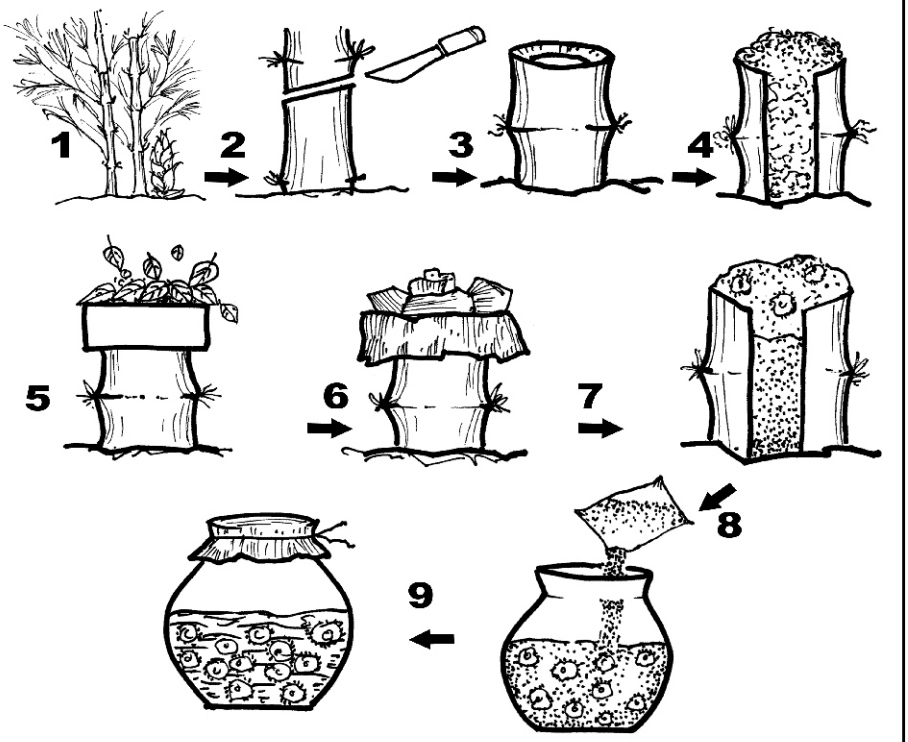
8. Mix jaggery with the IMO-1 in 1:1 ratio. For eg 1 Kg of jaggery should be mixed with 1 Kg of **IMO-1.** This mixture of brown sugar and IMO-1 is called **IMO-2.**

   The closer the state of sugar is to nature, the better. The less process the sugar has undergone, the more effective it is. Therefore, white refined sugar is not recommended. Brown sugar is advisable, but crude and unrefined sugar (jaggery) is better.

9. Cover the container using paper and rubber band.

NOTE: It takes 3 to 5 days depending on the local climatic conditions. You can experiment based on the climate of the place where you live.

INDIGENOUS MICROORGANISMS FROM BAMBOO STUMPS



1. Bamboo plant.
2. Cut the bamboo 10cm above the ground.
3. To prevent the leak cut the edge in side the rim
4. Fill the bamboo with steemed rice higher than the edge
5. Place the wooden box upside down and cover with leaf
6. Cover with plastic sheet to protect from rain and place stones on the top
7. In 3 to 5 days bacteria and Juice will be gathered and **IMO-1** is ready
8. Mix the jaggery and IMO-1 in 1:1 ratio in the jar and cover with paper and tie with thred or rubber band
9. With in 5 to 6 days **IMO-2** is formed

Method - 3

COLLECTION IMO's FROM PADDY FIELD

Materials/Ingredients needed

1. Wooden box **(made of Natural wood / bamboo / cedar etc)**
2. Hard-cooked rice **(Less moisture to collect aerobic microbes)**
3. Steel wire net
4. Plastic sheet
5. Jaggery /Brown Sugar
6. Paper Porous Paper (paper towel)
7. Rubber band / Thread
8. Glass Jar / Clay pot

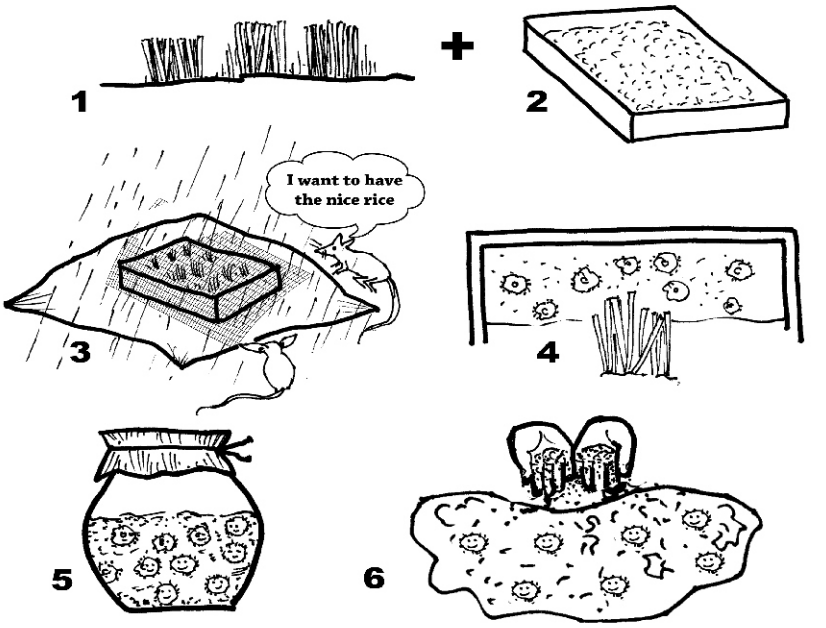
How to collect IMO-1

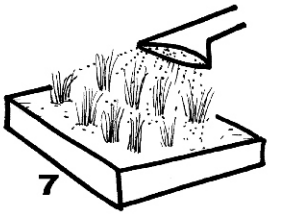
1. Fill the wooden box ¾ with steamed rice.
2. After the harvest of paddy (immediately after cutting the rice crops) cover the rice stumps with rice-filled wooden boxes facing downward in such a way that the rice is in touch with the paddy stumps.
3. Cover with steel wire net to prevent from mice and rats for causing damage.
4. Cover with plastic sheet to prevent rain from getting through. IMOs will be gathered approximately in a week. Mostly anaerobic microorganisms will be collected such as *Bacillus licheniformis* that actively breaks down protein, fat and carbohydrates and *Bacillus subtilis* that breaks up strong fibers such as straw and reeds. After 4 days the rice is covered with fungal growth. This is called as **IMO-1.**

5. Transfer the fungi-farmed rice in the clay pot or jar.
6. Mix Jaggery with the IMO-1 in 1:1 ratio. For eg, 1 Kg of Jaggery should be mixed with 1 Kg of IMO-1. This mixture of brown sugar and IMO-1 is called **IMO-2.**

   The closer the state of sugar is to nature, the better. The less process the sugar has undergone, the more effective it is. Therefore, white refined sugar is not recommended. Brown sugar is advisable, but crude and unrefined sugar (jaggery) is better.
7. Cover the clay pot with paper and fasten it by using rubber band.

INDIGENOUS MICROORGANISMS FROM PADDY





1. Rice crop after harvesting
2. Steamed rice packed in a wooden box
3. Put the box face down on the rice stumps after harvesting and wire fence for preventing Rats / Mice
4. Juice and microorganisms from rice plant can be collected
5. Mix the rice with jaggery in equal amounts and keep in the jar. IMO-2 is formed with in a week
6. 2ml of IMO-2 with 1000 ml of water ratio is good for manure making
7. 1ml of IMO-2 with 1000 ml of water is good for to dip the rice seedling roots during transplantation time

PREPARATION OF IMO-3

Materials / Ingredients needed

1. Water
2. Rice bran/flour
3. Paddy straw
4. IMO-2 **(The mixture of brown sugar an IMO-1 is called IMO-2)**
5. All the NF inputs diluted in water in the ratio of 1:1000

How to Make IMO -3

1. Dilute IMO-2 with water (1:1000) and mix with rice bran or flour. The moisture level of this mixture should be 65% - 70%. **(The consistency should be such that it should lump when pressed and loosen when shaken)**
2. For better results, use diluted NF inputs such as FPJ, FAA, OHN, etc, while adding water.
3. After mixing, stack (pile/heap) the rice bran mixture IMO-2 on soil floor and not on concrete floor
4. The height of the rice bran mixture bed should be not more than 30 to 40cm in height.
5. Cover this small heap with Paddy straw to ensure that the temperature would not rise over 50˚C. To do so, flip the straw once in 2 days.
6. It usually takes 5 to 7 days for the surface to be covered with whitish spores of IMOs, but the speed of cultivation depends on the outside temperature. When the temperature stops increasing, the fermentation is completed. This is called as **IMO-3.**

The moisture level can be measured by forming a rice bran boll and twisting it. If the moisture level is around 65 -70 % the boll can be easily divided into two halves. However, it is better to use the moisture meter (hygrometer) to get accurate data.

After evenly mixing with diluted IMO-2 make a heap 13-15 inches (30 to 40 cm) hight, and cover it with straw, straw mat or leaf litter to prevent moisture evaporation and to provide shade from direct sunlight. 70% shade and 30% light is recommended, since it creates favorable conditions for useful microbes in paddy straw, Eg. *Aspergillus's oryzae, Bacillus subtilis,* etc. Be sure to press several spots with weights or soils over the straw, because straw is too light to be fixed on the top of the rice bran mixture. It is best to use straw mats or straw bags (gunny bags) for covering.

This process is very important for massive cultivation of IMOs. This must be done on soil floor and not on a concrete floor and in a place with good ventilation. As time passes, the temperature rises within the pile of the rice bran mixture, because it undergoes fermentation. When the temperature reaches 40-50 ˚C turnover the rice bran mixture evenly so that the temperature does not rise further and also in order to prevent moist clusters. If the temperature is below 40 ˚C, the mixture may be in an anaerobic condition due to the excessive moisture. If the temperature rises up above 70 ˚C, proteins may be broken down by thermophilic microbes and nutrients released into the air resulting in loss of fertilizer effect. Therefore, it is necessary to turn over the rice bran mixture in order to control temperature. It takes about 7 days for this process.

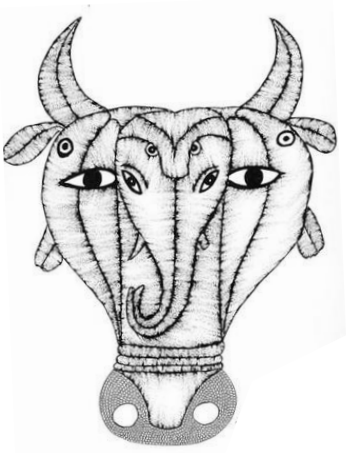
When IMO-3 is completely cultured, they become a lump of white colonies of IMOs and are visible over the top when the

straws are uncovered. In the beginning of the fermentation, the IMOs emit a pleasant smell (similar to those of Absida, Aspergillus, Mucor or Rhizopus) during their fermentation, and give out a fragrance when the fermentation process is completed. The moisture level drops to around 40% from 65-70% of the initial stage. It is called pure stock or IMO-3.

How to store IMO-3

Keep the IMO3 bags in shaded and cool place. Make sure that the air is well circulated by keeping IMO-3 in a ventilated container such as jute / gunny / cloth bags.

First, spread rice straw or leaf litter at the bottom of the container, and put in IMO-3. During storage, the IMO-3 may become dry (moisture level 20-30%) as the moisture gets evaporated. It means that the IMOs have entered a sleeping phase (state of dormancy). Pile up containers into 3 layers and shield them from direct sunlight and rain. At this point, there is no need to turn over, because of the convection currents that are created through the gaps of containers.



PREPARATION OF IMO-4

Materials / Ingredients needed

1. IMO-3 - 10 Kg
2. Field / crop soil - 5 Kg
3. Red fine Soil - 5 Kg
   (Anthill / Termite Mound)

HOW TO MAKE IMO -4

1. Combine 1 part of IMO-3 with 1 part of soil. 50% of the soil used for the mixture should be from the field for crops and the other half is from fresh new soil **(mountain soil, red fine soil, etc.)** This will harmonize wild IMOs with field IMOs.
2. Mixing should be done on the soil floor and not on concrete.
3. Create a heap of this mixture not more than 20 cm in height.
4. Keep the mixture covered for two days.
5. When needed, control moisture with Natural Farming inputs such as FPJ, FFJ, FAA, Lab etc **(All natural farming inputs at a ratio of 1:1000 dilution with water)**

Mix IMO-3 with field soil 30%, ant hill / termite mound 20% and field soil 50%. Use all the NF inputs in water and add in order to adjust the moisture content to 65- 75%. It is necessary to add sea water for the IMOs to work best, when they are inoculated to the soil. The end product is called **IMO- 4** in Natural Farming.

HOW TO STORE IMO- 4

Moisture may be evaporated during storage. So adjust the moisture content to 65-70% by adding nutrient liquids of natural farming inputs just before using IMO-4.

HOW TO UTILIZE IMOs

In order to be effective, IMOs should be used in a proper manner.

1. Use IMOs continuously. Since IMOs are used to make soil fertile and healthy, these should be collected and prepared every year. In order to bring about continued results. IMOs must be maintained in the soil.
2. Maintain IMO diversity. Avoid being choosy in collecting microorganisms. Instead, microorganisms from different environments should be collected and mixed. It is recommended to collect IMOs from all four directions of the field. We can also collect microbes from mountain, summit, valley and trench.
3. Use the tough guy. The types of microorganisms present in an area will vary from another, since each area has distinct environmental conditions. For example, the sunny side of the field will have different IMOs from the shaded side. Altitude will also affect the variety of microorganisms at every level. To include **"tough guys"** into the IMO mixture, samples from the high mountains or uncontaminated regions can also be collected.

CHAPTER - 3 - B

NATURAL FARMING INPUTS

MAKING FERMENTED PLANT JUICE (FPJ)

FPJ is a fermented extract of a plant's sap and chlorophylls. It is a rich enzyme solution full of microorganisms such as lactic acid bacteria and yeast that invigorates plants and animals. FPJ is used for crop treatments.

Materials/ ingredients needed:

1. Mugwart / Water amaranth / Bamboo shoot etc.
2. Jaggery / Brown sugar
3. Clay jar / glass jar
4. Porous paper (paper towel)
5. Rubber band / thread

WHAT TYPE OF PLANTS TO COLLECT

- Plants that are strong against cold and can grow well in spring. This is in order to pass down the characteristic of plants that can endure extreme climatic changes.
- Plants that grow fast and are vigorous. Fast developing plants have growth hormones that are very active. This characteristic can improve any plant weaknesses and the recovery of certain health problems of the plants.
- Fast-growing and vigorous plants. For example, Bamboo shoots and lateral buds of all kinds of plants have abundant growth hormone and vitality.
- Thinned-out fruits have a lot of gibberellins which makes plants healthy with thicker foliage and enhances the thickness of fruit.

WHEN TO COLLECT

- Avoid days when there is excessive sunshine or rainfall. Excessive sunshine may evaporate nutrients. Too much rainfall may wash away important nutrients and microorganisms. When there is rain, collect only after two days.
- Collect the ingredients just before sunrise. Plants have perfect moisture level during this time.

HOW TO MAKE FPJ

1. Shake off dirt from the Plants but do not wash in water. Washing will remove useful microorganisms. If the ingredients are too big, cut them to adequate sizes, about 3 to 5 cm. This increases contact surface area and promotes osmotic pressure. **(Do not mix different kinds of ingredients in one container. Use separate container for each ingredient.)**
2. Measure the weight of the ingredient and the weight of brown sugar. Brown sugar should be between half of the weight of the ingredient. You should add or subtract sugar according to plant's moisture level.
3. Put the ingredients and brown sugar in a large wide container and mix them with your hands. Cover with porous paper and leave for 1 to 2 hours.
4. Put the mixture into the clay pot. It should fill up ¾ of the jar. It is important that the jar is not too full or under full. The empty space is not empty. It is filled with air, for optimum fermentation to occur.
5. Put weight (Stone) on the mixture to control the amount of air in it.
6. Put on the cover and tie the jar. A cover is needed to prevent

insects from getting into the mixture. Paper is ideal because it lets the air in and out.

7. Remove the weight after 1 or 2 days. After the air has escaped, put back the cover again.
8. Put the jar in a cool and shaded place. Do not open, move or stir the ingredients during the process of fermentation.

WHEN TO USE FPJ

1. **Germination to early vegetative growth:** Mugwort (***Artemisia vulgaris,*** **Mosapatri in Telugu),** and bamboo shoot FPJs are suitable at this stage to help crops become resistant against cold and grow fast and strong. FPJs should be used at lower concentration during this stage, preferably at a dilution of 1:1000.
2. **Vegetative growth:** Arrowroot and Bamboo shoot FPJs, as well as Reeds **(water or marsh plants with a firm stem)**, help crops obtain their needed nitrogen to increase in volume. At this stage, FPJs can be used at a general dilution of 1:800 to 1:1000.
3. **Presence of pests:** FPJ can be used to keep pests away from fruits. A mixture of FPJ and rice bran can be sprinkled on the area around fruit trees to lure pests to the ground, thus preventing them from going to the fruits.

WHEN NOT TO USE FPJ

1. During excessive vegetative growth or overgrowth due to prolonged rains or cloudy weather.
2. FPJ made from the crop itself should not be used as this will promote further growth.
3. During acidic or nitrogen-excessive crop conditions, which create a pest-attractive environment.

4. Conditions of too much moisture or of bad ventilation, which promotes fungal growth.

HOW TO USE FPJ

FPJs are normally used at a dilution rate of 1: 800 to 1000 in water. When FPJ is used with other NF inputs, more water should be added to the solution.

FPJ from the same crops to get better results:

1. Tomato, **(Chilli, brinjal, etc,).** lateral buds of stems and leaves for tomato plants.
2. Squash and sweet potato- vines for same crops.
3. Pinched shoots of plants **(not contaminated by chemicals)**.

HOW TO STORE / PRESERVE FPJ

1. Polyethylene or glass products or clay jar may be used as a container. When using glass bottles, brown glass containers must be preferred.
2. Store in a cool place. Select a shaded area where there is no direct sunlight and where the temperature does not fluctuate. Direct sunlight should be avoided.
3. The optimum temperature range is 1 to15ºC for storage (Use a Refrigerator if available) if you want to keep for one year. Otherwise one can use within 30 days store at room temperature.

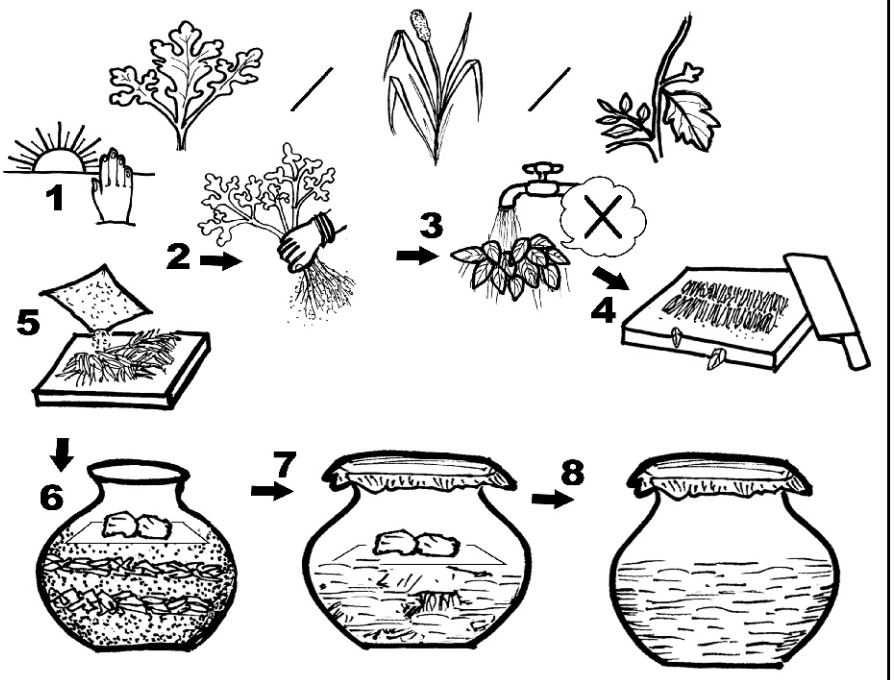
IMPORTANT NOTE:

1. It is not recommendable to use molasses as it contains too much moisture to raise the osmotic pressure as high as brown sugar does for good fermentation.
2. Sometimes small bubbles or fungi will be present in the Jar. They result from lacking brown sugar or from an

unbalanced volume between the empty space and the ingredient. In this case, add a little brown sugar, stir and preserve after filtering.

3. Avoid excessive sunshine (heat). Avoid sunlight for picking plants. If the hot weather continues, but FPJ production must continue, then water the plant one day before picking the plants / leaves before sunrise.
4. Avoid excessive rainfall (rainy season). Avoid picking plants during or after rainfall because rain washes away lactic acid bacteria and yeast on the leaves. If FPJ is made during this time, the juice can become sticky and thick, and won't ferment well. This is the same reason why the ingredients should not be washed before fermentation. It is advised to pick plants 2 to 3 days after rain.
5. Avoid picking plants near the road side to prevent the polluted plants.

FERMENTED PLANT JUICE (FPJ)



1. Pick the leaf before sunrise
2. Shake the plants to remove the soil from the roots
3. Donot wash the plants with water
4. Cut the plants in to small piceses of 4 inch length
5. Mix with jaggery half the weight of plant material
6. Fill the jar and keep a stone for a day
   (The weight of the stone maks the volume to reduce to third)
7. Cover with a paper
8. The FPJ is ready with in 5 - 7 days. Keep it in a cool place

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- ☞ Local plants that grow fast especially in spring
- ☞ Get growth hormone and chlorophyll.
- ☞ Throug making Phyllosphere microbial activities will be accelerated

CHAPTER - 3 - C

NATURAL FARMING INPUTS

PREPARING FERMENTED FRUIT JUICE (FFJ)

Fermented Fruit Juice (FFJ) is an artificial honey. It is a nutritional activation enzyme and is very effective in natural farming.

FFJ is a kind of FPJ that only uses fruits as its main ingredients. It is used to revitalize crops, livestock and humans.

As the main fruit ingredients we can use Banana, Papaya, Mango, Grape, Melon, Apple etc **(the fruits must be sweet).**

Materials / ingredients needed:

1. Banana
2. Jaggery /Brown sugar
3. Container
4. Wooden stick (ladle)
5. Chopping board
6. Porous paper

How to make FFJ

1. Prepare at least 3 fully ripened fruits, either picked or fallen. Look for fruits that grow in your locality. If the quantity of fruits is not sufficient, you may add supplementary ingredients such as spinach roots, wild yam, cabbage, cucumber, zucchini and radish. **(Use grapes only for grapes and citrus for citrus fruits. These fruits are not good when used on other crops due to their cold and sour characteristics.)**
2. For 1 Kg of fruit ingredient, use 1.2 to 1.3 Kg of brown sugar (Jaggery) in summer and 1Kg in winter. **(One of the functions of brown sugar is to control moisture. During winter, temperature is lower, thus, there is little need to control the moisture).**

3. Wash and dry the jar to disinfect container in the sun.
4. Spread the sugar on the chopping board.
5. Dice your fruit ingredients starting with the sweetest. After dicing, smear sugar on the fruits and put them in a container. This step should be taken quickly to prevent the loss of essential substances. Fruits that are difficult to dice like grapes and strawberries may be slightly crunched with clean fingers.
6. Use half of the sugar while dicing and pour the remaining half after all of the fruits have been diced and placed in the container.
7. Slowly stir the mixture of diced fruits and sugar, about 2 to 3 times with a wooden stick. Since temperature plays an important role in this process, stir the mixture with fewer strokes in summer and with more strokes in winter.
8. Cover with porous paper and tie to the container. Porous paper allows a good amount of air supply.
9. Let the mixture ferment. During summer, fermentation completes in 4 to 5 days. In winter the process takes 7 to 8 days.
10. After fermentation, sprinkle some more sugar on the mixture and store in a cool and shaded place. It is normal, that some sugar can still be found on the surface.

WHEN AND HOW TO USE FFJ

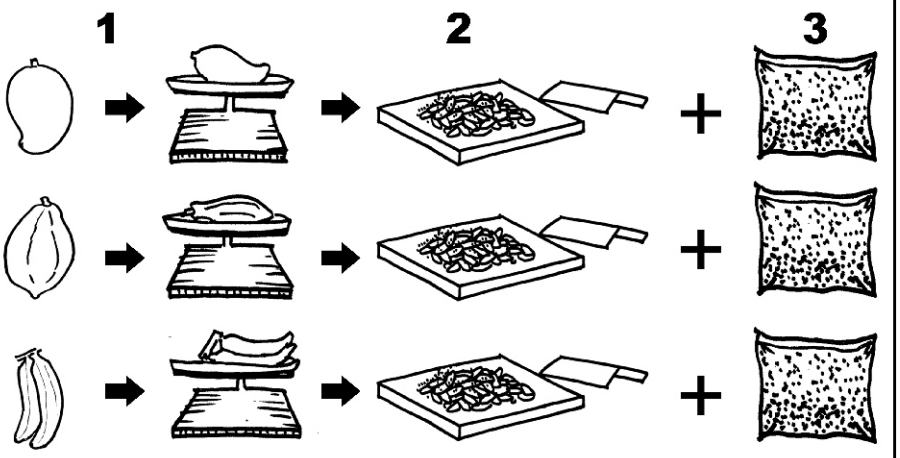
1. Changeover period: During this period, crops require ample amounts of phosphoric acid. Acid from FFJs of less ripe fruits is good such as those from Grape, Papaya, Mulberry or Raspberry.
2. Reproductive growth: FPJs made from fully ripened fruits

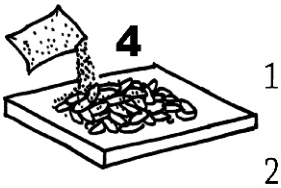
of apple, banana, mango, papaya, peach, and grape are useful to supply the calcium demand of crops at this stage.

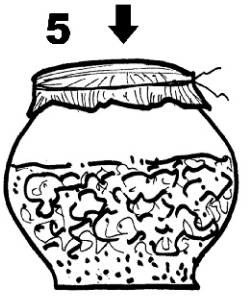
3. After the Changeover period of crops, they are applied with FFJ that has been diluted in 1:1000 ratio in water.
4. Spray it to chicken housing, vegetables, orchard for protection against diseases.
5. Plant activation enzyme is an indispensable material in Natural Farming. Activation enzyme enables used resources to be utilized in various application such as enzyme feed, enzyme fertilizers.
6. It is an excellent output for re-energizing crops and livestock.

Note: When big bubbles pop during the fermentation process, it means the power of enzyme is weak, and when tiny bubbles fiercely boil at once, it means power of enzyme is strong.

FERMENTED FRUIT JUICE (FFJ)







1. Take Mango or pappaya / Banana / Grapes
2. Take 1 kg of Banana and cut into pices
3. Add 1 kg of jaggery and mix it
4. Mixed the banana and Jaggery store in a Jar
5. With in a week the FFJ is ready

- ☞ Make several kinds of FFJ with a single material. Mix tham during application
- ☞ Cassave, Potato, Yam, Carrot, Sweet Potato use as sub materials.
- ☞ Orange, Liame, only approriate when they applied to same crops

CHAPTER - 3 - D

NATURAL FARMING INPUTS

ORIENTAL HERBAL NUTRIENT (OHN)

The oriental Herbal Nutrient (OHN)is a very important input in Natural Farming. It is made from herbs which are full of energy and function to increase plant robustness, to sterilize and keep plants warm. OHN revitalizes crops and activates their growth. It is made from popular oriental herbs such as *Angelica, Acutiloba,* Licorice and Cinnamon that are fermented, not boiled, to maintain the vigorous growth of crops.

GARLIC / GINGER / CINNAMON

The above ingredients may be classified as being in a raw state (Garlic / Ginger) in a dry state (Cinamon bark) can be used in their raw state.

Preparation of OHN with CINNAMON

Materials / ingredients needed:

1. Cinnamon
2. Rice wine/Bear
3. Jars / Bottle
4. Porous paper
5. Rubber band

HOW TO MAKE

1. Take cinnamon bark 250 gms / Bear 750 ml,
2. Put the cinnamon bark in a jar and fill up with bear so that the bark is completely soaked.
3. Fill the jar with 2/3 of the jar. **(The amount of bear should be such that it fully wets the ingredients but not too much. Let it absorb the moisture for 1 or 2 days).**

4. Add jaggary to the jar equivalent to the weight of the ingredients.
5. Cover the jar using porous paper and tie with rubber band. Leave for 3 to 5 days for fermentation.
6. Stir everyday with stick in the morning for two weeks.
7. After fermentation, pour distilled liquor into the remaining 1/3 space of the 3 jar. (For long storage)
8. If we use with in 45 days **no need to add liquor**, water will do.

HOW TO MAKE OHN WITH GARLIC / GINGER

Garlic : When using the whole bulb of garlic (1 kg), select freshly harvested garlic (**Do not wash with water).** Crush everything including the skins and the roots, which contain moisture. Crush 1kg of the garlic **(Do not crush too finely)**

Ginger : Collect ginger (**Do not wash with water).** Crush after shaking the soil off **(Do not crush too finely).**

1. Put 1kg of crushed garlic or ginger in the seperate jar.
2. Add the same amount of Jagerry 1kg (1:1 ratio) and cover it with porous paper. The amount of mixture should occupy 2/3 of the space of the jar. It is very important to fill only 2/3 of the jar in order for good fermentation. Leave it for 4-6 days.
3. The jar must cover it with tight lid / vinyl film. stir the mixture gently clockwise every day morning for a week. Leave it for 4-6 days.

4. Filter the content and keep the extraction in another jar for long-term storage.
5. The extracting process is difficult add water to extract juce this can be used with in 45 days.
6. To preserve longer period add liquor to extract the juce easily.

HOW TO DILUTE OHN

The dilution ration of OHN to water is 1:1000. The ratio can be changed depending on the weather or the condition of the plant. The three kinds of OHNs **(ginger, garlic and cinnamon)** are mixed just before using in the following ratio: 1:1:1:1000.

HOW TO USE OHN

OHN is used for making IMO - 3, IMO - 4, the soil treatment solution, and the seed treatment solution.

OHN is also good for all of the growth periods of crops, Nutritional growth period, Change-over period and Reproductive growth period. OHN is always used in Natural Farming.

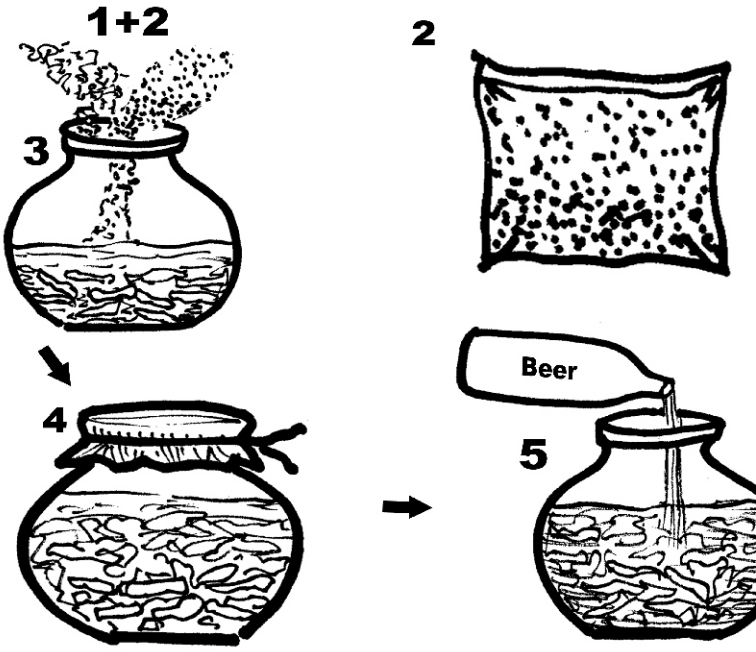
WHEN AND HOW TO USE OHN

Throughout the Nutritive Cycle. OHN is considered a very important input in Natural Farming and can be used throughout the early, vegetative, changeover and fruiting or reproductive stages at the basic dilution ratio of 1: 500 to 1000 times in water.

WHEN CROPS ARE WEAKENED

To reinvigorate weakened crops, a mixture of OHN (1:1000) with FPJ (1:500) and BRV (1:500) can be applied. For plants with soft rot or anthracnose, WCA (1:1000) is added to the mixture

ORIENTAL HERBAL NUTRIENTS (OHN)



1. One kg Gingger (crushed) or Garlic (crushed) or Cinnamon (break in to small pieces)
2. Jaggery 1 kg
3. Add 1 +2 in to Jar
4. Cover it with papper, keep in cool place. It will take 4-5 days to ferment
5. Add Distiled liquor or Beer to the esence and filter after 10-15 days

- When plants are weakened FPJ 5%, BRV 5%, OHM 1% mix them and spray to leaves
- Downy mildew and powdery mildew will be stopped.

CHAPTER - 3 - E

NATURAL FARMING INPUTS

PREPARING LIQUID FISH AMINO ACID (FAA)

What is Fish Amino Acid (FAA)

The Fish Amino Acid (FAA) is a liquid made from fish. FAA is of great value to both plants and microorganisms in their growth, because it contains and abundant amount of nutrients and various types of amino acids. Blue, back color fishes will get good FAA.

Fish Amino Acid is a liquid made from fish that contains abundant amount of nutrients and various types of amino acids. It is absorbed directly by the crops and it also stimulates the activity of microorganisms. The effects of FAA are more observable when mixed with a pinch of urea.

Materials/ ingredients needed:

1. Fish trash (head, bone, intestine, etc.)
2. Jagerry / Brown sugar
3. IMO-3
4. Mosquito net
5. Rubber band / thread
6. Clay pot / plastic jar (PE container) or glass jar

HOW TO MAKE FAA

1. Cut fish into pices and put in a clay pot or plastic jar (Blue-black colored fish are good because they contain high amounts of amino acid).
2. Add Jagerry of an equal amount (1:1 weight ratio). Fill the jar up to 2/3 of its volume.
3. Cover the opening of jar with a mosquito net. The meat will ferment in 7 to 10 days. In the presence of fat on the

surface of the solution, put 2 to 3 tea spoons of IMO-3 to dissolve the fat.

4. Extract the solution and use the liquid to crops.

Uses of FAA

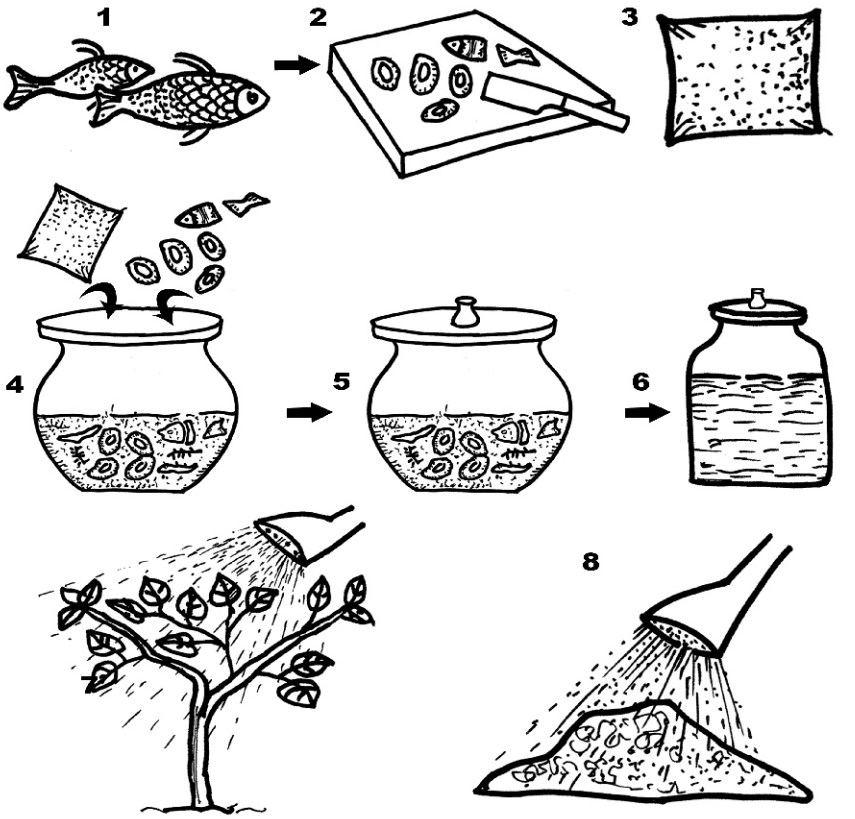
1. FAA is rich with nitrogen. It is good fertilizer for applying both to soil and foliage since it enhances the growth of crops during their vegetative growth period when used with other Natural Farming Materials
2. For leafy vegetable, it is possible to use FAA continuously to increase yield and improve taste and fragrance.
3. When making IMO or mixed compost apply the FAA after diluting it with water 1:1000 ratio. Then the FAA will help activate the micro organisms.
4. Mackerel FAA is very effective in getting rid of mites and the green house whitefly (*Trialeurodes vaporariorum*). Dilute FAA with water and spray it on both sides of the leaf.
5. Put the bones left over from creating FAA into the brown rice vinegar (BRV), which has a volume 10 times larger than the bones. The bones will decompose and produce good quality water-soluble calcium phosphate.

Note: It is not recommendable to use FAA during the period of reproductive growth, because it may induce over growth.

How to preserve FAA:

1. The optimum temperature ranges between 23-250C
2. No direct sunlight. A cool place is recommended.

FISH AMINO ACID (FAA)



1. Fish 1kg (with bones, skin, gut etc.)
2. Cut in to small peases
3. Jaggery 1 kg
4. Mix jaggery and fish in a jar
5. Keep the jar in a cool place
6. It will tack 10 to 12 days to get FAA
7. Apply 1% FAA to leaf surface
8. To compost and soil

☞ Excellent feed for microorganisms

CHAPTER - 3 - F

NATURAL FARMING INPUTS

CULTURING LACTIC ACID BACTERIA (LAB)

Lactic acid bacteria are anaerobic microorganisms. In the absence of oxygen, they break sugar into lactic acid. LAB is very effective in improving ventilation of air in the soil, promoting rapid growth of fruit trees and leaf vegetables.

Materials / ingredients needed:

1. Rice-washed water
2. Milk **(unprocessed and not boiled)**
3. Jagerry / Brown sugar
4. Clay jar / glass jar
5. Porous paper **(paper towel)**
6. Rubber band / thread

HOW TO MAKE LAB FROM MILK

1. Put rice-washed water 15 to 20 cm deep in a jar. Cover the mouth of the jar with handmade paper and leave in shade.
2. Lactic acid bacteria will propagate at 23 to 25^{0}C, and the solution will start to smell sour.
3. Add this rice water to milk. The ideal ratio between milk and rice water is 3:1 ratio. Milk in the market pasteurized in low temperature is okay. But sometimes, milk brought from the stores will not be effective. The best milk to be used is the milk from cows. Since milk has more nutrients than the rice-washed water, lactic acid bacteria will grow vigorously.

4) In 3 to 4 days, the jar will have three divided layers a) floating matter b) clear liquid and c) debris (waste). Starch, protein and fat will float on the surface and yellow

liquid will be deposited at the middle, this is called as Lactic acid bacteria .The waste will be deposited in the bottom of the container. Remove the floating substance, strain and save the yellow liquid and store in a separate bottle and keep in cool and shaded place or in a refrigerator.

HOW TO USE LAB

1. The basic dilution ratio is 1:1000.
2. LAB reinforces the ability of anabolism of microbes living on the plant stem and leaf, a condition that arose from the abuse of insecticides and fungicides.
3. When using LAB alone, it is more effective to use it with FPJs.
4. Fields will recover fertility and the soil will become soft and fluffy if IMO mixed with LAB is sprayed on the field.
5. Use LAB (1:500) with FPJ (1:300) as drinking water for livestock, to recover their digestive function.
6. LAB is extremely effective in making fruits and leaves large, but the amount of LAB used should be reduced while approaching the later stages.
7. If the LAB is used together with mixed compost or IMO, the fermentation process occurs fast, leading to very effective results. The LAB function is to prevent the fermented mixed compost from decaying.

USES OF LAB

1. The Lactic Acid Bacteria (LAB) is very effective for improving soil ventilation and for growing fruits and leafy vegetables.

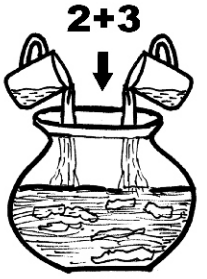
2. The initial growth of the plant, when LAB is used during the vegetative growth period of fruiting vegetables, higher quality plants will result, and may be kept for longer periods, in storage.
3. LAB increases the solubility of the fertilizer.
4. LAB can reduce damage from gas through neutralizing ammonia gas produced where the immature compost is applied.
5. LAB is conditionally anaerobic, so they can also survive with oxygen.
6. LAB is resistant to high temperatures.
7. LAB is strong sterilizer.
8. LAB is used to culture IMO-3.
9. LAB solubilizes phosphate in 100-200 ppm (parts per million) (100-200ml of LAB in 1000ml of water). Using LAB in phosphate-accumulated soil will increase its capacity to absorb the insoluble form of phosphates and help overcome the saline disorder as a result of decomposition of the phosphates.
10. LAB has power to resistance to some fungi.

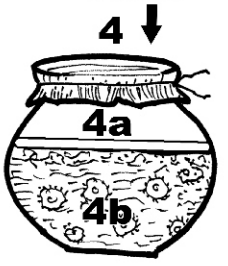
HOW TO STORE LAB

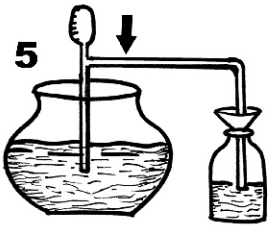
1. Keep the refined LAB serum at cool temperature, so for longer period where there is temperature change (1-15ºC).
2. No storage under direct sunlight.
3. In order to keep LAB at a normal temperature it must be mixed with the same amount of brown sugar and stirred with a wooden stick (ladle).

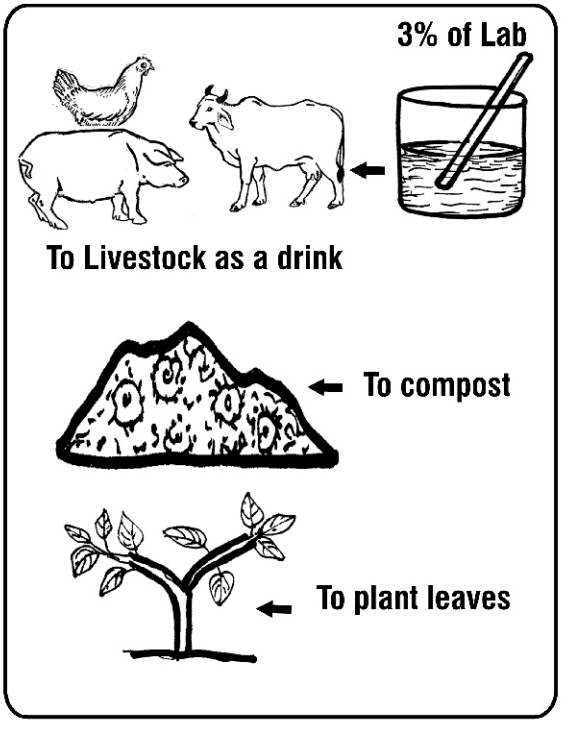
Note: Using rice-washed water in obtaining lactic acid bacteria is to collect stronger ones. Only strong ones can survive in poor nutrients condition like rice washed water.

LACTIC ACID BACTERIA (LAB)









1. Rice washed water
2. Put the Rice water in a pot cover it with a white paper
3. pour the milk in rice washed water pot
4. After 4 to 5 days

4a Fat protein & carbohydrate form as a top layer

4b Lactic Acid Bacteria Serum (Light yellow) will form

5 Add jaggery same amount as lab to keep ti at room temperature.

CHAPTER - 3 - G

NATURAL FARMING INPUTS

WATER-SOLUBLE POTASSIUM (WS-K)

Potassium deficiency occurs when the soil lacks potassium. Even though enough potassium exists, if the soil contains a lot of lime and magnesium, the plant suffers from potassium deficiency, because the absorption of potassium is suppressed due to those trace elements. Potassium deficiency can also easily occur in sandy soil which has less humus.

FUNCTIONS OF WATER-SOLUBLE POTASSIUM (WS-K)

1. Potassium activates the starch-synthesizing enzyme, facilitates the translocation of photosynthate, and helps to relocate the storage substances in a starchy crop.
2. Potassium deficiency symptoms occur first on older leaves, because potassium is a highly mobile element in the plant. The potassium content in the leaf decreases rapidly in the fruit enlargement period because a lot of potassium is translocated to the fruit.
3. The principal function of potassium is to grow meristematic tissues.
4. Potassium regulates the plant stomata and water use. At low concentrations, potassium decreases the growth rate, the size of the fruit, and the moisture content in the tissues. Therefore, potassium plays a vital role in cell enlargement. When the stomata are opened, the potassium content in guard cells is high; when the stomata are closed, the potassium content in guard cells low. In the light. Guard cells produce ATP through photosynthesis and absorb potassium by using energy from ATP. Consequently, when

potassium is accumulated in the guard cells, the turgor pressure rises resulting in the opening of the stomata.

5. Potassium promotes synthesis of the carbon dioxide-fixing enzyme, decreases the diffusive resistance of CO2 in the leaf, and activates various enzyme reaction systems.
6. The absorption of potassium is metabolic and its rate is high and increases the fluidity in the system. The main route of translocation is bound for meristematic tissues. Sometimes, potassium is translocated again from old tissues to young tissues.
7. Potassium functions to regulate the absorption of moisture, to enhance the translocation of photosynthates and to activate metabolic enzymes.
8. Potassium is abundant in leaves, the stems and the root tips as almost a form of salt. Potassium is very mobile in the plant, because it always exists as an ion or an easily ionizable form.
9. Potassium functions to help transport carbohydrates, to vitalize carbon assimilation, to control the turgidity (swollen) of protoplasm and to improve resistance to drought and freezing of plant tissues.
10. Potassium reduces lodging problems, increases yield and improves the quality of crops.

SYMPTOMS OF POTASSIUM (K) DEFICIENCY

1. Potassium deficiency occurs in plants that lack potassium in the plant or soil. The lack of potassium leads to an abnormal enzyme system and restrains various metabolisms. Consequently, the plant is disturbs/obstructs in its growth.

2. When WS-K is deficient, the branch shows growth deterioration, maturity is stunted, and yield/quality is deteriorated.
3. It is rare to have WS-K deficiency in initial stages of growth. In general, the symptoms of deficiency appear after the plant grows up to a certain point.
4. Chlorosis starts from the old leaves whose edges become yellowish brown. Chlorosis appears as a spot in the middle of leaves in some plants.
5. When roots and stems are getting thin, especially when lignifications of vascular bundles in the stem are suppressed consequently becoming less resistant to cold.
6. The seeds of fruits become small and matures late.
7. Chlorosis usually starts from the old leaf, but the tip of the leaf in the middle may discolor and dry out even at the peak of growth.

MATERIALS / INGREDIENTS NEEDED

1. Clay jar / mud pot
2. Porous paper **(Paper towel)**
3. Tobacco stems
4. Water
5. Rubber Band / Thread

HOW TO MAKE

1. Dry tobacco stems and cut them in to pieces. **(Do not ground too fine to avoid making powder).**
2. Put 1kg of tobacco stem in the hemp/cotton cloth bag and dip it in 5 Lt of water in order to dissolve potassium in water **(crude liquid of natural potassium).** It takes about 7 days.

HOW TO USE

It is necessary to use water-soluble potassium alone. Dilute 0.7 Lt of the crude potassium liquid with 20 Lt of water.

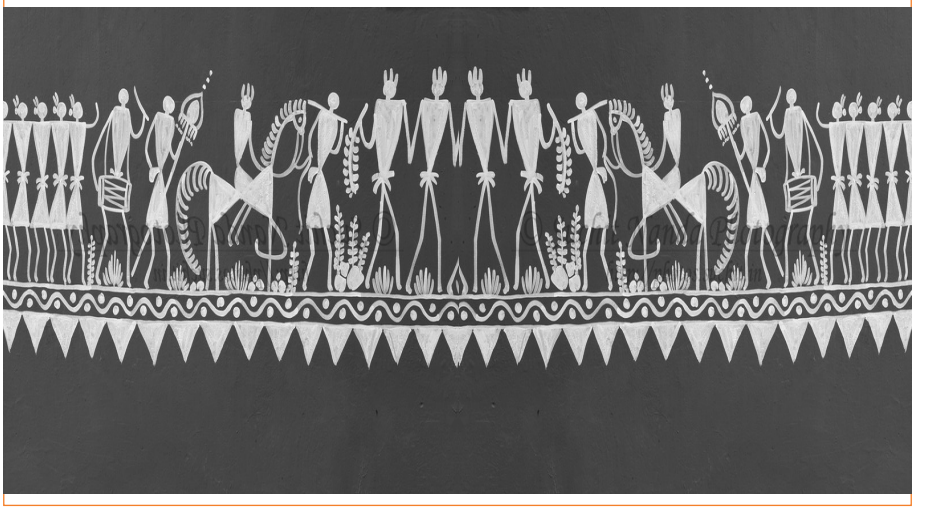
SYMPTOMS OF EXCESSIVE WS-K

1. Magnesium deficiency occurs if the potassium level is excessive.
2. It is similar to gas disorder and occurs in the middle part of leaves.

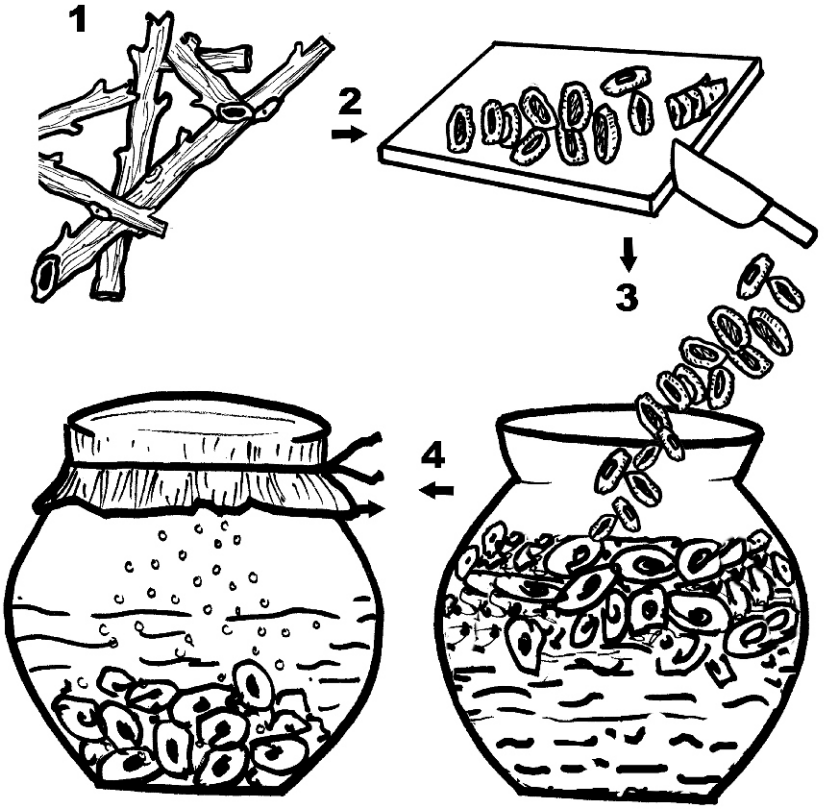
ENVIRONMENTAL CONDITIONS

1. Optimum temperature range is 23~25 ºC.
2. It is good to select a cool and shaded area with no direct sunlight.

NOTE: Weather conditions should be taken into consideration when WS-K is used. If WS-K is applied with nitrogen in a hot and humid condition or WS-K is applied on a rainy day, WS-K may bring about the synergy effect, which helps the plant to absorb nitrogen resulting in overgrowth.



WATER-SOLUBLE POTASSIUM (WS-K)



1. Take dry tobacco stems

2. Cut into pieces **(do not ground and avoid making powder)**

3. Put 1kg of tobacco stems in the jar and pour 5 liters of water in order to dissolve potassium in water

4. Cover the jar with paper

5. It takes 7days to get potassium
   (Crude liquid of natural potassium)

CHAPTER - 3 - H

NATURAL FARMING INPUTS

MAKING WATER-SOLUBLE PHOSPHORIC ACID (WS-PA)

Phosphoric acid is a substance of the cell nucleus and major element of the reproductive body of the plant. If the plant is deficient in phosphoric acid, cell division is hindered and the reproductive growth is not good.

1. Phosphoric acid is an important element for the life of crops, it contained in every plant. Phosphoric acid is a substance that composes the cell nucleus.

2. Absorbed phosphoric acid is used for cellular division when it moves to the bud, root tip or seed.

3. The stem of Sesame **(Zingly)** contains large amounts of phosphoric acid, and is used in Natural Farming. Burn sesame stems into charcoal and percolate the charcoal to extract WS-PA.

4. Phytic acid, storage form of phosphoric acid, is the major substance in the seed. Phosphoric acid is involved in photo phosphorylation and electron transport in photosynthesis. Also, phosphoric acid affects transporting anabolites and in protein synthesis.

Materials / Ingredients Needed

1. Charcoal from sesame stems
2. Water
3. Jar /Glass jar
3. Porous paper (Paper towel)
4. Rubber Band / thread

HOW TO MAKE WS-PA

1. Make charcoal out of sesame stems. Natural phosphoric acid is abundant in those stems. Burn the sesame stems and put out the fire when large flames appear.
2. Put 1 Kg of sesame stem charcoal in the cloth bag and dip it in 5 liters of water in order to dissolve phosphoric acid in water **(Crude Liquid of Natural phosphoric acid)**
3. It takes about 7 days although the time varies depending on the temperature of the surroundings.
4. Use air to enter once in two days **(blow air into the water with a tube).** Phosphoric acid dissolves in water.

HOW TO USE WS-PA

1. In 20 liters of water, 700 ml of WS-PA solution is added and mixed. The mixture is then applied during changeover period.
2. Dilute 700 ml of the crude WS-PA liquid with 20 liters of water when WS-PA is used alone.
3. Dilute WS-PA with water in the ratio of 1:1000, when it is used together with water-soluble calcium.

WHEN TO USE WS-PA

1. Apply WS-PA during the Change-over period. It promotes the differentiation of flower buds resulting in high fertility and yield.
2. WS-PA improves the sugar content of fruits.
3. Apply WS-PA when the colours of leaves turn light or dark green.

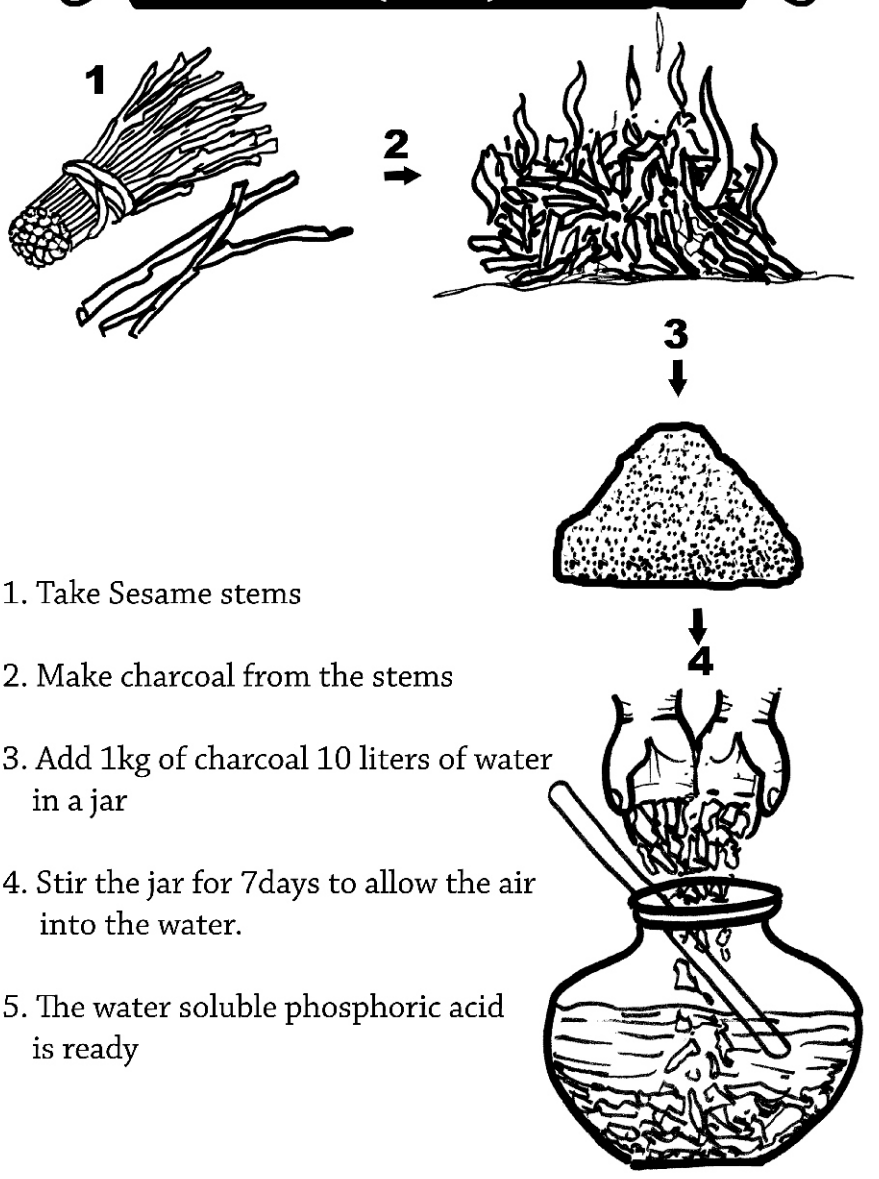
ENVIRONMENTAL CONDITIONS

1. The optimum temperature ranges from 23-25 ºC.
2. It is good to select a cool and shaded place with no direct sunlight.

SYMPTOMS OF WS-PA DEFICIENCY

1. WS-P can easily travel within the plant and move to the vigorous new leaves first. As a result, symptoms of deficiency appear mainly on the petiole and veins of the old leaf.
2. The new leaf does not grow well and it becomes smaller and dark green in color.
3. The growth of flowers is noticeably suppressed, naturally bearing fewer fruits.
4. Usually the symptoms are dormant within the body. It is therefore difficult to recover, even considering the ability to cope with the disease when the symptoms appear on the exterior.
5. The fruit skin becomes thick and the acid content increases.

WATER-SOLUBLE PHOSPHORIC ACID (WS-PA)



1. Take Sesame stems
2. Make charcoal from the stems
3. Add 1kg of charcoal 10 liters of water in a jar
4. Stir the jar for 7days to allow the air into the water.
5. The water soluble phosphoric acid is ready

CHAPTER - 3 - I

NATURAL FARMING INPUTS

WATER-SOLUBLE CALCIUM (WS-Ca)

Calcium is as important to plants as it is to humans. It is one of the most common substances in the world next to oxygen and silicon and the majority of calcium exists in the form of calcium carbonate (CaCO3). In Natural Farming, calcium carbonate is extracted from egg shells in which calcium carbonate is the main component by using brown rice vinegar. Through this process, calcium carbonate is changed to water-soluble calcium, which can be quickly absorbed by the crop. It prevents overgrowth of crops, hardens the fruit, prolongs storage period, promotes absorption of phosphoric acid and helps crops to accumulate nutrients. Calcium in water soluble form is efficient and effective in natural farming. Eggshells are very cost-effective materials for WS-Ca.

CHARACTERISTICS OF CALCIUM

1. Calcium contributes to better utilization of carbohydrates and protein. It is the major component in forming cell membranes and enables smooth cell division.
2. Calcium removes harmful substances in the body by binding with organic acids.
3. Calcium prevents crops from overgrowing.
4. Calcium makes fruits firm and prolongs the storage period.
5. Calcium promotes absorption of phosphoric acid and is responsible for nutrient accumulation in the crop.
6. Calcium plays a very important role in maintaining the health of the plant.

7. Calcium carries and accumulates nutrients for e.g., carbohydrate, which are temporarily stored in branches and in leaves till the final storage organ for e.g., ovary through physiological activity.

Materials / Ingredients Needed

1. Eggshells / Seashells
2. Crushing / Pounding Tool
3. Brown Rice Vinegar (BRV)
4. Jar / Polyethylene container
5. Porous paper **(Paper Towel)**
6. Rubber band / Thread

Calcium carbonate is the main component of eggshells. When calcium carbonate acts with any kind of acid, it produces carbon dioxide (CO2). But acetic acid, the major component of vinegar, is a weak acid, so it reacts very slowly and emits an imperceptible amount of CO2. A fluffy egg shell means that CO2 is melting into vinegar.

HOW TO PREPARE WS-CA

1. Collect eggshells and take out the inside peel. Taking out the inside peelings clears the eggshells of matters other than calcium.
2. Crush / Pound the shells in to small pieces **(not into powder form).** This makes the process faster and the product more effective.
3. Lightly roast the shells to remove any organic substances that may rot and deteriorate during the process.
4. Put the roasted shells in a container filled with brown rice vinegar (BRV). The eggshells will move up and down, emitting bubbles and melt to become a neutralized liquid. When there is no more movement or bubbles, it is done.

When there are no more bubbles with the added eggshells, it means the solution is saturated.

PRECAUTION: Put the roasted eggshells little by little and slowly into the container with veniger or BRV. If not, the bubbles can overflow by the reaction between the materials and the BRV.

NOTE: The eggshells that still have calcium carbonate may sink and remain at the bottom. This is because there are too many materials for the veniger or BRV to melt and the solubilization process reaches the saturation point. In this case, take out the solution and add more veniger or BRV.

HOW TO USE WS-Ca

WS-Ca is used with WCaP, FPJ, OHN and sea water for better taste and more aromatic fruits. It is sprayed on the leaves after the fruits have become large.

Use after dilution with water. The basic dilution ratio is 1:1000

WHEN TO USE WS-Ca

1. Several WS-Ca completed separately may be mixed in order to enhance the effect of calcium.
2. WS-Ca is very effective in the cross-over period when the growth of crop changes from vegetative to reproductive growth.
3. Spray WS-Ca on the leaves several times after the fruits have become large to some degree. Spraying WS-Ca prevents plants from overgrowing and yields solid fruits.
4. WS-Ca leads nutrients to be accumulated in flower buds and fruits. As a result, the flower buds become strong, can prepare for high yields the following year and harvest solid and substantial fruits that year as well.

5. WS-Ca has an effect of improving the taste and fragrance of the fruit when it is used with water-soluble calcium phosphate, oriental herbal nutrient (OHN), fermented plant juice(FPJ) and sea-water.
6. Use WS-Ca when the plants overgrow.
7. Use WS-Ca when the initial growth of the crop is poor.
8. Use WS-Ca when the leaves discolor and lack luster
9. Use WS-Ca when the flower buds have poor differentiation.
10. Use WS-Ca when the physiological drop is severe.
11. Use WS-Ca when fruit enlargement is slow
12. Use WS-Ca when the sugar content decreases.
13. WS-Ca helps in the transition from vegetative to reproductive growth. It is also effective when crops are overgrown, leaves have bad color or no luster, floral differentiation is weak, flower blossoms just fall, fruits do not ripen, fruits are not sweet and crops are nitrogen-excessive. However, WS-Ca should **not be** given when vigorous vegetative growth is needed.

ENVIRONMENTAL CONDITIONS

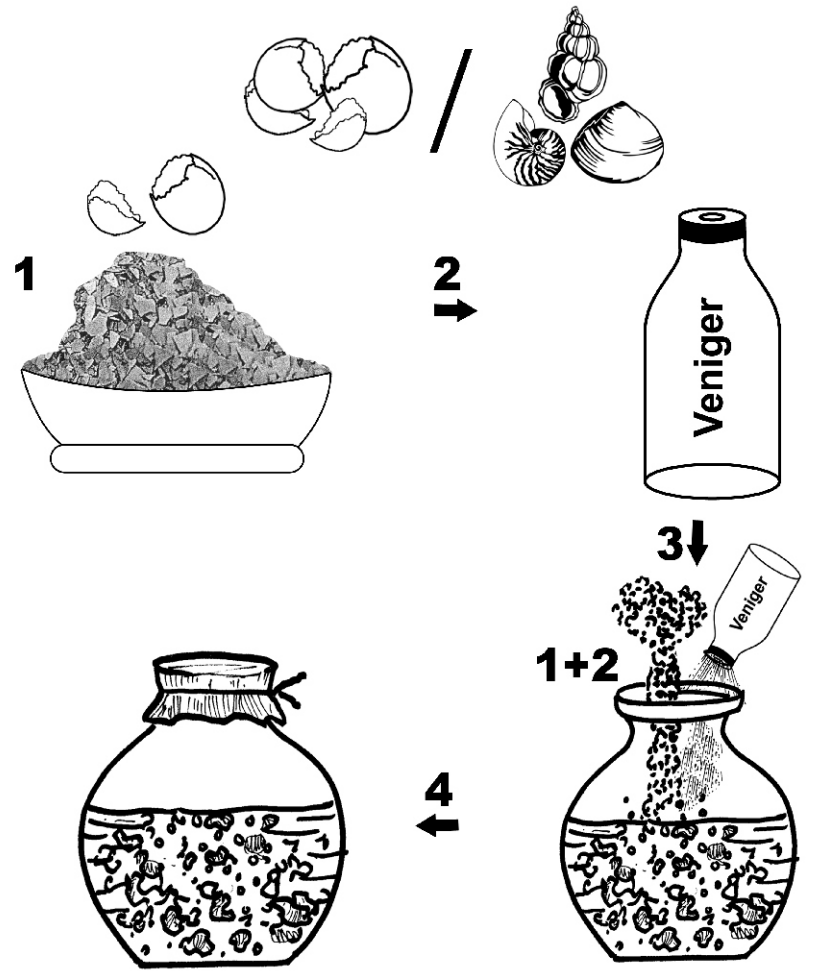
1. The optimum temperature should range from 23-25 ºC.
2. It is good to have cool and shaded place where no direct sunlight can penetrate.

SYMPTOMS OF CALCIUM DEFICIENCY

1. Underdeveloped roots and feeble root hairs: It is because, the normal protoplasm of the cell is not formed due to calcium deficiency.
2. The leaves discolor become brownish and then dry out.

3. Appearance of empty bean pods.
4. Poor ripening of the fruit and vegetable, excessive moisture and organic acid, lack of sugar content, softening of the fruit flesh, insufficient fragrance.
5. Leafy vegetable contact with Rhizoctonia disease and the poor heading phenomenon.
6. Root vegetables become pithy(spongy) and hollow, lack of sugar content and fragrance and it stay a short time in storage.
7. Both rice plants and barley plants suffer from problems such as excessive moisture, low accumulation of starch, lack of luster and fragrance and low resistance to insects and diseases.

WATER-SOLUBLE CALCIUM (WS-Ca)



1. Crush the egg shells / sea shells in to small pieces (not into powder form)
2. Lightly roast the shells to remove any organic substances that may rot and deteriorate during process
3. Put the roasted shells and add veniger (BRV)
4. With in 2 -3 days the Water Soluble Calcium is ready

CHAPTER - 3 - J

NATURAL FARMING INPUTS

WATER-SOLUBLE CALCIUM PHOSPHATE (WS-CaPo)

The Water-soluble Calcium Phosphate (WS-CaPo) is extracted from the bone of vertebrate animals. WS-CaPo is an essential substance for plant growth and is widely distributed in the soil. Calcium phosphate is insoluble in water, but soluble in acids: this property is used in Natural Farming. Calcium phosphate can dissolve slightly in the water containing CO2.

Phosphoric acid and Calcium are good for plant cultivation. Their results are said to be effective, but with improved method of production and correct usage, the benefits may be seen much faster.

Materials / Ingredients Needed

1. Animal bones 200 gms **(Cow / Pig / Chicken/ fish)**
2. Brown Rice Vinegar 1 liter. (BRV)
3. Clay Jar / Glass Jar
4. Porous paper **(Paper towel)**
5. Rubber Band

HOW TO PREPARE WS-CaPo

1. To remove the flesh boiled the bones and dry under sunlight. Do not use raw bones, on which meat and fat is attached. Turn the bones into a charcoal state by burning them at a low temperature. This process is necessary to burn organic and fatty substances.
2. Use the charcoal of the bones as they are or pound them (Do not pound too much, as it will become powder). Put the bones in the jar with BRV.
3. Calcium phosphate is dissolved from the bones.

4. Small bubbles will appear. If there is no movement, it means that the process of solution is completed **(about 7 days).**

NOTE: Cow, Pig or Fish bones contain much calcium phosphate. After burning them at a low temperature for removing organic substances, then put them into veniger or BRV for extracting inorganic substance, calcium phosphate.

HOW TO USE WS-CaPo

WS-CaPo is diluted 1:500 to 1:1000 times for crops. A stronger dilution rate can be used when needed. The solution is then sprayed on leaves.

WHEN TO USE WS-CaPo

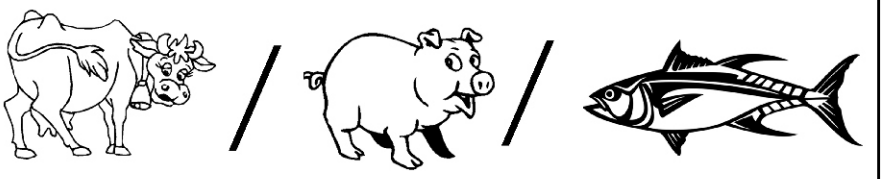
WS-CaPo is used on plants before and after the changeover period.

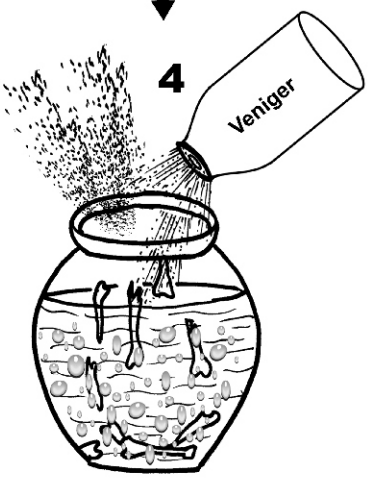
1. Use after dilution with water. The basic dilution ratio is 1:1000
2. Spray WS-CaPo on leaves during the periods of cross-over and vegetative growth.
3. Use WS-CaPo when the crop overgrows.
4. Use WS-CaPo when the initial growth is poor.
5. Use WS-CaPo when the flower buds have weak differentiation.
6. Use as drinking water (1:500) for the livestock that are pregnant or ovulating.
7. WS-CaPo It can be fed to animals during pregnancy or breeding time.

HOW TO STORE

1. The optimum temperature ranges from 23-25 ºC.
2. It is good to have cool and shaded place where no direct sunlight can penetrate.

WATER-SOLUBLE CALCIUM PHOSPHATE (WS-CaPo)





1. Take the bones

2. Boil the bones to get rid of the fat and meat

3. Burn the bones into charcoal

4. Add charcoal bones and veniger inside the pot until no bubbles pot are formed.

5. When more bubbles are formed, add the charcol bones more into the pot

CHAPTER - 3 - K

NATURAL FARMING INPUTS

BROWN RICE VINEGAR (BRV)

Characteristics of Brown Rice Vinegar

1. The acetic acid bacteria of brown rice vinegar (BRV) affects liver cells and support them for sterilization, neutralization, diuresis, synthesis, and works to prevent and cure various diseases in live stock.
2. BRV is weakly acidic but when it is decomposed in the body, the remnant becomes alkali. Therefore, it is called alkali food. Cereals and fruits, which produce vinegars are typical alkali foods.
3. BRV itself is an acid, but it changes into a base when it is absorbed by humans, livestock or crops. So, BRV functions to change the physical constitution from acidic to alkali, which means it renews the body into a pure and healthy condition.
4. BRV contains phytic acid, it helps to neutralize poisons, to sterilize and to improve physical constitution. It is effective in preventing and curing various diseases.
5. BRV has more amino acids and organic acids, which are antidotal, than any other food. Therefore, it is excellent for decomposing lactic acid, which prevents aging.
6. BRV raises the calcium absorption ratio. If body fluid tends to be acidic, the body tries to neutralize it and when this happens, the body needs calcium. It is difficult for calcium to be absorbed in an acidic condition. But, combined with the citric acid in BRV, calcium can easily be absorbed.

FUNCTIONS OF BRV

1. BRV in low concentrations facilitates vegetative growth and affects the initial growth of leaves. If BRV is applied on the leaves, it helps them form the wax layer, which creates

thicker leaves, fastens foliation and increases resistance to diseases and insects.

2. BRV improves the flexibility of the tree and increases absorption ability when Natural Farming materials are sprayed.
3. Due to the activity of the acetic acid bacteria, BRV has an ability to sterilize and restrain bacterial growth.
4. Because it is used with water-soluble calcium, BRV maximizes the effect of calcium.
5. BRV of high concentration accelerates reproductive growth.

HOW TO PREPARE BRV

1. Same method as 'Makgeolli' (Korean rice wine).
2. If ripe 'Makgeolli' is left as it is, BRV is produced due to the acetic acid bacteria. **(insted of BRV we can use 15 days fermented toddy, it turn in to Vinegar)**

PRACTICAL USAGE OF BRV

1. Put the eggshells in BRV and make water-soluble calcium.
2. Dissolve the animal bones **(cow / pig / chicken / fish)** in BRV and make water-soluble calcium phosphate.
3. For the purpose of sterilizing, use BRV with a dilution ratio of 1:500 at the juvenile leaf stage and a ratio of 1:200-1:300 at the adult leaf stage.
4. BRV is used for making Soil Ground work, Seed and Seedling Treatment, treatment of Nutritional Growth Period, Changeover Period and Reproductive Growth Period.
5. BRV is used for making IMO-3, IMO-4 and enriched compost.

CHAPTER - 3 - L

NATURAL FARMING INPUTS

YEAST

FUNCTIONS OF YEAST

1. Yeast is a microorganism which is in charge of the last step of fermentation. Yeast breaks sugars down into alcohol and carbon dioxide which is necessary in the process of fermentation.
2. Yeast enhances metabolism and expands capillary vessels.
3. Yeast functions to resynthesize organic substances decomposed by various microbes into amino acids, hormones, vitamins, etc.,
4. Yeast produces various substances, e.g., vitamins, nucleic acids, minerals, hormones and fatty acids that humans cannot synthesize. It is not healthy to eat many fermented foods containing yeast.
5. Yeast has the excellent ability to decompose chemical fertilizers.
6. Yeast usually sticks onto the fruit surface. Many yeast exists specifically on the grape.

HOW TO USE YEAST

Dilute yeast with water in the ratio of 1:1000.

1. Use yeast when the plant becomes weak.
2. Use yeast when viral or bacterial disease occurs.
3. Use yeast when branches or stems are heavily damaged by strong wind.
4. Use yeast when the amount of photosynthesis is low during the rainy or high-humidity seasons.
5. Use yeast when the livestock lose appetite or vigor.

It is effective to spray yeast on the leaves along with other natural farming materials.

ATTENTION ON USING GRAPE OR STRAWBERRY AS A CULTURE MEDIUM

- Do not wash in water and use as it is.
- Tools must always be sterilized before use.
- Do not seal the container. Cover the container by its lid loosely.
- Keep the container on a separate place in order to prevent unwanted microbes and odors from permeating it.
- Maintain the optimum temperature (23-25ºC) and humidity (65 - 70 %).
- Shake 1-2 times a day to protect from fungi during the cultivation of yeast.
- Keep the cultivated yeast in the refrigerator (1-15ºC)
- Yeast can be kept for a maximum one month but it is recommended to use all of it within a week.

CHAPTER - 3 - M

NATURAL FARMING INPUTS

LOESS POWDER (Silica soil or Ant hill mud)

THE IMPORTANCE OF LOESS POWDER

Loess soil is full of soil vitality and is the foundation for all life.

Loess powder is uncontaminated soil containing various trace elements and even some growth factors that are yet undefined.

Loess powder possesses a natural healing power that has not yet been explained by scientific analysis. Natural Farming uses this ability of loess.

HOW TO MAKE LOESS POWDER.

Materials / Ingredients Needed

1. Loess
2. Containers.

METHOD.

1. Put 2-3 kg of loess into 20 lit of water and stir well. Thick particles and small stones will sink and fine particles will float.
2. Collect the floating particles into a separate container. As time passes, the floating particles will precipitate.
3. When the precipitation is completed, drain the surface water into another container.
4. Dry the precipitated loess in a cool and shaded place. Be careful that, if the loess is dried under the sunlight, it does not disperse in the water.

HOW TO USE

1. Put 20-30 grams of loess powder in one lit water for seedling treatment. Liquid for preventing diseased such as canker.
2. We can spray of the leaf fungus treatment for vegetable plants.

Loess Soil

Ant hill Soil

CHAPTER - 3 - N

NATURAL FARMING INPUTS

SEAWATER AND FERMENTED SEAWATER (SW)

The deeper the sea water is the higher the salt content. There fore it is desirable to use the surface seawater.

Organic matter in sea water produces an excellent effect when the microbes of land and the minerals and microbes of seawater meet. Brackish provides a favorable conditions for microbes. Which in turn helps support may plankton and many fish that eat the plankton.

In other words fermented seawater provides abundant energy to the crops and the livestock. Because of viruses skin disease occurs. When skin looses fat, the number of microbes decrease and even such a small change can induce out breaks of disease. Sea water can solve this problem. Adding rice-washed water (5ml) brings out its best properties. Rice-washed water and fermented plant juice (5ml) to sea water (diluted 30 ml to one lit water) brings out its best properties. Rice washed water has an effect like that of yeast. It is more effective when oriental herbal nutrient is mixed.

The combination has a similar effect when the river and sea merging point where freshwater and seawater meet. It provides a favorable condition for microbes which in turn support many plankton and many fish that eat the plankton. In other wards fermented seawater provides abundant energy to the crops and the live stock.

When the microbes of land and the minerals and microbes of seawater are combined it produces an excellent effect for crops and livestock.

HOW TO PREPARE SEA WATER.

For storage, pour seawater in a large bowl and leave it for a day to let air borne microbes go in it.

1. Using Seawater (SW) as an NF Input

While Natural Farming uses materials that farmers can prepare by themselves, other natural inputs need to be collected away from the farms. Such inputs include seawater (SW) and natural minerals (NM).

Seawater and sun-dried salt are two sources of nutrients and minerals regarded by Natural Farming as also essential together with NPK.

WHEN AND HOW TO USE SEAWATER

One lit Seawater is diluted with 30 lit water, while sun-dried salt is diluted 2ml for1000 ml water.

1. To sweeten fruits. WS-Ca is added to diluted seawater and then the solution is sprayed twice in one month and then 20 days before harvest.
2. Soil application. Sun-dried salt is applied to soil at 5 kg for every 10 acres.
3. Prevent feather loss in chickens. To avoid feather loss of chickens in summer, BRV (200) and WS-Ca (500) is mixed with diluted seawater and fed to chickens once in two days.

CHAPTER - 4

NATURAL FARMING INPUTS

SEED/SEEDLING SOLUTION (SSES) TREATMENT

The quality of seeds is imperative to the success of farming. A strong seed means a healthy plant throughout its life cycle. Seeds grown under harsh conditions are tougher and stronger with superior adaptability.

Seeds in the market, on the other hand, are bred in artificial conditions and soaked in chemicals. They cannot grow without human protection and cannot attain their fullest potentials even if given scientific treatments.

Natural Farming aims to maximize the seed's strength. Since seeds in the market are almost chemical products, they need to be treated to recover their natural powers. Furthermore, the conventional practice of soaking seeds for a long period of time before broadcast causes seeds to lose nutrients. Natural Farming uses a seed/seedling solution (SESS) with a brief treatment period to restore the seed's natural vitality.

HOW TO PREPARE THE SES

INPUTS MIXED AT SPECIFIED DILUTIONS	
FPJ - 2 ml	-
BRV - 2 ml	-
OHN - 1 ml	-
Water - 1000 ml	-
-	ADDITIONS
FAA - 1 ml	If seedlings are small and weak
WsCa - 1 ml	Seedlings are overgrown and soft

How to use SES

Duration of Treatment applied to Type of Seed

Type of Seed	Duration of treatment
Fast-germinating (Turnip, cabbage, Bean)	2 hrs
Intermediate (Cucumber, Melon, Squash, Lotus)	4 hrs
Slow-germinating (rice, barley, tomato)	7 hrs
Other (potato, ginger, garlic, taro)	30 min – 1 hr

PREPARING A SOIL TREATMENT SOLUTION (SOS)

Good, fertile soil is the basis of a productive land. While conventional farming practices deep tilling using soil conditioners, Natural Farming has devised ways to depart from this approach. In Natural Farming, earthworms till the land, straw-and-leaves mulching suppresses weeds and IMOs manage the soil health. In addition, an all-natural soil treatment solution (SOS) is used as soil conditioner.

SOIL TREATMENT FOR ONE ACRE (.4 Hectare) LAND:

INPUTS MIXED AT SPECIFIED DILUTIONS

IMO - 2	**500 ml**
FPJ	**500 ml**
OHN	**500 ml**
BRV	**500 ml**
LAB	**300 ml**
WCaP	**300 ml**
FAA	**300 ml**
CHARCOAL	**50 kg**
SOIL	**500 kg**
SW	**3 Liters**
WATER	**200 Liters**
FARM YAED MANURE	**1000 Kg**

When using IMO-4, scatter compost over the field, so that the top soil is barely covered (minimum 1500 Kgs per acre). The deeper the soil is, the richer it is, so do not bury the IMO. Soil applied with IMO-4 will get warm and have soft surface and maintain the balanced microbial community. It is recommended that IMO-4 be applied to the field in small lumps.

This form helps the field soil build up the aggregated structure rapidly. Soil treatment may be done 7 days before seeding or transplanting. In case the field has repeated cultivation disorder, soil treatment should be done 14 days before seeding. Apply IMO-4, 2-3 hours before sunset and make the soil foundation right after that.

How to use SOS

The mixture is set aside for 3-5 hours for microorganisms to propagate. The final product should be used according to the need. Common practice is to apply the solution three times before or after broadcast of seeds and then during the middle and later stages of plant growth.

CHAPTER - 5

FERMENTED MIXED COMPOST (FMC)

Mixed compost is a very useful Natural Farming input. FMC is quite similar to farm yard manure or ordinary compost, but the quality is completely different. FMC is very effective in promoting micronutrient absorption, enhancing plant hormone's effectiveness and in providing vitamins.

1. Hot and humid weather in the summer is favorable for bacteria to multiply

2. Cool and dry weather between late fall and winter is favorable for fermenting microbes to multiply.

In the first stage the fermenting microbes utilize the FMC and adapt to Make the sugars. They can be active without hindrance from bacteria in the season between late fall and winter. This is the reason why FMC should be made in the late fall.

WHERE TO MAKE FMC

The appropriate place for making FMC is some place where little wind and good drainage is available. Water availability also is important. For green houses transparent vinyl film should not be used. Install the shade over the green house in order to protect plant from direct sunlight. The floor must be soil. If the floor is made of concrete **(When FMC becomes hot it starts to emit moisture in all directions. The concrete floor gets wet and causes FMC to decay. Consequently the fertilizing FMC is decreased).** Cover the floor with soil with one foot height.

MATERIALS / INGREDIENTS NEEDED

1. IMO-4
2. Organic matter **(ingredients of organic matter may differ)**
3. Natural Farming Inputs such as FPJ, FAA, OHN etc.,
4. Shovel or mixing machine
5. Sacks of Jute
6. Powdered oyster/ crab / shrimp / eggshells are very good

HOW TO MAKE FMC

METHOD-1

1. Add IMO-4 will aide in the absorption of micronutrients. One microorganism possesses hundreds of enzymes and compounds that can change compounds into substances that can be easily absorbed.
2. Mix Oil cake, fish waste, bone meal, bean oil cake and egg shell. Spray them with water and add IMO-4. The amount of IMO-4 is 10% of the total materials.
3. Mix ingredients under a roof or indoors, protected from direct sunlight and rain. Do it on a soil floor, not on concrete floor. The whole material should be more than 500 kg. It is difficult to maintain fermentation heat with smaller volumes or quantities.

   - The creation of FMCs should be done indoors to have control over the moisture and over the specific temperature or amount of heat needed. Direct sunlight can affect the level of moisture of mixed compost because direct heat from sun can cause evaporation of moisture and nutrients.
   - In preparing FMC, temperature plays an important role

as fermentation needs precise temperature. FMCs are best done during a specific time of the year depending on the geographic location

4. Heap it to a height of 40 cm when hot and 80 cm when cold weather. This is to let oxygen get into the material and also to control the temperature.

5. Adjust moisture level to 60 percent with diluted (about 500 times) FPJ, FAA, OHN, other inputs. The matter should be slightly wet to the hand and can barely maintain shape when squeezed. Adding powdered oyster / crab / shrimp or eggshells is very good.

   - Adding powdered ingredients rich in calcium makes FMC more effective. FMC contains a lot of hormones due to its many ingredients (FPJ, FAA, etc.), which may result to the formation of more hormones during the process of fermentation.

   - Hormones like auxin produced by yeast and filamentous fungus; gibberellins from red fungus; and cytokines from germs and yeast, gets produced. Cytokine hormone promotes leaves / branch growth, cell division, embryo and seed formation, flower bud formation, germination and prevents aging.

6 Cover with rice straw mat to control moisture, temperature and the propagation of FMCs.

7. When temperature reaches 50˚C, use a shovel or machine to turn the material over. Mixing inside out will lower temperature and allow better aeration. Do first turning on Day 2, second turning on 5 to 6 Day and third turning on 8 to 10 Day.

- The temperature during the process must be controlled. Effective fermentation is dependent on temperature. If temperature reaches 70˚C, nutrients and other good liquids in the ingredients will evaporate.
- Specific days of mixing are based on the estimated temperature during the process of making FMC. At Day 2, the temperature is raised, reaching almost to 50˚C. Mixing is important at this temperature. The same goes with Days 5 to 6 and Days 8 to 10.

8. Control moisture level when necessary. Use NF inputs such as FPJ, FAA and all the other inputs of the NF.
9. After 20 days, FMC is complete.
   - A well-made FMC has a sweet smell. If it stinks, it's not fermented properly; it's deterioration. In worst cases, when you do not turn it over well or gave too much water, you may even have maggots.
10. Put FMC in sacks or gunny bags for storage. Keep in cool shade. You can store this for about a year.

HOW TO MAKE FMC

METHOD-2

Mix IMO-4 with mixed fermented compost materials (oil cake, fowl droppings, pig manure, cow manure, fish meal, commercial organic fertilizer) with a 1:10 ratio and use after fermenting for 7-14 days.

It is very effective to add cow bone powder, shrimp shell or crab shell to the mixture and ferment for more than a week. The result is IMO-5.

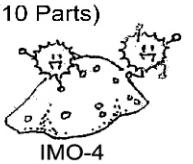
WHEN TO USE FMC

1. FMC is applied to the field 2-3 hours before sunset (avoid hot sun) or on a cloudy day, in order to prevent strong UV radiation. Ultraviolet rays of the sun can affect the microorganisms.
2. It is important to cover FMC with soil right after applying or to put FMC in to the soil by lightly plowing with a 1 to 2 inch rotary hoe.
3. It is recommended to apply FMC partially on the topsoil of the field. Partial application allows microorganisms to survive better in the soil.
4. The surface application spread FMC under rice straw (hay) or any kind of mulching
5. It is better and more sustainable to apply FMC in the small lump form than in the smashed form.
6. To use FMC as liquid fertilizer, place an amount of FMC in cloth and immerse it in water. Adding FPJ, LAB (1ml : 1000 ml) etc. to the solution is even better. The solution can be sprayed on crops in the evening or at night.

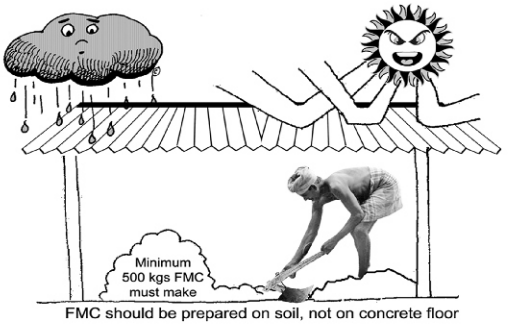
NOTE: Include at least one item from each category: Garden (Fallen leaves or fruits) The paddy (rice bran, straw) From the field the litter from oil cake or bean cake and from the sea (sea weed, Fish waste) Include as many kinds as possible. But the major ingredients are animal materials with abundant proteins (Bone meal or fish meal) and plant materials

MIXED COMPOST (FMC)

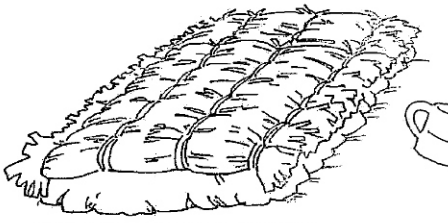
Organic Matter
(10 Parts)



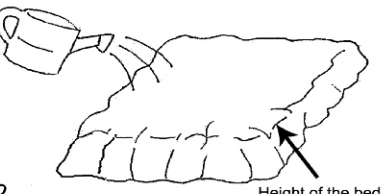
IMO-4
(1 Part)



FMC should be prepared on soil, not on concrete floor

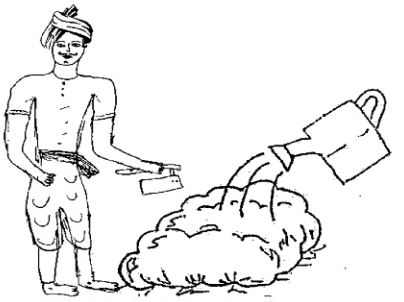


Cover bed with rice straw or mat

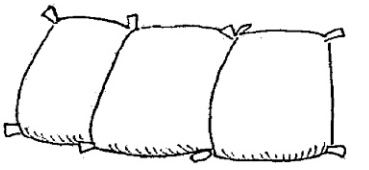


Height of the bed
40cm in hot temp
80cm in cold temp

The mixture should be
slightly wet to the touch &
barely maintain shape when squeezed



Maintain Moisture level
using diluted FPJ, FAA,
OHN, or NMA



Place FMC in sacks
and store in a cool and shaded place
to protect from direct sun light & rain

CHAPTER - 6

PEST CONTROL

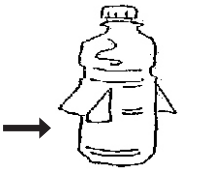
AROMATIC INSECT ATTRACTANTS (AIA)

Method: A

Natural Farming is completely chemical-free and environment-friendly agriculture. It developed a few methods for pest control such as aromatic insect attractant (AIA), fluorescent insect attractant (FIA) and the method of using fish odour.

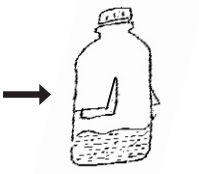
Materials / ingredients needed

1. PET bottle (polyethylene normal soft drink bottles)
2. Taddy or Brandy
3. FPJ / FFJ

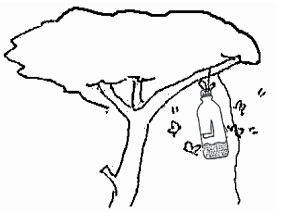


HOW TO MAKE AIA

1. Slit open the two sides of a PET bottle.



2. Put in rice wine and FPJ diluted 300 times. FFJ is best for attracting insects.
3. Install at the height of the fruits/leaves that moths/butterflies like. Install at the time when insects lay eggs. It is no use once the insects fly into the field and lay eggs before they drown in the solution.



4. The bottles should be hung around the field, according to the height of the plants for the vegetables and for the fruit trees 4 to 6 must be hung according to the size of the tree.

METHOD : B

SETTING UP A FLUORESCENT INSECT ATTRACTANT

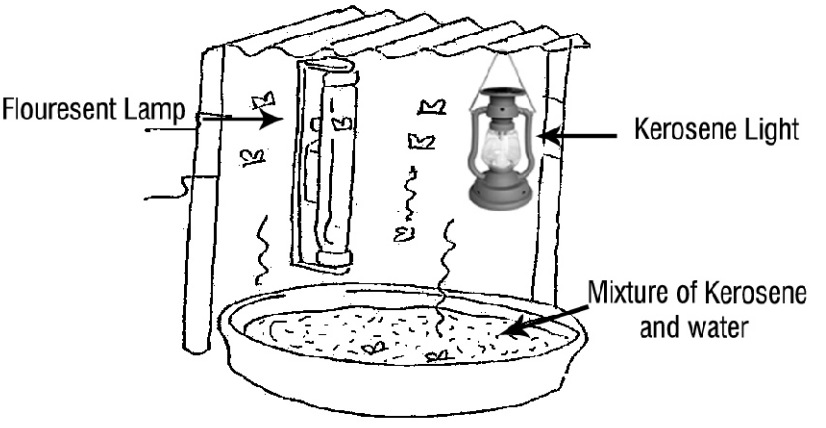
Insects are attracted to fluorescent lights. If used properly fluorescent insect attractant (FIA) is effective in controlling pests

MATERIALS NEEDED

1. Zinc sheet
2. Fluorescent Light
3. Roofing
4. Basin full of water
5. Gasoline/ Kerosene

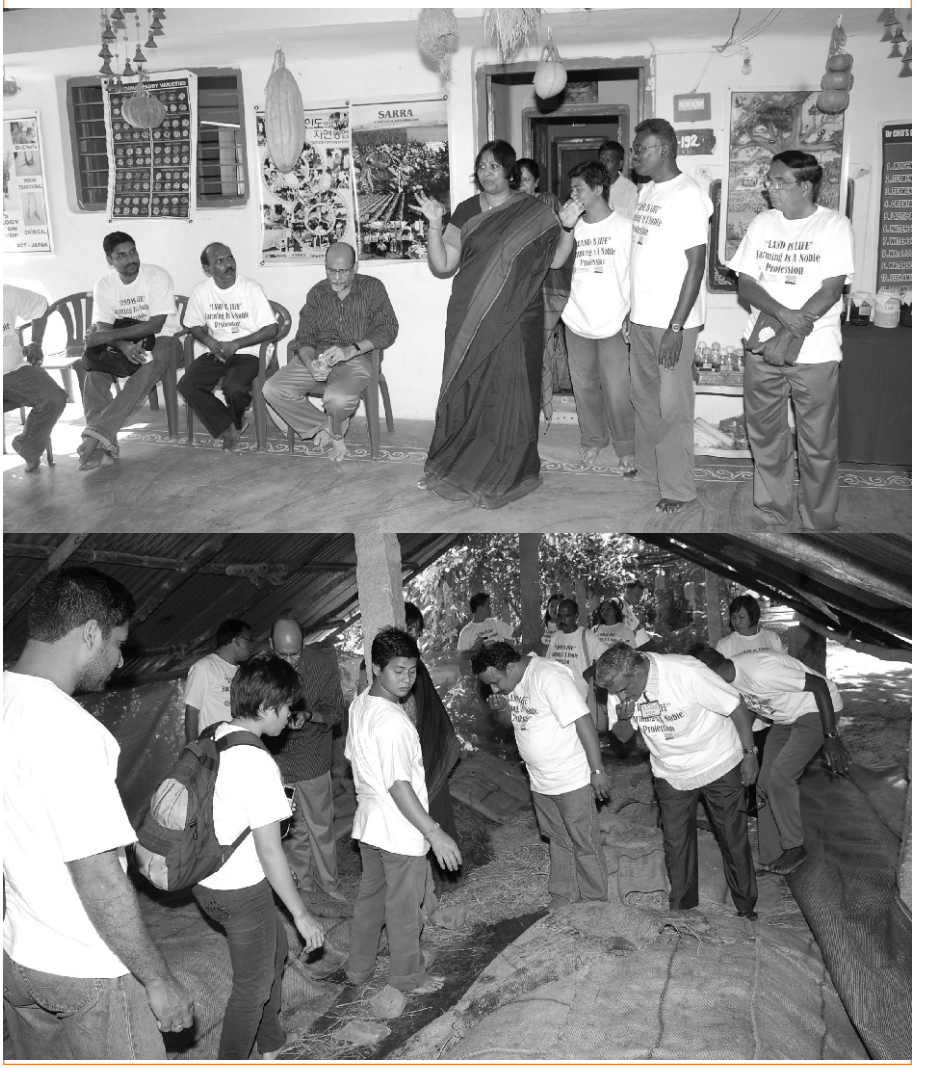
HOW TO MAKE FIA

1. Bend a zinc sheet in an "L" shape.
2. Hang a fluorescent light vertically on the corner of the sheet.
3. Make a roof to prevent rain damaging the light.
4. Put a basin full of water beneath the light.
5. Add a few drops of gasoline/ Kerosene in the water to completely drown the fallen insects.



WHEN TO USE FIA

During the egg-laying season of pestilent insects, AIA and FIA are installed at the height of fruits or leaves in and around the field. They are usually necessary during the peak of the reproductive growth of fruit-bearing plants and during the height of vegetative growth of leafy vegetables.



CHAPTER-VII

TREATMENTS AT DIFFERENT STAGES OF PLANTS

Other treatments have also been developed to address the specific needs of plants and livestock at the different growth stages.

1. Treatment for Vegetative Growth Stage

Treatment is used to promote vegetative growth and increase the volume and size of crops.

INPUTS MIXED AT SPECIFIED DILUTIONS	ADDITIONS
OHN-1 ml	**To prevent over growth**, WCaP 1 ml : 1000 ml
BRV-2 ml	**For larger fruits**, FPJ from baby fruits of the same crop 2 ml : 1000 ml and LAB 1 ml : 1000 ml
FAA-1 ml	
WP-1 ml	
FPJ-2 ml	

The above NF input are diluted ratio in 1:1000 ml of water depending on the necessity the addtions are also to be mixed in the input solution

2. Treatment for Changeover Period Stage

This treatment is given to supply the demand for phosphoric acid during this stage.

INPUTS MIXED AT SPECIFIED DILUTIONS	ADDITIONS
OHN 1 ml	**When crops are weak apply** FAA 1 ml : 1000 ml
BRV-2 ml	
FPJ from baby fruits 2 ml	
FFJ-2 ml	
WCaP-1 ml	
WP-1 ml	
NMD-1 ml	
WCa-1 ml	

The above NF input are diluted ratio in 1:1000 ml of water depending on the necessity the addtions are also to be mixed in the input solution

3. Treatment For Reproductive Growth Stage

At this stage, more calcium is required.

Inputs mixed at specified dilutions	Additions
OHN-1 ml	If growth is weak FAA-1 ml
BRV-2 ml	For strong resistance to cold and heat or to prevent bacterial disease NMA 1 ml
FPJ-2 ml	
WCa-5 ml	
SW-30 ml	

The above NF input are diluted ratio in 1:1000 ml of water depending on the necessity the addtions are also to be mixed in the input solution

4. Ripeness And Enhanced Sweetness Promotion Treatment For Fruits

Inputs Mixed at Specified Dilutions

OHN 1 ml
WCA 2 ml
SW 30 ml
} Mixed in 1000ml of water

Spray above NF inputs 15 days and 2 days (2 times) before harvesting to promote sweetness and maturity in the fruits

5. Crack Prevention in Fruits and Vegetables

Fruits crack when rains arrive after a long drought. The following inputs comprise the treatment to be applied during drought:

Inputs Mixed at Specified Dilutions

OHN 1 ml
BRV 2 ml
FPJ 2 ml
LAB 1 ml
SW 30 ml
} Mixed in 1000ml of water

CHAPTER - 8

LIVESTOCK NATURAL FARMING METHODS OF RAISING POULTRY



The aim of modern poultries is to attain efficiency and productivity that will turn out the highest profit. However, this comes with a total disregard for the chickens' quality of life. They are raised in narrow cages under artificial lighting and heating, not to mention fed with chemicals and medicines. They are seen as mere tools of production and profit, not as living things to respect.

While Natural Farming might also aim for efficiency, productivity and profit, it returns to chickens their right to a better life and provides them the opportunity to develop their natural potentials. In Natural Farming, chickens are raised with all their needs in mind. They are provided houses with space and natural heating, fresh water, and natural feeds. In addition, the housing design dispenses with cleaning and wastewater, no chemicals are used and little labour is required. This is the Natural Farming approach to poultry management.

NF Poultry has Three Purposes

1. The poultry will provide food for people and manure to condition the soil for the crops. In return, agricultural by-products can be used as chicken feed. In this manner humans, animals and crops will become inter-dependent.

2. To foster harmony among family members.
3. A family working together to take care of the chickens and do other tasks will form a close relationship.
4. To rehabilitate the surrounding environment. NF poultry will enrich the land, put healthier food on the table and boost the local economy.

There are Three Principles observed in NF Poultry

1. The floor of the chicken housing should be soil, not concrete. Separating the chickens from the soil can cause disease.
2. Temperature should not be artificially controlled. Heat from fermenting compost will suffice, even for small chicks, eliminating the need for heating machines.
3. Feed for hatchlings should consist of whole brown rice grains and bamboo leaves to strengthen the intestines.

How to Prepare the Chicken Housing

The NF chicken housing is designed in such a way that there is no bad smell, no emission, no cleaning needed, and no disease. The houses are constructed to suit the habits, instincts, and behaviors of the residents (chickens). Illustrations for constructing the various housing parts are shown in the picture.

ROOF

Made of galvanized zinc sheets.

- The metal roof conducts heat into the house With a skylight that allows sunlight to illuminate 1/3 of the floor throughout the day
- As the sun moves, it shines on another part of the floor, which enables the whole floor to receive some sun and get disinfected.

- The greater proportion of shade to sun enables the growth of microorganisms

WALL

Made of steel wire mesh

- Disperses the heat conducted by the metal roof.
- The continuous passage of warm air and cool air into the interior takes away moisture from the floor and thus controls dampness.
- The walls have curtains to control air flow.
- The air convection allowed by the open walls provides an ideal moisture level for microorganisms to grow.

FLOOR

The flooring of the poultryshed must be soil-based

- Carpeted with rice straw chopped to 3 cm long
- Flour thickness 7cm in general
- For broilers 3 cm thickness of flour
- FPJ, LAB and IMO – is added to the mixture for soil floor, enzymes from straw carpet and chicken feces.
- During certain times of the year, the floor may dry up easily, which requires water to be sprayed at least 1-2 times a week.

It is vital to maintain a host of microorganisms on the floor in order to break down chicken feces. This contributes to the absence of smell in the chicken house. The feces do not need to be removed unless needed for compost. The chickens feed on the fermented products of their feces, so taking out all the feces may affect the chickens negatively. The floor serves as feed producer, fertilizer factory, and waste treatment plant all in one.

WATER PIPE

Made of PVC drilled with holes.

- One chicken per hole to prevent fighting.
- The size of the hole and pipe is increased as the chickens grow.
- The hole is drilled such that it is slightly tilted back from the chicken's position.
- Designed to wipe the chicken's beak as it lifts its head to prevent water from dripping onto its chest as this can get the chicken sick.
- Water should always flow in the pipe to ensure that the water available is always fresh.

PERCH

The chickens are provided with perches for resting.

- Slightly arched in shape – sloping slightly, higher at the center.
- Prevents chickens from bumping into each other.

FEEDERS

Arranged in straight lines

- Placed in the area between the perches and water.
- To provide room for movement The design is shown in the picture.

NESTING BOX

The nesting boxes must Placed inside the house

- So that the chicks get used to them at an early age
- With bright lighting at first and then gradually darkened, so that the hens will not get frightened.

BROODING BOX

Chicks are grown in the brooding boxes, which also serves as an exercise and play area. In front of the box is the chicks' playground, which is gradually enlarged as they grow.

- The brooding box is divided into Rooms A, B and C.
- Room A is hot, where chicks rest.
- Room B is warm and serves as the feeding area.
- Chicks drink water in Room C.
- The distance from Room A to C is 710 cm for medium-sized chicks.
- To compel chicks to run back and forth 50-60 times a day.
- A cloth curtain resembling a mother hen's feathers is draped between Rooms B and C.
- To make chicks feel cared for by their mother.

HEATING

Artificial heating is not provided in Natural Farming even if temperatures drop below zero. Chicks develop short, dense hair and resistance when exposed more often to cold. Under artificial heating, they will grow long hair and weak resistance. When exposed to cold, these weaker chicks will gather in a corner, increasing chances of getting crushed to death. In colder regions, heat from fermenting compost can be used. The compost is situated below the brooding box.

- Use heat from fermenting compost
- Place compost below brooding box


HOW TO PREPARE THE CHICKEN FEED

NF emphasizes the use of homemade chicken feed. More importantly however, the nutrient content of the feed given is carefully balanced. Feed is given normally **once a day**, 2 hours before sunset.

BROWN RICE AND BAMBOO LEAVES

In Natural Farming, newly hatched chicks are fed whole brown rice grains in unlimited quantity instead of enriched commercial feed. After three days for layers and one day for broilers, bamboo leaves are added. On Day 50, rice husk is added. Gradually, the proportion of rice husk is increased until it consists 20-25% of the total feed at 6 months, when the egg-laying rate is 60%.

This kind of feed toughens the intestines and makes the chicken healthy. Conventional farming believes that soft powder should be given to chicks, which have fragile stomachs. However, giving soft and over-nutritious feed will prevent chicks from developing strong digestive organs. This leads to the excretion of undigested nutrition, which causes smell and disease.

HOME MADE FEED

Any material except mineral matter can be given as feed. Fresh green grass is good and it makes up for 1/3 of the total feed for adult chickens. Feed can be found on the housing floors, too. Along with soil rich in microorganisms, the fermented products of chicken feces can make up for 7-10% of the total feed.

To hold down the laying rate, rice husks can be used at 15-20% of feed from late February to mid-May. To maintain the laying rate at 65-70% for three years, rice husks can make up as much as 25% of the total feed.

THE TYPE OF FEED GIVEN DURING THE DIFFERENT STAGES OF CHICKEN GROWTH

AGE OF CHICKEN	FEED
Hatchlings	Whole brown rice grains in unlimited quantity
3 days after hatching (layers)	Whole brown rice grains + bamboo leaves
1 day after hatching (broilers)	
50 days to 6 months (when egg-laying rate is at 60%)	Whole brown rice grains + bamboo leaves + rice husk (slowly increase proportion of rice husk until it consists 20-25% of total feed)
Adult	Add fresh green grass (1/3 of total feed) and any other material except mineral matter Allow to feed on soil floor and fermented products of feces (7-10% of total feed)
Layers, from late February to mid-May (to hold down laying rate)	Proportion of rice husk is given at 15-20% of total feed
Layers (to maintain laying rate at 65-70% for 3 years)	Rice husks increased to as much as 25% of total feed

List of abbreviations

CGNF	Cho's Global Natural Farming
IMO	Indigenous Microorganisms
FPJ	Fermented Plant Juice
FFJ	Fermented Fruit juice
OHN	Oriental Herbal Nutrient
FAA	Fish Amino Acid
LAB	Lactic Acid Bacteria
Ws-K	Water Soluble Potassium
Ws-PA	Water-Soluble Phosphoric Acid
Ws-Ca	Water-Soluble calcium
Ws-CaPo	Water –Soluble Calcium Phosphate
BRV	Brown rice Vinegar
SW	Seawater
SES	Seed / Seedling Treatment
FMC	Fermented Mixed Compost
AIA	Aromatic Insect Attractants
GRT	Green Revolution Technologies
MNC	Multi National Companies

References

1. **Dr. Cho's, NF Books**
2. **Roel Revenare, Trainers hand book**