BRAIN

[Episode 8] Labor-Saving of Agricultural Workload Using the AI-Driven Watering/Manuring System

Outcome Example of Bio-oriented Technology **Issued on June 22, 2020**
Research Advancement Institution

[Labor-saving, high yield, and high-quality protected horticulture]

The primary concern for agricultural producers is the difficulty of adequately determining when and how much water and fertilizer should be applied while visiting the cultivation sites and verifying the growth states of farm products, the water content in the field soil, and the influence of weather. In certain cases, advanced protected horticulture meeting three requirements (labor-saving, high yield, and high quality) have been achieved by taking advantage of artificial intelligence (AI) in watering and manuring works, which have relied on intuition and experience in the past.

Some tomato and strawberry producers have expressed their joy, “We can now engage more in quality management and yield improvement because I don’t have to do watering that used to take more than one hour every day.” About 90% of their watering and manuring works decreased in that dramatic case.

[Ideal watering and manuring by most advanced AI]

This innovative technology, called “ZeRo.Agri,” was developed by Routrek Networks, Inc. (Kawasaki, Kanagawa. CEO, Shin’ichi SASAKI). Routrek Networks, Inc. won the Agricultural Venture Award (Minister of Agriculture, Forestry and Fisheries Award), the 4th Japan Venture Awards 2018 (sponsored by Ministry of Economy, Trade and Industry).

The “ZeRo.Agri” system (Image 1) enables the agricultural producers to determine the most appropriate amount of water and fertilizer based on the electrical conductivity (EC) values, an indicator of the fertilizer content in the field soil, read on a soil sensor, in combination with solar irradiance forecast data, making full use of the most advanced AI technology.

Image 1: ZeRo.Agri system

Image 2: Dripping tube

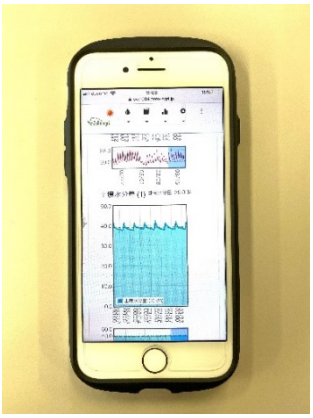

Image 3: Control panel display

(Source: Home Page of Routrek Networks, Inc.)

The producers consume a large amount of time and workload in walking around the greenhouses fields to check the crop growth and applying water. However, because “ZeRo.Agri” can automatically supply the most appropriate amount of nutrient solution (water and fertilizer) required by farm products timely from the dripping tubes (Photo 2), labor- and water-saving become feasible. This frequent watering in small amounts (a small amount of watering almost every hour) is expected to achieve high quality and improve the yield because of no stress imposed on the products.

[Remote control using a smart phone]

The producers have the advantage of verifying the data obtained from “ZeRo.Agri” on a PC or a smartphone (Photo 3). With no need to go to their fields, producers can remotely monitor data on the fields and control the concentration of the nutrient solution and the setting of the manuring timing. Owing to this system, the producers can save the time required for watering and manuring and focus on the cultivation management and yield of farm products, leading to the feasibility of expansion in the scale of farming. This technology can support younger persons who hope to enter the agricultural industry but have less experience in this field.

[Two hundreds or more agricultural fields in 40 prefectures have introduced “ZeRo.Agri.”]

“ZeRo.Agri” has already been used at 200 or more agricultural fields in 40 prefectures, including Fukushima, Kumamoto, Hiroshima, Gunma, and Tochigi. The farm products applicable to this system include fruits and vegetables such as tomato and cucumber. Recently, it has been spreading into strawberry cultivation, thus achieving high yield. Moreover, “ZeRo.Agri” has been applied to the cultivation of bell pepper, eggplant, cantaloupe, and flowers and become a dependable partner in protected horticulture.

[Joyful comments from the producers who introduced “ZeRo.Agri”]

The producers who introduced "ZeRo.Agri" have given their positive comments: "I could expand in size owing to the saved working time"; "Since work efficiency has improved, we can have the "ZeRo.Agri" to manage holiday operation. The farm products are now less prone to disease"; "With the reduced time required for watering and manuring, we are now able to concentrate on other works, such as harvesting." It is not uncommon for the producers introduced “ZeRo.Agri” that the work time has been considerably reduced, water and fertilizer were saved by almost 50%, and their incomes have increased by about 30%.

Moreover, some producers introduced this system to promote the employment of persons with disabilities, which is an innovative challenge in agriculture-welfare collaboration.

For more information on “Episode Series”, please visit the URL:
http://www.naro.affrc.go.jp/laboratory/brain/contents/fukyu/episode/index.html

<Project name>	**The Special Scheme Project on advanced research and development for next-generation technology (institution’s corporate enhancement project)**
<Project period>	**FY 2017 to 2019**
<Title>	**Generalization and demonstration of ICT-based fertigation control system, which achieves high incomes using pipe houses**
<Leading research institutes>	**Routrek Networks, Inc. (ICT-based fertigation consortium)**