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Pearlmillet Based Cropping Systems Involving Pulses, Oilseeds and Vegetables for Attaining Sustainability and Economic Viability in Semi-Arid Regions of India

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Abstract: The field experiments were conducted during the year 2010-11 and 2011-12 at Agronomy Research Farm of CCS Haryana Agricultural University, Hisar, India. The experiment was laid out in randomized block design with seven cropping systems replicated four times. The study indicate that cotton-wheat cropping system gave highest wheat equivalent yield of 10598 kg/ha followed by clusterbean-broccoli-onion with 10112 kg/ha. System productivity also followed the same pattern. Employment generation was higher in cropping system involving vegetables with total man days of 298 in a year. Net return of Rs.81554/ha/annum, economic efficiency of Rs.223 /ha/day and water use of 89.7 ha-cm was higher in cotton-wheat cropping system.

Key Words: Wheat equivalent yield, System productivity, Economic efficiency and Nutrient use productivity

Cropping system needs to be inherently flexible to avail advantage of economic opportunities and or adapt to environmental modalities under changing climatic scenario. A dynamic cropping system concept characterized by management approach, whereby crop sequencing decisions are undertaken on an annual basis to improve the adaptability of cropping practices to externalities. A sound cropping system represents a long term strategy of annual crop sequencing that optimizes crop and soil use options to attain production, economic and resource conservation goals considering ecological management principles, however, short term research efforts can help to identify crop sequence synergisms and antagonisms, thereby providing the necessary foundation for developing strategies to sequence crops over a longer period of time.

Pearlmillet-wheat and cotton-wheat are the two most dominating crop sequence of south-west Haryana. Both these cropping systems are fertility exhaustive and needs heavy nutrition. Continuous cropping of these heavy feeders of crop sequences over a long period of time reduces productivity and soil fertility. The inclusion of pulses and oilseeds in the conventional cropping system like pearlmillet-wheat in the south western part of Haryana will suit the need of the farmer for his family liability and will fetch the market of Delhi. Short duration pulses like mungbean, cowpea etc and vegetables like onion will fit into this traditional system and will be monetarily beneficial to the growers. Therefore, the present experiment was carried out to find out suitable alternate cropping system for semi-arid region with higher sustainability productivity and economic viability which include pulses, oilseeds and vegetables.

MATERIAL AND METHODS

The field experiments were conducted during cropping years 2010-11 and 2011-12 at CCS HAU, Hisar under All India Coordinated Research Project on Integrated Farming System. The soil of experimental field was sandy loam in texture and classified typic haplastepts, having organic carbon content 0.36% and available N 154 kg/ha (low), P 12.4 kg/ha (medium) and K 294 kg/ha (high).

Seven cropping systems viz. Pearlmillet-Wheat, Cotton-Wheat, Pearlmillet -Barley-Mungbean, Clusterbean-Broccoli-Onion, Mungbean-Mustard+Kasni, Pearlmillet-Wheat(d)-Cowpea and Pearlmillet+mung bean-Wheat+mustard were evaluated using randomized block design with four replications. For comparison purpose between different crop sequences, the yields of all the crops were converted into wheat equivalent yield on price basis. Production effiency was calculated by dividing the mean wheat equivalent yield by 365 days and the mean data of two years was analyzed for computing other indices (Katyal *et al.* 1999). Prevailing minimum support price/university rates for 2010-11 and 2011-12 were used for computing economic returns. The economic efficiency of cropping systems was calculated by dividing net returns/ha in a sequence by 365 days. Nutrient use productivity was calculated by dividing the wheat equivalent yield of system with the total quantity of fertilizers applied to different crops in a system. Water use (ha-cm) was computed on the basis of total water applied to the crops.