WORLD METEOROLOGICAL ORGANIZATION

Report on the UNFSS Science Days' Side Event "Risks to Agriculture from Air pollution

The "Risks to agriculture from air pollution" Side Event, held on 6th July 2021, was jointly organized by the World Meteorological Organization and the Indian Institute of Science Education and Research Mohali, India. The aim of the event was to raise awareness of the impacts of air pollution on agriculture as well as highlight the role of the scientific community in developing tools to assess the impacts of atmospheric deposition of pollutants on agriculture and food systems. The side event consisted of the following four presentations:

-" What role might ground level ozone pollution play in food security", by Lisa Emberson, from the University of York, United Kingdom

-"Effects of ozone on agriculture in India", by Baerbel Sinha, from the Indian Institute of Science Education and Research Mohali, India

-"Measurement-Model fusion for Global tola Atmospheric Deposition, a WMO Initiative", by Amanda Cole, from Environment and Climate Change Canada, Canada.

-"Ground-level ozone production deposition to Sweden: food production", by Camilla Andersson, from the Swedish Meteorological and Hydrological Institute, Sweden.

The key points that resulted from the presentations and the following panel discussion are:

- Atmospheric deposition is strongly linked to food systems and several UN Sustainable Development Goals (SDGs), specifically Goals 2, 6, 13, 14 and 15 (Zero Hunger, Clean Water and Sanitation, Climate Action, Life Below Water, Life on Land) due to impacts on crop yields, nitrate leaching, and biodiversity, ecosystem health and productivity (acidification and eutrophication).
- Tropospheric ozone is one of the main air pollutants affecting crop yields, with global losses for staple crops (wheat, rice, maize and soybean) estimates in the of 3-16% range (US$ 14-26 billion annually).
- The mechanisms whereby ozone affects plants and crops are qualitatively well understood but poorly quantified. Coupled atmospheric/crop models and techniques such as model-data fusion are needed to improve quantitative estimates and fill knowledge gaps.
- Although in the US and Europe peak ozone concentrations have decreased since 1990s, impacts from ozone deposition may follow a different path due to, for example, changes in the onset of the growing season and soil moisture. In other parts of the world, however, in particular in Asia, ozone levels are still increasing.
- Within the agricultural community, air pollution in general, and ozone in particular, are not routinely recognized as stressors, in part due the difficulty in teasing out the effects of pollution on crops from those of other factors, in particular extreme weather and climate events such as droughts and heat stress episodes, which visibly dominate production losses at local levels. Ozone impacts occur throughout the growing season and are in particular important for irrigated agriculture. It is extremely important to bring air pollution into the debate in the agricultural community to better inform future agro-management decision and policies
- At the local level, there are adaptation approaches that could, if implemented, result in reduced air pollution stress and other benefits. At the global level, the consequences of atmospheric pollution need to be integrated in both climate mitigation and adaptation policies.
- By implementing its "Science for Services" strategy, WMO aims to play a central role in bridging the gap between the scientific community and a range of stakeholders including policy makers, extension services and the agronomic community at large. An initial step in that direction is the WMO-led Measurement-Model Fusion for Global total Atmospheric Deposition Initiative, aimed at operationally producing 'best possible' regional-to-global maps of atmospheric deposition. In the long term, further integration of atmospheric, climate and agronomic community efforts will result in improved understanding of the effects of air pollution on food production, and enhanced capability of countries to reach their SDGs targets, rationalizing air pollution and climate policies, and enabling farmers to sustainably improve food production.