

## Increase in forage maize production by bacterial fertilisers

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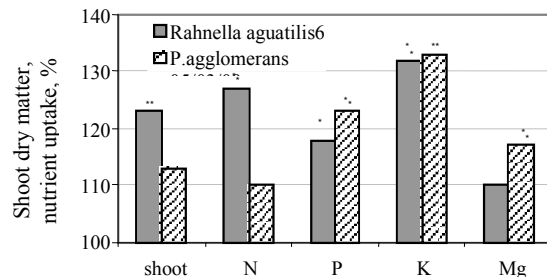
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**Introduction** Farmers in many countries value green material generated from maize as a high quality forage. Its inclusion in dairy cow diets can improve forage intake, increase animal performance and has the potential to reduce production costs (Phipps, 1994). Restrictions on the use of chemical fertilisers and a renewed interest in organic sustainable farming systems in general, has restored attention to crop rotations. The increase of maize production using bacterial fertilisers also gives alternative ways to reduce chemical fertilisers in forage production. Increased uptake of nutrients such as N, P, and K and crop yield was reported with rhizobacteria (Lazarovits & Nowak, 1997). This paper presents studies carried out to evaluate the effects of bacterial fertilisers on maize production.

**Material and methods** An experimental field site was established on Salmtieflehm-Fahlerde (Arbeitsgruppe Boden, 1994), Germany, in a randomised block design with six replicates (plot size: 15 m<sup>2</sup>, harvest was carried out after 3 months). The preceding crops were yellow lupin (*Lupinus luteus* L.) with under-sown cocksfoot (*Dactylis glomerata* L.). Farmyard manure (30 t/ha fresh weight) was mixed into the soil by a milling machine before the sowing of the maize. The seeds were inoculated with the bacterial preparation (10<sup>8</sup> cfu / g peat). The criteria for growth promotion were shoot dry matter and the N, P, K and Mg content of the plants. *Rahnella aguatis* 6 and *Pantoea agglomerans* 050309 were used as bacterial preparations. The data were analysed with two-way ANOVA and Student-Newman-Keuls test for testing significant differences (P = 0.05) of main effects.

**Results** Increases in plant growth and nutrient uptake were recorded for treated plants (12-leaf stage) in the field experiment (Figure 1). Strain *Rahnella aguatis* 6 gave the best performance and resulted in a 23% increase in plant growth over the control. The various bacterial inoculants differentially influenced the N, P, K, and Mg contents of plant components. The content of K was increased significantly in both treatments. Only strain *Rahnella aguatis* 6 resulted in a significant increase in N uptake.



**Figure 1** Effect of inoculation with *Rahnella aguatis* 6, and *Pantoea agglomerans* 050309 on shoot dry matter and nutrient uptake of maize in field experiments with loamy sand (control=100)

**Conclusion** The experiments showed that maize dry weight and nutrient content such as N, P, K, Mg uptake may be increased using bacterial fertilisers. This biological approach will decrease the use of chemical fertilisers in forage production.

### References

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- Phipps, R.H. (1994). Complementary forages for milk production. In: P.C. Garnsworthy & D.J.A. Cole (eds.) *Recent Advances in Animal Nutrition*. Butterworths, London, 215-230.