

Hebe Breeding at the Auckland Regional Botanic Gardens

Jack Hobbs

Curator, Auckland Regional Botanic Gardens
102 Hill Road, Manurewa

The *Hebe* breeding programme at the Auckland Regional Botanic Gardens commenced in 1982, with the objective of developing new cultivars of superior appearance and garden performance. The susceptibility of many hebes to disease has severely limited their popularity, especially in areas with very humid climates. Septoria leaf spot (*Septoria exotica*) is common on many hebes, including *H. speciosa*, which has been used as the main source of bright floral colours such as magenta, pink, and purple. Many hebes are also attacked by downy mildew (*Peronospora grisea*), (Pennycook, 1989). Some species, eg. *H. diosmifolia*, and cultivars are generally free of such disease problems and this characteristic is sometimes imparted to their offspring. Many other species and cultivars have also been used with the expectation that some of the offspring will inherit the desirable characteristics of their parents without inheriting their weaknesses.

Nomenclature used follows that of Metcalf, (1987).

Developing the Programme

Desirable Characteristics

1. Greater disease resistance, under typical garden and nursery conditions.

2. Improved flower production:

- longer flowering periods (triploids possible)
- repeat flowering;
- increased flower quantity/flush flowering;
- reliable and predictable flower production;
- reduced cold and light requirements for flower initiation to occur, especially in warmer areas.

3. Improved floral appearance:

- greater colour range, especially pink and purple;
- large individual florets;
- branched inflorescences which should smother the plant;
- unbranched inflorescences possible in a range of lengths and habits (e.g. pendulous or upright). Those with a high density of flowers are generally most satisfying.

4. Attractive foliage, including:

- bronze, red and grey foliage;
- a range of other colours including various shades of green;
- a range of shapes, sizes and textures.

5. Attractive growth habit, including:

- compact symmetrical habit as young plants grown from cuttings for container use;
- neat, compact appearance in the garden;
- a range of habits from tall upright to spreading and pendulous.

6. Reliable garden performance:

- tolerance of heat or cold;
- tolerance of wind including coastal situations;

- tolerance of a range of soil types.

7. Acceptable nursery performance:

- rapid flowering from cuttings;
- vigorous growth;
- robust root development;
- symmetrical growth habit;
- long container life;
- tolerance of shade.

Selecting Parent Material

The variability within many *Hebe* species makes it important to use genetically superior material as parents. In recent years numerous accessions of wild material have been tested in cultivation at the Auckland Regional Botanic Gardens and outstanding clones are being introduced into the breeding programme. Important suppliers of new material have included Graeme Platt (Platts Nursery, Albany), Ewen Cameron (Auckland University), Terry Hatch (Joy Plants, Pukekohe) and Peter Heenan (DSIR Land Resources, Christchurch). I have also collected material in Northland and more recently from the N.W. Nelson region.

Interspecific hybrids have displayed great uniformity with most of their characteristics intermediate between those of the parents. More complex hybrids display greater variability.

Parents combinations are calculated to achieve a desired objective and these are often tested by raising a few seedlings to maturity.

Genetic incompatibility can occur. Moore, (1973) lists chromosome numbers of *Hebe* spp. Attempts to cross *H. macrocarpa* var. *brevifolia* and *H. macrantha* with various diploid species have so far failed to produce viable seed.

Methods and Techniques

Pollination of containerised plants under cover provides greatest control and convenience.

Hand pollination:

- stamens are removed from each flower before pollen is produced;
- pollination of basal flowers commences as they open and is continued until entire inflorescence is pollinated.

Seed collection and storage:

- seed capsules are collected immediately they become a brownish colour as seed dispersal is rapid once the capsules split. The period from pollination until seed collection has varied from 48 to 104 days. (average 70 days);
- storage is in a cool dry location until ripening and dispersal of seed is complete. Seed is usually ready for final sorting and sowing after a minimum of 1 month in storage. Viability exceeds 12 months.

Sowing:

- sown at moderate temperatures under cover (22-25°C);
- light required;
- no cold pre-treatment required and no periodicity of germination shown by northern species and hybrids. (May be different for alpine hebes).

Germination:

- commencement of germination has occurred between 6 and 53 days after sowing. (average 25 days);
- germination rates of hybrid seed are usually significantly lower than those of species;
- germination can occur sporadically over a period of several months, particularly with hybrid seed. Late germinating seedlings may exhibit different characteristics (e.g. vigour, etc.) than early seedlings and should be retained.

Transplanting:

- the earliest seedlings are ready for transplanting (into tubes etc) between 22 and 92 days after sowing. (average 51 days).

Flowering:

- the first flowers usually appear about 30 to 40 weeks after sowing.

Monitoring and Recording Performance at the Auckland Regional Botanic Gardens:

- Usually all the seedlings which germinate are pricked out and those which subsequently are infected by disease are culled immediately. The proportion which remains at planting time is almost always less than 50% and has been as low as 8%. Downy mildew heavily infects certain crosses — disease resistance at the seedling stage is usually retained at maturity;
- selected individuals are numerically coded. Flowering records and performance assessments are kept regularly;
- Selected seedlings are cutting-grown and tested at various sites. Only outstanding individuals with distinctive characteristics are eventually named and registered.

Characteristics typically imparted by some species when used as parents

H. speciosa:

- bright flower colours;
- long flowering period;
- winter flowering;
- when crossed with summer flowering varieties two flowerings usually result;
- variable inflorescences — simple or branched;
- high flower density;
- flowering reliable but may not flush flower;
- attractive glossy foliage;
- susceptibility to leaf spot.

H. diosmifolia:

- limited colour range;
- flush flowering;
- branched inflorescences;



Fig. 1 FH 76. Left: *H. diosmifolia* (branched inflorescence). Centre: *H. bollonsii* (simple inflorescence). Right: Hybrid between *H. diosmifolia* and *H. bollonsii*. This illustrates how most hybrid characteristics are intermediate between those of the two parents.

- high flower density;
- reliable flower production;
- attractive small foliage;
- freedom from disease;
- some shade tolerance;
- compact growth habit.

H. macrocarpa var. *latisejala*:

- purple or blue flowers;
- long inflorescences;
- high flower density;
- large flowers;
- susceptibility to leaf spot disease;
- upright growth habit.

H. obtusata:

- flower colours in a range from mauve to purple;
- prostrate/pendulous growth habit;
- susceptibility to disease (Downy mildew).

H. albicans:

- attractive fleshy foliage, occasionally grey;
- growth habit usually dense, possibly prostrate;
- freedom from disease;
- hardy;
- cold often required to induce flowering.

Characteristics typically imparted by some cultivars when used as parents

H. diosmifolia (pink):

- increased colour potential in the pink, rose to magenta range compared with typical *H. diosmifolia*;

• flush flowering.

H. diosmifolia 'Lilac Gem':

- purple flowers;
- flush flowering;
- attractive stems.

H. 'Lavender Lace':

- prolonged flowering;

- repeat flowering.

H. speciosa (bronze leaf reverse):

- bronze foliage, especially underside, is evident in most offspring;
- as for *H. speciosa* but less susceptible to disease.

H. speciosa (purple):

- purple flowers;
- as for *H. speciosa*, less susceptibility to disease.

H. speciosa (mauve):

- large plants, vigorous growth.

H. 'Wiri Jewel':

- as for *H. speciosa*, less susceptibility to disease.

H. 'Wiri Joy':

- pink to rose flower colour range;
- prolonged flowering;
- repeat flowering;
- flush flowering;
- compact growth habit;
- attractive glossy foliage;
- susceptibility to disease (Downy mildew).

H. 'Wiri Gem' and *H. 'Wiri Charm'*:

- flower colours in shades of violet rose;
- long flowering periods;
- repeat flowering — winter and summer;
- flush flowering;
- branched inflorescences;
- small attractive foliage;
- compact growth habit;
- freedom from disease.

H. 'Pamela Joy':

- purple flowers;
- long flowering periods;
- repeat flowering;
- flush flowering;
- simple or branched inflorescences;
- compact growth;
- freedom from disease.

Successful Crosses

Seed of the following hand made crosses has been sown in the period between 14.3.84 and 10.4.90 and has germinated successfully (seed parent shown first, date of sowing in parenthesis).

Code

AD	<i>H. 'Amy'</i> x <i>H. diosmifolia</i> (14.3.84)
AL/A	<i>H. albicans</i> x <i>H. 'Amy'</i> (14.3.84)
AL/BG	<i>H. albicans</i> x <i>H. franciscana</i> 'Blue Gem' (14.3.84)
AS	<i>H. albicans</i> x <i>H. speciosa</i> (mauve) (14.3.84)
Albl/A	<i>H. albicans</i> 'Boulder Lake' x <i>H. 'Amy'</i> (14.3.84)
LS	<i>H. x lewisii</i> 'Lewisii' x <i>H. speciosa</i> (mauve) (14.3.84)
LA	<i>H. x lewisii</i> 'Lewisii' x <i>H. 'Amy'</i> (26.4.84)
PC	<i>H. 'Snowdrift'</i> x <i>H. x carnea</i> 'Carnea' (14.3.84)
PL	<i>H. 'Snowdrift'</i> x <i>H. x lewisii</i> 'Lewisii' (14.3.84)
DC	<i>H. diosmifolia</i> 3/81 x <i>H. x carnea</i> 'Carnea' (14.3.84)
1	<i>H. 'Wiri Jewel'</i> x <i>H. diosmifolia</i> (pink) (1.3.86)
2	<i>H. bollonsii</i> x <i>H. diosmifolia</i> (pink) (1.3.86)
4	<i>H. 'Wiri Joy'</i> x <i>H. speciosa</i> (bronze leaf) (18.5.87)
5	<i>H. macrocarpa</i> var. <i>latisejala</i> x <i>H. speciosa</i> (mauve) (17.7.87)
8	<i>H. diosmifolia</i> x <i>H. 'Wiri Jewel'</i> (8.2.88)
9	<i>H. diosmifolia</i> 'Wairua

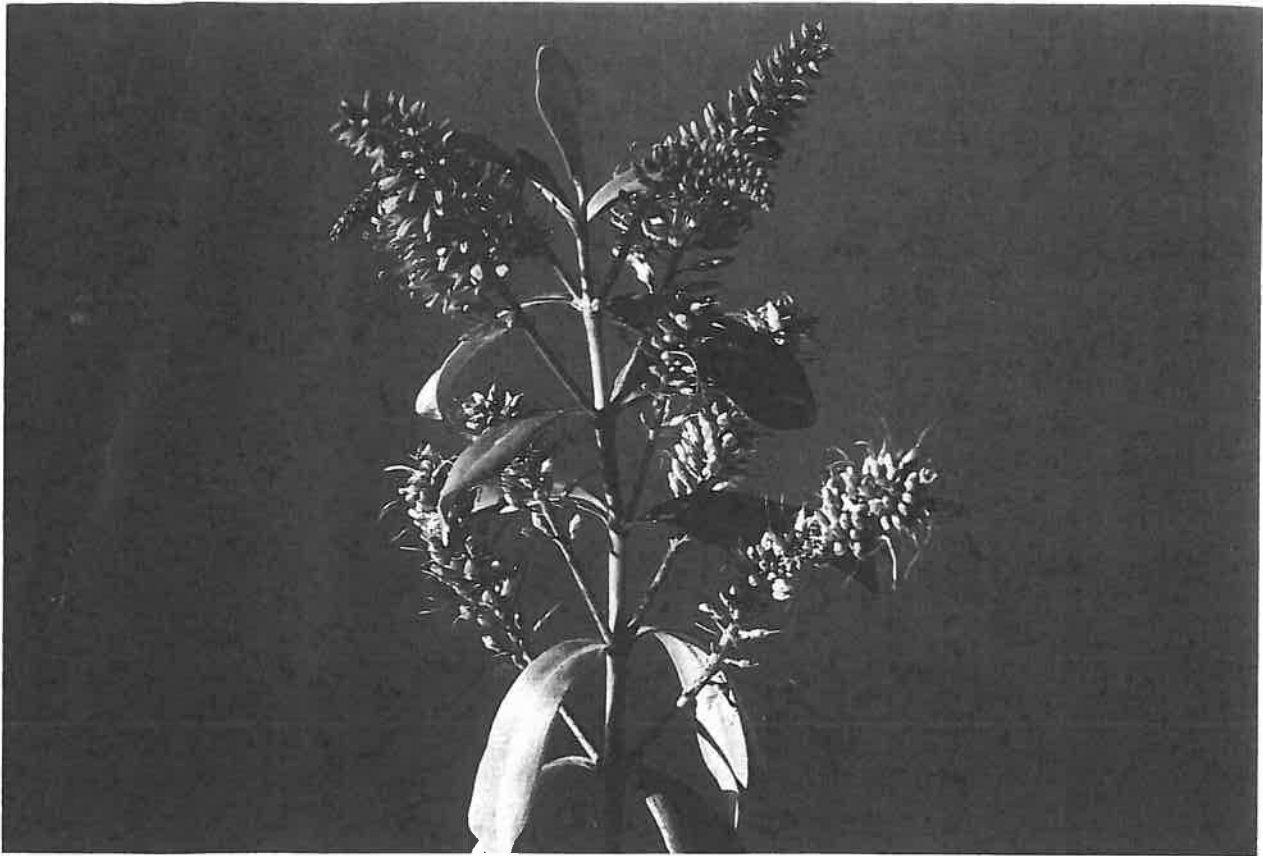


Fig. 2 FH 66. *Hebe* 'Wiri Vision' showing successive flowering, which is often characteristic of hybrids derived from *H. speciosa*.

- Beauty' x *H.* 'Wiri Jewel' (8.2.88)
 10 *H.* 'Lavender Lace' x *H.* 'Wiri Jewel' (8.2.88)
 11 *H.* 'Wiri Jewel' x *H. diosmifolia* (pink) (8.2.88)
 12 *H.* 'Wiri Jewel' x *H.* 'Wiri Joy' (8.2.88)
 16 *H. obtusata* x *H. speciosa* (bronze leaf) (7.6.89)
 19 *H.* 'Wiri Spears' x *H. speciosa* (bronze leaf)
 22 *H.* 'Wiri Gem' x *H.* 'Inspiration' (28.11.89)
 23 *H.* 'Wiri Gem' x *H.* 'Wiri Joy' (28.11.89)
 24 *H.* 'Wiri Gem' x *H.* 'Pamela Joy' (28.11.89)
 25 *H.* 'Wiri Gem' x *H.* 'Lilac Gem' (28.11.89)
 27 *H.* 'Wiri Gem' x *H.* 'Wiri Charm' (28.11.89)
 28 *H.* 'Pamela Joy' x *H.* 'Wiri Charm' (10.4.90)
 32 *H.* 'Pamela Joy' x *H.* 'Lilac Gem' (24.4.90)
 35 *H.* 'Inspiration' x *H.* 'Wiri Splash' (18.4.90)
 37 *H.* 'Wiri Charm' x *H.* 'Wiri Gem' (28.11.89)
 41 *H.* 'Inspiration' x *H. diosmifolia* (pink) (10.4.90)

Hebe Cultivars raised at the Auckland Regional Botanic Gardens

'Wiri Joy' A32 (1982 *H. speciosa* x *H. carnea* 'Carnea' — 85cm x 120cm in 3 years). This variety bears some resemblance to *H.* 'Inspiration' in habit and general appearance but the flowers are a most

attractive rose pink. Flowering can exceed 8 months in duration from mid-November until the following August. Best planted in an open situation as downy mildew has occasionally been a problem.

'Wiri Splash' A17 (1982 *H. brachysiphon* x *H.* 'Lavender Lace' — 40cm x 55cm in 3 years). A compact variety with attractive golden-green foliage which reliably produces a profusion of lilac coloured flowers in early summer (mid-November to early January). Disease resistant and suitable for massed planting and container use.

'Wiri Jewel' C72 (1982 *H. speciosa* selection — 85cm x 85cm in 3 years). Similar to typical *H. speciosa* in general appearance with the most notable difference being the undulating margins and pointed tips of the foliage. This variety was selected primarily for its relative resistance to leaf spot disease and it has been used extensively as a parent. The prolonged flower period commences in about January, peaks from March until June, then continues sporadically until about October.

'Wiri Spears' B40 (1982 *H. speciosa* (mauve hybrid) x *H. macrocarpa* var. *latisepala* — 140cm x 170cm in 3 years). This is a quick growing shrub which somewhat resembles *H.* 'Andersonii' but differs particularly in its more compact growth habit and relative freedom from disease. The long spear shape flowers of bluebird blue are produced abundantly from late January until May.

'Wiri Grace' B90 (1982 *H. speciosa* (mauve hybrid) x *H. stricta* — 140cm x 150cm in 3 years). *H. stricta*, *H. speciosa* and *H. bollonsii* all appear in the pedigree of this cultivar which combines many of their most desirable attributes. In general appearance

it resembles *H. stricta* but it is more compact, disease resistant and ornamental than typical members of that species. The long mauve inflorescences are most abundantly produced in January and February with sporadic flowering occurring until winter.

'Wiri Image' B7 (1982. *H. bollonsii* x *H. venustula* — 100cm x 130cm in 3 years). This cultivar is distinguished by its compact habit and dark green lanceolate leaves which remain disease resistant even in Auckland's humid climate. The methyl-violet flowers are produced in November-December and again intermittently through winter. It is suitable for use in massed plantings or individually in a shrub border. It is popular as a container subject because of its symmetrical habit and disease resistance.

'Wiri Gem' 1/1 (1986 *H.* 'Wiri Jewel' x *H. diosmifolia* (pink) — 100cm x 130cm in 3 years). An attractive shrub with a neat symmetrical and somewhat upright growth habit. Flowering is intermittent over a period that can total 9 months and the flowers are a shade of rose. The inflorescences are usually branched and produced abundantly at the tips of the branches. The main flower period is from April until October with a brief flush in December. An outstanding variety for both gardens and containers with its abundant flowering and freedom from disease.

'Wiri Charm' 1/2 (1986. *H.* 'Wiri Jewel' x *H. diosmifolia* (pink) — 75cm x 130cm in 3 years). From the same cross as 'Wiri Gem' this variety is distinguished by its more compact and less upright habit, slightly undulating foliage with rounded tips and the flower colour which is a deeper shade of rose purple. The racemes are usually branched. Flowering occurs over a

similar period to 'Wiri Gem' but it is generally less pronounced in winter and more prolific and for a longer period in summer. Also outstanding for garden and container use and usually free of disease.

'Wiri Dawn' 4/3 (1987 *H. 'Wiri Joy'* x *H. albicans* (prostrate) — 45cm x 100cm in 3 years). A low spreading variety which will cascade if planted near a wall. The rose pink buds open to produce pale pink flowers with a white throat. The racemes appear over a long period in summer and again in autumn/winter. The narrow fleshy foliage is a pale shade of olive green. Suitable for use as a groundcover and as an attractive weeping container plant.

'Wiri Vision' 12/1 (1988 *H. 'Wiri Jewel'* x *H. 'Wiri Joy'* — 90cm x 120cm in 2 years). This variety combines some of the best characteristics of its parents. The attractive purple red racemes are produced over a long period in autumn/winter and again in summer with the peak flower period occurring in May and June. The foliage is distinctively undulating and somewhat revolute and is resistant to disease. As it flowers very rapidly when grown from cuttings it makes an attractive container plant. Also excellent in the garden where it forms a rounded shrub of rather open habit.

Other Hebes released by the Auckland Regional Botanic Gardens

Hebe 'Anne' (1988 *H. speciosa* (bronze) x *H. 'Wiri Joy'* — 75cm x 10cm in 15mths). Similar in general appearance to *H. speciosa* but flower colour is pink and the leaf tips are pointed. The flowers are slightly deeper pink than *H. 'Wiri Joy'* and are produced densely on 8-10cm racemes over a long period, especially in winter. The colour of the foliage and stems resembles that of *H. 'Wiri Joy'*. The glossy leaves are about 8.5cm x 3.5cm and most resemble *H. speciosa* in size and shape. This disease resistant variety is excellent for the garden and containers. Raised by J. G. Hobbs at Mauku.

H. 'Sandra Joy' (1988 *H. speciosa* (bronze) x *H. macrocarpa* var *latisejala* — 90cm x 100cm in 15 mths). Rich purple flowers fading with age are produced densely on 12cm racemes over a long period, particularly in winter. The deep green leaves are about 10cm x 3.5cm wide and have a distinct reddish midrib and pointed tips. The foliage attractively contrasts the reddish brown stems. Disease resistant and suitable for garden and container use. Raised by J. G. Hobbs at Mauku.

Conclusion

The popularity of hebes as cultivated ornamentals is increasing worldwide. For example Denmark currently produces about 2.5 million potted hebes annually for the European market, and this number is expected to grow considerably. Interest both here and overseas will be stimulated by the introduction of outstanding new cultivars, whether they be hybrids or elite selections from the wild. The huge diversity within this genus provides breeders with many possibilities. Most breeding work has previously been undertaken overseas, but the far greater pool of genetic material available in New Zealand provides breeders here with an obvious advantage.

References

- Metcalf, L. J. (1987) *The Cultivation of New Zealand Trees and Shrubs*. A. H. Reed, Wellington.
- Moore, R. J. Editor (1973) *Index to plant chromosome numbers, 1967-1971*. Oosthoek's Uitgeversmaatschappij B. V. Utrecht, Netherlands.
- Pennycook, S. R. (1989) *Diseases recorded in New Zealand, Vols. 1-3*. Plant Diseases Division, DSIR, Auckland.

Note: Further photographs on back cover.