ON THE RELATIONSHIP OF ANTHOCYANIN PIGMENTATION AND STEM LENGTH IN PEA SEEDLINGS

Nozzolillo, C. University of Ottawa, Canada

In a previous report (PNL 9:42-43, 1977) it was noted that red-stemmed seedlings grown from a heterogeneous seed lot identified as P.I. 356980 had shorter inter-nodes on the average than green-stemmed seedlings from the same lot. Otherwise the red- and green-stemmed plants were indistinguishable, both having a red spot at the nodes and a wild-type flower. Crosses were made by the author and by G. A. Marx between red-stemmed and green-stemmed second generation plants derived from the original lot. All F1 seedlings were red-stemmed. In the F2, red-stemmed seedlings were about three times more numerous than green-stemmed seedlings (Table 1) suggesting that red-stemmedness is dominant over green-stemmedness and that inheritance is a simple Mendelian segregation of two alleles.

Internodal lengths of the F2 plants grown under fluorescent lights at a constant temperature of 15°C were measured (Table 2). The offspring of the selfed parent plants were also grown with the hybrids and measurements of their internodes are included in Table 2. From Table 2 it can be seen that internodal lengths of the F2 plants did not differ significantly between red stems and green stems, although red-stemmed plants tended to be slightly shorter, especially in the third and fourth internodes. The red-stemmed parents, on the other hand, were decidedly shorter than the green-stemmed parents in two of the three cases. In the third instance, the red line plants were in fact green-stemmed, presumably as the result of an unintentional selection of the offspring of a heterozygous red parent, and were taller than green line plants. Thus there is no evidence of an association between inter-node length and the presence or absence of basal anthocyanin.

Table 1. Proportion of red- and green-stemmed seedlings in the F_2 of several crosses between red- and green-stemmed parents (crosses made by Nozzolillo or Marx as indicated.

Cross	Number red-stemmed	Number green-stemmed	Ratio
Red ♀ x Green ♂			
1 x 9-5 (Nozzolillo)	48	20	2.4:1
2 x 2-8 (Marx)	29	11	2.6:1
3 x 3-2 (Nozzolillo)	not successful		
Green ♀ x Red ♂			
1 x 10-63	8	4	2.0:1
2 x 5-18	155	39	4.0:1
3 x 5-11	105	44	2.4:1
Total numbers	345	118	2.9:1

Table 2. Internodal lengths (± standard deviations) of red- and green-stemmed seedlings in the F_2 of crosses between red- and green-stemmed parents.

Internode	1	2	3	4	5	Sum of averages
Red parent* (9-5)	6±1	5±1	45±9	61±6	55±9	172
Green parent (10-63)	7±1	10±0	48±3	54±1	49±7	167
Red ♀ F_2 red (25)	5	8	41	51	60	165
" green (15)	5	8	43	53	57	166
Green ♀ F_2 red (5)	4	8	34	45	55	146
" green (4)	4	7	36	52	56	157
Red parent (2-8)	6±1	9±5	26±5	40	45	126
Green parent (5-18)	6	7	54	53	58	178
Red ♀ F_2 red (25)	5	7	37	54	60	163
" green (14)	6	8	39	59	57	169
Green ♀ F_2 red (121)	6	8	40	58	64	176
" green (50)	6	9	41	59	61	176
Red parent (3-2)	5	8	28	46	59	146
Green parent (5-11)	5	3	39	63	64	174
Red ♀ (cross not successful)						
Green ♀ F_2 red (61)	5	7	39	52	60	163
" green (22)	5	7	40	53	58	164

The plant on which the cross was made was red-stemmed but these second generation offspring were green-stemmed, suggesting that an unintentional selection had been made of the green-stemmed condition among offspring of a heterozygous parent.