Recycling of sludge from pig wastewater

Waste sludge can be put to many uses after the water content is reduced, and the sludge is fermented or composted. It can be utilized as a culture medium, an organic fertilizer, or as raw material for manufacturing bricks, flower pots and drainage trays for plants. Some equipment is needed for such processing. Therefore, this technique is best suited to a small commercial company or a cooperative organization.

**Processing**

The recycling of waste sludge generated from plants for pig wastewater treatment begins by reducing the water content. This process is carried out either by solar drying (Fig. 1) or by using a pressing machine (Fig. 2). The latter method uses less labor and space than the former. During this process, the water content falls from about 80% to 10%.

The dried sludge is further processed in a chamber for fermentation or composting for 50 days (Fig. 3). The final sludge product has the following characteristics and nutrient content; pH 6.42; electric conductivity (EC) 2.91 mS/cm; total nitrogen 4.19; P2O5 9.61; CaO 10.28; MgO 1.88; Zn 0.4; Cu 0.076; organic matter content 65.9%.

**Utilization**

As a culture medium

Pot tests for vegetables showed that compost made from sludge could be used as a culture medium instead of peat. The compost could also be used mixed with bark and vermiculite.

As an organic fertilizer

In a trial for Chinese cabbage, the application of composted sludge at a rate of 40 mt/ha gave the same yield as the standard rate of chemical fertilizers (Fig. 5). This means that the sludge compost can replace chemical fertilizers as a good organic fertilizer. The highest yield was obtained in the plot given half the standard rate of chemical fertilizer plus 20 mt/ha of sludge compost. The sludge compost can also be processed into powder or pellets (Fig. 5).

As raw material for some other products

The sludge compost can also be used as a raw material for making items such as pots for plants (Fig. 6) and trays. When the sludge compost is mixed with clay to make bricks, it is recommended that it should not exceed

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**Fig. 1.** Solar drying beds for the sludge

**Fig. 2.** Pressing machine to remove water from the sludge
20% by weight. When the sludge is mixed with pulp from waste paper to make flower pots and drainage trays, the best ratio is 40% sludge compost: 60% pulp paper (2:3). Nutrient elements in the flower pots were found to be absorbed after being released from the pot to the soil, or by roots which had penetrated into the pot. Pots made from recycled sludge are now being used for orchids and other garden plants in place of plastic or porcelain pots (Fig. 7).

Fig. 3. Fermentation chamber for the sludge

Fig. 4. Growth of Chinese cabbage in sludge medium

Fig. 5. Organic fertilizer made from sludge

Fig. 6. Some pots made from sludge

Fig. 7. Orchids grown in sludge pots