

Date of poster presentation: 11 April 2022

CIRCULAR AGRICULTURAL PRODUCTION SYSTEM OF SMALL AND MARGINAL FARMS – A SUSTAINABLE PATHWAY DEVELOPMENT UNDER CLIMATE CHANGE SCENARIO

N. SUBASH^{1*}, H. SINGH², B. SINGH³, G. PAUDEL⁴, M.S. MEENA⁵, S.V. SINGH⁶ and R. VALDIVIA⁷

1) ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut, Uttar Pradesh, India

2) ICAR-Indian Agricultural Research Institute, New Delhi, India

3) CIMMYT, New Delhi, 4) CIMMYT, Nepal

5) ICAR-Agricultural Technology Application Research Institute, Jodhpur, Rajasthan, India

6) ICAR-National Dairy Research Institute, Karnal, Haryana, India

7) Oregon State University, USA

It is projected that by the end of the twenty-first century, the average temperature over India is to rise by approximately 4.4°C relative to the recent past (1976–2005 average) under the RCP8.5 scenario. There has also been an increase in the occurrence of extreme weather events, that affected food security and livelihoods of many small and marginal farmers, which is more than 90% of the total agricultural population of the country. The adaptation and mitigation strategies should be concentrated at the local level and hence the impact should be assessed at the farm level. Hence, a study was conducted in Meerut District of Uttar Pradesh, to understand the impact of climate change at the local level by linking climate-crop-economic models with stakeholder participation under ICAR-AgMIP Collaborative study. Rice–wheat and sugarcane–wheat are the predominant cropping systems in the area. Livestock (cow and buffalo for milk purposes) is an integral part of the farming system of sample households. However, in this present study, we have considered only the farmers practicing rice–wheat and livestock (cow–buffalo) farming system. Livestock holding is generally proportional to land holding, but a majority of the farmers, even with small landholdings, keep at least one milk animal (indigenous or crossbred cow and/or buffalo). Livestock serves a dual purpose; while milk is either consumed in the family or sold to earn extra income, livestock dung is used as farmyard manure, which helps improve soil health. Thus, on-farm recycling of crop by-products enhances resource use efficiency and also reduces farm households' dependence on farm input (e.g., fertilizers) purchased from the market. However, due to smallholdings, farm households are also engaged in non-farm activities (wage-earning,

small grocery shops, employment in the formal and informal sector, etc.) to support their livelihoods. Although the magnitude of the decline in net farm returns and per capita income may look small, it will adversely affect a large proportion of farms (49%–74%). The adaptation strategy for the current production system enhances rice yields by 6%–14% and wheat yields by 11%–18%. These changes in the production system result in 11%–14% increase in mean net farm returns and 7%–8% increase in per capita income. This study also highlights the importance of the existing circular agricultural system in the majority of households and the latest technological options can make the system more risk-free from climate change and climate variability aberrations.

Keywords: Agricultural pathway, current production system, livelihoods, employment, circular integrated system