Performance of intercropping and strip cropping systems of pearl millet – legume association

A field experiment was conducted during kharif seasons of 2002-03 and 2003-04 on a sandy loam soil, lightly alkaline in reaction (pH = 8.1), low in organic carbon (0.18 %) and available N (117 kg ha-1), medium in available P (17.5 kg ha-1) and high in available potassium (275 kg ha-1 at the Crop Research Farm, Choudhary Charan Singh Haryana Agricultural University, Hisar (India). The experiment consisting of seventeen treatments involving sole (pearl millet, clusterbean, mungbean, cowpea and blackgram), intercroppings [pearl millet + clusterbean, pearl millet + mungbean, pearl millet + cowpea, pearl millet + blackgram each in (2: 1) ratio] and stripcroppings [pearl millet + clusterbean, pearl millet + mungbean, pearl millet + cowpea, pearl millet + blackgram each in 4:2 ratio and pearl millet + clusterbean, pearl millet + mungbean, pearl millet + cowpea, pearl millet + blackgram each in (6:3) ratio] was conducted in randomized block design with three replications. Cropping system involving strip cropping of pearl millet + blackgram (6:3) was observed to be significantly superior in terms of growth of base crop pearl millet (plant height, dry matter accumulation plant-I, leaf area index, crop growth rate, number of tillers plant-I and leaf area duration at 40-50 DAS) than sole and intercropping system of pearl millet and various grain legumes. However, pearl millet sole recorded significantly higher grain, stover and biological yield than inter and strip cropping systems involving pearl millet and different grain legumes in various proportions. Such effects of sole, inter and strip cropping systems on grain yield attributing characters [ears plant-1, length of ear head, girth of ear head, test (1000) weight, attraction index, harvest index and grain to chaff ratio] were not apparent and the effect of various treatments were character specific. Among various treatments sole, inter and strip cropping systems, nutrient (N, P and K) uptake by pearl millet was recorded to be significantly highest with pearl millet sole.

The growth of various grain legumes in terms of number of branches plant-1, dry matter accumulation plant-1, leaf area index crop growth rate and leaf area duration was recorded to be significantly superior under sole croppings than their respective inter (2: 1) and strip [(4:2) and /or (6:3)] cropping systems. Sole cropping system of each of the legumes (pearl millet, clusterbean, mungbean, cowpea and blackgram) produced higher pods plant-1 and seeds pod-1 than different inter and strip cropping systems involving pearl millet and legumes in various ratios. Consequently, sole (pearl millet, clusterbean, mungbean, cowpea and blackgram) crops recorded significantly higher seed, stover and biological yield than respective inter (2: 1) and strip [(4:2) and / or (6:3)] cropping systems. Similarly, sole croppings of various grain legumes recorded significantly higher nutrient (N, P and K) uptake by seed, stover and total than their inter and strip cropping systems.

Assessment of yield advantage of different cropping systems revealed that pearl millet + clusterbean (6:3) and pearl millet + blackgram (4:2) strip cropping systems recorded highest land equivalent ratio in first year and second year of experiment. Economic analysis of various inter, strip and sole cropping systems in terms of pearl millet yield equivalent, gross and net monetary returns and benefit : cost ratio revealed strip cropping of pearl millet + clusterbean (6.3) to be most economic.