

076 - Tannins as a natural priming agent to improve seed quality in faba bean (*Vicia faba* L.)

Saucke, H.¹, Hornung, K.¹, Riemer, N.¹, Geßner, C.¹, Baćanović, J.¹, Šišić, A.¹, Bruns, C.¹, Brede, U.², Finckh, M.R.¹

¹Department of Ecological Plant Protection, University of Kassel, Nordbahnhofstr. 1a, 37213 Witzenhausen, hsaucke@uni-kassel.de

²Bäuerliche Saatzeit, Wichter Straße 15 – 17, 44593 Knüllwald-Niederbeisheim, <http://www.ökosaatzzeit-eg>

Tannins are known for their antimicrobial activity in the early germination phase of faba bean (*Vicia faba* L.). Post harvest removal of the testa in tannin-rich, colour-flowering cultivars increases the energy value of dehulled seeds and in the same time generates a 10% (w/w) testa fraction. We utilized testa material as a farm-saved tannin source and explored its potential as a natural priming agent in reducing the detrimental impacts of biotic stress in the seedling establishment phase.

A tannin-containing (coloured-flowered) variety 'Bilbo' was compared with a tannin-poor (white-flowered) variety 'Taifun' with intact as well as with *Bruchus rufimanus*-damaged seeds. Primed seeds received between 0,07 to 1,45 µg each condensed tannins in 0,008% w/w water which enhanced varietal tannin contents from 0,1 to 1,8 fold in 'Bilbo' and 22 to 485 fold in 'Taifun', respectively. Blank water treatments served as controls. In order to increase soil-borne fungal stress at sowing, arable soil received a foot root rot 4-species *Fusarium*-mixture (1:1:1:1), cultured separately before usage. Primed kernels (9 per pot) in the fractions undamaged and *B. rufimanus*-damaged were sown 5 cm deep into 1,5 l pots in a factorial greenhouse cold-test with 4 replicates at 10°C and 14 h L : D and grown for 6 weeks. Seedling emergence and visual fungal lesion incidence on stem and tap root were recorded. In intact seeds of 'Bilbo' tannin priming contributed to significantly improved seedling emergence from 77% unprimed to >92% in the highest dosage, with a similar non significant trend in 'Taifun' (from 81% to 89%, respectively). Incidence of fungal stem- and tap root infections did not respond to tannin-priming (data not shown here). In case of *B. rufimanus*- seed damage, emergence rates were consistently below those of intact seeds and tannins lead to a moderate, although in-significant trend of improvement in both cultivars. Priming of *B. rufimanus*-damaged seeds however, revealed partially enhanced fungal symptoms in both cultivars (data not shown here).

Therefore, condensed tannins applied as a low volume aqueous treatment have potential to improve seed quality parameters to a moderate extent. When seeds have *B. rufimanus*-related quality deficits however, tannin-priming did not compensate further for biotic stress, even at enhanced dosages. The findings highlight the critical role of condensed tannins embedded into an intact testa matrix as a natural preformed barrier against fungal stress in the early germination phase.

Acknowledgement

Sincere thanks to Wolfgang Link, Dept. „Breeding Research Faba Bean“ University Göttingen, for his helpful and constructive advice and to Christian Wagner, Dept. “Animal Husbandry in the Tropics and Subtropics”, University Kassel, for kindly quantifying tannin contents. This study was funded by Zentrale Forschungsförderung (ZFF) University Kassel 2013

References

Chang, K. F.; Conner, R. L.; Hwang, S. F.; Ahmed, H. U.; McLaren, D. L.; Gossen, B. D.; Turnbull, G. D. (2014): Effects of seed treatments and inoculum density of *Fusarium avenaceum* and *Rhizoctonia solani* on seedling blight and root rot of faba bean. In: *Canadian Journal of Plant Science* 94 (4), S. 693–700.

El-Mougy, N. S.; Abdel-Kader, M. M. (2008): Long-term activity of bio-priming seed treatment for biological control of faba bean root rot path (Herbivorous insects: Host seeking behaviour and Mechanisms 1983)ogens. In: *Australasian Plant Pathology* 37 (5), S. 464–471.

gehört zur Postergruppe " Pflanzenschutz im ökologischen Landbau"