

Influence of variety and sulfur fertilization on the contents of crude protein, and selected amino acids in blue lupins (*Lupinus angustifolius* L.)

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State of art and aim: Legumes are the most important nitrogen suppliers in organic farming, have positive effects in crop rotation and are important protein feedstuffs. In 100 % organic feeding, the amino acid (AA) supply of feedstuffs is of increasing interest. The first and second limiting AAs for swine and poultry are lysine (Lys) and the sulfur-containing AAs (SAAs), methionine (Met) and cysteine (Cys), respectively. Since SAAs are limiting in the diet of monogastrics and, besides tryptophan, also in grain legumes, it was meant to examine, if sulfur (S) fertilization could increase the SAA contents in blue lupins (*L. angustifolius* L.) and if it affects the Lys content in different varieties.

Results and discussion: Two branched ('Boregine', 'Probor') and two determinated ('Boruta', 'Sonet') blue lupin varieties were cultivated at the experimental station in the years 2012 and 2013. In each year, the varieties were grown either with or without S fertilization (40 kg S ha⁻¹; MgSO₄). Laboratory analyzes were done with NIRS, statistical analyzes with SAS 9.4 (proc glm). In 2013, the crop yield (3.65 ± 0.38 t ha⁻¹, 86% DM) and the contents of the measured ingredients (CP: 33.80 ± 1.77 g 100 g⁻¹ DM and Lys: 4.94 ± 0.14, Met: 0.68 ± 0.03, Cys: 1.39 ± 0.03 g 100 g⁻¹ CP) were higher than in 2012 (Table). There was an effect of the variety on all parameters. In 2013, 'Sonet' had a significantly lower crop yield and CP content than the other varieties. However, 'Boruta' showed a high yield difference in both years. Additionally, the variation of the Met contents between the years was higher for 'Probor' and 'Boregine' than for the other varieties. 'Boregine' had the highest and 'Probor' the lowest Met contents in 2013 (0.69 vs. 0.64 g 100 g⁻¹ CP, p < 0.05). Contrary to 2012, S fertilization affected the mean Met content of the lupins in 2013 (-S: 0.67, +S: 0.69 g 100 g⁻¹ CP). Furthermore, S fertilization led to increased Cys contents of 'Boruta' and 'Sonet' in both years and 'Boregine' in 2012 (p < 0.05). This reaction of the SAAs was already observed in grain legumes (Schumacher *et al.* 2011). The crops of 'Sonet' in both years and of 'Boruta' in 2013 showed significantly lower Lys contents (p < 0.05) when fertilized with S. This might be due to an altered storage protein ratio (Blagrove *et al.* 1976). 'Probor' was not affected by S fertilization in both years. In conclusion, S fertilization can positively affect the SAA contents of blue lupins to the detriment of the amount of Lys. Further effects of environment and variety are considered to alter the reaction.

Table: Crop yield (t ha⁻¹, 86% DM) and contents of crude protein (CP in g · 100 g⁻¹ DM) and some amino acids (g · 100 g⁻¹ CP) in four varieties of blue lupines (*L. angustifolius* L.) with and without sulfur fertilization (S) in 2012

| Variety | S | Yield | CP | Lysine | Methionine | Cysteine |
|----------|---|--------------------|--------------------|--------------------|-------------------|--------------------|
| Boregine | - | 3.73 ^a | 32.56 ^b | 5.13 ^b | 0.58 ^b | 1.10 ^c |
| | + | 3.53 ^a | 33.38 ^b | 4.91 ^{bc} | 0.62 ^b | 1.27 ^b |
| Boruta | - | 2.25 ^c | 30.44 ^d | 4.63 ^d | 0.64 ^b | 1.28 ^b |
| | + | 2.10 ^c | 30.61 ^d | 4.68 ^{cd} | 0.62 ^b | 1.49 ^a |
| Probor | - | 2.89 ^b | 37.96 ^a | 4.51 ^d | 0.51 ^c | 1.21 ^{bc} |
| | + | 2.52 ^b | 38.68 ^a | 4.67 ^{cd} | 0.53 ^c | 1.21 ^{bc} |
| Sonet | - | 2.41 ^{bc} | 28.32 ^e | 5.42 ^a | 0.67 ^a | 1.27 ^b |
| | + | 2.31 ^{bc} | 28.72 ^e | 4.98 ^b | 0.70 ^a | 1.59 ^a |

^{a, b, c, d} Significant differences within columns (p < 0.05)

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References:

- Schumacher, H. *et al.* (2011) *Plant Breeding*, 130, 156
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Tags: lysine, methionine, cysteine

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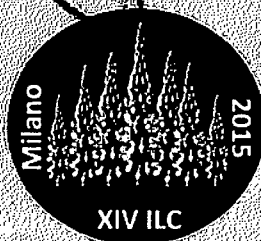
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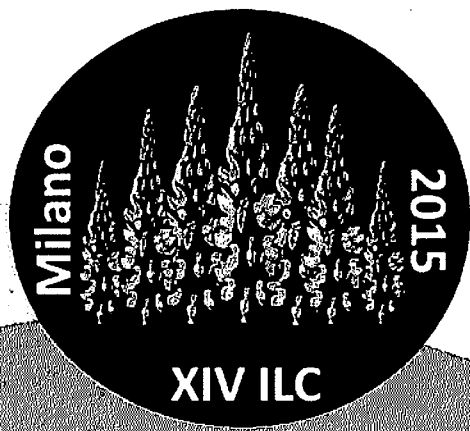
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