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Influence of Mineral Nutrition and Combination of Mineral and Organic Nutrition at Different Nitrogen Levels on the Root Yield and Nutritional Qualities of a Common Carrot Cultivar from Myanmar

LE LE WIN¹, ANNA KEUTGEN², ELKE PAWELZIK¹

¹Georg-August-Universität Göttingen, Department of Crop Sciences, Quality of Plant Products, Germany

²University of Technology and Life Sciences in Bydgoszcz, Department of Storage and Processing of Plant Products, Poland

Abstract

In Myanmar, low-input agriculture is commonly practised by resource poor farmers using organic manures and land races for cultivation of carrot, where the yield is usually not satisfactory. Nowadays, farmers are trying to introduce hybrid carrot cultivars due to their higher yield and quality. However, hybrid cultivars demand higher amounts of mineral nutrients generally covered by chemical fertilisers. Combined application of chemical and organic fertilisers, therefore, might be an alternative for the farmers to achieve higher yield of better nutritional quality regardless the use of local or hybrid cultivars.

To investigate the productivity and nutritional properties in relation to different types of fertilisation and carrot cultivars, the pot experiment was performed in winter season 2007 in the green house at the Section Quality of Plant Products of the Georg-August University Goettingen, Germany. The experimental design was split-split plot with three replications per treatment. Both mineral and organic fertilisers were used as a source of nitrogen fertilisers, while $P_2O_5 = 140 \text{ kg ha}^{-1}$ and $K_2O = 220 \text{ kg ha}^{-1}$ were applied in all combinations in the form of mineral fertiliser.

In the main plot, three kind of fertilisers were set: mineral fertiliser (MF), farmyard manure (FYM) + MF (FYM+MF), and Compost + MF (C+MF). Three levels of nitrogen ($N_1 = 60$, $N_2 = 120$ and $N_3 = 180 \text{ kg ha}^{-1}$) were allocated in the sub plot and in the sub-sub plot, a common carrot cultivar from Myanmar (Srup) and a hybrid cultivar from Germany (Fly Away) were grown.

Cultivar Srup was characterised by higher ascorbic acid and nitrate content. Fly Away showed higher yield, dry matter content and total phenolics content. FYM + MF and C+MF remarkably increased dry matter and total carotenoids content. Moreover, C + MF significantly increased total phenolics content, but decreased the content of nitrate. Total antioxidant capacity was not affected by cultivar difference and type of fertilisation. Levels of nitrogen influenced to a lesser extent on the yield and quality parameters. Generally, use of hybrid cultivar and combined application of mineral and organic fertiliser can be recommended to achieve higher yield and better nutritional quality.

Keywords: Ascorbic acid, genotype, low input agriculture, mineral nutrients, total carotenoids, total phenolics

Contact Address: Le Le Win, Georg-August-Universität Göttingen, Department of Crop Sciences, Quality of Plant Products, Carl-Sprengel-Weg 1, D 37075 Göttingen, Germany, e-mail: queenlele@gmail.com