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Good Agricultural Practice (GAP) of glasshouse lettuce and spinach

Registration during 2004-2005

C. de Kreijl and M.P.J. van der Maarel



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Applied Plant Research
Research Unit Glass
December 2005

PPO no. 416 80047

2244033

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PPO Publication no. 416 80047

This research has been funded by the Productboard of Horticulture (Productschap
Tuinbouw)



Project no. 416 80047
PT-nummer: 10859

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1 Introduction

This report deals with registration of Good Agricultural Practice for glasshouse lettuce and spinach. It covers the period October 2004 – October 2005 for spinach (both under glass and outdoor production) and October 2004 – May 2005 for glasshouse lettuce.

It has been calculated from earlier registrations that it was possible to get a reliable result with a selective sampling. The auctions *the Greenery* and *ZON* selected growers based on earlier experience that these growers supplied regularly lettuce or spinach to the auction and these growers were willing to register accurately. These growers had to report a planned harvest about 10 days before harvest date. *The Greenery* asked the Environment - Conscious-Cultivation (Certa) to sample the heads at the nurseries. Samples were analysed at the TNO Nutrition and Food Research Institute. Auction *ZON* asked laboratory Zeeuws-Vlaanderen to sample and analyse the spinach and lettuce. Nitrate contents were reported to the auctions. These data together with the registration of the growers were processed by the Applied Plant Research – Division Glasshouse Horticulture on request of the Productboard of Horticulture (Productschap Tuinbouw).

Earlier registrations have been published e.g. De Kreij and Voorbij (2004).

2 Spread of the registration

Total number of registration for lettuce was 72 from 33 growers. This was an area of 12.9 ha of in total about 200 ha (Van den Berg, en Cadel, 2000 and personal communication). This is all under glass.

The number of registration for spinach was 51 from 8 growers. This was 15 registration under glass (December 2004 – May 2005 and October 2005) and 36 registrations outdoor spinach. The spinach registration covered 34.7 ha of a total of about 2000 ha in 2003/2004 (Van den Berg, personal communication).

3 Soil analysis, N advices and fertilisation

Soil samples were taken before fertilisation and planting. Samples were analysed according the 1:2 volume water extract (Sonneveld and van den Ende, 1971). The reported EC, nitrate and chloride concentrations in the extract are reported in Figure 1. The target EC is 1.2 – 1.5 mS/cm depending on the soil type and time of the year (Van den Bos *et al.*, 1999). Some growers had too high EC in the soil. Nitrate optimal values range from 3.5 – 6.0 mmol/l. The values were in many cases lower than optimal, which is understandable, since the sampling was before the fertilisation. After fertilisation the optimal values have to be reached. The chloride values were often below the optimal for winter production, which is at least 2.0 mmol/l.

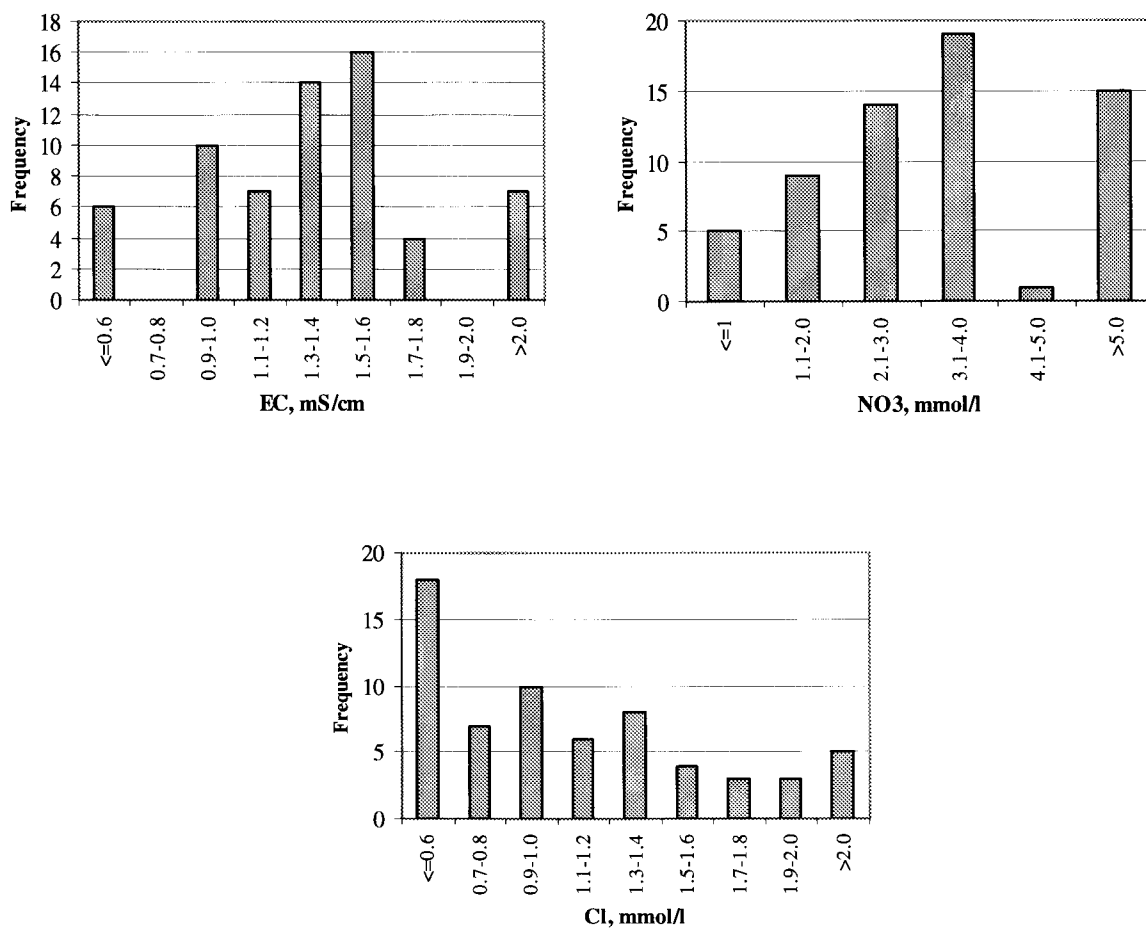


Figure 1. EC, NO₃ and Cl levels in the soil analysis (1:2 volume extract) of lettuce

From the nitrate levels in the 1:2 volume water extract the N-recommendation can be calculated. To be practical for all data the target has been taken at 5.0 mmol/l (Van den Bos et al, 1999). The N-recommendation in kg/ha is then: $5 - (\text{nitrate in soil analysis}) * 56$. The N-recommendations are given in Figure 2. The N fertilizations were higher than the recommendation.

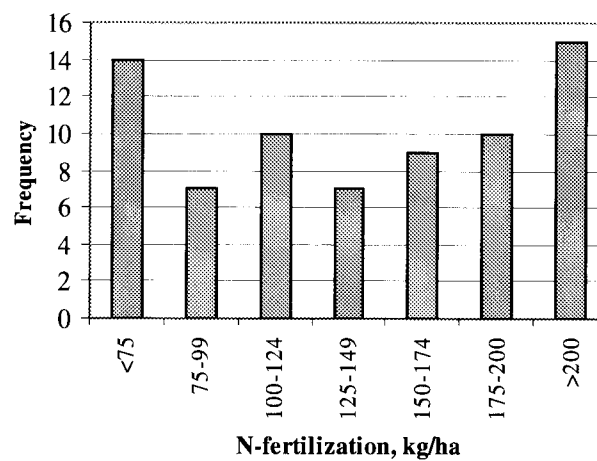
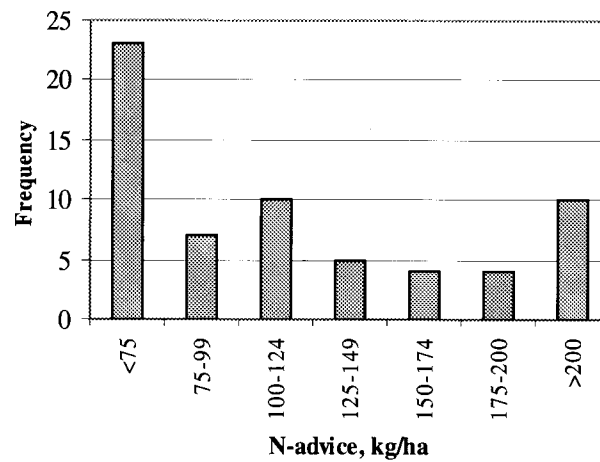


Figure 2. N advices and fertilization for lettuce crops

In Figure 3 the N fertilization for spinach is shown. The N advice for lettuce is not shown, since too less data were available. So, the N fertilizations could not be compared with the recommendations.

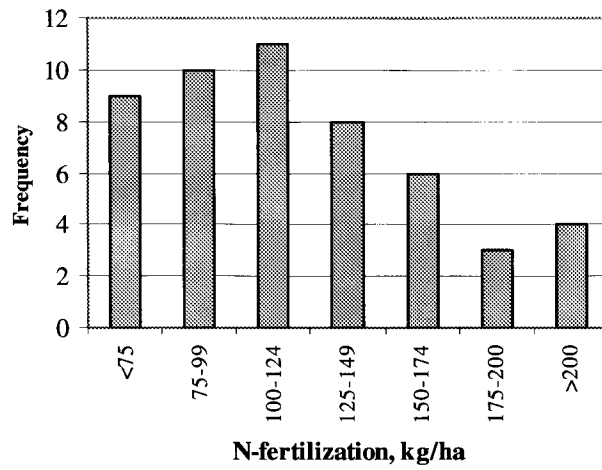


Figure 3. Nitrogen fertilization of spinach.

4 Nitrate contents in lettuce

Nitrate contents in lettuce are shown in Figure 4. In October 2004 – March 2005 (winter period) the nitrate contents exceeded the EU limit (4500 mg per kg fresh weight) in 1 out of 53 samples. This was 2 % of the samples. In the period April - May 2004 the summer limit of 3500 mg per kg fresh weight has not been exceeded in the 19 samples.

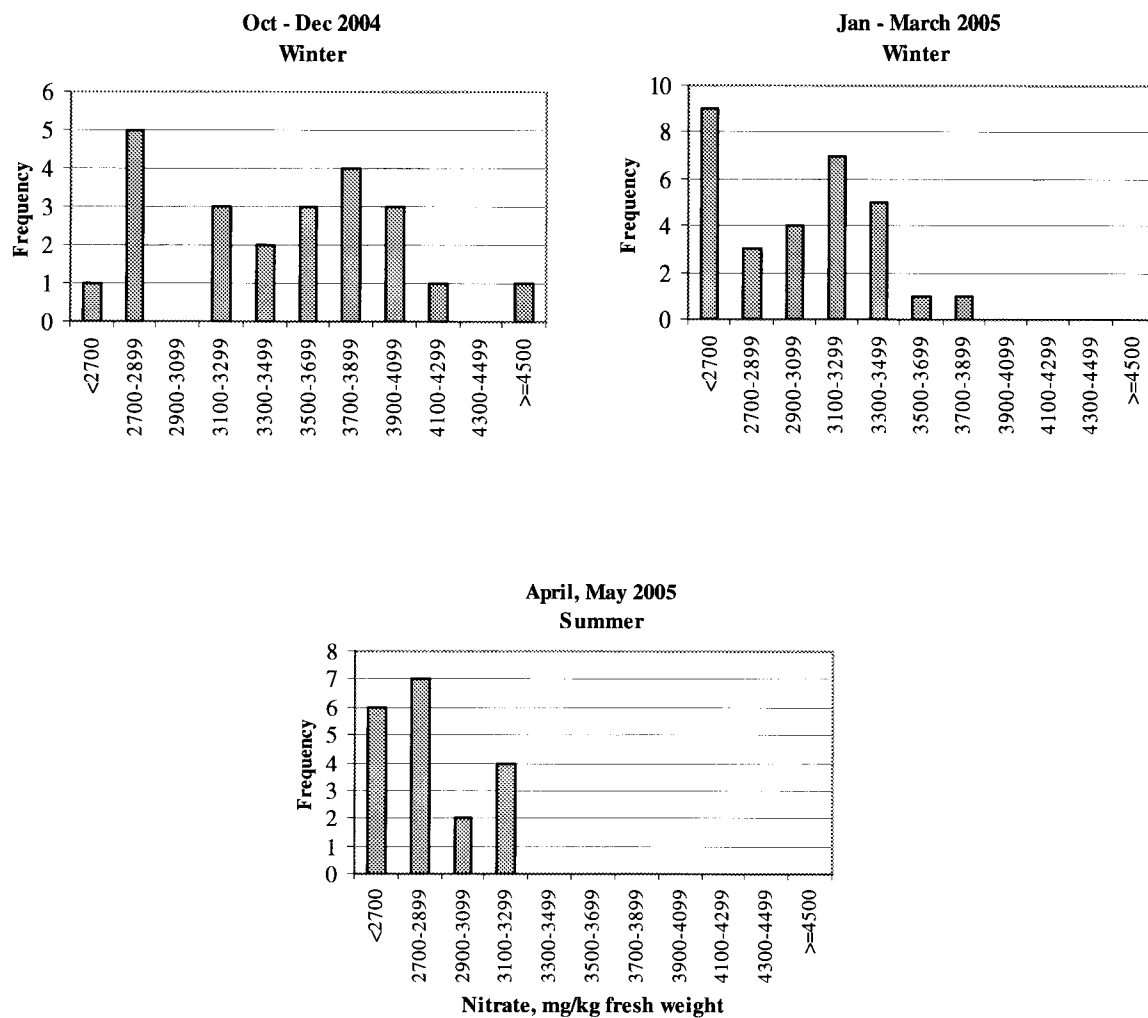


Figure 4. Nitrate content in lettuce.

5 Nitrate contents in spinach

Nitrate contents in spinach are shown in Figure 5.

In the summer period (July – September 2004 and April – September 2005) 40 samples have been analyzed. The EU limit in the summer period was 2500 and the NL-limit was 3500 mg per kg fresh weight. The EU limit has been exceeded in 6 samples, that was 15 %. The NL limit has not been exceeded.

In the winter period (October 2004 – March 2005 and October 2005) in total 11 samples have been analyzed. In this period the EU-limit was 3000 mg per kg fresh weight. This limit has been exceeded by 3 samples, being 27 % of the samples. The NL- limit in the winter was 4500 mg per kg fresh weight. This limit has not been exceeded by any sample.

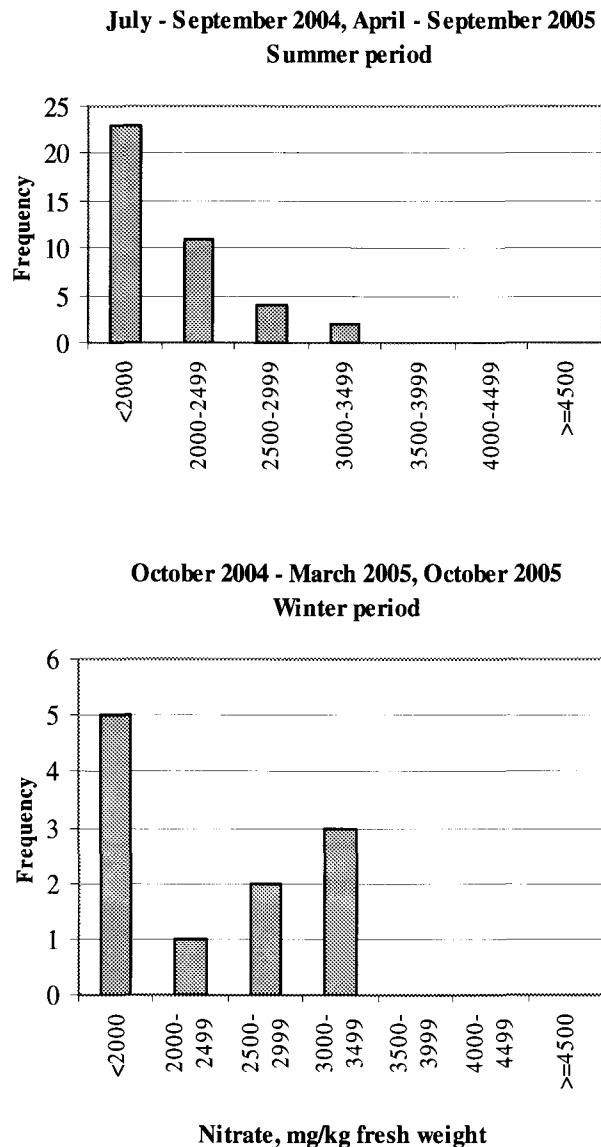


Figure 5. Nitrate content in spinach.

6 Conclusion and summary

Lettuce

During October 2004 until May 2005 a sample survey has been executed for Good Agricultural Practice of lettuce grown under glass. In total 72 registrations of 33 lettuce growers were examined, which covered an area 12.9 ha of in total about 200 ha. Of the registrations there were 53 registrations during the winter period (October – March) and 19 registrations during the summer period (April and May 2005).

The EU-limit for nitrate in lettuce during the winter period of 4500 mg per kg fresh weight has been exceeded by 1 sample, being 2 % of the samples. All the 19 samples from the summer period had lower nitrate contents than the EU limit of 3500 mg per kg fresh weight.

Spinach

For spinach the same registrations has been made of in total 51 registrations by 8 spinach growers. This covered an area of 34.7 ha. Registrations were during July 2004 – October 2005, of which 40 registrations in the summer period (July - September 2004 and April – September 2005) and 11 registrations in the winter period (October 2004 – March 2005 and October 2005).

During the summer period all 40 samples had a lower nitrate content than the NL limit (3500 mg per kg fresh weight). Six of 40 (15 %) exceeded the EU summer limit (2500 mg per kg fresh weight).

In the winter period the EU-limit for nitrate in spinach of 3000 mg per kg fresh weight has been exceeded by 3 out of 11 samples, being 27 % of the samples. The NL nitrate limit during the winter period of 4500 mg per kg fresh weight has not been exceeded.

Soil analysis and fertilization

As found in earlier registrations of the soil analysis, the chloride contents in the soil were lower than advised. Still growers could use more chloride containing fertilizers.

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