The Hyper-Thermophilic Composting Sewage Sludge and the Ash Alkali Composting Feces are Excellent Organic Fertilizers for the Sustainable Agriculture

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This lecture discusses how to connect human waste to agriculture as organic fertilizers safely, by referring two different composting methods. The important and common concept is the probiotic environmental agriculture (Figure 1).

First method is the hyper-thermophilic composting method, which was developed for composting sewage sludge in Japan (Figure 2). This method is now recommended to install wastewater treatment plants in the name of BISTRO sewage works by the department of sewage works of Ministry of Land, Infrastructure, Transport and Tourism (MLIT). Farmers utilize the organic fertilizer and harvest high quality crops by saving fertilizer cost, and enriching soil fertility and the diversity of the farming environment.

Second method is the urine and feces separation toilets, those have been constructed more than 1,300 unites in Malawi and Kenya by a Japanese international NGO, NICCO for the last decade (Figure 3). The success of this sanitation approach attributes to the improvement of agricultural economy as well as health conditions of many families. Urine is an excellent liquid fertilizer with optimum dilution. Feces are stored in container boxes under a toilet for a half year, where after each defecation, a cup of ash is thrown over the feces which are fermented in the alkali condition by the ash from a cooking stove of a family.

It is very interesting that when I compared the bacteria diversities between the sewage and the feces organic fertilizers, both share a similarity that is also found in the diversity of plant growth-promoting rhizobacteria (PGPR) (Figure 4). This may imply why the organic farming is successful. Properly composted sewage sludge and feces can be excellent organic fertilizer as well as properly composted animal dungs. Phosphate rocks are a crucial limiting nutrient for the sustainable agriculture. We have to recycle and save phosphate nutrient for next generations.

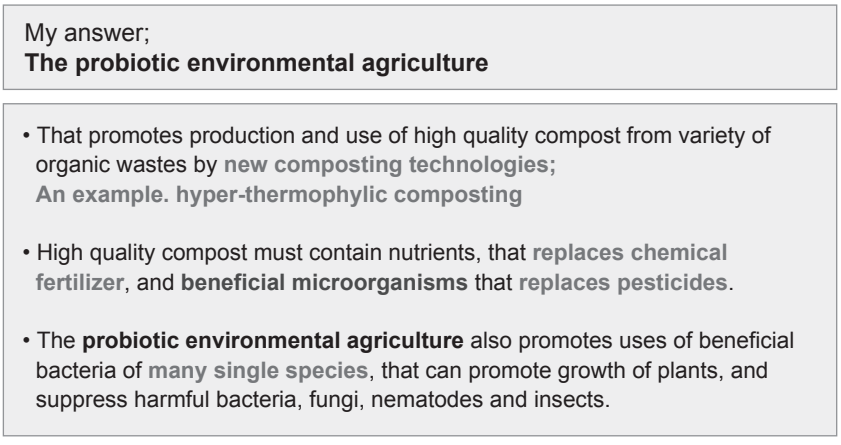

Figure 1. Concept of the probiotic environmental agriculture.

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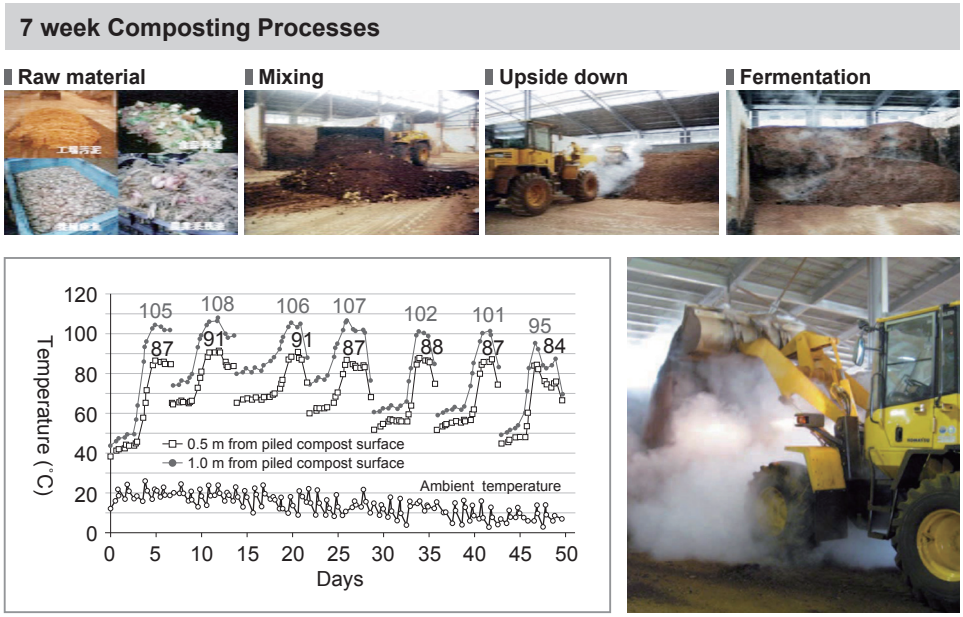

Figure 2. Process of hyper-thermophilic composting method in Japan.

Figure 3. Urine and feces separation toilet in Africa.

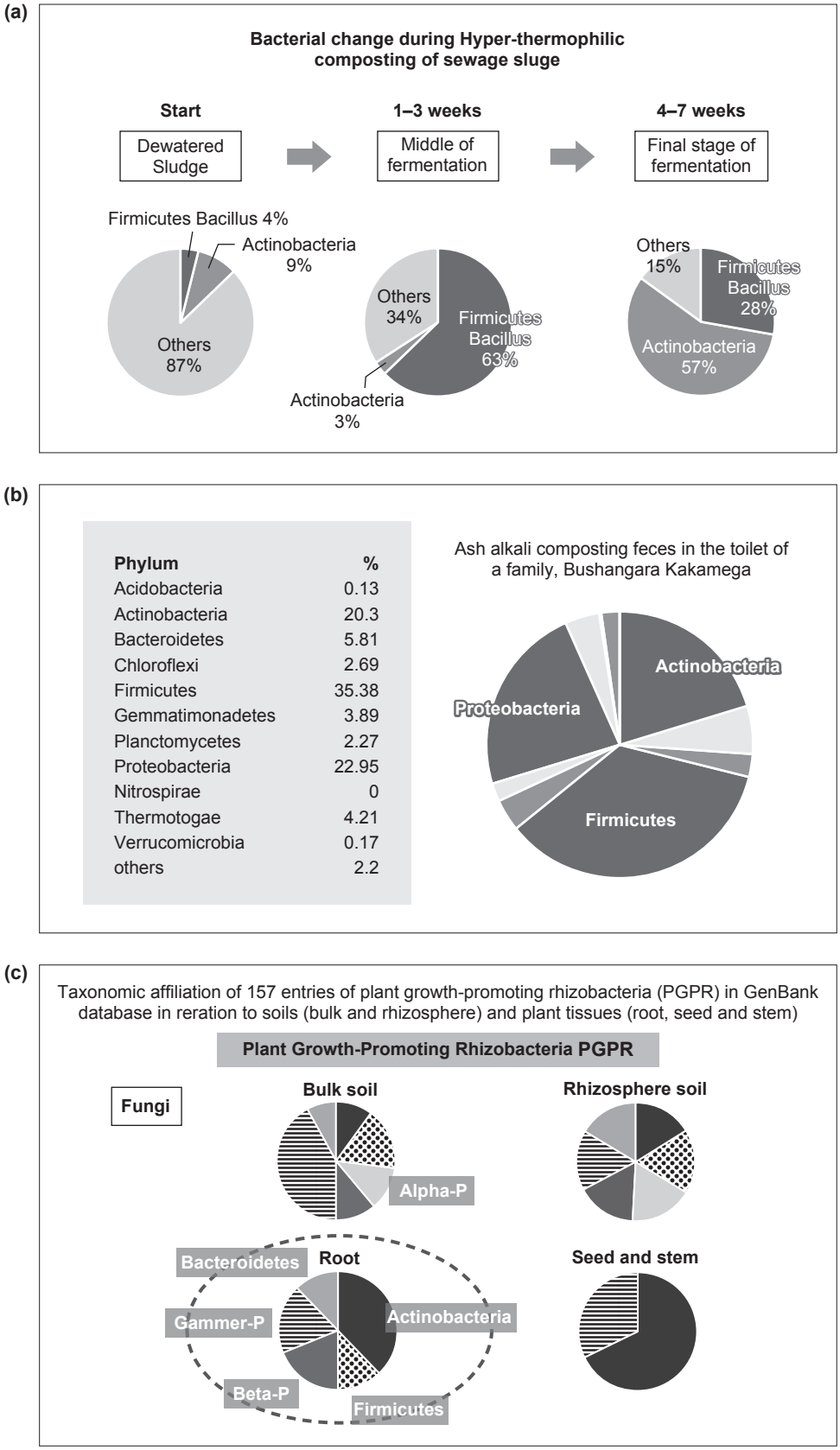

Figure 4. (a) Bacteria diversities in hyper-thermophilic composting of sewage sludge. (b) Urine and feces separation toilet. (c) Plant growth-promoting rhizobacteria.