The pea *rms2-1 rms4-1* double-mutant phenotype is transgressive

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Mutant recessive alleles at six *Rms* (*ramosus*) loci in pea confer increased branching, and we recently reported on the phenotype of several double-mutant combinations (1). For the cross K524 (*rms2-1*) x K164 (*rms4-1*) (both mutants ex cv. Torsdag), we found no evidence of transgression but with n = 24 there was a 20% chance that no double-mutant plant was actually present in this small F_2 population. To obtain a definitive answer, we have now grown F_3 progeny from two F_2 plants with a single-mutant *rms4* phenotype. These plants were identified by their *ramosus* phenotype but normal pod shape like cv. Torsdag. In contrast, pure *rms2-1* plants have convexly-curved pods (1).

Both F_3 progenies segregated some plants with curved pods and a tendency to wilt indicating they were homozygous for allele *rms2-1*. Two of these candidate double-mutant plants were subsequently confirmed as pure *rms2-1 rms4-1* with greater than 99% confidence (n = 7) by backcrossing to K164 and K524. All backcross plants had a mutant phenotype.

The *rms2-1 rms4-1* double-mutant plants were also easily recognizable by their profuse branching, and it is now clear that this double mutant has a transgressive phenotype. Based on either of the two branching indices ratio of total lateral length to main-stem length or number of laterals exceeding 1 cm in length, the double mutant showed a 2 to 3-fold increase in branching over either single mutant (Fig. 1).

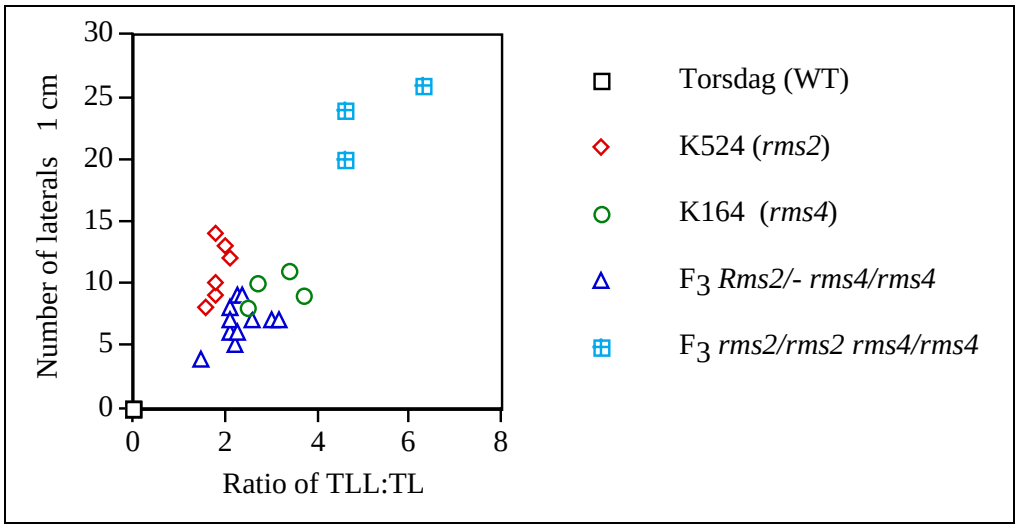

Fig. 1. Two-way plot of branching indices ratio of total lateral length to main-stem length (TLL:TL) and number of laterals ≥ 1 cm for initial line cv. Torsdag, single mutants K524 (rms2-1) and K164 (rms4-1), and F_3 progeny from two cross K524 x K164 F_2 plants with genotype Rms2/- rms4/rms4. Photoperiod 18 h.

1. Murfet, I.C. and Symons, G.M. 2000. Pisum Genetics 32: 33-38.