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Effect of black peat, pH and Mg on growth of heather on sandy soil

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Abstract. The effect of amount and method of application of black peat, soil pH and Mg fertilization on growth of heather cultivars was studied. Increasing amounts of peat up to 4 m^3 per 100 m^2 improved growth. Applying the peat as a layer was sometimes slightly superior to incorporation into the top-soil. Optimum soil pH-KCl (median for the trials) was 4.2. Application of 150 to 200 kg MgO per ha had little effect on growth and quality.

Key words: black peat, pH, Mg, heather, sandy soil

Introduction. A favourable effect of peat or other organic materials on growth of heather has been reported by various authors (Aendekerk, 1972, 1978; Chapple, 1964; van de Laar, 1974; Underhill, 1971). In the Netherlands, growers mix black peat (upgraded by freezing and shredding) through the top layer of sandy soils or add it as a layer on top of the soil without knowing which method and quantity is best. Because black peat is strongly acid (van der Boon et al., 1965), its application can be expected to affect soil pH. Optimum pH-KCl ranges, usually between 4 and 5, for different heather species and cultivars have been reported (Aendekerk, 1972, 1978; van de Laar, 1974). Growers sometimes observed an abnormal yellow colour in heather, which they ascribed to Mg deficiency.

Field experiments were conducted to determine the effect of amount and method of application of black peat, soil pH and Mg fertilization on growth and quality of heather.

Materials and methods. Eight trials were carried out between 1976 and 1981 on a sandy soil (5 % mineral particles < 16 μm) containing 4.6 % organic matter and, in the Mg fertilization trials, 21-55 mg MgO (–NaCl) per kg, which is considered low for nursery crops.

The amounts of peat applied varied from 0 to 8 m^3 per 100 m^2, and target soil pH-KCl levels from 3.0 to 6.8. The peat was incorporated in the top-soil (0-20 cm) or supplied as a layer. To compensate for possible N fixation, 0.75 kg calcium ammonium nitrate per m^3 was added. Except in the first experiments, trace elements were given and, because the acid peat affected soil pH and growth, the peat was limed to the original pH of the soil or the target pH of the treatment by adding $CaCO_3$ on the basis of 140 g per m^3 of peat to raise pH-KCl by 0.1 unit (van der Boon et al., 1965). In three trials, with only *Calluna* cultivars, Mg was applied at rates of 0 and 150 or 200 kg MgO per ha in the form of kieserite. Different cultivars were used to determine their response to the treatments. *Calluna vulgaris* 'Carmen' was always planted, and in one or more years the cultivars 'Cuprea' and 'Robert Chapman', *Erica tetralix* 'Con Underwood', *E. carnea* 'King George', and *E. cinerea* 'C.D. Eason' were included. Planting time was between the beginning of April and mid-May.

During the growing season the 'stand', mainly in terms of plant mass, was visually rated monthly. In autumn, twigs were sampled for chemical analysis (dry matter, N, P, K, Ca, Mg), and plant and root quality were visually estimated. The data were analysed graphically and by means of analysis of variance.

Results. Growth and quality of the plants, the aerial parts as well as the roots, improved with increasing amounts of peat up to 4 m^3 per 100 m^2. Amounts in excess of 4 m^3 had little or no effect (Fig. 1). Peat applied as a layer sometimes gave slightly better results than the same amount of peat incorporated into the top-soil.

pH was measured at the beginning and at the end of the growing season. The effect of the soil pH (mean of two values) on growth of *Calluna vulgaris* 'Carmen' is shown in Fig. 2. The pattern in this figure is more or less typical of all cultivars tested. The optimum pH-KCl for cultivars of *Calluna vulgaris, Erica tetralix,* and *E. cinerea* varied, depending on year and amount of peat added, from 3.6 to 4.6, with 4.2 as the median. In the range 3.8-4.7 the growth was not much worse than the optimum. There was a tendency for the optimum pH-KCl value to be somewhat lower (a few tenths of a unit) as the amount of peat added was higher. Growth declined rapidly as soil pH decreased to suboptimum values; the decline was more gradual when pH increased to values higher than the optimum. *Erica carnea* 'King George'

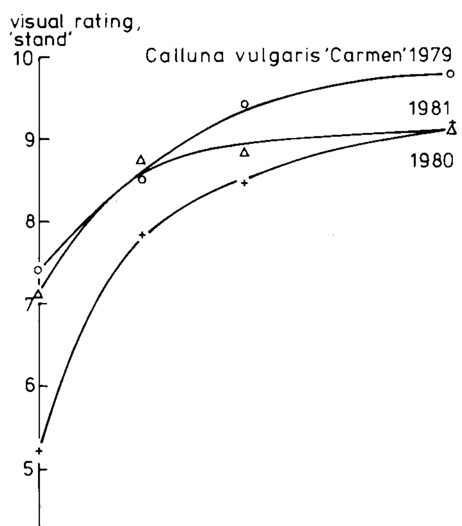

Fig. 1. Effect of limed black peat on the 'stand' of *Calluna vulgaris* 'Carmen' at the end of the growing season (three years).

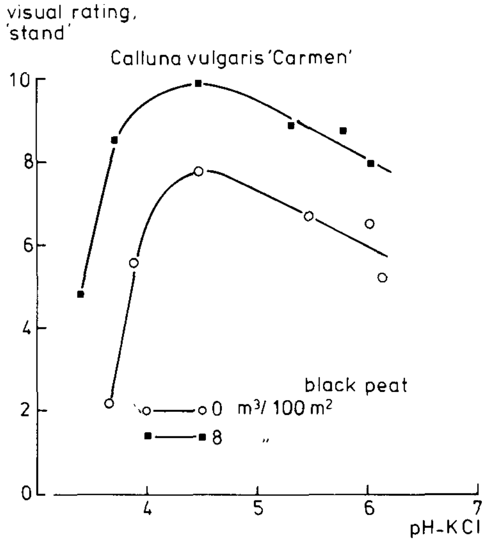

Fig. 2. Effect of soil pH-KCl (mean of measurements at beginning and end of the growing season) and 8 m^3 black peat per 100 m^2 on the 'stand' of *Calluna vulgaris* 'Carmen' at the end of the growing season.

was more tolerant towards higher pH values than cultivars of the other species investigated.

The Mg content of the soil and of the heather twigs was raised by the application of 150-200 kg MgO per ha, but the effect on growth was small and negative. No yellow plants were observed in the plots that did not receive Mg.

Conclusions. Increasing amounts of black peat up to 4 m^3 per 100 m^2, incorporated into the top-soil (20 cm) or applied as a layer, improved growth and quality of heather cultivars. Amounts higher than 4 m^3 per 100 m^2 had little or no effect. A soil pH-KCl value of 4.2 was found to be the optimum for growth of most of the cultivars tested; reasonably good growth may be expected in the range 3.8-4.7. Application of Mg to soils with a low Mg content had a small, negative effect on growth. The Mg requirement of heather apparently is low.

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This synopsis is based on a report entitled 'De invloed van tuinturf, pH, Mg and beregening op de groei van calluna and erica' by H. Niers, Report 11-84, Instituut voor Bodemvruchtbaarheid, Haren (Gr.), Netherlands, 1984. 87 pp., 9 figs., 20 tables, 18 refs., 11 appendices. Dutch with English summary and captions.

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A study of soil variation in podzols in the Netherlands

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Abstract. Variation of 31 soil characteristics was studied in a 100-ha area with a nested random sampling method and a 400-m transect. Apart from water-table, no characteristics or combinations thereof could be mapped accurately with a sampling distance of 50 m. Wet and dry podzols were distinguished, distributed in a fine-grained pattern of small units (less than 4 m^2).
Key words: soil variation, soil mapping, nested sampling, podzols.

Introduction. A well-known problem encountered in soil mapping is the necessity to delineate soil types while the boundary between regions is only vague. One soil type usually dominates in each region, buth when short-distance variation is large, a region has to be described by soil type complexes. The problem of discerning boundaries becomes more difficult when the desired amount of detail on the soil map increases, as this usually coincides with an increase in vagueness of the boundaries. When the relation between sampling distance and the accuracy of the resulting soil map is known, it is possible to choose a sampling distance which is optimal in view of both the purpose of the soil map and the actual variation in the area. Without this information, the usefulness of the soil map remains unknown.

To investigate the possibilities for a detailed soil map in a 100-ha area in the province of Brabant in the south of the Netherlands, we made a study of soil variation. The area is a more or less undisturbed complex of moor and fens, dominated by dry and wet podzols, developed in Pleistocene cover sand.