Contribution of flower and pod abscission to reproductive abortion in lupinus angustifolius

R. Delane[1], A. Pigeaire[2] , M. Seymour[3] and C. Atkins[2]

[1]Department of Agriculture, P.O. Box 110, Geraldton, WA 6530
[2]Botany Department, University of WA, Crawley, 6009
[3]Department of Agriculture, PMB 50, Esperance, WA 6450

Lupins frequently do not attain their yield potential due to high abortion of reproductive structures. The final number of pods at maturity can be related to both the size of the inflorescence, and to the level of abscission of flowers or pods at different stages. The causes of abscission of flowers, young pods and developing pods are likely to be different. This study aimed to determine whether variation in pod setting is primarily due to variable flower formation, flower abscission or abscission of pods at various stages.

Methods

Three trials incorporating sowing dates and plant densities were grown at Geraldton and Esperance, W.A. At Geraldton (deep, red loamy sand; May-October rain 375mm), one trial had 8 sowings (2 per week) during May, 1988. An adjacent trial had a further 4 sowings. At each sowing date, cv. Danja was grown at 22 and 44 plants.m^{-2} (hand thinned). At Esperance (grey sand /clay at 40cm; May-Nov. rain 385 mm) there were 4 sowing dates at weekly intervals (44 plants.m^{-2} only). From the start of anthesis the phenological stage of each reproductive site on the main inflorescence was recorded weekly on 12 plants/plot, and the timing of flower opening and abscission, and pod formation and abscission was determined.

Results and discussion

Flower abscission accounted for most of the reproductive abortion (47-85% aborted as flowers) and was strongly influenced by environment (Table 1). Except for Date 1 at Esperance (73% initiated pods aborted), pod abortion was relatively constant for all sowings at both sites (51-58% off initiated pods aborted at Geraldton; 45-53% at Esperance). Very young (9-10 mm) pods were most likely to abort,and there was very little abortion of pods greater than 14 mm in length (Table 1). It is suggested that the abortion of flowers and very young pods is under different control from the abortion of developing pods, and that attempts to understand and minimize reproductive abortion in L. angustifolius should concentrate on the study of abortion of flowers and very young pods.

Table 1. Inflorescence size, flower and pod abscission and final pod number for cv. Danja. Four selected sowings (44 plants.m^{-2}) at Geraldton and Esperance. Values are per main stem inflorescence.

Site	Geraldton				Esperance			
Sowing number	2	3	6	12	1	2	3	4
Total flowers	19.6	16.4	24.7	28.5	32.1	35.6	35.1	33.4
Aborted-flowers	9.2	8.1	15.2	18.4	23.8	25.3	27.8	28.3
-pods (9-10mm)	5.2	4.7	4.0	4.8	6.1	5.2	3.3	2.7
(11-13mm)	0.1	0.1	1.0	0.6	nd*	nd	nd	nd
(14-27mm)	-	-	0.3	-	nd	nd	nd	nd
Final pod no.	5.1	3.5	4.2	4.7	2.2	5.0	4.0	2.4
% Total abortion	74	79	83	84	93	86	89	93

* nd=not determined