

INFORMATION ON RESEARCH RESULTS

1. General information:

Project title: **STUDY ON SEDIMENTATION OF STRIPED CATFISH PONDS TREATMENT TO PRODUCE MICROBIAL-COMPOST FERTILIZER FOR CROP CULTIVATION IN THE MEKONG DELTA, VIETNAM**

Code number: **B2011-16-02**

Coordinator: CAO NGOC DIEP, PhD

Implementing institution: Ministry of Education and Training

Duration: from Jan, 2011 to Dec, 2012

2. Objective(s):

2.1. Treating environmental pollution of surface water resource.

2.2. Using bio-product and aquatic plants to treat sedimentation of striped catfish ponds and exploiting sedimentation (and plant residue) for microbial-compost fertilizer production reached to TCVN 6169:1996 standard of Ministry of Agriculture and Rural Development.

2.3. Application of microbial-compost fertilizer for crop cultivation as follows: leaf-eating vegetable, hybrid corn, high-yielding rice and fruit plant (as TAC plant) saved 50% of chemical fertilizer.

3. Creativeness and innovativeness:

3.1. Innovativeness:

- Application of micro-organisms to treat and collect sedimentation of striped catfish ponds not only reached to B standard (TCVN 5945:2005) but also produce compost.

3.2. Creativeness:

- Exploiting of sedimentation and plant residue as rice straw, hyacinth...to produce compost and supplementing beneficial microbes (nitrogen-fixing bacteria, phosphate-solubilizing bacteria...) into compost for microbial-compost fertilizer production with high quality (reach to TCVN 6169:1996 of Ministry of Agriculture and Rural Development).

- Using of microbial-compost for crop cultivation (leaf-eating vegetable, hybrid corn, high-yielding rice, fruit plant) saved 50% quantity of chemical fertilizer but biomass, quality and soil fertility did not reduce (sustainable production).

4. Research results:

4.1. Application of bio-product composing of flocculant-producing bacteria and nitrogen removal bacteria & poly-P bacteria for sedimentation and water from striped catfish ponds treatment with the best sedimentation flocculation and the lowest total of suspended solid, chemical oxygen demand, N-NH_4^+ and PO_4^- concentration in 10-L bioreactor and pond experiments; supernatant (water after bio-product treatment) reached to B standard, TCVN 5945:2005 after 48 hours. Combination with aquatic plants as duckweed (*Woffia arrhiga*) and *Cyperus* sp. declined ammonia and phosphate concentration lower than standard concentration; Sedimentation and water

from striped catfish ponds treatment process by biological method with flocculant-producing bacteria, nitrogen removal bacteria, poly-P bacteria together with aquatic plants is appropriate and cheap method.

4.2. Application of sedimentation from striped catfish ponds (from above experiment) together with plant residue as rice straw, hyacinth supplemented with *Trichoderma* sp., rock phosphate and beneficial microbes (N_2 -fixing bacteria, phosphate-solubilizing bacteria) for microbial-compost fertilizer production reached to standard of Ministry of Agriculture and Rural Development (TCVN 6169:1996) such as pH, moisture, C/N ratio, available P concentration and beneficial bacterial population ($>10^6$ cell/g fertilizer). Optimal mixture composed of 0.2 m^3 sedimentation + 0.4 m^3 plant residue (rice straw, hyacinth) supplemented with *Trichoderma*, rock phosphate incubated aerobic condition partly in 50-56 days and application of beneficial bacteria into this mixture at day 42th and incubation in 7-10 days.

4.3. Application of microbial compost fertilizer (MC) saved 50% chemical fertilizer for vegetable cultivation as leaf-eating vegetable (spinach, basella-alba, lettuce) which biomass yield did not differ with biomass of vegetable only applying of 100% chemical fertilizer but nitrate concentration in vegetable were lower, recommended formula as follows:

- * with leaf-eating vegetable: 1000 kg MC fertilizer + 50 N - 40 P_2O_5 - 20 K_2O kg/ha.
- * with hybrid-corn: 1000 kg MC fertilizer + 90 N - 50 P_2O_5 - 30 K_2O kg/ha
- * with high-yielding rice: 1000 kg MC fertilizer + 50 N - 30 P_2O_5 - 15 K_2O kg/ha.
- * with fruit -tree: 1000 kg MC fertilizer + 80 N - 80 P_2O_5 - 60 K_2O kg/ha.

5. Products:

- **Bio-product** including strains of bioflocculant-producing bacteria, nitrogen removal bacteria and poly-P bacteria
- **Isolation sedimentation and water of striped catfish ponds by biological process**
- **Process of microbial-compost fertilizer production** from sedimentation of striped catfish ponds and plant residues
- **Process of combination of microbial-compost fertilizer** and chemical fertilizer for crop cultivation have high yield, good quality and soil fertility (sustainable cultivation).
- **04 MSc. students of Biology & Environment** defended their theses successfully
- **03 papers in Agriculture and Rural Development Journal** and **02 papers in Can Tho University Journal of Science**

6. Effects, transfer alternatives of research results and applicability:

- Exploiting sedimentation, environment protection, compost production for crop cultivation
- These process will be done easily by farmers and they can apply these practices in their farm-houses

CANTHO UNIVERSITY

Can Tho, 25th October, 2012
Coordinator



Cao Hoa Bui