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Organic agriculture phosphites and stone breads

Chapter 1 fermented organic fertilizers

Chapter 2 prepared and fermented bio-fertilizers based on cow shit

Chapter 3 mineral broths how to prepare to control some nutritional deficiencies and diseases in crops

Chapter 4 phosphites prepared from ashes and flour of charred bones for the bio-protection of crops

Chapter 5 The rock meal

Presentation

In this new book or practical manual, they are condensed, among others, the three most common practices that the farmers are adopting quickly
in recent years in the middle of their crops, in the search to maximize the local resources available to them within their properties, farms, plots, farms or in
the rural communities where they live. **These three practices are:**

1. **Bocashi aerobic fermented organic fertilizers,**
2. **the preparation of bio-fertilizers based on shit of cow and**
3. **mineral broths.**

As an innovation, in three topics we incorporated the use of rock meal, as another fundamental practice for mineral regeneration of the cultivated soils that are tired.
Both the presentation and the description of each one of the four practices are treated separately, with the objective of didactically facilitating its approach, mainly on the part of the promoters and peasants who come developing these activities in different types of training in rural areas throughout Latin America.

With the publication of this material we do not pretend not to know the fundamental importance it has for organic agriculture the existence of other practices or techniques, of systemic impact, which are being developed in the
rural environment, such as:

green fertilizers;

the diversification of crops;

permaculture;

agrosilvo- systems pastoralists;

Perennial crops in association with coverages permanent the family garden and medicinal plants;

the systematized rotation of crops;

livestock diversification linked to the independence of external inputs and
to the production of forage or local biomass;

the basic works for the recovery and conservation of soils, aboneras, vermiculture;

organic matter and microbiology ground;

the rescue, the multiplication, the improvement and the reproduction of seeds in the hands of farmers;

among other practices that exist and that we leave to mention not to lose the initial objective of this book or manual, which is to collect and systematize some experiences.

Finally, with the disclosure of A, B, C of agriculture organic matter and the issue of soil remineralization with rock meal, incorporated in this publication in the IV chapter, at no time do we intend to deny or tarnish the importance of the infinite knowledge that the traditional peoples and communities have given us
and have preserved throughout the history of agriculture, to get ahead of deceit, lies, betrayal and the genocide to which they were subjected by the package of the green revolution, in the hands of industrial input mafias and merchants, international centers, professors, academics, researchers, extensionists and other sources mercenaries of the agricultural sector in the world.

Our main interest is to master the context of technology and to be able to redesign it according to the realities, moments and needs in the farmer's house with the elements of their environment.

Author's Note

Cordially,
The author

Introduction

Contemporary technocrats flaunted the false or dubious privilege of having a unique and unprecedented role in the development of industrial agriculture for the achievement of human well-being; however, they are the same species that has most developed the power to commit a collective suicide and destroy all life on the earth from the invention, the production and application of technology (machines, poisons, fertilizer, etc) inadequate and of war origin in the agrarian ecosystems.

In view of this situation, it is extremely important to understand the roots of the global crisis which is the current paradigm of the failed green revolution, to develop strategies and effective actions to change or reorient the decline of most of today's approaches. Decadence concentrated mainly in state manipulation and corruption policies, anti-ethical manipulation of technology and blindness scientific, based on the vision of a world mechanistic and reduced in the way of observing and determine the destruction of the life of many species.

To overcome the legacy of the current crisis of conventional agriculture, you have to print a new paradigm, a new vision, a new behavior, because a solution is inconceivable radical and permanent without a transformation to the interior of the human being.

Hope is in every BEING, it is not in the society, or in religious systems or creeds. In this new way of thinking and acting, the most important should no longer be the "the more the better" the linear and monolithic growth, gigantism and what right now; but it must be harmony, biodiversity, the dynamic, systemic, functional approach and complementarity of the whole universe, where reborn the mystic, the freedom, the collective, the emotion, the wisdom, the intuitive, the creativity, the heterogeneous, the coexistence, the process, the sacred, the spiritual internality, the traditional, the ancestral, the symbiosis, the durability, the universal knowledge, Confidence, multi-cyclical and harmony sacred of the coexistence of a human being in peace and not of conflict and destruction with the other expressions life symphony discovered, to be discovered and never discovered on this planet.

"The Earth is a network of relationships, it is a undivided wholeness, is the expression of an order universal based on the whole and not in isolated parts. "

On the other hand, access "new" forms of make a different agriculture, it also equals for universities to wake up from the deceptive mechanistic sleep and reduced in that they are submerged and they usually live, get out of anxiety consumerist and the cavern of illusions mercantilist in which they find themselves, is the challenge (*although as Plato himself adds in his famous myth of the cave who tries to explain that outside there is light to those who only know the cave will be taken by madman or by liar*).

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The construction of a new paradigm within of agriculture requires a new perception of reality, a new language, a new vision of the formation of the universe (cosmogony), too means to carry with the new postulates of the practical life of the peasants, complemented with new information and new observation models of natural phenomena in a way flexible, without denying them the dynamic that governs them.

"A paradigm is a set of theories, values, constructions, forms of models and techniques shared by members of a community and whose assumptions do not work as hypotheses, but as stratified beliefs. The belief is insistence in which the truth is what one would wish that was. From this it follows that a believer only will open your mind to the truth on the condition that it makes sense of the word, faith is the essential virtue of this nascent paradigm that conjugates in its interior the ancient wisdom and modern science fits with your ideas and wishes previously conceived. Actually, the paradigm of the new consciousness replaces its belief structure by a system of faith (A. Watts), because faith is an opening without reservations of the mind to the truth, be this whatever it was; lacking prior conceptions, faith implies a "plunge into the unknown"; this intimidates and terrorizes those who have a norm default to act. Beliefs cling, but faith is a letting go. In this sense of the word, faith is the essential virtue of this nascent paradigm that conjugates in its interior the ancient wisdom and modern science. The concept of paradigm and its essential relationship with scientific thinking was introduced in 1962 by Thomas Kuhn. For this historian of the science, a paradigm is a capital intellectual achievement that underlies science and guides the course of the investigations. It is assumed that every paradigm scientist must be amenable to modifications, refutations, or validations, however, when a theory works efficiently by a time, it becomes a "norm", that beyond of providing an operational context to a field of phenomena restricts it and pre-program. Converted in an implicit reference frame for the most, it becomes the "natural" way of seeing and acting, in the "reasonable" way of thinking about a phenomenon. In this way, nobody thinks about questioning or rebel against something that seems to be "order natural of the universe ". Work as a set of blinders, says Charles Tart.

We live in a time of conflict of paradigms, where renovating paradigms are proposed in front of older ones and new directions are opened in the explorations. The paradigm of the new agriculture consciousness should combine different approaches in a dynamic equilibrium, involving a ductile model of reflection and holistic thinking.

The paradigm of the new agriculture consciousness should combine different approaches in a dynamic equilibrium, involving a ductile model of reflection and holistic thinking. The proposal to build a different agriculture consists of proposing the construction of a new paradigm, which may consist, among other concepts, in not

happening to have more or in abandon:
• The vision of the universe as if it were a system mechanical compound of loose parts or cycles isolated
• The vision of the human body, the animals, the plants, soil and other living organisms; as if they were simplified production machines, transformation and recycling of food.
• The vision of eco-social life as if it were in a forced way in a constant competitive struggle for territoriality, food and survival
• Reduced vision, in believing in material progress unlimited at the expense of merely growing economic and technical.
• The vision of ownership, control and exploitation of nature on the part of the human being as a mechanism for understanding it.
• A vision of abuse and abuse, both of us same as of our environment, reflecting a lack of systemic wisdom.
• The vision of conquest and control of nature as a subjection mechanism created by Cartesian science, where false development has interrupted the cyclical process, "replacing" for a linear career.
• A vision or the false idea that in evolution of the species only survive the fittest and the most suitable within each species and that the life is a blind struggle against the environment and the rest; forgetting that what guides nature is peaceful coexistence, cooperation and not competition until death.
• The vision of the subordination of human development for technological development and subordination of personal growth through growth economic.
• The supreme species vision capable of eliminating and deny others for their existence.
• The vision of simplifying the complex with the linear relationships of cause and effect nonexistent. This new paradigm also consists of abandon any sympathy for institutions highly structured, vertical, inflexible and bureaucratic, similar to monastic institutions and military that characterized the extension rural in agriculture.

Finally "it's time to understand that we live immersed in a network of systems. Arrogance from a linear anthropocentric perspective, place the way of man over the road of the universe. Our responsibility consists of rethink the human being as an eco-systemic unit complex, which involves and contains the synthesis altogether. This synthesis resides in consciousness, and only the one who perceives beyond the body and will access levels of order and structure higher. Awakening to the new consciousness involves the responsibility in the exercise of truth. Be conscious, coherent and consistent, is to perceive the essential in each of our acts and in the nature of everything that surrounds us, of this form the everyday becomes transcendent; the divine human. " (Carlos Fregtman).

In any case, like conventional agriculture of the industry is based on a framework of concepts and values that are no longer viable, the will inevitably decline and in the long term it will disintegrate and the sociocultural forces they represent the "new" paradigm of organic agriculture, on the contrary, they will continue to grow and with the will eventually dominate. This transformation process it is a fact and it is now clearly visible for rural communities in many countries, from the constant increase of the systems of organic production. (Consult conference: Modernize agriculture, a new current in Europe and Latin America, by the same author).

"Organic agriculture is dedicated to the task to unearth and rescue the old paradigm (not exhausted) of the agrarian societies that practiced and they guaranteed for a long time the self-determination of their communities,
through the design of authentic models of rural family enterprises, where they conjugated wisdom and skills to guarantee sustainability and respect for nature, this same agriculture is much more than a simple revolution in the agricultural techniques of production. It is the practical foundation of a movement spiritual, of a revolution, to change the way of life of human beings."

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Fermented organic fertilizers

General features

Development of the fermented organic fertilizers it can be understood as a process of aerobic semi-decomposition (with presence of oxygen) of organic waste by means of populations of microorganisms, chemo-organo-trophics,

1. that exist in the waste itself, with controlled conditions, and that produce a material partially stable of slow decomposition in favorable conditions and that are capable of fertilize the plants and at the same time nourish the land.

The advantages of the production process of the fermented organic fertilizer are:

a) No toxic gases are formed or bad smells due to the controls that are carried out in each stage of the fermentation process, avoiding any beginning of putrefaction.

b) Managing the volume of fertilizer is facilitated, its storage, transportation and disposal of the materials to make it (you can elaborate in small or large volumes, of

.Before starting... page 23 of Spanish text.

A. Without a doubt, doing things is very good, but the real way to achieve a bio-rebellion against the empire of industrial agriculture is not only to know how to do things, but also to know why we do the same, and again each of the recommendations that are presented to prepare the different bocashi fermented organic fertilizers, bio-fertilizers, mineral broths, phosphates and rock meal applications.

B. Many of these recommendations may seem to be the same, but they are not really the same, due to certain characteristics very specific to the preparation and management of each fertilizer, bio-fertilizer, mineral broth, phosphate and rock meal application, according to each space where we are and the materials available.

C. For example, the final good quality of an organic manure or other bio-fermented preparation depends on many factors, such as the origin, the way of harvesting, the storage and the humidity of manures. **These should be as natural as possible or local, since the activity of the microbiological memory will be greater and more authentic. If manures, or fertilizers prepared with them, suffer prolonged exposure to sunlight or rain, or if too much water is added during their preparation or if their poor storage deteriorates, their quality will be lower. The ideal is to know how to collect them, mainly in the stables, sheds, sheepfolds, rabbits and chicken coops, among other facilities, and to be clear to which activity or practice we are going to destine them.**

D. It is also very important that the animals used as a source of manure are healthy and preferably also be raised in an ecological way. At first probably and,

E It is possible to use the final product in crops, in a relatively short period and at very low costs.

F. By inoculating and reproducing native microorganisms present in local soils and yeasts, the materials are gradually transformed into excellent quality nutrients available for the soil, plants and the actual feedback of biological activity.

G. The growth of the plants is stimulated by a series of phyto-hormones and natural phyto-regulators that are activated through fermented fertilizers.

H. Organic fertilizers activate a series of rhizo bacteria that promote plant growth and bio-protection.

I. It does not require very high economic investments in rural infrastructure works.

J. The materials with which they are made are well known by producers and easy to obtain locally.

K. The different materials that are available in the different work zones, plus the creativity of the farmers, make it possible to vary the formulations or the recipes, making them more appropriate to each agricultural activity or rural condition.

L. During or at the end of the preparation they may be enriched with rock powder or locally produced rock meal,

M. Finally, farmers will be able to undergo a process of conversion from poisoned agriculture to organic farming in a period of time ranging from one to three years of permanent work; Under their own control and guarantees, without being deceived by the certifiers, who offer services and bureaucratic control processes, and in some cases full of corruption or fraud.

Process of elaboration of the fermented organic fertilizer

In the process of making the fermented organic fertilizer it can be said that there are two well-defined stages: **stabilization and maturation.**

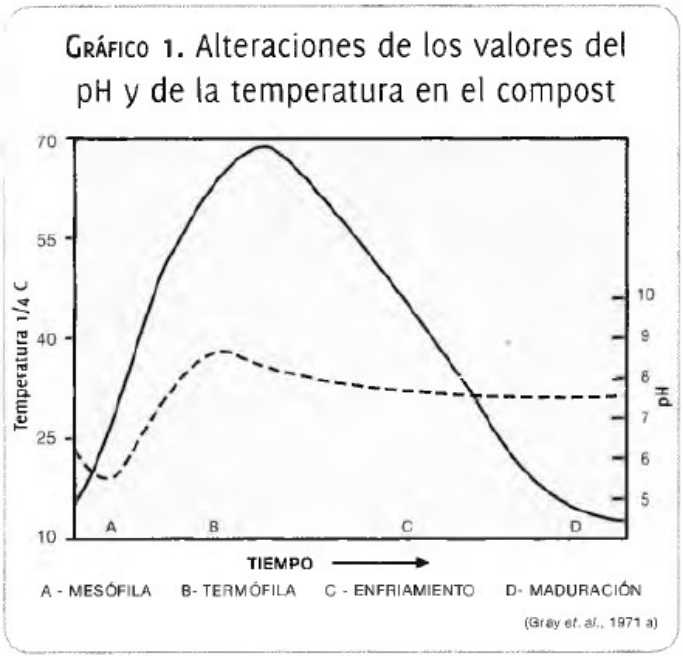
The first stage through which the fermentation of the fertilizer passes is stabilization, where the temperature can reach between 70 °C and 75 °C if we do not control it properly, due to the increase of the microbial activity. Subsequently, the temperature of the fertilizer begins to fall again, given the depletion or the decrease of the energy source that would re-feed the process. At this moment the stabilization of the fertilizer begins and only the materials that present a greater difficulty for its degradation in the short term stand out.

From here, the fertilizer passes to the second stage, which is maturation, in which the degradation of the organic materials that still remain is slower, and then reach its ideal state for immediate use.

Factors affecting the processing of fertilizers;
Among the main factors affecting the process of making organic fermented fertilizers are highlighted to.

A. **The temperature:**
It is a function of the increase of the microbiological activity of the fertilizer, which begins after the stage of mixing all the ingredients. Approximately after 14 hours of preparation, the fertilizer must have temperatures that can easily surpass 50 ° C, which is a good signal to continue with the other stages of the process. Microbiological activity can be adversely affected by lack of oxygenation, very high temperatures and excess or lack of moisture.

B. **The pH (acidity):**
The development of this type of fertilizer requires that the pH oscillates between 6% and 7.5% in the maximum, since the extreme values inhibit the microbiological activity during the process of the degradation of the materials . However, at the beginning of the fermentation the pH is very low, but gradually it is self correcting with the biological evolution of the fermentation or maturation of the fertilizer.



Graph 1. Alterations of pH and temperature values in compost.

C. **Moisture:** The optimum humidity, to achieve the maximum efficiency of the fertilizer fermentation process, ranges from 50% to 60% (by weight), that is, the materials are regulated to an oxidation phase. When the humidity is less than 35% there is a very slow aerobic decomposition of the organic materials that are part of the compound. On the other hand, when the humidity exceeds 60%, the number of pores that are free of water are very few, which hinders the oxygenation of the fermentation resulting in a rotten anaerobic process, which is linked to a phase of reduction of Organic matter, which is neither desired nor ideal to obtain a good quality fertilizer. In most cases, when the preparation is passed from the ideal moisture content, from one day to the next, it is still possible to correct this fault by adding a little more dry materials such as earth and / or rock meal.

D. **Aeration:** The presence of oxygen or a good aeration is necessary so that there are no limitations in the aerobic process of fertilizer fertilization. It is estimated that at least 5% to 10% of oxygen concentration should exist in the macro-pores of the mass. However, when micro pores are in the anaerobic state (without oxygen) due to excess moisture, this can impair the aeration of the process and, consequently, a product of poor quality is obtained. (See attached appendix on well-decomposed compost at the end of this chapter).

E. **The particle size of the ingredients:** The reduction of the particle size of compost components may have the advantage of increasing the surface for microbiological decomposition. However, the excess of very small particles can easily lead to compaction that favors the development of an anaerobic process, which is not ideal for obtaining a good fermented organic fertilizer. In some cases, this phenomenon is corrected by adding to the fertilizer particle filler materials and such as chopped pieces of wood, coarse vegetable charcoal, etc.

On the other hand, the way to prepare the bocashi is varied and is adjusted to the conditions of machinery and materials that each farmer has on his farm or community. That is, there is no single recipe or formula to make the fertilizer; The most important thing is the enthusiasm and availability of time to be creative and thus try to overcome the crisis that the peasants "inherited" from the conventional agriculture of highly soluble chemical fertilizers and poisons.

F. **Carbon-Nitrogen Ratio:** The theoretical and ideal ratio for the manufacture of a good fast fermentation fertilizer is calculated to be 1 to 25-35. Minor relationships can result in considerable losses of nitrogen by volatilization; On the other hand, higher ratios result in slower fermentation and decomposition, and in many cases is convenient. At times, quite different from the peasant world, academics enjoy the calculations of the carbon and nitrogen relationships that exist in the different materials used for fertilizers; With the purpose of facilitating this exercise, at the end of this chapter. We append a series of tables of these relations and at the same time a practical exercise is proposed. See Annex: Mathematical calculations to prepare organic fertilizers.

Bocashi fermented organic type Bocashi

“Formerly, both pirates and usurers, they only bothered to find the gold metal. Today, gold transcends color, what is coveted is between the black color of the traces of life on earth and the healthy green of crops; Between humus and the living mineral quality of food.”

The word bocashi is from the Japanese language and, in the case of the production of fermented organic fertilizers, means to pre-steam the organic fertilizer materials, taking advantage of the heat generated by the aerobic fermentation of the same. It can also be understood as a pre-digestion of organic matter through the heat generated by the decomposition.

Ingredients and their main contributions.

Main contributions of the ingredients used to make organic fermented bocashi fertilizers and some recommendations.

Charcoal

It improves the physical characteristics of the soil, such as its structure and texture, which facilitates a better distribution of roots, aeration and absorption of moisture and heat (energy). Its high degree of porosity benefits the macro and microbiological activity of the earth, while working with the "solid sponge" effect, which consists of the ability to retain, filter and gradually release useful nutrients to the plants, decreasing the loss and washing of them on the ground. On the other hand, the carbon particles allow a good oxygenation of the fertilizer, so that there are no limitations in the aerobic process of the fermentation; Another property that possesses this element is to function as a thermal regulator of the plant root system, making them more resistant against the low nocturnal temperatures that are registered in some regions. Finally, the total decomposition of this material in the earth, will give as final product, humus. In order to further develop the importance of the use of coal sources, in the regeneration and construction of fertile lands, we recommend to consult the electronic pages referring to the articles "**black Indian land**"*ddave.* This term corresponds to the formation of a very dark and fertile type of land, found mainly in the basin of the Amazon river, in Brazil. Both reading and understanding this information are essential for the mental regeneration of many agronomists, who lack the basic knowledge of the origin and fertility of the Amazonian lands before the pirates of Europe navigate the area.

Recommendations *ddave*

The uniformity of the particle size will influence the good quality of the fertilizer to be used in the field. Based on the practice it is recommended that the particles or pieces of coal are not very large; The measurements are very varied and this should not be transformed into a limitation to stop making the fertilizer, **the measurements from half an inch to a centimeter and a half by a centimeter and a half in diameter (length = 0.5 to cm X 1.5 cm, diameter = 1.5 cm) constitute the approximate ideal size.** When it is desired to work with vegetables in the greenhouse on the system of seedlings in trays, the particles of the coal to be used in the preparation of the fermented fertilizer must be smaller (semi-pulverized or cisco of coal), as this facilitates to fill the trays and allows

to remove the seedlings Without damaging its roots, and then finally transplanting them to the field. On the other hand, a good mix of equal parts between coal particles and rock meal also strengthens plant health at the time of transplantation or direct seeding. For a rapid reconstruction of the structure and texture of clay soil and the achievement of a good stability of the organic matter that we can incorporate in them, **the constant addition of coal dust or leonardite is a good recommendation**. The leonardite date back to the Paleozoic carbonaceous age, consisting of intermediates between peat and lignite, very rich in organic matter and in them is one of the best sources of humus. These can be dissolved in an alkaline medium with a solution of potassium hydroxide (KOH) to obtain a high concentration of humic acids and then applied to the soil or foliar route, associated with bio-fertilizers.

The application of a mixture of coal powders of vegetal origin, leonardites and rock meal, favors both the nutrition of the soil, as well as the fertilization of the crops, by the continuous synergic action between them and the minerals found in the Formation of the soil, being highly available chemical compounds for root absorption. The unlocking and transformation of the elements such as phosphorus and the formation of chelated compounds based on iron for the use of crops are a clear example of these benefits; Mainly in lands of argillaceous origin.

Hens or manure
It is the main source of nitrogen in the production of fermented organic fertilizers. Its main contribution is to improve the vital and nutritional characteristics of the soil and the fertility of the crops with some nutrients, mainly with phosphorus, potassium, calcium, magnesium, iron, manganese, zinc, copper and boron, among other elements. Depending on its origin, it may provide microbiological inoculum and other organic materials to a greater or lesser extent, which will improve the biological, chemical and physical conditions of the soil where the fertilizers are applied.

Recommendations *ddave*
The experience developed by many farmers throughout Latin America has been showing that the best gallinaza for the production of organic fertilizers is the one that originates from the breeding of laying hens under roof and floor covered with dry materials such as coffee grounds, sawdust, Weeds, stubble, straw, ground cane bagasse and rice husks; Which can also be enriched with rock meal, such as those originating from ground basalts, serpentines, slates, apatites or phosphoric rocks and granites, among other minerals. In order to delve deeper into this topic we recommend the readings: **Alexander Fersman's Recreational Geochemistry and Stone Breads, by Julius Hensel**. In many cases, farmers are avoiding the use of pollinaza that originates from broiler breeding, because it has a higher amount of water, is rotten and often in the same are residues of coccidiostats. Antibiotics, which interfere in many cases in the process of fertilizer fermentation. However, good knowledge of how to avoid rotting, control moisture and biodegrade antibiotic residues in these cases are essential tools to maximize and exploit such manures.

On the other hand, some farmers have been successfully experimenting with the use of other manures: rabbits, guinea pigs, horses, sheep, goats, pigs, cows, quails and ducks, so

as not to use poultry. In some very specific cases, with much knowledge and technical skill, manure or chicken manure can be partially or totally replaced by blood meal, feathers, crushed fresh bone and fish remains; This situation will depend both on the economic conditions of each producer and on the conditions of the supply of the materials in each place, especially when there are companies that sacrifice animals and which do not know what to do with the waste management that are generated in those facilities. **Likewise, due to the high nitrogen content that some manures usually have, it is very important to have the availability of rock meal or even wood-burning ash at the place of preparation of the same, for the purpose to maximize this nitrogenous element, which easily volatilizes and causes some imbalances in the development of fertilizers and crop development. In many cases it is advisable to use 5% to 20% of rock meal or ashes in these preparations.**

Finally, in many cases it is possible to make a very appropriate management of the collection separately from the urine of the animals, mainly of rabbits and guinea pigs; When this collection is possible, then those urine are allowed to ferment for more than 15 days in dark containers with a rock meal mixture, then used directly in crop fumigation, and in dosages that may vary between 1% and 5%. Do not forget, try each new technique or dosage only on some plants. Observe and draw your own conclusions, and so you can adjust to your measure and more accurately each recommendation.

Rice husks or parchment coffee beans

These ingredients enhance the physical characteristics of the soil and organic fertilizers, facilitating aeration, moisture absorption, dosing and nutrient filtration. They also benefit from increased macro and microbiological activity of the soil, while stimulating the uniform and abundant development of the root system of plants, as well as their symbiotic activity with the microbiology of the rhizosphere. It is also a source rich in silicon, which benefits vegetables, as it makes them more resistant to insect attacks and diseases. In the long run, they become a source of humus. In the form of semi-crystalline or carbonized husks, they mainly contribute silicon, phosphorus, potassium and other trace minerals in a smaller quantity and help to correct the acidity of the soils. Finally, rice husks and parchment coffee are the most suitable materials for the preparation of phosphites enriched with calcined bone meal.

Recommendations
The husks of rice or parchment of coffee can occupy, in many cases, until a third of the total volume of the ingredients of the organic fertilizers. They are recommended to control excess moisture when fermented fertilizer is being prepared. They can be replaced by dried coffee pulp, crop or stubble remains, cane bagasse, or well-dried, shredded straw. In some cases, and to a lesser extent, pieces of wood or sawdust can also replace it, depending on the type of wood that originates them, since some have the capacity to paralyze the microbiological activity of the fertilization of the fertilizers by the toxic substances Which mainly contain tannins and aromatic or oily substances. When using sawdust, ideally they are half-composed and with little humidity. When there are only wood sawdust and we do not find other alternatives to not use them during the processing of the fertilizers, we recommend to duplicate in some recipes the suggested amounts of sugarcane molasses and yeast. Finally, in order to make possible all the materials that we can find in the vicinity of each property, in many cases some sawdust or wood remains can also be semi-finished or converted into charcoal or ashes with the aim of adding them at some point during preparation of fertilizers.

Pulp or bran of rice or bran or semolina
It is one of the ingredients that favor, to a great extent, the fermentation of the fertilizers and enzymatic activities, which are increased by the presence of complex vitamins in the polish or bran of rice, also called bran or semolina in many countries. It provides nitrogen and is very rich in other very complex nutrients when their carbohydrates are fermented; Minerals, such as phosphorus, potassium, calcium, zinc and magnesium, among other trace elements, important for soil and crops, are also present.

Recommendations
In many cases, given the difficulty for farmers to obtain this material, they substitute it for another type of raw material easier to acquire, such as those saved from corn, wheat and barley. This experience is an adaptation that the producers of Central America and Mexico have been proving in the different rural communities with some success. However, due to the great results and experience with the use of bran, polished rice or semolina, it is worth making the effort to get this ingredient.

Cane sugar or Molasses or panela
It is the main energy source for the fermentation of organic fertilizers. It promotes the multiplication of microbiological activity, is rich in potassium, calcium, phosphorus and magnesium; And contains micro-nutrients, mainly boron, zinc, manganese, iron and copper, among other trace elements. The vitamin B group of the B complex is also largely present.

Recommendations
To achieve a homogeneous application of molasses during the production of fermented organic fertilizers, it is recommended to dilute it in a part of the volume of water to be used at the beginning of fertilizer preparation, in many cases it has been replaced by panela, piloncillo, Chancaca, cane juice or brown sugar, as it is called elsewhere; Countries of all Latin America. In the coffee and cocoa producing countries, it is very

common to have a large concentration of the extra water available after the benefit of the fruits, these liquids are of excellent quality for use both in the production of fermented organic fertilizers and in Bio-fertilizers because of their high content of sugars, which in many cases comes to completely replace the use of molasses or piloncillo. On the other hand, the concentration of these honey waters and their respective fermentation also lead to the possibility of completely eliminating the use of yeast in the preparation of fertilizers. In many cases, when there is an abundance of by-products from the coffee and cocoa beneficiaries, they can completely replace the volume of water that will be used, both in the preparation of different types of solid organic fertilizers, as well as in bio-fertilizers. In many places they are being stored, mixed with volumes of whey, with the subsequent use in the preparation of bio preparates based on squash (pumpkin or chayote) and fermentation of cow shit, enriched with minerals, ashes or rock meal. Finally, there is no need to cite the use of the concentration of the water of coffee and cocoa, as an alternative to control and degrade the remains of vegetables or organic materials present in the middle of the main crop.

Yeast, virgin soil or forest cover and bocashi
These three ingredients are the main source of microbiological inoculation for the production of fermented organic fertilizers. It is the starter or the seed of the fermentation.

Central American farmers, to develop their first experience in the production of fermented fertilizers, successfully used barley or powdered yeast, virgin forest land, or the two ingredients in unison. After some time, and with experience, they selected a good amount of their best tanning fertilizer, bocashi type (fermented seed), to use it constantly as their main source of inoculation, accompanied by a certain amount of yeast. They thus eliminated the use of virgin land or forest mulch, to avoid serious consequences for the deterioration of the soil and cover or forest cover.

Recommendations
After obtaining the first fermented fertilizer and successfully testing it in the crops, it is advisable to separate a little of this fertilizer to apply it as a source of inoculation in the preparation of a new fertilizer; In some cases can be accompanied with the yeast to accelerate the process of fermentation, mainly during the first two or three days. Due to the lack of refrigeration due to the lack of electrical energy in many rural areas, it is recommended to use granulated or dry yeast, since its conservation is easier.

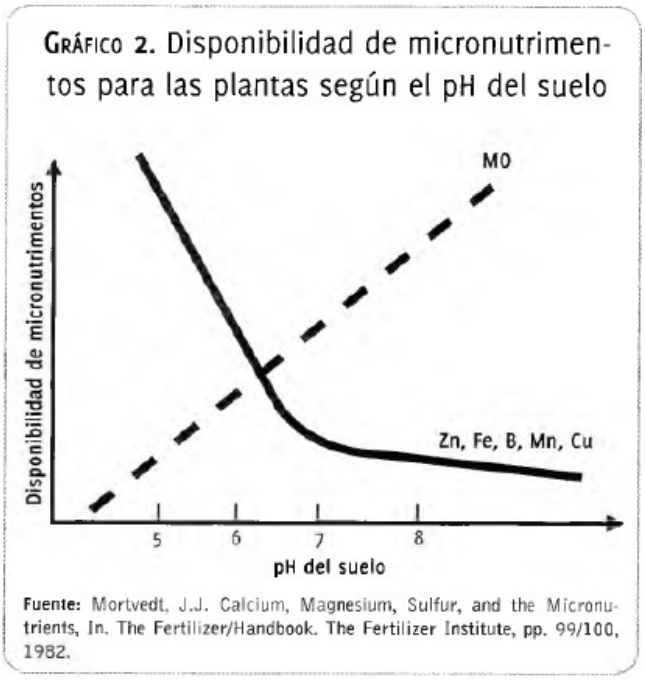
Common ground
In many cases it occupies up to a third of the total volume of fertilizer to be produced. Among other contributions has the function of giving a greater physical homogeneity to the fertilizer and to distribute its moisture; With its volume, increases the propitious medium for the development of the microbiological activity of fertilizers and, consequently, to achieve a good fermentation.
On the other hand, it functions as a sponge, having the ability to retain, filter and gradually release nutrients to plants according to their needs. According to its origin can provide various types of clays, microorganisms, and other mineral elements Indispensable to the normal development of vegetables.

Recommendations

In some cases, it is advisable to sift the soil with the purpose of releasing it from stones, large lumps, woods and other elements foreign to it. This land can be obtained from the land borders of the internal roads of the estate itself, or from the roadsides. The best soil for the production of these fertilizers are those of argillaceous origins, because they facilitate the formation of complex silicates and humic clay, together with organic matter. On some occasions, of the total land that will be used in the preparation of some fertilizers, it can be substituted for up to 20% of rock meal. Any processing or processing of organic material to produce a good fermented organic fertilizer, should at least have 30% soil. For the preparation of organic fertilizers in order to regenerate and rapidly increase the constant microbiological enrichment of the land, cultivated mainly with vegetables of short cycles, it is recommended to use the soil from the same stone cutters, banks or eras where the new crop will be established .

Calcium carbonate or agricultural lime or wood ash

Its main function is to regulate the acidity that occurs throughout the fermentation process, when the organic fertilizer is being prepared; Depending on its origin, natural or manufactured, can contribute with other useful minerals to the plants. In the rural environment of Latin America, it is commonly known as the agricultural lime or dolomite lime.



Graph 2.

Availability of micro-nutrients for plants according to soil pH

Recommendations
In many cases, peasants have been replacing this ingredient with the ash of their stoves, representing excellent results by the contribution of other mineral elements for the crops. The use of rock meal or the recycling of stone dust that is left over from marble or construction companies that break or crush them are often excellent materials to replace the use of agricultural lime, 25 to 50 kilos of powder or flour of stones or 25 kilos of ashes of plant origin is a good measure to be used for every ton of bocashi fertilizer that you want to prepare. Finally, we can not forget that to the extent that soils recover in their composition a large quantity or percentage of organic matter, it exerts the buffering role of the pH of the cultivated land. In many cases, the constant application or amendments of limes on cultivated land can lead to structural deterioration or rapid oxidation of the organic matter they contain.

Water
It has the purpose of homogenizing the humidity of all the ingredients that compose the fertilizer. It provides the ideal conditions for the development of aerobic microbiological activity and reproduction throughout the fermentation process when organic fertilizers are being prepared.

Recommendations
Both the lack of moisture and its excess are detrimental to the final production of a good fertilizer Fermented organic fertilizer. The ideal moisture of the fertilizer is gradually achieved, as the water gradually increases to the mixture of the ingredients. The most practical way to test the ideal oumity is by means of a fist or fist test, which consists of taking a quantity of the mixture with the hand and tightening it, so that no drops of Water between the fingers and a brittle lump should form in the hand. When checking excess moisture, it is best to control it immediately by adding more rice or coffee husks to the mixture, or in some cases you can add more dry earth or rock meal. Finally, in many cases where large volumes of bio-fertilizers or leftovers are available, they can be used as a source of moisture to enrich the fertilizers.

Fig. Fist test. (Squeeze test)

Observation
To prepare fermented bocashi fertilizers, water is only used once during the mixing of the ingredients; It is not necessary to use it in the other stages of the fermentation process. Finally, while achieving the ideal moisture practice, initially, it is better that the fertilizer store to dry and not to very humid. Do not forget, once the bocashi organic fertilizer has been prepared, no more water is added to it during the process.

Place or place
The preparation of fermented organic fertilizers should be done in a place protected from the sun, wind and rain, as these interfere in the fermentation process, paralyzing it or affecting the final quality of the fertilizer prepared.

The floor should preferably be covered with brick or lined with cement, or in the latter

case it should be a firm ground floor with some lateral canals, so that the accumulation of moisture or flooding of the room where the fertilizers are made is avoided to the maximum extent.

As for the measures of the spaces necessary to make the fertilizers, in general it is rememberable to consider in the minimum of 2.00 to 2.50 square meters of area, for each cubic meter of raw material to be prepared or compost .

Recommendations
In some places where there are economic difficulties to build a minimum infrastructure to make the fertilizer, the farmers are preparing it outdoors by protecting it with a layer of dry straw or some plastic tarpaulin, which must be separated from the surface of the fertilizer to Avoid accumulating excess moisture and being exposed to the sun's rays. On the other hand, also consider the summer seasons to avoid rains in the preparation of fertilizers. Having sufficient clarity on the volume of fertilizer to be used is part of the planning for its elaboration and its immediate use, since the sooner the land is taken, the better the crop response.

Thread Tools
Metal shovels, metal forks, plastic buckets, a water hose, dust mask and good boots are the most common and easy to get anywhere tools to prepare this type of fertilizer. In some cases, while you do not have the experience and manual sensitivity to control the temperature, it is recommended to buy a thermometer to do the controls, especially during the first few days of the process.

Recommendations
For cases where large volumes of organic fertilizers have to be prepared for marketing or application in large tracts of crops, there are and are available on the market machines designed to produce or process from 10 to 800 tonnes of fertilizer per hour.

Time to prepare the fertilizers
Farmers who are beginning to make fermented organic fertilizers usually do this activity for about 15 to 20 days. The most experienced producers do it in 10 and 15 days. For this, during the first three or five days of fermentation they stir or turn the preparation twice a day in some cases (morning and evening). Afterwards they stir it only once a day, controlling the height (maximum one meter and twenty centimeters, at the time of preparation, which gradually goes down until reaching a final height of approximately 50 to 30 centimeters, and the width of the pile up Two and a half meters, so that it is the most appropriate for good aeration. See attached document: Reasons why a tall row is less efficient than a row of adequate size in the preparation of fermented organic fertilizers, aboneras the compound.
When it is necessary to calculate or estimate the time that a farmer must dedicate to make his fertilizers, and based on the principle that the materials are available in the workplace, it will spend approximately between 20 and 25 hours of work to prepare three to four tons of bocashi. In a month, with normal days of daily work and dedication exclusively for this task, a farmer or a worker is able to produce 25 to 30 tons of fertilizers.

ABC1

Original Formula

Basic ingredients for the preparation of fermented organic fertilizers type bocashi

- Laying poultry or other manure (bovine, equine, bovine, pig, goat, etc.).
- Coal broken into small or crushed particles (cisco of coal).
- Groung semolina or rice bran.
- rice husks, or coffee or finely chopped straws or well-ground stubble.
- Cal dolomite or agricultural lime or fire ash or rock meal.
- Molasses or sugarcane honey or juice of the same.
- Yeast for bread, granulated or in bar.
- Well sieved soil, preferably clayey.
- Water (only once and at the time of preparation), which can also be enriched with bio-fertilizer.

By the term bocashi, which comes from the Japanese language, is designated organic matter in fermentation or organic fertilizer fermented by microorganisms native to the land or forest mulch.