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H. HOLSTENER-JØRGENSEN and H. BRYNDUM: Preliminary Results of Experiments with Nitrogen Fertilization of Rather Old Norway Spruce on Heathland Localities in Jutland. S. 397—401. (Beretning nr. 272).

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PRELIMINARY RESULTS OF EXPERIMENTS WITH NITROGEN FERTILIZATION OF RATHER OLD NORWAY SPRUCE ON HEATHLAND LOCALITIES IN JUTLAND

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In 1965 and 1966 fertilizing experiments were established in 4 rather old Norway spruce plantations on heathland localities in Jutland —

1. Lindet State forest district, Hønning plantation, 70-year-old Norway spruce of Site Classes IV.1 to IV.8 (1965).
2. Palsgaard State forest district, Gludsted plantation, 77-year-old Norway spruce of Site Classes V.4 to VI.2 (1965).
3. Feldborg State forest district, Borbjerg plantation, 83-year-old Norway spruce of Site Classes IV.4 to V.9 (1966).
4. The Klosterheden State forest district, 66-year-old Norway spruce of Site Classes IV.9 to V.9 (1966).

The site classes indicated are raw, potential Height Quality Classes according to *Møller,* 1933. The experiments are planned to run for 10 years.

In each locality there were three replications of the following treatments —

O = non-fertilized control plot

N_1 = 500 kg/hectare $Ca(NO_3)_2$ at establishment and the same dose after 5 years

N_2 = 1000 kg/hectare $Ca(NO_3)_2$ at establishment and the same dose after 5 years

P = 3000 kg/hectare superphosphate at establishment, no repeated fertilization

together with the combinations N_1P and N_2P, where the N-fertilization is repeated after 5 years.

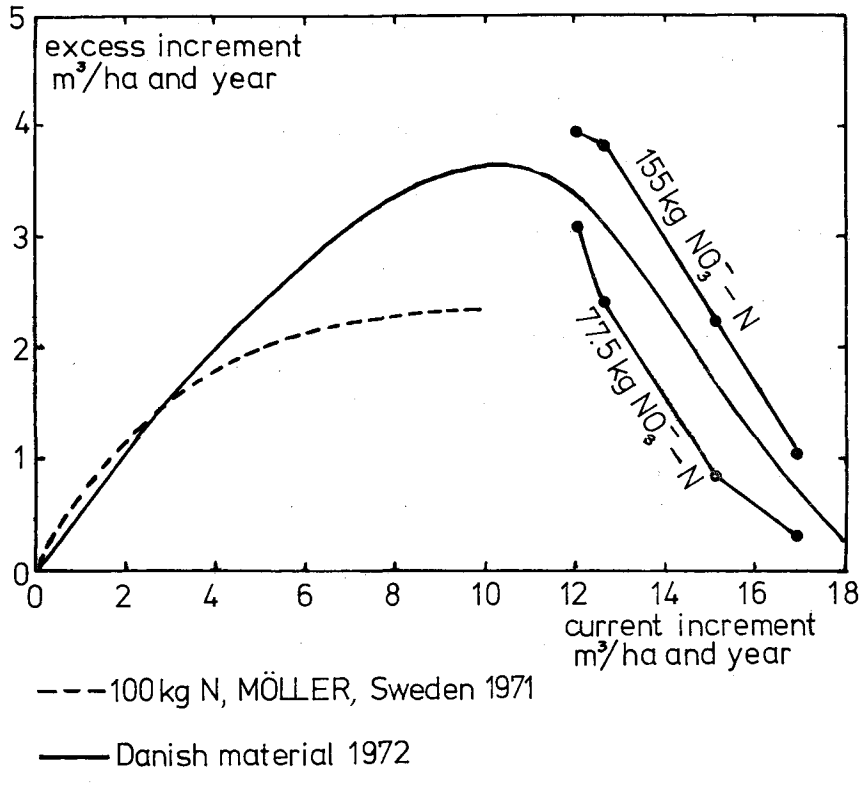
Preliminary results in the form of basal-area increments have earlier been published for the first three of the mentioned experiments (*Holstener-Jørgensen* and *Bryndum,* 1969).

The present report, applying to the plots in the four experiments which are exclusively N-fertilized, accounts briefly for the excess increment of volume in cub.m/hectare/year during the first 5 years. Besides, a comparison is made with results of Swedish experiments.

In Fig. 1 the average excess increments have been superimposed on the average current increment in the control plots. Each dot represents the average for an experimental area. The dots are connected to form two curves representing, respectively, application of 77.5 kg NO_3^--N and 155 kg NO_3^--N.

Möller (1971) has published at yield curve for application of 100 kg urea-N to Swedish spruce. This curve, too, has been inserted in Fig. 1. It shows lower excess yields at low current increments. With higher site classes the excess yields increase, but between 6 and 10 cub.m current increment the curve becomes flatter. It seems to reach its maximum in this area.

The Danish material, deriving from localities with higher increments than those of the Swedish localities, shows very clearly a falling excess incre-



ment with rising current increment. This shape of the curve is authenticated by the fact that fertilizing experiments in higher Danish site classes (morainic localities) have shown no measurable responses to N-fertilization.

It is natural to bring together the Danish and the Swedish results. In Fig. 1 a free-hand curve has been drawn which in the high site classes passes between the two Danish curves and in the inferior site classes approximately coincides with the lower part of the Swedish curve. The curve represents fairly well the excess yields from application of 100 kg NO_3^--N. It reaches its maximum at a current increment of abt. 10 cub.m/hectare/year. It is at present the best estimate of what excess increments may under Danish conditions be expected during a 5-year period from application of 100 kg NO_3^--N per hectare to rather old heathland spruce.

It should be noted that the climate during the experimental period (1965—71) was comparatively favourable (precipitation above normal). The current annual increments have therefore been somewhat above normal. In this connexion it must be kept in mind that the N-release in the soil is more abundant in years with a high precipitation than in years of drought (see, e.g., *Wehrmann*, 1961). Therefore it is impossible to judge whether

the shape of the curve would have been essentially different in periods with normal precipitation or in years of drought.

Finally it should be mentioned that the occurrence of the gap between the Swedish urea-N curve and the Danish NO_3^--N curve is in keeping with the fact that in Sweden it has been ascertained that urea gives 30—40 per cent lower excess increment per kg N than, for instance, ammonium nitrate fertilizers.

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