Selecting winter wheat lines from a composite cross population

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BACKGROUND

Genetically diverse wheat Composite Cross Populations (CCPs) are a valuable source of breeding material which can be used to select lines or varieties adapted to local conditions, which could be integrated into participatory plant breeding (PPB) programmes.

Ears were selected from the CCP in the field in the UK and Hungary and were multiplied in ear rows and small plots in the following two years. A replicated field trial compared the best performing selected lines against a commercial variety and the original CCP.

RESULTS

Some selected lines had greater **resistance to yellow rust** (*Puccinia striiformis*) than the original population and the control variety (Alchemy) ($P<0.001$). Figure 1 suggests that yellow rust may have reduced the yield of susceptible lines.

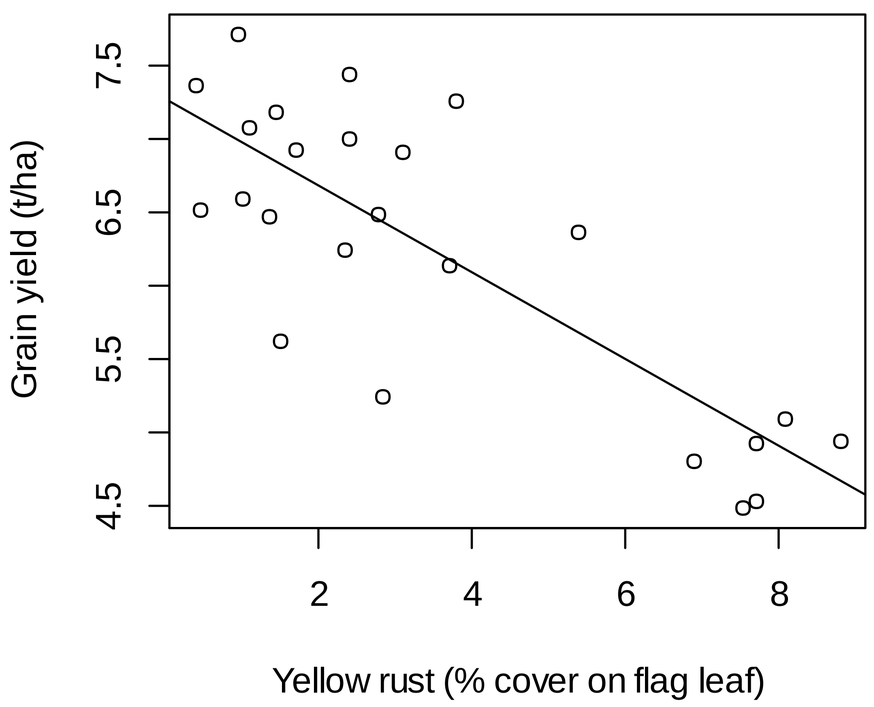

Figure 1. The correlation between mean yellow rust infection on the flag leaf and grain yield per plot.

Some selected lines had significantly greater early ground cover ($P<0.005$) and Leaf Area Index (LAI) at tillering ($P<0.05$) than the population and the control variety. Early crop cover was correlated negatively with **weed cover** ($P<0.05$) (Figure 2).
There was also a significant negative correlation between grain yield and protein content (%) for each of the selected lines ($P<0.01$) (Figure 3).

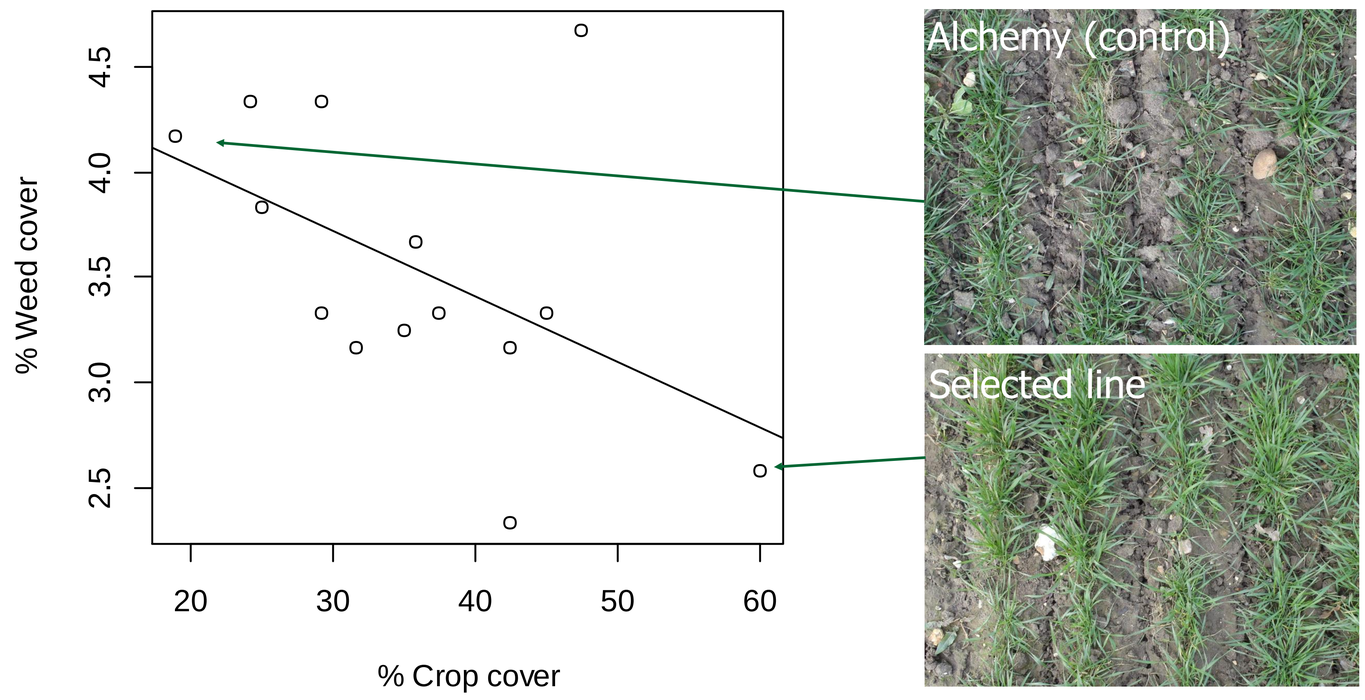

Figure 2. Mean crop and weed cover (%) for each of the selected lines and control variety.

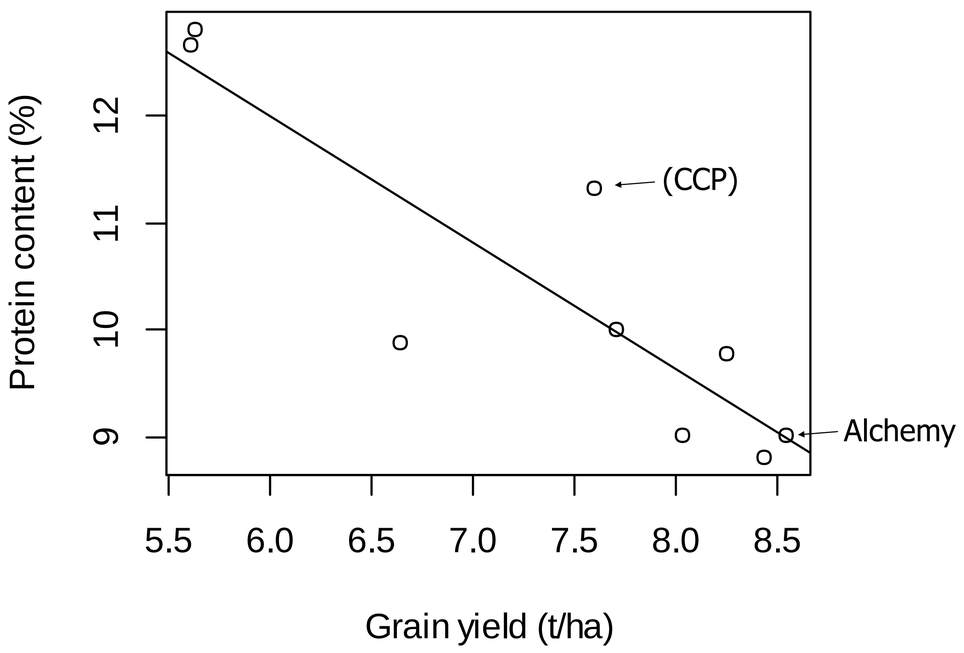

Figure 3. The relationship between grain yield and protein content (%).

CONCLUSIONS

- Lines with enhanced yellow rust resistance can be selected from the CCP, which may improve yield stability.
- Similarly, lines with better traits for weed competition, such as early growth rate and LAI, can also be selected from the CCP.
- The trade-off between grain yield and protein content should be considered when selecting pure lines from a CCP.
- This process could lead to development of mixtures of selected lines with potentially higher performance, including stability, than either the CCP or individual pure-line varieties.

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