



Deutscher Tropentag, October 11-13, 2005, Hohenheim

“The Global Food & Product Chain—
Dynamics, Innovations, Conflicts, Strategies”

Salt Tolerance of Ethiopian *Phaseolus vulgaris* L. Varieties

CARSTEN RICKHOFF, BURKHARD HEILIGTAG, CHRISTIAN RICHTER

University of Kassel, Institute of Crop Science, Germany

Abstract

Phaseolus vulgaris L., a staple food crop in Ethiopia, is characterised by a very low salt (NaCl) tolerance. To overcome salt injury, adequate agricultural (e.g. irrigation) methods must be applied, and only salt tolerant varieties should be cultivated by farmers.

In Mitscherlich pot experiments, we tested 10 Ethiopian *P. vulgaris* varieties from the Hararghe region in Ethiopia and 4 modern German varieties obtained from the Bundessortenamt in Hannover by an addition of salt corresponding to an ECe of 0 and 4 dS m⁻¹ to the experimental soil, which was a loam with a pH (0,01 m Calciumchloride) of 6.8 and a very low salt content (ECe of 0.3 dS m⁻¹).

The Ethiopian varieties Mexican 142, ANO 1063, Ayenew and CAL 27 showed the highest salt tolerance, leading to 106.1, 98.6, 90.8 and 82.0 % yield of biomass (dry matter of roots and shoots) at an ECe of 4 dS m⁻¹, respectively, compared to no salt application. For Mexican 142, we observed an excluder mechanism for sodium and chloride, which means a protection of plant tissue by salt exclusion, while ANO 1063 seems to be more an includer variety, taking up the sodium, which can be used as osmotical adjustment in order to overcome the water stress, which is due to salt injury. The varieties Awash 1, Gofta, Almut, G 9872, Maxi and Red Woleita were not as tolerant as the previous ones, their biomass was reduced to a dry matter yield of 78.3, 74.8, 73.2, 71.8, 67.1 and 65.6 %, respectively, if grown on a soil with an ECe of 4 dS m⁻¹, compared to the no salt control (=100 %). The varieties Negra, Roba 1, Vollenda and G 3339 were the most sensitive ones, leading to a root and shoot dry matter yield of only 62.5, 61.6, 51.9 and 45.4 %, respectively, compared to no salt application.

It could be seen, that, in spite of the observed varietal differences, nearly all *P. vulgaris* varieties tested had a threshold of less than 4 dS m⁻¹ and were very salt sensitive.

Keywords: Ethiopia, *Phaseolus vulgaris*, salt tolerance