# Cosmic Ray Neutron Sensing: Estimation of Agricultural Crop Biomass Water Equivalent

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# Foreword

The International Atomic Energy Agency (IAEA) and the Food and Agriculture Organization of the United Nations (FAO), through the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, assist scientists and farmers worldwide to ensure food security and promote sustainable agricultural resources. The Joint FAO/IAEA Division's programme and activities are demand-driven and focus on developing and transferring technologies in response to real and practical needs. This programme provides assistance to member states in the implementation of suitable nuclear and related techniques, where these have a competitive advantage to enhance, improve or increase agricultural production.

This publication was developed as a practical guideline for the estimation of fresh standing crop biomass and its water equivalent for incorporation into the calibration process of the novel soil moisture sensing technology known as the cosmic ray neutron sensor (CRNS). This publication was created to augment the IAEA TECDOC publication # 1809 which provides general instruction on the use, calibration and validation of the CRNS technology. This publication was created to be open access as to ensure accessibility for the wide scientific community. The specific intent of the following publication is to provide an introduction to three primary strategies for biomass estimation, an explanation of the advantages and disadvantages of each, incorporation of data into the CRNS calibration process and discussion of potential applications. This work is intended to serve as a referencing guide and synthesis of information regarding the estimation of crop biomass.

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