CLONAL SELECTION OF HARDY ORNAMENTAL NURSERY STOCK

H N S 14 Final

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HNS 14 Final Report

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THE "CLONAL SELECTION SCHEME" FOR ORNAMENTAL TREES AND SHRUBS

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THE CLONAL SELECTION SCHEME which, between the early 1980s and 1991, was centred at Horticulture Research International (H.R.I.), East Malling, Kent was initiated in 1976 by researchers at Long Ashton Research Station, Bristol. It had long been recognised that there was considerable variability within many of the woody ornamental subjects sold by the UK nursery industry. Consequently, the same subject supplied by different nurseries tended to perform differently, depending on the nursery source. Something obviously needed to be done to examine causes of this variability and a scheme was set up, with considerable encouragement from the nursery industry, to try to address the problem.

The original objective of the Clonal Selection Scheme was to select, from a range of material of a particular clonally-propagated species or cultivar collected from different sources, a clone or clones true-to-name, reliable in performance and, if possible, an improvement on those generally grown. A second objective was to identify plants showing novel and interesting variation which, although not necessarily having great merit for garden use, might prove of value in maintaining genetic diversity within the species or cultivar.

Plants chosen for study

A list of plants identified as the most appropriate for evaluation was chosen by a Clonal Selection Committee; this was an advisory committee made up of researchers, nursery stock

producers, specialist ADAS staff, botanists and staff from the horticultural colleges. Plants included in this list were those which were popular with nurserymen and gardeners and which were reported to exhibit some degree of variability. The Scheme took in 8-10 new subjects each year.

Material collection and propagation

Requests for material were sent out primarily to nurseries (a total of almost 250 different nurseries contributed to the Scheme), but also to garden centres, colleges, public and private gardens and international collections. On average the Scheme received material from around 15 to 20 sources per subject, although the range varied from 6 to 34 sources. The material, which was all donated to the Scheme free of charge, arrived in various forms, some as unrooted cuttings, other samples as container-grown stock plants, whilst trees were sent in as bud and graft wood. All material received was given a code number which was known only to the Clonal Selection staff and to the contributor. In order that the evaluation was conducted on plants of similar initial size, raised in a similar environment, repropagation from the donated material was almost always necessary.

Using conventional propagation methods, a minimum of 20 uniform trial plants per clone were produced. Where there were propagation difficulties the production often took two to three years to achieve. From these, the six most uniform plants of each source were chosen for comparison in a replicated trial designed to allow statistical analysis of results.

The duration of each trial depended upon the length of time necessary for the plants to flower or grow sufficiently to show their true habit and potential. This frequently took between five and eight years from the date of receiving the original material. During this time the plants were inspected and evaluated at least twice by a group of experts consisting of plant taxonomists, nurserymen and other specialists; these inspections supplemented the propagation tests and evaluations carried out by Clonal Selection staff during the trial period.

When necessary, help with the identification of plants was provided by plant experts from the Royal Horticultural Society, Wisley, The Royal Botanic Gardens, Kew, specialist growers and the owners of appropriate national and international plant collections.

Selection and distribution

When a particular correctly-named and apparently genetically stable clone was identified as being superior to others submitted for trialling, it was given the suffix EM followed by the year of Selection. Those plants previously selected at Long Ashton Research Station were given the suffix LA.

From the selected source a single nucleus plant was chosen to provide propagation material for raising plants for subsequent distribution. Most of the selections made before 1990 were returned to the original contributor who was responsible for their further distribution to other nurseries. The most recent selections have been sent to HRI, Efford where the complete range of selections is now held pending promotion and more widespread distribution to, and use by the nursery industry.

When true-to-type plants of very similar performance were received from several sources selection of a superior EM clone was not justified. Instead, representative material was sent to Efford to form the supplementary propagation source of material verified true-to-type. Wrongly named plants submitted to the Scheme were also identified and added to this true-to-type collection at Efford. Other plants, considered to have characters of merit but for which no name could be found, have been sent to the National Council for the Conservation of Plants and Gardens. These will be sent to the specialist collections within this organisation for further study.

Causes of variation

Three main causes for variability have been identified amongst material submitted for evaluation.

i) Incorrect naming has proved to be the most common cause. Trials of most subjects evaluated within the Scheme contained at least one, usually many more, wrongly-named plants and in some cases up to 20% of submissions were incorrectly named. There is an urgent need for nurseries to take note of this finding, to rectify the wrong naming and to take measures to guard against its recurrence. Although, occasionally, nurseries may be growing wrongly-named stockplants, problems may also arise from the common nursery practice of taking propagules from non-flowering young plants, such as liners. If these plants or their labels become mixed at some point during production then errors in propagation are to be expected.

ii) Genetic variation. Natural mutation and the production of 'sports', may give rise to significant variability. These

variations may show over a period of time as changes in, for example, plant habit, vigour, flower colour or rooting ability. Where the degree of change from the standard type is large, it may be appropriate to consider the mutant form as a new clone or cultivar. The difficulty arises in distinguishing the stable changes exhibited by solid somatic mutants from those of more transient nature, the result of phase change or virus infection.

Examples of subjects evaluated under the Scheme where new distinct forms have been recorded are within *Thuja plicata Zebrina*, and *Hypericum moseranum* 'Tricolor'.

Quite often, variation was attributable to natural seedling variation. Several of the species evaluated, although now largely clonally propagated, had occasionally been raised from seed in the past and some degree of variation was not unexpected in the performance of such plants. The dilemma was to decide whether to select superior cultivars from within these populations and to give them cultivar names.

iii) Infection by viruses or other pathogens can also result in striking differences in appearance and often lead to mistaken identity. One such example became evident in a trial of *Hedera helix* Buttercup at East Malling. From the material received, two acquisitions with attractive variegated foliage were shown not to be Buttercup but green forms of *Hedera helix* infected with *Arabis Mosaic* virus. During the spring, these plants had a high percentage of yellow in the young foliage whilst later in the season the extent of variegation decreased in both types, with one turning almost entirely green. Unfortunately, under light shade the true *Hedera helix* Buttercup will also develop some pale green foliage, adding to the chances of mistaken identity.

Benefits of the Clonal Selection Schemes for hardy ornamental trees and shrubs

The principal benefits to growers and gardeners are that ornamentals selected by the Scheme will:

a) be correctly named;

b) possess the best all-round attributes with regard to aesthetic qualities and growth performance;

c) have good propagation and nursery performance, where possible.

Selection Scheme Achievements and the Future

During the past fifteen years, the Clonal Selection Scheme resulted in the selection of over 50 subjects (Tables 1 and 2) from the 130 chosen for evaluation during the period. Material of these plants may be obtained from the donating nurseries or from Horticulture Research International, Efford.

A further 46 clones, verified by taxonomists as true-to-type, (Table 3) were also sent to Efford to serve as a nucleus of authentic material. Plants of several subjects were passed on to the National Council for Conservation of Plants and Gardens (NCCPG) for further examination whilst 12 subjects (Table 4) which did not complete their evaluation at East Malling were passed to the Royal Horticultural Society, Wisley for further evaluation.

Funding for the Clonal Selection Scheme, generously provided by the Ministry of Agriculture, Fisheries and Food and the Horticultural Development Council, ceased in April 1991 and the work at East Malling has now been wound down.

A new Scheme for the selection of hardy ornamentals, is now being planned by the Royal Horticultural Society. Although this

Scheme is likely to focus on fewer genera than the Clonal Selection Scheme, it will undoubtedly have similar objectives and benefits to all who plant ornamental shrubs and trees.

TABLE 1

PLANTS SELECTED FROM 1979 TO 1990

Betula pendula 'Dalecarlica'	EM85 Pershore	*Forsythia* 'Lynwood'	LA79 Wyevale
Buddleia davidii 'Empire Blue'	EM84 Waterers	*Lonicera periclymenum* 'Serotina'	EM84 Wellington
Buddleia davidii 'Royal Red'	EM84 Darby	*Philadelphus* 'Virginal'	LA82 Waterers
Caryopteris x clandonensis	EM86 Boningale	*Potentilla fruticosa* 'Tangerine'	LA79 J Coles
Cornus alba 'Spaethii'	LA79 Darby	*Prunus subhirtella* 'Autumnalis'	EM86 Pershore
Cornus alba 'Westonbirt'	EM87 Wellington	*Prunus subhirtella* 'Autumnalis Rosea'	EM86 R V Roger
Cotinus coggygria 'Royal Purple'	EM84 Darby	*Pyrus salicifolia* 'Pendula'	EM86 St Bridget
Cotoneaster conspicuus 'Decorus'	EM84 E R Johnson	*Sambucus nigra* 'Aurea'	LA80 Scotts
Crataegus crus-galli	EM85 Slocock	*Thuja occidentalis* 'Ellwangerana Aurea' ('Rheingold')	EM86 Goscote
Crataegus oxyacantha 'Paul's Scarlet'	EM85 R V Roger	*Tilia platyphyllos* 'Rubra'	EM86 Matthews
Crataegus oxyacantha 'Rosea Flore Pleno'	EM85 Old England	*Viburnum burkwoodii*	EM86 Scotts
Crataegus prunifolia	EM86 Matthews	*Viburnum farreri*	EM87 Tooby
Cytisus 'Burkwoodii'	EM85 Hilliers	*Viburnum tinus* 'Eve Price'	EM87 St Bridget
Elaeagnus pungens 'Maculata'	EM86 R V Roger	*Viburnum tinus* 'French White'	EM87 New Place
Euonymus fortunei 'Silver Queen'	EM85A/B Wyevale	*Weigela florida* 'Variegata'	LA83 Pershore
Euonymus fortunei 'Variegatus'	EM85 Bridgemere		

Pershore College of Horticulture, Avonbank, Pershore, Worcs, WR10 3JP.
Waterers Nurseries, Bagshot, Surrey, GU19 5DG.
Darby Nursery Stock Ltd., Old Feltwell Road, Methwold, Thetford, Norfolk, IP26 4PW.
Boningale Nurseries, Holyhead Road, Boningale, near Albrighton, Wolverhampton, Staff, WV7 3AU.
E R Johnson Ltd., The Nurseries, Whixley, York, YO5 8AQ.
Slocock Nurseries Ltd., Barrs Lane, Knaphill, Woking, Surrey, GU21 2JW.
R V Roger Ltd., The Nurseries, Whitby Road, Pickering, North Yorkshire, YO18 7HG.
Old England Hotel Gardens, Sutton on Trent, Newark, Notts.
Matthews Fruit Trees Ltd., Thurston, Bury St Edmunds, Suffolk, IP31 3RN.
Hilliers Nurseries (Winchester) Ltd., Ampfield House, Ampfield, Romsey, Hants, SO51 9PA.
Wyevale Nurseries, Kingsacre, Hereford, HR4 0SE.
Wellington Nurseries, Brandon Crescent, Shadwell, Leeds, West Yorkshire, LS17 9JH.
Bridgemere Nurseries Ltd., Bridgemere, near Nantwich, Cheshire, CW5 7QB.
J Coles and Sons Ltd., The Nurseries, Thurnby, Leicester, LE7 9QB.
Scotts Nurseries, Merriott, Crewkerne, Somerset, TA16 5PL.
St Bridget Nurseries, Old Rydon Lane, Exeter, Devon, EX2 7JY.
Goscote Nurseries Ltd., Syston Road, Crossington, Leics.
New Place Nurseries Ltd., London Road, Pulborough, West Sussex, RH20 1AT.
J Tooby and Co Ltd., Bransford Nurseries, Bransford, Worcestershire, WR6 5JB.

Table 2

New Selections from the Clonal Selection Scheme available from Horticulture Research International, Efford

Acer platanoides Crimson King	EM 90
Acer pseudoplatanus Leopoldii	EM 90
Acer pseudoplatanus Worleei	EM 90
Aucuba japonica Variegata/Crotonifolia	EM 89
Ceanothus burkwoodii	EM 89
Cistus Silver Pink	EM 90
Clematis montana Rubens	EM 90
Hedera colchica Dentata	EM 90
Hebe Midsummer Beauty	EM 90
Hypericum x moseranum	EM 90
Hypericum x moseranum Tricolor	EM 90
Hypericum patulum Hidcote	EM 90
Juniperus communis Depressa Aurea	EM 90
Lonicera sempervirens *	EM 90
Olearea macrodonta Major	EM 89
Philadelphus Belle Etoile	EM 89
Prunus avium Plena (two distinct clones)	EM 90
Prunus Kiku-shidare Sakura (Cheal's Weeping) (two distinct clones)	EM 90
Prunus sargentii (two distinct clones)	EM 90
Prunus Tai Haku	EM 90
Vitis coignetiae	EM 90
Weigela Bristol Ruby	EM 89

* most frequently sold as *Lonicera* Dropmore Scarlet. In trial at East Malling proved to be superior to the latter in both habit and flower abundance.

+ HRI-Efford, Lymington, Hampshire SO41 0LZ.

Table 3

Subject verified as true-to-type within the Clonal Selection Scheme, a source of which will be maintained at Efford

Acer platanoides Drummondii
Buddleia globosa
Ceanothus A.T. Johnson
Ceanothus Autumnal Blue
Ceanothus Trewithan Blue
Ceanothus x veitchianus
Cistus Sunset
Cistus Peggy Sammons
Cistus creticus
Cistus parviflorus
Clematis armandii Snowdrift
Clematis montana Pictons Var.
Euonymus fortunei Emerald Gaity
Hebe x franciscana Variegata
Hebe Miss E. Fittall
Hebe x andersonii
Hedera canariensis Iberian Form
Hedera canariensis Ravensholst
Hedera colchica Dendroides
Hedera helix Angularis Aurea
Hedera helix buttercup
Hedera helix Chrysophylla
Hedera helix Hibernica
Hydrangea Blue Wave
Hydrangea paniculata Grandiflora
Hydrangea paniculata Praecox
Hydrangea serrata Preziosa
Hypericum x inodoratum Elstead
Hypericum multiflorum
Ilex aquifolium J.C. van Tol
Lavandula angustifolia Hidcote
Lonicera Dropmore Scarlet
Lonicera japonica Aureoreticulata
Lonicera nitida Elegant
Lonicera nitida Ernest Wilson
Lonicera nitida Yunnan
Lonicera tellmanniana
Lonicera caprifolium
Picea albertiniana Conica
Pieris Forest Flame
Pieris formosa forestii
Potentilla fruticosa Elizabeth
Potentilla f. Katherine Dykes
Potentilla f. Jackman's Var.
Prunus laurocerasus Otto Luyken
Salix x chrysocoma

Table 4

Clonal Selection Scheme subjects offered to the R.H.S. Wisley for further evaluation

Abelia x grandiflora
Berberis lologensis
Camellia Adolph Audusson
Camellia Donation
Clematis armandii Apple Blossom
Hydrangea petiolaris
Laburnum wateri Vossii
Ligustrum ovalifol. Aureum
Magnolia stellata
Pyracantha Orange Glow
Viburnum davidii
Viburnum plicatum Grandiflorum