the government doesn't stuff the economy or whack on an extra tax or two. I want to enjoy the benefits of my hard work, to travel, go on holiday, buy what I want.

The only way to get this reward is to have a successful company that returns a good margin. Such a company is one that has a secure future and is protected against the movements of the economy and the decisions of other people. A company that maintains its margins, that has a broad customer base, and a broad product range. A company that is efficient, that the staff can enjoy being part of and that you can be proud of. Your business is a tool to give you a lifestyle that you and your family can enjoy.

We can all have this. We just have to be aware of what our business is, what affects it, and what we can do to safeguard it. We all need to develop our own "Unique Selling Point". I have chosen to develop a process for finding and commercialising new plants in the Australian market place and for maintaining an extensive range. This is our "Unique Selling Point". What is or will be yours?

Herbaceous Perennial Production in Poland©

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Production of garden perennials is developing rapidly in Poland, because of the introduction of container technology in the early seventies, the development of garden centre chains, the expanding home market, and increasing export opportunities. This paper analyses the author's research into the trends in the Polish herbaceous perennial industry over the past 30 years. More than 2000 species and cultivars are listed by nurseries' lists, but their frequency varies. Production is spread all over the country and was estimated at about 500,000 container plants in the year 1989 increasing to more than 5 million in 2000. There is a potential to increase both the range and production volume further.

INTRODUCTION

Poland is in the middle of Europe. The climate can be described as continental, but influenced by the Atlantic Ocean making weather patterns difficult to predict. For example, winters vary from a real continental winter with lots of snow and very low temperatures to rainy, mild maritime winters. Similar unpredictability occurs in the other seasons. It is hard to be a gardener in Poland, but on the other hand plants produced by the Polish industry are considered more hardy than plants from the mild climate of Holland.

In addition to the climate, the structure of the nursery industry, and the assortment of plants has been influenced by the many years within a centrally planned economy and lack of access to technological innovation.

Since 1989 the economy of the country has changed, with further changes foreseen as a result of membership of the European Union. Horticultural production and markets are under great pressure. Producers of cut flowers, pot plants, and greenhouse vegetables have to compete with the imported goods, mainly via Holland, but originating from many countries. That is not the case with most hardy plant production. Perennials, especially those produced in containers, are rarely imported or exported — the exception being from Poland to Russia.

Production of garden perennials is developing rapidly in Poland, because of the introduction of container technology in the early 1970s, the development of garden centre chains, the expanding home market and increasing export opportunities. In the 1970s, perennial production was concentrated in small private or municipal open-ground nurseries. These were in decline for both economic and technological reasons. About 500 taxa appeared on trade price lists. In the 1980s the first container nursery was started in the field station of the Research Institute of Pomology and Floriculture in Skierniewice, Poland, and 10 years later there were more such nurseries. The range of plants on industry price lists increased to 700 taxa.

CHANGES IN THE RANGE OF TAXA PRODUCED

More than 2000 species and cultivars now appear on industry price lists. The author has surveyed 21 nursery catalogues and found that more than 1000 taxa are restricted to single nurseries. The most popular 100 taxa can be found only in 10 nurseries. Just one plant, *Stachys byzantina*, is present on all 21 lists. The most commonly listed perennials are shown in Table 1. Garden centres are supplied mainly by local growers and their managers rarely search further afield to obtain the full range the Polish industry has to offer. Importation from abroad is rarer still. It should therefore be possible to increase the sale of perennials and increase the range readily available to consumers who currently have to search all over the country to find particular plants.

Table 1. Popularity of perennial species and cultivars based on price lists of Polish nurseries.

Plant	Nurseries (No.)
Stachys byzantina	21
Sagina subulata, Lychnis chalcedonica, Coreopsis verticillata	20
Nepeta ×faassenii, Leontopodium alpinum, Festuca gautieri	19
Lysimachia nummularia, Iberis sempervirens, Aurinia saxatilis (syn. *Alyssum saxatile*)	18
Ligularia dentata, Arabis alpina subsp. *caucasica* 'Variegata', *Doronicum orientale*	
Sedum rupustre, Oenothera macrocarpa (syn. *Oenothera missouriensis*), *Pachysandra terminalis, Sedum kamtschaticum*	17
Thymus pseudolanuginosus, Sedum ewersii, Festuca glauca	16

Some 600 species and cultivars were listed by nurseries in the 1970s. Many of these taxa are not produced any more because they are not considered as highly ornamental. They are also very tall and vigorous, and not easy for beginners to grow in small containers. Some could be reintroduced to production. Examples include *Actaea rubra, Anemone canadensis, Anthericum ramosum, Stachys officinalis, Silphium perfoliatum, Telekia speciosissima, Rheum palmatum, Rudbeckia laciniata,* and *Rudbeckia nitida.* Some old cultivars of the standard herbaceous perennials have also disappeared: *Phlox paniculata* (29 cultivars), *Aster novi-belgii* (14 cultivars), *Aster dumosus* (nine cultivars), *Astilbe ×arendsii* (nine cultivars), and

Solidago sp. (nine species and cultivars). While some old cultivars have gone out of production, some forms typical for species such as *Anemone ×hybrida, Monarda didyma,* and *Primula denticulata* have been replaced by cultivars.

Further development of nursery production was apparent in the 1980s and 1990s. Expansion of the range of available taxa was achieved by small-scale importation. Polish resources, including private collections as well as the collections of botanical gardens, were not used frequently.

During the 1990s, many new plants were introduced to production, sometimes there were plants not especially convenient for the Polish climate, for example *Commelina tuberosa* appears on at least one nursery list. There was a distinct trend during the 1990s towards the introduction of alpines (good-looking, flowering plants in small containers produced for garden centres) — twice as many of these were introduced than tall herbaceous perennials used for borders.

Between 2000 and 2003 I have recorded about 800 new taxa (Table 2). Most of the new plants in production were cultivars, in total 581, but still more than 200 new plants were the species or a garden selection, not separately named.

A plant list has been compiled which covers all botanical gardens and some private collections (Nowak et al, 2000). It runs to more than 10,000 taxa including annuals, agricultural crops, and bulbous plants requiring annual digging or frost-free storage during the winter (generally from Iridaceae and Liliaceae). There are about 6 thousand taxa of hardy herbaceous perennials. A lot of these plants are worthy of attention by the trade — a personal favourite is *Iris lactea* var. *chinensis*, a beautiful foliage plant for every garden.

Table 2. Number of new species and cultivars for Polish nurseries.

Genus	Number of species and/or cultivars introduced to production from 2000 to 2003
Aster	39
Hosta	25
Saxifraga	24
Campanula	23
Sedum	22
Dianthus	21
Geranium	19
Phlox	17
Viola	17
Aquilegia	15
Astilbe	14
Aubrieta	13
Primula	13
Thymus	13
Delphinium	11
Salvia	9

It has been difficult to obtain hardiness information for recent introductions. The information I have obtained is presented in Table 3. Most of Poland belongs to Zone 6 (U.S.D.A. hardiness definitions), the western part to Zone 7. The data, mainly from British or American books and catalogues, can be treated as approximation of the real overwintering characteristics in Poland. The winter of 2002/03 was bad for

plants in containers. Plants such as *Vinca minor*, *Alcea rosea, Convallaria majalis*, and *Ajuga*, suffered severely in containers but the same species growing in the ground were not damaged at all.

Table 3. Number of recently introduced taxons according to their winter hardiness.

Zone number and the critical temperatures	Species and cultivars (no.) introduced in 1990s	Species and cultivars (no.) introduced in last 3 years
9 (-6.6 °C to -1.2 °C)		3
8 (-12.2 °C to -6.7 °C)	14	24
7 (-17.7 °C to -12.3 °C)	34	141
6 (-23.3 °C to -17.8 °C)	47	155
5 (-28.8 °C to -23.4 °C)	72	172
4 (-34.4 °C to -28.9 °C)	42	104
3 (-40.0 °C to -34.5 °C)	56	151
2 (-45.5 °C to -40.1 °C)	7	28
1 (below -45.5 °C)		3

Some plants hardy in Zone 9, can be found in Polish nurseries where they are treated as annuals, for example, *Agastache mexicana* and *Crassula setulosa* var. *curta*, noted for years in Polish collections. There are more plants from Zone 8 which are grown in our nurseries, but their hardiness is doubtful (e.g., *Delphinium cardinale, Bouteloua gracilis, Carex morrowii, C. pendula, Delosperma deschampsii, D. hookeri, Dryopteris erythrosora, Kniphofia citrina, Leptinella potentillina, Lupinus arboreus, Phygelius capensis, Sisyrinchium californicum, Stipa tenuissima*). These plants can be treated as rarities for advanced amateurs, not as the plants for general retail sales or or public displays.

CURRENT PRODUCTION TRENDS

There are no available statistical data about nursery production in Poland. More than 20 members of the Polish Nurserymen's Association offer garden perennials (the term includes alpines in Poland) but not all Polish nurseries are members of this organisation. Production is spread all over the country. There are about five large nurseries each producing up to 1 million plants per year, mainly in the standard P9 container. Production and sales of larger sizes — 1.5- to 2-L containers — are growing rapidly. According to my estimates, production of perennials in containers was about 500,000 plants in the year 1989, increasing to more then 5 million in the year 2000.

There are about 50 smaller nurseries, producing about 100,000 plants per year. Very small producers are impossible to account but probably they are quite numerous, and often offer rare plants. In comparison to European markets the prices in Poland are rather low but apparently stable. The average wholesale price for a hardy herbaceous plant in a P9 has been 1,5 PLN for the last few years. Increasing market competition has made it difficult for growers to raise prices.

Polish buyers are not prepared to pay for novel introductions such as *Vinca minor* 'Illumination' or *Brunnera macrophylla* 'Jack Frost' at four times the price of the standard species or selection. Simple introductions such as *B. macrophylla*, not currently available from Polish nurseries, would be novel enough for most Polish consumers. Introductions such as that of *Scabiosa* 'Butterfly Blue', with its associated expensive promotions, wouldn't be possible in Poland.

New plants are also introduced by seed companies, such as Syngenta and Florensis. They offer seed of perennials as well as young plants, seedlings, and rooted cuttings. Although their main interest is the bedding plants industry they have some influence on perennial production — for example where a grower wants to introduce a slow-to-propagate plant such as *Rodgersia*, or to try something new, such as new selections of *Delphinium, Astilbe, Lythrum,* and others.

Micropropagation laboratories are currently not a very important source of material because the young plants are rather expensive and because of the large quantities needed to make the process viable. For the average Polish perennial nursery 1000 plants is the most common quantity grown.

FUTURE OPPORTUNITIES

The Polish market is becoming increasingly interested in two groups of perennials.

The first group are the typical herbaceous perennials for flower borders. People have more disposable income and there is a trend towards the professional design and construction of "instant" domestic gardens. Some landscapers have already learned to use perennials as fillers in newly planted gardens. Perennials are a relatively cheap product, fast growing, bringing diversity of forms and colours in a short time. Nurseries are now producing border perennials in larger containers for this market.

The second group are the groundcovers, which are becoming increasingly used instead of mulching with bark or gravel. Offering *Vinca* and *Pachysandra* is no longer enough. However, not all plants proven in western Europe are suitable for Poland. For example, *Persicaria affinis* (syn. *Polygonum affine*), often loses its leaves in Polish winters.

Green roof planting is the next promising sector of the market. Simple plants such as *Sedum, Thymus,* and *Festuca* are grown in quantities to be planted on the flat roofs of many commercial buildings.

There are opportunities to go back to open-field production. Poland has cheap land while labour is still cheaper than in western Europe. As more customers demand perennials in larger containers, the market for bare-root plants will develop. There are also possibilities for co-operation with foreign partners. For example, Poland has good micropropagation laboratories, which have been working on contract with Dutch companies.

A promising future market for plants produced in Poland will be exports to countries further East. Russia has always been a good export market for Polish nursery stock and currently sales to Russia and the Ukraine are expanding. Polish plants are considered hardier then Dutch or German products and they are also cheaper for that market because of lower transportation costs.

Entrance of Poland to the European Union will also bring opportunities. We are not afraid to meet the competition from the advanced technology of western nurseries, and we are ready to search for new possibilities of co-operation.

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Refining Root Propagation Techniques©

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INTRODUCTION

As a leading producer of herbaceous perennials in the U.K., Howard Nurseries Ltd. (formerly Howard and Kooij's Nurseries) has always used root cuttings as one of the principle means of propagation. Many herbaceous genera lend themselves to propagation from roots. Commercially, root cuttings are a low-tech solution, capable of giving speedy increases in numbers with much less hassle than many propagators assume. Even highly skilled propagators who visit our nursery appear to regard propagation from roots with an air of muck and mysticism. In fact it is a very simple and effective technique if managed properly.

Recent years have seen many changes to propagation systems. Open-ground and low-tunnel systems have given way to glasshouses; mist and bottom heat have been joined by tissue culture; modular trays have replaced seed flats and boxes. At Howard Nurseries Ltd., techniques for production from root cuttings have been adapted in accordance with these trends. This paper reviews some of these developments both in general terms and applied to specific crops. Improvements in handling and preparation of land will also be shown to improve the final product. Equally an ability to examine old ideas, such as storage of cuttings, and to fit them into the modern system has been crucial to the nursery's present success with this means of propagation.

BENEFITS OF PROPAGATING FROM ROOT CUTTINGS

For the earliest horticulturists, the potential of some roots as propagation material must have soon been apparent. If a gardener tries to transplant subjects such as *Papaver* and *Phlox*, broken roots frequently regenerate into plants on the old site. Other genera such as *Macleaya* and *Anemone* already have visible buds on their roots. Many plants on commercial herbaceous production nurseries are candidates for propagation from roots. The following is at list of those genera for which the technique is currently used at Howard Nurseries: *Acanthus, Catananche, Echinops, Phlox, Anchusa, Centaurea, Eryngium, Physalis, Anemone, Cichorium, Geranium, Pulmonaria, Bergenia, Crambe, Macleaya, Stokesia, Brunnera, Cynoglossum, Papaver,* and *Verbascum.*

Commercially there are several justifications:

- It is a form of vegetative propagation so named cultivars can be maintained true to type. There are some exceptions, for example if the cultivar is variegated.
- The technique utilises the capacity of some genera to regenerate shoots from roots, either from existing buds or from callused wounds. Typically these roots are 'fleshy' rather than 'wiry'.