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Response of tomato to fertilizer nutrients integration and herbicides spray: Evaluating growth, yield, fruit quality and herbicides residue

Yerra Pavani

Tamil Nadu Agricultural University, India

The interaction between fertilizer nutrients and pesticides and their impact on tomato production and quality has been insufficiently studied in tropical agricultural conditions. This research investigated four fertilizer nutrient management (FNM) approaches: major nutrients (NPK), micronutrients, farmyard manure (FYM), and traditional farmer practices (FP), alongside three herbicides—glyphosate, pendimethalin, and metribuzin applied using seven methods. Results highlighted the substantial influence of FNM strategies and herbicide applications on tomato growth and yield parameters such as plant height, cluster count, fruits per plant, fruit number, and yield per plant. Notably, the NPK+FYM strategy consistently yielded superior results across herbicides and application methods. Individually applied herbicides, particularly glyphosate, exhibited detrimental effects on growth

and yield parameters, and the negative impact was conspicuously higher with glyphosate > metribuzin > pendimethalin than with their sequential or combined application. While herbicides decreased tomato yield across FNM practices, the reduction ranged from 1.90–10.95%, 1.79–6.75%, 1.62–6.49%, and 1.40–9.10% in NPK, NPK+MN, NPK+FYM, and FP treatments, respectively. Fruit quality remained unaffected by FNM practices and herbicides, except for elevated ascorbic acid content and shelf life under NPK+FYM. Herbicide residues in tomato fruits were within permissible limits (below 0.1 mg/kg for glyphosate and 0.05 mg/kg for pendimethalin and metribuzin) across treatments. This study showed that the NPK+FYM practice is the best strategy for increasing the tomato yield and quality parameters besides reducing the herbicides toxicity effect on tomato growth at an early stage.

Biography

Y. Pavani, a recent Ph.D. graduate from the Department of Soil Science and Agricultural Chemistry at Tamil Nadu Agricultural University, specialization is in herbicides and nutrient interactions in soil. Her research explores the intricate dynamics between herbicides and soil nutrients, unravelling the fate of herbicides in soil under various nutrient sources, and detecting of pesticide residues in fruits. Her post-graduation work includes Soil Test-Based Nutrient application on sustainable agriculture practices. Despite being early in my career, her passion for a sustainable soil environment is evident. She would like to make a promising contributor to the field of soil science and agricultural chemistry.