

## Utilization of Functional Water for Plant Propagation<sup>®</sup>

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### INTRODUCTION

Various functions of water have been studied at Akatsuka Orchid Co., Ltd. since 1984. The major focus of research was on functions of rare metals and minerals such as iron. Currently, selected tests are going on at our company's farm, private farms, and other companies. Cooperative research projects are also being conducted with several research institutions. The term and concept of "functional water" has been used since 1990s in Japan. Functional water is defined as "physically and chemically processed water that has additional functions, such as higher reactivity, probably due to structural changes of the water caused by pH change, reducing oxidation-reduction potential, increasing surface activity, etc.". There are a number of different processes adding functions to water including; electrolysis, magnetism, far infrared, membranes, microorganisms, evaporation, resonance energy, electric fields, supersonic waves, ozone, minerals, and ceramics.

The process used at our company is a combined effect of three materials: "FFC Pairogen", "FFC Ceramics", and "FFC Ace".

### UTILIZATION OF FUNCTIONAL WATER FOR PLANT PROPAGATION

**Definition of "FFC".** "FFC" is an abbreviation of ferrous ferric chloride. With our definition, "FFC" is an effect that increases biological functions and cleans an environment. In other words, combining effects of far infrared, mineral, dilution of active ingredients, and ceramics, can enhance this effect.

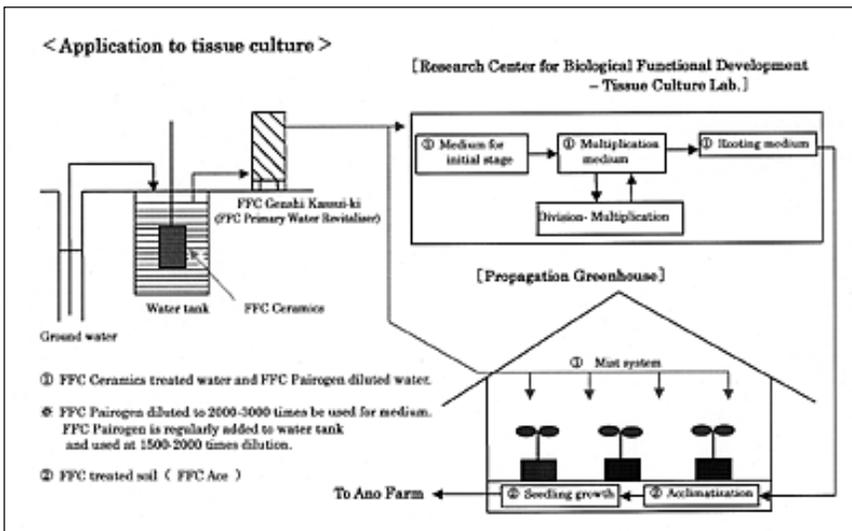
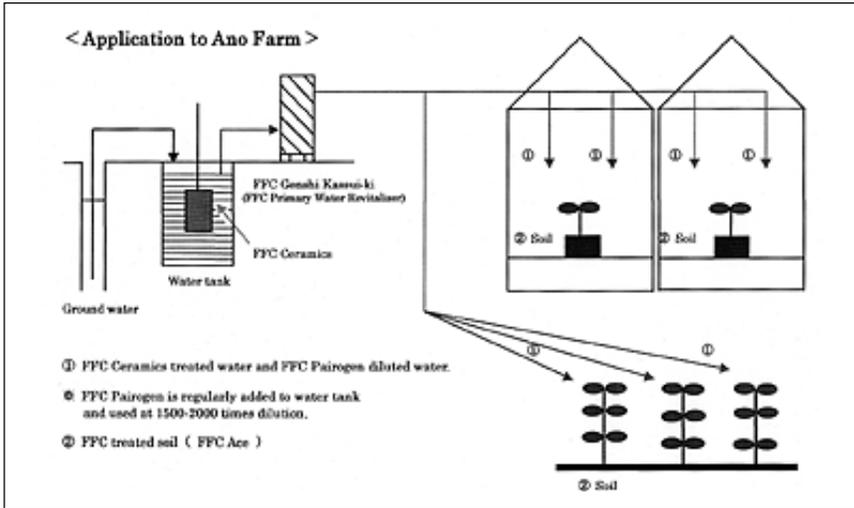


Figure 1. Methods for FFC utilization at Akatsuka Orchid Co. Ltd.



**Figure 2.** Methods for FFC utilization at Akatsuka Orchid Co. Ltd.

#### Utilization of “FFC” at Akatsuka.

- **Methods:** Combination of three materials can be applied by spraying and soil treatment of diluted FFC Pairogen water, irrigation of FFC Ceramics-treated water, and soil treatment by ‘FFC Ace’. (Fig.1, Fig.2.)
- **Target Crop:** Ornamental plants such as *Dracaena*; orchids, such as *Cymbidium*; flowering shrubs, such as *Rhododendron* and *Kalmia*; vegetables, such as mini tomato and cucumber; plant seedlings; etc.
- **Effects and Results:** Treated plants in general showing vigorous growth due to improved root development and they appeared to be resistant to disease and insect damage.

#### Utilization of “FFC” for Various Plant Production.

- **Example 1.** Growth test of rice.
- **Example 2.** Growth test of chingensai (*Brassica rapa* Chinensis Group).
- **Example 3.** Fertilization trial of komatsuna (*Brassica rapa* Perviridis Group) using “FFC” materials.
- **Example 4.** Preservation test of various vegetables.

### CONCLUSION

Research on plant propagation using functional water has just started and functional water itself is not clearly defined yet. However, with increasing demand for products organically grown or grown with no or less pesticide, the use of functional water will become increasingly important because it can provide safe, reliable, and good tasting food without harming the global environment. Although theoretical mechanism of functional water still needs to be identified, our company will continue research in the future.