

**Title** Effects of passive heating and storage on the quality of hand-bagged and pre-packed growing media

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### Abstract

Passive heating during storage of pre-packed growing media may reduce its quality. However, the impact of passive heating on basic chemical characteristics of growing media and plant yield are not fully understood. The objectives of this study were to investigate the effect of (i) the passive heating temperature under oxygen depleted conditions, (ii) the critical passive heating duration and (iii) the type of storage on the basic chemical composition of hand-bagged and pre-packed growing media and on yield of Chinese white cabbage (*Brassica napus* var. *chinensis*). Six growing media at three different degrees of humification (H2–H7 on the von post humification scale) were heated for two weeks at 20, 35, 45 and 60 °C under oxygen depleted conditions prior to testing. Additionally, the growing media were heated for 2, 4, 6, 8 and 10 days at 35 °C under oxygen depleted conditions and tested directly after heating and after five months of storage. Increased heating temperatures of unlimed and unfertilized (unamended) growing media from 20 to 60 °C led to  $\text{NH}_4^+$  accumulation, but did not cause plant yield losses, if nitrogen fertilization of growing media after heating was mainly through  $\text{NO}_3^-$ . Heating of amended growing media to 35 °C for six days or longer decreased plant fresh weight more than 20%. Five months of storage after heating at 35 °C of amended growing media for zero to 10 days influenced yield slightly negatively only for one growing medium, which was based on weakly decomposed peat (H2–H3). For growing media amended prior to heating, the loss of  $\text{NO}_3^-$  explained 87% of the variation in fresh weight yield. The  $\text{NH}_4^+:\text{NO}_3^-$  ratio was a good indicator of a previous heating event. The  $\text{NH}_4^+:\text{NO}_3^-$  ratio values were fitted by a logarithmic curve to the plant fresh yield and were high significantly correlated ( $r^2 = 0.75$ ). Nitrate loss during storage of pre-packed growing media in bags was less for bags with perforations on the outside of the palette than those with perforations on the inside of the palette. Our results indicate that growing media should not be exposed to temperatures higher than 35 °C for more than six days during transport and storage.