BioClean and Liquid Biofertilizers a New Way to the Green Area

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ABSTRACT: The one selection to solve the problems of severely damaged by the tragic earthquake and tsunami is presenting a new way to green area planet. The aim is to be creating a pilot project to support green area for environmental places living. BioClean and liquid biofertilizer projects are attempting to be a new way for the natural balance of combined green area. This generation of bioclean had produced by the donation of various flowers during the graduated ceremony of khon kaen university since 2010, and adding the 18 zymogenic synthetic microorganisms (18 ZSMs) with molasses as substrate. Furthermore, the liquid biofertilizers had produced as similar processes as bioclean excepting differential raw materials by using the previous research product of liquid biofertilizers, which were produced by using vegetables, fruits, herbal crops, etc. Results of microorganism population of bioclean and liquid biofertilizer products were 1.0 x 10^8 to 8.0 x 10^12 cfu/ml, which mainly serviced for environmental and agricultural sections, respectively. Including, the both products were presented focus on supporting to the green area for living places and related to climate change. The service result of project products was activated on the event of “Temples Big Cleaning Day 2011” by servicing for cleaning and the green area at the two temples near khon kaen university, which satisfactory result obtained 4.26 average score value or 85.3%, evaluated by the expert board of ten committees’s considerations.

Keywords: BioClean, Liquid biofertilizer, 18 Zymogenic synthetic microorganism (18 ZSMs), Temples, Green area

1. INTRODUCTION

BioClean is an original brand name of liquid bioextracted flowers since 2002 [2]. BioClean was produced as the similar processes as the production of liquid biofertilizers by fermenting various biomaterials. The difference between bioclean and liquid biofertilizers was the differential raw materials, which liquid biofertilizers were produced by using various combined biomaterials such as; vegetables, fruits, some herbaceous crops, etc., while bioclean was produced by using the diversities of odoriferous flowers (donated various flowers from a sugar cane factory at the local area of udon thani province). Molasses was supplied from the local sugar cane factory at the province of udon thani to produce this generation of bioclean product as 1). To produce biofertilizer KKU-1 [2].

2. MATERIALS AND METHODS

2.1 Materials

The raw materials were used to produce this generation products as 1). To produce biofertilizer KKU-1 was utilized the donated various flowers during the graduated ceremony of khon kaen university in 2010. 2). To produce liquid biofertilizers (version 2011) were utilized the previous research stocks of original microorganism seeding of liquid biofertilizer biotech-1 and liquid biofertilizer biotech-2 which had been produced by using organic biomaterials such as; vegetables, fruits, herbaceous crops, etc. since 2004 - 2005 [3]-[5]. 3). The original microorganism seeding of liquid biofertilizer biotech-1 or liquid biofertilizer biotech-2 were produced by the group of 18 zymogenic synthetic microorganisms (18 ZSMs) that was transferred from the microorganism seeding product of a liquid biofertilizer KKU-1 [2]. 4). Molasses was supplied from a sugar cane factory at the local area of udon thani near khon kaen provinces.

2.2 Equipments

The biofermentor equipments utilized to produce this generated products of biofertilizer and liquid biofertilizers were supported by the previous research equipments such as; a 300-L biofermentor model BT-1 equipped with a stirrer motor ½ hp [2], a 500-L liquid biofermentor model BT-1 equipped with a motor 1 hp and/or without a compressor air supply [3], a 500-L liquid biofermentor model.
model BT-2 equipped with a stirrer motor 1 hp and/or/without an air pump supply [5], and a 500-L liquid biofermentor model BT-3 equipped with a stirrer motor 1 hp and/or/without an air pump supply [7], as shown in Fig.1.

Fig.1 Liquid biofermentors.

2.3 Methods
The method to produce bioclean was produced as the same processes method as the production of liquid biofertilizers but excepting only the differential raw materials [8]-[11]. This generation of bioclean (2011) was used variously donated flowers as mention above while liquid biofertilizers were utilized the previous research stocks of original liquid bio-extract of vegetables, fruits, some herbaceous crops, etc., the 3 step processes methods as:

The first step of preparation of original liquid bio-extract product (OLBP), the all raw materials of variously donated flowers were cleaned and cut into small pieces for fermenting as the ratio as “small pieced flowers : molasses : liquid biofertilizer microorganism seeding (LBMS) of liquid biofertilizer biotech-1 or biotech-2” = 3 : 1 : 1 or 3 : 1 : 2 (w/v), and clean water within biofermentors such as; 75.7, 113.55, 151.4 liters (20, 30, 40 gallons) or more etc., during the retention time of 2-3 week (14-21 days).

The second step of fermentation, the LBMS product from the first step process was fermented with molasses and clean water as the ratio as “LBMS : molasses : clean water” = 1 : 1 : 40 or 2 : 1 : 40 (v/v) within liquid biofermentors such as; 500, 1000, 1500 liters equipped with/or without a stirrer motor to produce the liquid fermented bioproduct during the retention time of 1-2 weeks (7-14 days).

The third step of filtration, the liquid fermented bioproduct (LFBP) from the second step process was filtered to obtain the final products as so called “BioClean” or “Liquid Biofertilizers” depending on the differential types of raw materials.

The methods to utilization of bioclean and liquid biofertilizers (including 18 ZSMs) are aimed to the two way for environmental and agricultural sections as; 1). For agriculture, using the dilution ratio of liquid biofertilizer product at 1:2000 by spraying or pouring to the growth crops every 5-7 days, and the dilution ratio of 1:500 to the plant trees and green area for lively places.

2.4 Analysis Methods
The analysis composition of bioclean and liquid biofertilizer products were supported investigation by a laboratory of faculty of agriculture of khon kaen university, and referred to the previous analysis methods of the composition of liquid biofertilizers such as; pH, EC, %OM, N, P, K, Na, Ca, Mg, etc., as in [2]-[7]. Microorganism biomass populations were determined by the method of standard plate count (agar powder, peptone, bacteriological HIMEDIA RM001). The quality standard of both products were determined by impact testing for agricultural, environmental and healthy impact assessments. For agricultural testing, the quality of both products were evaluated the growth rate of crops by pots/fields testing such as; water convolvulus, some flower, etc. For environmental and healthy impact assessments, the quality of both products were evaluated by field testing at sanitary systems such as; reducing odour treatment for bathroom/ lavatory/ toilet/ wc./ sewerage, wastewater treatment and water treatment, including water quality treatment for goldfish and nile tilapiafish living, etc.
general persons/ home/ shop owner or members were evaluated by surveying at around the regions of the both temples. 2). Evaluation of satisfactory services rating by persons and monks were evaluated by surveying at the both temples. 3). Evaluation of satisfactory services rating by the board of expert committees were evaluated by inviting the expert board of ten committee’s considerations.

3 RESULTS AND DISCUSSION

3.1 Properties products of BioClean and Liquid Biofertilizers

The products of bioclean and liquid biofertilizers of biotech-1 and biotech-2 (2011) were contained into bottom and tank containers such as; 1-L, 10-L, 20-L, etc., as shown in Fig. 2. The results of effective microorganism populations of bioclean and liquid biofertilizers biotech-1, 2 obtained $1.0 \times 10^8$ to $4.0 \times 10^{12}$ cfu/ml and $1.0 \times 10^8$ to $8.0 \times 10^{12}$ cfu/ml after the retention time more than 7-8 day respectively, which be more than the standard products ($10^7-10^8$ cfu/ml), the properties of both products obtained such as; $pH = 3.76$, $EC = 4.31$ ds/m, $N = 0.018$ ppm, $P = 25$ ppm, $K = 561$ ppm, $Na = 73$ ppm, $Ca = 254$ ppm and $Mg = 200$ ppm for bioclean, and $pH = 3.45-4.19$, $EC = 3.00-5.43$ ds/m, $N = 0.025-14$ ppm, $P = 28-38$ ppm, $K = 881-1023$ ppm, $Na = 108-225$ ppm, $Ca = 175-271$ ppm and $Mg = 0.50-142$ ppm for liquid biofertilizers biotech-1, 2, as shown in Table 1, and as similar results as the previous research products of bioclean and liquid biofertilizers, as in [2]-[11].

![Fig. 2 BioClean and Liquid biofertilizer biotech-2 (2011).](image)

Table 1 Properties products of bioclean and liquid biofertilizers biotech-1, 2.

<table>
<thead>
<tr>
<th>Product Sample</th>
<th>$pH_{w}$</th>
<th>$EC$</th>
<th>OM (%)</th>
<th>Total N (ppm)</th>
<th>Total P (ppm)</th>
<th>Total K (ppm)</th>
<th>Total Na (ppm)</th>
<th>Total Ca (ppm)</th>
<th>Total Mg (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BioClean (donated flowers)</td>
<td>4.32 (1:5)</td>
<td>2.50</td>
<td>10</td>
<td>26</td>
<td>598</td>
<td>82</td>
<td>205</td>
<td>131</td>
<td></td>
</tr>
<tr>
<td>BioClean</td>
<td>3.76</td>
<td>4.31</td>
<td>0.018</td>
<td>25</td>
<td>561</td>
<td>73</td>
<td>254</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Liquid biofertilizer Biotech-1</td>
<td>4.19 (1:5)</td>
<td>3.00</td>
<td>14</td>
<td>28</td>
<td>811</td>
<td>108</td>
<td>271</td>
<td>142</td>
<td></td>
</tr>
<tr>
<td>Liquid biofertilizer Biotech-2</td>
<td>3.45</td>
<td>5.43</td>
<td>1.43</td>
<td>0.025</td>
<td>1023</td>
<td>225</td>
<td>175</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

*The generational products were produced since 2011.
*The $pH_{w}$ (1:5).

3.2 Quality Testings of Products

The quality products of bioclean and liquid biofertilizers biotech-1, 2 were satisfyingly evaluated by quality testing before distributing to general users at the pots/fields tests. For agricultural testing, the both products of bioclean and liquid biofertilizers were satisfactory the growth rate of various crops such as; water convolvulus, flower, etc. during 45 days [2]-[11]. For environmental and healthy testing, the both products were satisfactorily evaluated by testing for sanitary systems such as; reducing odour treatment for the bathroom/ lavatory/ toilet/ wc./ sewerage of distributed general households by responding feedback users, and the efficiency bioclean of pond treatment for chemical oxygen demand (COD) was 61.90% and 89.80% during the retention time of 7 day and 14 day, respectively at a pond treatment of wat non muang near khon kaen university, including water quality treatment by using the dilution ratio of 0.05% bioclean for goldfish and nilefish healthy living.

3.3 Services Rating of Temples Big Cleaning Day

The both products of bioclean and liquid biofertilizers were serviced to the two temples of wat adul kaew mordee and wat non muang near the regions of khon kaen university, as
shown in Fig. 3, on the event of “Temples big cleaning day” by using the dilution ratio of bioclean at 1:2000 for floor cleaning, 70-80% for thin coating sewerage/toilet/wc., 0.05% for wastewater treatment or water quality treatment, and using the dilution ratio of liquid biofertilizer biotech-1, 2 at 1:500 for the temples plant trees and green area. The overview services to the both temples were satisfactory results which obtained 44.4% excellence, 33.3% good, 22.2% fair for wat adulkaewmordee, and 50% excellence, 20% fair for wat nonmuang after services respectively, which overview obtained good satisfactory result as 4.26 average score value or 85.3%, evaluated by the expert board of ten committees’ considerations.

3.4 Services Products to Green Area
The utilization of liquid biofertilizers biotech-1, 2 was serviced in order to being liquid biofertilizers for the green area living and the plant trees along the main road at the regions of khon kaen university by using at the dilution ratio of 1:500, as shown in Fig. 4. The overview services of liquid biofertilizer products were satisfactory for green area living place during May-August, 2011.

Fig. 4 Service of liquid biofertilizer biotech -1 (v.2011) at along the main kku road to the green area living.

4 CONCLUSION
1). BioClean services to the temples
BioClean (v.2011) services from the board of 18 zymogenic synthetic microorganisms (18 ZSMs) could be reduced odour treatment for sanitary systems and communities healthy living places to the pilot temples with satisfactory services.

2). Liquid biofertilizers services to the along main road and the green area
Liquid biofertilizers biotech-1, 2 (v.2011) services from the board of 18 zymogenic synthetic microorganisms (18 ZSMs) could be much more enriched to the plentiful trees of along main road and green area for environmental places living and related to climate change with satisfactory services.

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6 REFERENCES

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