THE FEASIBILITY OF ALLEY CROPPING IN MAHAWELI SYSTEM C

By

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Thesis

Submitted in partial fulfilment of the requirements

for the degree of

MASTER OF PHILOSOPHY

in the

POSTGRADUATE INSTITUTE OF AGRICULTURE

of the

UNIVERSITY OF PERADENIYA

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January 1988.

ABSTRACT

Alley cropping on terraced land was compared with open unterraced farming on a knoll of highland at the research farm of the Agricultural Research Station, Girandurukotte. Avenues of Gliricidia and Leucaena were planted along the contours in separate blocks. In maha, rainfed maize and cowpea, sole cropped and intercropped, were planted. Cowpea, black gram and sesame were planted in yala in the open land, under Gliricidia and Leucaena.

Maha yields were low due to late season drought, pest attack and reduced fertiliser efficiency and there were no differences (P=0.05) between farming systems. Cowpea yielded 889 kg ha^{-1} and maize 67 g $plant^{-1}$ (extensively damaged by boar). The Relative Yield Total of the intercrop was 1.59 with no differences (P=0.05) between systems. In the open land pre plant dry weed material removed (5 t ha^{-1}) was double that used as mulch in the alleys. Light penetration into the alleys was 82% (Leucaena) and 88% (Gliricidia) in the maha. Air and soil surface temperatures in the alleys were 1 to 5°C and 5.5 to 7.5°C lower respectively. Throughout the season there was 13% more available water in the Gliricidia alleys. Though cowpea establishment was more rapid in the alleys, fairly complete stand was obtained in each system. Maize stand in the alleys was no greater, due to rodent damage to seeds. In the alleys post plant weed weights were reduced by a fifth (Gliricidia) and a half (Leucaena) but insect damage to both crops was noticeably greater. Dry matter accumulation and Relative Growth Rates were similar in both farming systems.

Yala yields of alley cropped cowpea (546 kg ha^{-1}), black gram (421 kg ha^{-1}) and sesame (272 kg ha^{-1}) were 42, 46 and 26% greater. Light penetration into alleys was much the same as in maha. There was less air temperature reduction (1-3°C) but a greater soil surface temperature reduction (5.5-10°C) in yala. Pre plant weed material in open land was only 60% that present at the onset of the maha, with about half this quantity in the alleys. Soil moisture throughout the season did not exceed 55% AWC and was below 25% AWC for most of the season. Soil under Gliricidia had about 15% more available water at 40cm than under Leucaena or in the open. Due to drought cowpea stand was only half of the anticipated in the open yet 80% in the alleys, there was a lesser

advantage with black gram and no difference (P=0.05) with sesame. Post plant weed control was similar to that in maha but insect damage was considerably greater in the alleys, for all three crops in yala. Plant mortality reduced stand in the open by one-eighth at 35 DAP and a quarter at 65 DAP, but in the alleys mortality was about one-third less. Sesame plants did not die from drought. Leaf area at flowering was 23% greater in the alleys, but all crops had LAIs less than unity.

Leaf-air temperature differences at flowering were within acceptable limits for cowpea in the alleys (+1.3°C) but reached 4.5°C in the open. Black gram was severely stressed in the open (+9.1°C) and in the alleys (+5.5°C). Sesame received rain at about flowering and did not evidence stress. Dry matter accumulation by harvest was 50, 40 and 10% greater for cowpea, black gram and sesame when grown in the alleys.