

Genetic analysis of complex traits in brassicas

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Flowering-time, seed-yield and winter-survival are all examples of quantitative traits which are both agronomically important and biologically interesting. The individual genes which determine such traits have been difficult to identify and manipulate, in part because the environment has an appreciable influence on these traits (making an accurate assessment of the genotype of a plant difficult) but also because several genes all contribute to a single measurable character.

The scoring of these characters can be made more accurate and environmental influences (and environment x genotype interactions) can be estimated by carrying out replicated trials with genetically uniform lines. Traditionally, sets of genetically homogeneous lines have been derived by repeated selfing (recombinant inbred lines) or by repeated backcrossing (recombinant backcrossed lines). More recently, it has become possible to produce recombinant doubled-haploid lines in a single generation by microspore-culturing F₁ plants.¹ The production of segregating doubled-haploid lines of *Brassica napus* (oilseed rape) is described below.

Restriction fragment length polymorphisms (RFLPs) and isozymes can provide the large number of genetic markers, with little or no effect on phenotype, necessary to establish genetic linkages to each of several genes influencing a particular quantitative trait in a single segregating population.² There have been relatively few thorough genetic analyses of even simply inherited traits in *B. napus* but with the construction of saturated RFLP maps of *B. napus* and related *Brassica* species, the first stages of which are described below, the resolution and indirect selection of individual quantitative trait loci in oilseed rape should be practicable.

High heritability is an essential prerequisite for the genetic analysis of a quantitative trait. Seed-yield, percentage oil in the seed, 1000 seed weight, days to flowering, vernalization requirement and plant height are some of the characters currently being assessed for their suitability.

References

- 1 *Lichter, R, De Groot, E, Fiebig, D, Schweiger, R, Gland, A (1988) Plant Breeding 100, 209-221.*
- 2 *Paterson, A H, Lander, E S, Hewitt, J D, Peterson, S, Lincoln, S E, Tanksley, S D (1988) Nature 335, 721-726.*