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Nine ways to prepare bocashi fermented organic fertilizers

Observation ddave

Do not forget that the materials to prepare the fertilizers and bio-ferments are not fixed, there are alternatives and local materials with which you can make a fertilizer and even of better quality;

If necessary read again the function of each ingredient and the possible alternatives for them when these are not available. Remember, a good cook is not one who prepares a good meal with a list of ingredients, but one that makes a good meal with the ingredients that have at their disposal and at the same time is also able to prepare different types of dishes with the Same ingredients.

1. Ingredients for the preparation of a sample of the basic fermented manure, typical bocashi

- 100kg (2 quintals or sacks) of well sieved earth. (quintal = 112lbs ca 50kg)
- 100kg (2 quintals or sacks) of rice husks or coffee or stubble.
- 100kg (2 quintals or sacks) of chicken manure or cow manure.
- 50kg (1 quintal or costal cisco) of well broken coal.
- 5 kilo of polish or rice bran.
- 5 kilo of lime dolomite or agricultural lime or fire ash.
- 5 kilo of black soil or virgin forest mulch or bocashi.
- 1 litre of cane molasses or honey or cane juice.
- 100 grams of yeast for bread, granulated or in bar.
- Water (according to the fist test and only once).

2. Ingredients for the preparation of fermented fertilizer for seedlings (Panama, 1994)

- 100kg (2 quintals or sacks) of soil.
- 50kg (1 quintal or polishing sack) of rice bran.
- 50kg (1 quintal or sack) of charcoal broken into small particles.
- 50kg (1 quintal or sack) of rice husk or coffee.
- 50kg (1 quintal or gall) of poultry (poultry).
- 1 litre of molasses or honey or cane juice.
- 10 pounds of dolomite lime or agricultural lime.
- 100 grams of yeast for bread, granulated or in bar.
- Water (according to the fist test and only once).

Source: Communication and personal work with Panamanian peasants, 1994

3. Ingredients for the preparation of fermented organic fertilizer (Panama, 1995)

- 400kg (8 quintals or sacks) of earth.
- 300kg (6 quintals) of poultry.
- 200kg (4 quintals or sack) of rice husk or coffee.
- 50kg (1 quintal or polishing sack) of rice bran.
- 50kg (1 quintal or sack) of charcoal broken into small particles.
- 1 litre of molasses or honey or cane juice.
- 5 kilo of dolomite lime or agricultural lime.
- 100 grams of yeast for bread, granulated or in bar.
- Water (according to the test of the fist and only once).

Source: Communication and personal work with Panamanian peasants producing vegetables in family farms, 1995.

4. Ingredients for the preparation of 3400kg (68 quintals or sacks) of fermented organic fertilizer bocashi (Tapezco, Costa Rica, 1994)

- 1000kg (20 quintals or sacks) of chicken manure (of laying birds).
- 1000kg (20 quintals or sacks) of rice husk.
- 1000kg (20 quintals or sacks) of earth (sifted).
- 200kg (4 quintals or sacks) of well-broken coal (cisco).
- 50kg (1 quintal or sack) of polish or rice bran.
- 50kg (1 quintal or sack) of dolomite lime or agricultural lime.
- 1 gallon of molasses or cane honey
- 2 pounds of bread, granulated or bar yeast.
- Water (according to the fist test and only once).

5. Ingredients for the preparation of 1700kg (34 quintals or sacks) of fermented organic fertilizer (Cerro Punta, Panama, 1995)

- 500Kg (10 quintals) of chicken coops (laying birds).
- 500kg (10 quintals) or sacks of rice husk or coffee.
- 500kg (10 quintals) or sacks of well sieved earth.
- 150kg (3 quintals or sacks) of well broken coal (cisco).
- 50kg (1 quintal or polishing sack) or rice bran.
- 1 gallon of molasses or cane honey.
- 1 pound of yeast for bread, granulated or in bar.
- Water (according to the fist test and only once).

Source: Communication and personal work with Panamanian farmers, 1995.

6. Ingredients for the preparation of 14 quintals or sacks of fermented organic fertilizer (Dolega, Chiriquí, Panamá, 1995)

- 5 quintals or sacks of virgin land.
- 3 quintals or sacks of rice husk or coffee.
- 3 quintals or poultry sacks (laying birds).
- 1 quintal or polishing sack or rice bran.
- 1 quintal or sack of charcoal broken into small particles.
- 15 pounds of phosphate (ground phosphate rock).
- Water (according to the fist test and only once).

Source: Communication and personal work with Panamanian farmers, 1995.

7. Ingredients for the preparation of 30 quintals or sacks of fermented organic fertilizer, substrate type for seedlings (Cali, Colombia, 2009)

- **8 quintals or sacks of virgin land.**
- **8 quintals or gallinaza sacks (laying birds).**
- **5 quintals or bags of rice husks or coffee.**
- **5 quintals or sacks of pulverized coal.**
- **2 quintals or sacks of polish or rice bran.**
- **2 quintals or sacks of phosphoric rock meal.**
- **4 gallons of sugar cane molasses.**
- **1 kilo of yeast granulates for bread.**
- **Water (according to the fist test and only once).**

Observation:
Once finished the fermentation process of the credit, you can add 10 kilos of seed of microorganisms reproduced natives locally.

8. Organic bocashi fertilizer for vegetables and seedlings
Ingredients Amounts

- 18 sack hen
- 14 sacks Rice husks
- 15 sacks Soil
- 2 sacks Bran or rice paddy
- 4 sacks Bocashi tanned
- 6 sacks Charcoal (cisco)
- 10 gallons Sugar cane molasses
- 15 kilos Seed of native micro organisms
- Humidity (fist test) 35 to 40%

Source: Juan José Pan water, Producer of organic vegetables, Tapezco, Costa Rica, August 2001. Organic Agriculture Workshop with emphasis on Vegetables and Organic Coffee. UNED, State University at a Distance, San José, Costa Rica.

9. Organic bocashi fertilizer for Freshly transplanted vegetables and seedlings
Ingredients Amounts

- 20 sacks Gallinaza (poultry manuer)
- 20 sacks Earth
- 5 sacks Rice husks
- 2 sacks Bran or rice paddy
- 6 sacks Charcoal (cisco)
- 40 litres Sugar cane molasses
- 5 kilo Innoculum of native micro organisms
- 25 litres activated microorganisms
  Humidity (fist test) 35 to 40%

Observation
Moisture: In some cases, depending on the original moisture content of the ingredients, approximately 250-300 liters of water can be expended for preparation. Of every two to three tons of fertilizer.

Box i. **Nutrient content in three forms of bocashi**

	I	II	III
• Nitrogen (%)	1.18	0.96	0.93
• Phosphorus (%)	0.70	0.58	0.44
• Potassium (%)	0.50	0.51	0.47
• Calcium (%)	2.05	2.26	2.58
• Magnesium (%)	0.21	0.20	0.20
• Iron (mg/l)	2.304 4.260	2.312	
• Manganese (mg/l)	506	495	531
• Zinc (mg/l)	61	78	205
• Copper (mg/l)	19	33	28
• Boron (mg/l)	14	8	f.d.

f.d.=failure mg/l = ppm
Observation
Dare to comment or attempt to draw general conclusions from the chemical analysis of an organic fertilizer, to compare it with commercially standardized formulations, is not the most correct within the approach of the practice of organic agriculture; The same are two different things, mainly when we consider the importance of the organic materials with which they are made and their beneficial effects for the development of microbiology and the recovery of the structure of the soils.

Measure these impacts within the purely chemical conception, or think about it. Therefore, the conventional analyzes to which many successful experiences of organic agriculture are submitted by conventional agronomists are nothing more than half-hearted comparisons and mediocre comments.

Organic fertilizers are characterized by the biological value they possess, this is something that do not have the chemical fertilizers and is outside the mathematical reach of any soil laboratory, which only produces very limited figures, disintegrated or isolated from The whole and without any sign of life.

Ways to maximize and replace some ingredients in compost preparation.

How farmers are finding different creative ways to maximize and replace some ingredients in the preparation of bocashi fermented organic fertilizer?

Chicken or manure
This component is of vital importance for the production of fermented organic fertilizer, mainly by the supply of nitrogen and other nutritious mineral elements for the crops.

Peasants have often replaced it with cattle manure, which they collect directly in the stables where the animals are in the state of fattening or semi-finned, or at least where they are gathered for the night.

To maximize the collection of manure, to try to conserve its quality and to lose the minimum amount of its nutrients, it is being recommended to permanently line the floor of the premises where the animals remain confined with rock meal and plant material, preferably well dried, With the aim of absorbing the maximum moisture from the urine and the manure itself. The most recommended materials to cover the floor of the stables or bedrooms are: well-chopped post-harvest stubble, such as straw and corn or corn husks, rice husks, wheat straw, bagasse, coffee husks and in a last case of wood sawdust.

Over a few weeks, it can be said that farmers already have a good mix of pre-processed materials, as a result of the trampling of plant debris with rock meal, animal manure and urine moisture, Which is ready to be used in the production of good quality bocashi fermented organic fertilizer. Considering an area of approximately 10 to 8 square meters (10 to 8 m2) of available area per bovine animal in feed in a stable, it is recommended to cover the floor with 8 to 10 kilograms of straws per animal, which is ideal to maximize the collection of manure and urine.

A very healthy practice is to place together with the floor covering of the stables, rock meal (basalt, granites, serpentinites, schist, carbonatites, marmolines, carbonates, zeolites, silicates or even ash, etc.) or phosphoric rock Apatites) at the rate of one to two kilos per square meter of available floor area per animal. On the other hand, it should not be forgotten that a good stable, protected from the rains and sun and with a good coverage of its floor with straw and rock meal, besides being a comfortable area for animals, is almost an indispensable requirement To obtain as a final result a good quality fertilizer, which will yield excellent results in the short, medium and long term through harvests.

How to use the mixture of manure collected in the stables in the preparation of bocashi fermented organic fertilizer?

Firstly: The material collected in the stables is a mixture of four materials (manure + urine + plant material + rock meal or phosphoric rock), which in some cases contains a considerable degree of humidity. This should be controlled, when you want to prepare the bocashi, otherwise, if the water is not controlled, the fertilizer will be very moist, will tend to putrefaction due to lack of oxygenation and will be of poor quality.

Secondly: To the mixture that comes out of the stables must be added the other ingredients that are part of the bocashi, when you want to prepare this type of fertilizer, which are: earth, yeast, lime, molasses, Charcoal when available, rice bran or polish; Finally, a little water in a very controlled way, if the mixture requires it. (The fist test is recommended to check the moisture status of the final mix). On the other hand, once the volume we wish to collect or remove from the manure from the barn to prepare the fertilizer is defined, three to five days in advance, in the same stable we can start

activating the ingredients with a solution based on 10 liters of water, half a liter of molasses and 100 grams of yeast.

This mixture is applied with the spraying pump directly on the bed of the barn, in order to inoculate it biologically and later to make the collection of the materials and thus to make the bocashi type fertilizer outside the stables.

Farmers have also been replacing the manure for goats, sheep and rabbits, which they collect directly in the sheepfolds, dormitories or in the places where the animals remain. However, the collection of manures is maximized when the facilities of the animals are constructed at a distance that can range from one meter to one meter and fifty centimeters above the floor.

In many places, it is also very common to take the manure that comes from raising pigs in order to make fermented organic fertilizers. Ideally, it is recommended to use the same treatment as cows, covering or lining The floor of the facilities with dry materials in order to absorb the maximum of humidity and maximize the quality of them. The ideal vision for the handling of manures, of many animals inside some facilities, must be conceived of integral form with the elaboration of organic fertilizers to be applied directly in the cultures. We believe or we are convinced that the main problem that is generated for the correct handling of the agricultural facilities are the great wastes of volumes of water that are used in them. The ideal is to try to work to the fullest of all dry facilities, because along with the great waste of water are associated the poor quality of organic fertilizers, environmental pollution and the constant deterioration of animal health.

Finally, in most of the municipalities of Latin American countries it is very common to find an inadequate management of the waste that originates in the establishments where they are slaughtered, mainly cattle, pigs and poultry. Most of these establishments, which are known by the name of slaughterhouses, traces or camales, do not have the sufficient knowledge and technical ability to transform in fertilizers and bio-fertilizers of good quality all the wastes or waste that originate in those facilities, as are the large volumes of ruminal contents, blood, feathers, baits, bones, hair, bile liquids, horns, helmets and other materials that derive from the whole process of animal sacrifice. Ideally, this area would have an area adjacent to the site, either by installing a bio-factory to process fertilizers, composting and bio-fertilizers enriched with minerals, or to apply them directly to land available for the crop. Generally, these facilities handle and contaminate large volumes of water, which must be controlled immediately to avoid the early deterioration of materials and environmental pollution and to be able to take advantage of them in the best way. The great trick for the good handling of the high protein content, which these waste has, is to know how to mix them well with other sources of dry materials and with a high carbon content such as sawdust, husks and stubble, among others. On the other hand, the adequate application of some sources of rock meal based on zeolites, basalts, bentonites or dry clays are often some elements allied to the production of fertilizers of very good quality and low humidity.

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Yeast
This is one of the ingredients that the peasants have been replacing in a creative and ingenious way. For example, an innovative method that farmers have been using in Panama to replace industrialized yeast is to place in a vessel to germinate or be born for a period of eight days, three pounds of corn, with a little water that covers everything the grain. After this time, the corn is ground and left to ferment again for two days in the same water where it was and an additional gallon is added. Once fermented, this mixture is applied to the bocashi. This quantity is used to prepare approximately sixty sacks or quintals of fertilizer.

Another way farmers have found to replace yeast is by using raw and fermented sugar cane juice for two days; Two gallons of the product are used for every ten sacks or quintals of fertilizer to be processed.

On the other hand, Mexicans have been substituting yeast, with the popular fermented drink called pulque or water of fermented nixtamal, which is the by-product of the soaking of the corn destined for the elaboration of the tortillas. Finally, in an alternative way, in cases where no other option is available to substitute yeast, it is to increase the amount of cane and bran, at the time of bocashi preparation.

Lime and charcoal
One way farmers have replaced these two ingredients in the preparation of the bocashi is by directly using the ash from the wood-burning stoves they possess, while taking advantage of the remains of charred wood left in the burners. Do not forget that rock meal or crushed stone powder can also replace the use of agricultural lime, with the advantage of being present in these flours other mineral elements called traces, which are vital for the nutritional balance of crops and resistance against insect attack and disease.

Rice husks
Farmers have replaced this ingredient with well-dried and crushed post harvest remains, which facilitate handling of the fertilizer and accelerate its decomposition. The most commonly used materials are well-crushed straws and corn or sorghum, corn or wheat straw or oats, bagasse with well-pulverized cane and coffee husks or very dry pulp. In the latter case, it is also possible to use wood sawdust in a weathered or weathered state, so that it has lost the toxic effect of some allelopathic substances that it possesses, such as tannins and some oils.

Honey or cane molasses

Despite being an ingredient that is very easy to find in the markets, peasants in many cases substitute it for the popular panela, piloncillo, tapa or tied of sweet or chancaca, in the relation of a kilogram for each kilogram or liter of honey or cane molasses that you want to replace. Another alternative is the use of one's own juice of cane or guarapo, in a ratio of two liters of juice for each kilogram of molasses want to replace.

ABC2

Preparation and storage

How are farmers preparing, using and storing fermented organic fertilizers?
Once you have planned and determined the amount of organic fertilizer to be processed, you must obtain all the necessary ingredients and choose the most appropriate place for your preparation. Farmers have developed different ways of making their own fermented organic fertilizers, recovering with their creativity the art of cultivating the soil. Do not forget to try to make the most of the materials available on the ground or nearby, because transportation at a considerable distance from large volumes of unprocessed organic materials is very costly and makes the whole process more expensive.

How are you preparing them?

Both the quantities and proportions of the ingredients and the way in which farmers are preparing their organic fertilizers clearly demonstrate that the development of these bio-inputs does not constitute a simple package of technology transfer recipes but, on the contrary, The different ways of elaborating them and of calculating the proportion of their ingredients are the result of the error and the correctness of the traditional knowledge of peasant practice adjusted to each reality.

The mixture of the ingredients

Figures 2, 3 and 4 show three examples.
Some farmers choose to mix all the ingredients by alternate little by little until obtaining a homogeneous mixture of the whole mass of the ingredients, to which, little by little and in layers, they add the water necessary to obtain the recommended humidity (this is the most usual and most appropriate form). Others mix all the income dry teeth and at the end, in one last turn of the whole mixed mass, add water to the ta get the proper humidity.

Finally, other farmers subdivide all the ingredients in equal proportions and form two or three heaps then they mix all the ingredients of each one of the piles independently tooth, which facilitates the proper distribution of all the ingredients, since the amount of appropriate water is added to control the humidity; and finally put together all the piles that were mixed separately, leaving at the end a uniform mass that later spread on the floor where I mix

Figure 2. Mixing the ingredients when preparing fermented organic fertilizers (First example)

A. The mixture of the ingredients
B. Homogeneous mixture of all Ingredients ... in a lot
C. Finally, after preparation, the fertilizer should be extended, protected from the sun and rain.

FIGURA 2. Mezcla de los ingredientes al preparar los abonos orgánicos fermentados
(Primer ejemplo)

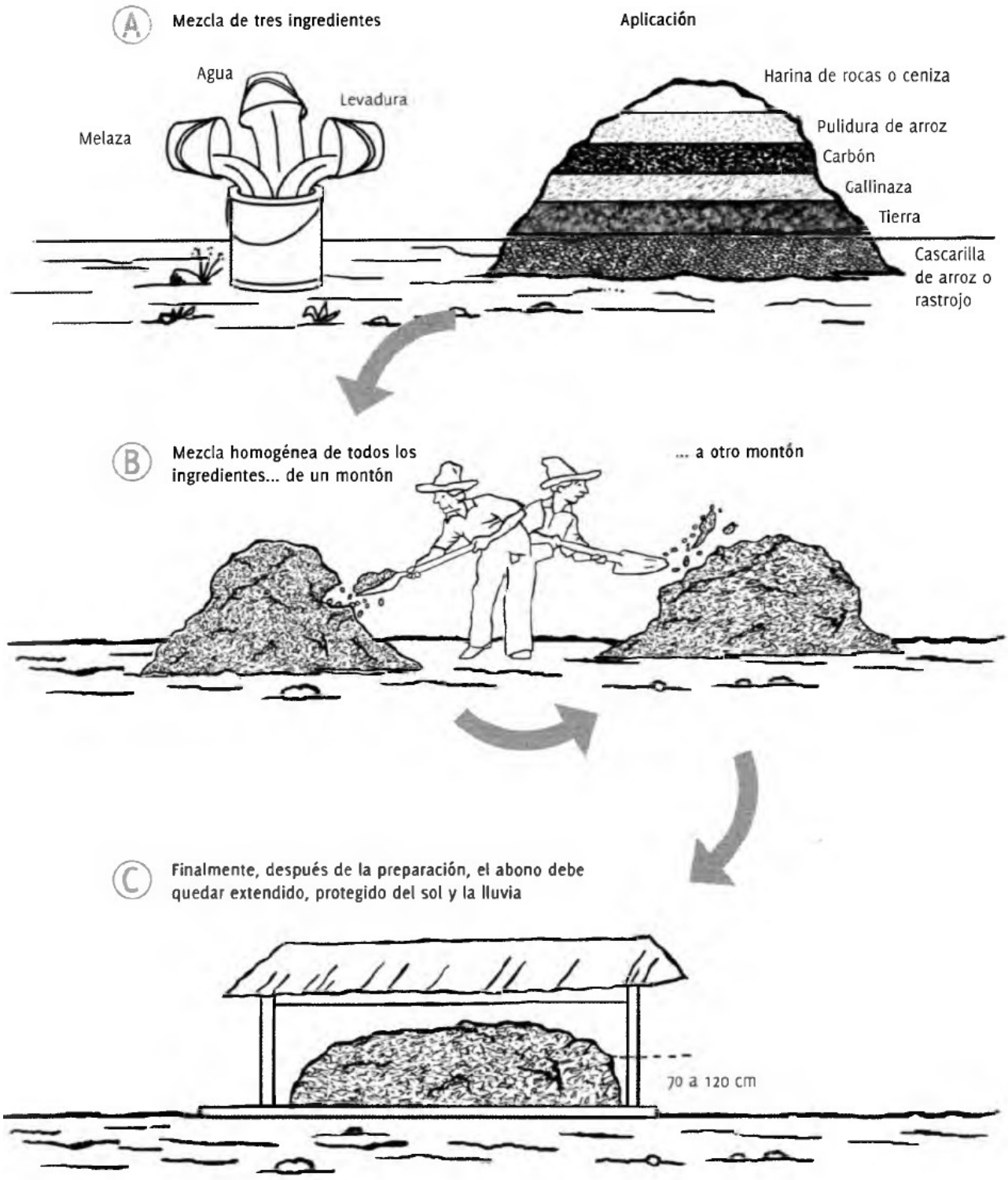


Figura 4. Mezcla de los ingredientes al preparar los abonos orgánicos fermentados.
(Tercer ejemplo)

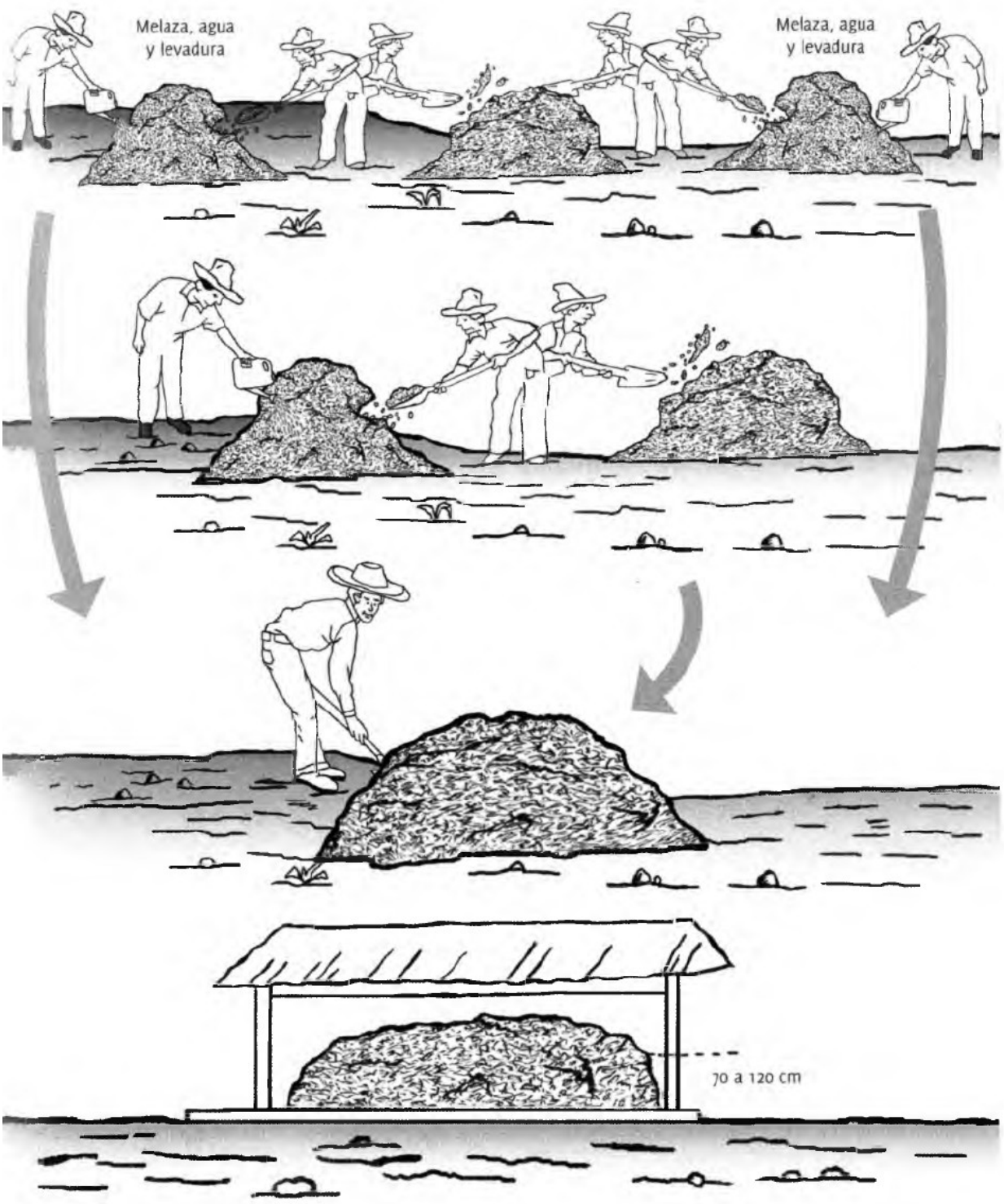


Figure 3. Mixing the ingredients when preparing the fermented organic fertilizers. (Second example)

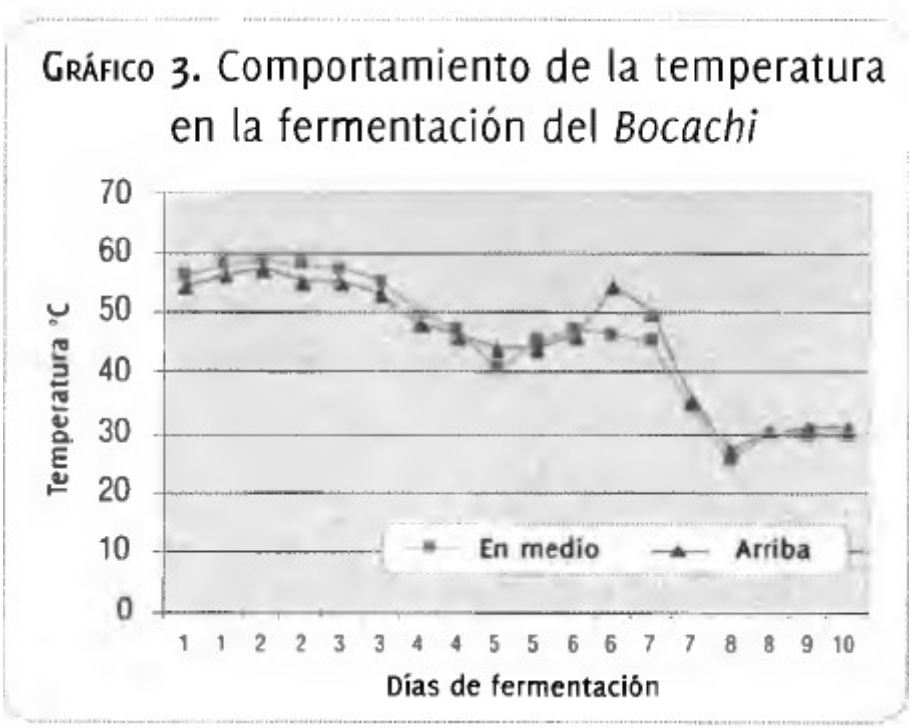
A. Dry mixing
B. water added
C. Finally, after preparation, the fertilizer must remain Extended, protected from sun and rain.

Figure 4. Mixing the ingredients when preparing the fermented organic fertilizers. (Third example)

Stage of fermentation and temperature control

Once the stage of the mixture of all the ingredients of the fertilizer is finished and the humidity uniformity is controlled, the mass is left on the floor, so that the height of the pile is at most one meter and twenty in the first three Days, and then gradually the heap is lowered during the other days of the volteos to take it to a height that can oscillate between the 50 to 30 centimeters. Some farmers usually cover the fertilizer with sacks of fiber during the first three days of fermentation, with the aim of accelerating it. The temperature of the fertilizer should be checked every day with a thermometer or Introducing

The hand in the same, from the second day of its elaboration. It is not recommended that the temperature exceeds 65 ° C. The ideal is to handle temperatures around the fifty or fifty-five degree limit (50 to 55 ° C), and from this range down. Do not forget, only water is added to the fertilizer at the time of preparation. Never in the other stages of the fermentation should be added more moisture.



Graph 3. Temperature behavior in the fermentation of Bocachi

During the first few days, the temperature of the compost tends to rise to more than 70 degrees Celsius (70 degrees Celsius), which is not ideal and should not be allowed. The temperature should be controlled by flipping or mixing the whole lot twice a day when necessary (once in the morning and once in the afternoon), which allows a greater aeration and cooling to the fertilizer. Another good practice to accelerate the final

process of fermentation is to gradually lower the heap height from the third day until reaching a height of 50 to 30 centimeters on the eighth or tenth day. From now on, the temperature of the fertilizer begins to be lower and it begins to stabilize, being necessary to stir only once a day. Between 12 and 15 days, the fermented organic fertilizer has already matured and its temperature is the same as the ambient temperature, its color is light gray, and it remains dry, with an appearance of loose sandy powder and consistency. Some farmers experienced in the preparation of their fertilizers manage to complete all stages of the fermentation process in about 10 days for some very specialized fertilizers.

Lastly, the amount of fertilizer to be prepared will depend on the type of crop and the frequency with That you want to develop the experience with the application of bocashi. Your increase will depend on the results achieved over time and practice in the different plots.

How are they used?
Once the final stage of the fermentation is completed, and if the fertilizer has achieved its stability, it is ready to be used in crops.

The different ways that farmers experiment when they are made, they do not constitute a package of recipes ready to be recommended and applied arbitrarily How it does conventional agriculture with its traditional recipe "milagrosa" of the N-P-K. Then We cite some examples (not recipes) of the use that some farmers are experiencing with great success in the nurseries, in the transplant of seedlings and in established crops.

In nurseries
The pre-germination and the development of the seedlings in the nurseries have an approximate duration of 18 to 24 days and for the case of some Tomato varieties and green peppers can range between 30 and 40 days. Farmers have done this work in three ways:

- In greenhouse trays raised from floor.
- In trays without greenhouses protected from sun and rain.
- In wooden crates on the floor or raised.

Figure 5. Development of seedlings in tray with organic fertilizer.

Used for germination of seedlings a mixture of sifted earth with bocashi tanned and pulverized coal, in proportions that can vary from 80% of sifted land with a 20 of bocashi tanned up to 60% earth sifted with 40% of bocashi tanned or old.

For cases of bagging of fruit trees in nurseries, it is recommended to mix 60% of the soil with a 40% bocashi fertilizer or a part of soil and a part of fertilizer. It should not be forgotten that in the nurseries of both vegetables and fruit trees, in parallel, other activities can be developed with the seedlings: Application of bio-fertilisers, phosphites, mineral broths and flour of rocks.

Figure 6.
Bagging and development of seedlings of fruit trees with 40% of fertilizer and 60% of Earth

The tanned bocashi and its use:

The tanned bocashi is the same fermented organic fertilizer, but older or aged; that is, once the process has been saved between two and three months.

Farmers are using it more often by mixing it with sifted earth and pulverized coal to prepare the vegetable seedlings in the trays. It has the advantage of not burning the seedlings, which is the risk that runs when fresh bocashi is used does not mix with sifted soil and pulverized coal in nurseries. Farmers have been doing regularly small trials with different proportions of bocashi tanned for the production of the vegetable beds, with the aim of observing and choosing the best result that It suits your crops.

Table 2. Proportions of bocashi tanned and sieved earth Which can be experienced in the production of vegetable seedlings in nurseries.

sifted earth	**bocashi tanned with pulverized carbon**	
90%	10%	
85%	15%	These mixtures are the most common to produce
80%	20%	leafy vegetables. E j .: Lettuce.
70%	30%	These mixtures are the most common to produce
60%	40%	fruit trees and vegetables head. Example: Cauliflower and broccoli.

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In the transplant of the seedling (piloncito or seedling)

Farmers have been experimenting with several ways to fertilize their crops when transplanted:

a. Direct fertilization at the base of the hole where the seedling is to be placed at the time of transplantation. In this case the fertilizer is placed pure and must be covered or mixed with a little soil, so that the root of the plant does not come into direct contact with it, since it can burn it and not Let it develop in a normal way.

FIGURA 7. Abonado directo en la base del hoyo en donde se coloca la plántula.

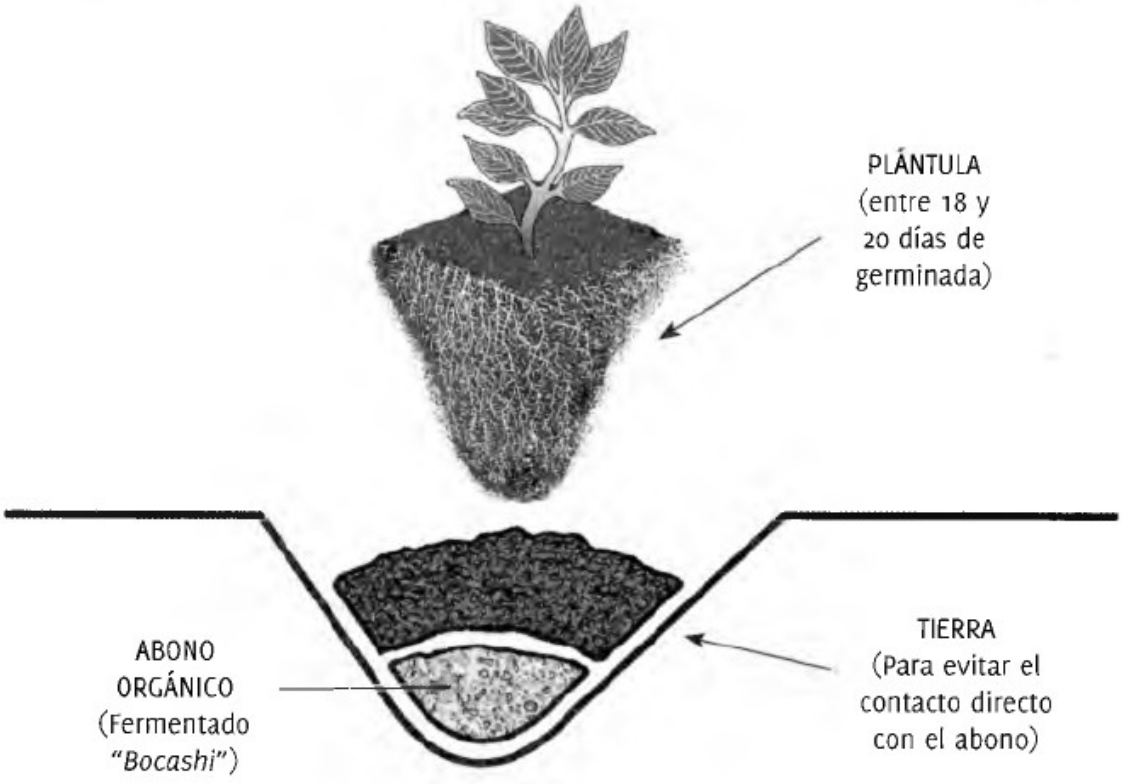

Figure 7. Direct fertilization at the base of the hole where the seedling is placed.

Substrate with pure bocashi on the sides of the plant. This system has been used regularly in established vegetable crops, and serves to make a second, a third and even a fourth nutrition maintenance free of nutrition. At the same time it stimulates the rapid growth of the root system towards the sides.

b. The first rebound in the field, it is recommended to realize it between the ten and the twelve days after the transplant. Finally, a fourth, fifth, and up to sixth rebound of the crop will depend on the direct tracking or accompaniment of the crop in the field, to the "eye of a good bucket".

Figure 8. Replenishment of plants, 12 days after transplantation.

C. Direct fertilization with pure bocashi in the furrow where the crop to be planted will be established, without prior germination and transplantation. This system can be used for example with carrots, cilantro, beans, sunflower, beans, corn and other grains, in some cases, in already established crops; The amount of organic fertilizer to be applied can range between 2.5 to 3 tons per hectare.

With 10 to 12 days afterwards. Final fertilization with pure bocashi in the groove where the crop to be planted will be established, without previous germination and transplant. This system can be used for example with carrot, coriander, broad beans, sunflower, Beans, maize and other grains, in some cases, in established crops, the amount of organic fertilizer to be applied can vary from 2.5 to 3 tons per hectare.

Figure 9.

Direct fertilization in the furrows of the crop (Example: Beans And maize)

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Amount of pure fertilizer that can be applied to vegetable crops

The amount of fertilizer to be applied to crops is conditioned mainly by several factors, such as the original fertility of the soil where you want to establish the crop, the climate and nutritional requirement of the plants that you want to cultivate. However, some farmers have been experimenting with fertilizer doses ranging from 50 to 80 grams per seedlings for leafy vegetables; From 100 to 150 grams for tubers or head vegetables on the surface, such as cauliflower, broccoli and cabbage; And up to 200 grams of fertilizer for tomato and paprika (sweet chili), there are reports of experiences in the cultivation of tomatoes and their relatives, such as chilies, where farmers have used 350 to 500 grams of fertilizer per plant , Both at the time of transplantation and in the rebound of the culture. Regardless of the form chosen to fertilize the crops, the organic fertilizer once applied, must be covered and mixed with soil so that it is not easily lost and thus obtain better results.

Depending on the nutritional grade and biological quality buffering each Soil, and mainly of the amount of the different microbiological functional groups present in the same, we can risk experimenting in a part of the land the application of a predetermined amount of a fermented organic fertilizer type bocashi in semi-processed or "raw" state. In areas that suffer from low temperatures in some seasons of the year, this experience is gaining good results. As well as being a good thermal shock absorber, this fertilizer quickly helps to restore or maintain very close hormonal relationships, mainly between roots, minerals and Organic matter that is found in the soil, impacting on the good development of plants. We can say that these fertilizers become rapidly bio domesticated by the different biological sequences that are established in the different levels, spaces and times of transformation of the organic matter in the earth. In cold-weather soils, the trend in microbiology is to predominate in a more stable bacterial functional groups and to a greater depth, when compared to the soils of hotter climates, where the functional groups of fungi a predominate in their microbiology A more shallow depth.

Do not forget that choosing the amount of organic fertilizer to be applied the most accurate way in each crop is in your hands. In the proposal of organic agriculture, just as there is no unchangeable recipe to experience a new idea, in the same way with the application of an input there is no preset quantity that can not be modified. Farmer friend and producer: It is necessary to adjust and record the detail of each result, in order to establish which are the best practices and preparations that fit each crop or situation in particular.

Table 3. Recommendations for experiencing doses of bocashi in vegetables (San *Antonio de Escazú, Costa Rica).*

Tomato	125 to 250 grams in the: base
Onion and chives	25 to 50 grams in the base:
Beet	100 grams to the side
Yellow lettuce	50 to 80 grams in the base
Lettuce american	50 to 80 grams in the base
Beans or vanilla	30 to 50 grams in the base
Brassicas	50 to 80 grams in the base
Cucumber	50 to 80 grams under the seed

How have they been storing?

Normally, farmers produce organic fertilizers according to the immediate needs of their crops, so it is not a very common practice to store them for long weather. When they save a certain amount of fertilizer Or, regularly do so in order to leave it aged or grow longer, then use it in nurseries or as a seed of microbiological inoculation to make a new fertilizer. However, during the short period that can be stored before being used, it is advisable to keep it indoors to protect it from the sun, wind and rain. Some experiments indicate that no more than two months should be expected to be applied in the field.

The microorganisms In nature they transform into pathogens to the extent that out of control or mismatches the harmony nutrition between microbiology of soil and the roots of the plants. **)

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ABC2

Eight factors by which fermented organic fertilizers paralyze their biological activity, which reduces their effectiveness for crops

1. Very "old" beds washed by the rains and exposed to the sun.

2. Manures with a lot of earth or a lot of husks of rice or sawdust, for the cases in which they are used chicken or pollinaza.

3. Presence of antibiotics and coccidiostats in manures of animals treated with these substances. Presence of herbicide residues in the manures of herbivorous animals, mainly of cows, horses and goats. Excess moisture when preparing the abonera (rot) .

4. Resistance of herbicide residues in the manures of herbivorous animals, mainly of cows, horses and goats.

5. Excess moisture when preparing the aboneras (putrefaction)

6. Imbalance between the proportions of the ingredients.

7. Lack of uniformity in the mixture, at the time of preparation.

8. Exposure to wind, sun and rains.

Source: Experiences lived by the author with peasants in training courses offered in Panama and Central America: April 1996.

Almacigos in greenhouse or nurseries

Advantages of the system of germination in trays with the use of Organic fertilizers bocashi type

- Easy to control the conditions of germination of the seeds of the species to be cultivated.
- Greater utilization of the number of seeds per crop.
- Greater economy, because the expenses in seeds diminish.
- Germination of healthy and nutritionally balanced plants.
- Vegetation cycles shorter, increasing the number of crops per cultivated area. See Table 4.

- Best index of relation between the number of transplanted seedlings and the number of plants harvested. See Table 5.
- Ease of transporting and handling trays with seedlings in the field.
- By releasing and removing the seedlings from the trays to be transplanted, the organic fertilizer with a good amount of particles or coal dust, rice husks or coconut fiber, helps them to protect the integrity of the root system, avoiding root breaking .
- On the other hand, with the purpose of guaranteeing this management we recommend during the last day in the greenhouse to completely suspend the moisture of the trays "water blow", so that the roots do not decompose, suffer a less impact and arrive with good thirst Your new destination and start a "perfect" healthy development in your new habitat.
- The system of seedlings in trays allows to stagger, select and efficiently program the crops that are to be harvested at a certain time of the year.
- For farmers with low availability of land, the production of seedlings in trays is an economic option.
- The nutrient medium of the soil directly influences the metabolism of the plant, and in turn, the plant metabolism originates the variety. And that they can be sold by parcels among farmers in a particular area or rural region.
- The seedlings in trays allow rapid field trials to be carried out in order to test the efficiency and quality of the fermented organic fertilizers or specialized substrates that are produced on the farm for each crop or variety.
- Finally, the best results achieved with the application of organic fertilizers for the production of vegetable seedlings in greenhouses are those with a low nitrogen content, since they avoid the phenomenon of the exaggerated development of the vegetative aerial part Of the seedlings, which is not desirable nor healthy: in contrast, they allow the abundant development of a healthy root system, guaranteeing the future nutritional harmony of the crop to resist against the attack of insects and diseases.

The root is the most Sensitive plant, she tells us exactly who the soil is and in what state of health it is.

Table 4. Duration of the vegetative cycle of eleven vegetables between an organic and conventional production system in Laguna de Alfaro Ruiz, Alajuela, Costa Rica. CultivoVariedad

(Weeks) in a systemic		**"Organic"**	*** Conventional**
Broccoli	Marathon	8	10
	Malebowl	8	12
Coliflor	Montano	7	10
Culantro	Grifaton	5	8
Remolacha	Early Wonder	6-7	12-14
Large yellow	Prima/White Boston	5-6	6-8
Collar American	Cool Breeze	7	10
Mostaza	Pagoda	4	8
Rabanito	Champion	3	4-6
Repollo	Stone Head	8	10
	Bangorycho / Fl	8	10

Table 5. Comparison of total lossesn Between organic and conventional crops of eight varieties of vegetables per hectare in Laguna de Alfaro Ruiz, Alajuela, Costa Rica.

Cultivation		Operation	Losses
Organic Yield			
	Small-nursery	2%	95%
	Transplant-field	3%	
Conventional			
	Direct cultivation	30%	70%

Advantages that farmers experience with the elaboration of Organic fertilizers

- Cheap materials, easy to handle and get locally (independence).
- Easy to make and save (technological appropriation by farmers).
- Low costs, compared to the prices of chemical fertilizers that depend on the oil economy; For example, in Central America the ratio is approximately 1:10 and 1: up to 45 for some cases where peasants possess a variety of materials in the plot itself; That is, with the cost of a chemical fertilizer sack, it reaches to prepare between 10 and 45 sacks of organic fertilizer.
- Its elaboration requires little time and can be planned and staggered according to the needs of the crops. Varieties of vegetables: Broccoli, cauliflower, beet, cabbage (two varieties) and lettuce (three varieties) .

- Eliminate risk factors for the health of agricultural workers. Short-term results are obtained and their dynamics allow the creation of new alternative forms of elaboration.
- They do not pollute the environment.
- Respect the fauna and flora.
- Fertilizers are more complete, incorporating to the soil the macro and micro nutrients necessary for the vigorous growth of the plants.

Benefits that farmers experience with the use of organic fertilizers in their land

- Easy to transport, handle and apply in any crop.
- Eliminate risk factors for the health of workers, consumers and any biological system.
- They protect the environment, fauna, flora, biodiversity and water quality, as they are absent from highly toxic nitrate-based poisons and fertilizers.
- They gradually improve the fertility, nutrition and vitality of the soil associated with its macro and microbiology.
- They stimulate and accelerate the vegetative cycle of the plants (in vegetables they are observed smaller vegetative cycles and consequently more harvests are obtained by cultivated area).
- They gradually improve the energy efficiency of all the blo transformations that the organic matter undergoes by the macro and microbiology of the soil. Higher yield of number of plants per hectare. (Lower index of losses).
- They are a constant source of organic matter for the sustenance of life on earth. Soils retain moisture and better buffer the temperature changes, saving water volume and number of irrigation per crop.
- Reduce surface water drainage. They improve the permeability of soils and their block. They favor the colonization of the soil by the macro and microvlda. They provide the land with the formation of a high rate of microbial humus in the long term. They contribute to the achievement of safer, more efficient and healthier harvests.
- Greater economic profitability per cultivated area.
- They allow farmers to have greater economic options and lower production costs. They function as a constant source of fertilization and nutrition of gradual release and with prolonged residual action, not only of macro nutrients, but also of micro-nutrients and trace minerals.
- They increase the efficiency of the nutritional absorption by the plants, as these have a greater development In the volume of the adical system.
- Cultivated plants are healthy and vigorous and do not become easily sick because they are naturally protected by the nutritional harmony inherent in the presence of hormones, / vitamines, catalysts and plant enzymes, depending on the physiological activity, Which is backed by the conditions of organic nutrition that fermented organic fertilizer offers to plants, soil and life.

- Organic fertilizers enriched with rock meal when applied to the soil trigger a series of biochemical reactions. To intense root activity of crops; Consequently, there is a constant increase of gaseous exchange in the solution of the soil, due to the corrosion reactions that are established between the microbiology and the minerals that are found in the rocks.
- On the other hand, organic fertilizers promote the evolution of Geo-diversity, fatten the broth of biological divinity, to become the best regulator of the manipulated greenhouse effect and bio terrorist commercial marquetry of the destruction of the planet by global warming.
- Finally , Organic crops, in nutritional aspects of both quantity and quality (nutraceutical foods), surpass any other production system.

Table 6 The analysis of trace elements and the amount of vitamins are superior in all the organic systems of production, when they are compared with the systems of the agriculture-dependent production of poisons and fertilizers químicos.

Element	**Name**	**Concentration %**
Si	Silicio	25
Ca	Calcio	10
Al	Aluminio	10
Mg	Magnesio	10
K	Potasio	10
S	Azufre	10
Na	Sodio	1
Fe	Hierro	10
Ti	Titanio	1
Sri	Estroncio	0.1

Table 7. Analysis of Phosphatic Rocks Flour Mexican geological service Dec 2008

Element	**Name**	**Concentration %**
Ca	Calcio	25
Si	Silicio	10
P	Fósforo	10
Mg	Magnesio	10
Al	Aluminio	10
K	Potasium	1
Cl	Chlorine	0.01
F	Flúor	0.01
Fe	Hierro	10
Zn	Zinc	1
Ti	Titanio	0.1
Sr	Estroncio	0.1
Cu	Cobre	0.01

"Organic farming is bad when it is badly done."

Table 8. Analysis of Natural Rock Meal Mexican geological service. (Mass Plasma)

Elemento	Nombre	Concentración (Ppm)
Ag	Plata	N.D.
Al	Aluminio	29665
As	Arsénico	92
Au	Oro	N.D.
Ba	Bario	142
Be	Berilio	2
Bi	Bismuto	N.D.
Ca	Calcio	1200
Cd	Cadmio	3
Ce	Cerio	24
Co	Cobalto	8
Cr	Cromo	79
Cu	Cobre	30
Dy	Disprosio	3
Er	Erbio	2
Eu	Europio	1
Fe	Hierro	15380
Gd	Gadolinio	4
Ho	Holmio	1
K	Potasio	5858l
La	Lantano	10
Lu	Lutecio	N.D.
Mg	Magnesio	32632
Mn	Manganeso	191
Mo	Molibdeno	2
Na	Sodio	375
Nd	Neodimio	14
Ni	Níquel	33
P	Fósforo	5914
Pb	Plomo	36
Pr	Praseodimio	3
Sb	Antimonio	4
Se	Escandio	8
Se	Selenio	N.D.
Sm	Samario	3
Sn	Estaño	2
Sr	Estroncio	324
Tb	Terbio	N.D.
Te	Telurio	N.D.
Th	Torio	1
Ti	Titanio	1466
TI	Talio	N.D.
Tm	Tulio	N.D.
U	Uranio	1
V	Vanadio	205

W	Wolframio	1
Y	Itrio	13
Y	bIterbio	1
Zn	Zinc	117

Table 9. Phosphate Rock Meal Analysis Mexican geological service. (Plasma Mass)

Elemento	**Nombre**	**Concentración (Ppm)**
Ag	Plata	1
Al	Aluminio	22583
As	Arsénico	172
Au	Oro	N.D.
Ba	Bario	124
Be	Berilio	1
Bi	Bismuto	N.D.
Ca	Calcio	1220
Cd	Cadmio	10
Ce	Cerio	16
Co	Cobalto	6
Cr	Cromo	27
Cu	Cobre	565
Dy	Disprosio	1
Er	Erbio	1
Eu	Europio	N.D.
Fe	Hierro	10161
Gd	Gadolinio	1
Ho	Holmio	N.D
K	Potasio	2425
La	Lantano	7
Lu	Lutecio	N.D.
Mg	Magnesio	5153
Mn	Manganeso	370
Mo	Molibdeno	4
Na	Sodio	1147
Nd	Neodimio	7
Ni	Níquel	19
P	Fosforo	64296
Pb	Plomo	92
Pr	Praseodimio	2
Sb	Antimonio	1
Se	Escandio	7
Se	Selenio	72
Sm	Samario	1
Sn	Estaño	1
Sr	Estroncio	424
Tb	Terbio	N.D.
Te	Telurio	N.D.
Th	Torio	2
Ti	Titanio	767

Tl	Talio	N.D.
Tm	Tulio	N.D.
U	Uranio	2
V	Vanadio	209
W	Wolframio	1
Y	Itrio	5
Y	bIterbio	N.D.
Zn	Zinc	2945

Results that have been obtained with the application of organic fertilizer bocashi in maize production in Mexico and some formulas for preparation.**Table 10**

Results of Maize plots with organic manure Bocashi in Amealco, Queretaro State, Mexico. 1998;

Community	**Producer**	**Rend. ton / ha with fertilizer Bocashi**	**Rend.ton / ha with fertilizer Químico**
El Terrero	Vicente Aguilar	6.4	6.2
El Lindero	Bruno Serrano	3.1	2.9
La Rufael	Zúñiga Trees	5.1	3.2
Santiago Mexiquititlán. Barrio 1 °	José Ávila	3.6	3.4
Santiago Mexiquititlán. Barrio 5 °	Ernesto Pérez Triviño	2.8	2.5
La Manzana	Pedro Rodríguez	3.7	3.1

L = J Adequacy of organic fertilizer type bocashi for the highland of Mexico Jesús Valero Garza. INIFAP - Produce Foundation, Querétaro, Querétaro State, Mexico, 1998

Formula to accelerate the decomposition of coffee and cocoa pulp and convert it into organic fertilizer for coffee plantation fertilization

***Ingredients**:*
- One ton or 1000 kilos of bovine manure.
- One ton or 1000 kilos of coffee pulp or cocoa.
- 25 sacks or sacks of cisco coffee parchment (approx 300 kilos).
- 3 pounds of yeast for bread, granulated or in bread.

Follow the instructions for the preparation of the original fermented organic fertilizer, bocashi type. Too much humidity or the amount of water you want to use, because of the high humidity that the coffee or cocoa pulp may contain. In many cases, it is not necessary to use water

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ABC2

Adaptation of organic fertilizer Bocashi type for the Mexican highlands Jesus Valero Garza. INIFAP - Fundación Produce, Querétaro, State of Queretaro, Mexico, 1998

Ingredients:

- 300 kilos of manure, dried or milled.
- 300 kilos of soil.
- 200 kilos of wheat straw (preferably chopped) .
- 50 kilos of corn in well-ground corn.
- 50 kilos of charcoal, made with corn of maize.
- 10 kilos of firewood ash
- 8 liters of pulque 1/2 kilogram of yeast.
- 8 liters of molasses or 5 kilograms of ground piloncillo or panela
- Water (according to the test of the fist and only once).

Coal of corn cob: One ton cobs generates approximately 300 to 350 kg of coal for the bocashi.
Pulque: Alcoholic fermentation drink characteristic of Mexico, made with the fermentation of the sap, called water honey of the maguey.
Piloncillo: Sugar in blocks or bars made from concentrated cane juice; Also known in Central America as a panela, sweet cap or chancaca.
Molasses or sugarcane honey: By-product of sugar mills after crystallization of sugar.

* *Preparation*: Follow the instructions for the preparation of the original bocashi fermented organic fertilizer. In very cold areas it is recommended to work the heap of the highest fertilizer (between one meter and forty centimeters to one meter with fifty), so that the fermentation process starts and is not affected by the low temperatures, especially the night when there is The change of seasons.

Adaptation of organic fertilizer Bocashi type for the use of the "waste" of corn cultivation Atlacomulco, State of Mexico

Ingredients:

- 20 sacks or sacks of well-screened land or sifted.
- 20 sacks or sacks of corn stubble well chopped
- 20 sacks or bags of manure or manure bovine.
- 4 sacks or bags of charcoal corn.
- 8 liters of sugar cane molasses 8 kilos of brown sugar or panela.
- 3 sacks or sacks of corn cob good ground (bran type; derived by-product of the mechanical shelling of the corn).
- 1 kilo of granulated yeast for bread

- Enough water to moisten the mixture (fist test).
  Source: Maize Producers from Atlacomulco, State of Mexico, Mej Mexico, October 1998,
  preparation:
  Follow the instructions for the preparation of fermented organic fertilizer original, bocashi type.

Adequacy of organic fertilizer type bocashi State of Querétaro, Mexico

Ingredients:

- 200 kilograms of dry and well-grounded bovine manure.
- 200 kilograms of land sieved or screened.
- 4 bales of well-ground wheat straw.
- 50 kilograms of cisco charcoal made from corn husk.
- 50 kilograms of wheat bran.
- 40 kilograms of lime or wood-burning ash.
- 10 liters of pulque or 5 kilograms of piloncillo or panela.
- Enough water to moisten the mixture (fist test) .

Source: Jesus Valero Garza. INIFAP - Produce Foundation, Queretaro State, Mexico, 1998.

Preparation: Follow the instructions for the preparation of the original fermented organic fertilizer, type bocashi.El "tlaxcashi": Adequacy of organic fertilizer type bocashi

Grupo Vicente Guerrero of the Municipality of Españita in the State of Tlaxcala, Mexico

Ingredients:

- 2 sacks or stubble sacks or well chopped straw.
- 2 sacks or sacks of soil.
- 2 sacks or bags of manure (hen, cow, rabbit).
- 4 kilograms of lime or fire ash.
- 1 sack or charcoal sack.
- 1 pound of yeast for bread or 5 liters of pulque.
- 4 liters of molasses or 2 kilograms of piloncillo.
- Enough water for Moisten the mixture (fist test).

Source: Manual for farmers promoters:

Fertilization, conservation and management of soils. Memoria, November 1999. Grupo Vicente Guerrero, Municipality of Espafiita, Tlaxcala, Mexico.

Preparation: Follow the instructions for the preparation of the original fermented organic fertilizer, type bocashi.

ABC2

Organic fertilizer Bioveloz of seven days Bocashi type

Ingredients:

- • 40 sacks of black tierra well-cast iron or tam.
- • 20 sacks or sacks of coffee or coffee or dry pulp.
- • 20 sacks or sacks of corn or bovine manure.
- • 4 sacks or sacks of coal well crushed or (cisco de carbon).
- • 20 kilos of calcined bone horn.
- • 20 kilos of fish meat (for coastal areas).
- • 20 liters of molasses or cane honey.
- • 20 kilos of lime to wood or ash from a wood burner.
- • 25 kilos of sandstone, well molded.
- • 2 sacks or sacks of polishing or bran.
- Water Enough to moisten the mix (fist test).

preparation:
Follow the instructions for the preparation of the fermented organic fertilizer original, bocashi type. This version of the fermented fertilizer needs less time for its fermentation. Only in seven days it is ready to be used. This acceleration in its preparation, in a way, is associated with the great diversity of ingredients (proteins, carbohydrates, minerals and vitamins, among others).

Therefore, it is best to flip the mixture at least twice a day (morning and evening) to control the temperature during the seven days of preparation. On the other hand, the heap height should also be adjusted in parallel as the temperature is controlled, until finally a layer of approximately 15 to 20 centimeters in height is reached. At the end of the whole process, the fertilizer must have a uniform color of powder, be completely dry and at room temperature.

Note: After this type of bocashi has fermented and is completely cold, it can be enriched with a biological formulation of microorganisms Native, in the amount of 5 to 10 kilos per ton of fertilizer, which we have previously collected in the forest and reproduced on the farm or agricultural property. We recommend this preparation to be used mainly in vegetable crops such as tomato, paprika and potato. On the other hand, we recommend great care with the dosage of this product, as it can burn the crop and spoil it. However, when the soils are rich or possess abundant microbiology, the damping effect of the earth against any impact of this type is notorious. The seed or inoculum of the native microorganisms, we can get and at the same time reproduce in a very simple way, through the mantle or superficial layer of the forest; Which has been reproduced with molasses and bran or rice semolina. (Consult how to make this inoculum or reproduction of microorganisms native to the forest, on page 74).

Observations We are aware of the economic constraints that many peasant communities suffer from acquiring some of the materials proposed here in some formulations; However, in many places we frequent it is very common to find access to the waste (hair, leather, blood, bones, horns, hooves, ruminal and biliary contents, etc.) with a certain ease, which are generated from slaughter Of bovine and porcine animals. On the other hand, in many regions, mainly those of coastal origin, it is also very common to find a large amount of waste from fishing, shellfish consumption and fish; Materials that are well processed locally in the form of flours, reduce the costs of some fertilizers proposed here, which we find very expensive because we always think of acquiring the ingredients as inputs processed by the industry to produce them. Lately we have been recommending the waste from shrimp companies for the production of fertilizers and biofermentation of very good quality and excellent results in crop production and soil protection against pathologies. In case it is very difficult to obtain the different "mane Bone and fish), we can substitute the total of the weight of the two flours required, for one of them, depending on which is the most common in its use. Read the well-founded critiques of the Hapsel and the Swedish industry, which are found in the Chapter of this Manual.

The greatest difficulty in developing many types of fertilizers in different regions is not how to buy the ingredients but In the lack of knowledge to take advantage of the resources that are locally available.

In the area of the Colombian coffee-growing zone between the departments of Quindio, saralda and Caldas, it is very common to observe the "use and lack of management" of the coffee and banana plantations.

Of organic materials such as lapa, mucilage or mineral water and parchment; Cisco of the coffee that results after threshing or efficiency of the grain; As well as the stem or pin. The pseudo-stem and rhizome of banana. In order to maximize the use of these materials, we present some ideas: ai'a the elaboration of some organic fertilizers enriched with other materials, which because of their hot quality can substitute commercial fertilizers with the possibility of lowering: these To improve the quality of the products and to recover the soils that are found by the policy and the technological package "put by the Federation of Coffee Growers, which among others, if any technology can be accused directly by the destruction of the environment Environment, workers' health and the effect of global warming, is that of herbicides.

“With deception, many peasants drove bankruptcy, with the sum of the destruction of biodiversity and soils, when the dynamics Of the monoculture and the industry of the poisons.

ABC2

Formulation No. I

- 20 sacks or sacks of land.
- 20 sacks or sacks of hens.
- 20 sacks or sacks of coffee pulp.
- 1 Kilo of yeast for bread.
- 3 Sacks or sacks of charred charcoal .
- 1 Sack or bag of bran or rice paddy (50 kilos).

Humidity: The fist test must be considered to achieve the maximum between 35% and 45% moisture. In case the materials are very dry, it is ideal to get the moisture to take advantage of the mucilage of the coffee or the so-called water cherries of the benefit of the cherry, or you can also take advantage of the juice of the stalks of the banana plants that are They have harvested.

Formulation No. 2

- 20 sacks or sacks of ground.
- 20 sacks or sacks of banana stalks.
- 20 sacks or poultry sacks.
- 1 kilos of yeast for bread, granulated or in bar.
- 50 kilos of bran or polish of rice.
- 3 sacks or sacks of Charcoal.

Water mixed with the mucilage of the coffee, until a humidity between 35% and 45% (to make the test of the fist) is obtained.

Formulation No. 3

- 20 sacks or sacks of ground.
- 20 sacks or sacks of banana stalks finely chopped.
- 20 sacks or poultry sacks.
- 2 kilos of yeast for bread.
- 1 sack or bag of bran or polish of rice (50 kilos) .
- 3 bags or Crushed charcoal sacks (carbon cisco).

Water mixed with the mucilage of the coffee, until obtaining a humidity between 35% and 45% (to do the test of the fist).

Formulation No. 4

- 20 bags or sacks of ground.
- 20 sacks or sacks of coffee pulp.
- 20 sacks or poultry sacks.
- 1 kilo of yeast for bread, granulate in bar.

Water mixed with the mucilage of the coffee, until obtaining a humidity between 35 % And 45% (do the fist test).

Formulation No. 5

- 20 bags or sacks of earth.
- 20 sacks or sacks of cisco or pergan of coffee (husk).
- 20 sacks or sacks of coffee pulp

- 20 sacks or sacks of dry cow manure.
- 2 kilos of yeast for bread, granulate or bar.
- 3 bags or sacks of charcoal charcoal.
- 2 sacks or sacks of bran or pullet dude rice (100 kilos).

Water mixed with mucilage of the coffee, until obtaining a humidity between 35% and 45% (do the test of the fist).

Formulation No. 6

- 20 bags or sacks of coffee pulp.
- 20 bags or sacks of cisco or parchment of coffee (husk).
- 20 sacks or sacks of manure of pork or beef.
- 1 kilo of yeast for bread, granulated or in bar.
- 1 sack of bran or rice polish (50 kilos).

Water mixed with mucilage of the coffee, until obtaining a humidity between 35% and 45% (do the fist test) .

The ideal fertilizer does not exist, the best input for a peasant is all that he has at his disposal.

Formulation No. 7

- **20 sacks of earthen sacks**
- **20 sacks of pig manure. Bovine sacks.**
- **20 sacks of sacks of cisco or brown perchaid (husk), not**
- **1 kg of yeast for bread, granulated in bar.**
- **1 sacks of sacks of charcoal vegetal arroz (50 kg) (Coal cisco)**
- 3 sacks or sacks of crushed charcoal (cisco de carbon).

  Water mixed with coffee mucilage, has Agua mixed with the coffee mucilage, to get a humidity between 35% and up to get a humidity between 35% 45% (do the fist test).

Formulation No. 8

- 20 sacks of poultry sacks 0 es
- 20 sacks of sacks of cisco parchment
- 1 kg of yeast for bread, granulated in bar.
- 3 sacks of sacks of charcoal vegetal arroz (50 kg) (Coal cisco)
- 1 sack of sack of bran or rough cut (coal cisco). Rice (50 kg).

Water mixed with coffee mucilage, has water mixed with Mucilage of the coffee, get a humidity between 35% and up to get a humidity between 35% 45% (do the fist test) and 45% (do the fist test).

Formulation No. 9

- 20 sacks or sacks of ground.
- 20 sacks or poultry sacks.
- 20 sacks or sacks of finely chopped banana stalks.
- 20 sacks or sacks of coffee pulp.
- 20 sacks or sacks of coffee husk or parchment (sackcloth)
- 1 sack o (50 kilos) .
- 2 kilos of bread yeast, granulated or in bar.

Water mixed with the mucilage of the coffee, has to obtain a humidity of 35% and 45% is born the test of the Fist).

Formulation No. 10

- 20 bags or sacks of pig manure or beef.
- 10 sacks or sacks of earth.
- 20 sacks or sacks of cisco parchment of coffee (husks).
- 1 kilo of bread yeast, granulated or in a bar.
- 3 sacks or sacks of charcoal crushed (carbon cisco) "
- 2 bags or sacks of bran or polish of rice (100 kilos).
- Water mixed with the coffee mucilage, until getting a humidity between 35% and 45% (do the fist test).

Formulation No. 11

- 20 sacks or sacks of coffee pulp.
- 20 sacks or sacks of Cisco or parchment of coffee (cascarilla) .
- 20 sacks or sacks of manure or semi-dry bovine manure.
- 2 kilos of dry yeast for bread, granulated or in bar.
- 1 gallon of molasses or cane honey.
- 4 sacks or sacks of charcoal, Well crushed (carbon cisco).
- 3 sacks or sacks of calfos or phosphorita huila (phosphoric rock) .
- 2 sacks or sacks of bone meal.
- 2 sacks or sacks of bran or polish of rice (100 kilos).

Water mixed with the mucilage of the coffee, until obtaining a humidity between 35% and 45% (to do the test of the fist).

Formulation No. 12

- 20 sacks or sacks of manure or poultry.
- 20 bags or sacks of coffee cisco or parchment (husk) .
- 2 sacks or sacks of rice bran or polish (100 kilos) .
- 1 kilo dry yeast for bread.
- 1 gallon of Molasses or honey from cane purge.
- 4 sacks or sacks of well-ground charcoal (coal cisco) .
- 1 bag or bag of bone meal.
- 1 bag or bag of calfos or phosphorite huila (phosphoric rock).

Water mixed with Mucilage of the coffee, until obtaining a humidity between 35% and 45% (to make the test of the fist) .

Formulation No. 13

- 5 bags or sacks of ground (well dried and cast) .
- 20 sacks or poultry sacks.
- 20 sacks or sacks of coffee cisco or parchment (husk) .
- 2 sacks or sacks of bran or rice paddy (100 kilos) .
- 1 Kilo dry yeast for bread, granulated or in bar.
- 1 gallon of molasses or cane honey.
- 4 sacks or sacks of well-ground charcoal (coal cisco).

Water mixed with coffee mucilage. % And 45% (do the fist test).

"**Note**
that some formulations, such as f. 12 and 13 are preparations which require a major economic investment in relation to the other examples. However, their quality will be higher in nutrition and will be obtained in a shorter time. On the other hand, it should not be overlooked that the decision-making process to elaborate these abeooa is in their hands and not in those of the technical and cooperative commercial houses that make the producers more and more dependent and poor.

Lastly, let us forget that the way in which these abonJs are made follows the same instructions for the preparation of fermented organic fertilizer type bocashi, in accordance with the abilities to prepare and process them. Farmers can take between 8 and 1 g days to be ready for use in crops Formulas 14. 15. 16, 17 ..., etc., you can invest them according to your economic conditions And materials that he locates locally for his elaboration, and mainly, according to his creativity. Finally, in the preparation of this type of fertilizers, the moisture content is vital to achieve a final product of excellent quality, particularly when working with highly water-rich materials such as wastes originating from the cultivation of Banana.

Ingredients for the preparation of one ton of organic fertilizer Bocashi (Sao Paulo, Brazil, 1995)

Ingredients	Approximations
◦ 500 kilograms of rice paddy	11 quintals
◦ 300 kilograms of mango cake	6.6 quintals
◦ 180 kilograms of bone meal	4 quintals
◦ 20 kilograms of flour Fish	1/2 quintal
◦ 5 liters of cane molasses	1/2 gallon
◦ 4 liters of EM ** (microbiological broth) (soil or forest yeast or bocashi tanning)	
◦ 350 liters of water (according to the handful test and only once)	

** Concept of Efficient Microorganisms (EM) or effective microorganisms was developed in the eighties by Dr. Teguo Higa, Professor of Horticulture at Ryukyu University, Okinawa, Japan. An EM is a mixed crop of beneficial microorganisms found in nature and can be applied directly to soil or plants to increase microbiological diversity, or as an inoculant for fermented bocashi fertilizers. MS contain selected species of microorganisms, including predominant populations of lactobacilli, yeasts and a smaller

number of photosynthetic bacteria, actinomycetes and other types of organisms. All these are compatible with each other and can coexist in a liquid medium. MS does not contain genetically modified microorganisms. Source: Ryukyu University, Okinawa, Japan. Experiences in Indonesia, Thailand and Bangladesh

Observation
It is allowed to ferment for 24 hours well covered with sacks of vegetable fiber, protected from wind, sun and rain. 5 tons / hectare are applied.

Table 11 Composition of EM

Groups of genera and species microorganisms	
lactic asterisks	Streptemvces albus albus
	Rhcdcpseuodomonas splmeroides
	Lactobacillus plantarum
	Propicni bacterium freudenreichii
	Streptococcus lactís, S. faecalis
	Aspergillus cryzae
	Muccr hiemalis
	Seches ivees cerivisiae
	Candida utilrite
	Hume and Parr.

There are presently a number of formulations that are being commercially propagated in order to speed up Decomposition of organic materials. Some formulations even work and others are pure commercial fraud that promises false results, but the most important thing in the proposal of organic agriculture is not content with seeing things work and look for substitutes for inputs;

The most important thing is to understand why things work, and it will be easier to consciously make a decision: if I prepare the inputs themselves with the free supply of biological phenomena of nature in the plot or acquire them in the market . Directly in forests or crops where there is good coverage with decaying organic materials, we can naturally find a number of microorganisms which accelerate the reincorporation of organic waste in multidiverse and nutritive forms to plants; Among the most common decomposers found in nature, which can be reproduced directly in the plots, we can mention bacteria, fungi, actinomycetes and yeasts: Saccharomyces, Lactobacillus, Burkholderiti cepacia, Trichoderma, Paecelomyces lilacinus. On the other hand, one of the sectors that worries the industry of the agricultural sector, at a world level, is the career that many are undertaking towards the domain of patents in the market of chemical ecology and molecular biology. The present tendency, by the big manufacturers of inputs, is to wash the soul of all evil and sin with the new supply of biological inputs that in "nothing will affect" the environment, but that will increase the concentration of its riches.

Knowledge as common sense are not a business, do not yield to the mercantile purposes of the industry or to! Technological imperative. Until recently, a half-dozen companies in

the agro-chemicals sector invoiced more than $ 30 billion in global fungicide sales; In the search for a change of image before the market and consumers, they seek the technological mastery of the phenomena and symbiotic relationships that occur between the microbiological activity of soils and organic matter. For this case, and among others, we are talking about the dominance of rhizo bacteria, as promoters of growth and bio-protection of crops, of which some products have already been in the market for more than two decades and others are in trials.

Table 12. Genus and species of plant growth promoting rhizobacteria

	Reference	Genus and species
• 1990	sp.Tanii etai,	Actinobacter
• 1990	Americas caviae	Invar & Chet,
• 1991	Ryder & Jones,	Agrcbactenum radiebacter
• 1990	Yeun etai,	Alcallgenes sp.
• 1985	Chen et al,	Brevis bats
• 1993	Osburn etai,	B. Cercas
• 1995	Berge et al,	B. Circulans
• 1990	Chen et al,	B. Firms
• 1995	Chen et al.,	B. Licheniformis
• 1995	Luz,	B. Subtilis
• 1995	Utkhede,	b Corynebacterium sp.
• 1988	Parke et al.,	0 Entercbacter aercgenes
• 1988	Tanii etai,	E. Agglomerans
• 1990	Nelson,	E. Clcacac
• 1988	Nelson,	Encyclical herbiccla

Capture of microorganisms for reproduction and processing of organic fertilizer for the production of crops. Jesus Ignacio Simón Zamora of flowers. Floricola, Naples, Cayambe, Quito, Ecuador. (Nacho), Queensland, Australia.

- 1990 Tan et al.,
- 1996, Luz, in this revision
- 1990, Lamberte? Al.,
- 1995 Duffy & Weller,
- 1995; Mathre et al.
- 1995, Parke et al.,
- 1991, Light
- 1996 b. Vidhyasekaran & Mythamilan,
- 1995 Duffy & Weller,
- 1995 (Luz, 1996, in this review) Chanway et al.,
- 1991 Ordentlich et al.,
- 1991 Tahvonen et al.,
- 1987 Basic recipe for preparing bocashi fermented organic fertilizer, Area of one hectare for the production of vegetables and grains.

ABC2

Ingredients for the preparation of 68 quintales

- 3 or sacks of fermented organic fertilizer bocashi (Tapezco, Costa Rica, 1994)
- 20 quintals or poultry sacks.
- 20 quintals or sacks Of husks of rice.
- 20 Quintales or sacks of land (sifted) .
- 4 Quintales or sacks of well-broken charcoal (cisco) .
- 1 Yard or sack of pulidura or rice bran.
- 1 quintal or sack of dolomite lime or agricultural lime.
- 1 Gallon of molasses or cane honey.
- 2 pounds of yeast for bread, granulated or in bar.

Water (according to the fist test and only once). Source: Personal communication by Juan José Paniagua, 1994.

A quintal is a unit of volume characteristic of the Mexican rural environment, equivalent to a bundle, a sack or a sack in the rest of Latin America. LüJ Ingredients for the preparation of 30 quintals or sacks of fermented organic fertilizer, substrate type for seedlings (Cali, Colombia, 2009)

- 8 quintals or sacks of virgin land.
- 8 quintals or poultry sacks (laying birds) .
- 5 quintals or sacks of rice or coffee husks.
- 5 quintals or sacks of pulverized coal.
- 2 quintals or polishing sacks Or rice bran.
- 2 Quintales or sacks of phosphoric rock meal.
- 4 gallons of sugarcane molasses.
- 1 kilo of yeast granules for bread.

Water (According to the test of the fist and only once).
Source: Jaira Restrepo Rivera, personal work, 2009.

Formula to accelerate the decomposition of the coffee pulp and cocoa and convert it into organic fertilizer for coffee fertilization
Ingredients:

- One ton or 1000 kilos of bovine manure.
- A ton or 1000 kilos of coffee or cocoa pulp.
- 25 bags or sacks of coffee parchment (approximately 300 kilos)
- 25 kilos of rock meal, well ground
- * Water sufficient to moisten the mixture (fist test)

Water sufficient to moisten the mixture).
Source: Producers of organic coffee from Nicaragua and Costa Rica, in an exchange of peasant experiences in the Municipality of Cuá, Nicaragua, 1998.

Formulation No 10

- 20 sacks or sacks of manure of pork or beef.
- 10 bags or sacks of earth.
- 20 sacks or sacks of cisco parchment coffee (husk).
- 1 kilo of yeast for bread, granulated or in bar.