

Abstract:

In many agricultural systems in the semi-arid tropics, crops use only a small fraction of the total rainfall. Agroforestry can greatly reduce some losses, especially on hill slopes, where soil evaporation, runoff and soil losses are important. This paper reports on soil evaporation from a rotation of intercropped maize and cowpea between contour hedgerows of pruned Senna siamea trees as well as trimmed Panicum maximum grass strips on a 14% hill slope at a semi-arid site in Machakos, Kenya. There were five treatments in order to separate effects of Senna mulch, hedges, and grass strip. Micro-lysimeters were placed between crop rows for three seasons. It followed from their results that, for the three seasons concerned, tree prunings as mulch reduced soil evaporation as percentage of rainfall in the measuring period by absolute values of 9%, 4% and 6% compared to the control sole maize and cowpea with bare soil. The influence of the hedge added to this only insignificantly, even at 1 m distance. The non-mulched plots had soil evaporation reduced by only between on average 1% and 4% in absolute values compared to the control over all the seasons, with a maximum of 5% close to the hedge in the first season. Mulch apparently is the main evaporation reducing factor. Soil evaporation reached the highest percentage of rainfall in the long rains of 1994, becoming 65% in sole maize. It was 50% for sole cowpea in the 1994/1995 short rains and for sole maize in the next long rains. The highest value, although an upper limit could largely be understood from highest early season evaporative demands, rainfall distributions and low crop cover. The other values were in line with earlier reports for dry areas. Some advantages and disadvantages of these agroforestry systems are reviewed.