PRODUCTION FIGURES FOR MICROPROPAGATED HARDY NURSERY STOCK IN 1986

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Based on the results of a questionnaire sent to 42 commercial laboratories and scientific institutions (Table 1), an attempt is made to show the increasing use of micropropagated material in the hardy nursery stock industry. Twenty-five replies were received; the response from the commercial companies was poor whereas, in general, the scientific institutions gave a good response. In a number of cases, scientific staff went to considerable effort by contacting numerous firms so as to gain as accurate a picture as possible. Furthermore, direct personal contacts made at conferences on micropropagation, plus numerous telephone calls helped to increase the accuracy of the figures presented. However, it must be emphasized that the figures can only be seen as estimates as there is no method of accurately checking them. So far there are no reliable official figures and it is likely that some figures are counted twice as, for example, when a company imports micropropagated plants and sells them as their own product. Few commercial companies are likely to admit that they cannot produce certain lines. It is also possible that some plants are being propagated conventionally from micropropagated plants and then being sold as such. These points should help to explain the discrepancy in some of the figures. It is interesting to speculate how many of the plants produced reach saleable size.

Table 1. Estimated number of plants produced through micropropagation in:

	1980	1982	1984	1985	1986
1. *Rhododendron* (excl. *R. simsii* and the Indian Hybrid Azaleas)					
2. Azalea (deciduous)					
3. Other ericaceous plants (Please specify if possible)					
4. Rootstocks:					
Malus					
Prunus					
Other					
5. Roses, by cultivar					
6. Forest trees (Please specify if possible)					
7. *Other hardy ornamental plants* (Please specify if possible)					

The production of *Rhododendron* through micropropagation has increased very rapidly over the past six years. The figures presented for this crop show that this propagation method is likely

to become even more important for this species in the coming years. In Table 2 it can be seen that the development in the USA has been most rapid. Published figures (Jones, 1985) show that about 8 million rhododendron plants are now (1986) being grown *in vitro* in the USA. Other well informed specialists doubt that this number is correct and estimate that about 4 million would be a more accurate figure. Positive support from the scientific institutions as well as incentives from the government has led to a rapid expansion in *Rhododendron* production in Belgium. About 600,000 were produced there in 1986. There is rapid expansion also in Great Britain, due mainly to the efforts of one or two companies. Production in Britain is likely to have surpassed Belgium. Interesting is the almost total absence of activity in The Netherlands. Large quantities of Belgian-produced plants are being grown on to saleable liners in Boskoop.

Table 2. Estimated number (,000) of evergreen rhododendrons (excl. *R. simsii* and the Indian Hybrid Azaleas) produced through micropropagation in different countries (1980–86).

	USA	Belgium	G.B.	France	Can.	CH	Poland	Neth.
1980	250	—	—	3	—	—	—	—
1982	1500	60	—	6	—	—	—	—
1984	3000	250	100	47	3	—	—	—
1985	3000–5000	500	250	51	10	—	5	1–5
1986	4000–8000	600	500–750	?	20	2	10	1–5

Table 3. Estimated number (,000) of deciduous azaleas produced through micropropagation in different countries (1980–86).

	USA	Can.	G.B.	Poland
1980	250	—	—	—
1982	500	—	—	—
1984	800–1000	1	—	—
1985	1000–1500	5	1	—
1986	2500+	20	1	1

With the exception of the USA, only limited quantities of deciduous azaleas are being produced *in vitro* (Table 3).

Table 4 shows that the production of *Vaccinium* is increasing only gradually in the USA, where about 500,000 plants are being produced each year through micropropagation. In Australia production is likely to have dropped dramatically from a peak of 330,000 in 1984 to only 90,000 in 1986. Possible explanations for this situation could be reduced cropping in the early stages due to an extended juvenile stage, or an increase in the mutation rate. The expansion in area under *Vaccinium* culture may not have developed as rapidly as anticipated.

Table 4. Estimated number (,000) of *Vaccinium* Plants being produced through micropropagation in different countries (1982–86).

	USA	Aust.	Can.	Belgium	Poland
1982	100	—	2	—	—
1984	150–250	330	?	—	—
1985	200–400	320	?	10	—
1986	200–500	90	10	?	10

The production of *Kalmia latifolia* by conventional means is very difficult. Micropropagation has led to a rapid increase in the number of plants being sold. The number will increase much more rapidly when the initial growing-on problems have been solved. Some cultivars take a long time to get growing. Largest production is in the USA with approximately 200,000 in 1986 (Table 5). Production is increasing in Great Britain, but many plants are still being imported from North America. *Kalmia* is one of the few shrubs being produced through micropropagation in reasonable numbers in The Netherlands (50,000).

Table 5. Estimated number (,000) of *Kalmia latifolia* being produced through micropropagation in different countries (1982–86).

	USA	G.B.	Neth.
1982	50	—	—
1984	100–150	—	?
1985	150–200	50	30–50
1986	200+	?	50+

Table 6 shows that Italy is leading the field in the production of *Malus* and *Prunus*, 250,000 and 3,000,000 were produced, respectively, in 1986. A large drop in *Malus* rootstock propagation is explained by the lack of sales for M 27 and the non-suitability of the plants for budding due to their juvenility. They seem to be most suitable for stool bed planting. Up to 300,000 apple rootstocks are being produced in Spain. This figure may reflect Spain's joining the European Economic Community where it will enjoy full access to the Community's market. There is likely to be a rapid increase in production of *Prunus* rootstocks in Greece where numerous new commercial laboratories are being set up.

France is the largest producer of roses through micropropagation (Table 7), about 3,000,000 being produced annually. At least 50% are used in cut flower production because they are more vigorous than conventionally propagated plants and give a higher yield. Great Britain is the second most important producer of roses, where production has been about 1,000,000 in both 1985 and 1986. It is likely that production will increase next year after the reorganiza-

tion of one of the major producers. It would appear that the production of roses *in vitro* is now getting underway in the USA where only 500,000 are now being produced. Poland is increasing production rapidly, due mainly to the appearance of numerous private commercial laboratories. Most plants are being produced for cut flower producers.

The production of forest trees through micropropagation is not yet very significant (Table 8). In France and Belgium *Prunus avium* is now being produced in limited quantities. In France selected clones suitable for the different regions are available and are supposed to be particularly suitable for cherry wood production. Approximately 200,000 poplars are being produced in West Germany by one company. Poplars are the only hardy woody plants being propagated through micropropagation in such quantity in that country. Production of poplars through micropropagation seems to have ceased in The Netherlands where approximately 100,000 were produced in 1984. It appears they were propagated for a German company which is now getting its supplies in Germany.

Numerous other plants are being produced commercially through micropropagation. The quantities are in general quite small and in a few cases represent single orders. In the USA the following plants are being grown in vitro:

Acer (especially *Acer rubrum* cultivars)	200,000+
Nandina	200,000+
Malus (crabapples)	150,000+
Syringa	200,000+
Paradox walnut rootstocks	50,000

Quantities of 25,000 or less are being produced of the following species: *Amelanchier, Betula, Clematis, Corylopsis, Cotinus, Daphne, Hypericum,* and *Magnolia*.

Although the figures presented here account for only a fraction of the plants being produced in nurseries, one must not forget that this propagation method has only been used commercially for about ten years. Given the intense interest in this method and the investment in laboratories around the world, one must come to the conclusion that in 1986 development is only in the early stages.

REFERENCES

Jones, J. B. 1985. Determining markets and market potential of horticultural crops. Conference on tissue culture as a plant production system for horticultural crops held at USDA, Beltsville, Maryland, 20–23 October, 1986.

Table 6. Estimated number (,000) of *Malus* and Prunus rootstocks being produced through micropropagation in different countries (1982–86).

a) *Malus*

	Italy	Spain	Belgium	USA
1982	500	—	10	—
1984	500	—	10	2–5
1985	400	?	10	2–5
1986	250	300	?	2–5

b) *Prunus*

	Italy	*Belg.*	*Greece*	*Aust.*
1982	*1500*	*10*	*10*	—
1984	*3000*	*00*	*20*	—
1985	*3000*	*250*	*30*	*5*
1986	*3000*	*?*	*50*	*25*

Table 7. Estimated number (,000) of roses produced through micropropagation in different countries (1980–86).

	France	G.B.	USA	Aust.	Poland
1980	135	—	—	—	—
1982	1200	—	—	—	—
1984	2500	300	?	10	—
1985	*2800*	*1000*	100–175	*11*	*50*
1986	?	1000+	500	20	150

Table 8. Estimated number (,000) of forest trees produced through micropropagation *in different countries (1982–86).*

	France	Germany	Belgium	Neth.
1982	4	—	—	—
1984	30	?	3	50–100
1985	100–150	100–200	20	?
1986	150–160	100–200	?	—