

ABSTRACT

DIRECT AND RESIDUAL EFFECT OF ORGANIC AND INORGANIC FERTILIZERS IN JUTE-RICE CROPPING SYSTEM UNDER RAINFED LOWLAND CONDITION

The present investigation was undertaken with an objective to study the effects of various organic and inorganic fertilizers in jute-rice and rice-jute cropping sequences under lowland condition. The experiments were carried out for three years between 1989-1991 by growing jute during summer (April to July) and by growing rice during autumn (July to November). Jute crop grew under aerable soil condition during vegetative phase, and under waterlogged condition during the reproductive phase. The succeeding rice crop in the sequence was transplanted, and remained under submerged condition with depth of water varying from 15 to 50 cm. In view of the differences in the growing conditions in these cropping sequences, it was considered important to develop effective fertilizer management system for higher yield of these crops and for betterment of the soil fertility status.

It could be seen that the jute crop responded to nitrogen and phosphorus and response was best at $N_{40}P_{20}$ level. The slow release nitrogenous fertilizers viz., large granulated urea and urea super granule, and water soluble phosphorus e.g. single superphosphate proved superior and could increase the fibre yield of jute significantly. Organic manures like water hyacinth, farmyard manure and paddy straw were useful to jute and the total dose made up with chemical fertilizer urea proved superior to single

application of any of the organic manure. Jute crop added considerable amount of biomass to the soil through their root stubbles and leaf-fall. This biomass was responsible for residual fertility being useful to the succeeding rice crop. The increase of residual fertility also followed application of large granulated urea, urea super granule, ammonium polyphosphate and mussoorie rock phosphate. Organic materials, particularly paddy straw contributed greater residual fertility than urea. In jute-rice cropping sequence, when jute crop received $N_{60}P_{30}$ rice could derive benefit from the residual fertility and therefore required only minimal dose of fertilizer ($N_{20}P_{10}$) directly to obtain required high yield. In rice-jute cropping sequence, application of high dose of fertilizer to rice crop was not useful because of loss of the nutrient under waterlogged condition. In such situation, there was negligible residual fertility that could be used by the subsequent jute crop. Between the two cropping sequences, the average land productivity was 5.32 t/ha in case of jute-rice cropping sequence, compared to 3.91 t/ha observable in case of rice-jute sequence. Under waterlogged condition, the improved rice variety 'Gayatri' was superior to the traditional tall variety 'Kabirajsal'. There was improvement in soil fertility status in terms of organic carbon content, available nitrogen, available phosphorus and potassium after two cycles of jute-rice sequences following addition of the organic supplements.

Key words: Rice, Jute, Lowland cropping, Cropping system, Organic and inorganic fertilizers, Residual fertility, Land productivity.