EXECUTIVE SUMMARY

of

International Conference

Climate Smart Agriculture: The Way of Farming for 21st Century

October 08-09, 2018

Organized by

Department of Agronomy, MNS-University of Agriculture Multan, Pakistan

2018

EXECUTIVE SUMMARY

Global warming due to increased greenhouse gases carbon dioxide, nitrous oxide and methane (CO_2, N_2O and CH_4) emissions since industrialization has caused rise in temperatures and an increased frequency of extremes weather events around the globe. The negative impacts of climate change have also been observed across the world. Specifically, food production systems are highly vulnerable to climate change and it is a serious threat to food security for an ever-growing human population especially in developing countries. Nearly all nations, including Pakistan, have already realized the growing challenge and join to sign a historic Agreement (Paris Agreement-2015) in Paris to keep the planet's temperature rise well below 2 °C by the end of this century, by adopting massive climate change mitigation and adaptation strategies. Pakistan, the 6th most populous country is an agro-based economy where approximately half of the population is directly or indirectly dependent on agriculture for their livelihoods. Pakistan, due to its geographical and geopolitical location, falls under the top ten countries that are most prone to adverse impacts of climate change. During the past two decades, the country has faced the adverse effects of weather extremes, such as devastating floods (2010), droughts, heat waves, cyclones, smog (due to air pollution and dust because desertification/low rainfall) and temperature extremes. Erratic and unpredicted weather patterns, especially changes in rainfall distribution, and freshwater scarcity reduced agricultural production due to underperformance of existing farming systems. Moreover, risks due to unprecedented climatic changes and weather extremes are increasing many folds due to lack of awareness to cope with situations or early warning system to cut down major losses. The growing situations are specifically damaging for small land holding farming communities. Existing technologies and approaches seem inadequate to minimize climate change led losses or to develop climate resilient farming systems to achieve sustainable production and food security.

To explore recent advances adopted by developing/developed countries to cope with emerging climate change threats, the Department of Agronomy, MNS-University of Agriculture Multan has organized an international conference on "Climate Smart Agriculture: The Way of Farming for 21st Century" in collaboration with Hochschule Geisenheim University, Germany on October 08-09, 2018. The conference brought together international and national experts from academia, i.e. researchers and scientists from allied agriculture institutions, progressive farmers, policy makers and other stakeholders to discuss and explore recent climate change mitigation and adaptation strategies. The experiences shared during this event would help to

develop strategies and policies to mitigate the effects of climate change and increase agricultural productivity, to help ensure food security in the country.

The inaugural session of the conference was held on October 08, 2018 at 10:00 am. The conference was jointly inaugurated by Syed Hussain Jahania Gardezi (Provincial Minster of Punjab for Management and Professional Development), Syed Ibne Hussain (Former IG, Railway Police/Member PPSC), Prof. Dr. Claudia Kammann (Department for Applied Ecology/ Climate Change Research for Special Crops, Hochschule Geisenheim University, Germany) and Prof. Dr. Asif Ali, Vice Chancellor, MNS-UAM. Prof. Dr. Asif Ali welcomed the national and international participants of the conference.Prof. Dr. Claudia Kammann and Prof. Dr. Axel Garcia from University of Minnesota USA, delivered their key-note talks on Global perspective of Climate Change and Food Security. The inaugural session concluded with remarks by the Chief Guest Mr. Syed Hussain Jahania Gardezi Provincial Minister of MPDD. The Chairman Department of Agronomy, MNSUAM, Dr. Abdul Ghaffar, delivered his remarks and vote of thanks to all of the participants and dignities. The conference continued two days (October 08-09, 2018) comprising following sessions at three venues of MNS-UAM with following themes.

a) *Plenary Session*
b) *GHGs and Carbon Sequestration to Mitigate Climate Change*
c) *Global Warming and Climate Change Impacts on Agriculture*
d) *Food and Nutrition Security (bio-fortification and related approaches)*
e) *Challenges and Opportunities of Precision Agriculture in Pakistan*
f) *Prediction and Decision Support Modeling*
g) *CSA Innovations, Strategies and Solutions*
h) *Resource Use Efficiency*
i) *Concluding Session*

Conference Abstracts and Oral Talks and Posters:

Abstracts

Total abstract received = 126
International = 21
National = 105

Oral Talk

Total talks = 73

International = 16

National = 57

Posters

Poster presentations = 53

Climate change effects on agriculture and environment were highlighted and different mitigation strategies and solutions were proposed in above mentioned sessions via oral talks or poster presentations. Following renowned foreign and national scientists also delivered talks in different sessions.

The overall foreign scientists included Prof. Dr. Axel Garcia y Garcia (USA), Prof. Dr. Claudia Kammann (Germany), Prof. Dr. Jiahua Zhang (China), Prof. Fabián G. Fernández (USA), Prof. Dr. Hans-Werner Koyro (Germany), Dr. Muhammad Asif (Turkey), Dr. Faheem Shahzad Baloch (Turkey), Dr. Nasrin Salehnia and Mr. Sohrab Kolsoumi (Iran), Dr. Muhammad Shahbaz (Sweden), and Dr. Moustafa Selim (Germany). While the national key scientists included Dr. Saghir Ahmad (Director Cotton Research institute, Multan), Dr. Tasneem Khaliq, Dr. Fahad Rasul, and Dr. Hasan Munir from University of Agriculture Faisalabad, Dr. Wajid Nasim (COMSATS), Prof. Dr. Bashir Ahmad, Prof. Dr. Muhammad Arif and Prof. Dr. Akmal from University of Agriculture Peshawar, Dr. Kazmi from Pakistan Meteorological Department and other young scientists from all over Pakistan.

These sessions were chaired by the experienced scientists who drafted the final recommendations for each technical session after thorough discussion. The recommendations were presented by the session chairs individually. During the in-depth brainstorming sessions on effects of climate change on agriculture and CSA strategies to cater the effects were highlighted. Different mitigation strategies were proposed to cope with climate change and it was emphasized that farming practices should be modified in the light of following recommendations. Promotion of tree plantation could control temperature/increase precipitation/sequester carbon to mitigate climate change. Installation of more weather monitoring, forecasting and advisory systems for early warning about climate related disasters like heat or cold waves, floods (agro-meteorology – phenology and -pest models), Construction of water reservoirs/storage to reduce drought impacts. Crop rotations to break pest cycle, green manuring and use of biochar to increase soil organic matter and fertility. Conservation agriculture practices to reduce global CO_2 emissions, land degradation, improve fertility and to reduce cost of production. Diversification of bread basket by inclusion of stress-tolerant and versatile pseudo cereals and coarse grains like millets, quinoa, cheena. Legume crops

(mungbean, cowpea, sesbania) can be successfully adjusted in summer gap (from last week of April to mid-July) for getting fodder, grain and biomass for green manure. Climate smart agriculture through models of bio-gas plants and use of solar dryers for fruit and vegetables processing, solar operated hand pumps and ground-water pumps can be energy efficient. Pakistan is in dire need of implementing the proposed conference recommendations to cope with climate extreme threats with it's not well-educated farmers and lack of climate resilient infrastructure.

List of International delegates participated in the conference

1.	Prof. Dr. Axel Garcia y Garcia	USA
2.	Prof. Dr. Claudia Kammann	Germany
3.	Prof. Dr. Jiahua Zhang	China
4.	Prof. Dr. Fabián G. Fernández	USA
5.	Prof. Dr. Hans-Werner Koyro	Germany
6.	Dr. Muhammad Asif	Turkey
7.	Dr. Faheem Shahzad Baloch	Turkey
8.	Dr. Nasrin Salehnia	Iran
9.	Mr. Sohrab Kolsoumi	Iran
10.	Dr. Muhammad Shahbaz	Sweden
11.	Dr. Moustafa Selim	Germany

CONFERENCE RECOMMENDATIONS

Generally, the timing of MNS-UAM Climate Smart Agriculture Conference was ideal and both days of conference had direct relevance with Climate Change. For instance,

- on the first day of conference Monday October 08, 2018 **a wake-up call by IPCC was given in the form a mini report** "**IPCC SR 1.5°C**"

The second day (Tuesday 09, 2018) of Conference was the day when,

- **Nobel Prize was given to Climate Change Economists William Nordhaus & Paul Romer** for **"integrating climate change and technological change into macroeconomics"**

Commonly what we all should do?

- Connect local farmers to global (carbon) markets via a green and clean Pakistan

- Think global, act local, and support Pakistan societies' overall welfare via implementation

Recommendations for Government and Administration

1. Promote Tree plantation to control temperature increase / increase precipitation / sequester carbon to mitigate climate change
2. Installation of more Weather monitoring, forecasting and advisory systems for early warning about climate disaster like heat wave, cold wave or floods (agro-meteorology – phenology and -pest models)
3. Construction water reservoirs/storage to reduce drought impacts
4. Investment on research and development sector e.g establishment of climate change study centers in each region/division for development of climate smarty agricultural tools and dissemination of knowledge
5. Encourage carbon certification/organic farming schemes to connect local action to global carbon markets/ organic product markets
6. Must launch a move for assessing the health vulnerabilities of communities in vulnerable areas (diversification of food resources & home gardening)
7. Knowledge transfer: Investment on awareness, capacity building and efficient extension system for translation of research messages in to common man language
8. After 18th amendment we need provincial agriculture and climate policy. So, govt. must pay attention to this deficiency

Recommendations for Scientists: Research and Development

1. Exploring zone specific alternate crops and their varieties keeping in view the site-specific issues and challenges
2. Redefining of crop zoning in advance on the bases of global climate models predictions and downscaling using RCMs using Representative Concentration Pathways
3. Use of biotechnological tools to incorporate stress (heat, drought, salt) tolerance in crops

4. Development of varieties which will be able to accumulate micronutrient especially Zn and Iron in edible parts to combat malnutrition
5. Disseminate climate smart production technologies to ensure food and nutritional security under changing climate
6. Development of efficient water use technologies like deficit and drip irrigation, bed sowing of crops
7. Research institutes should introduce climate smart products using remote sensing, crop models and publish the specific informative material in local languages on local issues which can strengthen local capacities towards adverse effects of climate change

Recommendations for Farmers and Communities

1. Crop rotation to break pest cycle, green manuring and use of biochar to increase soil fertility.
2. Conservation agriculture can reduce global CO_2 emissions, degradation of land, improve fertility and reduce cost of production.
3. Diversification of bread basket by inclusion of stress-tolerant and versatile pseudo cereals and coarse grains like millets, quinoa, cheena.
4. Legume crops (Mungbean, cow pea, sesbanina) can be successfully adjusted in summer gap (from last week of April to mid-July) for getting fodder, grain and biomass for green manure.
5. Climate smart agriculture through models of bio-gas plants and use of solar dryers for fruit and vegetables processing, solar operated hand pumps and donkey pumps can be energy efficient
6. The activities performed by CSOs like Doaba Foundation could be helpful for sustainable crop production in changing climatic conditions of Pakistan
7. Being a responsible citizen, we must discourage the use of plastic bags, and promote use of public transport, use of bicycles, adopting renewable energy sources and sustainable bags like jute and cotton for shopping and storage.

Glimpses of the Conference Activities

International Conference on Climate Smart Agriculture: The Way of Farming for 21st Century