THE FLOWERING BEHAVIOR OF LINE R142F

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Gottschalk (2) reported that under the phytotron conditions at Bonn his line R142F flowered at node 39 (counting frora the first scale leaf as node 1) in continuous light, while the plants did not flower in a short-day photoperiod of 12 h (temperature - day 25°C, night 15°C). These results exceed the bounds of behavior previously reported for peas, suggesting the presence of a novel genotype for R142F. It was of interest, therefore, to examine the behavior of R142F under the phytotron conditions at Hobart, where a considerable diversity of material has been tested in recent years (8, 10). Only five plants were grown but the results are unequivocal. The three plants in continuous light flowered at node 22 and the two plants in 8 h short-day conditions flowered at nodes 64 and 76. These results for R142F place It in the phenotypic class variously known as G (3) or LHR (5). The large response to photoperiod is characteristic of lines with the gene combination Sn Dne Hr (7, 10), and the high flowering node in continuous light is characteristic of lines with gene Lf (9). The Hobart results for R142F are entirely consistent with those previously obtained for lines known to possess genotype Lf Sn Dne Hr, e.g. L16 (5, 6).

The flowering behavior of line R142F may therefore be accounted for in terms of presently identified genes. However, an explanation of the discrepancy between the Bonn and Hobart results is called for. The explanation is not likely to involve temperature, since fairly similar conditions were used in both cases. The night temperature used at Hobart, 17c, was slightly higher, but if anything these conditions would be somewhat less conducive to flowering (1). The 17-node difference in flower initiation under continuous light at the two sites is very substantial, since this character shows a low variance under these conditions. The explanation probably involves a difference in the light supply. Light intensity has little effect on flowering within the normal operating range, but light quality may have a considerable effect (7). A differential response to fluorescent and incandescent light by G = LHR lines is well established (4, 11). The 24 h photoperiod used at Hobart consists of natural light extended by light from a mixed incandescent/fluorescent source (100W tungsten filament Incandescent globes and Thorn 40 W white fluorescent tubers arranged alternately in a linear array) providing approximately 10 Wm at the top of the pots. It would appear the light source used at Bonn is not fully effective in satisfying the photoperiod requirement imposed by the Sn Dne Hr system.

The reason for the failure of R142F to flower In a 12 h photoperiod at Bonn is not clear. It has been our experience that most LHR plants will eventually flower in short days if they can be kept growing in a healthy state, although the process may take over a year (7). In the present case the latest R142F plant took 165 days to flower. Active growth of the main shoot was encouraged by regular excision of lateral branches.

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THE RELATIONSHIP BETWEEN THE MUTANT ALLELES AT THE na LOCUS IN LINE L81 AND WL1766

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The recessive mutation na (type line WL1766) causes extremely short internodes and a phenotype known as nana (6). The na locus is on chromosome 6 (3,7) near wlo (2). The na allele blocks a step early In the gibberellin biosynthetic pathway and shoots of these nana plants do not contain detectable levels of C ^-gibberellins (1,4). Two additional independently isolated mutations have been traced to this locus, one occurring in a Geneva progeny (2) and the other in a line from Bulgaria known as Hobart L81 (5). The internodes of L81 are about 75% longer than those of the nana type line WL1766 (Table 1). Nevertheless, the phenotype is still regarded as nana since L81 is considerably shorter than members of the dwarf class. The question arises therefore as to whether alleles na^{81} and na^{1766} do really differ in their ability to shorten internode length, i.e. is the length difference between L81 and WL1/66 due to an allelic difference at the na locus or to a difference in the remaining genetic background?

Lines 81 and 1766 differ at another chromosome 6 locus, pl, which shows a recombination value of about 24% with na (2). Thus segregation for Pl/pl may be used as a moderately effective marker to compare the action of na^{81} and na^{1766} in a segregating progeny. The results in Table 1 show no sign of any significant difference in internode length between the PI- and plpl segregates in either the F2 or F3 of cross 81 (pl) x 1766 (Pl). Indeed, the pl segregates, which should contain an above random proportion of na^{81} types, are on average slightly shorter in both generations. The genetic evidence therefore suggests that alleles na^{81} and na^{1766} are equivalent and equally effective in shortening internode length.