Industry note: A strategy for sustainable farming based on plant healthy and food safety

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1 Introduction

The conventional farming has delivered tremendous harvest of crops in productivity and efficiency, through extensive use of fertilisers and pesticides (FAO, 2017). Farmers are always over dosed of chemical fertilisers and synthetic pesticides to increase the yields, which also for the outward appearance of products. Herbicides are also widely applied to kill weeds for saving labours. These activities bring about not only in environmental pollutions and food safety for human health, but also losing conditions for microbe growth, which deteriorates soil and bad for plant growing. More, external energy inputs are generally required which contribute to the carbon footprint issues.

In conventional farming, long-term using N-P-K chemical fertilisers brings about the pH decrease in soil, and important trace elements are difficult to be absorbed from being precipitated with sulphate and phosphate, especially for calcium which is a very important element to strengthen cell-walls. From high conductivity of N-P-K salts in soils, breed of microbes and root development are limited in soils. Under these situations, plants are difficult to grow in health with weak cell walls, and cytosol is easy to leak which attracts pathogenetic fungi and then occur diseases. As diseases occur, pesticides

are always applied to crops, not only kill the pathogenetic fungi, but also the symbiotic microorganisms. Herbicides are widely applied to kill weeds for save labours. Spraying pesticides and herbicides diminish microbes in soil and on plants, and lose their functions. By the way, soils will be turn hard and lost permeability, limits breed of microbes and root development. Plants are thus growing in unhealthy. As the plant growing is not as expected, then fertilise again. The vicious circle thus occurred unfortunately.

Contrasted to conventional farming, organic farming are proposed and achieved which respond to site-specific conditions integrating biological, cultural, and mechanical methods for resources-cycling, ecological balance, and biodiversity (USDA, 2016). Instead of the use of chemical fertilisers, pesticides, herbicides growth regulators in conventional farming, organic farming depend upon crop rotation, with animal and plant manures as fertilisers, and some hand weeding, as well as biological plant diseases and insect pests control (Scialabba, 2015).

However, it is generally recognised that conventional farming produces a higher amount of food than organic (Gabriel et al., 2013). Because organic agriculture has lower yields, this will increase the need for more areas under cultivation to create abundance in food production to support the increasing populations (Röös et al., 2018). The possible adverse impacts of agriculture to environmental and the increasing incidence of food-borne illness are required for our attention also.

The influence of agriculture activities to global climate change is just start to be concerned. For increase agriculture production through rising the farming areas, tropical forests and other native vegetation have been destructed, and contribute to the elevated levels of carbon dioxide and other greenhouse gases (EEA, 2021).

Based on the sustainable agriculture concept, food safety, environmental protection, food production requirement to support the world's populations, and also global climate change issues should be considered in the agriculture operation. Therefore, a new strategy for the management of food-security crops based on plant healthy has been proposed and examined in the past decade.

2 Methodology

2.1 Materials

Colloidal nano-calcium carbonate based products containing nano-hydroxyl silica and trace mineral elements, and *Bacillus subtilis* biological agent with metabolites were supplied by Diamond Quantum Biochem. Co., Ltd. (Taichung, Taiwan). Technology of the *Bacillus subtilis* culture was transferred from Professor Huang, Department of plant pathology, National Chung Hsing University (Taiwan).

2.2 Establish environmental conditions for microbe growth in soils

Impose organic soil substances in soil to retain humidity and fertilisers, and for microbe growth.

2.3 Field experiments and application

1 Foliar spraying: After shaking or mixing thoroughly, the colloidal nano-calcium carbonate based products and *Bacillus subtilis* biological agent are diluted with water for 300–500 folds depending on the crops prior to foliar spraying.

2 Drip irrigation: After shaking or mixing thoroughly, the *Bacillus subtilis* biological agent was diluted with water for 300 folds prior to drip irrigation.

3 Results and discussion

It is known that a healthy body of human need not drugs and medical cares. Similarly, if pesticides were required in plant vegetation, it indicates that plants are under unhealthy. Factors affecting plants in unhealthy growing are often from environmental conditions including unhealthy soils, lack or overexposure of sun, poor ventilation, lack of or soak in water, dry climate, too high or too low temperature or humidity. Extreme climate will be serious in future. Unhealthy soils are generally occurred from poor soil texture including lack of organic matter, lack or unbalance of fertilisers, shortages in microbes. These unhealthy soils are bad for root development of plants. Improper fertilisation (includes fertiliser and nutrition elements) might cause nutritional deficiency or imbalance.

3.1 Inspection the vicious circle in conventional farming

The vicious circles in conventional farming were inspected based on the interactions among chemical, biochemical, and microbes in soil or on plants. In conventional farming, it is custom to apply N, P, K chemical fertilisers, and seldom to use accessory element fertiliser or micronutrient. If the plant growing is not as expected, then fertilise again. According to chemical equilibrium in soil, over-dose of phosphate would cause difficulty in uptake of Ca, Mg, and micronutrient such as Zn, etc. by roots due to the precipitation of elements with phosphate. Ca is also precipitated by sulphate (residual of ammonium sulphate). It would bring about hardness of soil by $CaSO_4$ and Ca_3PO_4.

Besides, soil pH would be decreased from long-term application of chemical fertilisers, which leaches out these important inorganic mineral elements and thus difficult to be absorbed. Silicate would be turned into a neutral polymeric form and lack of mobility, and hard to be uptake by roots.

If plant is lack of Ca and Si, cell walls would be weak, lose its toughness for insect resistance and disease prevention; if lacking mineral elements such as Cu, Mn, Zn, etc., plant would lose its physiological and metabolic functions and under unhealthy growing. Moreover, breed of microbes and root development are also limited by high conductivity in soils from chemical fertilisers (N-P-K), and go to unhealthy of plants. If soil turns hardened, it would lost permeability, and limits the breed of microbes and root development.

Under these inappropriate conditions, plants are difficulty in healthy growing and bring about the lack of resistance to pests and diseases, pesticides are thus applied to kill. Herbicides are widely applied to kill weeds for saving labours in conventional farming. Spray pesticides and herbicides would diminish (die out) microbes in soil and on plants and lose their functions. Trace elements would be chelated by herbicides or their

metabolites and lose their functions in plant growing. When the plant's growing is not in expect, chemical fertilisers are often over-dosed again. These inter-relations create vicious circle among worse soil conditions, bad plant growing, over-dosed chemical fertilisers, and pesticides.

3.2 Inspection the organic farming

Contrasted to conventional farming, organic farming are proposed and achieved as these respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity (USDA, 2016; Scialabba, 2015; Gabriel et al., 2013).

Rather than using synthetic fertilisers, pesticides, growth regulators and livestock feed additives, organic farming systems rely on crop rotation, animal and plant manures as fertilisers, some hand weeding and biological pest control. However, it is generally recognised that organic farming produces a much less amount of food than conventional farming. Because organic agriculture has lower yields of crops, it will increase the need for more cultivation areas to create food production due to the population increase over the world (Gabriel et al., 2013; Röös et al., 2018).

Related to greenhouse gases, lower yields of crops depict lower quantities of carbon dioxide are depleted from atmosphere for photosynthesis. For more cultivation areas are needed to create food production, more forests would be destroyed. Destruction of forests and other native vegetations for agricultural production has an important role to elevate levels of carbon dioxide and other greenhouse gases (EEA, 2021).

3.3 Strategy for food-security crops based on plant healthy and sustainability

3.3.1 Build-up soil environmental systems for plant growing healthy

Because of long-term using chemical fertilisers, most of soil textures are poor in lack of organic matter, and with shortages in microbe species and colony. Thus, important nutrition elements are in short or difficult to be converted into effective species in soil and absorbed by roots for plant growing. Therefore, establish soil environmental conditions for microbe growth is necessary to impose organic matter in soil to retain humidity and fertilisers, and for microbe growth. The beneficial microorganisms *Bacillus subtilis* was added into soils via drip irrigation to build-up bacterial colony which also forms micro-film on the roots to protect and promote root development.

3.3.2 Supply nutrients from leaves

A healthy tree requires balance nutrients to support its metabolism and growth. In addition to take up nutrients by roots from soils, nutrients can be taken up from leaves also. Owing to roots cannot take up nutrients efficiently from soils after long-time convention farming, an alternately method is used to supply required mineral nutrients (colloidal nano-calcium carbonate based products) from leaves or branches by foliar spray to en-strong the vitality of plants. The colloidal nano-calcium carbonate based products (containing Ca, Mg, Si, B, and Zn, etc.) are spray onto the leaves or branches of plants after dilution of 300–500 folds. Because the calcium carbonate is in nano-size, the surface area is relatively higher than that in micro-size, and the surface of calcium

carbonate would be as calcium bicarbonate in neutral aqueous solution, which is colloidal to adhere onto the upper surface of leaf and partially dissolved to release calcium ions to penetrate into leaves gradually for foliar absorption. This technique is more effective than conventional methods by using aqueous solution whatever containing only calcium ion or EDTA-Ca, or adding wetting agent to overcome surface-tension of water or sticker to enhance the adhesion on the upper waxy surface of leaf.

3.3.3 Build-up beneficial microorganism symbiosis systems

Spray the beneficial microorganisms *Bacillus subtilis* on plants to build-up a plant defense circumstance (symbiosis) to protect leaves and branches. Metabolites in *Bacillus subtilis* biological agent have potential to promote roots development to absorb fertilisers and nutrients, and thus for plant growing. The concentration of metabolites is increased through using nano-particles of solid nutrient medium during cultivation, to enhance sterilisation function and plant growing.

3.4 Characteristics of the proposed farming method for crops

3.4.1 Improve the efficiency of foliar fertilisation of nutrients

The outer of epidermal cell in leaf contains cuticle layer and wax. Penetration of species in aqueous solution was through the molecular gaps and hydrophilic –OH and –COOH groups on the molecules. Because the channel for penetration is very small (pores have a diameter of less than 1 nm), particles are difficult to and only ions (dissolved in aqueous solution) can penetrate through the small pores (Judy and Bertsch, 2014). However, mineral nutrients in aqueous solutions are still difficult to enter the inner of leaves due to the higher surface tension of water. It can find some mineral element products as negatively charged EDTA-chelates on the market, they are difficult to enter the inner of leaves due to the repellence with the negatively charged carboxylates (pKa are around 4.8–5.0) in neutral aqueous solution. Therefore, most of nutrients in aqueous solution would be lost during spraying with nutrient solutions. To improve this defect, some conventional products demonstrate by adding surfactants to decrease the surface tension or adding polymer glue to retain the solution on the leaf surface. However, residuals of high molecule surfactants or polymer glues would block the channel gaps and stoma, which hinder their functions.

In the proposed farming method, aqua gel of nano-calcium carbonate is used to substitute polymer glues, surfactants, and chelating agents. In neutral pH aqueous solution, the surface of $CaCO_3$ particles comprises $Ca(HCO_3)_2$ and $Ca(HCO_3)^+$ forming aqua gel with sticky. If the particle of inner $CaCO_3$ is bigger, precipitate occurs, or it would be suspended for smaller particle. From investigation, the particle should be controlled in tens nanometres to prevent $CaCO_3$ precipitation. After shaking, it can suspend in water homogeneously. Si and other nutrient elements are absorbed onto the aqua gel of nano-level calcium carbonate. Because aqua gel of calcium carbonate is in nano-levels and with sticky slightly, it is easy to adhere onto the leaf surface. The soluble calcium and other nutrients penetrate into leaves gradually, and the calcium carbonate will turn into soluble calcium bicarbonate when absorb moisture from air, and release gradually. It looks like a release-control technique. Other nutrient elements absorbed on the aqua gel will release with calcium ion.

3.4.2 Ca and Si intensify the cell

Calcium as a central regulator of plant growth and development (Hepler, 2015), it plays an important role to produce plant tissues and enables plants to grow healthy, and is responsible to hold the cell walls together. Silicon is effective to enhance the resistance of plants to biotic and abiotic stresses (Hepler, 2015).

After penetrate into leaves and then into the tissues, Ca and Si would interact with pectin in cell walls and with components in cell membrane, and enhance their physical properties. As the cell structures are intensified by Ca and Si, plant grows healthy, and thus protected from the extremes of the environment, such as damages by salt, freeze, drought, and plant diseases and insect pests, etc. (Ma, 2004; Skendži et al., 2021).

Nanosilised organism of plant increases the resistance to pests and diseases, and also has potential to increase drought and cold resistances too. Besides, the nano-silised cell wall thickens the fruit peel and increases its toughness, prevents to crack, and increases storability. Ca can react with pectic acid to form stable Ca-pectic salt, enhanced the strength of fruit to prevent fruit cracking, and keep the crispness in the maturation period of fruits, which has potential to extent storability and marketable life. Normalisation of plant metabolic activities for healthy growing will be accomplished for the required mineral elements being able to obtain with the present technique.

3.4.3 Microbial control instead of chemical pesticides

In the present method, chemical pesticides do not recommend to control plant-pathogenic fungi and bacteria, and using *Bacillus subtilis* biological agent to substitute chemical pesticides. Recovery of a healthy soil is the most important for modern agriculture. Therefore, in the proposed farming method, it is required to build-up *Bacillus subtilis* colony in soil which forms micro-film on the roots to promote root development, and setup micro-film on the leaves by spraying, as well as change morphology of pathogen to protect plant from pathogen. Metabolites in the culture solution of *Bacillus subtilis* contain antibiotic substances with antiseptics and sterilisation functions, as well as growth stimulants to promote root development to absorb fertilisers and nutrients.

3.5 Applications of the proposed farming method in varied plants

In the past decade, we have engaged in the proposed farming method for food-security crops from field experiments and applications in various crops in Taiwan. Cases about the effectiveness of the method to improve plant health and fruits are as follows.

3.5.1 Citrus tankan Hayata

From the experiment of spraying Nano-Ca onto trees of citrus tankan Hayata, results indicated that in addition to Nano-Ca enhanced plant (Tankan) nutrition, it also increased the tolerance to insect pest (Hua et al., 2015).

3.5.2 Rice

When applied nano-Ca, Si in paddy, it decreased bacterial blight, brown spot, chilo suppress salis (Walker) in rice and increase the yields of rice. When using in rice seedling, root system of rice plants developed healthy, and increased the survivability of

transplant. Comparing to non-using nano-Ca, Si, rice plants grow slower and miss planted point occurred which required replenishment, when using nano-Ca, Si, rice plants grew straight and strong, almost no miss planted point.

Comparison of lodging resistance under hurricane, rice plants were lodged seriously with hurricane and almost all of the rice plants fallen-down and could not recover again for non-using nano-Ca, Si, as to those using nano-Ca, Si, rice plants were lodged slightly after hurricane and was recovered again, head grains still had a good harvest. For lodging resistance test by measuring the pressure with manometer after push down at 45°, 388.5 Kpa was for rice plants for using nano Ca, Si, and 226.4 Kpa for that of non-used.

3.5.3 Grape (Kyoho)

When applied nano-Ca, Si with trace mineral elements on grape (Kyoho), spray 1 time before blossom, 1 time in fruit period, and 2 times in coloration period, results indicated that nano-Ca, Si could promote to fulfil fruit flesh for bunch of grapes with homogeneous granule size and coloration.

3.5.4 Tea

Tze-Ji tea orchard takes charge in vegetarianism with eco-friendly farming, no animal wastes, no pesticides and no herbicide. Tea plants were in poor growth with weak vigour, and severe pests and diseases occurred. Lower yields were obtained year by year. After using nano-Ca, Si, with trace mineral elements and microbial agent, tea plants sprout rapidly with strong growth vigour, having dark green, thick and solid leaf blade. Because leaf blades turn thicker, leaf roller moths are unable to roll the leaves and cannot be protect from predators. Therefore, pests and diseases are rarely seen. No more damage as before from *Lepidoptera*, *Gypsymoth*, and *Jacobiasca formosana*. The tea orchard had a bumper harvest after a year's intensive and meticulous farming with the proposed faming method. The tea orchard has successive years of good harvest. Yields increase year by year so far.

3.5.5 Pear

After using nano-Ca, Si with trace mineral elements in a pick-your-own sightseeing pear orchard, pears are in sturdy with tough peel, almost no cracked fruit and less disease. Cracked fruits and bad fruits are down to less than 2%. Pears stand on the tree can extend longer, increasing income for one more month's business days.

3.5.6 Orange (citrus)

When applied nano-Ca, Si, with trace mineral elements and microbial agent in orange (citrus) garden, orange (citrus) trees grew vigorously, and rarely saw pests and diseases. Fruits were growing in clusters, fruitfulness, with ancient early taste and rare deformity.

3.5.7 Melons

When spraying microbial agent and nano-Ca, Si onto the leaves of melon (cantloupe) plants in insect screen nets, the number of leaves and leaf area increased. The weight and sweetness of melon fruits increased also. Besides, microbial agent inhibits powdery

mildew too. When spraying Nano-Ca, Si, with trace mineral elements and microbial agent to melon and watermelon plants grew wildly in river-side, plants grew up rapidly with rare pests and diseases, melon fruits were sweet and crisp, and the inferior fruit rate was very low.

3.5.8 Cucumber

Cucumber is a fairly common economic crop, when applied Nano-Ca, Si, with trace mineral elements the growth of cucumber plants was full of energetic, fruits were in bumper harvest with long, plump, non-crooked, and crispy, which was the first choice filler of cucumber for Sushi in Japanese food.

3.5.9 Sesame

When applied the microbial agent and nano-Ca, Si with trace mineral elements onto the crown, roots and leaves of sesame plants, roots are still healthy without damping-off that often occur in picking time. Sesame seeds are full plump, oily, and full aroma.

3.5.10 Mango

Mango is an important cash crop in subtropical countries, which bring income to farmers. However, pesticides are always used in these cash crops to keep the yields and qualities. In conventional management of mango trees and fruits, it is required to spray pesticides over 20 times per harvest. When using the proposed farming method, nano-Ca, Si, with trace mineral elements and microbial agent only spray 6 times to produce no scab, sweet scented mango. Inferior fruit rate was quite low. For these no-pesticide-residuals mango, not only reduce the farming cost, but also sell at high price.

3.5.11 Wax apple

Wax apple (bell-fruit) is another important cash crop in Taiwan. It is difficult to take care of wax apple, thus almost of 50% of fruits was cracked or suffered black rot in the time of ripening by conventional farming method. When using Nano-Ca, Si, with trace mineral elements and microbial agent on wax apples, not only with high fruiting rate, but also solving the cracked and disease problem. Inferior fruit rate decreased to less than 5%. It has solved the black speck on young fruit which turn into black rot on matured fruit.

3.5.12 Guava

Guava is also an important cash crop in Taiwan. To prevent damage from pests and diseases, pesticides are often sprayed onto young fruits of guava prior to bagging. The offensive odour of pesticides is uncomfortable to baggers and also harmful to their health. However, inferior fruit rates are still in 40%–45%. When using nano-Ca, Si, with trace mineral elements and microbial agent to substitute pesticides to spray onto young guava fruits prior to bagging, and in the following treatment per ten days, it shortens the maturity time of fruits with thick, sweet and crunchy flesh. The inferior rate was less than 5%. It can extend the shelf life also.

3.5.13 Strawberry

Strawberry is a favourite fruit for most peoples. It is easy to suffer disease and pests, and often spray pesticides per 2–3 days to have a good harvest. It has been recognised as the highest pesticide-residuals fruit. When using nano-Ca, Si, with trace mineral elements and microbial agent (after dilute 800 folds) to substitute pesticides to spray the plants and fruits per week, no-pesticide-residuals strawberry can be harvest with juicy and attractive flavour.

3.6 Impacts of the proposed farming method

3.6.1 Supplement of sufficient safe foods for humans

Compared to organic agriculture, the present farming method has potential to provide sufficient foods for rearing humans. Although some trace mineral elements are not allowable to be used in organic planting, however, these mineral elements are very important to the health of plants, especially Ca and Si are able to strength cell walls and thus defend some pests and diseases, and supply the demands in cell-division stages. Magnesium is essential for the formation of chlorophyll, B, Cu, Fe, Mn, Mo, Zn are important elements generally as co-factor in enzymatic metabolisms for plant healthy growing. These mineral elements are also very important elements to human health. In general, toxicity of any species depends on its quantity. Therefore, quantities of these elements in agriculture products are undoubtedly in safety.

3.6.2 Environmental-friendly farming matched to sustainable agriculture

Compared to conventional agriculture, the crops are not required pesticides to protect from pests and diseases with the proposed farming method. It is an environmental-friendly agriculture activity same as the organic agriculture. Thus, impacts from pesticides to environment and food safety are no more occurred. Besides, building up soil conditions for microbe growth by imposing organic matters in soil to retain humidity and fertilisers, as well as add beneficial microorganisms to build-up bacterial colony. These activities are to conform to sustainable agriculture.

3.6.3 Extreme-climate maintenance for plant growing

Because plants are with adequate Ca, Si, and other trace mineral elements in tissues, Ca and Si interact with cell walls and cell membrane to intensify cell structure , and enhance their physical properties to protect the plant from the extremes of the environment, such as damages by salt, freeze, and drought. Besides, Ca can react with pectic acid to form stable Ca-pectic salt, enhanced the strength of fruit to prevent fruit cracking, and the nano-silised cell wall thickens the fruit peel and increases its toughness, prevents to crack, and increases storability. Both elements increase the drought and cold resistances of plants. Metabolites of *Bacillus subtilis* promote root development to deeper soil layer to prevent from the impact of weather and pickling in water. Therefore, plants should be grow healthy and sturdy, and with potentiality to maintain growing in the coming extreme-climate, by using the proposed agriculture farming method.

3.6.4 Reduce the cost for crop management and increase the income

With the proposed agriculture activity, it can be satisfied with plant growing by spraying the Ca, Si with trace mineral elements and microbial agent around 10–20 days and depending upon crops, compared to spray pesticides around 3–5 days in conventional agriculture. The costs of the Ca, Si with trace mineral elements and the microbial agent are less than pesticides, more, labour costs are much less than in conventional agriculture. In general, the yields of agriculture products increase about 10%–30% with better quality and non-pesticides residuals. Farmers are able to increase the income from higher yields and selling a higher unit-price.

3.6.5 Carbon footprint emissions and sink

Greenhouse gas emissions from agriculture, including crop and livestock production, forestry and associated land use changes, are responsible for a significant fraction of anthropogenic emissions, up to 30% according to the Intergovernmental Panel on Climate Change (IPCC) (Tubiello et al. 2013; FAOSTAT, 2018). Therefore, carbon footprint emissions from agriculture have been emphasised and should be taken into account also.

During photosynthesis, carbon dioxide is combined with water and solar energy, and converted to carbohydrates. With the proposed farming activity, carbon dioxide emission decreases greatly from no pesticides or less chemical pesticides are required, compared to the conventional agriculture farming. After using nano-Ca, Si, with trace mineral elements and microbial agent, plants generally sprout rapidly with strong growth vigour, and have dark green (high chlorophyll concentration), thick, broad, and solid leaf blade, which are beneficial to photosynthesis reaction. It indicates that a high photosynthetic efficiency would be obtained from these healthy leaf blades under sun light. Photosynthesis consumes enormous carbon dioxide to provide the growth momentum of plants and to build up all parts of plants including trunk, branches, leaf, roots and fruits. From the carbon contents in the tissues of these parts (including prune branches and fallen leaf), and their weights, the quantity of carbon dioxide (3.67 times of carbon content) consumed for the growth of plant can be obtained. The contributions of photosynthesis products are not only for plant growing appeared above the surface, but also supply the carbon contents (sink) in the soil to increase the ratio of carbon to nitrogen and as nutrient for microbe growth in addition to roots, which is about 25%–30%. From the results of crops applied with the proposed farming method in the past decade, the yields of crops increased about 10%–30% compared to conventional farming. Therefore, in addition to the numerous carbon dioxide emission decreases, the healthy sturdy plant growing and high-yields of crops contribute to enormous carbon negative in carbon footprint.

4 Conclusions

In this article, an alternate agriculture farming method has been described based on the plant healthy strategy, including establish soil conditions for microbe growth to build-up bacterial colony, and improve the foliar fertilisation efficiency Ca, Si, and trace mineral essential elements through release-control from adhered colloid nano-calcium carbonate on the leaf. After the field tests and applications in varied crops in the past decade, the

yields of agriculture products increase about 10%–30% with better quality and non-pesticides residuals, which reduce the farming cost and increase the income. Plants can grow healthy and sturdy, with potentiality to maintain growing in extreme-climate. It is an environmental-friendly agriculture activity matched to sustainable agriculture. Because non (or less)-pesticides and less labour operations are required, carbon dioxide emission thus decreases. The healthy sturdy plant growing and high-yields of crops contribute to a higher carbon negative in carbon footprint. The present agriculture method with sustainable characters has potential to provide sufficient foods for rearing humans. It is worthy to promote in the future.

Acknowledgements

We appreciate Diamond Quantum Biochem. Co., Ltd. to support materials of nano-calcium carbonate based products and *Bacillus subtilis* biological agent, Professor J.W. Huang and T.P. Huang, Department of plant pathology National Chung Hsing University for technology supports, and helps from farmers.

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