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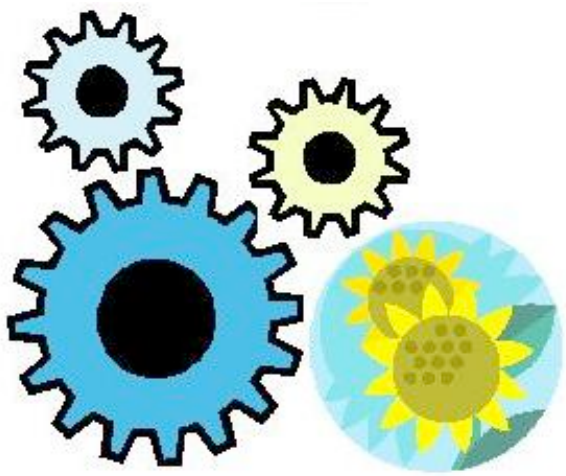
Organically grown plants can be reliable components of an engineered system



Engineers generally hesitate to use a living plant as a substitute for a mechanical component in a design. As an example, an engineer designing a life support system for space travel, and in particular a water evaporator in that system, wouldn't feel confident with replacing the mechanical device which evaporates water with a plant that does it with CO2, light, and water as the only needed resources, and with higher efficiency. The reason is that the engineer would worry about the plant dying. In fact, keeping a plant healthy isn't a mystery, although plants do die due to poor growing conditions all the time. The way to avoid that is to grow the plant in an **organic system**. Plants die or suffer in systems oversimplified by conventional agriculture. In a conventional system, it is assumed that nutrients, plus physical support by the soil, plus water, plus pesticides should allow a plant to grow. That is as unsophisticated as putting a human being in a donjon, feeding them nutrient tablets for life, and wondering why they are not striving! In order to strive, plans need high microbial activity in the soil; this can only exist in an organic system. **Organic systems** by definition are high biological activity in the soil. In non-organic systems pesticides reduce soil microbial activity. As a result the benefits of soil biological activity start disappearing from the system; nutrient and micronutrients mineralization, disease suppression, soil aggregation and aeration, good water retention but without water logging.

Therefore if planted in an organic system plants are very likely to strive and die only rarely enough to be easily replaced by 'stand by' plants. Sensors and other devices can allow monitoring the biological activity in the soil, through respiration levels and other indicators. Then, a system manager would only need to interfere when biological activity in the soil decreases. Based on the given conditions (temperature, light intensity, nutrient levels, etc...), a computerized model would determine what (organic) input need to be changed to bring the microbial activity level back up. **This organic system would be natural and controlled all at the same time**, and plants growing in it are practically guaranteed to strive and perform their function, be it water evaporation, cooling, oxygen production, waste recycling and other.