

Genotype-environment interaction for seed yield and ODAP concentration of *Lathyrus sativus* L. and *L. cicera* L. in Mediterranean-type environments.

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Summary

In 1994, 407 *L. sativus* and 96 *L. cicera* lines were evaluated for phenology, seed yield and seed concentration of the neurotoxin 3-(-N-oxalyl)-L-2,3-diamino propionic acid (ODAP) in the Mediterranean-type climate of south-western Australia. The large number of lines were evaluated at one site and included seed from the Indian sub-continent, Mediterranean/European and Ethiopian origin. A reduced number of lines from this study were grown at three sites in south-western Australia in 1995 and 1996, to examine genotype-environment interactions on seed yield and ODAP concentration in the seed of the two *Lathyrus* spp. No Ethiopian material was included in the 1995/96 study.

Principal components analysis showed that *L. sativus* lines grown in 1995 and 1996 could be divided into two distinct geographical origins: Indian sub-continent and Mediterranean/European (Fig. 1). Those lines of Mediterranean/European origin were consistently higher yielding (both in 1994 and 1995/96), with much larger seeds and later phenology. In *L. cicera* seed yield was closely associated with greater mean seed weight and to a lesser extent with early phenology. The genotype-environment study indicated that higher yielding lines of both species generally

responded to favourable environments; in the case of *L. sativus* the Mediterranean/European lines and for *L. cicera* the larger seeded, earlier phenology lines.

For both species, genotype was the most important determinant of ODAP concentration and environment had less influence. Genotype-environment interactions had no effect on seed ODAP concentrations. The ODAP concentrations in *L. sativus* were generally higher (0.04-0.76%) compared to *L. cicera* (0.08-0.34%).

In terms of seed yield, both species showed substantial potential in the environments tested. Further improvements in adaptation, seed yield and reduction in ODAP are possible in both species.

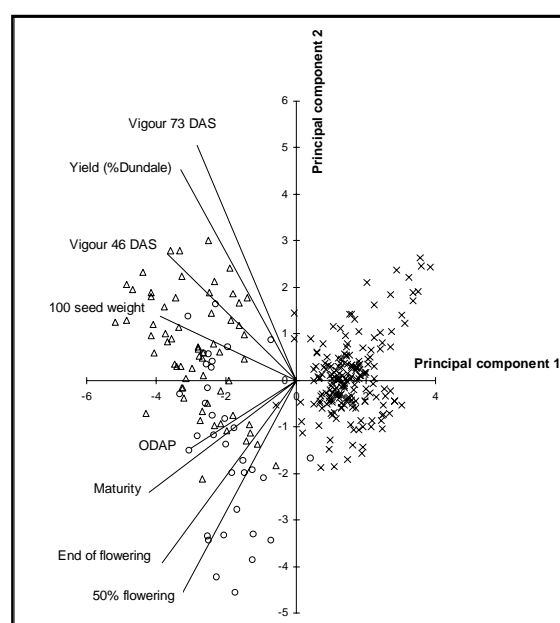


Fig. 1: Principal components analysis of *L. sativus* genotypes grown at one site in 1994, separated according to three geographic origins: Ethiopian (o), Indian (x) and Mediterranean/European (Δ). Included are the relative weights of 8 plant traits used in analysis (see 8 labelled lines indicating displacement from the origin). These traits are (i) Vigour 73 DAS- plant vigour assessed 73 days after sowing. (ii) Yield (% Dundale)- seed yield as % of adapted *Pisum sativum* cultivar. (iii) Vigour 46 DAS-plant vigour assessed 46 days after sowing. (iv) 100 seed weight- weight of 100 seeds (g). (v) ODAP- seed ODAP concentration (%). (vi) Maturity-days to plant maturity. (vii) End of flowering- days to end of flowering. (viii) 50% flowering- days to 50% of plants in plot flowering.