

Harvest of 4.2 kg muskmelon

–4.5kg at the time of harvest–

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I. Introduction

A muskmelon of 4.5 kg was harvested at Kamigaki Melon Farm in Shizunai, Shinhidaka Town, Hokkaido, and the farmer, Mr. Kamigaki was surprised at the size he had never even heard of before. It has been a year since the farm started using 300 L / min OK Nozzles to generate fine bubbles in the well mainly for cherry tomato culture, which has been successful. The bubbles were also irrigated to their muskmelon house, and consequently, most of the melons became larger. Here, firstly the email from Mr. Kamigaki will be introduced with titles I prepared, and the results of melon cultivation will be considered referring to the fine bubble effects.

II. Email from Mr. Kamigaki

A. ***A monster melon it is!***

Hello, Mr. Matsunaga. Let me share an amazing news with you. A muskmelon over 4 kg was born! What a monster melon it is..., 4.5 kg! We have heard of muskmelons over 3 kg before but never heard of them being over 4 kg.

The size of muskmelons is determined by the number of those that can fit into the standard muskmelon-box: for muskmelons of 8 kg in total and is fixed throughout the country, according to the general sizes of muskmelons. For example, the typical size most widely available in supermarkets is



The muskmelon of 4.2 kg

a size 5 (five muskmelons of 1.6kg avg. in the box), and as a muskmelon farmer, I am usually aiming for the size 4 (four muskmelons of 2 kg avg. in the box). In addition, as for the size 3, only three of them can be put into the box and the weight will be 2.66 kg each in average.

Therefore, a 4 kg muskmelon means it is a size 2 and only two of them are available in a standard melon box. However, in this case, they will not fit in to the box as the height, length, and width of them will all be out of the box specification. Hope you will understand how gigantic this monster melon is.

We will send you this over 4-kg muskmelon in a box especially prepared for it and will appreciate it if you could you tell us how you felt about the taste.



Even half of it is 2.19 kg

The measurement of sugar content and the comments on tasting

After it arrived our office, we measured the sugar content as below. For the number, refer to the photo on the right.

- 1: 13.0° Brix –The part close to the vine
- 2: 15.5° Brix –Middle part
- 3: 15.5° Brix –Lower part
- 4: 15.5° Brix –Middle part

People's comments on the tasting were:

"It's as large as a watermelon"

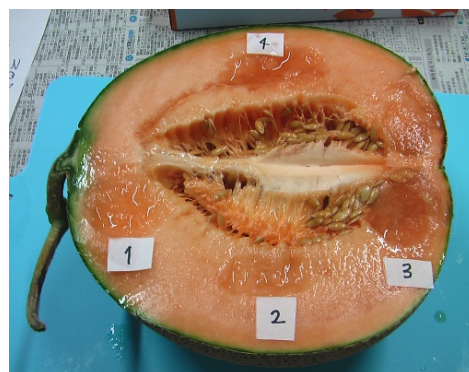
"How delicious!"

"It's sweet to the vicinity of the borderline of the rind",

"It's almost too sweet"

"The mesh is very fine"

"My daughter loved this even though she doesn't like melons usually."



Measurement position

From both measuring it and actually tasting it with several people, it was evaluated as sweet and delicious. If it is so sweet and tasteful even for its huge size, we can anticipate harvesting a lot more melons over 4 kg in the future.



The saccharimeter

*After this melon was delivered to our office, it was kept in the refrigerator for about a week until we got the saccharimeter. The reason the weight of the monster melon being 4.5 kg at the time of harvest became 4.2 kg when measuring the sugar content is:

- 1) There was a crack at the vine part when it arrived our office, which is probably caused by the shipment from Hokkaido to Osaka (5,000 km apart) as the upper part and the lower part of the box was wet with the juice.
- 2) Being stored in a refrigerator for a week until the saccharimeter arrived, even more juice was decreased probably here even it was rapped firmly.

B. Melons were mostly in size 3–4 this year

In our farm, aprox. 600 or more melons are harvested per house. This year, unlike the usual years, the size 5 were harvested extremely few and most of them were in size 4 or size 3 in almost an equal quantity .



2.61kg: Size 3

C. Will it be possible to collect six fruits per plant?

Melon culture is roughly divided into two types: creeping culture and three-dimensional culture, depending on the production areas. In Hokkaido, there are many creeping culture in which two vines are grown from one plant and two fruits are collected from one vine, and thus totally four fruits are collected per plant.



Based on the results of this year, we feel it is even possible to harvest three fruits from one vine and six fruits per plants next year. In that case, the yield will increase although I have never heard of six fruits per plant in any textbook of melon culture..., and I had been taking it for granted that the number of the melons per plant never changes and will never increase. However, now we are interested in taking initiative to improve the yield for next year and also for the future melon culture.

However, we worry about how the quality of taste changes if the yield increases. We have to take care of it too.

D. Usually, the size 3 is only about ten out of 600

Furthermore, I would like to talk about the other muskmelons I sent you which was of four in a box. The size of them is usually called size 3 and I think one or two of them were over 3kg because even the average weight of size 3 is 2.66kg as I mentioned earlier, this year some of them weighed more than 3kg.

Normally, the size 3 rarely appears in supermarkets and the like but in the "roadside stations" in the muskmelon-producing areas treated as featured products and are displayed conspicuously.



From my experience, the size 3 is as few as ten or even less out of about 600 muskmelons

harvested from one house of approx. 330m.² Although it is usually such a precious size, most of the muskmelons –especially the cantaloupes– came out in this size this year.

E. Why did the muskmelons grow larger?

–Because of the oxygen fine bubbles?

- i. The size of the house is 330 m². (frontage of 6.5 m x 50 m). The only thing changed from last year was the use of fine bubbles and oxygen tanks. Other than those, there was no particular change.
- ii. Fertilization was also designed based on the soil analysis value.
- iii. The root spread excellently. Was it because of the oxygen fine bubble water?
- iv. The weather was unfavorable than usual years as it was rainy and cloudy for more than two weeks until the harvest season. The quality of the crops was amazing for the weather.



Muskmelons grown near the tip of the vine

III. Fine bubble generation in the well

Hereafter, I will:

- Describe the fine bubble generation facility and the method in Kamigaki Farm.
- Consider the effect of oxygen fine bubbles in melon cultivation.

A. The installation of OK Nozzle for the irrigation culture

There are roughly three methods for producing fine bubble water using OK Nozzle in irrigation culture.

◆ *Method 1 (Single-pass method)*

When water pumped from a well or a river is irrigated directly, OK Nozzle is installed to the pipe at several meters ahead from the pump discharge side to generate fine bubbles. In this method, it is necessary to consider the back pressure of the irrigation pipe and to comprehend the amount of irrigation per minute almost accurately although it is difficult to grasp the precise number.

◆ *Method 2*

When water pumped either from a shallow or deep well is stored in a water tank and irrigated with another pump, fine bubbles can be generated while circulating the water with a different pump. This is the most simple and easy method.

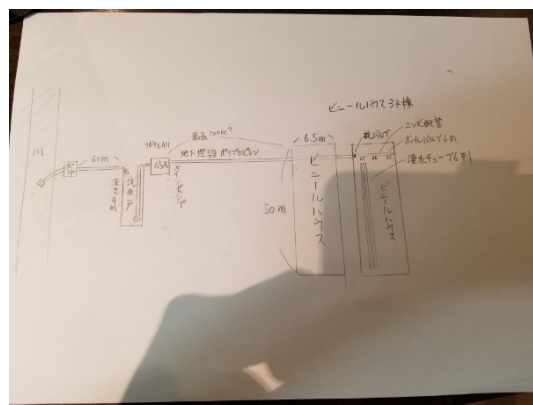
◆ *Method 3 (Single pass method) –the one used in the Kamigaki Farm*

When water pumped from the river etc. is stored in the water tank and irrigated with another pump, OK Nozzle can be installed to the discharge side of the pump that pumps river water, as DO level of river water is close to 100%. The advantage of this method is no requirement of a new pump.

There are also different arrangements for each method. The method will be determined according to the existing irrigation system, considering the efficiency of the fine bubble generation, simplicity of the system and the cost.

B. Method 3 was adopted in the Kamigaki Farm

The size and installation place of the OK Nozzle was examined after we received the schematic drawing and photographs of the irrigation facility of Kamigaki Farm. There was a well, but because the well water is not enough for the irrigation, it was also used to temporarily store the water pumped from the river. Therefore, we decided to install OK Nozzles at the middle of the well and the pump for river water. The size of OK Nozzle was judged from the amount of irrigation and the pump capability and determined to be 300 L / min nozzle, which was installed 2 m short of the well. This system is a single-pass method in which fine bubbles are generated by letting the river water pass the OK Nozzle only once.



It is necessary to control the water pressure and the amount of oxygen in order to correctly generate fine bubbles for irrigation. Here, the water pressure is managed by attaching manometer to immediate front of OK Nozzle inflow port, and the amount of oxygen is controlled by a gas flow meter.



Water distribution pipe



300 L / min OK Nozzle



Liquid fertilizer

IV. Considerations

A. About the melon root spreading

In general, when you supply fine bubbles to plants, the roots grow very well. Mr. Kamigaki also told us the muskmelon roots were spreading so much more than the usual years. As we do not have any photos of it unfortunately, the photos of muskmelon hydroponics by another farmer in Shimane prefecture are shown here. Fine bubbles are generated in a water tank especially for the hydroponics using 7 L / min OK Nozzle, and you may see how excellent the roots are from the photo. As you can see in the photo on the right, several fruits are grown from one vine without any defloration as for the experiment.



B. Fine bubbles concentrate the fertilizer

It is considered that the ionized fertilizer is concentrated by the characteristics of fine bubbles being electrified. As the examples of using OK Nozzle: in strawberry culture, the normal amount of liquid fertilizer became too much to be reduced due to the concentration; also, in Ariake seaweed culture, when fine bubbles were supplied to seaweed net in the farm, there was less discoloration even after it started to occur. Fine bubbles probably helped the seaweed gain enough nutrition to prevent the discoloration.

Thus, it is presumed that the muskmelons became larger because the roots absorbed the concentrated nutrient (fertilizer) efficiently, and the excellent spread of the roots has made is even more efficient.

C. High efficiency of FB generation with a single-pass method

Why does it effect on the growth of plants with a mere single-pass method? It is considered to be due to the quantity of fine bubbles –particularly that of ultrafine bubbles. By letting the pressured water go through the OK Nozzle, 10,000 microbubbles / ml and several 10,000,000 ultrafine bubbles are generated almost simultaneously.

*Although four million of ultrafine bubbles were generated in our experience using ultrapure water and pure oxygen, the generation number is several 10,000,000 ultrafine bubbles / ml or more in practical use with different quality of water and gas.

In addition, we presume the fine bubble effects increased more in the Kamigaki farm as oxygen fine bubbles was supplied using oxygen tanks, while even fine bubbles with atmospheric air is usually effective enough for plants.

D. For the future of melon culture!

We consider the muskmelons in the Kamigaki farm became larger due to the fine bubble effects written above, however, the most important fact is the Mr. Kamigaki's enthusiasm for the better melon culture.

Hope the farm will succeed in the challenge of: “harvesting three fruits from one vine and six fruits from one plant in total” and the “Harvest of 4-5 kg melons”. Also, if they can manage to constantly harvest muskmelons of 4-5 kg, they can be sold as a new brand of Shizunai area naming “Shizunai Monster Muskmelon” or “Shizunai King Melon” or the like.

We are very much looking forward to his muskmelons next year, even the irrigation control should be difficult to simultaneously conduct three farming experiment: harvest of two fruits per vine, three fruits per vine and the monster melons. –Concluded–

