‘Hidden hunger’: poorly balanced plant nutrition in Indonesian oil palm farming

**Introduction and problem statement**
- 13 million hectares of oil palm plantations in Indonesia
- Continued expansion threatens valuable rainforests
- 6 million hectares owned by smallholders
- Potential yield >35 ton fruit bunches per hectare
- Smallholder yield typically only 16 ton per hectare
- Could poor nutrition be a cause of this yield gap?

**Conclusions & recommendations**
- We show for the first time that poorly balanced plant nutrition has led to severe nutrient deficiencies in smallholder oil palm plantations in Indonesia.
  - We found widespread lack of K application (Fig. 1) and poor K status in the leaf tissue (Fig. 3)
  - Nutrient deficiencies are probably a key yield limiting factor
  - Poorly balanced plant nutrition => poor sustainability in terms of yield, profit, environment
  - Improved fertilizer application practices should be a key target of interventions

**Results**
- Vegetative growth and yield mostly suboptimal (data not shown)
- Most palms K deficient; some other nutrients applied in excess (Fig. 1, 3)
- Palms in Jambi K deficient despite high soil K (Fig. 2), indicating poor potassium availability
- Fertilisers mostly applied in the palm circle, leading to nutrient concentration and soil acidification (Fig. 2)

**Figure 1: Nutrient application**

**Figure 2: Soil fertility**

**Figure 3: Tissue nutrient concentrations**

**Figure 4: Important terms**

**Methods**
- Two sites: Sintang (Kalimantan) and Jambi (Sumatra) with contrasting soils and socio-economic conditions
- Random sample of 24 farmers in Sintang and 25 in Jambi
- Interviews about management practices
- Collection of soil and leaf samples from four palms per plantation
- Samples were analysed in the lab using standard analytical procedures

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