



Wheat breeding assessed for organics

An experiment with different tillage systems

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Landraces of old wheat relatives (emmer, einkorn, rivet) markedly outyielded modern milling wheat cultivars in ORC field trials ([ORC Research Digest no. 1](#)), but why? In the past century, plant breeding has led to enormous productivity gains for wheat. However, this progress was achieved in conjunction with the use of fertilisers, fungicides and herbicides, and has proven weaker in organic and low input conditions¹ where these inputs are not used. In addition, organic cropping systems also need to reduce the intensity of tillage, by minimising ploughing, which can further alter cultivar adaptation and performance.

In 2015/16 and 2016/17, 13 bread wheat cultivars selected and/or used in British agriculture were compared, in an experiment run at the University of Reading's Crops Research Unit. Cultivars were grouped into: (i) landraces (seeds used before any formal breeding was developed), (ii) historic (1940s-1960s), (iii) modern milling and (iv) modern high-yield feed cultivars. This set of cultivars were grown in an organic rotation under both ploughed and shallow non-inversion tillage.

Overall, the shallow non-inversion tillage reduced yield compared to the ploughed system. In both systems, landraces were consistently less productive than all other cultivar groups and, among the latter, historic cultivars yielded as much as the modern milling ones. In non-inversion tillage conditions, even the inherently high-yielding feed cultivars showed no advantage compared to the historic milling cultivars².

Historic cultivars bear traits that improve their performance in organic and low-input systems, and that might have been lost during most recent modern breeding. As such, they can provide interesting opportunities both for organic farmers, especially if aiming to reduce tillage intensity, and for breeders looking at cultivars adapted to organic and low-input systems.



Old landrace of rivet wheat thriving (left), modern wheat cultivar failing (right): a not uncommon observation in organic farming

FURTHER READING

1. Jones *et al.* (2010) doi.org/10.1017/S0021859610000146
2. Costanzo (2018) tinyurl.com/r2hev77n