

The effect of seed composition on seedling vigour in some pea cultivars

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Seedling vigour appears to be enhanced by seed composition. Low nutrient reserves in seeds can restrict seedling growth when availability of that nutrient is limited in the growing medium. There is little information on the relationship between seed composition and the growth of seedlings in field pea, *Pisum sativum*. The aim of this experiment was to investigate this relationship in 3 varieties of pea, Alma, Pennant and Prussian Blue.

Methods

The experiment was conducted in a glasshouse using a randomised complete block design. Seeds of each variety with the same weight (200 ± 5 mg) were used. The seed was obtained from two trials conducted in 1988 and 1989, and the protein concentration was determined using the Kjeldahl method. Seeds were also analysed for 15 micro-elements using Inductively Coupled Plasma (ICP) Emission Spectrometer. Plants were harvested every 3 days up to 12 days after emergence with the first harvest occurring 3 days after emergence. At each harvest, plants were separated into shoot, root and cotyledon, washed, dried and weighed.

Results and discussion

Alma produced significantly more dry matter than either Pennant or Prussian Blue. Alma also had higher concentrations of P, Mn and Zn in the seed than the other varieties (Table 1).

Table 1. The average seed protein, Phosphorus, Manganese and Zinc, and shoot dry matter at 4 times after emergence in 3 varieties of pea.

Variety	Protein (%)	Phosphorus (µg/g)	Manganese (µg/g)	Zinc (µg/g)	DM ₁ (mg)	DM ₂ (mg)	DM ₃ (mg)	DM ₄ (mg)
Alma	24.3	4239	18.9	32.7	44.8	70.3	95.0	126.2
Pennant	25.2	3784	10.5	23.2	38.6	64.8	86.5	115.5
Prussian Blue	22.3	3273	8.3	18.8	37.7	59.1	72.6	83.0
L.S.D. (P<0.05)	0.21	52.6	0.25	0.39	6.9	5.1	5.3	9.0

The correlation coefficients between seed protein, P, Mn and Zn and shoot dry matter were all significant, but the relationships were not significant for root dry matter (Table 2). P and protein showed the best correlation with shoot dry matter particularly at harvests 3 and 4.

Table 2. The correlation coefficients between some seed composition and shoot dry matter at 4 harvest times in 3 varieties of pea.

Seed Composition	DM ₁	DM ₂	DM ₃	DM ₄
Protein (%)	0.17 n.s.	0.52 **	0.64 **	0.70 **
Phosphorus (µg/g)	0.44 *	0.65 **	0.85 **	0.85 **
Manganese (µg/g)	0.44 *	0.44 *	0.46 **	0.50 **
Zinc (µg/g)	0.43 *	0.54 **	0.57 **	0.55 **

* P<0.05; ** P<0.01; n.s.: Non-significant

The results show that a variation in seedling vigour is due to seed composition. However, there were some differences between varieties in the effect of seed composition on seedling growth.