AGRICULTURE

Crop-yield drivers

Proc. Natl Acad. Sci. USA http://doi.org/w3b (2014)

STOCKBYTE

Anthropogenic climate changes result from emissions of long-lived greenhouse gases and other short-lived climate pollutants (SLCPs). In addition to impacting crop production through their influence on the climate system, SLCPs such as tropospheric ozone and black carbon, can have direct negative impacts on crops.

Jennifer Burney and V. Ramanathan from the University of California, San Diego, USA, investigated the direct and indirect (climatic) effects of these SLCPs on wheat and rice yields in India. They studied the period 1980–2010 when black carbon and ozone precursor emissions increased dramatically.

Their statistical model shows that average wheat yields for India as a whole were up to 36% lower in 2010 than they would have been without climate change and increases in pollution emissions. Impacts on rice were less clear. Around 90% of the yield losses were attributed to the direct polluting effects of SLCPs. The authors conclude therefore that addressing regional air pollution could go some way to countering the expected yield losses resulting from trends in long-lived greenhouse gases. *AB*

FOREST ECONOMICS

Woody biomass use in Japan

Forest Policy Econ. http://doi.org/w3f (2014)

To support its national industry, the Japanese government has tried to increase the demand for domestic timber by encouraging the use of woody biomass — sawmill and logging residues that can be used as raw materials to manufacture various woody products.

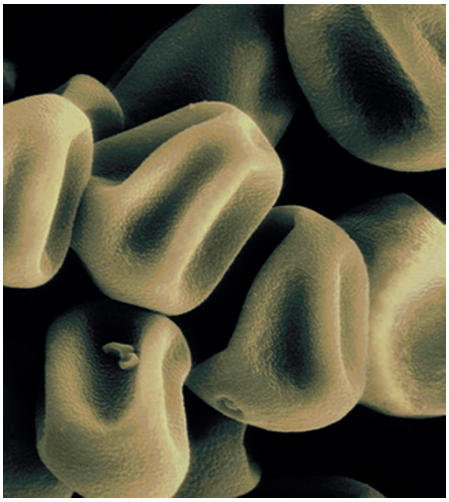
In Japan, mill residues are perceived as easier to use than logging residues, but whether or not they are better for the economy and the environment is not clear. Dami Moon of the National Institute of Advanced Industrial Science and Technology, Japan, and colleagues analysed the greenhouse-gas emissions and economic effects of using logging versus mill residues to manufacture chips, bark, and chip dust, in Maniwa, Japan. They developed three scenarios: business-as-usual, logging-residues-only utilization (LRU) and mill-residues-only utilization (MRU). They found that in the LRU scenario, the total gross income would be almost ¥204 million and 13 new full-time jobs would be created, whereas in the MRU scenario, the figures would be ¥124 million and 6 jobs.

In terms of emissions, in the LRU scenario they can be reduced by up to roughly 211 tonnes of CO_2 equivalent more than in the MRU. *MC*

CLIMATE IMPACTS

Suffering pollen

PLoS ONE **9,** e111712 (2014)



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Allergic and asthmatic symptoms following pollen exposure constitute a human health problem that could be accentuated by climate change. Widely distributed, wind-dispersed pollen from grass species are particularly allergenic, so the impacts of climate change on grass pollen are likely to have the greatest human health consequences.

Jennifer Albertine from Harvard University, USA, and co-workers exposed Timothy grass (*Phleum pratense*) to current and projected atmospheric concentrations of the greenhouse gases CO_2 and ozone (O_3) to investigate their individual and interactive effects on pollen and allergen production. They found that increased concentrations of atmospheric CO_2 increased the amount of grass pollen produced by ~50% per flower, regardless of O_3 levels. Higher concentrations of O_3 reduced the allergen protein (Phlp5) content of the pollen but the net effect, when accounting for CO_2-driven increases in pollen numbers, indicates increased allergen exposure. Quantitative estimates based on pollen production and the number of flowering plants per treatment indicate that airborne grass pollen concentrations will increase in the future up to ~200%. *AB*

OCEANOGRAPHY

Southern storage

J. Clim. http://doi.org/w3d (2014)

The Southern Ocean accounts for 30% of the global ocean and is an important region for upwelling as well as deep-water formation. Upwelled waters, which are cold and low in CO_2 (owing to their extended isolation from the surface) absorb heat and carbon from the atmosphere. It is thus important to understand the role of the Southern Ocean in the global carbon cycle.

Thomas Frölicher of ETH Zurich, Switzerland, and Princeton University, USA, and colleagues investigate the role of the ocean, and in particular the Southern Ocean, in uptake, storage and transport of anthropogenic carbon and heat from 1861 to 2005. They use 19 coupled climate models from the Coupled Model Intercomparison Project Phase 5 and observations over the period.

Model results show that for the historical period studied, 43% of the ocean uptake of anthropogenic CO_2 and 75% of heat uptake occurs in the Southern Ocean, which is all areas south of 30° S. Observational data indicates that the models are able to replicate ocean heat content trends, but underestimate carbon storage. *BW*

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