ers with coloured reverse. O. 'Buttermilk' has cream-yellow flowers with white base, and biscuit reverse. It is erect growing.

Osterospermum 'Cannington Roy': Purple, fading to white centres with purple reverse. Prostrate growing.

Osteospermum ecklonis 'Prostratum': White, with pale mauve reverse. Prostrate.

Osteospermum 'Whirleygig': The base of the petals have been crimped, making the end of the flowers spoon-shaped. The flower is white with a blue disc and mauve reverse. Erect growing.

Osteospermum jucundum: This osteospermum is perfectly hardy and should not be included in this list, but I cannot let this opportunity pass without mentioning it. It is mat forming and is covered with mauve flowers in early summer and has a smattering of flowers all through the summer. I have had it in my garden for five years and it is looking very fit and healthy.

HORTICULTURAL TRAVELS IN POLAND

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In September, 1984, I was invited to Poland to give a paper at a symposium on hardy nursery stock organised by the Warsaw Branch of the Society of the Horticultural Engineers and Technicians. Whilst in the country I was lucky enough to be able to visit several research stations, botanic gardens, and commercial nurseries both privately and state owned. This short but comprehensive visit gave me an opportunity to have a look at several aspects of ornamental horticulture in Poland.

The conference turned out to be a truly international gathering of both nurserymen and research workers involved in nursery stock production. Delegates attended not only from England but also Holland, Czechoslovakia, Hungary, and of course many from Poland. Unfortunately due to lack of simultaneous translation it was impossible to assimilate accurately the contents of the many conference papers.

My first experience of practical horticulture was when we visited what our Polish host called his garden. In England we would call these areas allotments. A short car journey from the centre of Warsaw brought us to some 200 to 300 acres of land which was neatly divided in 300 square metre plots. The owners of these plots grow vegetables and fruit for their own consumption. Many had a chalet on their allotment which is used for weekend accommodation. In addition to food crops many allotments were attractively planted with a wide range of perennial and annual ornamental plants. The garden

seemed to be a very important part of the economy of the town dwellers of Warsaw, providing not only cheap and fresh fruit and vegetables but also a healthy and constructive leisure activity.

It was obvious from the number of florist shops and flower stalls on the streets of Warsaw, that cut flowers are very important to the Poles. They, like many other inhabitants of the mainland of Europe, give flowers on many occasions. They do, however, have a custom in Poland which I have not come across in any other part of Europe, that is they do not celebrate birthdays as we certainly do in England, but celebrate "Name Days". Each day of the year is dedicated to a different christian name and when the day of the year arrives on which it is your name day — then you receive presents; the most common and traditional presents are cut flowers. This, of course, gives a great deal of support and buoyance to the cut flower market.

I visited one research station where the production of gladiolus corms was being undertaken and 8½ hectares of these plants were cultivated each year for this purpose.

I was interested to see what amenity plantings were being undertaken in Poland. Compared with England, Holland, or Germany there was very little. A certain amount of street tree planting had been done in Warsaw but this was very spasmodic. Species I saw used included *Acer platanoides, Acer pseudoplatanus, Fagus sylvatica,* and *Fraxinus pennsylvanica.* One interesting thing I noted was that large trees were labelled with a little metal tag on their main trunks. This tag stated that the tree was a natural monument. This very simple procedure I believe could be sensibly copied in the U.K. where we often take for granted some of our mature trees.

There were experiments being carried out in some of the research stations into the growth habits and rate of growth of certain indigenous plants, in particular *Juniperus horizontalis.* The Poles find this plant an excellent hardy ground cover.

Hardy nursery stock was produced both as container and field grown (bare root) plants. I saw both types of production on private nurseries and also on much larger state owned establishments. You cannot go to Poland without noticing the severe shortages of basic horticultural commodities, many of which we take for granted in the United Kingdom. For example bamboo canes seem to be missing completely. The Poles, being very innovative people, were using various ways to overcome these shortages. For bamboo canes they were cutting branches from hedgerows and using these as a very adequate substitute.

The mixture of pots which I saw was quite incredible, ranging from the best rigid containers through hand made polythene bags to clay pots and second hand cups.

Nearly all composts were based on a mixture of loam with either bark or peat added as an extra. A 2 to 1 loam/bark mixture was the most common. In many cases the loam was unsterilised and, in several instances, had been used for a previous crop. For example, on one nursery, I saw compost which had been originally used for the production of carnations as cut flowers.

The use of slow-release, resin-coated fertilisers was non-existent. The standard fertiliser was a product called 'Florovit'. I was unable to determine what this consisted of, but was informed that a small amount was added to the initial compost and then several top dressing were given during the course of the season.

The range of plants grown in containers was quite considerable, bearing in mind the very low temperatures that are experienced in Poland over the winter — 35°C being quite common. The range consisted of many conifers, ericas and numerous deciduous shrubs, such as *Forsythia*, *Spiraea*, *Philadelphus*, and *Berberis*.

Little research has been conducted into the production of plants in containers, although Warsaw University and several other research establishments are starting to undertake various research programmes. High on the list of priorities is finding resistance to winter damage, and ways in which plants can be grown in containers avoiding being killed by low winter temperatures. As far as I was able to ascertain no results had been forthcoming from this research and growers were still plunging plants to avoid damage over-winter.

Some excellent high quality plants were produced in the open ground. I saw extensive crops of maiden roses being grown for export to Sweden, and also many commoner type of shrubs such as *Ligustrum*, *Tamarix*, and *Cornus* produced to high quality. In addition, a certain number of trees are produced in Poland but I saw very little of their production.

In addition to having both an enjoyable and informative visit I was able to forge closer links with ornamental growers and research workers from several Eastern European countries. I.P.P.S. is now sending both "The Plant Propagator" and the "Proceedings" to representatives in Poland, Hungary, and Czechoslovakia. In return we have received catalogues and other interesting information on ornamental horticulture from these countries. This material is kept in the G.B. & I. Library. Finally, I would like to thank my host — Szczepan Marczynski

— for the help and hospitality which he extended during my visit.

INFLUENCE OF SEED WEIGHT ON THE EARLY GROWTH OF *QUERCUS SUBER* L. SEEDLINGS

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Abstract. The relationship between seed weight, time of maturation, and early growth of *Quercus suber* seedlings have been studied in order to establish their relative importance. The lengths attained by seedlings obtained from seeds harvested in September, November, and January were recorded during their first year of life. The results show that the main factor is harvest time and not seed weight. Therefore, further integrated research must be done, including as great a number of factors as possible.

REVIEW OF LITERATURE

Different authors, with different viewpoints, have studied the relationship between seed weight and early growth of seedlings, with not always consistent results.

Wrześniewśki, in a series of papers (8,9,10) establishes the differences in the ratio dry matter in the embryo to dry matter in the megagametophyte, its hydration level, and respiration rate, as well as the imbibition process in seeds of *Pinus sylvestris*, belonging to different weight classes. He concludes that medium-sized seeds are the most favourable and that the growth conditions of seedlings are mainly the result of the conditions of seed development in the mother organism.

Larson (4) did not find an actual influence of the seed weight of *Pinus ponderosa* on either the germination rate, the germination percentage, or seedling growth.

Robinson and van Buijtenen (7) consider there is a correlation between seed weight of *Pinus taeda* and certain morphological characteristics which were related to seedling size at 5, 10, and 15 years.

Working on the same species, Dunlap and Barnett (2) showed that there was a strong influence of seed size on early growth.

Likewise, Keiding (3) points out that the height of one-year-old plants of *Tectona grandis* depends on its seed weight.

Belcher, et al. (1) think that the size of the seed does not show a clear influence on the growth of *Pinus caribaea*.