Cost	—	£400, including variable speed motor drive, and operator's seat
Manufacturer	—	Terra Force Ltd., East Malling, Kent.

General comments:— The main attraction of this machine is that it enables the soft plastic pot to be potted more efficiently and quickly. The compost is settled by means of an agitator which also returns unused soil to the soil hopper.

I am sure we will see further developments of potting machines, since engineers are confident of being able to produce fully automatic machines for our purpose but are unable to speculate the money required to develop such a machine for a relatively small market.

It is in this field that international co-operation will speed the development of such a machine.

What of the future?

I am sure within ten years that there will be available an inert growing material which does not need a container to retain its shape; it would be moisture, heat retentive and porous. It could be stained any colour and formed into shape on the Nursery, depending on which plant was to be potted. plant nutrients would be added as and when required.

Potting on with this type of material would consist of inserting the existing 'pot' into a pre-formed sleeve of the same material to give the plant further root-run. This operation would be very speedy and could be repeated a number of times until the plant was in the final 'pot' size.

This proposed Society offers great scope for exchanging ideas, since we are all meeting new problems and although at last some research is being done in this country we can all gain a lot from our own personal experiences.

THE PROPAGATION OF HERBACEOUS STOCK

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First of all I must apologise for not being able to be present at this inaugural meeting to form a British Chapter of the International Plant Propagators' Soceity. I am fully in agreement with its aims and principles and therefore hope that my talk will have some useful contribution to the day's proceedings.

Before going into the actual part of herbaceous propagation itself I should like to explain the position we at Bressingham are trying to fill in the horticultural industry and the trends we see from our vantage point in Norfolk.

Most nurserymen would agree I think that the general trend has been towards roses, trees and shrubs over the past few years. In consequence most general nurseries have tended to concentrate on these lines and as herbaceous plants were always the last to be planted, and usually were the most uneconomic, due to high labour costs and a low profit margin, then it often followed that herbaceous were the first to be dropped. If not dropped altogether then they were bought in, usually from Holland.

My father, Alan Bloom, had always grown perennials before the war at Oakington, afterwards at our present nursery at Bressingham and became the only wholesale nurseryman specializing in growing quality perennials on any large scale in the country. We were therefore in an ideal position to supply the needs of nurserymen who had stopped growing herbaceous or didn't wish to start. Over the past five years in particular we have expanded considerably to meet this need but are still unable quite to meet the demand for the better plant. This of course brings me to the point of this talk — propagation. We have found it necessary to change some of our methods to meet the extra demand, but although we have simplified some of these, we have not been able to point to any such advance as has been made to trees and shrubs with the advent of mist propagation.

By and large we are using the same methods for herbaceous propagating as were used thirty or forty years ago. Mass production of plants, of course, calls for different methods than for a small scale unit. For instance, rooting cuttings in pans or boxes of certain subjects, as used to be the case with *Anchusa caespitosa,* while perfectly adequate for rooting a few hundred cuttings cannot be practiced for some thousands. The old method with Delphiniums which is no doubt still practised, was to bring plants into the greenhouse and force them into growth to take cuttings. These things are not economic on large scale production, and we have simplified our system to a point where we root 99% of our cuttings in cold frames. We used to do all our root cuttings such as Papavers and Anchusas in boxes during early January in a glasshouse. The amount of trouble we had with moving these boxes around and watering them was nobody's business! We now do them all direct into cold frames and cover the pitlights with straw during frosty weather. We believe that with a herbaceous plant one wants to use the most natural method of rooting; bottom heat or mist have little application, although I know of some nurserymen who root many herbaceous items under mist. One can so easily induce damping, particularly as most herbaceous cuttings are very sappy. One exception to the rule is Lythrum which roots like weeds under mist and of course there are a few others. We found cuttings of *Kirengeshoma palmata,* quite a choice plant, roots quite easily in mist, although it will also come from seed.

Herbaceous propagation of course falls into three categories. The first of these is division and the majority of genera are done in this way, Astilbes, Hostas, Iris, Paeonies, Kniphofias and so on. As with most plants there is a special time for doing most subjects, with March, April and early May the best and busiest of such times. We begin our year in July with Iris, dividing and planting immediately after flowering has finished followed in late August, early September with Paeonies. Division and planting in autumn can be difficult with many subjects and may result in winter losses. Such plants as Erigerons, Scabious, Pyrethrums, *Aster amellus* and many others cannot be risked until spring, after growth has begun. However we try to do very tough plants like Hemerocallis, Hostas, Geraniums, Doronicums and Astilbes before the New Year, but seldom achieve all. Spring growth usually comes with too much of a rush and we therefore have to spread the propagation as much as possible. We divide *and* take cuttings of some subjects as cuttings cannot always be relied on to make saleable plants by early autumn. Such things as *Salvia superba* types, *Solidagos* and Sidalceas come into this category. With the weather so growth fluctuates and if growth is slowed by a cold spring so much the better for our propagation schedule if not for one's comfort! This gives one the chance to keep up with Delphiniums and Lupin cuttings, Pyrethrums, *Chrysanthemum maximum,* Erigerons and so on, plants which want catching before growth becomes too leggy. This applies to both cuttings and divisions of course.

Division usually bears some relation to a plants flowering time, for instances those which flower late in the year such as Michaelmas Daisies can be left for late division. This goes of course for such things as Kniphofias, Schizostylis and Agapanthus, all plants on the doubtfully hard side, which are late to appear in spring.

Many early flowering plants, such as Doronicums and Pulmonarias are best done in autumn or after flowering in spring. If certain rules are followed with regard to plant habit and growth, then the best results are usually obtained.

As mentioned earlier our programme of propagation by cuttings follows from general experience and no great breakthrough has occurred to spread rooting or obtain a better percentage. Given the time it would be advantageous to grow everything possible from cuttings. Such plants as *Aster novi-belgii* and *amellus,* Erigerons, Scabious, Heucheras and so on would make younger, more vigorous plants with more chance of being completely free from disease, but time doesn't allow us that luxury. Often, so called cuttings are referred to as an Irishman's cuttings, in other words they are offshoots with some roots attached; *Chrysanthemum maximum, Veronica spicata* types, *Sedum spectabile* varieties are just a few that fall into this category.

Our cold frames are constructed of concrete blocks in the

main, and the soil is of a light loam with added grit. The bed is levelled, firmed and a thin layer of sand spread over the top, so that when cuttings are inserted some fine particles of sand find their way round the cutting, helping drainage and keeping some air within reach of the cuttings. The sand also prevents panning of the soil when watering. We insist that cuttings are well firmed and not 'hung' with a large air pocket below. We do not use any hormones, not finding them necessary. We cover most cuttings immediately with pitlights.

Ventilation and shading have a very important part to play in successful rooting of most subjects. The sun in early spring combined with our usual cold winds can soon desiccate freshly inserted cuttings, and yet it is often none too wise to shade lights heavily or to keep cuttings too close. We try to strike a happy balance and use hessian during sunny spells and put air on always the opposite side to the wind. On cuttings like Delphiniums one can soon get damp spreading through if a very careful watch is not kept.

Summer cuttings can be even more difficult to keep the happy balance. Weather changes are often extreme and rapid, from hot and dry to cool and very wet. Also growth can be very soft and damping off can easily occur, especially to plants like Anthemis and *Aster amellus*. A basal cutting in spring seems far more reliable than a tip cutting in mid-summer. I would agree that in some cases mist might be useful but we haven't the space during the summer to do the numbers we require.

Doubtless herbaceous propagating needs no elaborate or expensive equipment, labour is the highest cost by far. We don't rely on stock beds at Bressingham, as no plant with the exception of Paeonies and Bergenias are down for more than one year, and we reserve a certain amount from each years planting for next years stock. This works very well although with choice and rather slow growing plants we are creating a two bed system, having one bed up one year, dividing this for sale two years hence. This system we are applying to some Hostas, *Polygonatum multiflorum*, Trilliums and so on.

We are very fortunate in having plenty of land available to rotate with farm crops, in having a variety of soils from very sandy and acid, through black fen to medium heavy loam. This as much as anything enables us to grow the wide range of perennial plants and helps to produce the good quality that we try to achieve.

One aspect of propagation that I haven't touched on yet is those plants that are grown from seed. Many nurserymen stick to growing herbaceous plants from seed and leave it at that. This certainly simplifies things and there is quite a wide range that can be grown in this way. We grow all we can from seed of our own saving, rather than use other methods of propagation. Although we sow many species and

varieties direct out into beds, such as Helleborus, Russell Lupins mixed, Delphiniums, Hollyhocks, *Anemone pulsatilla,* this comprises only about half of the bulk and less than a quarter of the number of varieties. Mid-summer to late-summer is the usual time for outside sowing, although Lupins and Hollyhocks are sown in March or April and easily make good saleable size by the autumn.

The rest of our seed is sown at intervals during the winter in boxes, put outside to get the frost, which is necessary for many seeds to germinate. Certain plants are brought in to get early growth or avoid frost damage once germinated. We then, about the end of April begin 'lining out' seedlings into prepared and fertilized beds. These are divided into two categories, those seedlings which will be planted out within two months to become saleable by the autumn, and those which will have to be planted during the next autumn and spring for sale a year later.

Those in the first category include such items as *Salvia haematodes, Oenothera missourensis, Chelone barbata* and *Lychnis chalcedonica.*

Into the second category come *Aruncus sylvester,* Incarvilleaa, Agapanthus, Kniphofia mixed and so on. We realize that some nurseymen would consider some of these items would be saleable within a season, but to make a good quality plant we have found that two years is required for these and many other items. We have no doubt that lining out adds considerable growth to all young seedlings, time consuming though it may be.

We are always looking for ways to streamline propagation practices, and while we feel that improvements can always be made in this as well as other fields of productions, our system works well taken on a whole. One can never say definitely that one method of propagation, a certain time even, is the right one. One nurseryman's experience in the light of his conditions, his size of production, his labour can be quite different to anothers' and he's obviously going to reach different conclusions. I have not been able to go into great detail in this talk but I hope that it will be seen that as specialists in the production of good quality plants we believe our first duty is to maintain the standard which has guided our business for he past thirty five years. This has become a matter of pride with us as has the ability to offer a very wide range of subjects. We realize full well that we could make greater profits by giving less attention to high quality and wide variety. but it gives us greater satisfaction to run our business on these lines, rather than to hold money making as the sole objective.