

## Effect of Sulphur Fertilisation on Protein Fractions of Faba Bean (*Vicia faba* L.), Pea (*Pisum sativum* L.) and Lupin (*Lupinus albus* L.) Seeds

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Grain legumes are important sources of plant protein for human and animals; however protein nutritional value of seeds is notoriously deficient in sulphur-containing amino acids. Studies on the effects of sulphur (S) fertilisation on grain legume quality are limited (Elsiddig *et al* 1997, El Fiel *et al* 2002). Therefore, a field experiment was conducted, during the 2006-2007 season on a demonstration farm located in Southern of Italy (Gaudio di Lavello - Potenza, 41° 06' 00'' N; 15° 51' 09'' E; 180 m a.s.l.) on a sandy-clay textured soil, to evaluate the effect of sulphur fertilization on grain yield and quality of faba bean (*Vicia faba* L. cv. Prothabat 69), pea (*Pisum sativum* L. cv. Spirale) and sweet lupin (*Lupinus albus* L. cv. Multitalia).

In this paper is reported the effect of sulphur nutrition on protein content and fractions of grain. Experimental site is characterised by a summer-dry climate with a total annual rainfall of 450 mm distributed from autumn to spring, and a mean temperature of 16°C. Randomized complete block design with three replicates and plot area of 2,000 m<sup>2</sup> was used for each species. Three S applications (0, 30 and 60 kg/ha) for faba bean and pea, and two S doses (0 and 30 kg/ha) for lupin were used. S fertilization was applied at two times: 50% before sowing, as K<sub>2</sub>SO<sub>4</sub> and 50% in March 2007 (before flowering stage), as elemental S. No irrigation was applied. Crude protein was determined, and fractionation of crude protein was carried out, by the Cornell Net Carbohydrate and Protein System (Sniffen *et al* 1992).

**Table 1. Effect of sulphur fertilization on total protein content (% DM) and fractions (% CP) of legume grain**

Treatment	Crude protein	A (NPN)	B <sub>1</sub> (TSP)	B <sub>2</sub> (NDSP)	B <sub>3</sub> (NDIP)	C (ADIP)
<i>Faba bean</i>						
S <sub>0</sub>	26.15 <sup>b</sup>	21.17 <sup>c</sup>	23.03 <sup>a</sup>	20.67	29.87 <sup>b</sup>	5.27 <sup>a</sup>
S <sub>30</sub>	26.49 <sup>ab</sup>	21.38 <sup>b</sup>	22.73 <sup>b</sup>	20.60	30.17 <sup>a</sup>	5.12 <sup>ab</sup>
S <sub>60</sub>	26.69 <sup>a</sup>	21.60 <sup>a</sup>	22.55 <sup>c</sup>	20.62	30.27 <sup>a</sup>	4.97 <sup>b</sup>
Mean	26.44	21.38	22.77	20.63	30.10	5.12
<i>Pea</i>						
S <sub>0</sub>	24.08 <sup>c</sup>	20.43 <sup>b</sup>	20.77 <sup>a</sup>	28.77 <sup>ab</sup>	26.10 <sup>b</sup>	3.93 <sup>a</sup>
S <sub>30</sub>	24.84 <sup>b</sup>	20.63 <sup>ab</sup>	20.33 <sup>b</sup>	28.90 <sup>a</sup>	26.43 <sup>ab</sup>	3.70 <sup>b</sup>
S <sub>60</sub>	25.42 <sup>a</sup>	21.00 <sup>a</sup>	20.23 <sup>b</sup>	28.42 <sup>b</sup>	26.75 <sup>a</sup>	3.60 <sup>b</sup>
Mean	24.78	20.69	20.44	28.69	26.43	3.74
<i>Lupin</i>						
S <sub>0</sub>	35.04 <sup>b</sup>	19.80 <sup>b</sup>	20.63 <sup>a</sup>	37.30	18.13 <sup>b</sup>	4.13
S <sub>30</sub>	35.54 <sup>a</sup>	20.03 <sup>a</sup>	20.23 <sup>b</sup>	37.03	18.63 <sup>a</sup>	4.07
Mean	35.29	19.92	20.43	37.17	18.38	4.10

<sup>a, b, c</sup> Means for treatments within species followed by a different letter are significantly different ( $P < 0.05$ ).

The crude protein concentration of faba bean, pea and lupin seeds vary significantly ( $P < 0.05$ ) in response to the S fertilization. Higher crude protein values were registered in faba bean (26.69%) and pea (25.42%) grains when fertilized with the S<sub>60</sub> treatment, whereas in lupin it occurred with the S<sub>30</sub> treatment (35.54%). With regard to protein fractions as overall means, similar values were observed in faba bean, pea and lupin for A, B<sub>1</sub> and C fractions. There were large differences, as means, observed in faba bean, pea and lupin for B<sub>2</sub> (20.63, 28.69 and 37.17%, respectively) and B<sub>3</sub> (30.10, 26.43 and 18.38%, respectively) fractions. S addition significantly increased the protein fractions A and B<sub>3</sub> and decreased the fraction B<sub>1</sub> in all species. Protein fraction C decreased significantly at high levels of S fertilization in faba bean and pea, but there was no change the level in lupin seeds.

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