

# Legume Intercropping to Reduce Erosion, Increase Soil Fertility and Grain Yield, and Stop Burning in Highland Maize Production in Northern Thailand

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## ABSTRACT

*Residue burning in highland maize production is detrimental to soil fertility and contributes to Southeast Asia's haze problem. This study first determined residue production of four common grain legumes – lablab, rice bean, cowpea and mung bean – when intercropped with maize at Pang Da Royal Project Station in Chiang Mai, Thailand; the maize-lablab intercrop produced the largest amount of residue with the highest concentration of nitrogen. Then, this intercrop was evaluated for its effect on soil erosion compared to the farmers' practice of growing maize with residue burning, as well as maize without residue burning, on 33-48% slopes in Santisuk district, Nan province, northern Thailand, in the wet season of 2014 and 2015. Growing maize without burning significantly reduced soil and nitrogen loss in the first year, and with the maize/lablab intercrop reduced them considerably more by the second crop year, to only 11% of the soil and 14% of the nitrogen lost under the farmers' practice of burning the maize residue. The effects of intercropping with lablab and not burning were associated with 64% more residue after two crop years and 24% higher maize grain yield by the second crop year compared to growing maize alone with residue burning – the farmers' practice. Intercropping highland maize with a legume such as lablab without residue burning effectively reduced soil erosion and increased soil fertility and maize grain yield, while offering the additional benefit of not contributing to the region's haze problem.*

**Keywords:** Residue burning, Erosion, Intercrop, Lablab, Maize, Nitrogen