Chapter 17
Staking Recovery Hopes on Soma Revival Rice

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Abstract This chapter conveys the sense of crisis and mission felt by students who participated in soil survey analyses to help restore paddy fields immensely damaged by the tsunami. Also, it presents the background and hard work that led to the harvesting and sale of "Soma Revival Rice". This rice was grown on tsunami-damaged paddy fields recovered through a method developed by the Tokyo University of Agriculture.

Keywords Soma Revival Rice • Soil analyses • Tsunami-damaged paddy fields

17.1 The Story Behind Soma Revival Rice

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It was September 5, 2011, and we were on our way to Fukushima to study the effect of earthquake and tsunami-related damage on strawberry greenhouses. Partway through our journey, Professor Itsuo Goto received an e-mail. It was from Professor Toshiyuki Monma, explaining that farmers in the Iwanoko district of Soma city had requested help in restoring their damaged rice paddies. We changed our plans for the following day and headed for Iwanoko. This was the beginning of the Soma Revival Rice project.

We arrived on the afternoon of September 6 to find four people waiting for us, including Norio Sato, the head of the Iwanoko regional agricultural recovery asso-

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Fig. 17.1 Conducting soil study in a damaged rice paddy

ciation. Soma's Iwanoko district, which looks out onto Matsukawaura Prefectural Natural Park, has 150 ha of rice paddies located 2 km from the coast. Most paddies were littered with tsunami debris, ranging from pine trees uprooted from the sandbanks of Matsukawaura Lagoon, to debris from ruined homes, to boats. Furthermore, the surface of the paddies was covered with sediment that had been dredged from the ocean floor by the tsunami. The lack of a foreseeable way forward had sapped farmers of their will to cultivate the land.

We began by investigating four sites in the Iwanoko district with different levels of damage (Fig. 17.1). We divided the soil into three layers—the tsunami sediment covering the paddy surface, the prepared topsoil originally intended for rice planting, and the subsoil underneath—and analyzed their content. We found that the tsunami sediment washed from the seabed was rich in magnesium and potassium, substances required for plant growth. And although we feared that the sediment may contain heavy metals, our analysis found their level to be no different from that of the topsoil, which meant it had no impact on rice cultivation. On the other hand, the high concentration of salt from the seawater made it impossible to plant crops in the soil as it was.

To address this problem, near the end of September we combined the tsunami sediment and topsoil of a paddy of 60 ares owned by Sato, then created mole drains and attempted to remove the salt from the paddy using rainwater only. Compared to a neighboring paddy field whose layers were not mixed, the salt-removing effect was marked. This observation meant that the tsunami sediment did not need to be removed, and that farmers could restore their paddies on their own using agricul-

Fig. 17.2 Holding a briefing meeting on measures to restore rice paddies

tural machinery. This discovery gave Sato and the other farmers hope that they might be able to recommence farming.

On the evening of November 3, the university gathered the members of the Iwanoko recovery association and held a briefing on recommencing rice farming. It would be up to the local farmers to decide whether to remove the salt from their paddies using the successful Tokyo University of Agriculture Method (also known as the Soma Method). Around 40 participants were in attendance, and they listened intently as Professor Goto used slides to explain the situation. The salt removal method, which differed from the procedure recommended by the Ministry of Agriculture, Forestry and Fisheries, surprised the farmers. After the meeting, which lasted a little less than 2 h, the association members stayed late into the night discussing the best course of action (Fig. 17.2).

In the end, Sato concluded "We won't know unless we try," and at the end of November performed the salt removal process on two more paddies in addition to the original paddy whose soil layers were mixed in September. Nonetheless, only 1.7 ha of rice could be planted in 2012, which brought home to us the difficulty involved in restoring the rice paddies.

The tsunami sediment with which the topsoil was mixed contained pyrite. On the ocean floor, pyrite is stable and does not react. However, when exposed to air it oxidizes to form highly acidic sulfuric acid, lowering the soil pH (H_2O) to around 3. Countermeasures were therefore required to proceed with cultivation. To address this problem, we focused our attention on converter slag, which is available as a

Fig. 17.3 Using a lime sower to spread converter slag

commercial ameliorating agent. In addition to being rich in calcium, converter slag is also rich in iron and silicic acid. Adding this agent to the paddies not only lowers the acidity of the soil, but also prevents aging and hydrogen sulfide toxicity, effectively killing three birds with one stone and making it the logical choice.

The soil in the three paddies spanning 1.7 ha had also acidified. With support from Nippon Steel & Sumitomo Metal Corporation and Minex Corporation, who provided us with converter slag in three different pellet sizes, on April 24, 2012, we used a lime sower to distribute 0.5–1.0 t/10 ares of the agent (Fig. 17.3). As a result, the soil pH (H_2O) rose to a level suitable for rice cultivation.

Although some irrigation and drainage channels were damaged, on May 11 we filled the paddies with water and planted rice seedlings (Hitomebore variety) (Fig. 17.4). A year and 2 months after the earthquake, in a district devastated by the ensuing tsunami, we had managed to conduct our own salt removal process and plant rice paddies amidst surrounding fields that had been considered untouchable and left to run wild. Our paddy of rice seedlings, which lay among overgrown fields as far as the eye could see, became a local center of attention and a symbol of the first step toward restarting agriculture in Soma. With this heavy pressure, failure was not an option.

The city of Soma is located in Fukushima Prefecture, approximately 40 km from the Fukushima Daiichi Nuclear Power Station. Unless the radioactive cesium concentration in the rice harvested in 2012 was within the safety limit (100 Bq/kg) for

Fig. 17.4 Rice seedlings were successfully planted

unpolished rice, we would not be able to sell it. To this end, in August we collected stems and leaves to measure the concentration of radioactive cesium. Our results found the level to be below the limit of detection of 10 Bq/kg. The radiation concentration in unpolished rice grains is known to be around one third to half the level in the stems and leaves. This finding relieved Sato.

On September 27, the first crop of rice was harvested under a cloudless sky. The rice plants gathered by the combine were heavy, and from the outset Sato had a feeling that this year's crop was better than most. Once the plants were transported to his house—where the drier was kept—dried, and hulled, the size of the harvest became evident: 630 kg of rice per 10 ares. Before the earthquake, the harvest of Hitomebore had averaged around 600 kg per 10 ares. Thus, as far as the harvest was concerned, we could not have hoped for better and we all celebrated, but there were inevitable worries about the radiation content. Yet neither Fukushima Prefecture's "every bag" testing nor the university's germanium detector found any trace of cesium, and the rice was confirmed safe for consumption. All in all, the 1.7 ha of paddy fields generated about 10 tons of unpolished rice. Once polished, the rice was given the name "Soma Revival Rice" (Fig. 17.5), and in 2013, the area planted grew to about 40 ha. As a result of this success, I am hoping that the creation of Soma Revival Rice will serve as a first step toward recovery.

Fig. 17.5 The harvested Soma Revival Rice

17.2 Bonds Form as Rice Grows: Participating in the Revival Rice Project

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At 10 A.M. on November 2, 2012, the first day of the Tokyo University of Agriculture harvest festival, Soma Revival Rice went on sale outside the co-op store on the Setagaya campus. The five to six students in charge of the stall were shouting out, inviting potential customers to stop by. The stall itself was covered with 1 kg bags of rice arranged in lines. It was a simple booth, just a table and a cash register, but the students' handmade signs and posters gave it something of a presence despite its simplicity.

In May 2011, it was decided that the Laboratory of Agricultural Production and Environmental Chemistry, to which I belong, would form a recovery assistance team. Professor Goto explained the situation in the disaster zone, and I was asked if

I would like to assist. I made up my mind to join then and there. Although parental consent was required to participate, my parents were extremely supportive when I raised the issue, urging me to give it everything I had. Shortly after, the eight-member East Japan Assistance Project soil fertilization team was born, composed of researchers and students headed by Professor Goto. After study and analysis of soil conditions, a salt removal method was established, involving mixing the soil and then exposing it to rainwater. Subsequently, in 2012, rice was planted over 1.7 ha of paddy area in the Iwanoko district. We conducted regular studies of the paddies to observe the progress through to harvest. By June, the paddies next to the barren, salt-damaged land on which even weeds had refused to grow were filled with green shoots stretching toward the sky. By August heads of rice had taken shape, and by September a golden carpet had begun to form on the otherwise desolate land. These golden ears of rice, drooping with their own weight, would rustle as the wind swept across the vast plains. The sparkling golden grains shone under the clear fall sky, engraving their image in the minds of all who gazed upon them. Before the heads were harvested by combine, we collected a sample to study. No matter how bountiful the harvest, its safety had to be confirmed. We ran tests to determine levels of radiation, heavy metals, and quality. Our results found no trace of radiation, and heavy metal levels that were far lower than the designated limits. These results proved that the rice was safe and could be consumed with peace of mind, so the decision was made to sell the Revival Rice at the university's harvest festival.

Our sales target was 1 ton of rice. By selling the rice, we hoped to demonstrate that safe, quality-assured rice could be grown in Fukushima. We hoped that when people ate it, they would think not only of how good it tasted, but also of the people who grew it. The walls of the stall were filled with photographs showing the situation in the affected area and explaining the processes that were undertaken to grow the rice. Beside the register were A4-sized flyers explaining the concept behind Revival Rice. Although there were few visitors in the morning and sales of the rice were slow, some people stopped to look at the photos and ask about the product. Then the flow of customers gradually picked up, and our rice began to sell. Customers ranged from young children to senior citizens, with families and elementary school students among those making purchases. There was particular interest from homemakers, who would often question us intently about the safety of the rice. Although we were slightly concerned that the 1-kg size might be too heavy and deter customers, these worries proved unfounded. One woman even returned the next day to buy more, telling us that the rice she had purchased the day before was delicious. There were customers who would tell us, with tears in their eyes, that they were from Fukushima. One person bought more than a dozen bags to distribute to acquaintances. And just like that, our 1,000 bags of rice had sold out (Fig. 17.6).

This crop, harvested from a little corner of the tsunami-damaged region, generated a great deal of interest, and this year 40 ha of paddies have been planted in the Iwanoko district. Norio Sato, the farmer who grew the Revival Rice, told us, with a smile on his face, that it had given him renewed energy. Then he moved straight

Fig. 17.6 Soma Revival Rice is sold at the harvest festival

onto the topic of planting next year's crop. I realized that when people enjoy eating rice that tastes good and that the farmers enjoyed growing, bonds are forged. Each of the stages—from plowing and growing to selling, buying, and eating—is linked, and each of us is responsible for one of those stages. I hope to cherish my role in the process and keep these bonds between farmer and consumer alive.

17.3 Participating in the East Japan Assistance Project

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I first joined Tokyo University of Agriculture's East Japan Assistance Project during the soil fertilization team's second Fukushima survey in June 2011. Touring the damaged coastal districts of Soma, I was lost for words at the sheer devastation. Houses with only a skeleton of the ground floor remaining, cars reduced to mere lumps of metal, and boats washed inland as far as the residential areas—they all bore witness to the massive power of the tsunami. Farmlands in the coastal districts

were covered in sediment brought in by the tsunami, pine trees ripped from the Matsukawaura sandbanks, and masses of wreckage, and mangled tractors and other farm machinery lay scattered. Drainage pump stations had also been destroyed, and as the earthquake had caused the land to subside, seawater had flowed inland, turning the whole area into part of the ocean. I wondered who would even think of attempting to farm again on this ruined land. Nonetheless, having initially been taken aback by the scale of devastation, over the next one and a half years I would find myself deeply moved by the resilience of the local farmers as they successfully managed to start farming again.

My job mainly involved analysis of soil. Every month I would visit Soma to collect soil samples from tsunami-damaged farmland, then take them back to the laboratory to analyze the level of salt and other nutrients. Although collecting and analyzing a large volume of samples each time was in itself quite taxing, the anxiety of knowing that the data I produced would affect recovery work at the site was even more stressful. Realizing that any errors would cause irreparable damage to the project, I performed each analysis with the utmost care, knowing there would be no second chances.

We spent an anxious month after planting the rice seedlings in May 2012. However, by June our worries subsided as we saw that the seedlings had developed strong roots. As time passed in July and August, the fields neighboring our plot began to grow wild. Then herbicides were sprayed to control this runaway growth, and the wilted brown scrub became reminiscent of wintertime, despite it being the middle of summer. Amidst this, however, stood our three paddies, filled with rice shoots growing green and strong. It was a moving sight. And I will never forget the beauty of the way the plants bent in the September wind before the harvest. Although it covered only a small area, the first sight of shimmering gold in 2 years seemed almost majestic. “I want to encourage my fellow farmers by showing that we can still plant and grow rice ourselves, in spite of the tsunami,” commented Norio Sato, the farmer who grew the rice. His success proved that our efforts had not been in vain, and gave us renewed hope.

When we sold the rice at the harvest festival, we were initially worried about whether we would be able to sell it all. However, these concerns quickly vanished. Admittedly, quite a few people were worried about radiation, and we did sense the damage that a negative reputation and misinformation can cause, but most visitors were reassured when we explained that the rice had been thoroughly tested. Many offered kind words of encouragement, and expressed their desire to support the affected regions, asking whether the money they paid would go to the grower. The words of appreciation from former Fukushima residents left a particular impression on me (Fig. 17.7).

It is, however, still the case that, although farmland in all areas damaged by the tsunami will likely be restored over the next several years, recovery from the nuclear accident will take much longer. I believe the university should continue doing everything in its power to provide even greater support until all areas

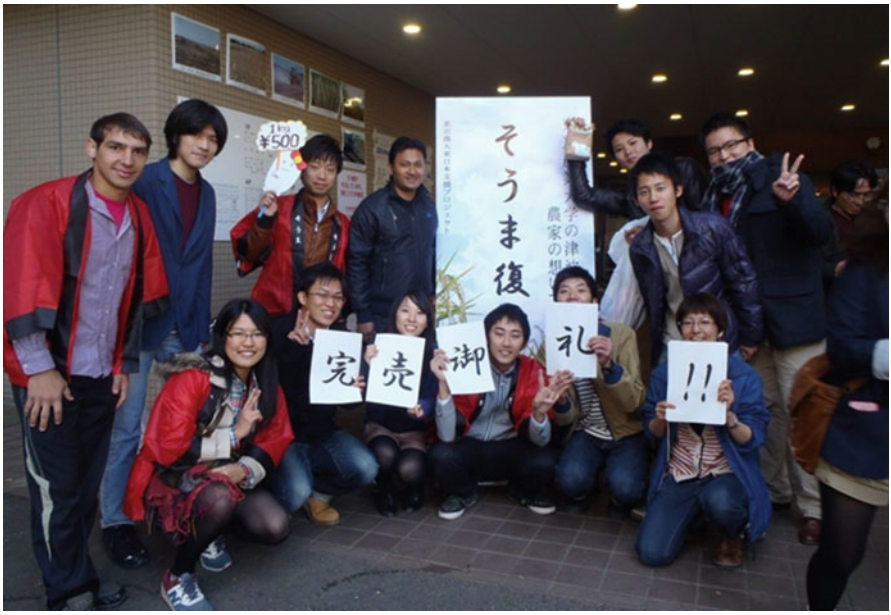

Fig. 17.7 Soma Revival Rice sold out at the harvest festival

damaged as a result of the Great East Japan Earthquake and its associated disasters have fully recovered.

Being involved with the project brought home to me the huge significance of the calling invoked by the word "Agriculture" in the university's name.

17.4 Revival Rice and *Kizuna* (Bonds of Friendship)

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Initially, after the earthquake, the tsunami footage replayed over and over on television seemed like a scene from a far-off place. However, a year later I joined the earthquake recovery voluntary activities sponsored by the university's parents' association, wanting to see the situation in the affected region with my own eyes. In Ishinomaki, Miyagi Prefecture, the sight of debris still piled high and houses

Fig. 17.8 The plants were still green in mid-August, with ears of rice beginning to form

reduced to their foundations left me at a loss for words. Later, we volunteered at temporary housing units in Higashi-Matsushima, also in Miyagi Prefecture. Although our time there passed by in a flash, the parting words of one of the residents left a particularly lasting impression: "You said that you haven't been able to help us much, but that's not true. Knowing that you haven't forgotten us is all the support we need."

Through this volunteering experience I learned about Tokyo University of Agriculture's East Japan Assistance Project. I was curious to know how my research group was involved, and when I expressed my desire to accompany the team on their survey of Fukushima, I was allowed to participate despite being only a third-year student.

The study took place in early August, and the rice plants were still green, with the ears only just starting to form (Fig. 17.8). I tagged along with the more senior students, helping perform growth studies and collect soil samples. At first I felt satisfied simply being in Fukushima. But as the study progressed, I heard the passion in the farmers' voices as they addressed Professor Goto and research fellow Kaisei Inagaki, and realized that to assist the recovery effort I first needed to understand the problems people were facing. I needed to study harder.

I also helped sell Soma Revival Rice at the harvest festival. I believe that selling the rice helped deliver hope to the farmers in the disaster zones as well as increase

the number of people supporting them as they worked to recover. I intend to continue supporting the afflicted region by remembering the people impacted by the disasters, visiting Tohoku and buying Tohoku-made products, and studying and researching the situation with them in mind.