

van der Velden, Naomi ORCID: <https://orcid.org/0000-0001-8969-1191> (2012)
Multispecies systems in agroecology. In: British Ecological Society 1st Annual Meeting of the Agricultural Ecology Special Interest Group, 1-2 November 2012, Charles Darwin House, London. (Unpublished)

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Multi-species systems in Agroecology



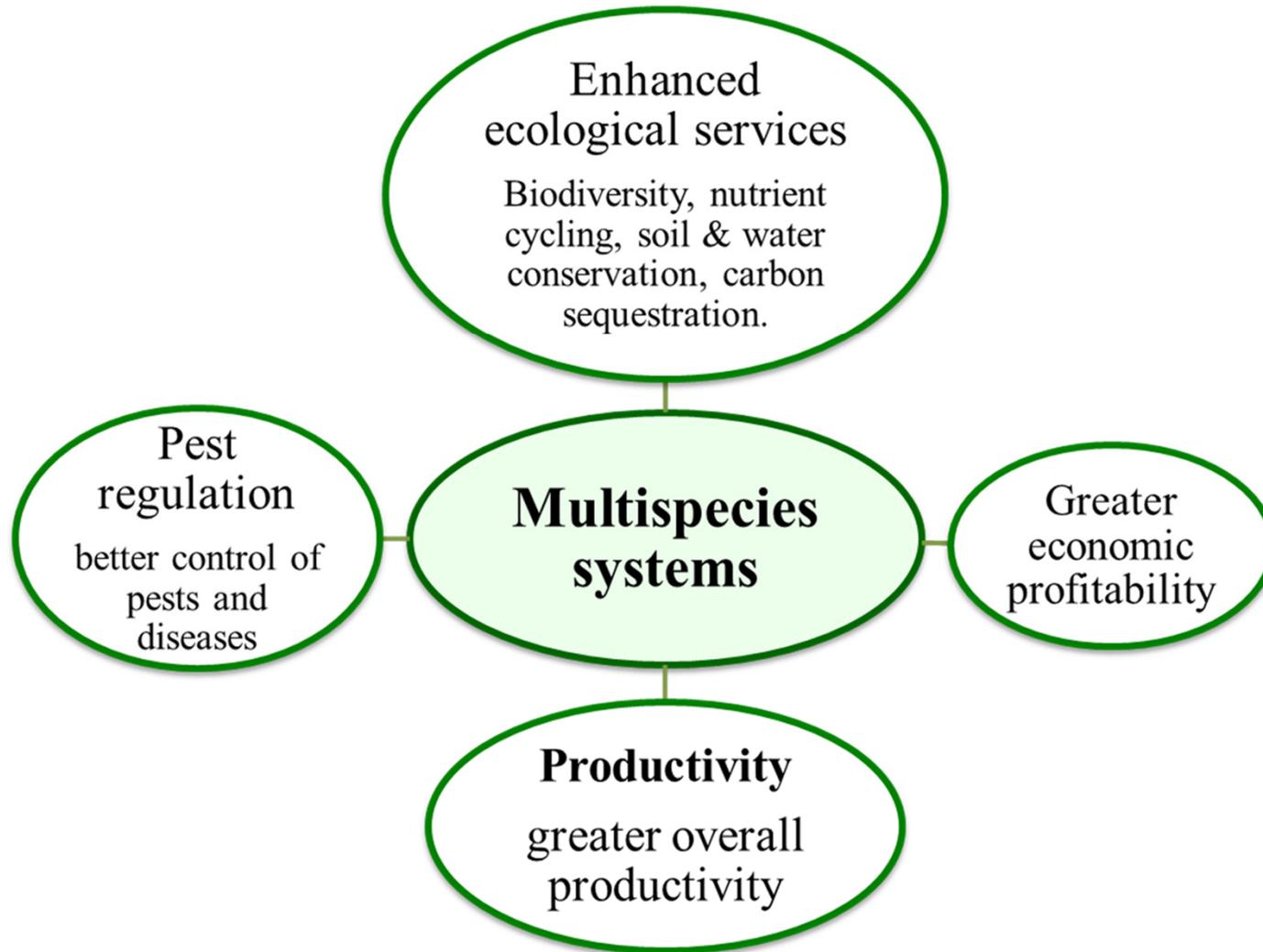
Dr N.K. van der Velden



UNIVERSITY of
Cumbria

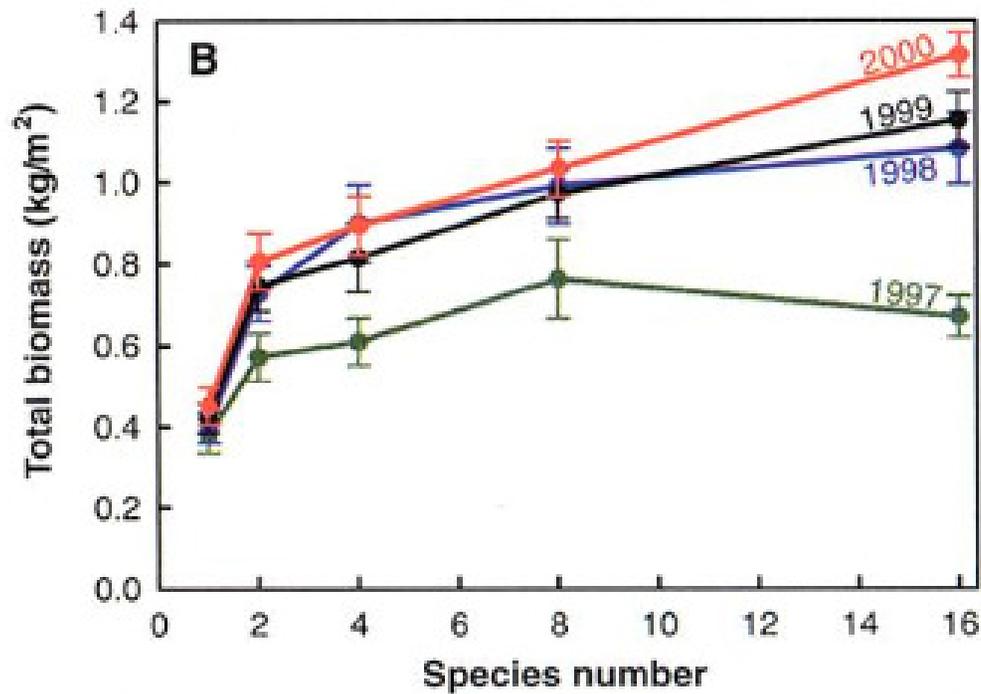
BES 1st Agroecology meeting
1st 2nd November 2012, London

Benefits of multispecies systems



Diversity and production

“16-species plots attain 2.7 times greater biomass than monocultures”



Tilman *et al.*, 2001. *Science* **294** (5543) 843-845

Use of multispecies systems

- Subsistence production (tropics)
- Agroforestry (tropics, then temperate)
- Cottage gardens (European)

Little commercial production

Few published studies on barriers to use

Given the apparent advantages, why aren't they more used?

Use of multispecies systems

Given the apparent advantages, why aren't they more used?

Mechanisation? Labour costs

Complication? Knowledge and experience

Unfamiliarity? Trying new things - risk

Unpredictable yields? **Opportunity cost?**

Scale?

Scale in multispecies systems



Market gardens?

e.g. Bosley Patch,
Henley-on-Thames



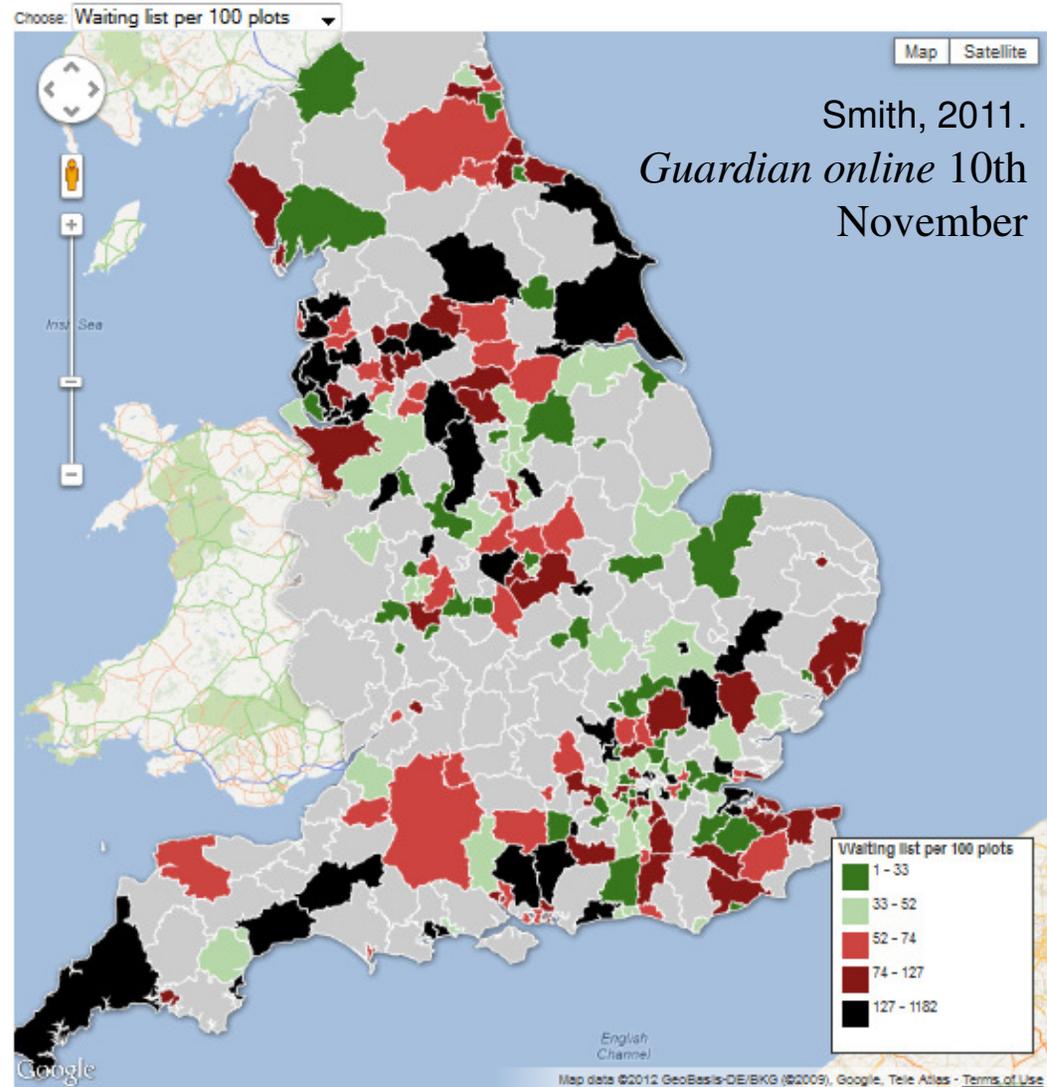
Allotments?

Household food production

Similar issues of land availability as in global agriculture

“Allotment demand leads to 40-year waiting lists”

Jones, 2009.
Guardian online 2nd June



Polyculture Productivity:

Diversity and Efficiency in “grow your own” food production



Naomi van der Velden¹, Andy Goldring², Tomas Remiarz²,
Roz Brown², Ian Fitzpatrick²

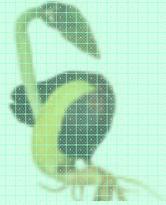


March - October 2011

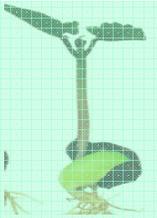


Aim

Diversity and production



Methods

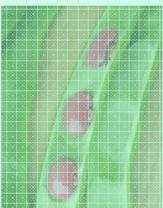
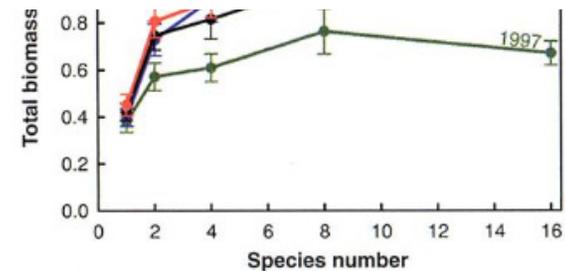
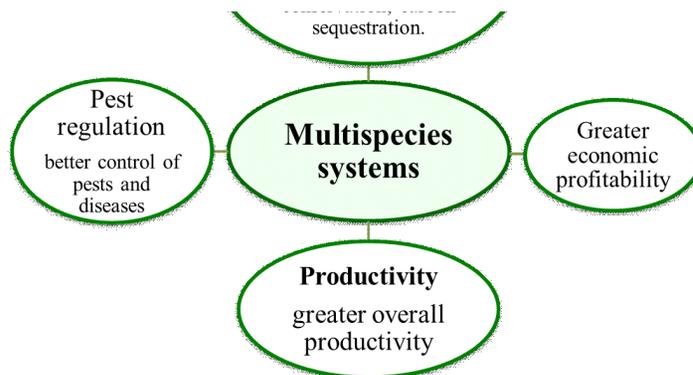


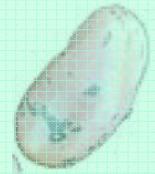
Results

Aim: To compare productivity of Low- and High-diversity mixes of veg in household gardens



Context





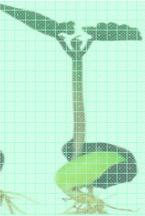
Rationale

Public participatory trial



Methods

7 plant families
12 crops (plus 1 flower).



Results

50 sets of seeds
to participants

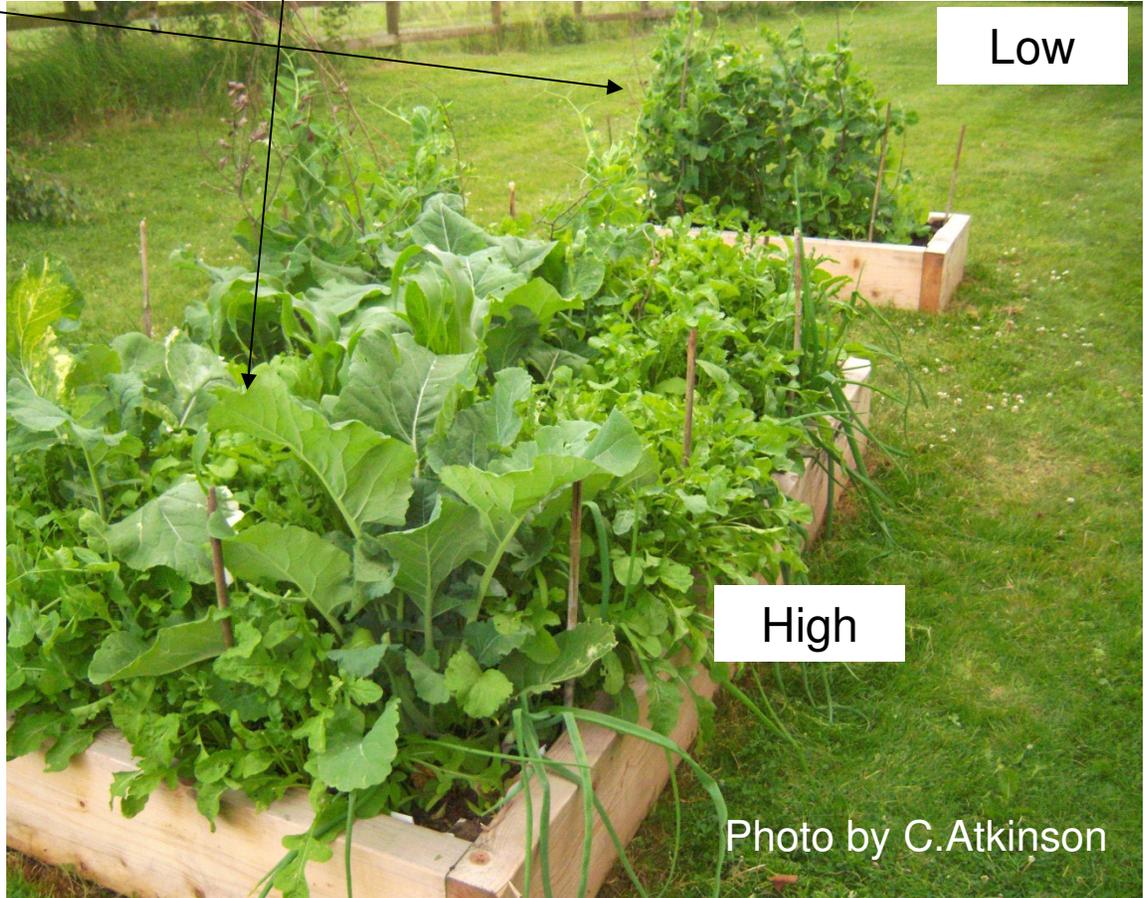
Weigh each crop
every harvest.



Context

Record time spent
on each plot.

Questionnaires



Mixed vegetable research trials (2011)
Information for participants



Working in partnership with
the National School of
Forestry and Centre for
Wildlife Conservation at the
University of Cumbria



Rationale

Veg production



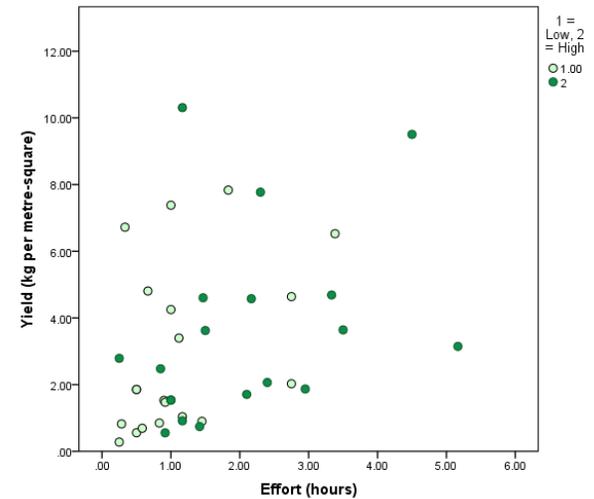
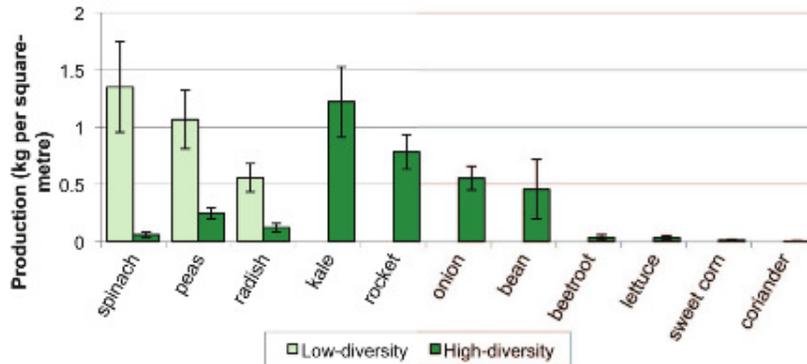
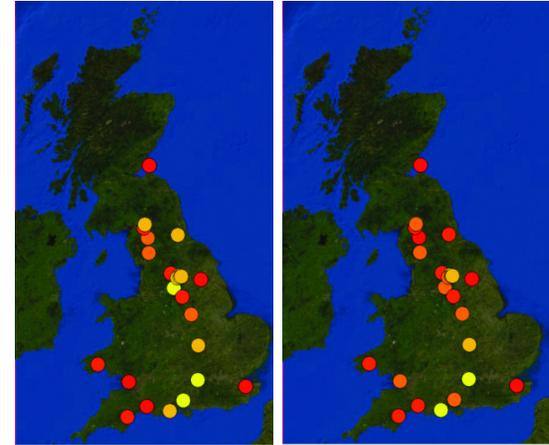
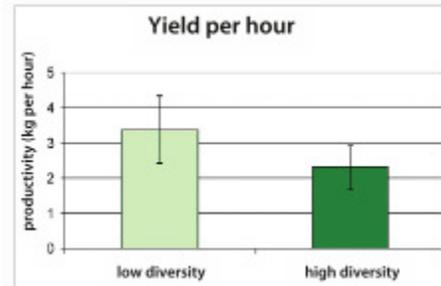
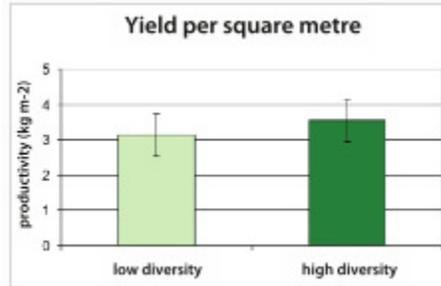
Methods



Results



Context





Rationale

Veg production



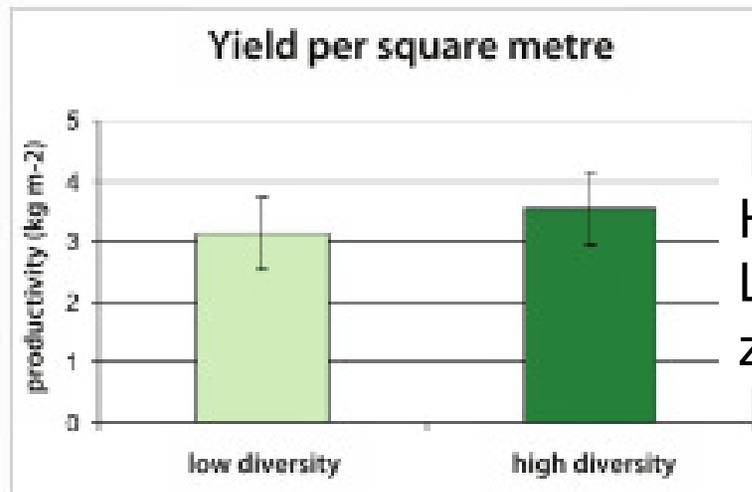
Methods



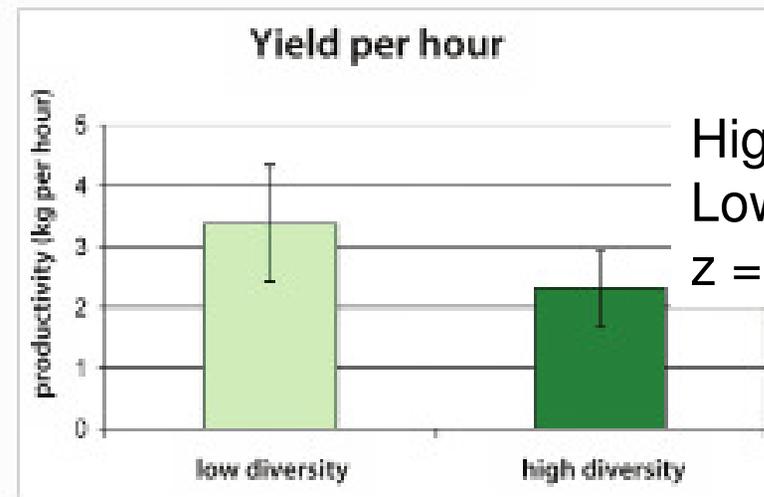
Results



Context



High 3.5 ± 0.6 kg m⁻²
Low 3.1 ± 0.6 kg m⁻²
 $z = 1.154$, $p = 0.130$.

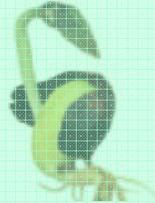


High 2.3 ± 0.6 kg m⁻² hr⁻¹
Low 3.4 ± 1.0 kg m⁻² hr⁻¹;
 $z = 1.680$, $p = 0.093$



Rationale

Veg production



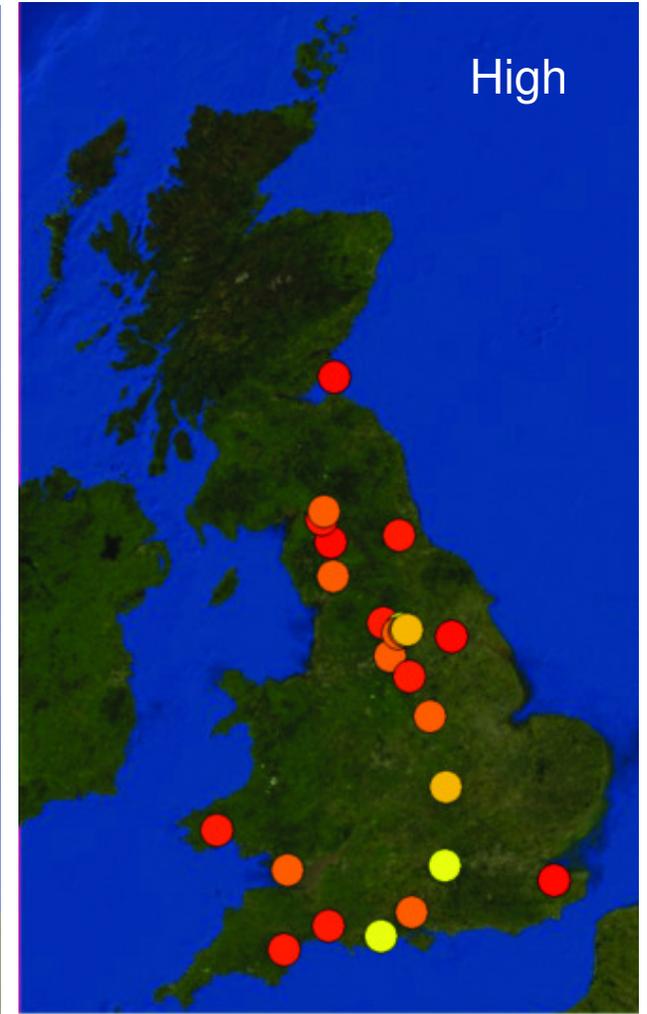
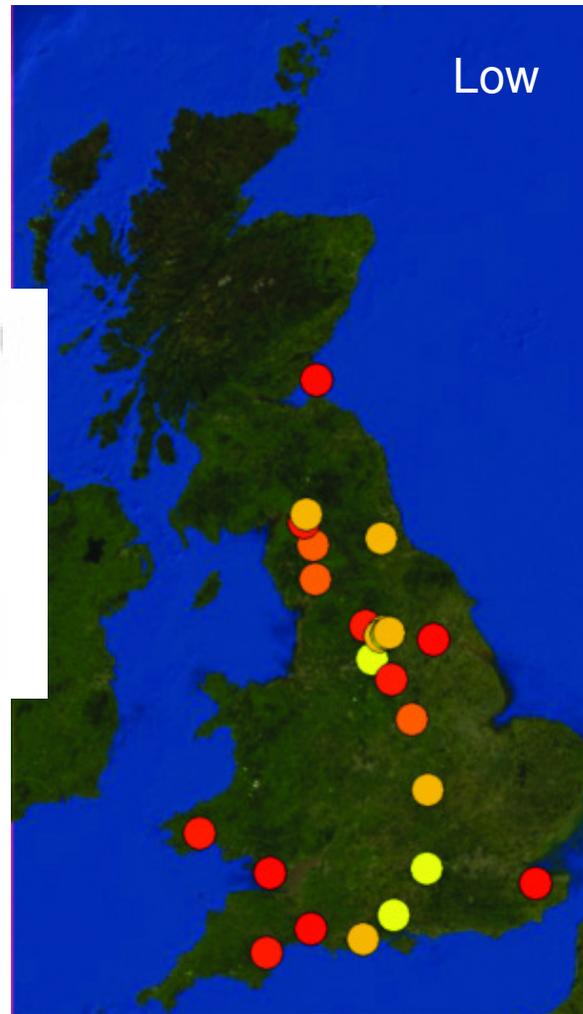
Methods



Results



Context





Rationale

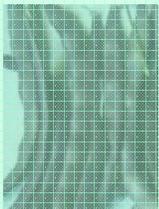
Veg production



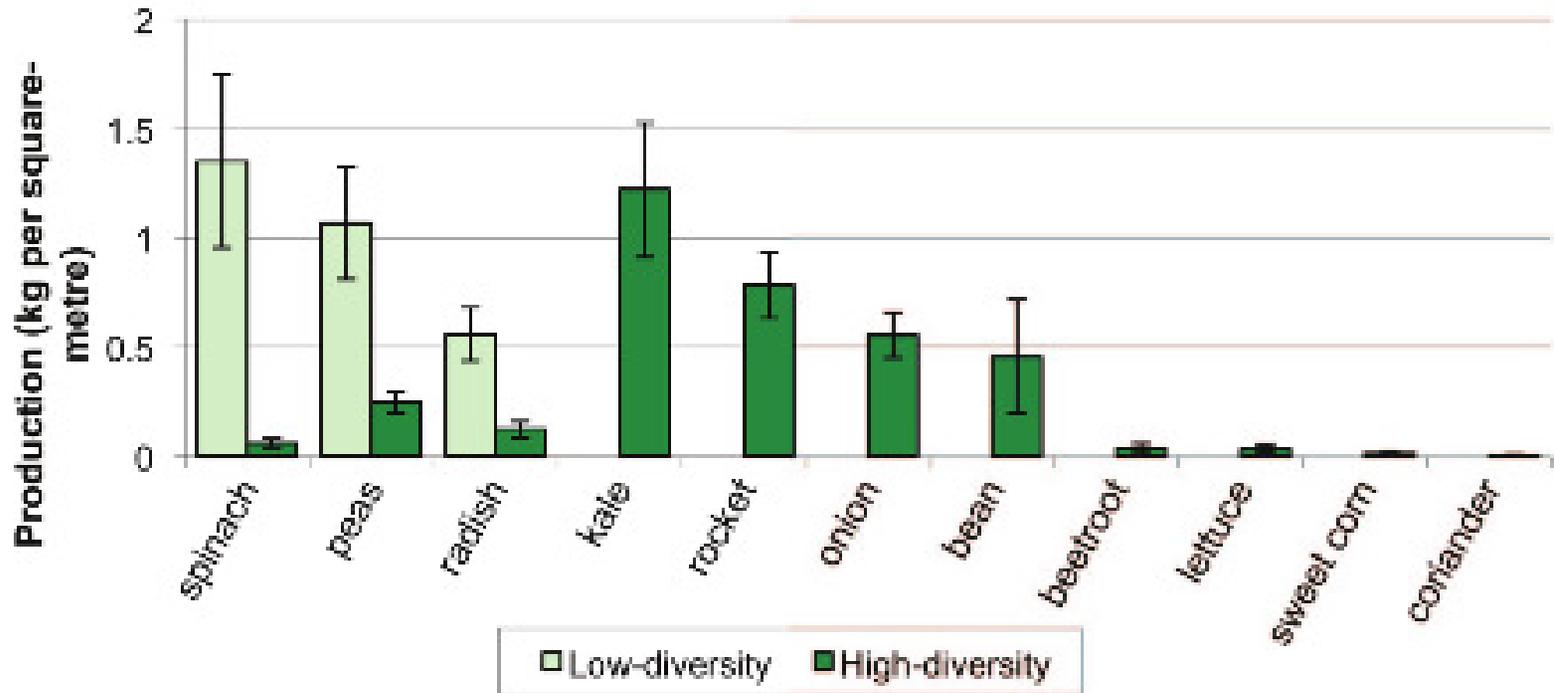
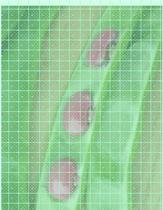
Methods



Results



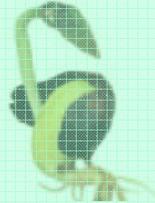
Context





Rationale

Veg production



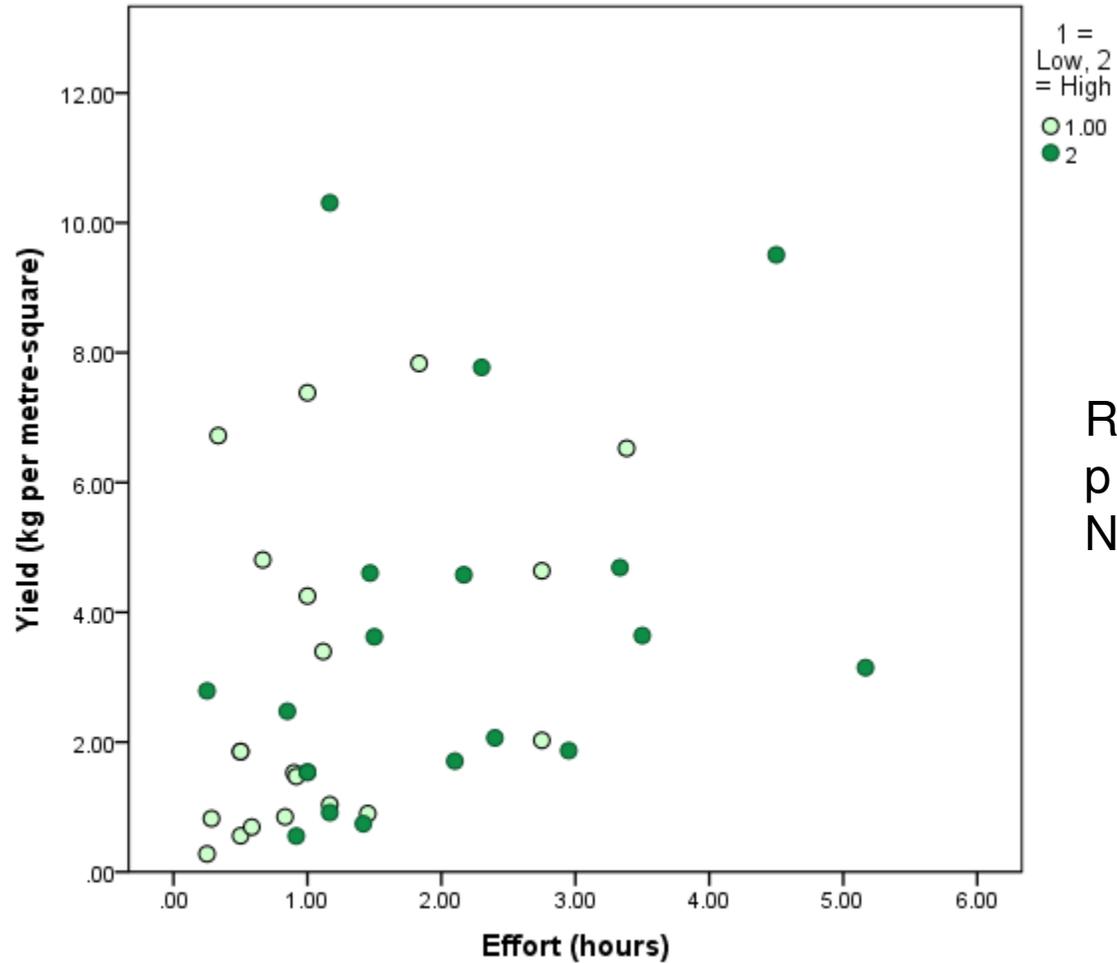
Methods



Results



Context

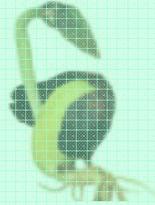


R = 0.462
p = 0.03
N = 39



Rationale

Veg production



Methods

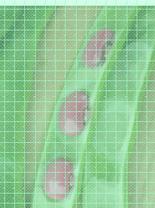


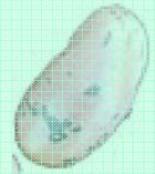
Results

- Average production was equivalent to 35 tonnes per hectare.
- No significant difference in total yields
- Significant differences in individual species (More peas, spinach & radish from Low-diversity plot)
- Production linked to effort (50%), plus probable differences in soil, weather, location etc.



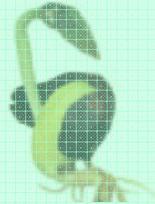
Context





Rationale

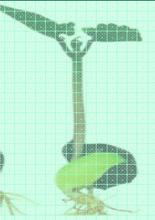
Context and next steps



Methods

Household yields are high; 35 tonnes ha⁻¹.

- Allotment yields of 16 tonnes ha⁻¹, Supplying 10% of UK food production. (Stamp, 1948)
- UK field veg yields 19 tonnes ha⁻¹ in 2011 (BHS, 2012)



Results

Polycultures may yield more than monocultures at this scale.

Production linked to effort (50%). **Time costs are leisure time.**
Additional health benefits to gardening (Leake *et al.*, 2009)



Context

Own-produced food could meet some [UK] food demand in a low input, low-impact way. How much?



BHS – British Horticultural Society info [online records]

Leake *et al.*, 2009 . *Environmental Health* 2009, **8**(Suppl 1):S6

Stamp, 1948 *The Land of Britain: it's use and misuse*. Longmans, Green & Co.



Rationale

References



Methods

Jones, R. 2009 “Allotment demand leads to 40-year waiting lists” *Guardian online* 2nd June [accessed 14/8/12]

<http://www.guardian.co.uk/money/2009/jun/02/allotments-shortage-waiting-lists>

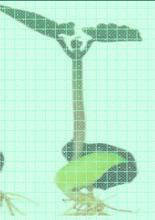
Malézieux *et al.*, 2009 Mixing plant species in cropping systems: concepts, tools and models. *A review Agron. Sustain. Dev.* **29** 43–62

Smith, A.P. 2011 “The English allotment lottery mapped” *Guardian online* 10th November [accessed 14/8/12].

<http://www.guardian.co.uk/news/datablog/interactive/2011/nov/10/allotments-rents-waiting-list-england>

Stamp, 1948 *The Land of Britain: its use and misuse*. Longmans, Green and Co. London

Tilman *et al.*, 2001 Diversity and Productivity in a Long-Term Grassland Experiment. *Science* **294** (5543) 843-845.



Results



Context





Rationale

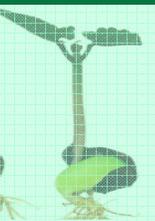
Thanks!



Methods

Thanks - For listening!

To all the participants, to co-ordinators Celia Ashman and Edgars at the Permaculture Association. To Chris Evans for advice on appropriate plant mixes. Thanks to these seed companies for supplying the seeds



Results

BEANS and Herbs



TUCKERS SEEDS



Context

Contact : n.k.vandervelden@cumbria.ac.uk

