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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 1.0×10^8 to 8.0×10^{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 2003 [10]. 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 graduated ceremony of khon kaen university since 2010) in order to solving the odour problem of liquid biofertilizers that responded by users. The target project of this generation of bioclean was mainly used to service for the example communities of environmental and healthy living tothe two temples of adulkaewmordee temple and nonmuang temple at nearly to the regions of khon kaen university in order to servicing for reducing odour treatment such as; on floor temples, sewerage, bathroom/lavatory, wastewater treatment, water quality treatment etc., and liquid biofertilizer services were mainly used to encourage for green area and along the main road of khon kaen university. Furthermore, bioclean could be applied for agricultural sectors as the similar as liquid biofertilizers. Thus, the utilization of liquid biofertilizers were to solve the problem of decay soil by increasing organic biofertilizers into soil land, and to increase quality organic agricultural productions [1], and to quality better life and health safety, and to respond the policy for agricultural products safety to kitchen of the world [3]. The board of 18 zymogenic synthetic microorganisms (18 ZSMs) were consisted of 9 bacteria, 6 fungi and 3 yeast species. The 18 ZSMs was originally selected by Prof.Dr.Chaitat Pairintra at khon kaen university to our research project of "Improvement of the Theparuge's Liquid Biofertilizer Product" since 2002 [2].

2. MATERIALS AND METHODS

2.1 Materials

The raw materials were used to produce this generation products as 1).To produce bioclean (version 2011)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 bioclean 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/with/or/without a compressor air supply [3],a 500-L liquid biofermentor

model BT-2 equipped with a stirrer motor 1 hp and/with/or/without an air pump supply [5], and a 500-L liquid biofermentor model BT-3 equipped with a stirrer motor 1 hp and/with/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 motorto 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 of utilization 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 areafor lively places.

2). For environment, using the dilution ratio of bioclean product at 0.05% (1:2000) for floor cleaning, and the concentration ratio of 70-80% for reducing odour treatment of bathroom/ lavatory/ toilet/ wc./ sewerage etc., and the concentration ratio of 0.05% for wastewater treatment and water quality treatment or flood treatment.

The methods to quality testing of bioclean and liquid biofertilizers were investigated before servicing to the temples and the green area at the regions of khon kaen university as; 1). For agricultural testing, the both products were tested by cultivating for various crops such as; water convolvulus, flowers, etc., 2). For environmental and healthy testing, the both products were tested by treating for 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.

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 at general households etc., and quality testing for the efficiency of water treatment such as; DO, BOD, COD, TKN, etc., at a pond treatment of nonmuang temple near khon kean university.

The analysis methods to evaluate the satisfactory services rating of both products of bioclean and liquid biofertilizers during temples big cleaning day at watadulkaewmordee and wat nonmuang, and green areas and along main road at the region of khon kaen university, were evaluated by surveying the applied checklist forms of academic service center of khon kaen university, the evaluated methods as following; 1). Evaluation of satisfactory services rating by

general persons/ home/shop ownerormembers were evaluated by surveying at around the regions of the both temples. 2). Evaluation of satisfactory services rating by persons and monkswere 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 x $10^8$to 4.0 x 10^{12} cfu/ml and 1.0 x $10^8$to 8.0 x 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).

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

Product Sample (2011)[a]	pH_w	EC (ds/m)	OM (%)	Total N (ppm)	Total P (ppm)	Total K (ppm)	Total Na (ppm)	Total Ca (ppm)	Total Mg (ppm)
BioClean (donated flowers)	4.32 (1:5)[b]	2.50		10	26	598	82	205	131
BioClean	3.76	4.31		0.018	25	561	73	254	200
Liquid biofertilizer Biotech-1	4.19 (1:5)[b]	3.00		14	28	811	108	271	142
Liquid biofertilizer Biotech-2	3.45	5.43	1.43	0.025	38	1023	225	175	0.50

[a]The generational products were produced since 2011.
[b]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 rateof 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 distributedgeneral 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, includingwater 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

Fig. 3 The Two Temples Big Cleaning Services.

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 usingthe 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, 30% good, 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's 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 universityby 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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