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(54) Title: MOISTURE RESISTANT BIODEGRADABLE COMPOSITION

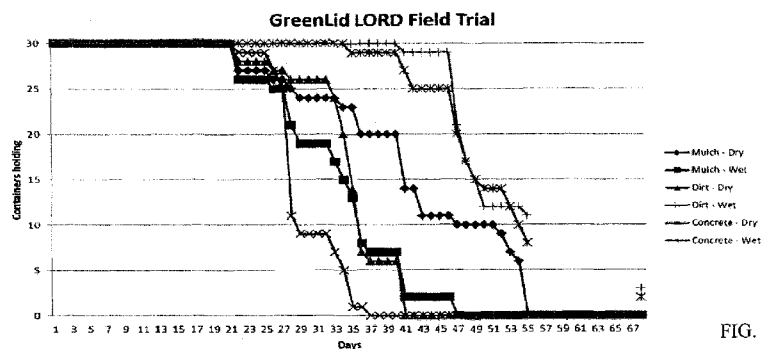


FIG. 1

(57) Abstract: A biodegradable composition having resistance to moisture and organic waste is provided.

MOISTURE RESISTANT BIODEGRADABLE COMPOSITION

FIELD

[0001] The present description relates to a moisture resistant biodegradable composition.

BACKGROUND

[0002] Temporary environmentally friendly storage of certain materials such as wet organic waste or water has associated with it a range of problems. Containers made of biodegradable materials may not sufficiently store the waste in that the organic waste may too quickly break down the container in which the waste is stored. Containers made of other materials may sufficiently store organic waste but may not adequately degrade themselves or may present with additional problems.

[0003] For example, compost containers are typically made of plastic or other water-resistant material. These compost containers must be able to effectively store organic waste while avoiding leakage. To facilitate transport of the compost from, for example, a kitchen compost bin to a larger organic waste collection, biodegradable liners such as bags are often used with compost containers. These bags or liners, however, are not immune to leakage from the liquid naturally resulting from the organic waste. Further, the bags do not always line the plastic compost bin properly, resulting in compost that is not always contained within the liner but spills onto the container walls which must be cleaned to avoid offensive odors and to maintain cleanliness.

[0004] Similarly, temporary environmentally friendly storage of water or other liquids has its own problems. Currently, plastic containers filled with water are used to control water-breeding insect populations such as mosquitoes. Certain insect populations are responsible for the spread of diseases, such as mosquito borne diseases, affecting humans across the world in tropical climates. Approximately 3.4 billion people are at risk of being infected by Malaria or Dengue with over 500,000 and 25,000 deaths attributed to these diseases, respectively, each year. Additionally, the recent Zika outbreak in Brazil associated with mosquito has prompted further investigation into vector control (i.e., killing mosquitoes).

[0005] Presently, plastic containers filled with water are used as mosquito traps in areas such as Australia to combat Dengue or Malaria. One hundred plastic traps may be used in response to a single infection. However, once the insecticide in the water-filled traps wears off, the plastic traps must be collected to avoid having the traps become a breeding pool for new mosquitoes. This collection process requires the use of resources to track the locations of the plastic bins and to subsequently collect these bins.

[0006] Given the foregoing, it would be desirable to develop a biodegradable moisture resistant composition for use in a variety of applications including as a disposable container suitable for use as a compost container.

SUMMARY

[0007] A moisture resistant biodegradable composition is described herein.

[0008] According to an aspect of the present disclosure, a moisture resistant biodegradable composition is provided comprising a pulp component comprising between about 75% to about 100% wood-based fiber and optionally up to about 25% non-wood-based fiber, and a sizing agent in an amount of about 2% to 10% for every about 100 kg of the pulp component.

[0009] According to another aspect of the present disclosure, a moisture and waste resistant biodegradable composition is provided comprising a pulp component comprising about 90% double lined kraft corrugated scrap (DLK), about 10% newsprint, and alkyl ketone dimer (AKD) in an amount of about 6% for every 100 kg of the pulp component.

[0010] According to another aspect of the present disclosure, a container made of the above composition is provided.

[0011] According to another aspect of the present disclosure, a moisture resistant biodegradable insect trap is provided comprising a container as defined above which incorporates an insecticide.

[0012] In still another aspect of the present disclosure, a method of making the above container is provided comprising the steps of preparing the pulp component by blending about 75% to about 100% of wood-based fiber and optionally up to about 25% non-wood-based fiber; mixing a sizing agent into the pulp component in an amount of about 2% to about 10% for every about 100 kg of said pulp component to form the composition; and forming the composition into the shape of a container and allowing the composition to dry.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the disclosure will become more apparent from the following description in which reference is made to the appended drawings wherein:

FIGURE 1 is a chart showing the water holding capability of an exemplary biodegradable container over an approximately nine-week period;

FIGURE 2 is a chart showing the temperature evolution in test and control bins during a composting test;

FIGURE 3 is a chart showing CO₂ production rate during the composting test referenced in Figure 2;

FIGURE 4 is a chart showing O₂ concentration in exhaust air during the composting test referenced in Figure 2;

FIGURE 5 is a chart showing the pH evolution in test and control bins during the composting test referenced in Figure 2;

FIGURE 6 is a chart showing the trend in NH₄⁺-N in test and control bins during the composting test referenced in Figure 2;

FIGURE 7 is a chart showing the trend in NO_x⁻-N in test and control bins during the composting test referenced in Figure 2; and

FIGURE 8 is a top perspective view of an exemplary container having a frusto-conical shape.

DETAILED DESCRIPTION

[0013] According to an aspect of the present invention, a moisture resistant biodegradable composition is provided comprising between about 75% to about 100% wood-based fiber and optionally up to about 25% non-wood-based fiber to form a pulp component, and comprising a sizing agent in an amount of between about 2% to about 10% for every about 100 kg of the pulp component.

[0014] The wood-based fiber component of the composition may be obtained from any biodegradable wood-based fiber product. For example, the wood-based fiber component may be obtained, using procedures well-established in the art (e.g. macerating and blending) from various types of board prepared from wood pulp having a thickness of at least about 0.010 inches (or 10 points). Examples of suitable wood pulp-based boards for use include, but are not limited to, paperboard or cardboard, such as chipboard, kraft board, containerboard, bleached or unbleached paperboard, corrugated or uncorrugated. For example, the wood-based board component may be double lined kraft corrugated scrap (DLK). This wood-based fiber component can be obtained from waste paper. The wood-based fiber is present in the composition in an amount between about 75% to about 100% of the composition. In one embodiment, it is about 90% of the composition, for example, 90% DLK. In another embodiment, it is about 100% of the composition, for example, 100% DLK.

[0015] The non-wood-based fiber component of the composition may be obtained from waste paper. This non-wood-based fiber may be any biodegradable non-wood based fiber. For example, it may be based on agricultural residue such as straw. It may also be based on annual plants and grasses such as miscanthus, jute, bamboo, sorghum, switchgrass, kenaf, and hemp among others as will be known to one skilled in the art. This non-wood-based fiber may be obtained from any recycled paper that is not cardboard. For example, it may be newsprint as identified by particular recycling facilities. The non-wood-based fiber component may be used as is to make the present composition, without processing to provide it in fibrous form. The non-wood-based fiber component is present in the composition in an

amount between about 0% to about 25% of the composition. In one embodiment, it is about 10% of the composition, for example, 10% newsprint.

[0016] The composition also includes a sizing agent in an amount between about 2% to about 10% for every about 100 kg of the pulp component. Preferably, an amount of about 4% to 8% of sizing agent is incorporated within the composition. The sizing agent may be any suitable sizing agent such as a basic or neutral sizing agent, e.g. alkyl succinic anhydride (ASA), alkene ketone dimer (AKD) or other wax-like chemicals known to one skilled in the art, or an acidic sizing agent, e.g. rosin and derivatives thereof. The sizing agent may also be a modified starch or hydrocolloid such as gelatin, or an acrylic co-polymer such as styrene acrylate or other polyacrylamides. In one embodiment, the composition comprises a sizing agent such as AKD in the amount of 6% for every about 100 kg of the pulp component formed by the wood-based fiber and non-wood-based fiber. In another embodiment, the composition comprises about 8% sizing agent (e.g. AKD) for every 100 kg of pulp component.

[0017] The composition may be made by combining the wood-based fiber and non-wood-based fiber and macerating the combination. It may also be made by macerating the wood-based fiber alone without the non-wood based fiber. Water may be added to turn the combination into a pulp slurry. For example, an industrial 'blender' may be used to macerate and blend the combination into a pulp slurry. After the slurry is created, a sizing agent is added in an amount of about 2% to about 10% for every about 100 kg of the pulp component to the pulp component and mixed to yield the present composition.

[0018] The composition may be formed into a desired shape for use. Accordingly, to mould the composition into a desired shape, a pulp moulding machine may be used. The composition is then formed into the desired shape by, for example, using appropriate moulds. The moulded composition is then dried, for example, on a conveyor belt that passes through a drying chamber such as an oven.

[0019] More particularly, containers from the present composition may be made on a pulp moulding machine using a two step moulding process. First, a female mould is provided that is perforated and covered in mesh whereby a vacuum can be applied to pull the present pulp composition into the female mould. The female mould is placed into a reservoir containing the composition, a vacuum is applied to pull composition into the mould, and the mould is removed from the slurry containing a coating of pulp composition that will become the final desired shape. A male mould designed to fit into the female mould may also be provided that is used as a wet press to further define the desired shape. Finally, excess moisture is removed from the shaped containers by drying, for example, in an oven.

[0020] As known to one skilled in the art, other moulding methods may also be employed. For example, the composition may also be moulded using thermoformed pulp moulding presses and other similar machinery common in the industry or any other method as known to one skilled in the art.

[0021] The composition may be used in a variety of applications including biodegradable moisture resistant products, such as containers. Products made by this process are biodegradable over time while also providing moisture resistance properties to permit retention of moist or wet matter for limited periods of time without leakage, e.g. for at least about 1 week (7 days), preferably for at least about 2 weeks (14 days), and more preferably for at least 3 weeks (21 days) or longer. For example, a moisture resistant container is useful as a biodegradable container for organic waste, a biodegradable insect trap, a food container, a beverage container, or an indoor plant pot, among other uses. These biodegradable containers may be any suitable shape capable of holding a volume. For example, the container may have a circular cross-section and be of a generally frusto-conical shape, or the container may assume any other suitable shape, such as that of a square, rectangular, hexagonal or other cross-sectional shape.

[0022] Containers made with the present composition may additionally include a cover or lid to limit spills, to limit access to the contents of the container or to contain odours. To achieve these purposes, the lid or cover will advantageously correspond in shape to the open end of

the container and be sized to fit snugly thereon, either within the internal perimeter of the open-end of the container or snugly about the outer perimeter of the open-end of the container. The lid may be made of the same or similar biodegradable composition as the container. Alternatively, the lid may be made of another material such as paper or, for example, a non-biodegradable material for re-use, e.g. such as a plastic material.

[0023] With respect to using the biodegradable container as an insect trap, for example, for water-breeding insects such as mosquitoes, bed bugs, wasps, centipedes, earwigs, and other insect pests, the containers made of the present composition may incorporate an insecticide, a larvicide, or both. The term “incorporate” is used herein with respect to inclusion of the insecticide in the present container, to refer to either a surface coating of the insecticide on the container, or combination of the insecticide directly within the composition prior to making of the container.

[0024] Thus, in one embodiment, the container may be coated on its internal surface, i.e. the surface of the container which comes in contact with the content of the container, with an insecticide, filled with water, and placed in an appropriate area. Any suitable insecticide may be used to target a given insect, such as but not limited to bifenthrin or lambda-cyhalothrin (pyrethroids), organophosphates, such as malathion, Neonicotinoids such as Imidacloprid, Ryanoids, biological control agents such as *Bacillus thuringiensis*, organochlorides, Insect Growth Regulators, Carbamates, and larvicide such as *Bacillus thuringiensis israelensis*, *Bacillus sphaericus*, Methoprene, Temephos, monomolecular films (e.g. Arosurf MSF and Agnique MMF) and oils (e.g. Bonide, BVA2, and Golden Bear-1111 (GB-1111)). The container is coated with an amount of insecticide which wets the container. One or more coats of insecticide may be used. In another embodiment, the container may be pre-treated with insecticide, e.g. soaked in insecticide.

[0025] Alternatively, the insecticide may be included directly in the composition used to make the container in an amount suitable to provide insecticidal/larvicidal activity. Such amounts are known to those of skill in the art. In still other embodiments, a small piece of fabric, a biodegradable composition, or other material soaked, coated, or otherwise treated

with insecticide may be attached to the container to provide a landing or egg-laying zone for mosquitoes or other water-borne insects. Insecticide may be incorporated into the container in other ways known to one with skill in the art.

[0026] Embodiments of the present invention are described by reference to the following specific examples which are not to be construed as limiting.

[0027] **EXAMPLE 1: Method for making a biodegradable container**

[0028] The biodegradable containers referenced in Table 1 were created from a pulp slurry formed by maceration and blending of the wood-based fiber and non-wood-based fiber in water. A sizing agent was then mixed into the slurry to give the final product a moisture-resistance property. The slurry was then formed into a container using a pulp moulding machine in a two step moulding process. A perforated female mould was provided covered in mesh. The female mould was then placed into the slurry, a vacuum applied, and the mould was then removed from the slurry containing a coating of pulp that would become the container. A male mould was also provided and used as a wet-press to further define the container. Finally, the containers were ejected onto a conveyor belt that entered into an oven to remove excess moisture from the container.

[0029] **EXAMPLE 2: Containers with Organic Waste**

[0030] An organic waste resistance test was conducted in which organic ingredients were mixed within pulp containers of varied compositions. The organic ingredients included: 1 cup cooked rice, 1 cup coffee grinds, ½ cup crushed tomatoes, 1 banana and peel, and water for the balance so that it reached the top of each container. About 10 containers of each composition were observed in a home industrial compost tumbler (home compost pile) for a period of about six (6) weeks. Similarly, about 5 containers of each composition were observed in an industrial compost facility (industrial compost pile comprising aerobic tunnels) for a period of about two (2) weeks.

[0031] **First Container Composition:** A pulp container was used with the following composition: approximately 50% DLK and approximately 50% newsprint with approximately 4% AKD added as a sizing agent (Fennosize KD 266MB NA, Kemira®).

[0032] **Second Container Composition:** A pulp container was used with the following composition: approximately 90% DLK and approximately 10% newsprint with approximately 8% AKD.

[0033] **Third Container Composition:** A pulp container was used with the following composition: approximately 100% DLK and approximately 8% AKD.

[0034] **Fourth Container Composition:** A pulp container was used with the following composition: approximately 90% DLK with approximately 10% No 9 Newsprint, pulped to 98% dilution with water, and approximately 6% AKD. The pulping time was 18 minutes and was produced with Type II moulded fibre production line.

[0035] The AKD in all tested compositions was Fennosize KD 266MB NA, Kemira®.

[0036] The results of the organic waste resistance test are shown in Table 1, including an indication of the time within which the container degraded (e.g. to the point of leaking) and other observations.

TABLE 1: Time for Degradation of Container in the Presence of Wet Organic Waste in a Home Compost Pile and an Industrial Compost Pile

Container Composition	Wet Waste Resistance in a Home Compost Pile	Wet Waste Resistance in an Industrial Compost Pile	Other Observations
50% DLK; 50% newsprint; 4% AKD	1-2 days	1-2 days	

Container Composition	Wet Waste Resistance in a Home Compost Pile	Wet Waste Resistance in an Industrial Compost Pile	Other Observations
90% DLK; 10% newsprint; 8% AKD	7 days	7 days	Container degraded in about 10 days
100% DLK; 8% AKD	7 days	7 days	Definition of the container was reduced after 7 days Container degraded in about 12 days
90% DLK; 10% newsprint pulped to 98% dilution with water; 6% AKD	2 weeks	7 days	

[0037] EXAMPLE 3: Biodegradability in Field

[0038] The biodegradability of the containers was tested in the field. The following container composition was used, 100% DLK + 8% AKD. The containers were filled with water to one inch of the top of the container and left in a garden bed in a natural environment.

[0039] Within two weeks of exposure, beads of water were present on the outsides of the biodegradable container. Within three weeks of exposure in the garden bed, the underside of the containers had softened considerably. Within three weeks of exposure in the garden bed, plant roots were evident underneath the container searching for moisture.

[0040] EXAMPLE 4: Disintegration Evaluation in a Pilot-Scale Aerobic Composting Test

[0041] An exemplary water-resistant container as used in Example 3, having a thickness of approximately 2.7 mm and grammage of approximately 819 g/m^2 , was evaluated for disintegration in a pilot-scale aerobic composting test. The exemplary frusto-conical container had an approximate height of 14.6 cm, maximum diameter of approximately 21.7 cm, and minimum diameter of approximately 14.2 cm. The purpose of the test was to simulate as closely as possible a real and complete composting process in pilot-scale composting bins of 200 L. The exemplary container was cut into eight pieces for evaluation of disintegration. A portion of the container along with a paper lid was also milled to form a milled material. The cut pieces formed approximately 1% and the milled material formed approximately 9% of the material to be tested for disintegration. This test material was added to biowaste and introduced into an insulated composting bin after which composting spontaneously begins. The biowaste comprised a Vegetable, Garden, and Fruit (VGF) mixture and structural material. Control and testing bins were filled to the top with the biowaste which had characteristics as shown in Table 3.

TABLE 2: Characteristics of Biowaste in Control and Test Bins

Characteristics	Biowaste in Control Bin	Biowaste and Test Material in Test Bin
Total solids (TS, %)	27.5	33.5
Moisture content (%)	72.5	66.5
Volatile solids (VS, % on TS)	82.0	84.5
Ash content (% on TS)	18.0	15.5
Total N (g/kg TS)	19.5	15.0
C/N	21	28

[0042] As can be seen in Figures 2-4, the temperature evolution, CO_2 production, and O_2 concentration in the exhaust air of the Test Bins (labeled MWY-1/2-03 and MWY-1/2-04)

closely tracked that of the Control Bins (labeled MWY-1/2-01 and MWY-1/2-02). Similarly, as can be seen in Figures 5-7, the pH evolution, Ammonium-Nitrogen ($\text{NH}_4^+\text{-N}$), and Nitrate and nitrite – nitrogen ($\text{NO}_x^-\text{-N}$) trends of the Test Bins generally followed the upward or downward trends of the Control Bins.

[0043] At the end of twelve weeks, the compost in the Control Bins and Test Bins were stable and mature, demonstrated by a Rottegrad of V as measured on the < 10 mm fraction.

Additionally, none of the bins had volatile fatty acids. A normal average pH of 8.4 and 7.8 was measured for the Control Bins and Test Bins, respectively. Lower salt levels were found in the Test Bins (2390 $\mu\text{S/cm}$) when compared to the Control Bins (3000 $\mu\text{S/cm}$) which is beneficial for compost quality. Additionally, low $\text{NH}_4^+\text{-N}$ levels were obtained and an increase in the NO_x^-N content was observed for the Test and Control Bins. The increase in the NO_x^-N content to an average of 65 mg $\text{NO}_x^-\text{N/I}$ for the Control Bins and 495 mg $\text{NO}_x^-\text{N/I}$ for the Test Bins indicates the nitrification process had started and was proceeding well.

[0044] Finally, a rather comparable average N content was found for the Control and Test Bins, while a somewhat higher P, K, and Mg content was observed for the Control Bins.

[0045] **EXAMPLE 5: Biodegradable Mosquito Traps**

[0046] The biodegradable container has also been used in the context of a mosquito trap. For example, containers made with the composition, 100% DLK and 8% AKD, were field tested. One hundred eighty (180) containers having the above composition and of a frusto-conical shape were filled with water to within 1 inch of the top of the container and placed on various substrates. These substrates existed in duplicate in a dry zone which remained protected from water other than what was in the container, and a wet zone where the substrate was watered every few days to simulate rain. Thus, 90 containers were in the dry zone and 90 containers were in the wet zone. Three substrate types were used as follows: mulch, soil/dirt, and concrete. Thus, 30 containers were placed in each substrate in each zone.

[0047] Prior to filling with water, the internal surface of the containers was coated with a pesticide, either 0.1% bifenthrin (a pyrethroid), or Lambda-cyhalothrin to kill mosquitoes. A

non-pesticide control group was also present in each substrate and zone as indicated above. Other pesticide equivalents may also be used. The containers were coated with the insecticide by spraying the internal surface of the containers. Thus, each substrate in each zone had 10 containers coated with 0.1% bifenthrin, 10 containers coated with Lambda-cyhalothrin, and 10 containers that remained uncoated. All containers were then observed over approximately a 9 week period to determine their water holding capability over that period.

[0048] Figure 1 is a chart showing the containers' water holding ability over an approximately 9 week period in the various substrates in both the dry and wet zones. As shown in the chart, all thirty containers in all substrates and in both the dry and wet zone held water for at least approximately 21 days or three weeks. Not surprisingly, the containers on the concrete substrate in the dry zone held water for a longer period. For example, the first container on the concrete substrate in the dry zone held water for about 37 days (a little over 5 weeks), whereas the first container on the concrete substrate in the wet zone held water for about 41 days (almost 6 weeks).

[0049] All containers in the wet soil substrate held water for about 37 days. All containers in the dry soil substrate held water for about 41 days. All containers in the wet mulch substrate held water for about 47 days, whereas all containers in the dry mulch held water for about 55 days. At 9 weeks, two containers remained on the dry concrete and three containers remained on the wet concrete.

[0050] The biodegradable containers also successfully functioned as a mosquito trap. For example, containers were double sprayed with lambda-cyhalothrin filled with water and placed in a closed area with a known number of mosquitoes. After about 4 weeks, mosquito mortality was measured by counting the number of live mosquitoes compared to the dead mosquitoes. 100% mosquito mortality was achieved.

[0051] One or more currently preferred embodiments have been described by way of example. It will be apparent to persons skilled in the art that a number of variations and

modifications can be made without departing from the scope of the invention as defined in the claims.

WHAT IS CLAIMED IS:

1. A moisture and waste resistant biodegradable composition comprising:
 - a pulp component comprising between about 75% to about 100% wood based fiber and optionally up to about 25% non-wood-based fiber; and
 - a sizing agent, wherein said sizing agent is in an amount of about 2% to about 10% for every about 100 kg of said pulp component.
2. The moisture resistant biodegradable composition of claim 1, wherein the wood based fiber is obtained from corrugated or uncorrugated chipboard, kraft board, containerboard or bleached or unbleached paperboard.
3. The moisture resistant biodegradable composition of claim 2, wherein the wood-based fiber is from corrugated kraft board.
4. The moisture resistant biodegradable composition of claim 1, wherein the non-wood-based fiber is obtained from grasses such as miscanthus, jute, bamboo, sorghum, switchgrass, kenaf, and hemp, recycled paper or newsprint.
5. The moisture resistant biodegradable composition of claim 4, wherein the non-wood-based fiber is newsprint.
6. The moisture resistant biodegradable composition of claim 1, wherein the sizing agent is included in an amount of from about 4% to 8%.
7. The moisture resistant biodegradable composition of claim 1, wherein the sizing agent is a basic or neutral sizing agent.
8. The moisture resistant biodegradable composition of claim 7, wherein the sizing agent is selected from the group comprising of: alkene ketone dimer (AKD) and alkyl succinic anhydride (ASA).

9. The moisture resistant biodegradable composition of claim 1, wherein the sizing agent is AKD.
10. A moisture and waste resistant biodegradable composition comprising:
 - a pulp component comprising about 90% double lined kraft corrugated scrap (DLK) and about 10% newsprint; and
 - alkyl ketene dimer (AKD) in an amount of about 6% for every about 100 kg of said pulp component.
11. The moisture and waste resistant biodegradable composition of claim 10, wherein the non-wood-based fiber is number 9 newsprint.
12. A container made of a composition as defined in claim 1.
13. A container made of a composition as defined in claim 10.
14. A moisture resistant biodegradable insect trap comprising a container as defined in claim 12 incorporating an insecticide.
15. The moisture resistant biodegradable insect trap of claim 14, wherein said wood based fiber is double lined kraft corrugated scrap (DLK).
16. The moisture resistant biodegradable insect trap of claim 14, wherein said insecticide is selected from pyrethroids, organophosphates, organochlorides, neonicotinoids, ryanoids, biological control agents, insect growth regulators, carbamates, monomolecular films, and oils.
17. The moisture resistant biodegradable insect trap of claim 14, wherein said insecticide is selected from: bifenthrin, lambda-cyhalothrin, malathion, imidacloprid, bacillus thuringiensis, bacillus thuringiensis israelensis, bacillus sphaericus, methropene, and temephos.

18. The moisture resistant biodegradable insect trap of claim 14, wherein the composition for the container comprises:
- a pulp component comprising about 100% double lined kraft corrugated scrap (DLK); and
 - about 8% AKD for every about 100 kg of said pulp component.
19. A method of making a container as defined in claim 12, comprising the steps of:
- i) preparing the pulp component by blending about 75% to about 100% of wood-based fiber and optionally up to about 25% non-wood-based fiber;
 - ii) mixing a sizing agent into the pulp component in an amount of about 2% to about 10% for every about 100 kg of said pulp component to form the composition; and
 - iii) forming the composition into the shape of a container and allowing the composition to dry.
20. The method of claim 19, including the additional step of incorporating into the container an insecticide.
21. The method of claim 20, wherein incorporating the container with an insecticide includes coating an internal surface of the container with an insecticide.

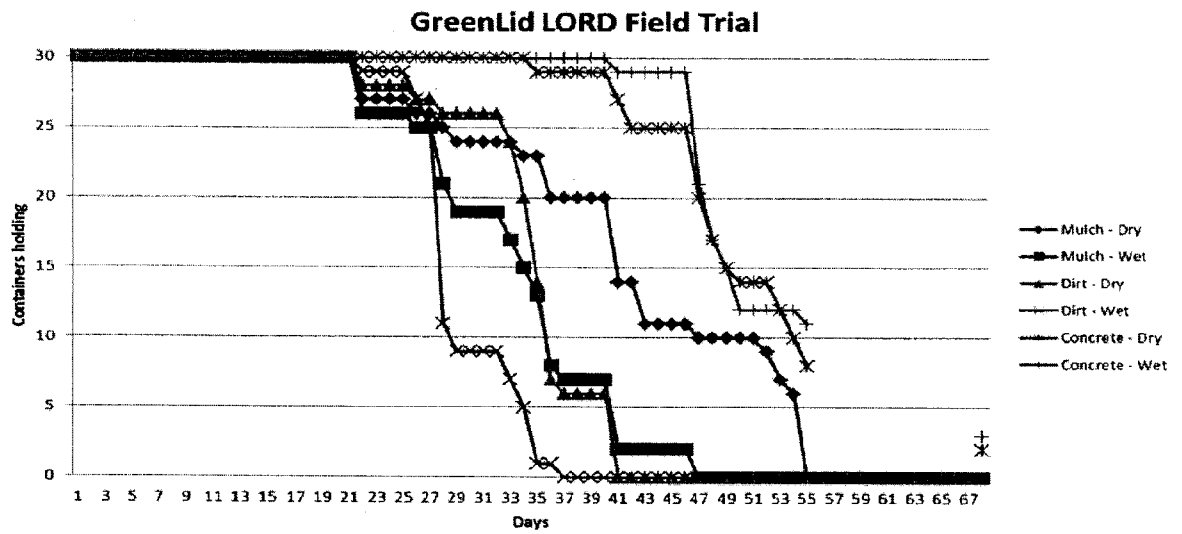


FIG. 1

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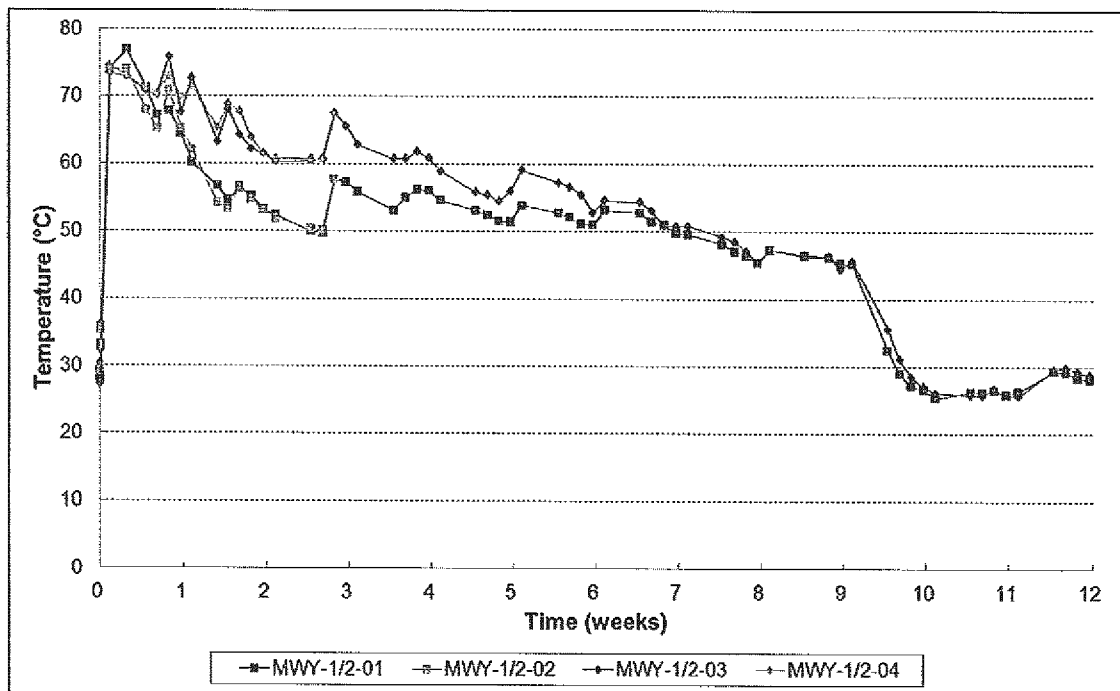


FIG. 2

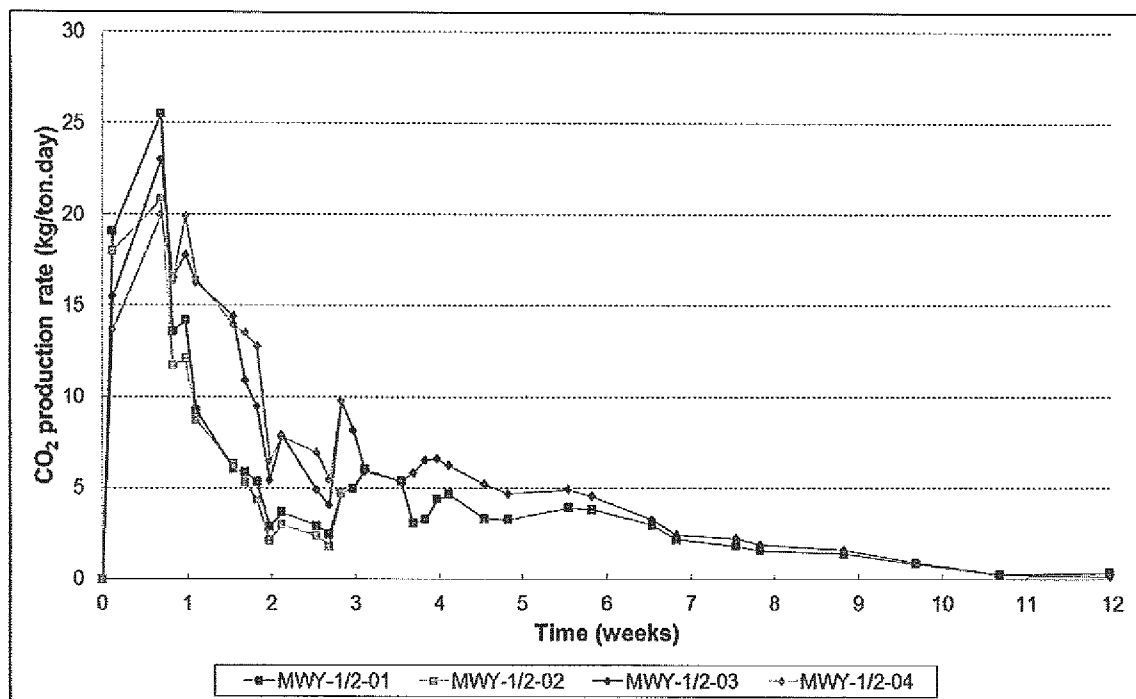


FIG. 3

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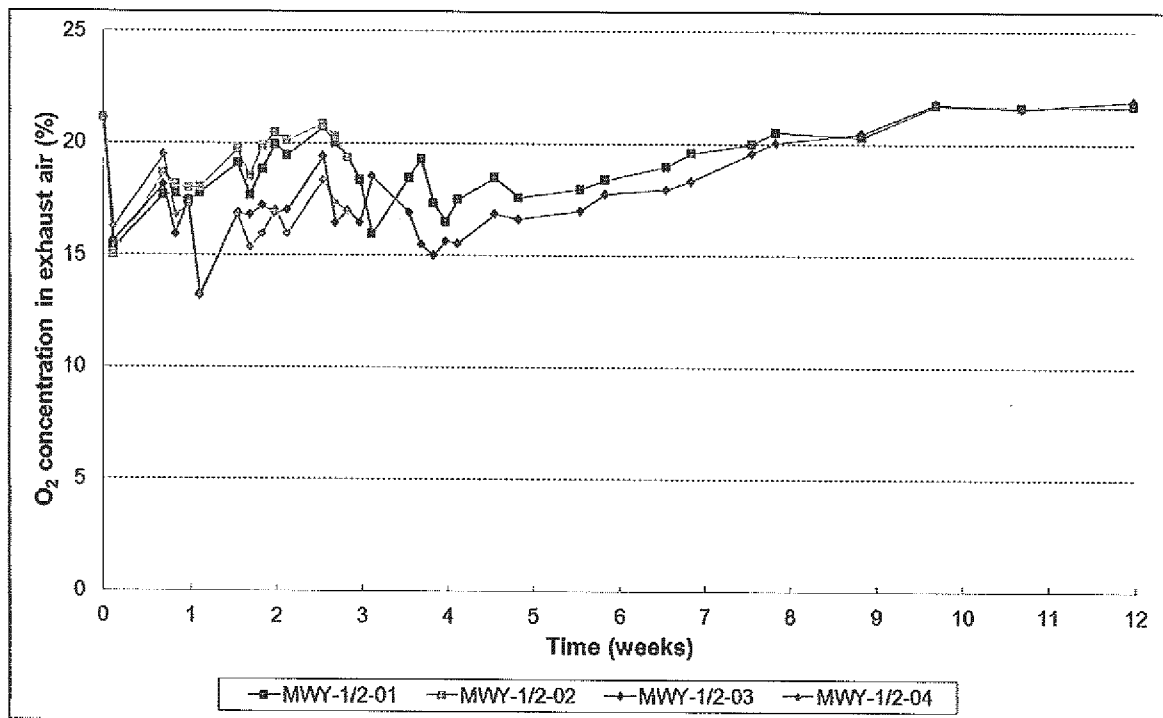


FIG. 4

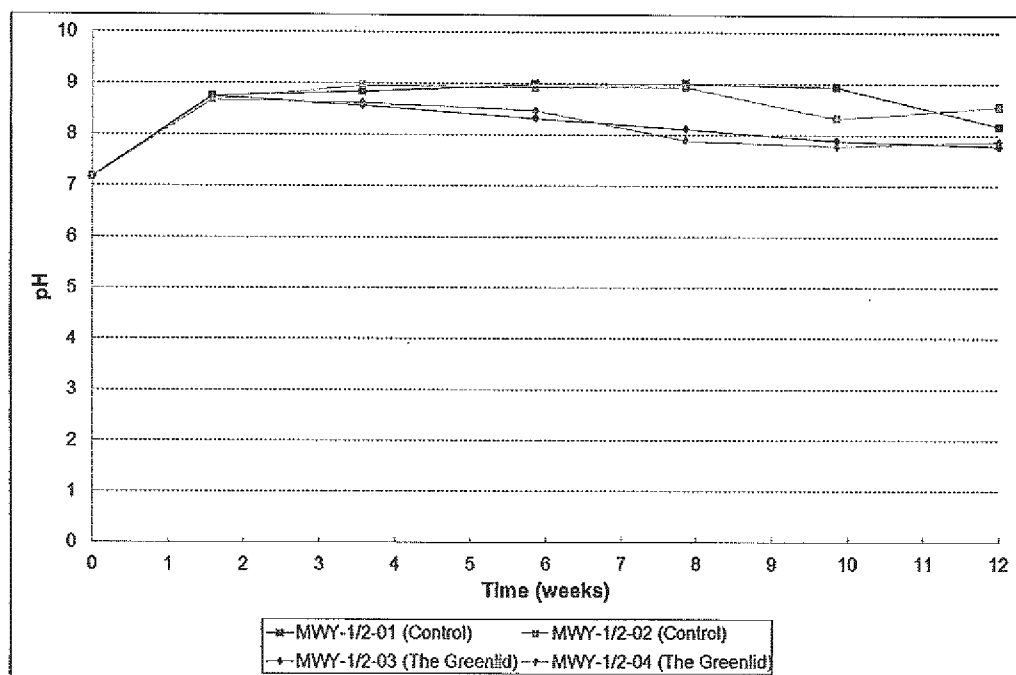


FIG. 5

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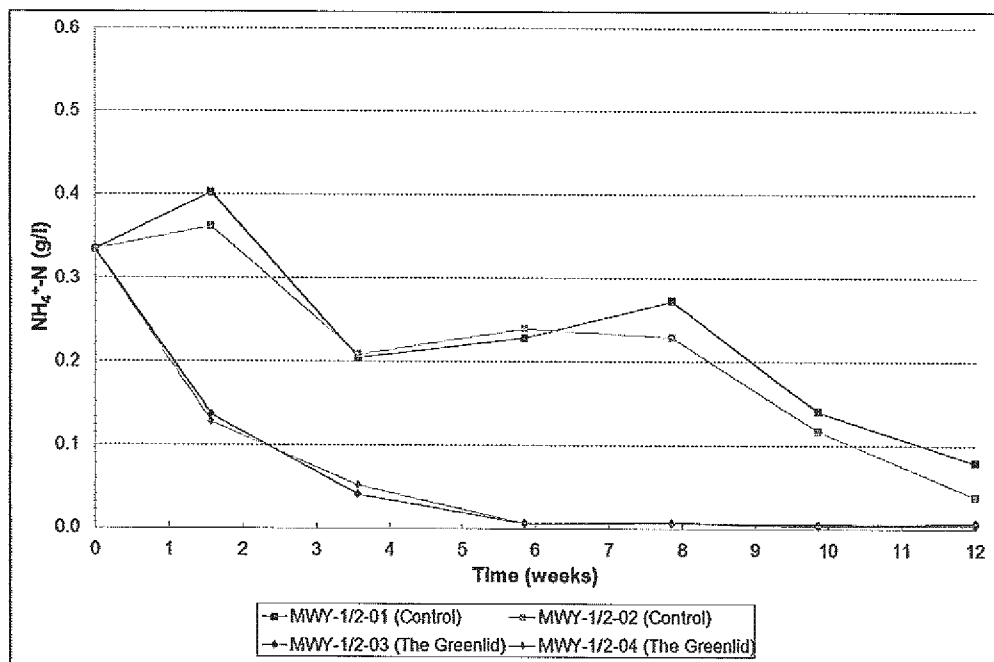


FIG. 6

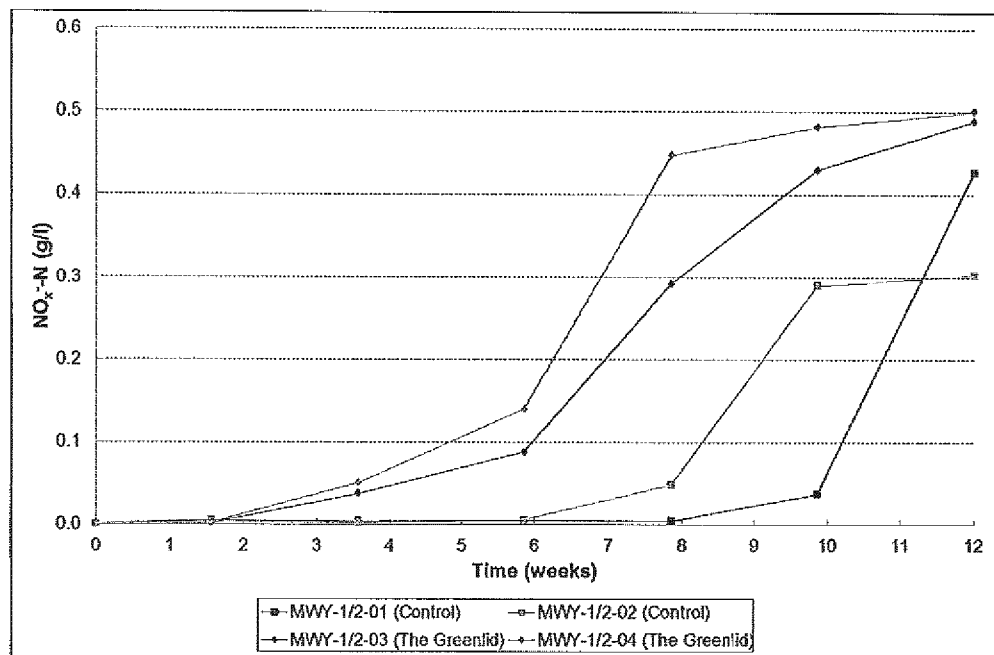


FIG. 7

5/5



FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2016/050087

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **D21H 21/16** (2006.01) , **B65D 5/42** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: **D21H 21/16** (2006.01) , **B65D 5/42** (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Canadian Patent Database, QUESTEL-ORBIT (Keywords: biodegradable, insecticide, container, carton, siz*, pulp, bio*, newsprint, dispos*, enviro*, inect+, enviro+, dispos+, siz+)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CA 2 799 306 A1 (HEISKANEN et al.) 24 November 2011 (24-11-2011) *whole document*	1-13 and 19
Y		14-18, 20 and 21
X	KR 20120021764 (HWAN) 09 March 2012 (09-03-2012) *whole document*	1-13 and 19
Y		14-18, 20 and 21
Y	CA 2 434 210 A1 (HIRSBRUNNER et al.) 22 August 2002 (22-08-2002) *whole document*	14-18, 20 and 21

 Further documents are listed in the continuation of Box C.

 See patent family annex.

* "A" "E" "L" "O" "P"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance earlier application or patent but published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	"T" "X" "Y" "&"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art document member of the same patent family
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Date of the actual completion of the international search
14 April 2016 (14-04-2016)

Date of mailing of the international search report
18 April 2016 (18-04-2016)

Name and mailing address of the ISA/CA
Canadian Intellectual Property Office
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Authorized officer

Malcolm Downey (819) 934-2329

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2016/050087

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
CA2799306A1	24 November 2011 (24-11-2011)	CA2799306A1 AU2011254282A1 CL2012003183A1 CN103025615A EP2571771A1 JP2013526463A JP5859518B2 KR20130080793A MX2012013503A NZ603694A RU2012155701A SE1050510A1 US2013056383A1 US8728592B2 WO2011145073A1	24 November 2011 (24-11-2011) 13 December 2012 (13-12-2012) 01 March 2013 (01-03-2013) 03 April 2013 (03-04-2013) 27 March 2013 (27-03-2013) 24 June 2013 (24-06-2013) 10 February 2016 (10-02-2016) 15 July 2013 (15-07-2013) 24 January 2013 (24-01-2013) 25 October 2013 (25-10-2013) 27 June 2014 (27-06-2014) 22 November 2011 (22-11-2011) 07 March 2013 (07-03-2013) 20 May 2014 (20-05-2014) 24 November 2011 (24-11-2011)
KR 20120021764	09 March 2012 (09-03-2012)	None	
CA2434210A1	22 August 2002 (22-08-2002)	CA2434210A1 EP1223200A1 US2002094937A1 US6649569B2 WO02064686A1	22 August 2002 (22-08-2002) 17 July 2002 (17-07-2002) 18 July 2002 (18-07-2002) 18 November 2003 (18-11-2003) 22 August 2002 (22-08-2002)

DOCUMENT MADE AVAILABLE UNDER THE PATENT COOPERATION TREATY (PCT)

International application number:	PCT/CA2016/050087
International filing date:	02 February 2016 (02.02.2016)
Document type:	Certified copy of priority document
Document details:	Country/Office: US
	Number: 62/111,943
	Filing date: 04 February 2015 (04.02.2015)
Date of receipt at the International Bureau:	03 March 2016 (03.03.2016)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a),(b) or (b-bis)

23 February 2016 23.02.2016

PA 1987859



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UNITED STATES DEPARTMENT OF COMMERCE

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February 09, 2016

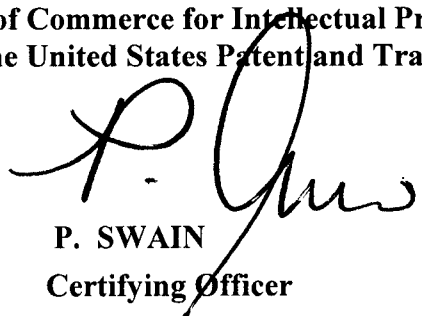
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APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A
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APPLICATION NUMBER: 62/111,943

FILING DATE: February 04, 2015

**THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY
APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS
CONVENTION, IS US62/111,943**

**By Authority of the
Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office**



P. SWAIN

Certifying Officer

Electronic Acknowledgement Receipt

EFS ID:	21401770
Application Number:	62111943
International Application Number:	
Confirmation Number:	1097
Title of Invention:	MOISTURE RESISTANT BIODEGRADABLE COMPOSITION
First Named Inventor/Applicant Name:	Morgan WYATT
Customer Number:	28079
Filer:	Susan Tandan/Nicole Emond
Filer Authorized By:	Susan Tandan
Attorney Docket Number:	H8312985USP
Receipt Date:	04-FEB-2015
Filing Date:	
Time Stamp:	16:59:03
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 130
RAM confirmation Number	24405
Deposit Account	501641
Authorized User	

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Provisional Cover Sheet (SB16)	ProvisionalSB.pdf	1477415	no	3
			d823085f1ee9e036f91fb8e73c6f9ce39892cd30		
Warnings:					
Information:					
2	Application Data Sheet	aia0014.pdf	1894646	no	7
			9beec99b452217870b1c26a12db6f09e2e39c9d9		
Warnings:					
Information:					
3		application.pdf	1409599	yes	19
			94a574075b9f762028323e354b6e1b46183f69f2		
	Multipart Description/PDF files in .zip description				
	Document Description	Start	End		
	Specification	1	10		
	Claims	11	13		
	Abstract	14	14		
	Drawings-only black and white line drawings	15	19		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30011	no	2
			e6cfc76b3f3684ae6af8a480013a5727577ffa25		
Warnings:					
Information:					
Total Files Size (in bytes):			4811671		

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New International Application Filed with the USPTO as a Receiving Office

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Doc Code: **TR.PROV**

Document Description: Provisional Cover Sheet (SB16)

PTO/SB/16 (11-08)

Approved for use through 05/31/2015. OMB 0851-0032

U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1

Remove

Given Name	Middle Name	Family Name	City	State	Country i
Morgan		Wyatt	Toronto	ON	CA

Inventor 2

Remove

Given Name	Middle Name	Family Name	City	State	Country i
Jackson		Wyatt	Toronto	ON	CA

All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.

Add

Title of Invention	MOISTURE RESISTANT BIODEGRADABLE COMPOSITION
Attorney Docket Number (if applicable)	H83121985USP

Correspondence Address

Direct all correspondence to (select one):

☒ The address corresponding to Customer Number
 ☐ Firm or Individual Name

Customer Number	28079
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

- ☒ No.
- ☐ Yes, the invention was made by an agency of the United States Government. The U.S. Government agency name is:
- ☐ Yes, the invention was under a contract with an agency of the United States Government. The name of the U.S. Government agency and Government contract number are:

Doc Code: **TR.PROV**

Document Description: Provisional Cover Sheet (SB16)

PTO/SB/16 (11-08)

Approved for use through 05/31/2015. OMB 0851-0032

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Entity Status**Applicant asserts small entity status under 37 CFR 1.27 or applicant certifies micro entity status under 37 CFR 1.29**

- ☒ Applicant asserts small entity status under 37 CFR 1.27
- ☐ Applicant certifies micro entity status under 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
- ☐ No

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Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Susan Tandan/			Date (YYYY-MM-DD)	2015-02-04
First Name	Susan	Last Name	Tandan	Registration Number (If appropriate)	37014

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MOISTURE RESISTANT BIODEGRADABLE COMPOSITION

FIELD

[0001] The present description relates to a moisture resistant biodegradable composition.

BACKGROUND

[0002] Temporary “green” storage of certain materials such as wet organic waste has associated with it a range of problems. Containers made of biodegradable materials may not sufficiently store the waste in that the organic waste may too quickly break down the container in which the waste is stored. Containers made of other materials may sufficiently store organic waste but may not adequately degrade themselves or may present with additional problems.

[0003] For example, compost containers are typically made of plastic or other water-resistant material. These compost containers must be able to effectively store organic waste while avoiding leakage. To facilitate transport of the compost from, for example, a kitchen compost bin to a larger organic waste collection, biodegradable liners such as bags are often used with compost containers. These bags or liners, however, are not immune to leakage from the liquid naturally resulting from the organic waste. Further, the bags do not always line the plastic compost bin properly, resulting in compost that is not always contained within the liner but spills onto the container walls which must be cleaned to avoid offensive odors and to maintain cleanliness.

[0004] Given the foregoing, it would be desirable to develop a biodegradable moisture resistant composition for use in a variety of applications including as a disposable container suitable for use as a compost container.

SUMMARY

[0005] A moisture resistant biodegradable composition is described herein.

[0006] According to an aspect of the present disclosure, a moisture resistant biodegradable composition is provided comprising between about 75% to about 100% wood-based fiber and

between about 0% to about 25% non-wood-based fiber to form a pulp component, and a sizing agent in an amount of between about 4% to about 8% for every about 100 kg of the pulp component.

[0007] According to another aspect of the present disclosure, a moisture resistant biodegradable insect trap is provided. The insect trap comprises a container capable of holding a volume. The container is of a composition comprising between about 75% to about 100% wood-based fiber and between about 0% to about 25% non-wood-based fiber to form a pulp component, and a sizing agent in an amount between about 4% to about 8% for every about 100 kg of the pulp component. The container is also coated with an insecticide.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] These and other features of the disclosure will become more apparent from the following description in which reference is made to the appended drawings wherein:

FIGURE 1 shows a side perspective view of an exemplary biodegradable container in accordance with one embodiment of the present disclosure following two weeks of exposure in a garden bed;

FIGURE 2 shows a bottom perspective view of the biodegradable container of Figure 1 following three weeks of exposure in the garden bed;

FIGURE 3 shows a top perspective view of the garden bed following removal of the biodegradable container of Figure 1 following three weeks of exposure in the garden bed;

FIGURE 4A shows a top perspective view of exemplary biodegradable containers in accordance with another embodiment of the present disclosure treated with Lambda-cyhalothrin, Bifenthrin, and a Control and placed on a mulch substrate, soil or dirt substrate, and concrete substrate and separated into a dry zone and a wet zone;

FIGURE 4B shows a front perspective view of the exemplary biodegradable containers of Figure 4A;

FIGURE 5A shows a front perspective view of the exemplary biodegradable containers of Figure 4A on a mulch substrate;

FIGURE 5B shows a front perspective view of the exemplary biodegradable containers of Figure 4A on a soil substrate;

FIGURE 5C shows a front perspective view of the exemplary biodegradable containers of Figure 4A on a concrete substrate; and

FIGURE 6 is a chart showing the water holding capability of the exemplary biodegradable containers of Figure 4A over an approximately 9 week period.

DETAILED DESCRIPTION

[0009] According to an aspect of the present disclosure, a moisture resistant biodegradable composition is provided comprising between about 75% to about 100% wood-based fiber and between about 0% to about 25% non-wood-based fiber to form a pulp component, and comprising a sizing agent in an amount of between about 4% to about 8% for every about 100 kg of the pulp component.

[0010] The wood-based fiber component of the composition may be obtained from any biodegradable wood-based fiber product. For example, the wood-based fiber component may be obtained from various types of board prepared from wood pulp having a thickness of at least about 0.010 inches (or 10 points). Examples of suitable wood pulp-based boards for use include, but are not limited to, paperboard or cardboard, such as chipboard, kraft board, containerboard, bleached or unbleached paperboard, corrugated or uncorrugated. For example, the wood-based board component may be double lined kraft corrugated scrap (DLK). This wood-based fiber component can be obtained from waste paper. The wood-based fiber is present in the composition in an amount between about 75% to about 100% of the composition. In one embodiment, it is about 90% of the composition, for example, 90% DLK.

[0011] The non-wood-based fiber component of the composition may be obtained from waste paper. This non-wood-based fiber may be any biodegradable non-wood based fiber. For example, it may be based on agricultural residue such as straw. It may also be based on annual plants and grasses such as miscanthus, jute, bamboo, sorghum, switchgrass, kenaf, and hemp among others as will be known to one skilled in the art. This non-wood-based fiber may be obtained from any recycled paper that is not cardboard. For example, it may be newsprint as identified by particular recycling facilities. The non-wood-based fiber component is present in the composition in an amount between about 0% to about 25% of the composition. In one embodiment, it is about 10% of the composition, for example, 10% newsprint.

[0012] The composition also requires a sizing agent in an amount between about 4% to about 8% for every about 100 kg of the pulp component. The sizing agent may be any suitable sizing agent such as alkyl succinic anhydride (ASA), alkene ketone dimer (AKD) or other wax-like chemicals known to one skilled in the art. For example, the sizing agent may be a modified starch or hydrocolloid such as gelatin, or an acrylic co-polymer, or rosin among others. For example, the sizing agent may be 6% AKD for every about 100 kg of the pulp component formed by the wood-based fiber and non-wood-based fiber.

[0013] The composition may be made by combining the wood-based fiber and non-wood-based fiber and macerating the combination. Water may be added to turn the combination into a pulp slurry. For example, an industrial 'blender' may be used to macerate and blend the combination into a pulp slurry. After the slurry is created, a sizing agent is added in an amount of about 4% to about 8% for every about 100 kg of the pulp component to yield the present composition.

[0014] Accordingly, to mould the composition into a desired shape, a pulp moulding machine may be used. The composition is then formed into the desired shape by, for example, using appropriate moulds. The composition is then dried, for example, on a conveyor belt that passes through a drying chamber such as an oven.

[0015] More particularly, containers from the present composition may be made on a pulp moulding machine using a two step moulding process. First, a female mould is provided that is perforated and covered in mesh whereby a vacuum can be applied to pull the pulp into the female mould. The female mould is placed into the slurry, a vacuum is applied, and the mould exits the slurry containing a coating of pulp that will become the final desired shape. A male mould may also be provided that is used as a wet press to further define the desired shape. Finally, excess moisture is removed from the shaped containers by using, for example, an oven.

[0016] These steps may take place as mentioned above or according to a method as known to one skilled in the art. For example, the composition may also be moulded using thermoformed pulp moulding presses and other similar machinery common in the industry or any other method as known to one skilled in the art.

[0017] The composition can be used in a variety of applications including biodegradable moisture resistant containers. Containers made by this process are biodegradable over time while also providing moisture resistance properties to permit holding water for limited periods of time as described above. For example, the moisture resistant container could be used as a biodegradable container for organic waste, a biodegradable insect trap, a food container, a beverage container, or an indoor plant pot, among other uses. These biodegradable containers may additionally take any suitable shape capable of holding a volume. For example, although the containers in the accompanying figures have been shown to generally have a circular cross-section and be of a generally frusto-conical shape, the containers may assume any suitable shape, such as that of a square, rectangular hexagonal or other cross-sectional shape.

[0018] With respect to using the biodegradable container as an insect trap, for example, water-breeding insects such as mosquitoes and the like, the containers made of the present composition may be coated with an insecticide, filled with water, and placed in an appropriate area. As one of skill in the art will know, any suitable insecticide may be used to target a given insect, such as but not limited to bifenthrin (a pyrethroid) or lambda-cyhalothrin. The

container is coated with an amount of insecticide which wets the container. One or more coats of insecticide may be used.

[0019] Embodiments of the present invention are described by reference to the following specific examples which are not to be construed as limiting.

[0020] EXAMPLE 1: Method for making a biodegradable container

[0021] The biodegradable containers referenced in Table 1 were created from a pulp slurry formed by maceration and blending of the wood-based fiber and non-wood-based fibre in water. A sizing agent was then mixed into the slurry to give the final product a moisture-resistance property. The slurry was then formed into a container using a pulp moulding machine in a two step moulding process. A perforated female mould was provided covered in mesh. The female mould was then placed into the slurry, a vacuum applied, and the mould exited the slurry containing a coating of pulp that would become the container. A male mould was also provided and used as a wet-press to further define the container. Finally, the containers were ejected onto a conveyor belt that entered into an oven to remove excess moisture from the container.

[0022] EXAMPLE 2: Containers with Organic Waste

[0023] An organic waste resistance test was created that mixed organic ingredients within a pulp container of varied compositions. The organic ingredients included: 1 cup cooked rice, 1 cup coffee grinds, ½ cup crushed tomatoes, 1 banana and peel, and water for the balance so that it reached the top of each container. About 10 containers of each composition were observed in a home industrial compost tumbler (home compost pile) for a period of about six (6) weeks. Similarly, about 5 containers of each composition were observed in an industrial compost facility (industrial compost pile comprising aerobic tunnels) for a period of about two (2) weeks.

[0024] **First Container Composition:** A pulp container was used with the following composition: approximately 50% DLK and approximately 50% newsprint with approximately 4% AKD added as a sizing agent(Fennosize KD 266MB NA, Kemira®).

[0025] **Second Container Composition:** A pulp container was used with the following composition: approximately 90% DLK and approximately 10% newsprint with approximately 8% AKD.

[0026] **Third Container Composition:** A pulp container was used with the following composition: approximately 100% DLK and approximately 8% AKD.

[0027] **Fourth Container Composition:** A pulp container was used with the following composition: approximately 90% DLK with approximately 10% No 9 Newsprint, pulped to 98% dilution with water, and approximately 6% AKD. The pulping time was 18 minutes and was produced with Type II moulded fibre production line.

[0028] The AKD in all tested compositions was FennoSize KD 266MB NA, Kemira.

TABLE 1: Time for Degradation of Container in the Presence Wet Organic Waste in a Home Compost Pile and an Industrial Compost Pile

Container Composition	Wet Waste Resistance in a Home Compost Pile	Wet Waste Resistance in an Industrial Compost Pile	Notes
50% DLK; 50% newsprint; 4% AKD	1-2 days	1-2 days	
90% DLK; 10% newsprint; 8% AKD	7 days	7 days	Container degraded in about 10 days.

100% DLK; 8% AKD	7 days	7 days	Definition of the container was reduced after 7 days; Container degraded in about 12 days.
90% DLK; 10% Newsprint pulpd to 98% dilution with water; 6% AKD	2 weeks	7 days	

[0029] EXAMPLE 3: Biodegradability in Field

[0030] The biodegradability of the containers in the environment was tested in the field. The following composition was used 100% DLK + 8% AKD. The containers were filled with water to one inch of the top of the container and left in a garden bed in a natural environment.

[0031] As shown in Figure 1, within two weeks of exposure, beads of water were present on the outsides of the biodegradable container. As shown in Figure 2, within three weeks of exposure in the garden bed, the underside of the containers had softened considerably. As shown in Figure 3, within three weeks of exposure in the garden bed, plant roots are evident underneath the container searching for moisture.

[0032] EXAMPLE 4: Biodegradable Mosquito Traps

[0033] The biodegradable container has also been used in the context of a mosquito trap. For example, containers made with the composition 100% DLK and 8% AKD were field tested as shown in Figures 4A-5C. One hundred eighty (180) containers having the above composition were filled with water to within 1 inch of the top of the container and placed on various

substrates. These substrates existed in duplicate in a dry zone which remained protected from water other than what was in the container, and a wet zone where the substrate was watered every few days to simulate rain, for example as shown in Figure 4A and 4B. Thus, 90 containers were in the dry zone and 90 containers were in the wet zone. Three substrate types were used as follows: mulch as shown in Figure 4A, soil/dirt as shown in Figure 4B, and concrete as shown in Figure 4C. Thus, 30 containers were placed in each substrate in each zone.

[0034] These containers were further coated with pesticides, 0.1% bifenthrin (a pyrethroid), and Lambda-cyhalothrin to kill mosquitoes. A control group was also present in each substrate and zone as indicated above. Other pesticide equivalents may also be used. The containers were coated with the insecticide by spraying. Thus, each substrate in each zone had 10 containers coated with 0.1% bifenthrin, 10 containers coated with Lambda-cyhalothrin, and 10 containers that remained uncoated. All containers were then observed over a approximately 9 week period to determine their water holding capability over that period.

[0035] Figure 6 is a chart showing the containers' water holding ability over an approximately 9 week period in the various substrates in both the dry and wet zones. As shown in the chart, all thirty containers in all substrates and in both the dry and wet zone held water for at least approximately 21 days or three weeks. Not surprisingly, the containers on the concrete substrate in the dry zone held water for a longer period. For example, the first container on the concrete substrate in the dry zone held water for about 37 days (a little over 5 weeks), whereas the first container on the concrete substrate in the wet zone began held water for about 41 days (almost 6 weeks).

[0036] All containers in the wet soil substrate held water for about 37 days. All containers in the dry soil substrate held water for about 41 days. All containers in the wet mulch substrate held water for about 47 days, whereas all containers in the dry mulch held water for about 55 days. At 9 weeks, two containers remained on the dry concrete and three containers remained on the wet concrete.

[0037] The biodegradable containers also successfully functioned as a mosquito trap. For example, containers were double sprayed with lambda-cyhalothrin filled with water and placed in a closed area with a known number of mosquitoes. After about 4 weeks, mosquito mortality was measured by counting the number of live mosquitoes compared to the dead mosquitoes. 100% mosquito mortality was achieved.

[0038] One or more currently preferred embodiments have been described by way of example. It will be apparent to persons skilled in the art that a number of variations and modifications can be made without departing from the scope of the invention as defined in the claims.

WHAT IS CLAIMED IS:

1. A moisture and waste resistant biodegradable composition comprising:
 - between about 75% to about 100% wood based fiber; and
 - between about 0.01% to about 25% non-wood-based fiber
 to form a pulp component; and
 - a sizing agent, wherein said sizing agent is in an amount comprising between about 4% to about 8% for every about 100 kg of said pulp component.
2. The moisture resistant biodegradable composition of claim 1, wherein the wood based fiber is double lined kraft corrugated scrap (DLK).
3. The moisture resistant biodegradable composition of claim 1, wherein the non-wood-based fiber is newsprint.
4. The moisture resistant biodegradable composition of claim 1, wherein the sizing agent is selected from the group comprising of: alkene ketone dimer (AKD) and alkyl succinic anhydride (ASA).
5. The moisture resistant biodegradable composition of claim 1, wherein the sizing agent is AKD.
6. A moisture and waste resistant biodegradable composition comprising:
 - about 90% double lined kraft corrugated scrap (DLK); and
 - about 10% newsprint to form a pulp component; and
 - alkyl ketene dimer (AKD);
 wherein said AKD is about 6% for every about 100 kg of said pulp component.

7. The moisture and waste resistant biodegradable composition of claim 2, wherein the non-wood-based fiber is number 9 newsprint.

8. A moisture resistant biodegradable insect trap comprising:

- a container capable of holding a volume;
- said container having a composition comprising:
 - between about 75% to about 100% wood based fiber; and
 - between about 0.01% to about 25% non-wood based fiber
 to form a pulp component; and
- alkyl ketene dimer (AKD);

wherein said AKD is in an amount between about 4% to about 8% for every about 100 kg of said composition; and

wherein said container is coated with an insecticide.

9. The moisture resistant biodegradable insect trap of claim 8, wherein said wood based fiber is double lined kraft corrugated scrap (DLK).

10. The moisture resistant biodegradable insect trap of claim 8, wherein said non-wood-based fiber is newsprint.

11. The moisture resistant biodegradable insect trap of claim 8, wherein said insecticide is selected from bifenthrin and Lambda-cyhalothrin.

12. The moisture resistant biodegradable insect trap of claim 10, wherein the composition for the container comprises:

- about 90% double lined kraft corrugated scrap (DLK) and about 10% newsprint to form a pulp component; and

- and about 6% AKD for every about 100 kg of said pulp component.

13. The moisture resistant biodegradable composition of claim 8, wherein the non-wood based fiber is number 9 newsprint.

ABSTRACT

A biodegradable composition having resistance to moisture and organic waste is provided.

FIG. 1

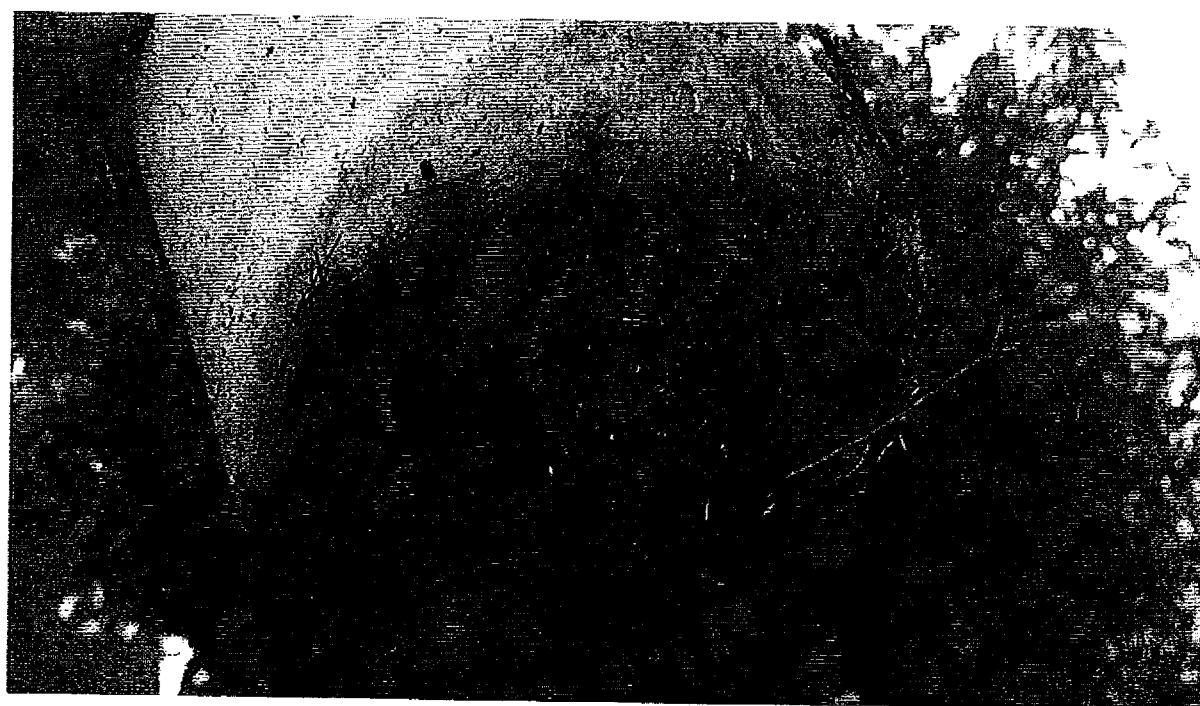
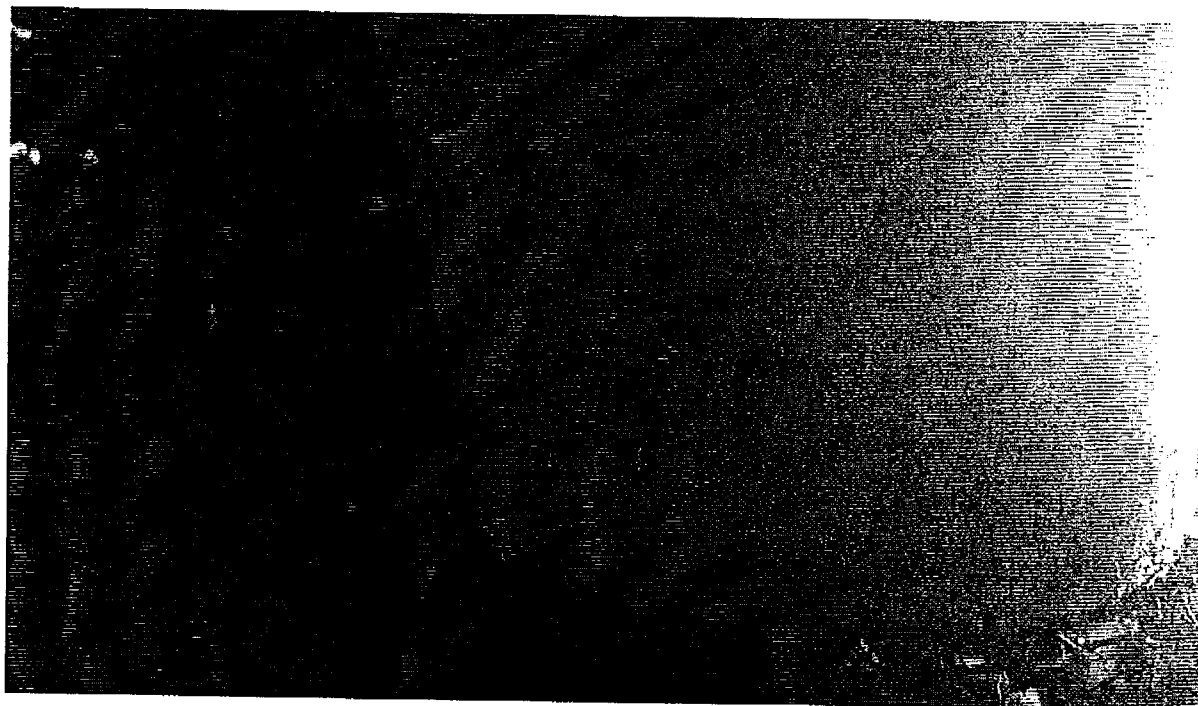


FIG. 2



FIG. 3



FIG. 4A

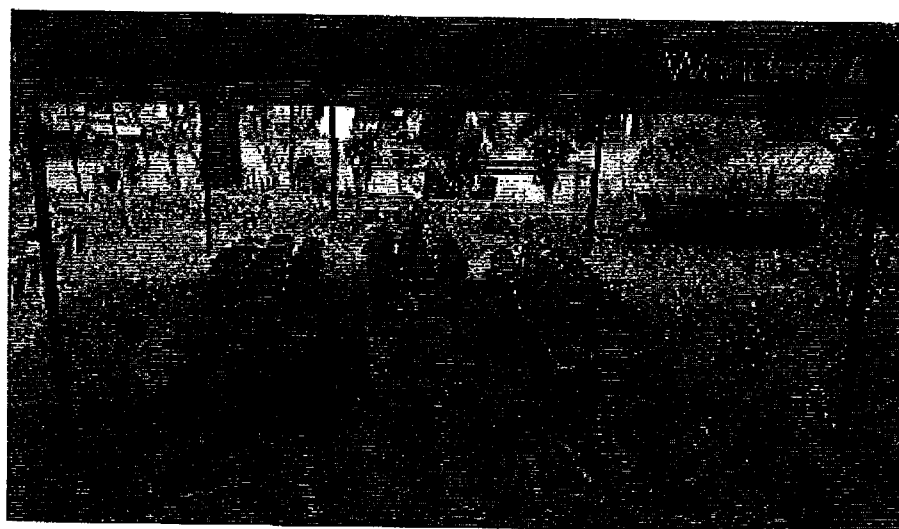


FIG. 4B

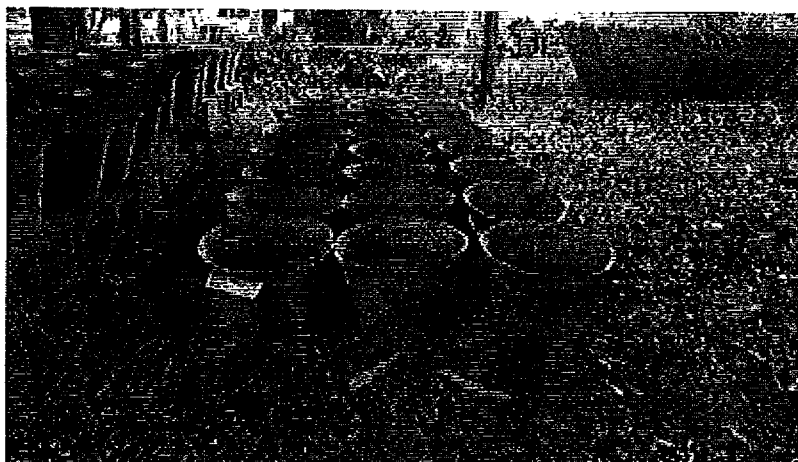


FIG. 5A



FIG. 5B



FIG. 5C

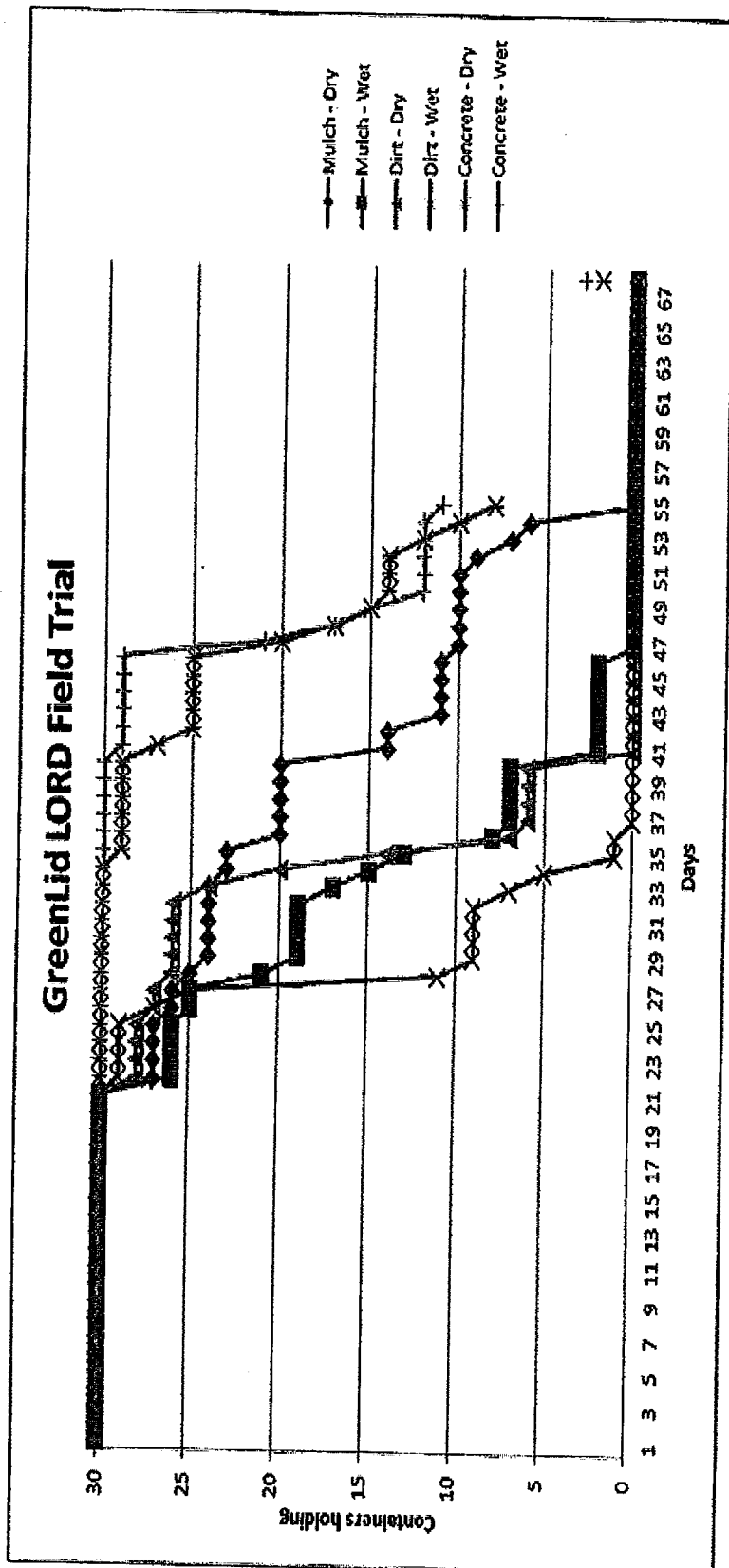


FIG. 6

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	H8312985USP
		Application Number	
Title of Invention	MOISTURE RESISTANT BIODEGRADABLE COMPOSITION		
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Title of the Invention	MOISTURE RESISTANT BIODEGRADABLE COMPOSITION		
Attorney Docket Number	H8312985USP	Small Entity Status Claimed	☒
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

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For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

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Prior Application Status		Remove	
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This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. ☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	H8312985USP
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		Application Number	
Title of Invention	MOISTURE RESISTANT BIODEGRADABLE COMPOSITION		

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	H8312985USP
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Title of Invention	MOISTURE RESISTANT BIODEGRADABLE COMPOSITION		

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First Name	Susan	Last Name	Tandan	Registration Number	37014
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Applicant's or agent's file reference H8312985PCT	IMPORTANT NOTIFICATION
International application No. PCT/CA2016/050087	International filing date (day/month/year) 02 February 2016 (02.02.2016)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 04 February 2015 (04.02.2015)
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Priority datePriority application No.Country or regional Office
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04 February 2015 (04.02.2015)

62/111,943

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