Abstract:

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Impacts of Climate Change on Rice Production and Possible Adaptation Options

Rice production systems have to become more resilient to abiotic stresses that will aggravate under climate change. Higher temperatures can adversely affect rice yields through two principal pathways, namely (i) high maximum temperatures that cause - in combination with high humidity -- spikelet sterility and adversely affect grain quality and (ii) increased nighttime temperatures that may reduce assimilate accumulation. On the other hand, some rice cultivars are grown in extremely hot environments, so that the development of rice germplasm with improved heat resistance can capture an enormous genetic pool for this trait. Likewise, drought is a common phenomenon in many rice growing environments, and agriculture research has achieved considerable progress in terms of germplasm improvement and crop management (i.e. water saving techniques) to cope with the complexity of the drought syndrome. The bulk of global rice supply originates from irrigated systems which are to some extent shielded from immediate drought effects. The buffer effect of irrigation against climate change impacts, however, will depend on nature and state of the respective irrigation system. The envisaged propagation of water saving techniques will entail benefits for the resilience of rice production systems to future droughts. Rice is highly sensitive to salinity. Salinity often coincides with other stresses in rice production, namely drought in inland areas or submergence in coastal areas. Submergence tolerance of rice plants has substantially been improved by introgressing the *Sub1* gene into popular rice cultivars in many Asian rice growing areas. We conclude that there are considerable risks for rice production stemming from climate change, but that the development of necessary adaptation options can capitalize on an enormous variety of rice production systems in very different climates and on encouraging progress in recent research

Presentation at 2009 AAAS Annual Meeting, "Our Planet and Its Life: Origins and Futures," within Symposium, "*Protecting Our Planet Against Food Riots in the Future*" on February 15, 2009