

Abstract

The effect of irrigation, nitrogen fertiliser and planting density on green leaf area index under field conditions was determined. Field experiments were carried out at Sonning (UK) in summer 1992, and two experiments at Kabete, Kenya from November 1992 to February 1993 (K1) and from February to May 1993 (K2) using beans (*Phaseolus vulgaris* var. Mwezi Moja). The treatments included two irrigation levels (not irrigated and irrigated), two fertiliser levels (no fertiliser and 100 kg N ha⁻¹) and two planting densities (22 and 44 m⁻²) arranged in a split-split plot design. Irrigation was done using a drip system at Sonning and watering cans at K1 and K2. Changes in individual leaf length of the first four middle trifoliate leaflets, the number of leaves per plant and the number of branches per plant were monitored. Leaf area index was largest at Sonning and least at K2. Although irrigation did not have a significant effect on LAI in the three experiments, it was important in maintaining leaf area late in the season at Sonning. Nitrogen increased LAI at Sonning and at K1 when water was not limiting. Nitrogen effect on LAI depended on the growth stage of the crop and total seasonal rainfall. Nitrogen effect on LAI was through increased leaf emergence and extension rate. High planting density increased LAI if water and N supply were not limiting. Leaves at Sonning were thin and wide (photoperiod effect) but small and thickest at Kabete in the dry season (water stress effect). Effective irrigation (above atmospheric evaporation demand), N application and judicious planting density increased LAL.