

## Changes in ornamental nursery production following Polish integration with the European Union

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**Abstract:** *Changes in ornamental nursery production following Polish integration with the European Union.* The objective of the study was to determine the effect of Polish integration with the European Union on ornamental nursery production. The study was designed in particular to assess changes in technology and mechanization, as well as to evaluate producers' use of EU financial support offered by the Agency for the Restructuring and Modernisation of Agriculture (ARMA) within the Rural Development Programmes (RDPs). The research was based on questionnaires and involved surveys of 612 holdings. Data from the ARMA regional offices were also analysed in addition to those generated by the study. In both cases the analyses concerned the three main types of investment initiatives carried out in the ornamental nurseries: machinery and equipment, construction, and irrigation systems. In the majority of cases the machinery and equipment initiatives were part-funded by the EU. The majority of the beneficiaries were very large nurseries with a production area greater than 5 ha. The nurserymen were particularly interested in obtaining funds for polyethylene tunnels. The total area of polyethylene tunnels was found to have increased by 20.73 ha since 2004, of which nearly half, 9.05 ha, was funded by the RDP.

*Key words:* investment in nurseries, financial credits for horticulture, EU financial support

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## INTRODUCTION

The nursery industry in Poland has seen rapid development over the past few years. In 2010 it accounted for a total area of 6,747 ha and a total production value of more than PLN one billion [GUS 2012, Marosz, 2012]. What is more, the area devoted to producing hardy nursery stock increased by 35% in 2002–2010. What made this possible was the excellent performance of one of the fastest-growing economies in Europe and very high market demand for ornamental plants [Brown, 2012]. According to data of 2011 from the International Association of Horticultural Producers (AIPH), ornamental nursery production has also been prospering in the Netherlands, Germany and Belgium. However, it was found that the area devoted to this activity had fallen in Denmark, France and Great Britain. Beginning from the period before the country joined the EU, a number of different agricultural financial credits have been available in Poland. It has therefore been of central importance to agricultural policy to identify farms to carry out investment initiatives based on these credits and thus to offer support from EU funds [Jabłońska, 2007, Marosz, 2008].

One characteristic of the horticultural sector is its heterogeneity. A very wide range of different types and sizes of business are found. Each concentrates on a more or less varied range of products (some field-grown, some container-grown), which are sold through a variety of different outlets [Crane and Barahona, 1996]. Containers allow greater flexibility in production and marketing and in some cases are less expensive than field production [Kneen et al., 1983, Orun, 2012]. Building a nursery requires a broad range of investments aimed at aiding production, lowering costs, using less human labour and at moving the holding to a higher level of competitiveness [Crane and Barahona, 1996, Marosz, 2009]. The propagation of ornamental trees and shrubs calls for special structures, such as greenhouses or polyethylene structures, while the production of container plants involves special growing areas, irrigation and a water source. Moreover, both field and container cultivation require mechanization [Dirr and Heuser, 2006, Szydło, 2010, Orun, 2012]. These are just a few of the specific and capital-intensive factors entailed by ornamental nursery production. Because of the considerable investment necessary, the pace of development of nurseries and other sectors of horticulture and agriculture has been on the slow side [Brown, 2012]. However as Plewa notes [2001], some opportunities for acceleration did appear following EU accession.

The aim of this study is to ascertain how nursery holdings in Poland have changed following EU-accession in

terms of product range, technology and mechanization and with regard to producers' use at their holdings of EU financial support administered by ARMA within the RDPs.

## MATERIAL AND METHODS

The purpose of the attitudinal questionnaire was to collect some background information on the businesses that were taking part in the main survey. As well as asking how long the grower had been involved in the business, or how big the area of production was, the questionnaire addressed the issue of how the business had changed over the previous eight years – especially in terms of product range, machinery, equipment and new buildings. The samples for this special study were recruited from the target number of nursery owners, 3,223, as listed by the Central Statistical Office (GUS). Of this number, addresses and e-mail contacts were found for 1,083 nurseries (33.6% of the target). In practice, however, only 612 holdings were finally recruited to the study (19% of the target), of which 122 (3.8% of the target) were members of the PNA (Polish Nurserymen's Association). The author visited 103 of the 612 holdings in 2010–2012 (3.2% of the target), while the remaining 509 were interviewed by means of a questionnaire sent by e-mail. The nurseries were divided into four groups according to the area of nursery crop held in 2012 (Table 1). It proved impossible to devise any meaningful weighting procedure for holdings of an area up to 1 ha; the results are therefore presented as unweighted sample averages. Though holdings of

TABLE 1. Characteristics of the investigated sample of hardy nursery stock holdings according to nursery size

Nursery size (ha)	Nurseries associated with PNA	Nurseries not associated with PNA	Total sample surveyed	Total number of nurseries in Poland*	% of nurseries surveyed
Small ( $\leq 1.0$ )	2	271	273	2 177	12.5
Medium (1.1–2.0)	8	114	122	399	30.6
Large (2.1–5.0)	27	86	113	399	28.3
Very large ( $\geq 5.1$ )	85	19	104	248	42.0
Total	122	490	612	3 223	19.0

Source: Author's own research; \*GUS, 2010.

this area made up the vast majority of the sample, they constitute the smallest proportion of the total number of nurseries in Poland. It would have been desirable to include more small nurseries in the survey, but they proved difficult to recruit. Data from the ARMA regional offices were also analysed in addition to the data generated by the study's empirical research. The former were based on official documentation submitted to the agency by farmers in 2004–2012. Funds were distributed by ARMA in the 2004–2006 programme period under the auspices of the European Agricultural Guidance and Guarantee Fund and under those of the Agricultural Fund for Rural Development in 2007–2013. In the case of both the study and AMRA data the analyses concerned the three main types of investment initiatives carried out in the ornamental nurseries: machinery and equipment, construction (greenhouses, polyethylene tunnels, potting and packaging sheds, storage) and irrigation systems. These capital investments are pivotal for establishing and managing an ornamental nursery. Moreover, they

are very important in container and field production and play a huge role in the competitiveness of the sector on the international market.

## RESULTS AND DISCUSSION

The major EU programmes for the part-financing of agricultural investment in Poland have been the RDPs of 2004–2006 and 2007–2013. The most important measure for ornamental nursery production in the latter programme has been action 121, the modernization of agricultural holdings. The results displayed in Table 2 show that 170 tractors and other machines used at the nurseries surveyed were partially refunded by the EU. The amount of machinery and equipment needed is based on the assumption that each size of nursery is a viable and ongoing business. It was noted that the majority of beneficiaries were very large nurseries with a production area above 5 ha – of which there were 104 in the sample. They accounted for the following purchases partially-funded as part of the programme: 8 tractors over 60 HP, 12 tractors of 60 HP and less, 27 potting machines, 25 Holmac rhizome

TABLE 2. Major machinery and equipment: number of items bought in 2004–2012 by the nurseries surveyed according to area and investment source

Nursery size (ha)	Source of investment	Item, description								Total					
		Tractor over 60 HP	Tractor below 60 HP	Delivery truck (<3.5 t)	Delivery truck (>3.5 t)	Tractor over 60 HP	Delivery truck (<3.5 t)	Delivery truck (>3.5 t)	Potting machine	Holmac rhizome unearthing machine	Shrub plougher	Working platform	Spraying machine	Item number	%
Small (<1.0)	Capital funding by the nursery	2	17	18	0	0	0	0	0	0	0	0	4	41	11.1
	Refunding from credit bank	0	0	6	0	0	0	0	0	0	0	0	0	6	16.2
	Partial refunding from EU financial means 2004–2013	1	13	0	0	0	0	0	0	0	0	0	3	15	9.3
Medium (1.1–2.0)	Capital funding by the nursery	3	17	13	0	0	0	0	1	2	0	0	2	38	10.2
	Refunding from credit bank	1	2	2	0	0	0	0	0	0	0	0	0	5	13.5
	Partial refunding from EU financial means 2004–2013	2	11	0	0	0	0	0	1	0	0	0	4	18	11.2
Large (2.1–5.0)	Capital funding by the nursery	8	32	22	0	2	3	1	3	3	1	11	62	16.7	
	Refunding from credit bank	2	3	4	0	0	0	0	0	0	0	0	0	7	18.9
	Partial refunding from EU financial means 2004–2013	11	7	0	0	8	4	1	0	0	0	1	9	40	23.5
Very large, (≥5.0)	Capital funding by the nursery	128	71	46	7	19	30	9	60	15	9	60	229	61.9	
	Refunding from credit bank	8	3	2	4	0	0	0	0	0	0	0	17	45.9	
	Partial refunding from EU financial means 2004–2013	8	12	0	0	27	25	6	17	0	6	17	95	56.0	
Total	Capital funding by the nursery	141	137	99	7	21	34	10	77	20	10	77	370	100.0	
	Refunding from credit bank	11	8	14	4	0	0	0	0	0	0	0	37	100.0	
	Partial refunding from EU financial means 2004–2013	22	43	0	0	35	30	7	33	0	7	33	170	100.0	

Source: Author's own research involving visits to nurseries and a survey of nurseries; data from ARMA regional offices.

unearthing machines, 6 working platforms and 17 spraying machines. This means that 56% of all the major machinery and equipment at the surveyed holdings was partially-funded as part of the programme and was bought for use at very large nurseries. This is the logical outcome of the need to invest in mechanization to expand the area of production; however the results also reveal a low level of activity in raising EU funds among producers managing small nurseries (Table 2). Of the group of large nurseries with an area of 2–5 ha under production, 23.5% took advantage of partially-refunded investments, which accounted for the purchase of 40 tractors and other machines as part of the RDP. Meanwhile, 13.5% of the medium-sized nurseries took advantage of credit bank refunding and 9.3% of the small nurseries took advantage of partial refunding from the EU. It should be stressed that many of the purchases of machines made by Polish nurseries after 2004 were self-financed (Table 2), which is a phenomenon far removed from the experience of western European or north American nurseries where bank loans are very often the source of finance [Kneen et al., 1983, Hammer, 1996, Mac Carthaigh, 1998]. In 2004–2013 there were a total of 546 self-financed purchases of machines, which included 278 tractors and 99 delivery trucks of 3.5 tons or less. These vehicles are needed for the transport, distribution and delivery of plants both within and outside nurseries. That the ornamental nursery sector is in a position to finance the purchase of these tractors, trucks and machines demon-

strates in itself that it was in a healthy economic condition during the period under discussion. What is more, this story of financial self-reliance confirms the findings of Jabłońska [2007] and the data presented by Brown [2012].

Frequent use for external financial resources, including from the EU, has also been found in the drive to erect new greenhouses, polyethylene tunnels, and potting and packaging sheds. These are costly investments much in demand that were often financed – regardless of the size of the nursery – by ARMA or by means of a bank loan (Table 3). The results from the sample of 612 growers interviewed show that 1.9 ha of greenhouses was built, of which 1.55 ha was partially refunded from the RDP. Only 0.25 ha of greenhouses in the investigated nurseries was accounted for by bank loans and a mere 0.1 ha by the holdings' own financial resources. New greenhouses are the most expensive of these investments and were built only at a bigger nurseries. The nurserymen's interest was the keenest, though, in securing funding for polyethylene tunnels, whose total area in 2004–2013 increased by 20.73 ha, of which almost half, 9.05 ha, was refunded from the RDP (Table 3). Polyethylene tunnels, which are used by growers in many different ways, such as for plant propagation, precipitating plant growth or overwintering [Mac Carthaigh, 1998, Szydło, 2010], are among the most important structures providing cover in ornamental nursery production. There was considerable interest from within all of the groups of nurseries in increasing the

TABLE 3. Buildings, greenhouses and polyethylene tunnels built at the nurseries surveyed after 2004 by size of holding and investment source

Nursery size (ha)	Source of investment	Item, description, area in ha				
		Green-house	Polyethylene structure	Potting and packaging shed	Office, restrooms	Mother plants area
Small ( $\leq 1.0$ )	Own capital	0.00	0.35	0.00	0.00	0.80
	Bank loan	0.00	0.00	0.00	0.00	0.00
	Partial funding from EU financial means 2004–2013	0.00	0.60	0.38	0.00	3.50
Medium (1.1–2.0)	Own capital	0.00	0.68	0.00	0.02	1.70
	Bank loan	0.00	0.25	0.00	0.03	0.00
	Partial funding from EU financial means 2004–2013	0.10	0.95	0.68	0.00	4.80
Large (2.1–5.0)	Own capital	0.00	1.80	0.30	0.04	2.90
	Bank loan	0.10	1.20	0.40	0.06	0.00
	Partial funding from EU financial means 2004–2013	0.30	2.30	0.70	0.01	3.50
Very large ( $\geq 5.0$ )	Own capital	0.10	3.60	0.10	0.05	3.75
	Bank loan	0.15	3.80	0.93	0.08	0.00
	Partial funding from EU financial means 2004–2013	1.15	5.20	1.05	0.015	4.15
Total	Own capital	0.10	6.43	0.40	0.11	9.15
	Bank loan	0.25	5.25	1.33	0.17	0.00
	Partial funding from EU financial means 2004–2013	1.55	9.05	2.81	0.025	15.95

Source: Author's own research involving visits to nurseries and a survey of nurseries; data from ARMA regional offices.

area devoted to the production of mother plants. In 2004–2013 over 25 ha of mother plants was established, of which almost 16 ha was partially refunded from EU means (Table 3). According to data obtained from ARMA, this activity was very popular in the RDP for 2007–2013 and many documents were still being considered by that institution's regional offices at the time of writing. The utilisation of EU funds at ornamental nurseries has proceeded very satisfactorily and has

been effective in raising the production base to a high level of competitiveness [Marosz, 2009].

The third area of investment concerned the modernization or construction of irrigation systems at nurseries. Its purpose was to minimize labour input while providing sufficient capacity to meet all anticipated needs. It was found that the group of very large nurseries had the most effective and labour-saving irrigation systems. For container-grown

plants these involved overhead sprinklers or some form of in-ground pipe system. Drip irrigation was also found to be very common and is used especially to water shrubs and trees grown in a bigger containers. When it comes to field irrigation at nurseries, the plants tended to be watered when drought made it a necessity. Here, reel-to-reel irrigation was form the most often used. A further widely-used method of irrigation deployed at modern nurseries involves digging wells

and building ponds. A pond is included in these investments even where it is assumed that a well with sufficient regenerative water capacity can be dug. They are built to reduce the risk to plants in pots where there are disruptions caused by repairs or electrical failure. All of these investments are of vital importance in running a nursery and cannot be overlooked if the desired outcome is to grow high-quality plants [Orun, 2012]. The results presented in Table 4 show

TABLE 4. Watering systems built or extended in 2004–2012 by nursery size and investment source (number of investments)

Nursery size (ha)	Source of investment	Description of watering system						
		Drip irrigation	By-hand	In-ground irrigation	Reel-to-reel irrigation	Fog system	Flooding	Automation
Small ( $\leq 1.0$ )	Own capital	3	104	118	0	18	0	1
	Bank loan	0	0	0	0	0	0	0
	Partial funding from EU financial means 2004–2013	0	0	0	0	4	0	2
Medium (1.1–2.0)	Own capital	12	28	82	6	27	0	13
	Bank loan	0	0	0	0	0	0	0
	Partial funding from EU financial means 2004–2013	0	0	1	1	6	0	4
Large (2.1–5.0)	Own capital	19	14	59	15	33	6	16
	Bank loan	0	0	1	0	0	0	0
	Partial funding from EU financial means 2004–2013	1	0	1	6	3	0	4
Very large ( $\geq 5.0$ )	Own capital	46	7	55	17	32	3	23
	Bank loan	0	0	1	0	0	0	0
	Partial funding from EU financial means 2004–2013	1	0	4	8	4	0	2
Total	Own capital	80	153	314	38	110	9	53
	Bank loan	0	0	2	0	0	0	8
	Partial funding from EU financial means 2004–2013	2	0	6	15	17	0	12

Source: Author's own research involving visits to nurseries and a survey of nurseries.



that irrigation systems have changed greatly as the area of ornamental nurseries has increased. In 38% of small nurseries compared to 6.7% of very large ones, irrigation is performed by hand, which is costly and very time consuming. In 2004–2012, seven-hundred-and-fifty-seven changes to irrigation systems were made at the nurseries surveyed, which mostly consisted in expanding or reconstructing existing systems. New systems built from scratch were a rarity. The major changes involved irrigation by overhead sprinklers and the modernization of undercover irrigation by introducing fog systems, which are highly effective for rooting cuttings. The majority of these investments were funded by the nurseries themselves – a tendency that held true for all of the sizes of holding (Table 4). The modernization of watering systems at the nurseries, which was often combined with other investments, was partially refunded by RDP means in only 52 cases.

## CONCLUSIONS

1. The results presented here show that investments in ornamental nursery involving EU financial support were very common and that they have had a great impact in changing ornamental nurseries from 2004. The bulk of the investments were seen at large, and very large, nurseries with more than 2 ha devoted to producing ornamental plants. These holdings can be regarded as the leaders, or as those who are developing well and are very highly likely to complete new investments. They are defined by a high to-

tal output and margin for hardy nursery stock, good organisation of work and a high employment rate. There is a direct link for these holdings between turnover size and profit. What is more, these are the holdings that have often implemented an investment project financed from EU funds distributed by ARMA under the auspices of an RDP.

2. Even though nurserymen managing smaller farms – usually up to 2 ha of hardy nursery stock – often reach a quite high level of production, they rarely use the forms of financial support made available by ARMA. This could prove to be a factor in limiting their development as, absent of investment, it will be a challenge to streamline labour, whose costs will grow. While making more efficient use of labour than smaller holdings, the larger sized commercial nurseries are also able to outperform them in achieving cost savings on the use of buildings, equipment and machinery, which means that the cost per-plant is lower.

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- Streszczenie:** *Zmiany w produkcji ozdobnego materiału szkółkarskiego po przystąpieniu Polski do Unii Europejskiej.* Celem badań było określenie wpływu integracji Polski z Unią Europejską na produkcję szkółkarską roślin ozdobnych. W szczególności oceniane były zmiany w technologii oraz mechanizacji, a także sposoby wykorzystania przez producentów finansowego wsparcia UE, przyznawanego przez Agencję Restrukturyzacji i Modernizacji Rolnictwa w zakresie Programu Rozwoju Obszarów Wiejskich (PROW). Badanie było przeprowadzone na podstawie ankiet. W ramach badania przeprowadzono ankietę wśród 612 gospodarstw rolnych. Poza badaniami własnymi także dane z biur regionalnych Agencji Restrukturyzacji i Modernizacji Rolnictwa były poddane analizie. Analizy zarówno badań ankietowych, jak i danych z Agencji dotyczyły trzech głównych rodzajów inwestycji prowadzonych w szkółkach roślin ozdobnych. Były to: maszyny i urządzenia, inwestycje budowlane oraz systemy nawadniania. Najwięcej beneficjentów odnotowano w grupie bardzo dużych szkółek z powierzchnią produkcyjną powyżej 5 hektarów. Szkółkarze byli bardzo zainteresowani uzyskiwaniem funduszy na tunele foliowe. Od 2004 roku całkowita powierzchnia tuneli foliowych zwiększyła się o 20,73 ha z czego prawie połowa (9,05 ha) była dofinansowana z Programu Rozwoju Obszarów Wiejskich.

