Intercropping

Impact: Crop yield

Reference 22

Slattery, RA; Ainsworth, EA; Ort, DR 2013 A meta-analysis of responses of canopy photosynthetic conversion efficiency to environmental factors reveals major causes of yield gap J. Exp. Bot. 12, 3723–3733 10.1093/jxb/ert207

Background and objective

Improving plant energy conversion efficiency (εc) is crucial for increasing food and bioenergy crop production and yields The purpose of this study was to use a meta-analysis to (a) determine the percentage change in εc due to elevated [CO2], elevated [O3], water stress, temperature stress, nitrogen application, phosphorus application, foliar damage, shade, and intercropping, and (b) identify the effect of within treatment variability due to treatment type and dosage, plant characteristics, and growth environment on εc.

Search strategy and selection criteria

Studies on Energy conversion efficiency (εc) or ‘radiation use efficiency’ were found using the Web of Science citation database (ISI, Philadelphia, PA, USA). Additional studies were included when referenced by the studies found by the methods above. Studies that did not report sample size could not be used. εc values based on incident light were not included because apparent changes in εc may have been influenced by changes in εi . Several studies included εc values during different parts of the growing season

Data and analysis

The meta-analysis was conducted using the natural log of the response ratio. A mixed-model analysis was run using MetaWin. When a sufficient number of studies contained standard deviation values within a treatment, a weighted parametric analysis was used where the weight of a study was determined by its mixed-model variance. Confidence intervals were determined by bootstrapping methods using 9999 iterations in non-parametric analyses

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
140	Multiple crops	Intercropping	Monoculture	Metric: Energy conversion efficiency (ec, the efficiency with which intercepted or absorbed energy is converted into biomass and is based on the photochemical efficiency of the entire plant canopy); Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	62%

Results

- Intercropping incresaed εc compared to monoculture but the effect was not significant.

- NA
- NA
- NA
- NA

Factors influencing effect sizes

- NA : NA
- NA : NA
- NA : NA

Conclusion

Optimizing management strategies such as intercropping can enhance energy conversion efficiency