

Ideotypes for the central wheatbelt of W. A. part II - Wheat

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The ideotype approach outlined in Part I was applied to the development of higher yielding wheat cultivars on heavy textured soils in the drier parts of the central wheatbelt of south-western Australia. Initial studies (1) indicated the following features of the environment: (i) winter intense rainfall, (ii) incomplete recharge of rooting profile, (iii) a high probability of severe early spring drought, (iv) the possibility of late frosts in early October, and they provided data indicating that restricted tillering was likely to be an important feature of the ideotype for heavy soils in the region. This feature was evaluated and confirmed by detillering experiments (2) and a source of genes for reduced tillering was identified (3).

Yield changes, shown in Table 1, (4), were confirmed by detailed studies comparing the performance of new cultivars, viz. Insignia (1946), Gamenya (1960), Tincurrin (1978) and Gutha (1983), released for the region over the last 41 years. These studies indicated that the ideotype should have the following characteristics: (i) early flowering, but with anthesis delayed until the danger of frost has past, (ii) restricted tillering, (iii) short stature and (iv) early terminal spikelet formation. Lines incorporating limited tillering have been developed and screened in the field (5) and now require further agronomic evaluation.

Table 1. Progress towards the ideotype and expected yield response (+ or -) in early to more recent cultivars released for the W.A. cereal belt.

Ideotype Character	Cultivar Progression					
	Insignia to Gamenya		Gamenya to Tincurrin		Gamenya to Gutha	
Flowering time	earlier	+	nil	o	earlier	+
Tillering	reduced	+	nil	o	nil	o
Stature	taller	-	shorter	+	taller	-
TS formation	earlier	+	earlier	+	earlier	+
Relative yield change(%)		+4		+13		+6
Relative height change(%)		+10		-13		+15

Table 1 indicates that yield improvement is associated with definite but uneven progress towards the ideotype, with respect to shorter time to flowering, red, iced height, earlier terminal spikelet (TS) formation, and reduced tillering. Yield gains were made in Gamenya being earlier than Insignia, Gutha being earlier than Gamenya and Tincurrin being shorter than Gamenya. Yield losses also occurred with Gutha, released after Tincurrin, being taller than Tincurrin and Gamenya. More deliberate screening for established ideotype features should speed up the rate of cultivar improvement.

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