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Retreat from Salix—Swedish experience with energy crops in the 1990s

Peter Helby[a,*], Håkan Rosenqvist[a], Anders Roos[b]

[a]*Environmental and Energy Systems Studies, Lund University, Gerdagatan 13, SE-22362 Lund, Sweden*
[b]*Department of Forest Products and Markets, Swedish University of Agricultural Sciences, P.O. Box 7060, SE-750 07 Uppsala, Sweden*

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Abstract

A wave of Salix (willow) planting rolled over Sweden in the early 1990s, driven by subsidies and optimistic market expectations. The expected economic life span of such investments is 20 years or more. But in fact, many plantations were terminated or reduced much sooner. This article explores the reasons for this retreat. In a survey to Salix farmers, 41 per cent either have retreated or regretted starting at all. The reasons given are mostly agronomic, rather than economic. In particular, many farmers had planted on low-quality lands, ignoring best-practice advice. Policies in support of energy crops have been volatile and badly designed, in the sense of giving incentives to such reckless plantings, rather than promoting good farm management. Prices for wood chips have also been disappointing, but few farmers cite this as a key reason for termination or regrets.

Keywords: Energy crops; Salix; Willow; Bioenergy; Energy policy; Subsidies; CAP; Set-aside; Sweden; Farm management; Decision making; Economics; Survey

1. Introduction

In the first half of the 1990s nearly 1200 Swedish farmers set up plantations of Salix (willow), covering some 15 000 hectares. The idea was to grow Salix as an energy crop. For this purpose, Salix can be harvested 4–6 years after planting, and then again at intervals of 3–4 years, for a total of 20 years or more. After harvest, Salix is usually converted to wood chips and then enters into the mainstream supply of these—a supply dominated by wood chips from forest residues. The demand comes mostly from district heating companies. These companies were greatly expanding their bio-energy activities in the same period, propelled in this direction by various government policies as well as rising local awareness of greenhouse gas emissions and the need to reduce these.

At the time, the economics of Salix appeared attractive to many farmers. A deregulation of Swedish agriculture was started in 1991. As result, the income from cereals, such as wheat, was decreasing. It was generally recognised at the time that cereal production would often be uneconomical in these new conditions, so there was a search for alternatives.

To promote this search, a set-aside hectare subsidy was introduced. This subsidy was made available to farmers who permanently transferred a part of their land from cereal production to other activities, including energy crops. The amount of subsidy was around 9000 SEK/ha,[1] with some variation linked to fertility. For a specific plot of land, the subsidy was only given once, and was contingent on a permanent exclusion of this land from cereal production.

Additionally, a specific subsidy for Salix planting was introduced in 1991. For policy makers, this was simultaneously a further means of nudging farmers towards non-food alternatives and a tool for sustainable energy policy. Each hectare of new Salix plantations got a planting subsidy of 10 000 SEK,[2] and in some cases additionally

*Corresponding author. Tel.: +46 46 222 86 38; fax: +46 46 222 86 44.
E-mail address: Peter.Helby@miljo.LTH.se (P. Helby).

[1]At 1991 exchange rates, 9 000 SEK = 1 200 ECU(EUR) = 1 485 USD. The ECU was the precursor of the EUR, which had not been legally established in 1991, but the definition was approximately the same.

[2]At 1991 exchange rates, 10 000 SEK = 1 330 ECU(EUR) = 1 650 USD.

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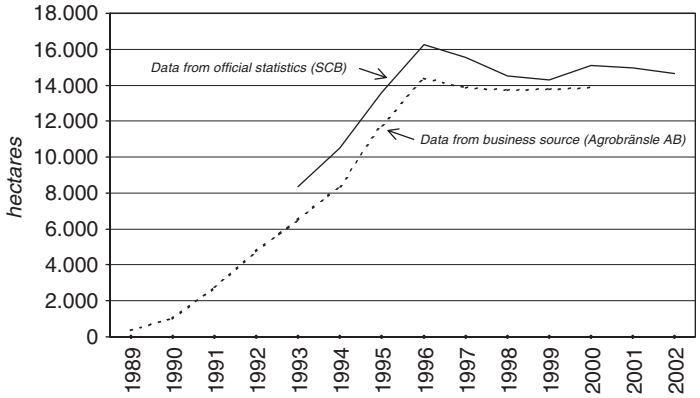

Fig. 1. Salix area in Sweden 1989–2002. Sources: [3–6].

4000 SEK[3] for fencing. This approximately[4] [1] covered the start-up costs, i.e. soil preparation, procurement of Salix cuttings (the plant material needed to start the plantation), the planting process, weed control, cutting back the growing plants, as well as advice and education for the farmer. The subsidy stayed at this level until 1997, when it was reduced to approximately 3000 SEK. It was increased again in 1999 to 5000 SEK, and has since remained at that level.[5]

At the same time, the infrastructure was developed. Breeding of Salix as an energy crop had been supported with research grants since 1984. In the 1990s this started to yield practical results in terms of increased productivity for farmers.[6] [2] Simultaneously, new or improved machinery for planting and harvesting became available. Planting cost per hectare decreased rapidly.[7]

Under these favourable circumstances, and under the pressure from low wheat prices, a significant number of farmers opted for Salix. The expansion in Salix area is shown in Fig. 1.

The characteristics of farmers adopting Salix were studied by Roos and Rosenqvist [7,8]. Briefly, they found a geographical clustering in areas with high bio fuel demand for district heating and where specialised service enterprises were active. Salix was grown much less on leased than owned land. This is logical, considering the long-term commitments involved, but at the same time constitutes a significant barrier, as 45 per cent of Swedish agricultural land is leased. Farmers seemed to be careful in their management of plantations. Weed control and fertilisers were employed on almost all plantations. The inclination to grow Salix increased with the age of the farmer, until a turning point around the age of 65. Presumably, young farmers want more labour intensive crops and/or quicker cash flows. The middle-aged might better be able to fit Salix to their desired workload and cash flows. While the old might be averse to new long-term commitments, or simply more conservative, and therefore, less interested.

Farmers were asked about motives for planting Salix. In summary, these were:

- changing the workload on the farm,
- good incomes from sales,
- subsidies and expected policies,
- land more suitable for Salix than for cereals.

Motives for maintaining plantations, once they are growing, could be different. Improved hunting counts as a motive for 40 per cent of Salix farmers asked by Börjesson et al. [9].

Within each farm, the lands on which Salix was grown tended to be below average quality [8]. Indeed, a preference for cereals on the best soils makes for good economics on most farms. On many farms, however, Salix was pushed onto lands of too low quality. In fact, 30 per cent of the plantations were on non-clay soils (<15 per cent clay). Such soils are not usually regarded as suitable for Salix [10].

Farm level optimism about Salix was in line with a more general societal optimism concerning energy crops. Fig. 2 summarises prognoses and scenarios from the 1990s, all from respected sources.

In the mid-1990s, the demand for bio-fuels was rapidly growing. This might have caused some optimism about price developments. But in fact, prices turned out to be kept in check by cheap imports and by the abundance and diminishing harvest costs of domestic forest residues. As shown in Fig. 3, wood chip prices hit an all-time low in 1994 and stayed in the cellar until 2002, i.e. during the first and perhaps even the second harvest of plantations started in the Salix boom.

[3]At 1991 exchange rates, 4 000 SEK = 530 ECU(EUR) = 660 USD.

[4]Standard calculations show 95 per cent cost coverage [1]. But obviously, the precise costs depend on specific circumstances at each farm.

[5]At 2003 exchange rates, 5 000 SEK = 550 EUR = 620 USD.

[6]By 1995, an increase of some 20 per cent in the productivity of new commercial planting stock had been achieved, compared to a pre-breeding reference [2].

[7]Planting costs (excluding the planting stock) were reduced from 2700 SEK in 1991 to 1500 SEK in 1994, i.e. a reduction by 44 per cent in nominal terms (50 per cent i real terms) [1].