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“Solidarity in a competing world —  
fair use of resources”

## Optimising Growth and Yield of Maize and Pigeonpea in Kongwa and Kiteto Districts, Tanzania

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### Abstract

Low crop yields and limited supply of high-quality livestock feeds are among the main development challenges facing farmers in semi-arid Tanzania. To address these problems, farmers under the Africa RISING project in Kongwa and Kiteto Districts are integrating maize, pigeonpea and *Gliricidia sepium*. Pigeonpea is a fairly new legume crop in these Districts, requiring both adaptability and agronomic studies to guide farmers on the best technology options, which can optimise farm productivity. We employed the participatory variety selection approach to identify adaptable pigeonpea varieties. These were then tested on farms under various intercropping arrangements with maize (Pure stands, 1:1, 1:2 and 2:1) and/or *G. sepium* (Pure stands, Maize+Pigeonpea, Maize+Pigeonpea+*Gliricidia*) to assess options for optimising growth and yields of crops and fodder supply. Two pigeonpea varieties (ICEAP 0057 and ICEAP 0054) were selected by farmers based on superior growth and grain yield. Maize grain yield ranged from 1.20–2.04 t ha<sup>-1</sup> in Mlali and from 1.24–3.25 t ha<sup>-1</sup> in Chitego, reflecting higher potential in the latter site. Relative to monoculture, yield of maize was reduced (28–40 % in Mlali and 2–62 % in Chitego) with the highest reduction noted for with increasing pigeonpea proportions. At 1:1 ratio, the most common ratio, reduction was modest and ranged from 30–40 % in both sites. Similar trend was noted for pigeonpea grain yield. As expected, the decline in maize and pigeonpea yields with increasing ratio of a companion crop reflects interspecific competition. However, the competition did not reduce other overall farm production because the Land Equivalent Ratio (LER) was above 1 in all cropping combinations (ratios), suggesting that intercropping was more efficient in utilising land resources for sustained productivity. The LER revealed that increasing the proportions of pigeonpea in maize based systems was more beneficial to farmers in less potential sites (LER = 1.53) than in high potential sites (1.15) at 1: 2 ratio of Maize and pigeonpea intercropping. At higher potential sites, farmers can benefit more by having larger proportion of maize than pigeonpea (1.06 versus 1.71). Thus, pigeonpea intercropping at the appropriate proportions based on local site conditions is necessary and a promising strategy to optimise yields in mixture.

**Keywords:** Intercropping, LER, sustainable intensification