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Enhancing organic wheat productivity through land configuration and optimised nitrogen management in sub-humid Rajasthan

ADARSH SHARMA¹, SHANTI KUMAR SHARMA²

¹Maharana Pratap University of Agriculture and Technology, Udaipur, India, Agronomy, India

²Indian Council of Agricultural Research, New Delhi, India, Human Resource Management ,

Abstract

As global agriculture shifts toward sustainable practices, optimising resource-use efficiency in organic systems becomes critical. This study investigated the impact of diverse land configuration methods and organic nitrogen optimisation strategies on the growth, productivity, and nutrient status of organic wheat (*Triticum aestivum* L.). A comprehensive field experiment was conducted over two consecutive rabi seasons (2022 and 2023) at the Organic Farming Unit, Rajasthan College of Agriculture, MPUAT, Udaipur. The experiment was laid out in a split-plot design with four replications, evaluating three land configuration methods Flat row sowing, Furrow Irrigated Raised Bed (FIRB), and Zero Tillagemas main-plot factors. The sub-plot factors comprised eight distinct nutrient management strategies utilising Farm Yard Manure (FYM) as a primary nitrogen source, supplemented with liquid bio-enhancers, specifically Jeevamrit and Panchagavya.

The pooled results demonstrated that the FIRB sowing method significantly outperformed both flat row and zero tillage systems. FIRB recorded superior growth attributes, including plant height, dry matter accumulation, and chlorophyll content, alongside a significant increase in the number of effective tillers. This enhancement is attributed to the creation of a favourable micro-environment, better moisture regulation, and reduced inter-plant competition. Furthermore, FIRB significantly improved the uptake of macro and micronutrients (N, P, K, Zn, and Fe), showing an increase of approximately 15.5 % to 22.4 % compared to other methods.

Among nutrient management practices, the application of 75 % Recommended Dose of Nitrogen (RDN) through FYM as a basal dose, combined with 25 % RDN at the first irrigation and supplemented with Jeevamrit and Panchagavya, yielded the highest growth and productivity. The integration of liquid organic manures acted as a catalyst, enhancing nutrient availability during critical growth stages. The study concludes that the combination of FIRB land configuration and integrated organic nutrient management offers a robust and sustainable strategy for maximising organic wheat yields and soil nutrient status under the agro-climatic conditions of sub-humid southern Rajasthan.

Keywords: FIRB, Jeevamrit, Land Configuration, Nutrient Management, organic Wheat, Sustainable Agriculture