

## Growth and water use of normal and reduced branching lupins

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Stem and branch growth of lupins (*Lupinus angustifolius*) ends in a floral bud, below which 3-4 branches develop in the uppermost leaf axils. Simultaneous vegetative branching and reproductive growth continues until environmental conditions are no longer suitable. Intra-plant competition for assimilate often limits pod set. Recently Dr. Gladstones has developed genetically reduced branching types (RBTs) which are higher yielding (1).

### Methods

Growth and yield partitioning, water use and root growth of Illyarrie and RBTs of similar flowering date were compared in several environments.

### Results and Discussion

The RBTs out-yielded Illyarrie by 13% (average of 5 environments), but biological yields (BY), root growth (RG) and rooting depth (RD) of the two types were similar. The difference between the two types in total seasonal water use (WU) was small, being no greater than 11mm in any growing season (Table 1). The two types had major differences in branch growth and yield components (Table 2).

**Table 1: Growth, seed yield, root growth and water use of normal and reduced branching lupins. WU is the difference in water use between the two types.**

SITE & YEAR	ILLYARRIE				RBT				WU
	BY	GY	RG	RD	BY	GY	RG	RD	
	t/ha	t/ha	m/m3	cm	t/ha	t/ha	m/m3	cm	mm
Gills '84	6.72	2.11	10990	290*	7.64	2.29	9156	290*	0
Criddle '84	6.04	1.88	NA	105**	6.13	1.94	NA	95**	11
ECRS '85	5.94	1.52	8304	240***	4.54	1.41	8182	240***	10
Carson D '86	9.18	3.07	NA	NA	8.98	3.55	NA	NA	5
Carson M '86	12.59	3.53	NA	NA	12.39	4.51	NA	NA	NA

Week after planting \* = 16, \*\* = 11, \*\*\* = 14, NA = not available

**Table 2: Growth, yield distribution and yield components**

	CRIDDLES 1984		GILLS 1984	
	Illyarrie	RBT	Illyarrie	RBT
1 BY on Main Stem	40	67	43	68
1 BY on 1st Order Branch	46	30	35	30
1 BY on Higher Orders	14	3	22	2
1 GY on Main Stem	37	63	42	54
1 GY on 1st Order Branch	52	35	40	41
1 GY on Higher Orders	11	2	18	5
Pods/m2	337	499	371	785
Seeds/pod	3.4	3.3	3.6	3.1
Wt/seed (g)	.16	.12	.14	.10

The main difference between normal lupins and RBTs is in the partitioning of growth, rather than in total growth and water use. The RBTs have a greater proportion of their total growth and yield on the main stem. They also set many more pods on the main stem. The RBTs had both fewer seeds/pod and smaller seeds than Illyarrie, suggesting possible source limitations to seed filling for the RBTs. The early yield

development of the RBTs has advantages over branching types in situations where intra-plant competition for assimilates limits early pod set, and water stress limits late pod set and seed filling.

1. Hamblin, J.; Delane, R.; Bishop, A. and Gladstones, J.S. 1986. Aust. J. Agric. Res. 37, 611-620.