K219, an early flowering pea mutant with neutral reaction to photoperiod

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The early flowering mutants K218 and K219 were induced in the variety Torsdag using EMS and the two mutants shown to be monogenic recessive and non-allelic (6). Additional data illustrating their monogenic recessive nature is provided in Table 1. K218 was characterised in several earlier studies and found to have a day neutral habit (2, 3, 5). The symbol *dne* was assigned (3) when the mutant proved to be non-allelic with *sn,* the first gene shown to confer a day neutral flowering habit (1). In Tables 2 and 3 we provide data illustrating the behaviour and characteristics of mutant K219. The data clearly show the early flowering, day neutral habit of K219 and that it has characteristics similar to K218 and typical also of early flowering day neutral lines with genotype *sn* (e.g. see 4). However, in the absence of the necessary allelism test, we cannot say whether K219 is allelic with *sn* or whether it is a new flowering gene.

Table 1. F_2 segregation data for reciprocal crosses between the initial variety Torsdag and mutants K218 and K219. F_1 plants had the same phenotype as Torsdag.

Cross	Phenotype			
	Progenitor	Mutant	Total	χ^2
K218 x Torsdag	69	19	88	0.55
Torsdag x K218	69	20	89	0.30
Total	138	39	177	0.83
K219 x Torsdag	82	31	113	0.36
Torsdag x K219	93	25	118	0.92
Total	175	56	231	0.07

Table 2. The effect of photoperiod on the duration of various developmental stages in the initial variety Torsdag and mutants K218 and K219.

Line	Photoperiod*	Node of first flower formation	Number of days			
			Seedlings to budding	Seedlings to flowering	Seedlings to beginning of ripening	Seedlings to maturity
Torsdag	LD	14-15	26	33	59	73
	SD	22-24	42	46	72	91
K218	LD	12-13	21	30	56	71
	SD	12-13	22	31	60	74
K219	LD	10-11	18	26	52	68
	SD	10-11	19	26	49	68

* LD = natural summer long day photoperiod at Novosibirsk (17-18 h).
SD = 8h light per day.

Table 3. Means ± SE for several traits in the initial variety Torsdag and mutants K218 and K219 under short and long day conditions

Line	Photoperiod*	Plant height (cm)	Node of first flower formation	Number of pods	Number of seeds	Weight of seeds (g)
Torsdag	LD	187.1 ± 2.9	14.7 ± 0.2	12.7 ± 0.4	29.8 ± 1.1	8.5 ± 0.3
	SD	215.1 ± 2.9	22.4 ± 0.3	13.3 ± 0.8	23.5 ± 1.6	6.6 ± 0.6
K218	LD	157.1 ± 2.1	12.1 ± 0.2	9.2 ± 0.5	24.4 ± 1.6	6.3 ± 0.4
	SD	140.5 ± 2.3	12.6 ± 0.2	9.5 ± 0.6	20.0 ± 1.3	5.2 ± 0.3
K219	LD	161.3 ± 1.6	10.7 ± 0.1	11.5 ± 0.4	26.1 ± 0.7	7.0 ± 0.2
	SD	131.6 ± 1.9	10.6 ± 0.1	8.7 ± 0.4	17.2 ± 1.0	4.4 ± 0.3

* LD = natural summer long day photoperiod at Novosibirsk (17-18 h).
SD = 8h light per day.

Pea mutants with a neutral reaction to photoperiod are valuable as initial material in breeding for early maturing pods. There is a possibility to use such mutants in breeding new genotypes of pea with a characteristic complex of valuable traits. Crossing photoperiodically neutral mutants with non-shattering forms resulted in strains exhibiting resistance to seed shattering, an early pod maturation and high productivity.

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