Column 5

Climate Change and Crop Management in Indonesia

Eri Matsuura and Nobuo Sakagami

Rice is a daily staple for the most of Indonesian people, and rice consumption has increased every year as the population has increased (Suryani et al. 2016). Climate change has severely affected rice production by increasing minimum temperatures and changing rainfall patterns. The decline in rice yield due climate change could threaten national food security over the long term. To maintain the food self-supporting rate and support farmers, new technologies for adapting to climate change in farming systems are needed. Asia-Pacific Climate Change Adaptation Information Platform (AP-PLAT) (2020) reported that the Indonesian government published the National Action Plan for Climate Change Adaptation (*Rencana Aksi Nasional Adaptasi Perubahan Iklim* or RAN-API) in 2014, and the Ministry of the Environment in Japan (MOEJ) and the Ministry of National Development Planning, Indonesia (BAPPENAS) are cooperating to assess the impact of climate change for local adaptation planning in the Republic of Indonesia.

Several farming systems have been proposed for adapting to climate change in Indonesia. First, the System of Rice Intensification (SRI) was developed in the early 1980s by Fr. Henri de Laulanie (SRI-Rice 2020). SRI is based on four main principles: (1) early plant establishment; (2) reduced plant density; (3) improved soil conditions through enrichment with organic matter; and (4) reduced and controlled water application (SRI-Rice 2020). To improve rice production, SRI was introduced in 1999 in Indonesia. The SRI method not only increases rice yields by using less water, grain and fertilizer, but it can also contribute to greenhouse gas mitigation from paddies.

In addition, according to a report based on knowledge exchange on the rice farming practices in Yogyakarta, Indonesia (FAO 2016), conservation farming systems

E. Matsuura · N. Sakagami (✉)
College of Agriculture, Ibaraki University, Ibaraki, Japan
e-mail: nobuo.sakagami.soil@vc.ibaraki.ac.jp

such as the *Mina Padi* system (Fig. C5.1) and the *Jajar Legowo* planting system (Fig. C5.2) have been practiced by local farmers.

Balai Pengkajian Teknologi Pertanian (BPTP) Sulawesi Barat (2020) described the *Mina padi* system as an integrated farming system for cultivating fish in paddies. Farmers derive four benefits from this system: (1) Minimum use of fertilizer; (2) Fish are natural predators of the pests in paddies; (3) Save time and labor due as weeding performed by fish; and (4) Double income by selling fish. Another integrated farming system, *Jajar Legowo* planting system has some variations that are used to cultivate rice using different spacing of transplanted rice, such as *Jarwo* 2:1, 3:1 or 4:1. Ducks are used for pest and weed control. *Legowo* 2:1 method can increase rice productivity by 1.5 times compared to the SRI method (Darmawan 2016). Regular spacing can create suitable humidity and temperature for rice growth in paddies.

Fig. C5.1 *Mina padi* system (BPTP Sulawesi Barat 2020)

Fig. C5.2 *Jajar Legowo* planting system 4:1 (Fausayana and Tarappa 2018)

Kusumasari (2016) noticed that farmers understand climate change occurring in their region and its influences on their cultivation method. She also pointed out that changing the planting pattern, using soil cultivation technique, plant pest management technique, and watering/irrigation technique can be used as countermeasures. Various integrated farming systems might be resilient to climate change and sustainable by saving water, less use of fertilizers and increasing soil organic matter. Moreover, farmers can manage the system better and adapt to the local environment in different islands of Indonesia. Farmers know the best farming practices in their region based on experience. Climate-smart agricultural technologies do not need to be expensive; rather, farmers' experience and new knowledge can be combined to produce better outcomes in farmers' livelihoods and mitigate global warming.

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