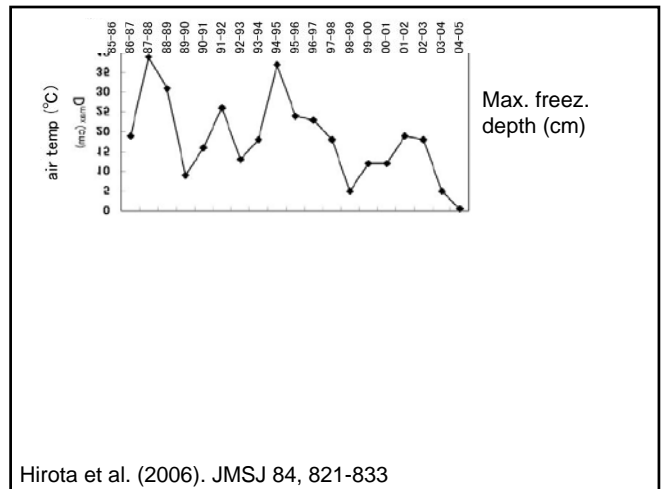
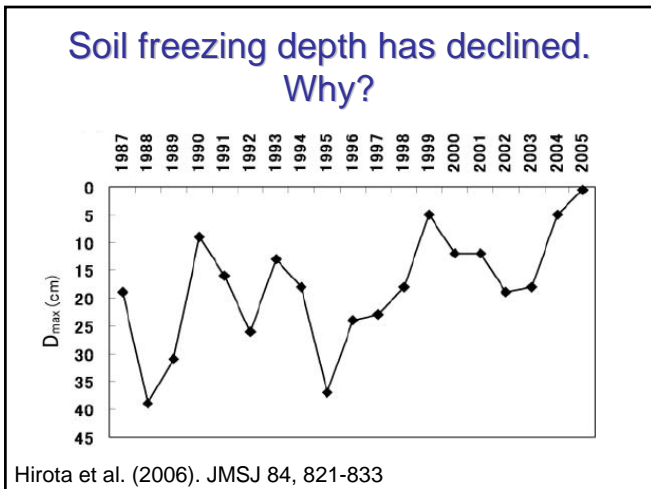
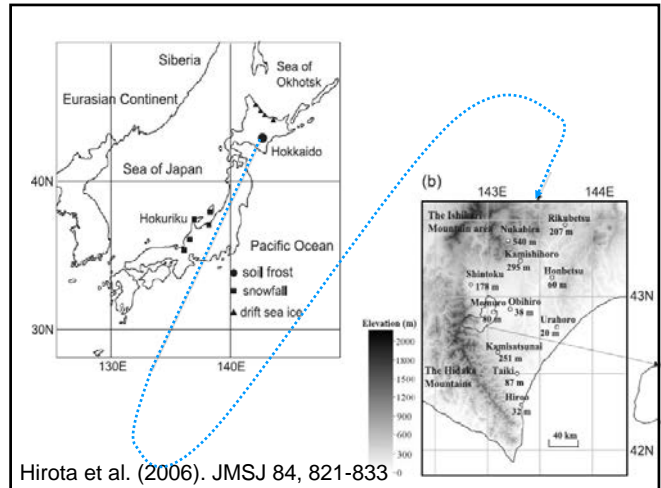
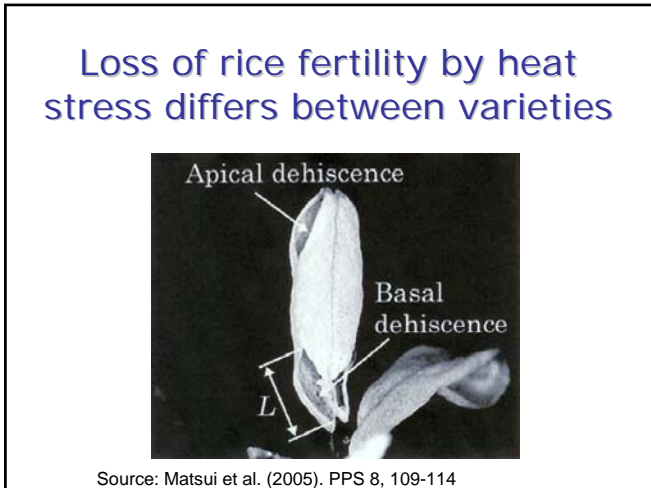
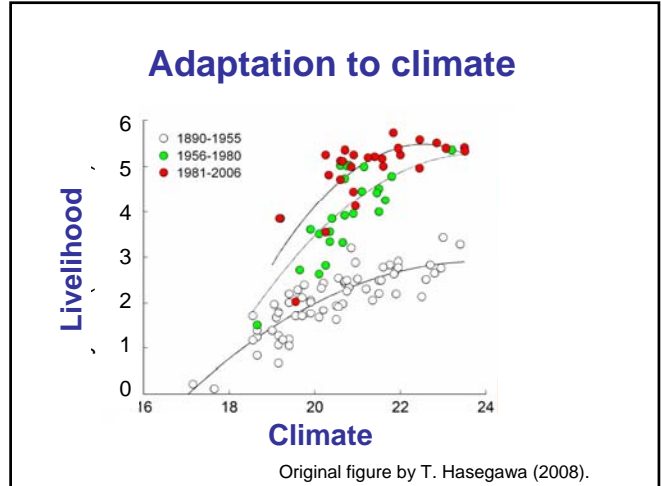
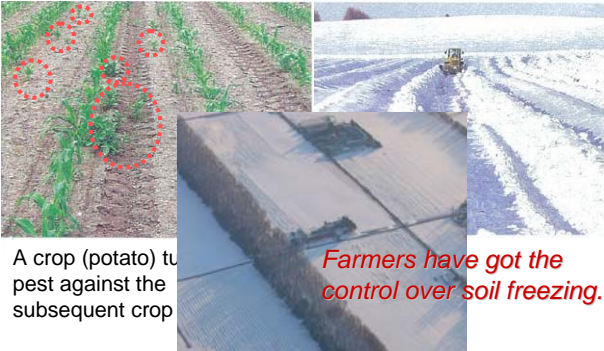


System-wide adaptations to the changes in climate

Kazuhiko KOBAYASHI
 Professor
 Dept. of Global Agricultural Sciences
 The University of Tokyo



Farmers' adaptation to the new climate



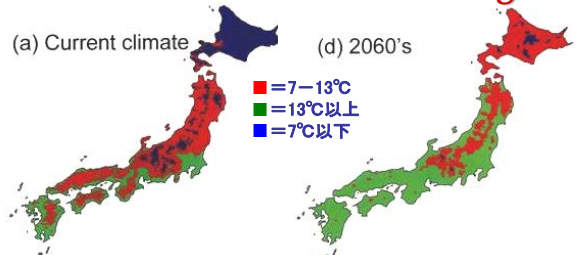
A crop (potato) to pest against the subsequent crop

Farmers have got the control over soil freezing.

The warming will change the distribution of fruit production

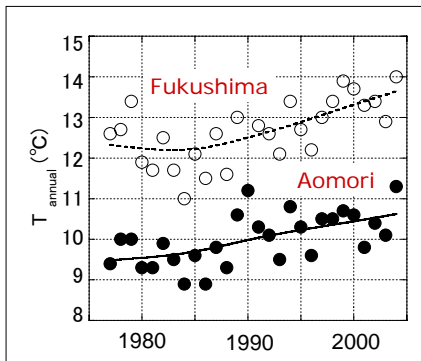
Apple growing areas moves?

Farmers make the change



Sugiura & Yokosawa (2004) Jour. Jpn. Soc. Hort. 73

Temperature is increasing...



Fujisawa & Kobayashi (2007)

Adaptation to the warming?

Original Fuji



Red Fuji

http://www.alps.pref.nagano.jp/letter/news2004/news_fru_0511_2.pdf

Coloring is the problem only in some markets...



Market matters...

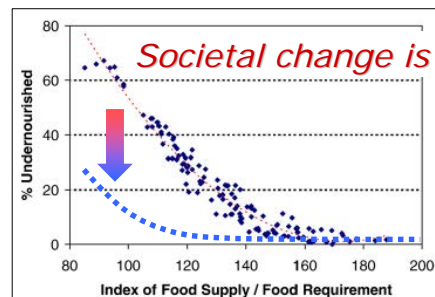
Japanese Fuji in Taipei



Chinese Fuji in Beijing

Photo: リンゴ技術80, 2007.

Food distribution system...



Tubiello, E., and Fischer, G. (2007). Technological Forecasting & Social Change 74 (2007) 1030-1056.

Malnutrition and food supply- demand ratio

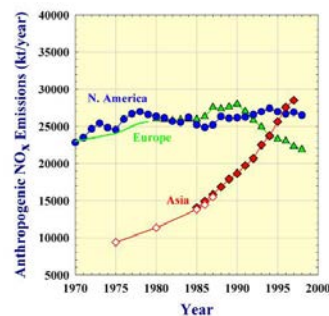
Recommendations for the leading scientists

Think globally and act locally.

Consider ALL major challenges you are going to face for the decades to come.

Connect well with the farmers and other actors in your food systems.

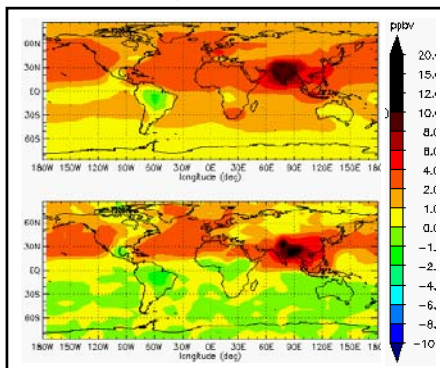
NO_x emission in Asia is increasing...



Source: Akimoto (2003) Science 302.

N. America: USA + Canada, Europe: including FSU, Asia: South, SE and NE

and surface [O₃] will increase:
Changes in [O₃] from 1990's to 2020's



Source: Dentener et al. (2005). Atmos. Chem. Phys. 5