Supporting programmes of the growing of short rotation coppices in the Czech Republic

Podpůrné programy pěstování rychle rostoucích dřevin v ČR

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Abstract: This article presents some partial conclusions from the solution to the Research Project QF 4142 Higher exploitation of non-food production in the industry. The funding and supporting programmes of the growing of short rotation coppices (SRC) are described. The establishment of short rotation coppices and the subsequent exploitation of wood mass are promising trends of diversification of farmers' activities in the rural space. Plot sizes in ha and financial support to the establishment of the SRC plantations are given for 2001–2004, when a total of 166 ha of supported short rotation coppices was established. The establishment support is paid at a single installment while the amount paid for the establishment of the SRC production plantation is 60 000 CZK/ha and the amount paid for the establishment of mother plantation (reproduction plantation) is 75 000 CZK/ha.

Key words: non-food production, supports, renewable energy resources, short rotation coppices

Abstrakt: V příspěvku jsou uvedeny některé dílčí závěry z řešení výzkumného projektu QF 4142 Vyšší využití nepotravinářské produkce v průmyslu. Je uvedeno financování a podpůrné programy pěstování rychle rostoucích dřevin (RRD). Založení plantáží rychle rostoucích dřevin a následné zhodnocení dřevní hmoty je jedním z perspektivních směrů diverzifikace činností zemědělců ve venkovském prostoru. V příspěvku jsou uvedeny výměry v ha a finanční podpory při založení plantáží RRD v letech 2001–2004, kdy bylo vysázeno celkem 166 ha dotačně podpořených plantáží rychle rostoucích dřevin. Dotace na založení je proplacena jednorázově, na založení produkční plantáže RRD je stanovena sazba ve výši 60 tis. Kč/ha a na založení matečnice (reprodukční plantáže) 75 tis. Kč/ha.

Klíčová slova: nepotravinářská produkce, podpory, obnovitelné zdroje energie, rychle rostoucí dřeviny

By approving of the Government Resolution No. 211/2004 of the 10th March 2004, the National Energy Concept was adopted, which defines the priorities and objectives of the CR in the energy sector and lays down the instruments of energy policy in an outlook by 2030 in relation to the EU energy policy. The development of the exploitation of renewable energy sources (RES) is one of the EU highly prioritised objectives. These objectives were set down in the framework of the National Energy Policy of the CR:

- The proportion of RES in the structure of primary energy sources should be 15–16% in 2030;
- The conditions for the achievement of the national indicative target in the exploitation of RES should be ensured – the proportion of these sources of energy in the gross electricity consumption should amount to 5–6% in 2005;
- Conditions for a larger-scale exploitation of RES should be created by setting the national indicative target in electricity production from these sources and its achievement, i.e. an 8% proportion of electricity production from RES in the gross electricity consumption in 2010.

Every year, the CR Government approves by its resolution the concept of the National Programme Promoting Energy Savings and Exploitation of Renewable Energy Sources (hereinafter the National Programme). The objective of this programme is to enhance activities leading to energy savings and to

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decrease energy requirements while the environmental impacts of fuel and energy consumption and conversion are minimised. The National Programme is fully compatible with procedures of the EU countries. It is a well-tried instrument to create an environment favourable for development of the activities aimed at a sustainable reduction in energy consumption. The National Programme is also compatible with the National Environmental Policy and Energy Policy. The National Programme is one of the instruments to achieve the objectives of the National Programme for Economical Management of Energy and Exploitation of its Renewable and Secondary Sources. Every year, it is updated and submitted by the Ministry of Industry and Trade in cooperation with the Ministry of Environment to be approved by the CR Government. The proposal of National Programme for 2003 was approved by the Government Resolution No. 1083/2002 of the 6th Nov. 2002. Its participants are 11 sectors while each sector is responsible for the respective part of the National Programme. The Ministry of Agriculture sector is responsible for the support to non-production functions of agriculture, mainly for a sub-programme of assistance to change the structure of agricultural production by the establishment of short rotation coppices on agricultural lands including the tending to these coppices. The programme of non-food exploitation of agricultural production by the end of 2003 was managed by the State Agricultural Intervention Fund in three aspects. The proposal of the National Programme for 2005 was approved by Government Resolution No. 1105/2005 of the 10th Nov. 2004.

Energy self-sufficiency of rural areas is one of the main objectives of the Government's agricultural concept for the period 2004-2013. Energy consumption in rural areas is by 60% higher than in towns. The average consumption of one rural household amounts to 110.5 GJ, of one urban household to 68 GJ. The agriculture sector is the producer of biomass for the power industry on the one hand, and the consumer of heat and electricity from local sources on the other. Both national supports and measures in operational programmes of structural funds promote the higher exploitation of renewables. Renewable energy sources are among the main priorities of the European Union because they significantly contribute to environment protection, ensure the security of energy supplies, help reduce dependence on fuel imports and partly initiate new job opportunities in the rural space. Biofuels, particularly the use of biomass, appear promising for further development of renewable energy resources in the CR. The CR agricultural policy aimed at both rural development and multifunctional agriculture provides many opportunities for agricultural businessmen in the area of non-food agricultural production and biomass exploitation in the power industry. In this article, our attention is focused on one of the promising ways of biomass exploitation, i.e. on the growing and financing of short rotation coppices (SRC).

METHODS AND DISCUSSION

Comparable projects of the targeted biomass growing and some experience in the exploitation of waste biomass are known from the Scandinavian countries, Canada, Germany and Austria. Our brief overview shows the technologies, production results and cost effectiveness of the SRC growing. At first, we must be aware of the specificities of climatic conditions in the CR because the high productive capacity of some clones of the fast-growing tree species reported from Sweden in literature does not imply a high productivity in the site conditions of the Czech Republic, and hence a higher economic effectiveness of the SRC growing. It is also to note that pests and diseases may attack dense crops of the SRC that do not occur in the site conditions of the country of origin (FAO 1980).

Flaig and Mohr (1993) provided information on the use of biomass – straw for central heating at Haslev in Denmark. A heating plant of the heat output 13 MW and electric output 5 MW was in operation since the autumn 1989, supplying heat to 2 000 inhabitants of the town of Haslev and also supplying some electricity to the distribution network. Out of the total built-up area of 2 700 m^2, the space of 1 600 m^2 was used for straw storage. Straw stored in this space met the needs for three days. Another heating plant at Holstebro for 57 000 heat consumers was in operation since 1993. The stability of heat supply was based on the diversification of fuel sources when the municipal waste, cereal straw and woodchip from the SRC were used while the natural gas was a reserve fuel.

At Hagenov near the town of Schwerin in Germany, it was assumed to utilise wood mass from 63 253 ha at the maximum transport distance of 27 km from Hagenov. Out of the total fuel amount 39 000 t per year, the wastes and wood residues accounted for 33 000 t per year while the biomass from agricultural and forest production accounted for 6 000 t per year, as reported by Dobler (1995). Dowson. (1988) evaluated the growing of *Salix burjatica* in a plantation of the density 20 000 plants per ha where a three-year cycle of harvest as a growing technology was used. At the densest spacing (1 × 0.25 m), an average yield of

17.0 t dry matter/ha was achieved while the yield at the spacing of 3.0 × 0.5 m was 8.8 t dry matter/ha.

If the suitable tree species and their varieties are used in appropriate sites, the annual production may amount to 10 t of air-dried biomass, i.e. 22 m^3 per 1 ha/year, as reported by Šindelář (1994). The breeding of new clones may bring a markedly higher production. The author explained that under some circumstances, the planting of tree species on plots exempted from agricultural production, even though these were crops of plantation type grown in a short rotation, could favourably influence environmental conditions in the landscape, contributing to its stability by protection from erosion and providing shelters to animals.

The materials of the Lantmännen Company from Sweden report that 10 000 ha of energy plantations of willow were set out in 1993. A total of 15 000–20 000 cuttings of Salix was planted per 1 ha. The crop was harvested every three or four years. Planned per-hectare yields were 12 t/ha in the fourth year, 13.5 t/ha in the eighth year and 14 t/ha in the twelfth year, under the cost terms 114 SEK/MWh.

Dimitri (1993) evaluated the SRC grown for energy production while any tree species with the total increment of 10 t dry matter per ha, i.e. 22 m^3 per ha/year, was considered as the SRC. Three types of rotation in the growing of short rotation coppices were distinguished. The advantages of the SRC growing and criteria of selection were emphasised: the assured biomass increments, a good growth from the first years of the crop establishment, easy propagation – cuttings, a good utilisation of wood, resistance to diseases and pests, great marketing opportunities not only in the energy sector but also in the paper and woodworking industry, and last but not least, a high fuel efficiency. Dimitri (1993) reported spacing, number of trees per ha and average increments. A total of 16 600 plants were set out at the spacing of 2.0 × 0.3 m, in twin rows it was 8 800 plants/ha. As for average yields, the yield in the 1st rotation was 4–8 t dry matter per ha while the yield of balsam poplars and crossbreds of balsam poplars was 12 t/ha in the four-year period. Eight clones achieved yields higher than 18 t: Raspalje 24.3 t per ha, Unal 23.3 t per ha, 218-78 22.4 t per ha, Max 1 19.3 t per ha, Max 4 18.7 t per ha, Trichobel 18.7 t per ha, Ross Lake 1 18.2 t per ha and Max 3 18.2 t per ha.

Experiences in the growing of short rotation coppices in Canada were describe in the report of the Prince Edward Island Energy Corporation from 1985. In 1981 selected poplar clones were planted at spacings of 1.25 × 1.25 m, 0.6 × 1 m and 0.3 × 1 m, which corresponded to cutting densities of 6 400, 16 500 and 33 000 plants per ha. N fertilisation levels 0, 100, 200, 400 kg N per ha were also tested. The production in the first year was 8.27 t dry matter/ha for the highest density and no N fertilisation. In the second production year the highest yield of 12.12 t dry matter per ha was achieved in the clone 79 with medium planting density and fertilisation rate of 400 kg N.

Schulze (1993) informed about the average production results achieved on experimental plots: 12 t dry matter per ha, up to 18 t dry matter per ha. A total 10 000–17 000 cuttings per ha was planted on the former agricultural lands with the adequate soil preparation in Germany according to production targets. The author also pointed to the potential failures that might be caused by planting only one clone on the plot, an unsuitable site, a lack of care of the crop especially in the first year of planting, the occurrence of diseases and pests, e.g. *Dotichiza populea*.

Joachim et al. (1989) evaluated various cultivars and their site requirements. In the fifties, they recommended these clones: *Populus nigra* Robusta, *P. nigra* Marilandica, *P. nigra* Reg., *P. nigra* Sirotina, *P. trichocarpa* Senior and *P. x berolinensis*. In the sixties, they grew *P. trichocarpa* Androscoggin and *P. tremula*; since 1987, the expansion of poplar growing contributed to their larger-scale growing in tree nurseries. Currently, the above-mentioned authors recommend to grow these black poplars: *P. nigra* Gelrica, *P. nigra* I 214, *P. nigra* Jacometti, *P. nigra* Löns, *P. nigra* Ostia; Tacamahaca Androscoggin, NE 42, Loschwitz and Bät from the section of balsam poplars, and Leuce Finow and Liepe from the section of white poplars.

At the Uherské Hradistě based breeding station of the Research Institute of Forest and Game Management specialising in the SRC, 600 poplar clones and 800 willow clones are grown. Among the tree species to be grown for biomass for energy production, Čížek (1993) recommended *Populus* sp., *Salix* sp., *Betula* sp. and *Alnus* sp. for sites with a good supply of water while *Robinia pseudoaccacia* L., *Ailanthus glandulosa* Desf. and *Corylus* sp. should be grown in dry sites. These traits are respected in the breeding strategy: maximum production, good health and maximum weight of dendromass with low water content at the time of harvest. Plants with narrow crowns are preferred for plantations because their light utilisation is higher. In the Czech Republic, Čížek (1993) recommended black poplars for altitudes of 300–400 m above the sea level, and balsam poplars and willows for higher locations. Based on the results of experimental plots, he expected the average yields of 10–12 t dry matter per year, maximally 20 t dry matter per ha on sample plots. According to his in-

vestigations, Dr. Čížek reported the yield of 15 t dry matter per ha/year in Blanc du Poitou, I-214, I-45-51 and NE-42. He pointed to the worse health status of the I-214 clone. A maximum amount of biomass 16 t dry matter per ha was achieved in the clone P 351, i.e. *P. x euroamericana* Guin. In willows, the maximum yield of 29 t dry matter per ha was recorded in the white willow *Salix alba* L. x win. None of the willows produced less than 10 t per ha.

Baldelli (1994) recommended robinia plantations with three-year rotation for soils and climate of Central and Southern Europe. At a high crop density (1 × 1 m spacing), it is possible to achieve the per-hectare yield in dry matter of 10 t. The author pointed to the sensitivity of flushed cuttings to low temperatures at early planting.

Tiefenbacher and Valkonen (1989) studied the relation between the number of plants per 1 ha and the planned rotation; they recommended 10 000 plants per ha for harvest every four years, if the crop was harvested each year, the number of planted cuttings per 1 ha could be increased to 20 000 plants. Plantations should be established in a one- or two-row design. The spacing between rows is given by the available mechanisation, e.g. 2.2–2.5 m. The spacing of cuttings in a row is 0.5–1 m. The authors recommended these numbers of cuttings according to the genera: 3 000–7 000 cuttings/ha in poplar and 7 000–12 000 cuttings/ha in willow. They also indicated the uptake of nutrients from soil in short rotation coppices. The density of poplar plantations 10 000 plants per ha was recommended by Ciria (1994). He reported the variability of production according to poplar clones. An increased growth of the plantation was observed between the 4th and 5th year after its establishment.

Results of the SRC growing and utilisation of biomass obtained from larger operational plots are especially valuable. The SL. Energi Malmö Company from Sweden reports on 2 700 ha of willow plantations for the biomass production.

Bonduelle et al. (1996) from the AFOCEL Company from France evaluated the pros and cons of density amounting to 2 000–3 000 plants compared to 10 000 plants per ha. The harvest every two years from the plantations with density of about 10 000 plants per ha resulted in

– higher costs of harvest
– lower fuel efficiency of woodchip
– higher content of bark in fuel.

The above-mentioned authors accentuated the environmental effect of the uptake of up to 25% nutrients from the subsoil by a short rotation coppice. The nutrients that are not taken up by the crop are frequently a source of groundwater contamination.

Hevin (1996) described the crops of Eucalyptus grown on 500 ha and Populus on 350 ha as the main SRC. Willows are tested on parcels of research institutes.

The success of the SRC growing is not connected only with the knowledge of biological regularities, production potential of clones and the number of plants set out per ha, it mainly depends on the human initiative. The optimum cost effectiveness of growing and harvest in an "economic environment" does not always guarantee the effectiveness of the SRC growing. Human invention, searching for the optimum variants for the exploitation of energy in wood grown on an agricultural farm are frequently described in journals such as the REVIEW. It is a quarterly published by the Ministry of Trade and Industry in the United Kingdom. E.g. in the issue No. 20, 1993, the spirit of cooperation of five farmers is described who jointly bought poplar and willow cuttings and through this joint purchase, they achieved much lower prices of cuttings than they would pay if each of them acted on their own. Součková (1995) explored economics and evaluation of the SRC. She reported cost per foundation of 1 ha of the SRC in average 95 000 CZK.

In the CR, in the Research Institute of Agricultural Engineering (RIAE), Kovářová et al. (2002) examined the growing and economics of the SRC. She reported that after subtraction of supports amounting to 54 000 CZK from costs per 1 ha, the costs of woody species production would decrease in average to 46 000 CZK. If we consider the yield of wood mass in poplars in a production area over 5 years 50 t/ha, the economics will be favourable, 918 CZK/t dry matter (without supports of ca. 2 000 CZK/t dry matter). As shown by the practical results of long-time testing in the RIAE, in the second and later rotations when the stump regeneration starts and the costs of plantation establishment are not incurred, the economics could be favourable even with minimum support, assuming only that the yield will be produced. But this assumption should be verified, which requires a longer time period. The calculation of costs per 1 GJ is also favourable. For the yield of 50 t dry matter over a five-year period and costs of 918 CZK/t 1 GJ = 54 CZK. If the orientation costs of additional drying and handling 75 CZK/t were taken into account, for the fuel efficiency of dry matter ca. 17 MJ/kg and for the reported real yield of ca. 50 t dry matter, the specific costs will be ca. 58 CZK/GJ, including supports in accordance with the Government Regulation No. 505/2000. In the Silva Tarouca Research Institute for Landscape and Ornamental Gardening, over the 20-year existence of the coppice plantation Havlíčková

et al. (2003) estimated the amount of the produced energy in woodchip to be ca. 13 500 GJ, i.e. 135 GJ per year/ha. An imaginary energy output of the coppice plantation is approximately 4.5 kW/ha (for the time fund of 8 760 hours the fuel efficiency of 12.5 GJ/t woodchip is assumed for 30% moisture content). Based on these values, it is possible to estimate the necessary area to meet the energy requirements of the given locality. The price of biomass from coppice plantations is calculated in the range of 90–160 CZK per GJ. Moudrý et al. (2004) reported the total variable costs of the establishment and tending of poplar crop on the one-hectare plot after four years to amount to 629 000 CZK (without own mother plantation) and to 589 400 CZK if cuttings were taken from the own mother plantation. The average yield of wood mass after four years of growing was 36 122 kg/ha. The author accentuated the need of good soil preparation. The highest cost item was the purchase of cuttings of fast-growing tree species.

As evident from bibliographical sources and from discussions with farmers, supports are essential, especially in the first year for soil preparation, establishment of plantation and for fencing against game.

RESULTS

In accordance with the Government Regulation No. 505/2000 laying down supporting programmes of support to non-production functions of agriculture, support to activities aimed at landscape conservation, programmes of support to less favourable areas and the criteria of their evaluation support is granted (see Table 1) in case the applicant plants a short rotation coppice designed for energy production on the minimum area of 0.25 ha if it is a reproduction plantation (mother plantation) or on the minimum area of 1 ha agricultural land if it is a production plantation. The performed operations are evaluated by amounts in CZK per technical unit of the operation to which support is granted.

Table 2 shows a survey of the supported plantations of short rotation coppices in 2001–2003. In 2001 a total of 19.7 ha of such plantations was established that received the support of 565 991 CZK; the largest portion of these plantations was established in the Karlovarský Region and the Liberecký Region. In 2002, sixteen hectares of the the SRC were planted on agricultural land that received the support amounting to 474 664 CZK and that were mostly located in the environs of Prague and in the South Bohemian Region. In 2003, the planting of 39.4 ha was supported by the amount of 802 311 CZK. An increased interest in the planting of SRC was in the Vysočina Region and the South Bohemian Region.

For application of the 2004 Government Regulation No. 308/2004, laying down the conditions for the grant of support to afforestation of agricultural land and to the establishment of short rotation coppices on agricultural land that are designed for energy production, took effect on the 5th May 2004. The Government Regulation No. 308/2004 defines the Horizontal Rural Development Plan (HRDP) including measures for forestry and allows to implement immediately the binding rules of the European Communities [the Council Regulation (EC) No. 1257/1999 as amended by the Council Regulation (EC) No. 1783/2003].

In 2004, a total of 376 applicants filed their applications to be included in the programme pursuant to the GR No. 308/2004 (afforestation and establishment of SRC plantations). The assumed support to this programme was calculated to amount to ca. 61.5 mil. CZK. SRC plantations should be established

Table 1. Amounts paid per technical unit of the performed operation

Object of support		Technical unit	Amount in CZK
Planting of reproduction plantation – poplar, willow		1 cutting	3
Building of fences to protect reproduction plantations		1 m	60
Protection of reproduction plantations from weed infestation		1 ha	5 000
First planting of production plantation	poplar, willow	1 cutting	5
	other trees	1 plant	5
Repeated planting of production plantation	poplar, willow	1 cutting	1
	other trees	1 plant	2.50
Protection of production plantations		1 ha	4 000

Source: Survey of the State of Agriculture for 2003, Ministry of Agriculture CR

Table 2 Regional survey of supports and areas of short rotation coppices in 2001–2003

Region	Supported title		Amount	2001		2002		2003	
				ha	CZK	ha	CZK	ha	CZK
Prague	12.c.1.1.	SRC – establishment of reproduction plantations	3 CZK/cutting			0.00		0.63	18 810
	12.c.1.2.	SRC – protection (exclusion fences)	60 CZK/m			x		x	19 800
	12.c.2.	establishment of SRC – protection against weed infestation	5000 CZK/ha			0.00		0.49	2 450
	12.c.3.1.	first planting of RP – poplar, willow	5 CZK/cutting			3.80	189 999	0.00	
	12.c.3.2.	first planting of RP – other tree species	5 CZK/cutting			0.00		0.00	
	12.c.4.1.	repeated planting PP – poplar, willow	1 CZK/cutting			0.00		1.14	11 400
	12.c.5.	protection of production plantations	4 000 CZK/ha			0.00		3.10	12 397
	total §12.c) change in production structure					3.80	189 999	5.36	64 857
Středočeský	12.c.1.1.	SRC – establishment of reproduction plantations	3 CZK/cutting	0.10	3 000	0.10	3 000		
	12.c.1.2.	SRC – protection (exclusion fences)	60 CZK/m	x	15 720	x	19 080		
	12.c.2.	establishment of SRC – protection against weed infestation	5 000 CZK/ha	0.00		0.25	1 250		
	12.c.3.1.	first planting of RP – poplar, willow	5 CZK/cutting	0.00	0	0.00	0	2.07	103 650
	12.c.3.2.	first planting of RP – other tree species	5 CZK/cutting	0.00		0.00			
	12.c.4.1.	repeated planting PP – poplar, willow	1 CZK/cutting	0.00		0.00		1.17	11 700
	12.c.5.	protection of production plantations	4 000 CZK/ha	0.00		0.00	0	8.09	32 373
	total §12.c) change in production structure			0.10	18 720	0.35	23 330	11.34	147 723
Jihočeský	12.c.1.1.	SRC – establishment of reproduction plantations	3 CZK/cutting	0.40	11 880	0.50	14 850		
	12.c.1.2.	SRC – protection (exclusion fences)	60 CZK/m	x	14 100	x	10 620		
	12.c.2.	establishment of SRC – protection against weed infestation	5 000 CZK/ha	0.30	1 516	0.56	2 815	0.30	1 516
	12.c.3.1.	first planting of RP – poplar, willow	5 CZK/cutting	0.00	0	1.33	66 450	0.70	35 000
	12.c.3.2.	first planting of RP – other tree species	5 CZK/cutting	0.00		0.00			
	12.c.4.1.	repeated planting PP – poplar, willow	1 CZK/cutting	0.00		0.00	0		

Continuation Table 2.

Region	Supported title		Amount	2001		2002		2003	
				ha	CZK	ha	CZK	ha	CZK
Jihočeský	12.c.5.	protection of production plantations	4 000 CZK/ha	0.00	0	1.33	5 316		4 406
	total §12.c) change in production structure			0.70	27 496	3.72	100 051	1.00	40 922
Karlovarský	12.c.1.1.	SRC – establishment of reproduction plantations	3 CZK/cutting	0.00		0.00			
	12.c.1.2.	SRC – protection (exclusion fences)	60 CZK/m	x		x			
	12.c.2.	establishment of SRC – protection against weed infestation	5 000 CZK/ha	0.00		0.00			
	12.c.3.1.	first planting of RP – poplar. willow	5 CZK/cutting	3.37	168 500	0.00		0.88	43 750
	12.c.3.2.	first planting of RP – other tree species	5 CZK/cutting	0.00		0.00		0.86	43 000
	12.c.4.1.	repeated planting PP – poplar. willow	1 CZK/cutting	0.00		0.43	4 300		
	12.c.5.	protection of production plantations	4 000 CZK/ha	3.10	12 410	3.10	12 409	1.48	5 918
	total §12.c) change in production structure			6.47	180 910	3.53	16 709	3.21	92 668
Liberecký	12.c.1.1.	SRC – establishment of reproduction plantations	3 CZK/cutting	1.60	48 000	0.00			
	12.c.1.2.	SRC – protection (exclusion fences)	60 CZK/m	x	59 754	x			
	12.c.2.	establishment of SRC – protection against weed infestation	5 000 CZK/ha	1.62	8 121	0.00			
	12.c.3.1.	first planting of RP – poplar. willow	5 CZK/cutting	1.46	73 000	1.63	81 500		
	12.c.3.2.	first planting of RP – other tree species	5 CZK/cutting	0.00		0.00			
	12.c.4.1.	repeated planting PP – poplar. willow	1 CZK/cutting	0.00		0.37	3 700	0.49	4 890
	12.c.5.	protection of production plantations	4 000 CZK/ha	1.10	4 400	0.00	0	2.33	9 312
	total §12.c) change in production structure			5.78	193 275	2.00	85 200	2.82	14 202
Královéhradecký	12.c.1.1.	SRC – establishment of reproduction plantations	3 CZK/cutting	0.00		0.19	5 700		
	12.c.1.2.	SRC – protection (exclusion fences)	60 CZK/m	x		x	42 780		
	12.c.2.	establishment of SRC – protection against weed infestation	5 000 CZK/ha	1.25	6 233	0.91	4 525		
	12.c.3.1.	first planting of RP – poplar. willow	5 CZK/cutting	0.94	46 980	0.00	0		

Continuation Table 2.

Region	Supported title		Amount	2001		2002		2003	
				ha	CZK	ha	CZK	ha	CZK
Královéhradecký	12.c.3.2.	first planting of RP – other tree species	5 CZK/cutting	0.09	4 255	0.00	0		
	12.c.4.1.	repeated planting PP – poplar. willow	1 CZK/cutting	0.00	0	0.00			
	12.c.5.	protection of production plantations	4 000 CZK/ha	0.00	0	1.25	4 986		
	total §12.c) change in production structure			2.27	57 467	2.34	57 991		
Pardubický	12.c.1.1.	SRC – establishment of reproduction plantations	3 CZK/cutting					1.75	52 500
	12.c.1.2.	SRC – protection (exclusion fences)	60 CZK/m					x	31 800
	12.c.2.	establishment of SRC – protection against weed infestation	5 000 CZK/ha					1.06	5 300
	12.c.3.1.	first planting of RP – poplar. willow	5 CZK/cutting					2.77	138 600
	12.c.3.2.	first planting of RP – other tree species	5 CZK/cutting					0.00	
	12.c.4.1.	repeated planting PP – poplar. willow	1 CZK/cutting					0.00	
	12.c.5.	protection of production plantations	4 000 CZK/ha					2.10	8 400
	total §12.c) change in production structure							7.68	236 600
Vysočina	12.c.1.1.	SRC – establishment of reproduction plantations	3 CZK/cutting	0.40	12 000	0.00		1.43	42 810
	12.c.1.2.	SRC – protection (exclusion fences)	60 CZK/m	x	13 980	x			
	12.c.2.	establishment of SRC – protection against weed infestation	5 000 CZK/ha	0.28	1 384	0.28	1 384	1.03	5 125
	12.c.3.1.	first planting of RP – poplar. willow	5 CZK/cutting	0.00	0	0.00		2.75	137 500
	12.c.3.2.	first planting of RP – other tree species	5 CZK/cutting	0.00		0.00		0.16	8 100
	12.c.4.1.	repeated planting PP – poplar. willow	1 CZK/cutting	0.00		0.00			
	12.c.5.	protection of production plantations	4 000 CZK/ha	0.00		0.00		2.95	11 804
	total §12.c) change in production structure			0.68	27 364	0.28	1 384	8.32	205 339
Moravskoslezský	12.c.1.1.	SRC – establishment of reproduction plantations	3 CZK/cutting	0.00					
	12.c.1.2.	SRC – protection (exclusion fences)	60 CZK/m	x					

Continuation Table 2.

Region	Supported title		Amount	2001 ha	2001 CZK	2002 ha	2002 CZK	2003 ha	2003 CZK
Moravsko-slezský	12.c.2.	establishment of SRC – protection against weed infestation	5 000 CZK/ha	0.00					
	12.c.3.1.	first planting of RP – poplar. willow	5 CZK/cutting	1.00	50 000				
	12.c.3.2.	first planting of RP – other tree species	5 CZK/cutting	0.00					
	12.c.4.1.	repeated planting PP – poplar. willow	1 CZK/cutting	0.00					
	12.c.5.	protection of production plantations	4 000 CZK/ha	2.69	10 759				
	total §12.c) change in production structure			3.69	60 759				
CR	total §12.c) change in production structure			19.69	565 991	16.02	474 664	39.37	802 311

Source: State Agricultural Intervention Fund, Survey of the State of Agriculture for 2001–2003, Ministry of Agriculture CR, Prague

on the area of 91 ha (forest stands should be planted on an area of ca. 540 ha).

In the framework of the programme supporting the establishment of SRC, crop support is granted to the establishment of production plantation that will be grown for the minimum period of 15 years on a plot 0.5 ha in size minimally and to the establishment of mother plantation (reproduction plantation) to be grown on an area 0.25 ha in size minimally for the minimum period of 10 years. Entering the programme, the applicant commits himself/herself to ensure the growing, harvest and recording of the SRC according to the type of crop and liquidation of the crop after the plantation lifetime has expired. The establishment support is paid at a single instalment while the amount paid for the establishment of the SRC production plantation is 60 000 CZK/ha and the amount paid for the establishment of mother plantation (reproduction plantation) is 75 000 CZK/ha.

CONCLUSION

The establishment of the SRC plantations and the subsequent exploitation of wood mass are promising trends of diversification of farmers' activities aimed at the increase in their incomes. Diversification in agriculture is a trend closely connected with sustainable rural development. This article proves an increasing interest of farmers in the growing of short rotation coppices. The measure Establishment of SRC Plantations in the Agriculture Sector is in close connection with the construction of heating plants for biomass in the rural space.

Basic objectives of the SRC plantations:
- to decrease the percentage of farmed arable land in the CR, without risk of the increase in the proportion of abandoned, not farmed lands;
- to decrease greenhouse gas production and to reduce emissions, especially of sulphur oxides;
- to contribute to the economic stability of the rural population by the change in the structure of incomes through diversification;
- to improve biodiversity of cultural landscape and to increase ecological stability in landscape.

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