PARTIONING OF FERTILITY AND COMPETITION EFFECTS OF A
Gliricidia sepium x Zea maise
AGROFORESTRY SYSTEM ON SLOPING HIGHLANDS IN THE MID-COUNTRY
WET ZONE OF SRI LANKA

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Contour hedgerow intercropping (HI) is an agroforestry system recommended to
improve soil fertility and sustain annual crop yields on the steep lands of humid
central highlands of Sri Lanka. The objective of the present experiment was to
quantify the overall tree-crop interaction (TCI) by partitioning the positive fertility
effect (F) and the negative competition effect (C) of Gliricidia sepium hedgerows
on maize (Zea mays L.) grown in a HI system on a sloping (35%) land at
Peradeniya in the mid-elevational (479 m above sea level), humid (rainfall of
2000 mm/yr) zone of Sri Lanka. The experimental treatment structure consisted
of two hedgerow intercrops with (Hm) and without (Ho) tree prunings added as
mulch and two sole maize crops with (Cm) and without (Co) mulch. The highest
maize yields were obtained in Cm whereas C and H, had the lowest with no
significant difference between them. Hm had an intermediate yield. The overall
TCI was positive (ranging from 26 to 112% depending on the method of
estimation of C) because of substantially positive F (85 to 94%) which
outweighed the predominantly negative C (-67 to +18). Mulching increased the
availability of P and K to maize and increased soil pH. Mulching also decreased
soil N and K and increased soil P during the cropping season. There was
significant competition for light by hedges, especially near the hedgerows.
However, positive effects of mulching ensured greater crop growth and radiation
interception away from hedges. Soil water (SW) depletion from top layers (0-30
cm) was highest in Ho. Within mulched treatments, Hm showed lower SW
depletion that Cm during the first 10 weeks showing the shading effect of hedges.
However subsequently, Hm had greater SW depletion than Cm indicating greater
SW extraction which was confirmed by SW depletion in deeper (30-110 cm)
layers. Based on inter-treatment variation of nutrients, water and radiation, it is
concluded that in the present situation, the fertility effect of hedgerow prunings
exceeded the competition effects of hedges.