

Economic analysis of field afforestation and forest clearance for cultivation in Finland

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Introduction

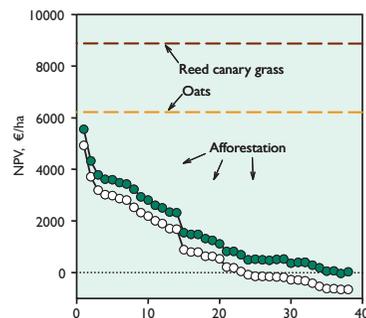
In this study we analyse the economic motives of Finnish farmers concerning forest clearance for cultivation, forest regeneration and field afforestation in the European Union's agricultural policy and the Finnish forest policy framework. Net present values of arable land and forestland are computed for three alternative land uses: cultivation of oats (*Avena sativa* L.), cultivation of reed canary grass (*Phalaris arundinacea* L.) for energy production, and production of Norway spruce (*Picea abies* [L.] Karst.) timber. We assume scale advantages in the EU's CAP supported agriculture on farm-level. Therefore, the net present value of land is calculated for a marginal hectare of a typical Finnish farm.

Materials and methods

Financial outcomes of alternative land uses are computed using agricultural and forestry statistics on yields and economic parameters. Detailed experimental data for 38 afforested stands from Metla's field afforestation survey and distance-independent individual-tree stand growth model (MOTTI model) were used for computing net present values of land under forestry. Reed canary grass production is still at a modest level, and thus its data was derived from available field experiments and from a single energy producer.

Results and discussion

Cultivation of energy grass gives clearly the highest economic outcome. However, the feedback from practise indicates that the reed canary grass technology suffers from significant harvesting losses, which were not included in our computations. This probably reduces its actual economic surplus closer to figures of traditional food production (oats), which also gives higher economic outcome than afforestation.



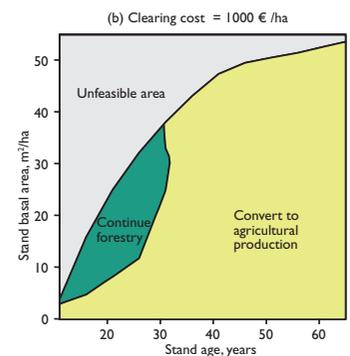
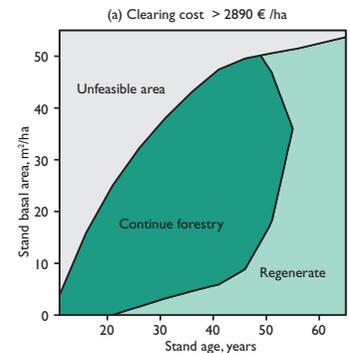
When plotting the 38 individual experiments in descending NPV order, we see that without national financial assistance about 2/5 of the field afforestation sites (open circles) have negative NPVs at 3% real interest rate. National support makes afforestation investments profitable even for the least successfully established stands (full circles), if agricultural production

is excluded. However, possibilities to continue agriculture in a reasonable scale, or alternatively to sell or rent out agricultural fields to other farms with scale advantages retain the arable lands under agricultural production. This explains poor success of the afforestation programmes. As a consequence, current reform of the forestry financing act includes that from 2008 onwards the existing national field afforestation support will be terminated.

Rationality of the forest clearance depends heavily on the conditions to include new field into the agricultural policy support programmes, age and stocking of the forest stand as well as on the conversion costs.

In a typical land use situation (figure a) clearance costs for cultivation exceed the private surplus from forest clearance (3% real interest rate). The farmer decides only between continued management and regeneration of the existing stand. If clearance costs decrease marginally and new fields are allowed to receive agricultural support, conversion to agricultural production instead of forest regeneration becomes an option into farmer's economic consideration.

At very low clearance costs (figure b), forest clearance for cultivation is evidently a profitable option for expanding the agricultural land of a farm (3% real interest rate).



Therefore, a ministerial policy reform in October 2004 was made in Finland to exclude new fields cleared after November 2004 from the most of agricultural support.

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