GENOTYPE-DEPENDENT CALLUS GROWTH IN PEA

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A study was performed to elucidate the genetic basis of callus growth in pea. The aim of the study was to select genetic lines with the ability to produce a quickly growing callus, which later should serve as starting material for the Initiation of suspension cultures. Malmberg (1) demonstrated that qualitative in vitro behavior depends strongly on the genotype investigated, but no correlation between regeneration ability and morphological characters could be detected. In the present study, 14 genotypes of pea were tested, including the mother variety (IL), 4 mutants (423, 1201A, 489C and 251A), and 9 recombinants (R 177, RM 879, RM 837, RM 513, RM 836, R 46C, RM 20D, RM 20E, RM 516) (Table 1).

Table 1. The origin of the recombinants.

Genotypes	Parents
RM 20D	R 46C x 489C
RM 20E	R 46C x 489C
R 46C	1201A x 46A
R 177	1201A x 489C
RM 513	251A x R 177
RM 516	251A x R 177
RM 836	445A x R 46C
RM 837	423 x R 46C
RM 879	1201A x R 46C

Leaf and epicotyl segments of sterile-grown seedlings (2 weeks old) were inoculated on MS-medium supplemented with 2.5% sucrose and 1% agar, with 0.06 mg/1 picloram as auxin and 0.1 mg/1 kinetin. The approximate weight of leaf segments inoculated was 5 mg, and of the epicotyl segments 12-15 mg. Callus induction was performed in the dark, and the weight increase was estimated after 5 weeks prior to inoculating the tissues on fresh media.

The results are shown Fig. 1. In this figure the genotypes are grouped according to Increasing callus weight (Fig. la: leaf-segments; lb: epicotyl segments). Analysis of variance showed highly significant (0.1%) differences. From the position numbers in Fig. la and lb, by addition a callus growth index can be estimated, which characterizes the respective callus weight increase in both tissues from every genotype. In Table 2, the genotypes are grouped according to their increasing callus growth index, showing that also with this quantitative trait there was no clear correlation with a morphological character, although in the group of slowly growing lines no fasciated genotype occurred.

1. Malmberg, R. L. 1979. PNL 11:21-22.

Table 2. Genotypes grouped according to increasing callus growth index (= addition of position numbers from Fig. 1a [leaves] + Fig. 1b [epicotyl segments]).

Genotype	Callus growth index	Characteristics
R 177	5	**bif-1** (100%), **sg**
423	6	waxless
RM 879	6	**bif-1** (red. pen.[1]), **efr**
1201A	7	**bif-1** (red. pen.)
RM 837	10	**bif-1** (red. pen.), **efr**, waxless
489C	16	fasciated
RM 513	16	**bif-1**, fasciated, short I
IL	16	initial line DGV
RM 836	17	**bif-1** (very red. pen.), **efr**, waxless
R 46C	18	**bif-1** (red. pen.), **efr**
RM 20D	21	**bif-1**, **efr**, fasciated, long III
RM 516	23	**bif-1**, short I
RM 20E	25	**bif-1**, short I, linear fasciated
251A	25	fasciated

[1] red. pen. = reduced penetrance

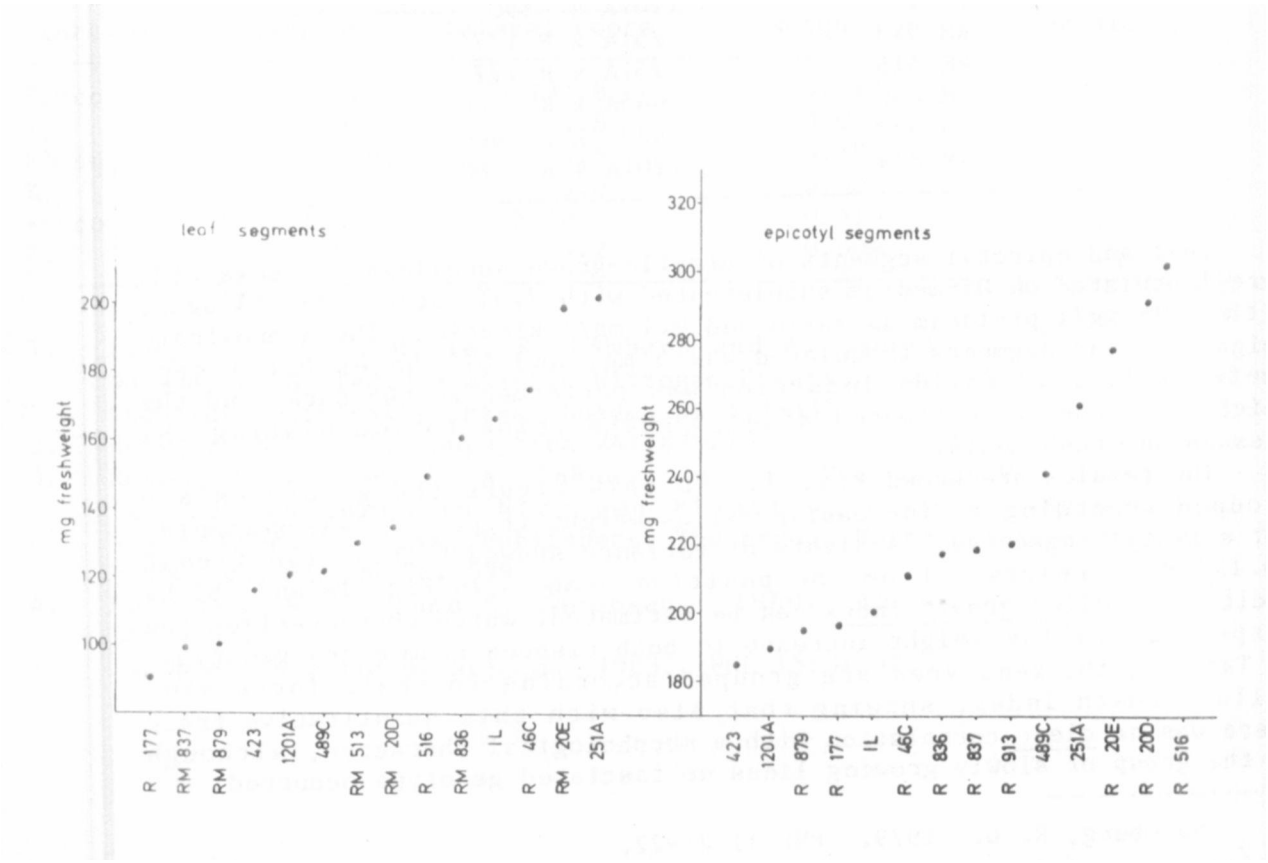

Fig. 1. Fresh weight increase during callus formation of leaf-and epicotyl segments of 14 genotypes after 5 weeks in culture.