INTERNODE LENGTH IN P1SUM: EFFECT OF THE cry^s/cry^c DIFFERENCE ON RESPONSE TO A DAYLENGTH EXTENSION WITH INCANDESCENT LIGHT

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While examining the effect of extended daylength on internode length in Pisum lines considerable variation in response was noted among dwarf lines. In particular, the dwarf lines 53 (le La cry^s) and 85 (le La cry^c), which had much the same internode length in 8 h short days (daylight), differed markedly in their response to an extended daylength regime consisting of 8 h daylight plus 16 h of incandescent light (3 mkmol m^{-2} s^{-1} at pot top). Line 85 was highly responsive with some internodes increasing in length five-fold. The internodes of line 53 were also substantially longer in the 24 h regime but in contrast the maximum response was only a little more than half that shown by line 85. The response of the (53 x 85) F1 was intermediate between that of the two parents but much closer to the line 53 habit. The F2 segregated cleanly in 24 h conditions into 3 line 53-type (short internodes, low response): 1 line 85-type (long internodes, high response). The minority class bred true in F3. Six pure breeding short selections and 15 long selections, each derived from a different F2 plant, were crossed to line 8 (le la cry^c) and one 48 seed F2 progeny raised from each cross. The short selections always contributed an le La cry^3 gamete and the long selections an Le La cry^c gamete. These results indicate the short internode, low response/long internode, high response difference is associated with the cry^s/cry^c genetic difference. A night break failed to trigger an increase in internode length in either line 53 or line 85 so the effect is not a true photoperiod response.

In summary, on an le La background plants with genotype cry^s showed a lower response to a daylength extension with incandescent light than cry^c plants, allele cry^s was dominant to allele cry^c, and cry^s segregates were clearly shorter than cry^s/cry^c segregates in 24 h conditions (i.e. segregation was discrete). In 8 h conditions segregation for the cry^s/cry^c pair was obscured but progenv tests indicated that cry^s segregates were, on average, marginally shorter than cry^c segregates. These results contrast with the situation on a le la background where allele cry^c is dominant to cry^s and le-la cry^s plants (slender) are longer than le la cry^c plants (cryptodwarf) (1,2,4). The effect of the cry^s/cry^c difference on an le la background was also examined using a segregating progeny. The cry^s segregates were again less responsive to extended daylength than cry^c segregates in both relative and absolute terms. Thus the cryptodwarf-/slender difference was clearest in the 8 h conditions although segregation was discrete in either 8 h or 24 h conditions. Based on data for lines representing several other internode length genotypes the microcryptodwarf/cryptodwarf and tall/dwarf differences were also more clearly evident in 8 h than 24 h conditions. In contrast, the very short internode nana types, e.g. na (6) or ls (5), were more readily distinguised from short dwarf (le) lines in 24 h conditions since the nana lines were less responsive to extended daylength. Detailed results of this study will be presented elsewhere (3).

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