



Tropentag, September 10-12, 2025, hybrid conference

“Reconcile land system changes  
with planetary health”

## Intercropping immature oil palms with food crops: Effects on oil palm growth

LOTTE WOITTIEZ<sup>1</sup>, MARIEKE SMIT<sup>2</sup>, JUSRIAN SAUBARA ORPA YANDA<sup>3</sup>, ROSA DE VOS<sup>4</sup>, MAJA A. SLINGERLAND<sup>5</sup>

<sup>1</sup> *Wageningen University & Research, Plant Production Systems, The Netherlands*

<sup>2</sup> *Wageningen University & Research, The Netherlands*

<sup>3</sup> *Arconesia, Indonesia*

<sup>4</sup> *Wageningen University & Research, Plant Production Systems, The Netherlands*

<sup>5</sup> *Wageningen University & Research, Plant Production Systems, The Netherlands*

### Abstract

#### Introduction

Oil palms take 3–4 years to start producing after replanting. Farmers regularly plant food crops in the space between immature palms. There is little research available about intercropping in immature oil palm fields. We report the state-of-the-art of oil palm intercropping research and we present some results of a two-year oil palm intercropping project with smallholders and a large company in Bengkulu, Indonesia.

#### Methods

Our field research consisted of two parts: 1) A one-time observational study in smallholder fields (monoculture vs intercrop;  $n=29$ ), and 2) Observations in an intercropped block of a large-scale plantation. In the large plantation, 11.3 ha were intercropped with watermelon in the first year after replanting, and bananas were established on 15 ha (partly overlapping with the watermelon area) in the following year. We established monitoring plots in an imbalanced pseudo-replicated design with four treatments: watermelon followed by monoculture ( $n=4$ ), watermelon followed by banana ( $n=4$ ), monoculture followed by banana ( $n=6$ ) and monoculture followed by monoculture ( $n=9$ ). We collected vegetative growth parameters for the oil palms (four time-points over 21 months) and visually inspected the data without statistical testing, as we used a pseudo-replicated design.

#### Results

No differences in oil palm vegetative growth were observed between monoculture and intercropped smallholder fields. In the large-scale plantation, the data suggest that oil palms fronds were larger in plots that were intercropped previously with watermelon. Intercropping with banana did not lead to visible changes in frond size and palm height. These trends were consistent over time.

#### Discussion & conclusions

We observed a potential positive effect of watermelon on oil palm. This may be due to irrigation, fertiliser application and weeding in the intercropped fields. There was confounding with the position in the landscape; watermelons were cultivated in low-lying areas where irrigation water was accessible. For banana intercropping, fertiliser inputs may lead to positive effects, but competition for light is a serious concern. Our data are inconclusive

but suggest that intercropping does not necessarily reduce oil palm growth and may even promote it. Rigorous long-term studies on effects of intercropping on future oil palm yields are required.

**Keywords:** Banana, frond size, large-scale plantation, oil palm, smallholders, watermelon