

## Effect of Plant Enhancement Liquid “FFC-Vegemake®” on Growth of Edible Flower Cultivated by Semi-Hydroponic Method

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### INTRODUCTION

Since 1984, Akatsuka Garden Company has focused on the behavior of certain ions, especially iron ions in water and interactions of water molecules with them. We have continued research on various solutions to not only accelerate plant growth, but also activate physiological functions of plants.

Based on this research, we have developed FFC materials such as “FFC-Ace” for soil improvement, “FFC-Vegemake” for plant enhancement, and others. In addition, many agricultural producers in Japan have been utilizing FFC materials to rejuvenate plants and increase profits. Those producers have also explored many other possible methods of using FFC materials and consequently found good ways that benefit their actual production sites.

On the other hand, our company has been cultivating and selling garden plants for many years. In addition, we started trial cultivation of edible flowers as a new business

in 2015. There is no special species as an edible flower. Among horticultural plants, (1) non-toxic flowers, (2) flowers cultivated with no pesticides or using pesticides within the specified range are distributed as edible flowers. It is said that there are about 100 kinds of edible flowers, such as Pansy (*Viola × wittrockiana*), Torenia (*Torenia fournieri*), Nasturtium (*Tropaeolum majus* L.), and Snapdragon (*Antirrhinum majus* L.). In recent years, it has been widely used in Japan as a decoration for cooking and confectionery. In this paper, we will introduce the trial cultivation of edible flowers using FFC-Vegemake and two edible flowers that are currently being considered for sale.

### MATERIALS AND METHODS

The effects of FFC-Vegemake on the growth of semi-hydroponic viola was studied by sowing 40 seeds of three kinds of viola were sown on a flat and thin sponge soaked with

tap water, and cultured in the dark at 20° C. After 5-6 days, the seeds with roots larger than 0.5 cm were selected, and the roots were inserted into a cube sponge notch. The seedling transplanted to the sponge was put in a tray containing fertilizer solution for hydroponics (Hyponica liquid fertilizer, Kyowa Co., Ltd.) diluted 750 times with tap water, and grown for about one month at 20° C. under artificial light (Toshiba Plantlux FL40S / BRN, Toshiba Corporation).

Ten seedlings of average size were selected from each kind and transplanted to the pot containing coconut chips. Liquid fertilizer (control) or liquid fertilizer in which FFC-Vegemake was diluted 1000 times (FFC) was poured into each tray to a height of about 1 cm and soaked 5 pots each transplanted seedlings of each kind. These seedlings were cultivated for about 2 months in a glass greenhouse with an average temperature of 15-20° C (winter). Three seedlings of average size were selected from each kind in each treatment and transplanted to planters. They were cultivated for about 5 months and the number of each flower was investigated.

## RESULTS AND DISCUSSION

The cultivated seedlings for about 2 months in the pot containing coconut chips promoted the growth of the above ground parts and roots in the FFC treatment compared to the control in kinds of all. The average number of flowers about 5 months after transplanting in the planter was about 100 more in the FFC treatment than in the control. Although there were individual differences, it can be said that the growth of seedlings and the number of flowers increased by FFC-Vegemake treatment.

## CONCLUSION

We tried the cultivation test of about 10 kinds of edible flowers by applying the semi-hydroponic cultivation test of viola above. As a result, good growth and flowering were observed in torenia, nasturtium, basil (*Ocimum basilicum*), and begonia (*Begonia* × *semperflorens-cultorum*). Among them, begonia showed stable growth and flowers (Fig. 1), and it has become possible to harvest all year round by heating in November to April when the temperature is below 15° C.



**Figure 1.** Pink begonia in flower

Begonia, which started cultivation in September 2017, is growing well without any problems such as disease even now (August 2019). Sometimes thrips and aphids occur, but they are not severely damaging to growth.

Currently, we are conducting trial and error on cultivation, harvesting, packing and transportation methods in order to sell the original cultivar ‘Titanbicus’ (*Hibiscus moscheutos* × *Hibiscus coccineus*) as an edible flower (Fig. 2).

'Titanbicus' has a texture like a soft lettuce and has a little stickiness. The taste is light and has a little sweetness that goes well with meat and fish. 'Titanbicus' is very large compared to other edible flowers with many small flowers. 'Titanbicus' will attract many people because of its impact, beauty and taste.



**Figure 2.** 'Titanbicus' (Rhea - Registration number 27541)