

Ideotypes for the central wheatbelt of W. A. part III - Grain legumes

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The following ideotype characters were identified for chickpea on heavy soils at Merredin in the W.A. cereal belt (1): early flowering, reduced. Branching and cold tolerance (good seed set at low temperatures). These characters can be expected to lead to higher pod set and seed numbers, giving higher harvest index and increased yield. Long term field trials (2) indicated that earlier flowering in the narrow leaved lupin cv. Yandee, compared to cv. Marri (released 1976), has contributed up to 22 per cent increase in yield in the Merredin region, and a further increase of 17 per cent with the introduction of Danja, released in 1986. Introduction of earlier flowering Derrimut (1964) or Dundale (1979), to replace the later flowering cv. Dun (early 1900's) probably increased yields by up to 25 per cent (2). Breeding tall semi-leafless field peas such as cv. Maitland, to facilitate harvesting does not fit the ideotype for high yield in a dryland environment, especially as this cultivar is late maturing.

The existence of high-yielding characters was investigated for lupins, field peas and chickpeas on intermediate light land, i.e. sand over clay and on heavy textured land at Merredin (rainfall 225 - 350 mm). Trials were machine sown in 1984 and 1985, and detailed information collected on crop yield and yield components, plant morphology, phenology and dry matter partitioning, for a range of crop types, which included reduced- branching lupins, semi-leafless peas and early chickpeas.

It appears that some of the expected yield gain from the reduced branching lupin would be lost by negative compensation due to later flowering and 9 per cent taller stems (Table 1). The semi-leafless peas studied indicated a yield gain over full-leafed Derrimut of 11 per cent even though it flowered 10 days later. In chickpea earlier flowering and erectness seemed to be associated with the higher yield of CPI 56288 (obtained from E.J. Knights) compared to cv. Tyson.

Table 1. Effect of changes in high-yielding characters (both + or -) on crop yield.

SPECIES	LUPIN		FIELD PEA		CHICKPEA	
Commercial crop	Yandee to		Derrimut to		Tyson to	
New crop	Reduced	branching	Semi-leafless	pea	CPI 56288	strain
Flowering	later	-	later	-	earlier	+
Cold tolerance	increase	+	nil	0	nil	0
Branching	reduced	+	reduced	+	nil	0
Stature	taller	-	shorter	+	taller	-
Erectness	more	+	more	+	more	+
% change in yield		5		11		12

The above data further indicate the need to define ideotypes for specific soil and climatic conditions, to permit a more critical assessment of yield gain due to a particular character, and so ensure a more rapid implementation of the ideotype by avoiding the introduction of negative changes in already established beneficial characters.

1. Siddique, K.H.M. and Sedgley, R.H. 1986. Aust.J.Agric.Res 37:245-61.

2. Fisher, H.M. 1987. W.A. Dept. of Agric. Bul. 4112 :54-62