

Plant compost and aquaculture - Introduction

- The composting is a means of upgrading the nutritive merit as well as the palatability of selected agricultural by-products through microbial activity especial aerobic bacteria
- The activity and survival of composting organisms would require carbon for energy, nitrogen for growth and oxygen as well as an adequate level of moisture
- When the quality of compost as well as the speed of composting is considered, the ratio between carbon and nitrogen (C:N) in the compost materials far exceeds the absolute quantity of the two elements
- The closer the C:N ratio to 30:1 the best quality of produced and the shorter the composting period. However, compost materials vary significantly in its contents of carbon and nitrogen
- Materials with a low C:N ratio (low carbon and high nitrogen) include animal manures, sewage sludge, animal wastes, green weeds and aquatic plants).
- Materials with a high C:N ratio (high carbon and low nitrogen) include paper, straw (e.g. rice, wheat), sugar cane trash, coffee pulp)



Plant compost and aquaculture - Composting

- Composting success is greatly influenced by the use of the right match between compost materials towards the optimum ratio (30 C: 1 N). Also, the right humidity and oxygen availability should be secured
- Several methods of composting are in practice
- Methods may vary depending on types of available materials or climatic conditions
- In general, coarse materials should be shredded into smaller pieces to facilitate the composting process
- Mixing or layering of compost materials are the main physical composting methods
- When layering method is adopted, the piling should ensure sufficient aeration and moisture. Also, it is necessary to apply alternate layers of fresh fodder (rich in nitrogen) followed by a carbon rich layers of dried organic matter. The addition of finished compost or soil is to provide the necessary bacteria that is needed to speed the composting process



Plant compost and aquaculture – Composting

- Water misting of compost layers upon piling and periodic moistening the pile afterward will be required to ensure an optimum moisture level throughout the composting process. However, if the compost pile turns too wet or soggy, beneficial organisms are endangered and may die. Covering the compost pile in rainy seasons or regions will protect the compost pile from being water logged. Whenever appropriate, a drainage pipe may be inserted in the compost pile to collect and drain the excess water
- Securing a sufficient oxygen level in the compost pile as required by composting organisms (e.g. bacteria) for its survival and activity is done through means of aeration
- Periodic turning of the pile will bring in oxygen into the center of the pile and facilitate decomposition. In static composting systems, additional aerating systems will be required. In simple operations, perforated bamboo poles are inserted into the compost pile for aeration. In larger operations, using mechanical air blowing or air suction techniques may be needed



Plant compost and aquaculture – Possible use

Possible use of compost in aquaculture:

- The internal heat generated during composting (60-70 °C) is sufficient to destroy weed seed or pathogens in finished compost and lead to a safe product. The upgrading of the nutritional merit of the compost is attributed to its nutrients as well as to its contents of live organisms
- Finished compost can be used for up to three months
- Compost could be used as organic fertilizers whereas periodic applications are used in fish ponds. In such case, quantities and frequency should be determined based on water fertility as measured by Secchi disk. This has been used successfully with Nile tilapia (*Oreochromis niloticus*)
- Several reports demonstrated a possibility of incorporating the plant compost in fish feed; composted water hyacinth was tested in high levels (75%) in the feed of Nile tilapia without negative effects on fish growth or performance when compared commercial diets
- Mixing of plant compost with other fish feed ingredients will depend on farmed species and aquaculture systems
- While compost may have limited use in commercial aquaculture, its use in small-scale aquaculture is great



The abundance of compost materials is important but should not be the influencing factor toward composting especially when materials are not appropriate or unsafe

If plants are grown in polluted water, some pollutants such as heavy metals may persist the composting and could exist in finished compost