

Evaluation of organic and conventional rice production systems for their productivity, profitability, grain quality and soil health

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Organic farming has been considered as one of the best options for protecting/sustaining soil health and is gaining lot of importance in present day agriculture. Considering the importance of organic farming and growing demand for organically produced foods, field studies were conducted for 5 years involving 10 crop seasons (2004-05 to 2009-10) on a black clayey vertisol soil at the Directorate of Rice Research, Hyderabad to study the influence of organic and conventional farming systems on productivity, grain quality, soil health and economic returns of super fine rice varieties. Two main plot treatments, with and without plant protection and four sub plot treatments viz., Control; 100% inorganics; 100% organics and 50% inorganics+50% organics (integrated nutrient management, INM) were imposed. During wet season, grain yields under conventional chemical farming and INM were near stable (4.7-5.5 t/ha) and superior to organics by 15-20% during the first two years which improved with organics (4.8-5.2 t/ha) in the later years to comparable levels with inorganics. However, during dry season, inorganics and INM were superior to organics for four consecutive years and organics recorded yields on par with inorganics and INM in the fifth year. Yield difference due to plant protection was only marginal during most part of the study due to very low pest incidence. Most of the grain quality parameters were not influenced even after five years of study though moderate improvement in nutritional quality was recorded with organics, especially in brown rice (by 5-16%) over inorganics. Polishing reduced the quality improvement to 1-6%. There was a significant improvement in soil physical, fertility and biological properties with organics compared to conventional system. Further, organic system significantly improved the soil quality indices (Nutrient, Crop and Microbial indices) and the sustainability index of the soil was maximum with organics (1.63) compared to inorganics (1.33) after five years of study. The soil organic carbon (SOC) stocks were higher with organics (19.5 and 17.5 t/ha) compared to conventional system (13.6 and 13.0 t/ha) during wet and dry seasons, respectively, after 5 years of study. The carbon sequestration rate was also positive with organics (0.97 and 0.57 t/ha/yr during wet and dry seasons, respectively) compared to conventional system that recorded negative SOC sequestration rate (-0.21 and -0.33 t/ha/yr during wet and dry seasons, respectively). Benefit cost ratio was less with organics (1.09:1) compared to inorganics (1.37:1) in the first year which improved with organics (1.99:1) over inorganics (1.75:1) by fifth year. Thus, organic farming can be sustainable and economical/remunerative over a period of time once the soil fertility is built up in irrigated rice in vertisols under tropical climate.

Biography

K Surekha has completed her Ph.D from ANGR Agricultural university, Hyderabad, India in Soil Science and has been working as Soil Scientist at the Directorate of Rice Research (Indian Council of Agricultural Research) since 1993. She has published around 35 research papers in reputed Journals, 45 papers in Symposia, 25 popular articles and 6 technical bulletins. She received six awards for her oral as well as poster presentations at various Symposia.

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