

Category	: International Rice Research Conference
Select Theme	: Climate change and environmental sustainability
Endorsement email	:
Keyword 1	: Adaptation to climate change
Keyword 2	: Soil, water, and air pollution
Keyword 3	:
Title of Entry	: Effects of 10 years of open-field soil and water warming on rice growth and yield
Presenting author	: Toshihiro Hasegawa
Presenting author email	: thase@affrc.go.jp
Co author 1	: Hitomi Wakatsuki, , Minehiko Fukuoka, Mayumi Yoshimoto, Yasuhiro Usui, Hidemitsu Sakai
Co author 2	:
Affiliation presenting author	: National Agriculture and Food Research Organization
Affiliation 1	:
Affiliation 2	:
Select only one type of presentation	: 15 minute oral presentation
Abstract	: Global warming can influence rice growth and yield through the direct impacts on rice physiology and through indirect effects through gradual changes in soil fertility. A single warming experiment is often insufficient to understand those direct and indirect effects on rice yield. Here we report the results from 10-year continuous open-air and year-around soil and water experiments to understand the impact of global warming on growth and yield of two rice cultivars (Akitakomachi and Koshihikari), by analyzing the effects of long-term continuous warming and those of year-to-year variation in weather conditions. The experiments were conducted at the year-around open-air warming facility at NIAES, Tsukuba, Ibaraki, Japan (36°01'N, 140°06'E) for 10 years from 2007 to 2016. During the rice growing season, water-proofed floor heating cables were installed on the submerged soil surface between rows, targeting to raise water temperature (T_w) by 2°C. In the winter fallow period (Nov-Feb), soil temperatures were raised passively by covering the plot with an infrared radiation reflecting sheet to reduce the radiation cooling in the evening. The effect of T_w on yield was different between cultivars; yield was reduced by 8 % in Akitakomachi, but only by 2 % in Koshihikari. The yield reduction was also different among years ($P=0.072$ for year x temperature), the reduction being greater in warm years. Elevated temperature (ET)/Normal temperature (NT) ratio for the grain yield was not correlated with years after start of the treatment. ET significantly shortened days to heading, but they were not correlated with biomass or yield. HI decreased linearly with increasing T_w , which accounted for the year x temperature interaction for yield. Aboveground biomass decreased linearly with years after start of the treatment at 20 g m ⁻² yr ⁻¹ ($P<0.001$). The decrease was not accelerated by ET, suggesting that continuous rice straw

removal decreased biomass production and grain yield in both treatments. In summary, the 10-year field trial revealed a clear decrease in biomass production. Grain yield was significantly reduced by ET notably in Akitakomachi, largely because of decreased HI by ET. We need to determine the mechanism by which HI was strongly affected by Tw.

[Read Less»](#)

Uploaded Files »

No files found.