

## Sprinkler irrigation for preventing heat wave effects on rice

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Climate change plays a significant role in the deterioration of rice (japonica) quality in Japan. The effect is referred to as high-temperature ripening damage. The daily mean temperature exceeded to 26°C during the 20 days after the heading of rice showed a clear association with decline in the observed rice quality. In particular, it is known that the exposure of the only panicles to high temperatures has a greater effect on rice quality than when only the leaves and stems are exposed. One adaptation method used by farmers to prevent such damage is water management.

Four experimental fields (each about 100 m<sup>2</sup>) were each planted with the Koshihikari rice variety, the most commonly grown and highest-quality rice in Japan. Sprinkler irrigation was performed for three hours, in one field in the morning, in another in the afternoon, and with the last field being irrigated in the evening. Regular surface irrigation was performed in a control field. Temperature, humidity, irrigation volume, and ponding depth were measured in all fields for the 20 days after heading. On two of the experimental days during which there were high temperatures without rainfall, sprinkler irrigation decreased the temperature in the fields at 80 cm height from the ground surface by up to 3.0°C relative to the control. The most effective irrigation time was the evening. Over the study period, the temperature at 80 cm height decreased sharply soon after the start of irrigation. In addition, the temperature at 80 cm height in the field irrigated in the evening was lower than that of the control by 0.72°C, as averaged over the 12 h post-irrigation.

The irrigation volume per irrigation trial varied from 2.7 to 8.7 mm/3 h. In cases where a field was irrigated less than 5.0 mm/3 h, the temperature at any height did not decrease significantly relative to the control. Generally, the irrigation volume per day in a rice paddy field in Japan is between 10 and 100 mm/d. Thus, it is possible to decrease the ambient temperature around rice panicles via sprinkler irrigation of sufficient volume and appropriate timing.