

# FAKTA *Skog*

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## Fiberskog

### – a research programme on intensive forestry

- The research programme “Fiberskog”, forests for fibre production, is a collaborative project between SLU and the forest industry. It will go on for four years, with a budget of 2.4 million Swedish kronor per year.
- The aim is to investigate how intensive forest production can be carried out in planted stands of spruce.
- The programme is made up of seven sections in which production and environmental aspects of intensive cultivation are studied. Methods for the practical cultivation of forests for fibre production are being developed.
- A major part of the research is being carried out on Fiberskog’s own research site at Hjuleberg in south-west Sweden.



Illustrations: Peter Roberntz

*"Fiberskog" – a collaborative project between SLU and the forest industry.*

**F**iberskog is a collaborative research programme run by SLU and the forest industry. Assi-Domän, Hydro Agri, Mellanskog, Skogssällskapet, Stora Enso Skog and Södra represent the industry. The aim is to investigate the possibilities for intensive forest production in plantations of spruce. The programme will continue for four years, with an annual budget of SEK 2.4 million. A major part of the research is carried out at Fiberskog's own research site, at Hjuleberg in the south-west of Sweden, 10 km east of Falkenberg.

### Intensive forest cultivation

The Fiberskog programme was initiated by Stora Skog and SLU, as it became apparent that there was a need for new, intensive methods of management. These would involve a high level of felling and cost-effective forest production. This type of plantation forestry was part of a planned model of forest practice in which some of the forest land would be intensively cultivated, some would be cultivated with equal emphasis on production and environmental goals and larger areas than at present would be set aside as reserves.

### Optimum nutrient supply

The intensively cultivated land is the focus of the Fiberskog programme. The goals are high production, high

profitability and minimal impact on the environment. Less attention is paid to biological diversity, to the cultural environment, and to the value for recreation and the outdoor life. It is therefore a prerequisite that intensive cultivation must be restricted to land which is currently of little environmental value.

Optimum supply of nutrients should enable production to be doubled on intensively cultivated land in southern Sweden and to be at least

tripled in the north. It should also result in shorter rotation periods.

### Production and the environment

The seven sections of the Fiberskog programme are described below. The production- and environmental aspects of intensive cultivation are studied within these sections. The development of practical methods for intensive cultivation is also part of the Fiberskog programme.



*In a model of the "differentiated" forestry of the future, intensive cultivation would make up one part. Different goals are set for different land: intensive use of production forests; traditional forests with similar weight being given to production and to the environment; and conservation of forests important for the environment.*

## 1

### Forest planning

The project aims to develop methods for identifying land suitable for intensive cultivation. Factors such as soil type, soil moisture, climate in the form of incident radiation, precipitation, evaporation, and environmental values affect the choice of land. Laws and technical boundaries can also have an effect.

After selection of suitable land, economic analysis of the intensive cultivation is required, together with analysis of the weight which should be given to other interests,

such as recreation, nature, culture and landscape. Depending on various restrictions, only part of the suitable or possible land will be able to be selected for intensive cultivation.

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## 2

### Optimisation of nutrition for intensive cultivation

Methods are being developed for the practical application of optimum fertilisation. Thus, in contrast to previous experiments on optimisation of nutrition, the nutrients are applied only in solid form. The composition of the nutrients supplied is determined by the nutrient status in the needles. The nitrogen content of the needles determines the magnitude of the amount to be applied and the composition is adjusted according to the proportions of the other nutrients in the needles.

Contact persons: *see section 4*

### 3

#### *Environmental effects of optimisation of nutrition*

This includes the study of whether an optimum nutrient supply is accompanied by leaching of nutrients to the ground water. This is checked by collecting and analysing the soil water. This is checked by collecting and analysing the soil water. If a nutrient is detected in the ground water, it implies that this nutrient has been supplied in too large an amount, and that the amount must be reduced in the following year. The goal is that the nutrient supply will support a rapid growth rate without leaching to the ground water. The soil changes caused by nutrient optimisation are also studied, by means of repeated sampling.

**Contact persons:**

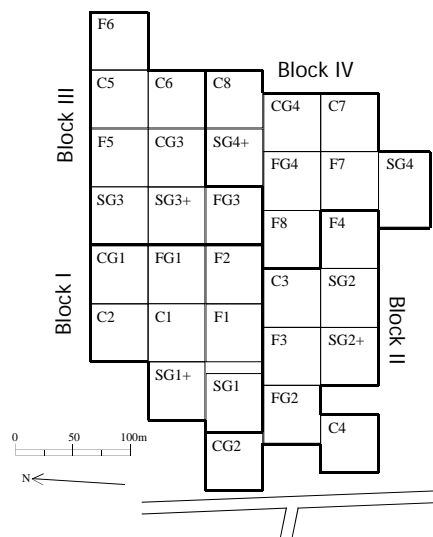
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### 4

#### *Nutrient optimisation experiments on fertile land*

At Hjuleberg, Fiberskog's own research site, there are investigations of whether it is possible to increase spruce production by means of an optimum nutrient supply even on the most productive Swedish land, i.e., on former arable land in the south-west of Sweden. The experiment was laid out in 1997 and the treatments began in July of the same year. The optimum nutrient supply is applied in a solid form, with or without herbicide treatment (see figure below). The fertilised areas are compared with the untreated controls. The experiment includes treatments with sludge pellets, and with sludge pellets supplemented with other nutrients (section 7).

**Hjuleberg research site**



**The figure shows the Hjuleberg research site. The main experiment includes: unfertilised areas, with weed control (C) and without (CG); areas to which complete fertiliser in solid form is applied annually, with weed control (F) and without (FG); and areas to which sludge pellets (SG) or sludge pellets supplemented with other nutrients (SG+) are applied.**

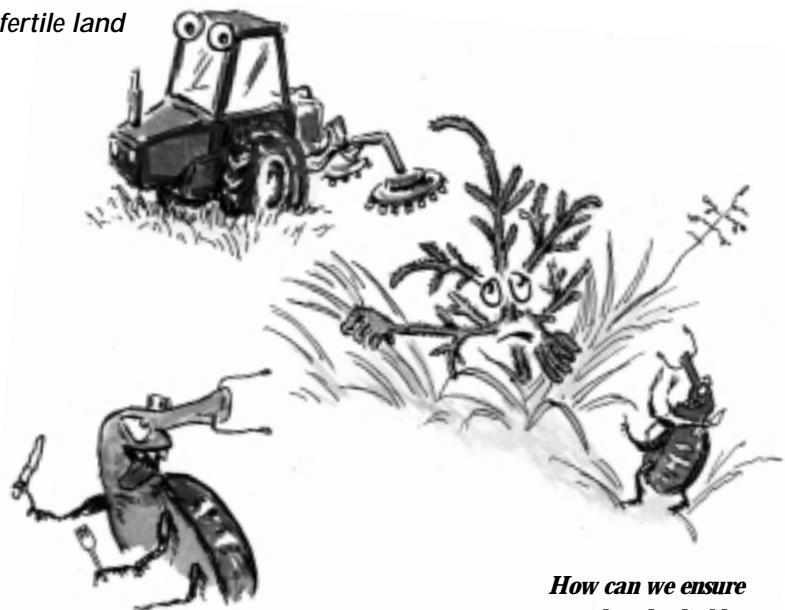
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### 5

#### *Intensive establishment methods on fertile land*

The aim is to devise and test methods of treating the land to ensure rapid and reliable establishment of new forest on fertile land, while minimising the risk of leaching of nutrients. The environmental effects of both old and new methods of regeneration are studied, together with plant establishment when there is especially strong competition from other vegetation. In addition, the effect of fertiliser and herbicide treatment on the growth of young spruce planted on former arable land are studied.



**How can we ensure rapid and reliable establishment of plants on intensively cultivated land?**

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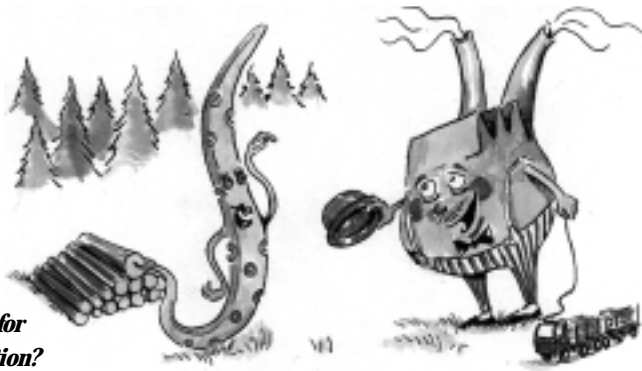
### Wood and fibre properties in conditions of optimum nutrition

The aim of the Fiberskog project is to maximise volume production and at the same time produce fibres with the properties required by the pulp and paper industry. The production of dry mass, wood structure, and fibre properties are affected by growth conditions, which in turn are dependent on the type of forest management. In order to design a management programme which will result in the desired properties of the wood and the fibres, we need more knowledge about how these properties are affected by nutrient optimisation in combination with other management practices such as clearing, thinning and changing rotation periods. The wood properties of interest include density, proportion of summer wood, proportion of young wood and fibre dimensions (width, length and thickness of cell walls).

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**How do we cultivate forests to produce fibres which are suitable for pulp production?**



### Effects of using sludge pellets as fertiliser

Today it is difficult to dispose of the waste products of the community. Sludge can be used in intensively cultivated forests as a supplement or replacement for conventional fertilisers. Sludge pellets are a fairly new product with a low water content. Sludge in this form is easy to handle and contains no disease-causing organisms since heat treatment is part of the production process. This project evaluates the effect on growth and the environment of using sludge pellets as a fertiliser in the intensive cultivation of spruce.

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### Key words

Intensive cultivation, differentiated forestry, differentiated land use, optimum nutrient supply, spruce

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