



Resource use efficiency of transgenic cotton and peanut intercropping system using modified fertilization technique

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Abstract

Of the several mechanisms that can bring about efficient resource use, the most widely-applicable one is intercropping systems that can make better use of resources. The aim of this study was to evaluate resource capture and resource use efficiency in transgenic cotton-peanut intercropping system and in their respective sole crops with using 25-50% substitution of recommended dose of nitrogen (RDN) of cotton through farmyard manure (FYM) along with 100 % RDN through urea and control (0N). Apparent crop water productivity, nutrient use efficiency, economic returns and modern intercropping indices (system productivity index, actual yield loss, intercropping advantage index, nitrogen stress factor, etc.) were measured for making better understanding of resource use efficiency. Comparisons of intercropped peanut with sole peanut were emphasized because of shrinking area of peanut in the south-east Asian region represents a threat to agricultural system sustainability. Cotton + peanut intercropping system resulted in improved water productivity (19%), nutrient use efficiency (15-20%) and monetary advantage index (16,709) as measured with modern tools of intercropping indices compared with sole crops of cotton and peanut. Peanut cultivated as sole crop attained the least resource productivity in terms of apparent crop water productivity (0.71 kg m^{-3}), nutrient use efficiency ($4.47 \text{ kg grain kg N}^{-1}$) and total factor productivity (0.07). Among fertility levels, substitution of 25% RDN of cotton through FYM maintained higher apparent crop water productivity (17%), monetary advantage index (6%), system productivity index (9%) and nutrient use efficiencies (15-17%) over 100% RDN through urea only. This work provides basis for efficient resource use by peanut intercropping with cotton which simultaneously enhances domestic oilseed production and reduce import load of cooking oil without sacrificing the productivity of main crop of cotton in India and other cotton growing countries of the world.