THE LIKELY FLOWERING GENOTYPE FOR SEVERAL CULTIVARS AND MUTANTS

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Table 1 shows the likely flowering genotype, in terms of the four loci lf, e, sn, and hr (5), for seven commercial cultivars which have recently been used in this laboratory for various purposes. Some estimates are based purely on phenotypic behavior and others also make use of the results of crosses.

Table 1. Estimates of the flowering genotype at the major loci lf, e, sn, and hr for seven cultivars.

Cultivar	Estimated genotype	Source of cultivar
Progress no. 9	lf E sn hr	E.W. Buxton, John Innes Institute
Early Dun	Lf^d Sn	M. Ali, Waite Institute
Austrian Winter	Lf^d Sn Hr	" "
Laxtons Superb	lf e sn hr	J.W. Ashby, DSIR, Christchurch
Puke[1/]	lf e Sn hr	" "
Frosty[1/]	lf e Sn hr	" "
Rondo	Sn hr	G. Ovenden, DSIR, Christchurch

[1/] Possible heterogeneity for E/e.

Useful estimates of the flowering genotype can often be made from quite a small quantity of information. For example, 'Austrian Winter' flowered at node 24 in an 18h photoperiod and in excess of node 70 in an 8h photoperiod (temperature: night 17°C/day 23-27°C). The high flowering node in long days indicates the presence of Lf^d and the very large response to photoperiod indicates combination Sn Hr. 'Early Dun' also flowered at node 24 in an 18h photoperiod and Lf^d is again indicated. However, the photoperiod response of 18 nodes does not clearly indicate either Sn hr or Sn Hr and further analysis would be required to resolve the genotype. [Berry and Aitken (1) have estimated a genotype of Lf^d Sp_ Hr for the related cultivar 'Dun'.] 'Rondo showed a 10 node response to photoperiod clearly indicating a genotype of Sn hr. However, the flowering node of 16 in a 24h photoperiod is consistent with either Lf or lf and further tests would be necessary to differentiate the alternatives. 'Puke' and 'Frosty' also showed a limited, quantitative response to photoperiod consistent with genotype Sp hr and in these varieties tests using continuous light from the start of germination give a minimum flowering node of 10 (lowest scale leaf counted as node 1) indicating genotype lf (4,5). Puke and Frosty both gave a bimodal distribution of flowering node under short days, segregating into two phenotypes EI and L (2). This behavior is not necessarily indicative of heterogeneity since it can occur in genotype If e Sn hr as a result of variable penetrance of gene Sn in terms of flowering node [see Hobart line 61a (3,4)]. However, the unlikely possibility that Puke and Frosty are heterogeneous for the E/e pair of alleles should not be discounted.

'Progress no. 9' and 'Laxton's Superb', unlike the other varieties, showed no response to photoperiod. They therefore carry sn. The cross Progress no. 9 x Hobart line 53 (If e Sn hr) gave an with a phenotype like Hobart line 60 (lf E Sn hr). The genotype of Progress no. 9 is therefore lf E sn hr. The F1's of Laxtons Superb x Puke and Laxtons Superb x Frosty were late like line 53. Laxtons Superb therefore appears to be lf e sn hr.

The reports by Sidorova et al (6,7) of certain induced flowering mutants are of interest for at least two reasons. Firstly, one of the mutants appears to be at the sn locus and all mutants so far tested (5) against the four locus system have proved to be at the lf locus. Secondly, the reports provide data on many characters including response to photoperiod, time to maturity, seed yield, etc., and this allows an estimate to be made of the genotypes. Unfortunately, there is some uncertainty over the scoring system used and for the purpose of this estimation I have assumed that nodes were counted from the second scale leaf as one and that "flowering node" means node of first open flower in this case (i.e. abortive flower initials were not counted as flowers). Using these assumptions the mutation giving rise to 218 is almost certainly of the type, or equivalent to, Sn to sn. This step is consistent with the lower flowering node, earlier onset of flowering, reduced time from the beginning to the end of flowering and from sowing to maturity, reduced yield, and loss of sensitivity to photoperiod (2). Mutants 2 and 319 are consistent with mutations from Lf_ to lf^a and Lf to lf respectively. Note these mutations promoted the onset of flowering but time to maturity was brought forward only marginally in mutant 2 and actually delayed in mutant 319, the yield was not reduced, and there was no loss of photoperiod response. As a tentative hypothesis we may estimate the genotype of the initial variety •Torsdag' as Lf E Sn hr, mutant 2 as lf^a E Sn hr, mutant 319 as lf E Sn hr, and mutant 218 as Lf E sn hr. These estimates are also consistent with the findings of Sidorova et al., that all three mutants are recessive, that mutant 218 is not allelic with 2 and 319, and that 2 and 319 are allelic but not identical.

Persons who would like us to estimate flowering genotypes for particular varieties are invited to send samples to me (about 20 seeds per variety) care of Chief Quarantine Officer (Plants), Dept. of Agriculture, P.O. Box 192B, Hobart, Tasmania, 7001, Australia.

We would also like to receive seed of any flowering mutants (and their initial lines) if and when they become available for release.

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