



Good Agricultural Practice (GAP) of glasshouse lettuce and spinach

Registration during 2002-2003

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1 Introduction

This report deals with registration of Good Agricultural Practice for glasshouse lettuce and spinach. It covers the period July 2002 – September 2003 for spinach (both under glass and outdoor production) and October 2002 – April 2003 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 auctions asked the Environment- Conscious-Cultivation (Certerra) to sample the heads at the nurseries. Samples were analysed at the TNO Nutrition and Food Research Institute. 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 Van Aanholt (2002).

2 Spread of the registration

Total number of registration for lettuce was 77 from 43 growers. This is an area of 16.3 ha of in total about 300 ha (Van den Berg en Cadet, 2000). This is all under glass. The number of registration for spinach is 57 from 15 growers. This is 7 registration under glass (one in December 2002 and the other 6 in January – March 2003) and 50 registrations outdoor spinach. The spinach registration covers 97 ha of a total of 2218 ha in 2002 (Van den Berg, personal communication).

3 Soil analysis and nitrogen recommendation in lettuce and spinach

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). Most growers had optimum values. However, some growers had too high EC in the soil. Nitrate optimal values range from 3.5 – 6.0 mmol/l. Most growers had lower values 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.

The amount of N supplied by the growers is given in figure 2. Some growers did not supply a top dressing. 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 – (nitrate in soil analysis) * 56. The N-recommendations are given in Figure 3. Nitrogen fertilization for spinach is supplied in figure 4.

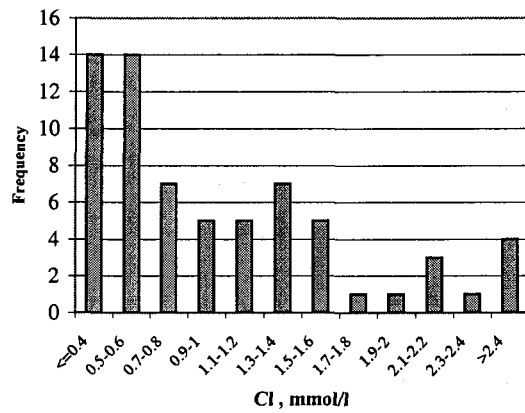
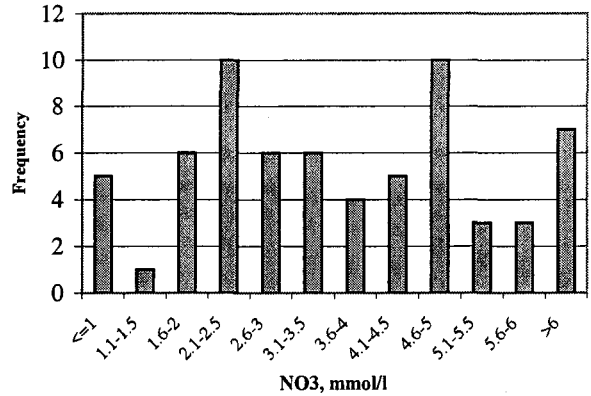
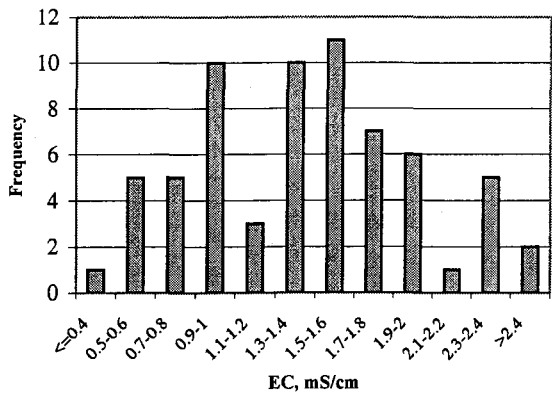
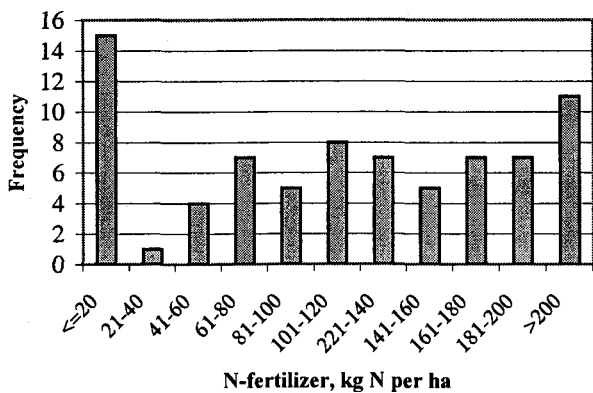


Figure 1. The soil analysis (EC, NO₃ and Cl) of the lettuce soil – sampled before planting.

Nitrogen base fertilization lettuce



Nitrogen top dressing fertilization lettuce

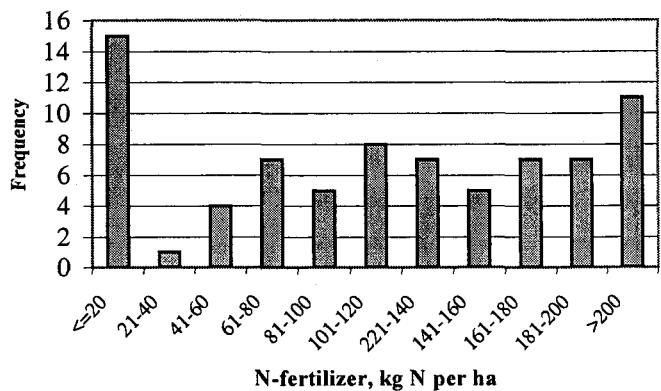


Figure 2. Nitrogen fertilization as base fertilizer and as top dressing for lettuce.

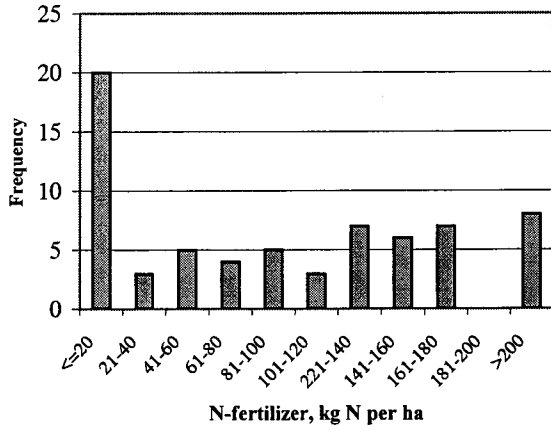


Figure 3. Nitrogen advice for lettuce

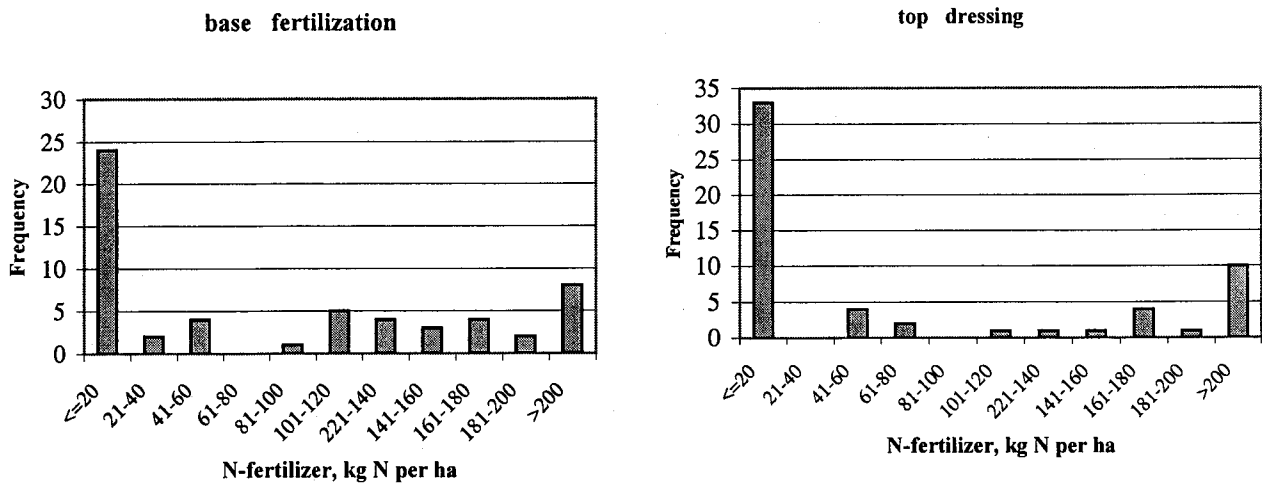


Figure 4. Nitrogen fertilization in spinach.

4 Nitrate in lettuce

Nitrate in lettuce is given in Figure 5. Nitrate levels in lettuce never exceeded the EU limit of 4500 mg/kg during winter (October – 31 March) or the target during summer of 3500 mg/kg fresh material (EU directive 563/2002 of 2 April 2002). The nitrate contents of ≤ 2500 mg/kg fresh weight in the period January – March 2003 were in all in the month March 2003.

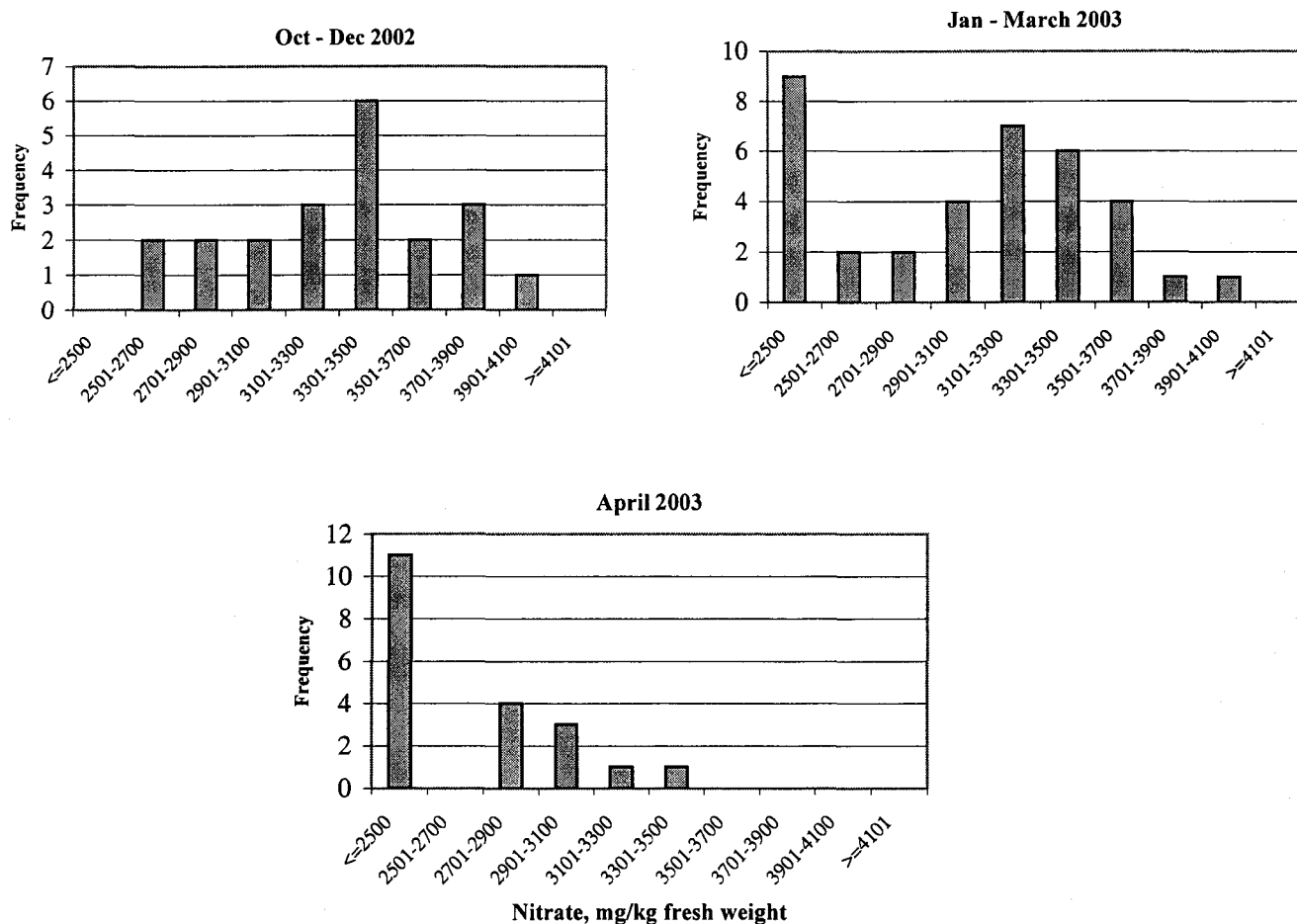


Figure 5. Nitrate content in lettuce for three periods.

5 Nitrate in spinach

Nitrate contents in spinach is given in figure 6. The data concern outdoor spinach, except the period January – March 2003 and one sample from December 2002. In July - September 2002 the EU (summer)-limit of 2500 mg/kg (EU directive 563/2002 of 2 April 2002) has been exceeded in 4 samples out of 15 (27 %). In October 2002 – March 2003 the EU (winter) limit of 3000 mg/kg has been exceeded in 3 of the 14 samples (being 21 %). In April - September 2003 the EU (summer) limit of 2500 mg/kg has been exceeded in 4 of the 28 samples (14 %). The NL-(winter)-limit of 4500 mg/kg has been exceeded in 1 sample out of 14 (7 %) in October 2002 – March 2003. The NL-(summer)-limit of 3500 mg/kg has been exceeded in 1 sample out of 28 (4 %) in the summer 2003.

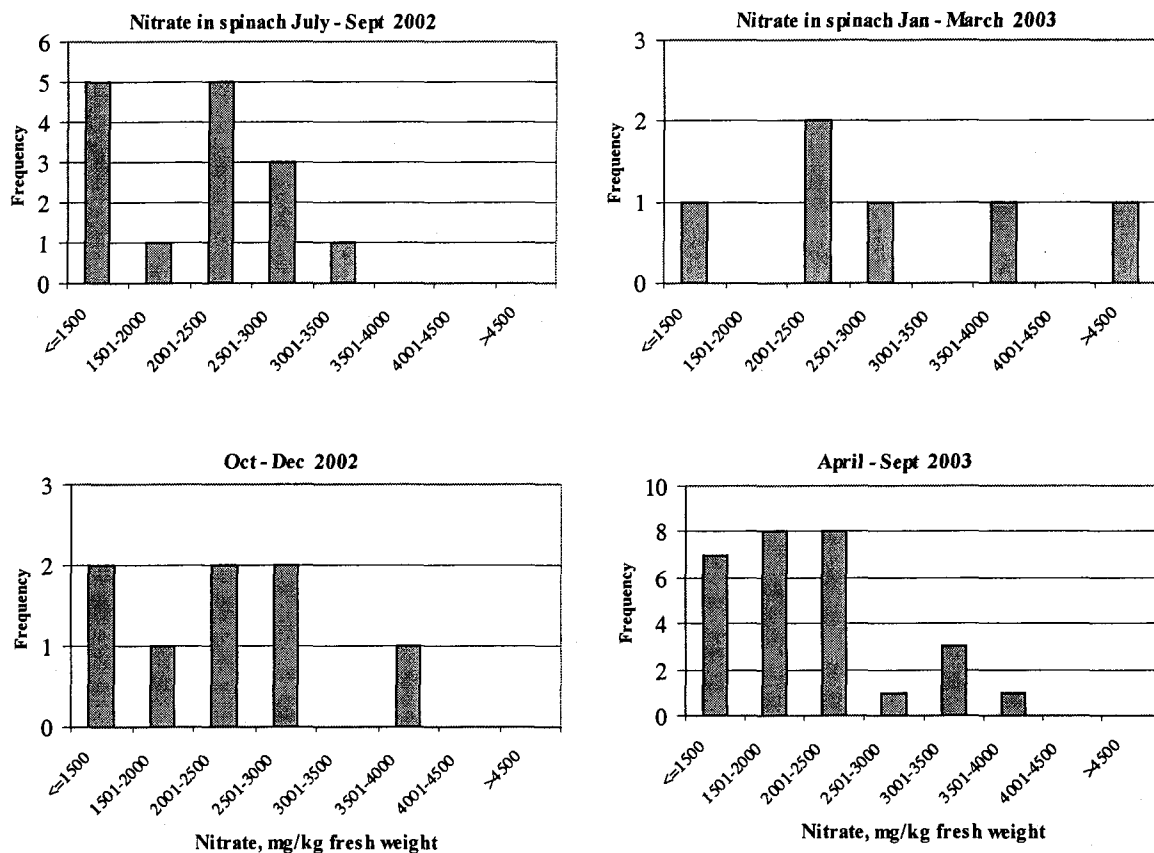


Figure 6. Nitrate contents in spinach.

6 Conclusion and summary

A sample survey has been executed during July 2002 – September 2003 from 15 spinach growers (57 registrations) covering 97 ha. This was outdoor spinach, except for the period January – March 2003 it was from glasshouse cultivation. The registration for lettuce was from crops grown under glass. There were 77 registrations during the period October 2002 – April 2003 from 43 growers covering 16 ha. This has been estimated to give a representative and reliable view of the lettuce and spinach growing.

The nitrogen levels in the soil correspond to the target values. The chloride levels in the soil were too low. Growers have to use more chloride containing fertiliser in winter grown lettuce.

The EU limits for lettuce of 3500 and 4500 mg per kg fresh weight in summer and winter, respectively, have not been exceeded.

The spinach nitrate levels were in the winter period (October – 31 March) in 21 % of the samples (3 out of 14) higher than the EU limit of 3000 mg/kg. In the summer periods in 2002 and 2003 the values exceeded in 8 of the 43 samples (19 %) the EU limit of 2500 mg/kg. The NL-limit in the winter of 4500 mg/kg was exceeded in 1 of the 14 samples. The NL-(summer)-limit of 3500 mg/kg has been exceeded in 1 sample in the summer 2003.

Literature

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