

Topic: Analysis of Temperature Impacts on Rice Production in Thailand during 1983-2012

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ABSTRACT

This study analyzed the 30-year trends of temperatures during 1983-2012 and evaluated the potential impacts of daily maximum temperature, mean daily temperature and daily minimum temperature on rice production in Thailand. The maximum temperatures records at 78 meteorological stations, minimum temperature at 80 meteorological stations and mean temperatures records at 69 meteorological stations of the Thai Meteorological Department in were used for this study. It was found that the average daily maximum and mean temperature had increased with increasing rate of 0.13°C and 0.10 °C per decade, respectively. Minimum temperatures had significant increased with increasing rate of 0.29°C ($p \leq 0.01$) per decade. Using the temperature indices derived from daily maximum temperature of $\geq 35^\circ\text{C}$ and mean daily temperature of $\leq 22^\circ\text{C}$, at which adverse effects on rice production have been suggested, revealed that rice cultivation in Thailand would have experienced high and low temperature stress. However, the overall impacts were considered as low for all stations except at Prachin Buri, Kosum Phisai and Thong Pha Phum station where the impact level was moderate, and Phatthaya, Phriu Agromet, Ranong, Ko Samui, Phuket Airport and Naratthiwat where there was no potential impact. On the monthly basis it was found that the potential impacts of high temperature on rice production were during February – May (vegetative growth state of rice), and in November (reproductive stage). In most case the impacts for these months were moderate, except in at Prachin Buri, Kosum Phisai and Thong Pha Phum station where these were high. For low temperature stress, the overall impacts were considered as low for all stations except at meteorological station in south Thailand where no potential impact was identified. On the monthly basis, it was found that the potential impacts of low temperature were in January and December (ripening stage). In most case the impacts for these months were moderate in north Thailand. These analysis indicate that the daily maximum temperature and mean daily temperature, both in terms of magnitude and frequency, may have exerted the adverse impacts on rice production in

Thailand. Further in-depth analysis with sufficient observation data will further improve our understanding of potential impacts as well as provide guidance for counter measures in the future.

Keywords: Daily maximum temperature; Mean daily temperature; Daily minimum temperature; High temperature stress; Low temperature stress; Rice production; Potential impact of temperature