Potenties van mengteelten

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Tjeerd Jan Stomph & Wopke van der Werf,
Centre for Crop Systems Analysis

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Intercropping and crop/tree mixture along the Yellow River in Gansu, North China (photo: Li Long)

Er is een enorme diversiteit aan combinaties

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Photo: Zhang Fusuo

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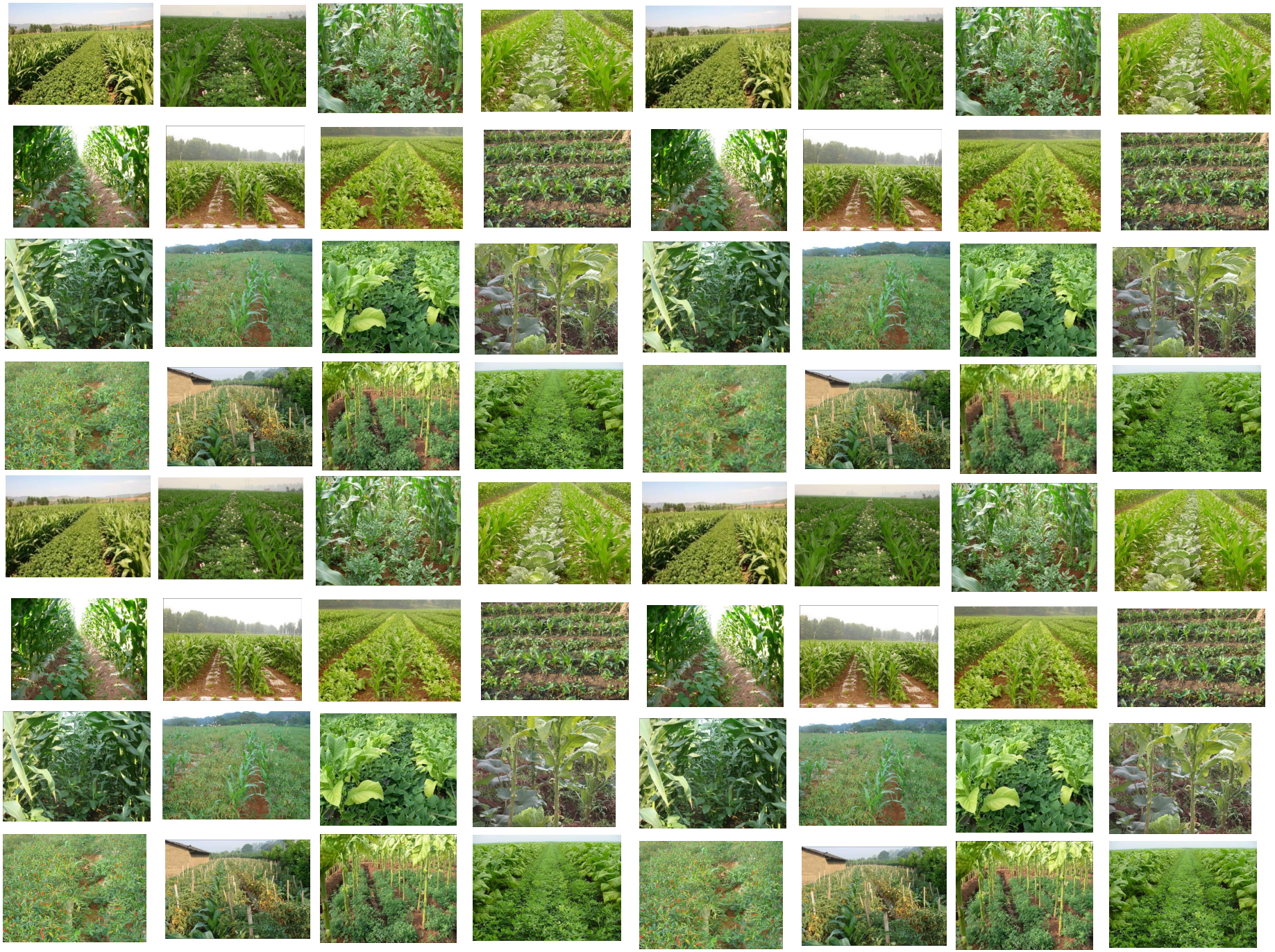


Typen mengteelt

- Volledig gemengde gewassen
- Alternerende stroken
- Alternerende rijen
- ‘Pizza’ of pleksgewijze mengsels

- Mengen van soorten
- Mengen van variëteiten

Veel systemen werken met temporele complementarity
→ toenemende opang van licht en andere groeifactoren

Plant plasticity

Rows 3 & 4

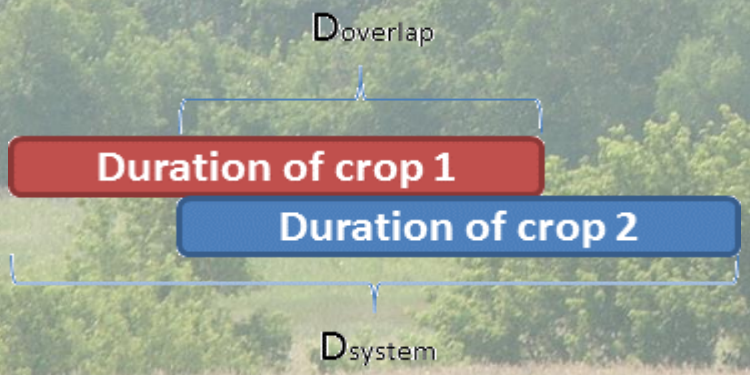
Rows 2 & 5

Border rows (1 & 6)

Sowing density is about 250 plants per m^2

Temporal niche differentiation (TND)

$$TND = \frac{D_{system} - D_{overlap}}{D_{system}} = 1 - \frac{D_{overlap}}{D_{system}}$$



TND=0

Duration of crop 1

Duration of crop 2

TND=1

Duration of crop 1

Duration of crop 2

Voorbeelden van model vergelijkingen van systemen

- Wheat-maize both crops sown at the same time (TND=0) 1 row maize 6 rows wheat
- Wheat-maize with wheat sown well before maize (TND=0.5) 1 row maize 6 rows wheat
- Wheat-maize with wheat sown well before maize (TND=0.5) 2 rows maize 6 rows wheat

Effecten van mengteelt?

- Productie per eenheid land?
- Ziekte en plaag onderdrukking?
- Effecten op bodem koolstof and nutrienten?
- Bijdrage aan meer met minder?

Performance characterized by
Land Equivalent Ratio = sum of the relative yields

$$\mathrm{LER} = \frac{Y_1}{M_1} + \frac{Y_2}{M_2}$$

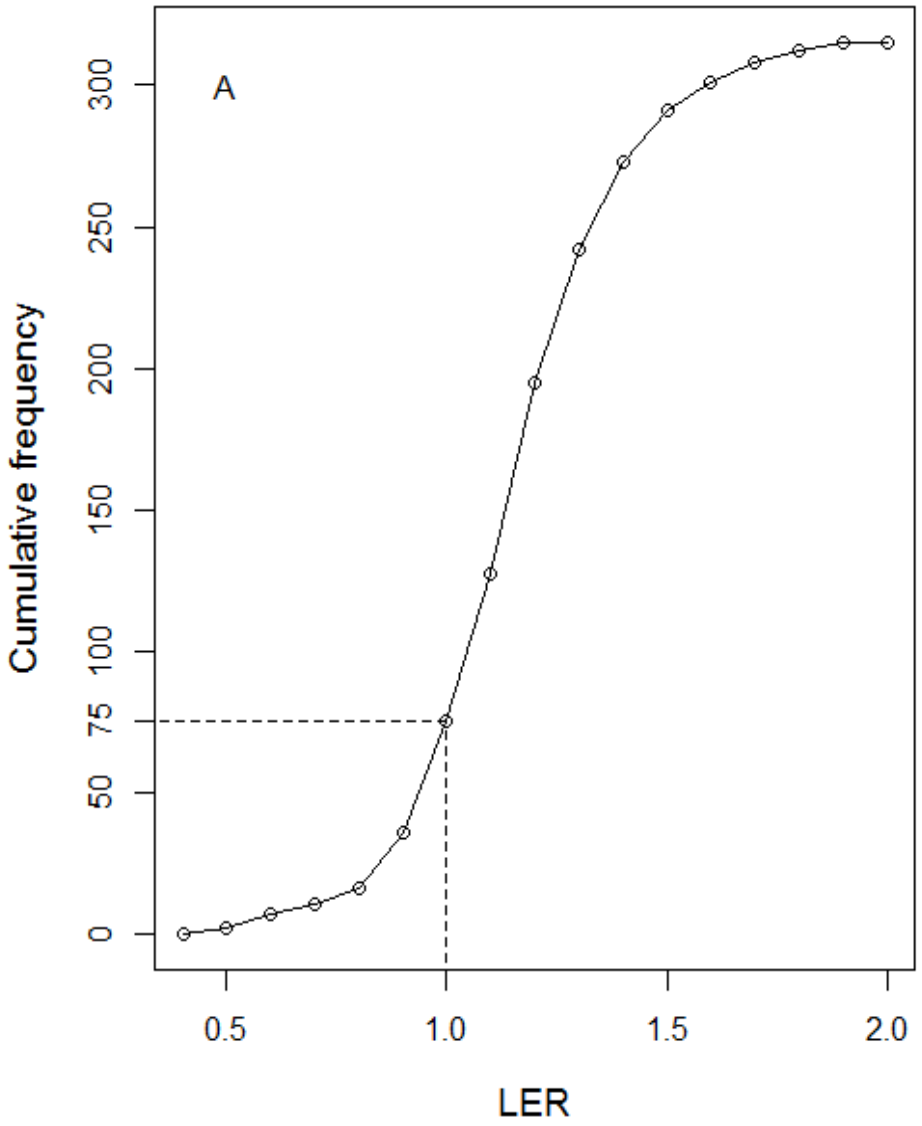
Y_i: yield crop i in intercrop
M_i: yield crop i in sole crop

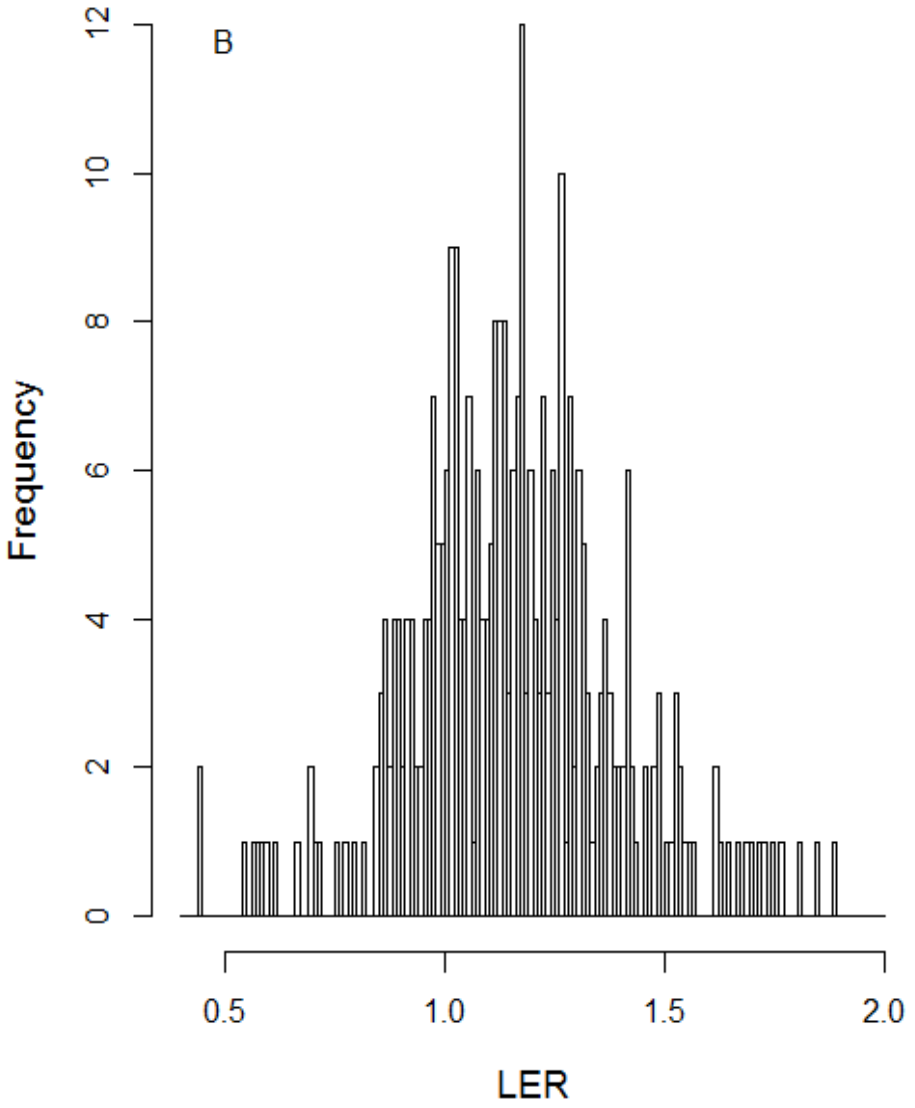
Intercrop system	LER
Wheat/maize	1.21-1.58
Wheat/soybean	1.23-1.26
Faba bean/maize	1.13-1.34

LER = land area that would be needed as sole crops to produce the same yield as a unit area of intercrop

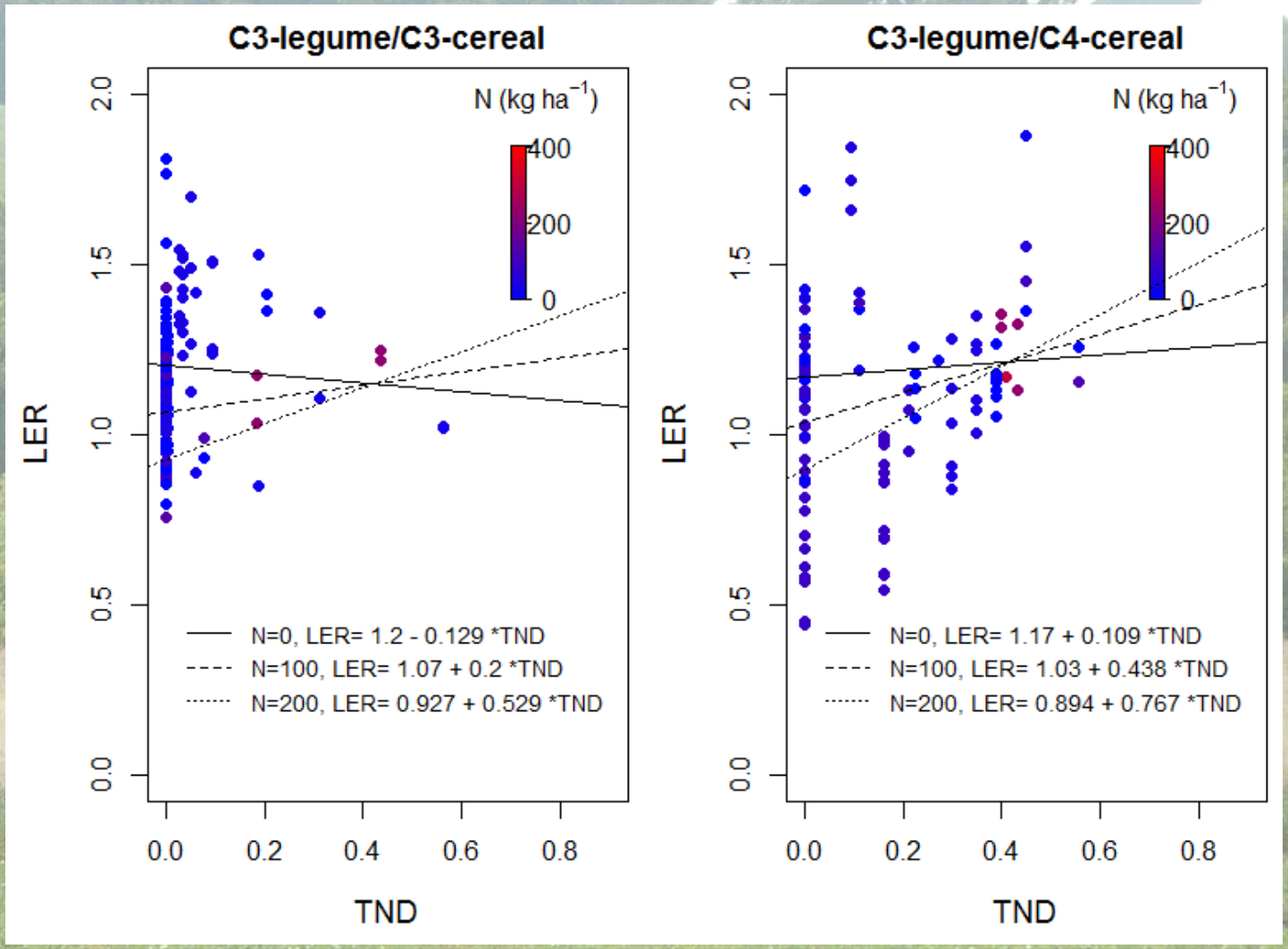
Meta-analysis of factors affecting LER

Yang et al. 2015 and 2016

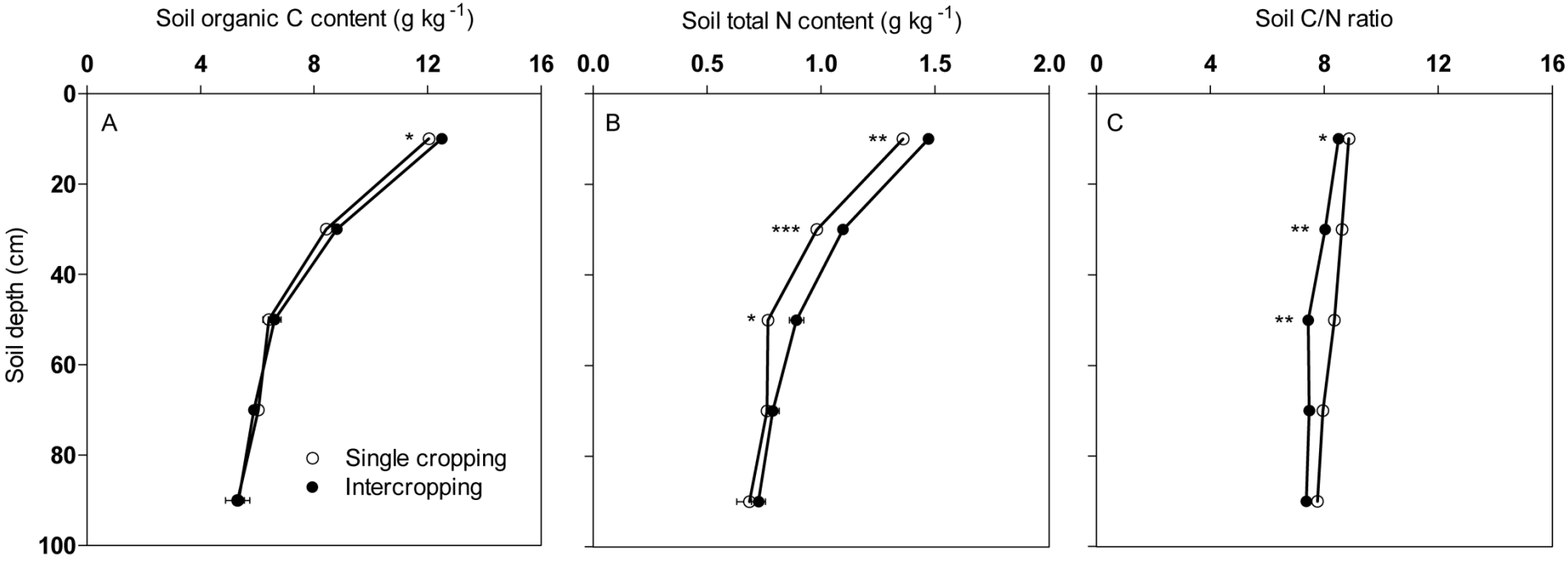




LER vs TND and N application

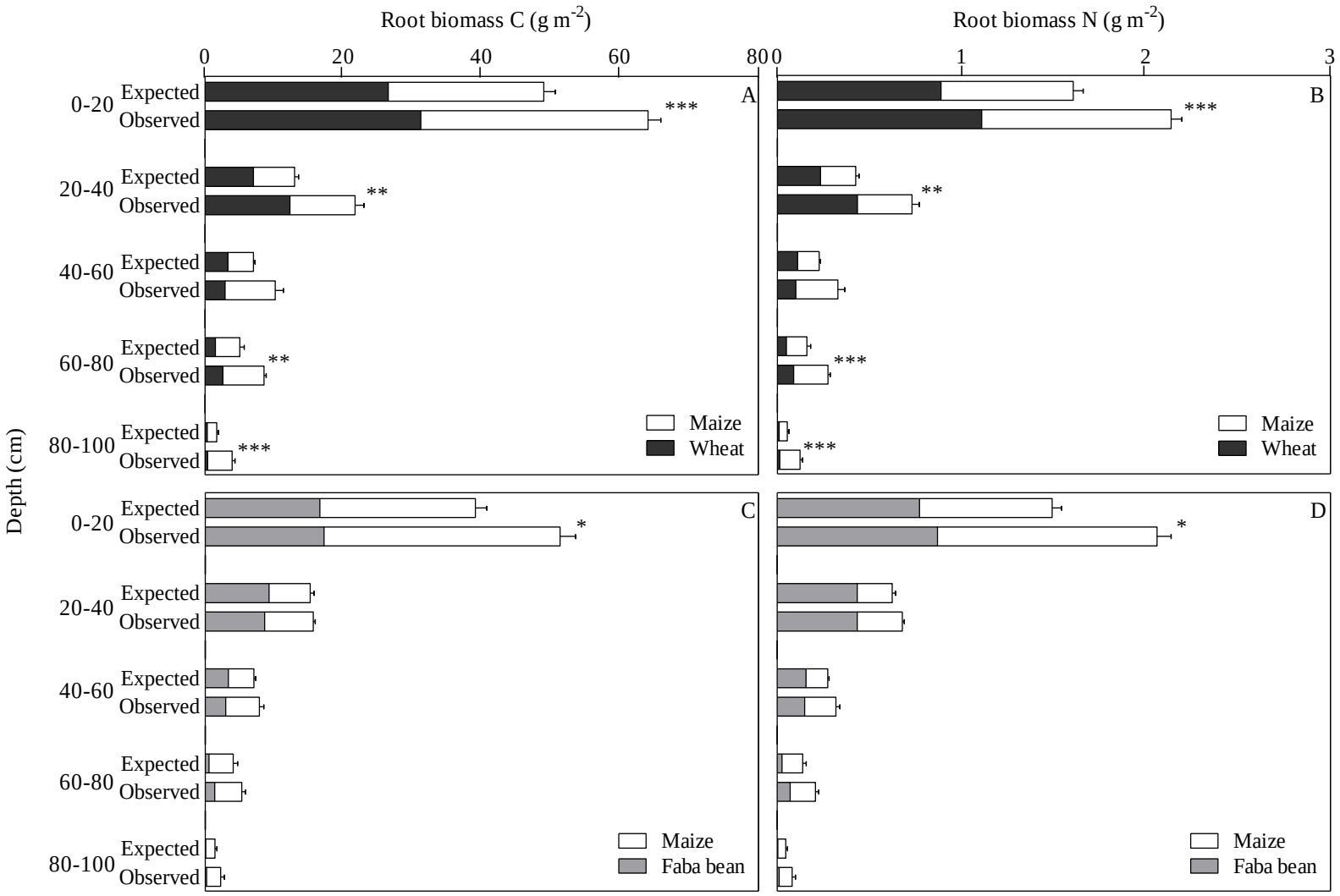


Long term increases in soil organic C and N associated with intercropping



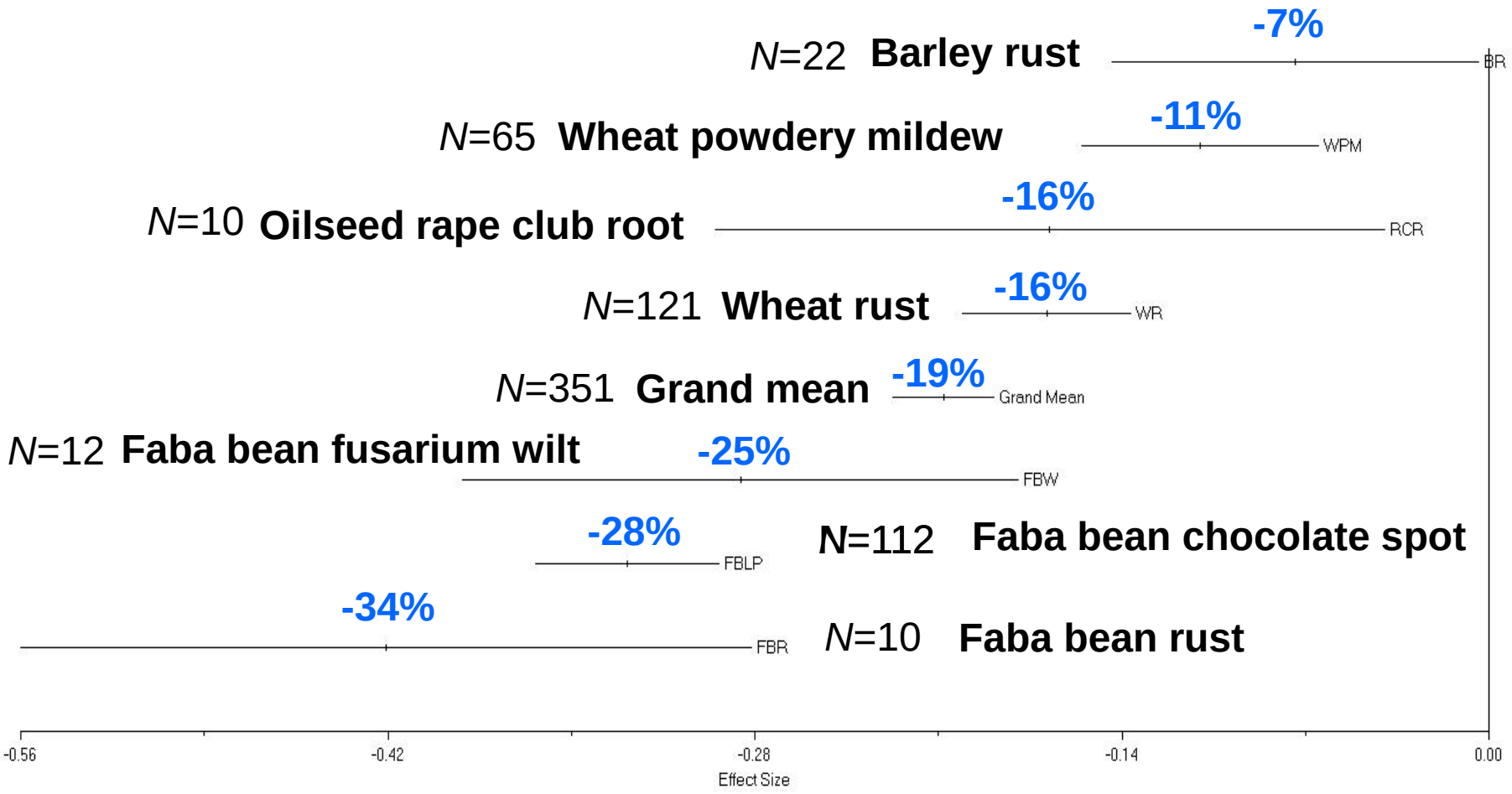
Cong et al., 2015 Global Change Biology

More root biomass in intercrops



Cong et al., 2015 Global Change Biology

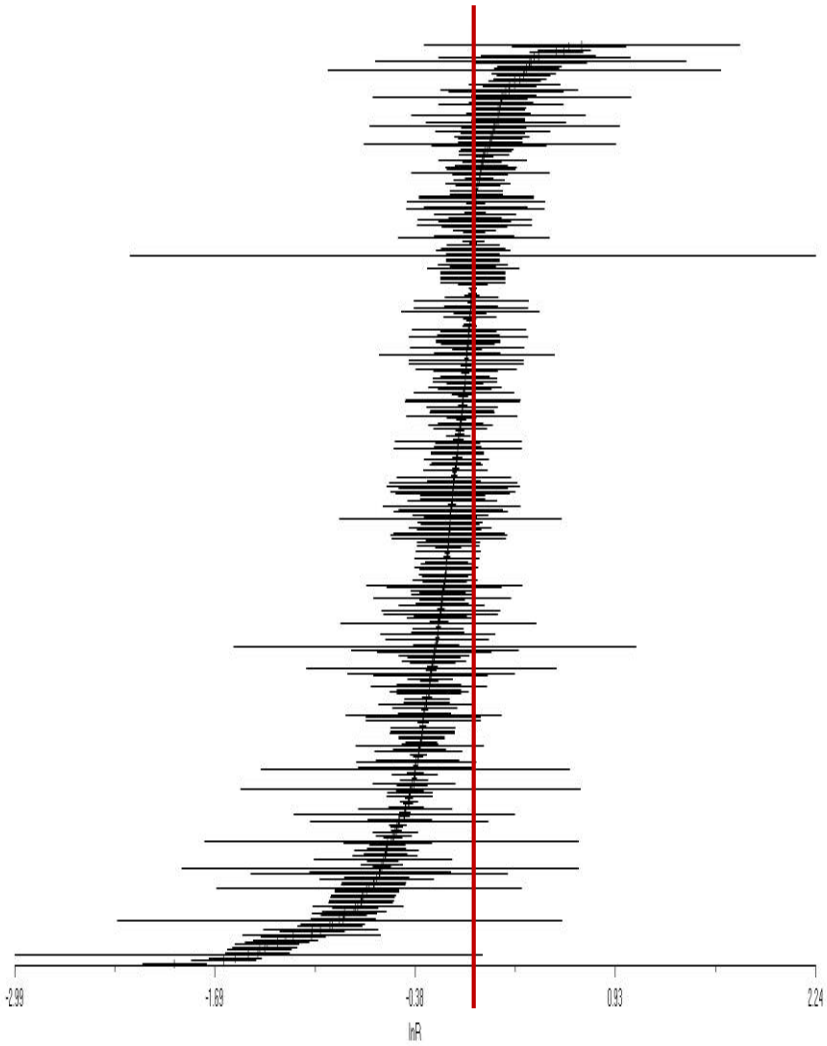
Faba bean mixed with cereals or oil seed rape
Effect size for different diseases (incidence)



Response ratio

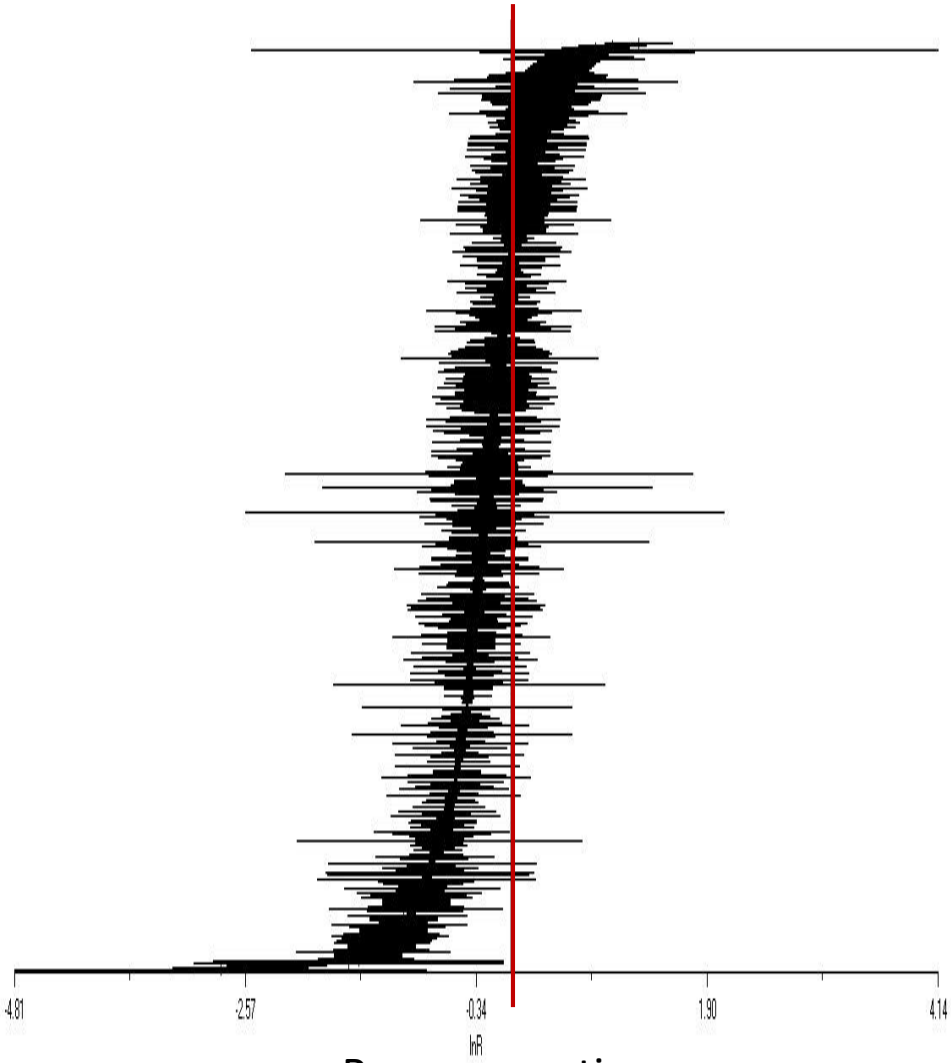
Faba bean mixed with cereals or oil seed rape

Incidence = -18.8%



Response ratio

Disease index =-24.6%



Response ratio

Airborne versus soil-borne pathogens

	n	Reduction in disease **incidence**	Reduction in disease **index**
Airborne	804	38%	40%
Soilborne	136	47%	38%

Pathogen groups

	n	Reduction in disease **incidence**	Reduction in disease **index**
Bacterial diseases	53	73%	37%
Fungal diseases	1158	32%	43%
Virus disease	43	35%	42%

Potenties van mengteelt

- Hogere productie per eenheid land
- Kan helpen bij het onderdrukken van ziektes, plagen en onkruiden
- Verhoogt bodem koolstof en nutriënten niveaus
- Kan bijdragen aan meer duurzame intensivering

Wat is er voor nodig?

- Slimme innovaties in de mechanisatie
- Beter begrip van mechanismes voor meeropbrengst, ziekte en plaag onderdrukking etc.
- Keten arrangementen waarbinnen bedrijven kunnen innoveren en daar wat aan overhouden

Vragen?

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