

Organic hydroponics

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Organic hydroponics is a hydroponics culture system which is managed based on organic agriculture concepts. Most studies have focused on use of organic fertilizer. Conventional hydroponics cannot use organic fertilizers because organic compounds contained in hydroponic solution inhibit the growth of the crop roots, so it uses only inorganic fertilizer.

In this method of organic hydroponics, organic fertilizer is degraded into inorganic nutrients by microorganisms in the hydroponic solution via ammonification and nitrification. The microorganisms are cultured with a method of multiple parallel mineralization. The culture solution can be used as the hydroponic solution. Practical method of organic hydroponics is developed in National Agriculture and Food Research Organization (NARO), in Japan, in 2005.^[1]

History of organic hydroponics

Studies for establishing organic hydroponics have been conducted for a long time. Kennedy Space Center had studied organic hydroponics for crop production in space.^[2] It was necessary to develop the method to generate nitrate from organic fertilizer via ammonification and nitrification, because most of crops are nitrate-philic but not ammonium-philic. It is easy to generate ammonium from organic fertilizer by saprophytic microorganisms. However it was difficult to degrade organic fertilizer to nitrate efficiently because the growth of nitrifying bacteria, such as the obligate chemolithoautotrophs *Nitrosomonas* spp. and *Nitrospira* spp., is particularly inhibited by the presence of organic compounds (Jensen 1950; Quastel and Scholefield 1951; Rittenberg 1969; Smith and Hoare 1977; Krummel and Harms 1982; Takahashi et al. 1992; Stutte 1996; Xu et al. 2000; Tomiyama et al. 2001).

Shinohara ^[2] invented the method to efficiently generate nitrate from in water. The method, multiple parallel mineralization, consists of three manipulations: small inoculation of soil microorganisms, addition of small amounts of organic fertilizer, and aeration. The mineralized solution can be used as the hydroponic solution and organic fertilizer can be added in the solution during cultivation. This is the first practical organic hydroponics technique that organic fertilizer can be added directly during cultivation.

Farajollahzade et al., ^[3] introduced a method in which soil remained as the source of nutrients and the nitrogen was supplied by a in-line tank containing nitrogen-fixing bacteria. This method could be considered as a variation of soil culture in which the plant and soil are connected by cycling liquid. By use of organic soil as the source of nutrients, they believe that it could be considered within the definition of organic agriculture.

See also

- Organic hydroponic solutions

References

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