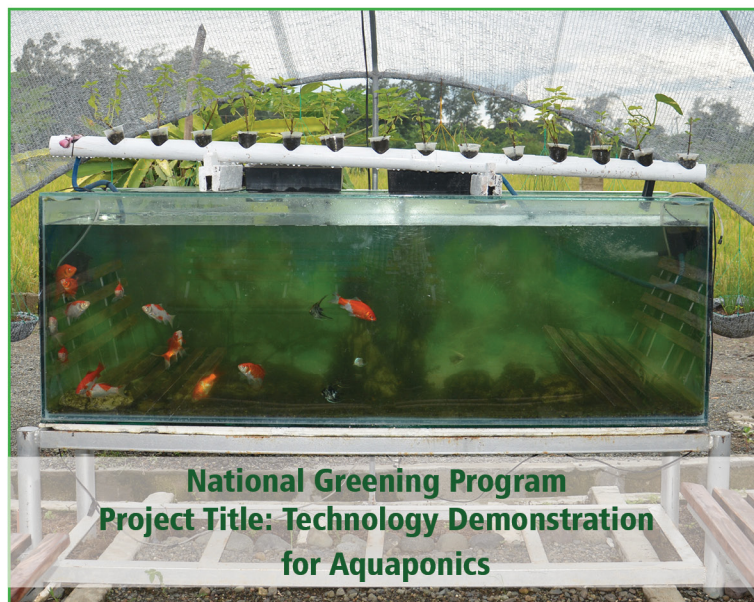




Managing the System

- Prepare planting cups out of discarded plastic bottles using discarded sponge as wick and carbonized rice hull, humus, and others as growing media.
- Germinate seeds directly in the planting cups; discard other seedlings from cups leaving only 2 to 3 seedlings.
- Start planting the prepared seedlings planted on cups at the pipe holes.
- Water the vegetables as necessary.
- Carefully apply or spray organic or inorganic fertilizer in the plants when the system is newly operated.
- Harvest vegetables after 30 to 40 days.

Note: Never apply insecticide to the system.



Funding Agency:



Philippine Council for Agriculture,
Aquatic and Natural Resources
Research and Development (PCAARRD)

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Packaged by:



CLSU Science and Technology Centrum

March 2016

**Smart Farming Systems to Conserve
Water, Food and Energy**

AQUAPONICS

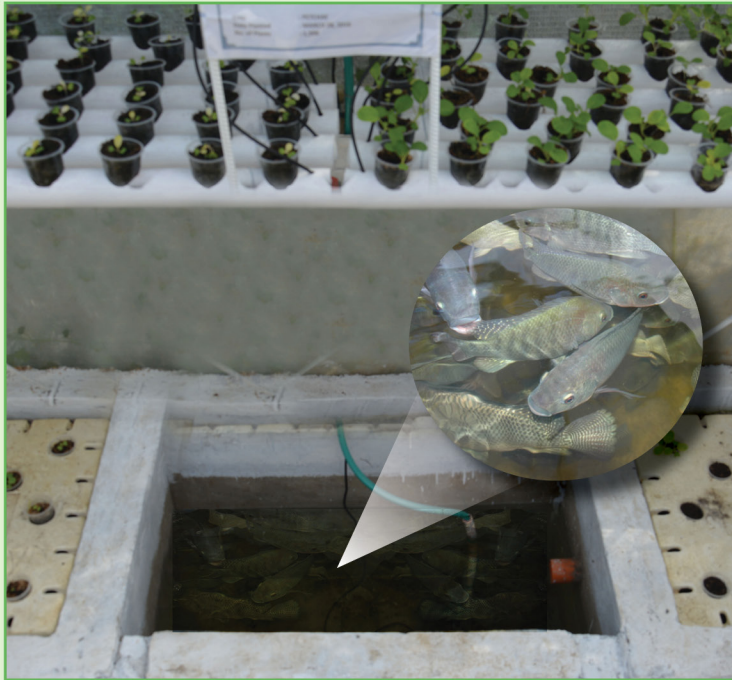
*Pinoy Aquaponic System for Fish
and Vegetable Production*



CENTRAL LUZON STATE UNIVERSITY
Science City of Muñoz 3120
Nueva Ecija, Philippines

What is Aquaponics?

Aquaponics is an integration of two cultures; aquaculture (raising fish) and hydroponics (vegetable growing). The presence of bacteria (*Nitrosomonas* and *Nitrobacter sp*) converts ammonia (NH_3) into free nitrogen for the plants. The plants filter the water back to the fish tank. Moreover, it is a technique that helps in adapting to and mitigating the impacts of climate change. It is also a form of urban agriculture.



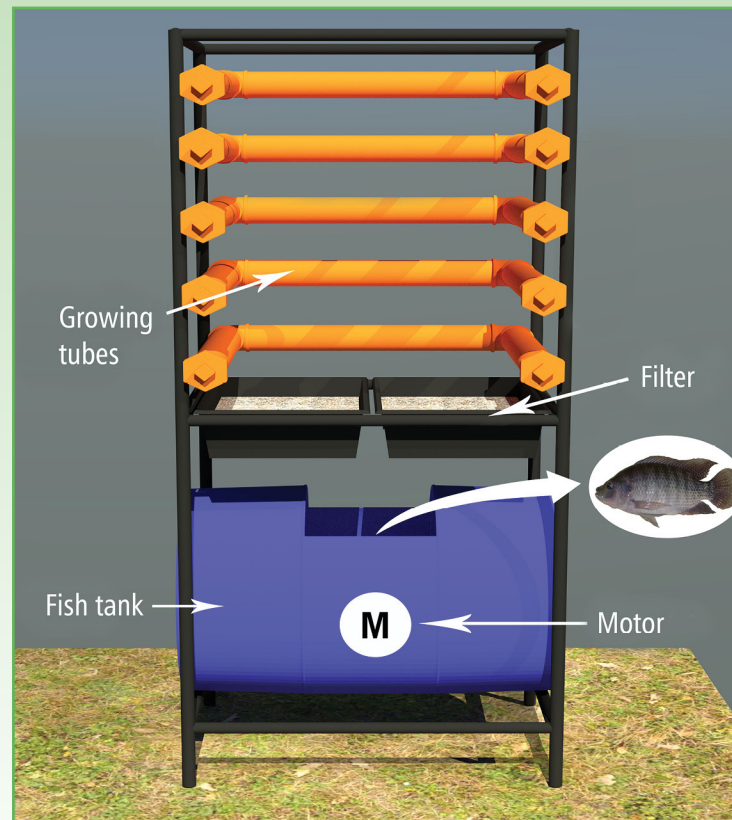
Constructing the System

- Fill the system with water.
- Run the system for at least 3 days to test for leaks and to volatilize chlorine in case tap water is used.
- A system that has developed moss is better for an aquaponic system.
- Stock Nile tilapia in the fish tank; feed them as desired.
- Add water as necessary.
- Check pumps regularly.
- Harvest fish after 4 to 5 months.

System Components

There are three basic components: fish tank, filter and hydroponic (raceway). These components are interconnected with pipes to become a production system for fish and vegetables in one infrastructure and one body of water

- Applies “one-pump rule” to lift culture water using a low-head submersible pump from the fish tank to the bio-filtration tank and allows water to flow or cascade by gravity in planting beds back to the fish tank
- Grows more than 100 hills of leafy vegetables (lettuce, pechay, mustard, water spinach, sweet potato, etc., and about 50 to 65 tilapia in 1 square meter area
- Uses minimal water and electricity
- A viable way of producing your own food



Advantages

- Households have direct access to clean, safe foods
- Can be a source of family income
- Encourages recycling
- Supports government's efforts to implement smart farming agriculture
- Conserves limited resources such as water, electricity, space, and time

History

- Aztecs, an American nomadic tribe which was once treated roughly by their neighboring tribe, developed hydroponics.
- In search for peace, the Aztecs left their homes, travelled south and settled in Lake Tenochtitlan of the central valley of Mexico.
- There, they built *chinampas* or the “floating garden” which is made of rafts of branches and stems and piling soil scoured from the bottom of the lake.
- As time passed by, vegetables, flowers and even trees grew on the *chinampas*. From this arose the concept of hydroponics, considered the first form of sustainable agriculture.
- Later, they defeated the people who once oppressed them but they never abandoned the lake, making it a huge and magnificent city, instead.