

FERMENTED ORGANIC AMENDMENTS

One of the techniques that growers and farmers have been using on farms, gardens or backyards to increase fertility on soil is by adding natural amendments, mainly at the beginning of the season.

The main objective that we try to reach with this technique is to **recover and support** biological, chemical and physical features in the soil and to enhance the **nutritional aspects** in crops.

In Ragman's holistic approach we recognize the need to include several parameters to develop these techniques, such as:

- **Recognize and understand** resources in our system
- Fit them with **objectives and purposes**
- **Avoid leaks** in our system using these techniques
- **Recognize and use benefits** through the process
- **Play (to discover** new ways for improvements)



For instance . . .

Using the heat from Bocashi to warm up the fermented brews

The main Organic amendment that we are doing at Ragmans is **Bokashi**.

BOKASHI

The word **Bokashi** means fermented Organic Matter in Japanese and it is an aerobic semi-decomposition process taken by microbes under controlled conditions.

Bokashi takes more energy to make than conventional compost, but it is ready to use more quickly, and is of higher quality. These are factors to consider when deciding whether or not to make bokashi.



Three different ways to make small scale Bocashi at Ragmans
(left to right: Conventional Bocashi; Bocashi + Natives Microbes inoculants; Bocashi + Biofertilisers)

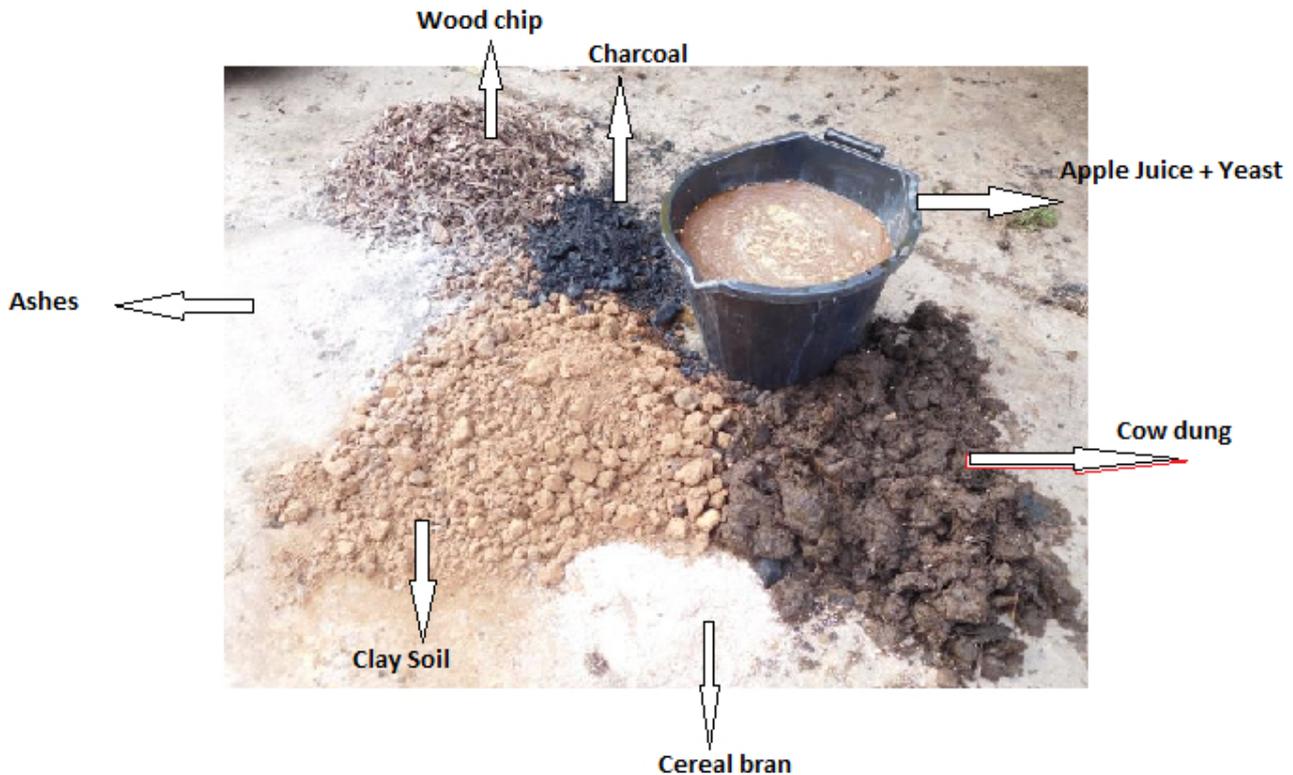
The mains aspects to look at when we are doing these types of amendments are the **ingredients** to use and the **processes** in them.

INGREDIENTS

Searching for what ingredients we need in order to make Bocashi, we can find several resources with list of ingredients to use; but what about if we can't easily get them? The only chance we have would be look in our system, the local resources, and use them in the right way.

One way for do this would be understand the roles of the ingredients in the compost process and in nature; therefore we will be able to replace them with others which performance the same characteristics in the pile by using **local or low cost resources**.

Ingredients used at Ragmans



Functions of those Ingredients and possibilities to replace them:

- Microbiology and mineral inoculants. **Cow dung/Any type of manure**
- Homogenization of biotic and non biotic properties of mix. **Clay soil/Old Bocashi/Compost**
- Silicon rich source as improver of physical characteristics in the mix. **Woodchip/straw/hay/Cereal hulls**

As we are talking about a high quality product under controlled conditions, the previous ingredients have to be supported by others in order to increase the quality of the amendment, the functions and the ingredients are:

- Improvers of structure and texture of the Bocashi (among others benefits). **Charcoal** (in our case we use Activate charcoal)
- Source of Carbohydrates and Vitamins. **Cereal Bran**
- Source of minerals (macro, micronutrients and trace elements). **Ashes/Rock Dust/specifics minerals**
- Source of sugar to microbes. **Apple Juice/Molasses/Brown sugar**
- Microbiological inoculants to start the fermentation process. **Commercial Yeast/local wild Yeast**

- Environment for microbes perform their function. **Free Chlorine water**

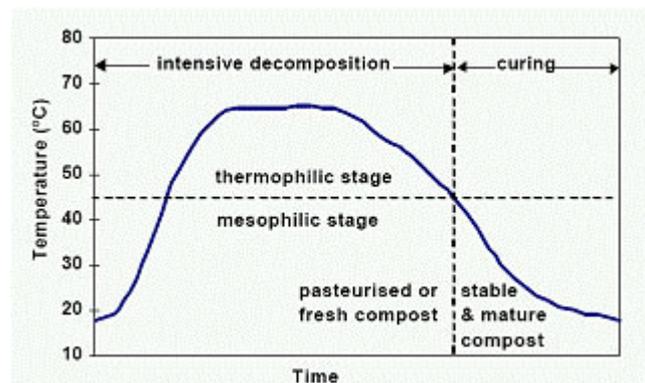
Different layers of ingredients in the pile before we start to turn it.



Please remember **that previous ingredients are not fixed, as we want to get their functions in the pile as well; **therefore feel free to use different ones which maybe fit better with your local or low cost resources.***

PROCESS

In the composting process there are two main stages which we need to manage properly in order to reach a high quality product; there are **stabilization** and **maturing** stages.



Some of the main factors that we should be looking for and manage through the process are **Carbon** and **Nitrogen** ratio, **Aeration** of the pile, **pH**, **Temperature**, **Humidity** and Ingredient **particle size**.

Therefore managing previous factors we will develop the pile of compost toward to a Physical, chemical and biological **balanced properties** in the final product.

Biological activity in process

The main microbe groups taken through the process are **Lactic Acid Bacteria**, **Photosynthetic bacteria**, **Yeast**, **Actinomyces** and **fungi**.



The “White Rainbow”* in Bocashi after 3 days of aerobic fermentation in pile

(The “White Rainbow” is a signal of **Actinomyces reproduction at the beginning of process, which means that the pile is reaching high temperatures, so the process is developing properly)*

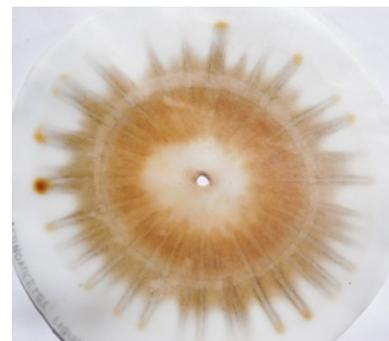
It’s quite important to understand the microbe’s groups’ behavior through the process in order to understand what’s going on in the Bokashi and have the chance to check the development of it (Visit annexed document: **Microbiology developed in Bokashi**)



Ameoba Nebela at maturation stage in Bokashi

(this type of ameoba appears in a rich humus environment and it’s linked with fungi. This corresponds with the maturing phase of bokashi.)

Also we sometimes **collect**, **isolate** and **reproduce** some microbe strains (as Actinomicetes) through the process for use in different purposes in our system (Visit **Orchard Management** section in the web to know further info about how we use them).



Chroma of Actinomicetes reproduction after isolation

Control Quality

To ensure a proper process there are a few tips to check out the quality of the pile, such as the Actinomyces reproduction (showed above), humidity absence or not ammonia smell when we are managing the pile, even all of them can be solved by different managements.

At Ragmans we try to go further in our understanding of how the pile improves through the time; therefore we are looking how **microbiology develops** in the pile through the microscope and how the **interaction** is between Microbiology, minerals and Organic Matter by doing Chromas (Visit **Chromas Section** in the web to know further about this).



Left: Chroma of raw compost



Right: Chroma of compost nearly done

(Visit Chromas Section on web to know more examples about Chromas in Bocashi process)

FINAL PRODUCT

The finished product can vary between 2-3 weeks depending on ingredients, climate and management; having these features as a standard to check that the process is over.

- The temperature has to be same as the ambient temperature
- The colour has to be clear grey
- The pile has to be dry
- The appearance has to be sandy dust with a loose consistency



TURNING " FARM'S WASTE" INTO INPUT

Compost/Bocashi with Apple pulp

Following our natural approach to managing land, plus our principles of not producing waste in our farm by closing loops in the system where possible and managing output as new opportunities; we are processing the apple pulp from juicing to make organic amendments.



Bokashi ready to use as mulch in the Orchard



Turning Bocashi pile at large scale production

To know further about how to prepare Bocashi, please visit **The ABC of Organic Agriculture** practical manual by **Jairo Restrepo** available through the website.