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by Edi Edi

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Editorial

Improving economic and environmental outcomes in oil palm smallholdings: The relationship between mulching, soil properties and yields

Katrin Rudolf^a, Nina Hennings^b, Michaela A. Dippold^b, Edi Edison^c, Meike Wollni^{a, d}

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Highlights

- Empty fruit bunch mulching could be a means to increase the sustainability of oil palm systems, which are expanding globally.
- We explored whether empty fruit bunch mulching is associated with improved yields and soil properties in oil palm smallholdings.
- Mulching was associated with 39% higher yields and 19% higher soil organic carbon content, but not with improved other soil properties.
- Smallholders' links to palm oil mills correlated with mulching so that strengthening inclusive value chains could support wider adoption.
- Promotion of empty fruit bunch mulching can improve smallholder oil palm systems, but supply constraints need to be taken into account.

Abstract

CONTEXT

The area under oil palm cultivation has expanded importantly in South-East Asia. The resulting land-use transformations are associated with environmental degradation such as substantial carbon dioxide emissions. Soil conservation practices can contribute to more sustainable oil palm systems by increasing soil organic carbon (SOC) contents and yields. One soil conservation practice in oil palm plantations is the mulching with empty fruit bunches (EFB).

OBJECTIVE

We estimated the relationship between EFB mulching and, respectively, yields, SOC and total nitrogen contents, the carbon-nitrogen ratio and the average bulk density in smallholder oil palm plantations. We further analyzed the determinants of smallholders' EFB application taking into account regional market, farm, and plot level aspects, as well as farmers' perceptions.

METHODS

We estimated the relationship between mulching and yields with panel data, and between mulching and soil properties with cross-sectional data. We accounted for the possible selection bias of the decision to apply EFB mulching with instrumental variable estimations. Descriptive analysis was used to analyze the determinants of smallholder EFB use.

RESULTS AND CONCLUSIONS

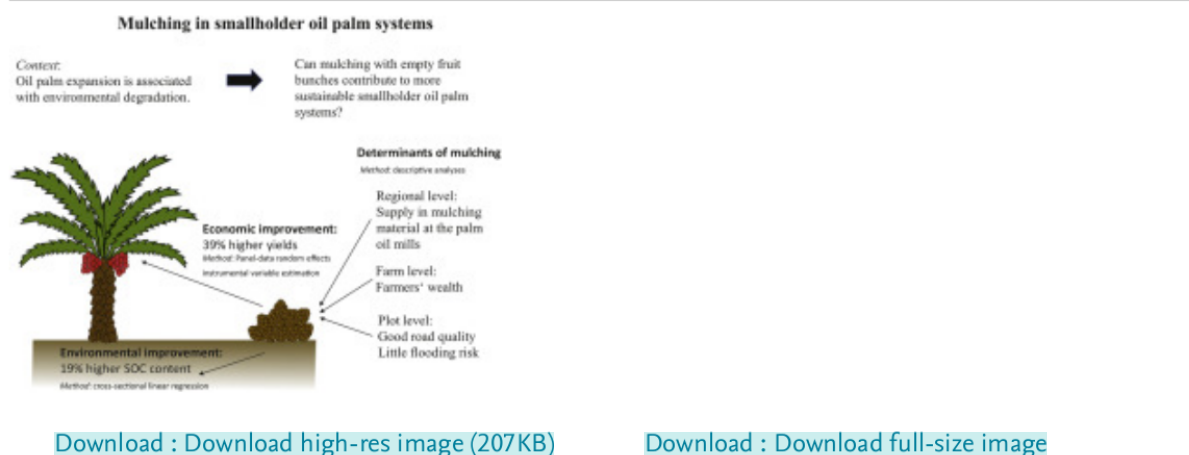
Our results indicated that in particular the regional supply in EFB and farmers' wealth levels were correlated with smallholder EFB mulching. EFB mulching was associated with 39% higher yields and 19% higher SOC contents. We attribute the higher yields to potentially improved soil chemical functions linked to higher SOC contents, such cation exchange capacity effects, and to an increased K and potentially Mg availability. Since EFB is not available in sufficient quantity to be applied to all plantations, policy makers could identify user groups with the greatest potentials for environmental and income improvements. Site-specific life cycle assessments and yield effects can help to inform such identification.

SIGNIFICANCE

Despite their growing importance in the oil palm sector, evidence on the effect of EFB mulching was missing for smallholder farmers. Because of associated higher SOC contents

mulching was missing for smallholder farmers. Because of associated higher SOC contents and yields, our findings indicate that the promotion of EFB mulching as best management practice could potentially contribute to more sustainable oil palm systems. Strengthening inclusive value chains for smallholders, information provision and investments in road infrastructure represent potential policy instruments to increase smallholder EFB application. The identification and promotion of best management practices are important with view to the still ongoing oil palm expansion in South-East Asia, and progressively in other parts of the world.

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Keywords

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