carbon-to-nitrogen ratio, high organic matter, high nutrients, small particle size, no offensive smell, and free of harmful pathogens and contaminants. All kinds of food waste, including, but not limited to, raw and cooked food, hot and cold food, protein (animal and plant), fat (animal and plant), carbohydrates, starch, feathers and hairs, pectin, cellulose, bones, crustacean shells, vegetables, fruits, food with high salt content, shredded newspaper, tissue paper, and etc., can be fully treated by the apparatus and method of the present invention less than 24 hours. In some embodiments, food waste can be fully treated by the apparatus and method of the present invention within 16 hours.

In the present invention, only a small quantity of a composition of microorganisms is required to treat all kinds of food waste. Typically, 10 grams of the composition of microorganisms is sufficient to treat up to 10 kilograms of food waste. The microorganisms utilised comprise bacillus subtilis, bacillus licheniformis, bacillus amyloliquidfaciens, bacillus atrophaeus, and bacillus circulans. In some embodiments, any one or combinations of two or more of the afore-stated microorganisms can be used to treat food waste. An optimal environment condition is provided by the apparatus for rapid decomposition of the food waste by the microorganisms. All kinds of food waste can be fully treated by the microorganisms, leaving no untreated food waste.

Fig. 1 shows a sectional front view of apparatus 100 for treating food waste in accordance with an embodiment of the present invention. Figs. 2 and 3 show the sectional side view and rear view of apparatus 100. Apparatus 100 comprises main body 102 within which various components, such as container 110, agitation means 120 and deodorization means 130, are installed. Main body 102 should be portable and compact enough for ease of installation in any desired location, such as kitchen area where food waste is available. Main body 102 may be configured in any suitable sizes and shapes. For an example, main body 102 is rectangular as shown in Figs. 1 to 3, having dimensions of about 0.5 m (length) x 0.5 m (width) x 0.6 m (height).

Container 110 is installed within main body 102 for containing food waste and allowing food waste to be treated therein. Container 110 has first side 112, second side 114, a bottom portion of semi-circular shape 116 (viewing from first side 112 or second side 114, see Fig. 2), a top portion having opening 118 for loading and unloading food waste. Main body 102 has lid 104 which is a removable and hinged cover for closing opening 118. Apparatus 100 has a sensor for sensing lid 104 so that apparatus 100 only operates when lid 104 is completely closed. Handle 106 is mounted on lid 104 for

oxygen is supplied for aerobic process by the microorganisms. The air expelled from container 110 may contain harmful substances, toxic gases, offensive smell, and moisture, which will be filtered and removed by deodorization means 130 before discharged from apparatus 100 through exhaust vent 164 at main body 102.

Deodorization means 130 is connected between air outlet 162 and exhaust vent 164 by pipes 139 for deodorizing and purifying the air expelled from container 110 before discharging it out of apparatus 100. Deodorization means 130 comprises a three-stage filtering system includes three separated filtering units connected by pipes 139. First filtering unit 132 has an ultraviolet lamp which produces ultraviolet light to sterilize the air expelled from container 110. Second filtering unit 134 comprises dehumidification heater 135 and zeolite filter 136. Dehumidification heater 135 generates heat to remove moisture in the air expelled from container 110, and zeolite filter 136 absorbs odorous gases expelled from container 110. Dehumidification heater 135 is controllable by a controlling means mounted on main body 102. Third filtering unit 138 has a carbon filter that absorbs harmful substances and toxic gases expelled from container 110.

Suction fan 166 is connected to exhaust vent 164 for sucking air and creating a compulsorily airflow in container 110. When suction fan 166 is activated, internal air of container 110 and air in pipes 139 are sucked out and discharged from apparatus 100. Once internal air of container 110 is sucked out, external fresh air is forced to flow into container 110 via air inlet 160 due to low pressure in container 110. Therefore, external air can be continuously supplied into container 110 for aerobic process. The air expelled from container 110 will channel through deodorization means 130 for filtering and purifying before discharged from apparatus 100. Suction fan 166 may be continuously activated or periodically activated based on a predetermined setting. For example, suction fan 166 may be in a periodic cycle of activation for 10 minutes followed by deactivation for 30 minutes.

Apparatus 100 further comprises a controlling means in connection with various components of apparatus 100, including heating means 150, suction fan 166, agitation means 120, motor 140, deodorization means 130, temperature sensors, and etc., for controlling the respective components in order to provide and maintain an optimal environment condition for aerobic treatment of food waste. The controlling means may be a control panel mounted on main body 102.

CLAIMS

1. An apparatus for treating food waste, the apparatus comprising:

a main body that is portable;

a container installed within the main body to contain food waste and to allow the food waste to be treated therein by a composition of microorganisms, the container having a first side, a second side opposite to the first side, and an upper portion having an opening for loading/unloading food waste;

heating means in contact with an outer surface of the container for heating the food waste in the container;

an air inlet disposed at the upper portion of the container through which air is introduced into the container;

an air outlet disposed at the upper portion of the container through which air is expelled from the container;

an exhaust vent disposed at the main body through which air is discharged from the apparatus;

agitation means installed within the container to mix the food waste and the microorganisms, the agitation means comprises:

a rotatable shaft extending from the first side to the second side of the container,

a plurality of agitator arms extending from the rotatable shaft, and

a paddle connected to each of the plurality of agitator arms and proximate an inner surface of the container;

deodorization means connected between the air outlet and the exhaust vent, the deodorization means comprises a 3-stage filtering system includes:

a first filtering unit having an ultraviolet lamp that produces ultraviolet light to sterilize air expelled from the container,

a second filtering unit having a dehumidification heater that generates heat to remove moisture expelled from the container and a zeolite filter that absorbs odorous gas expelled from the container, and

a third filtering unit having a carbon filter that absorbs harmful gas expelled from the container; and

a suction fan connected to the exhaust vent so as when the suction fan is activated, air in the container is sucked out of the container via the air outlet and external air is sucked into the container via the air inlet, the air expelled from the container channels through the deodorization means before discharged from the apparatus via the exhaust vent.

2. The apparatus of claim 1, further comprising:

controlling means for controlling the heating means, the agitation means, the suction fan, and the deodorization means so as to provide an optimal environment condition for aerobic treatment of the food waste.

3. The apparatus according to any one of the preceding claims, wherein the microorganisms comprise bacillus subtilis, bacillus licheniformis, bacillus amyloliquidfaciens, bacillus atrophaeus, and bacillus circulans.

4. A method for treating food waste using the apparatus of claim 1, the method comprising:

loading food waste into the container;

adding a predetermined amount of the composition of microorganisms into the container, wherein the microorganisms comprise bacillus subtilis, bacillus licheniformis, bacillus amyloliquidfaciens, bacillus atrophaeus, and bacillus circulans; and

mixing the food waste and the microorganisms by the agitation means for a period of time sufficient for the food waste to be fully treated by the microorganisms.

5. The method of claim 4, wherein the period of time is less than 24 hours.

6. The method of claim 4 or claim 5, further comprising:

maintaining an optimal environment condition for aerobic treatment of the food waste in the container by controlling the heating means, the agitation means, the suction fan, and the deodorization means.

7. The method of claim 6, wherein the optimal environment condition comprises a temperature within 70°C to 75°C.

8. The method according to any one of the claims 4 to 7, wherein 10 grams of the composition of microorganisms is sufficient for treating up to 10 kilograms of the food waste.

9. A kit comprising:

(a) an apparatus for treating food waste, the apparatus comprising:

a main body that is portable;

a container installed within the main body to contain food waste, the container having a first side, a second side opposite to the first side, and an upper portion having an opening for loading/unloading food waste;

heating means in contact with an outer surface of the container for heating the food waste in the container;

an air inlet disposed at the upper portion of the container through which air is introduced into the container;

an air outlet disposed at the upper portion of the container through which air is expelled from the container;

an exhaust vent disposed at the main body through which air is discharged from the apparatus;

agitation means installed within the container for mixing the food waste, the agitation means comprises:

a rotatable shaft extending from the first side to the second side of the container,

a plurality of agitator arms extending from the rotatable shaft, and

a paddle connected to each of the plurality of agitator arms and proximate an inner surface of the container;

deodorization means connected between the air outlet and the exhaust vent, the deodorization means comprises a 3-stage filtering system includes:

a first filtering unit having an ultraviolet lamp that produces ultraviolet light to sterilize air expelled from the container,

a second filtering unit having a dehumidification heater that generates heat to remove moisture expelled from the container and a zeolite filter that absorbs odorous gas expelled from the container, and

a third filtering unit having a carbon filter that absorbs harmful gas expelled from the container; and

a suction fan connected to the exhaust vent so as when the suction fan is activated, air in the container is sucked out of the container via the air outlet and external air is sucked into the container via the air inlet, the air expelled from the container channels through the deodorization means before discharged from the apparatus via the exhaust vent; and

(b) an article having a composition of microorganisms comprises bacillus subtilis, bacillus licheniformis, bacillus amyloliquidfaciens, bacillus atrophaeus, and bacillus circulans, wherein the composition of microorganisms is added into the container to treat the food waste.