

## Cultivar Classification of *Taxus* L. (Taxaceae)

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### Abstract

The cultivars of the genus *Taxus* are up till now usually classified in species and interspecific hybrids. This system is not satisfactory anymore. Instead a new, more stable classification of six cultivar-groups is proposed here. The new classification is based on practical application (culton concept), while the old classification is based on genetic relationships (taxon concept). The definitions of the cultivar-groups are simple and clear, cultivars can be classified better and this system is easy to work with, even for non-specialists. The proposed cultivar-groups are: Addressa Group, Fastigiata Group, Hedge Group, Nana Group, Repens Group, and Washington Group. The system is an extension and improvement of the system of cultivar-groups introduced by H.J. Welch in his manual of dwarf conifers.

### INTRODUCTION

*Taxus* L. (Yew: Taxaceae) is a popular ornamental shrub or small tree, especially in temperate regions. It is much appreciated for its habit, evergreen needles and fleshy red arils. There is a large variation among the species and cultivars, especially in habit and form and colour of the needles. Because of the variation in habit, *Taxus* can be used for many purposes: hedging plant, solitary, topiary, ground covering, rough plantings, rock gardens, and pot plant.

Nowadays ten (in some literature, three) species are recognized. Most of them are cultivated in (botanical) gardens. A few species has been used for breeding and/or selection: *T. baccata* L., *T. cuspidata* Sieb. & Zucc. and (less importantly) *T. canadensis* Marshall. Furthermore, interspecific hybridisation is a common phenomenon, which has resulted in the distinction of two interspecific hybrids (*T. ×media* Rehder and *T. ×hunnewelliana* Rehder) and over 100 cultivars, which often possess a genome derived from two or maybe more species. The use of these species and interspecific hybrids for classifying cultivars is no longer satisfactory because the genomes of many of the present cultivars do not clearly belong to one of these species or interspecific hybrids. This has resulted in much instability in the application of such names.

Applied Plant Research, Unit Nursery Stock in Boskoop performed a taxonomic research and practical validation of *Taxus* during 1994-2002 at the request of the Dutch nursery industry and in cooperation with the Royal Boskoop Horticultural Society. One of the problems that was worked out is the nomenclature and classification of cultivars.

The use of hybrid binomials for grouping cultivars is often doubtful, because the genomes of many cultivars show influences of other species than the parent species. The deviation of individuals from the main body of a species or interspecific hybrid is a phenomenon which is often stimulated by man through selection. For a number of genera this phenomenon is so widespread that the traditional systematics, working with the taxon concept, has become unsatisfactory for classifying cultivated plants. Hettterscheid & Brandenburg (1995) have argued that cultivated plants and their special purpose taxonomy are part of a context (human society) different from the context of taxonomy of plants in nature (evolution). Therefore they propose to separate the systematics of cultivated plants from the taxon concept (which is used for the systematics of plants found in nature). They propose new directives for the systematics of cultivated plants. As

the general concept of systematic groups of cultivated plants they propose the term “culton”. The most important categories of culta are the cultivar and the cultivar-group. The most important character of the systematics of cultivated plants is the fact that the classification of cultivars may be based on all sorts of user criteria, which means that hierarchical ranking is not obligatory. The practical advantage of the culton concept for the classification of *Taxus* cultivars will be shown.

## MATERIAL AND METHODS

A total of 110 accessions were collected by the Applied Plant Research in Boskoop and planted at the trial field in Horst (sandy soil, in southern part of Holland). The plants have been observed during eight years, starting in 1994. The accessions mainly came from growers. Next to it 140 accessions from the Dutch Plant Collection of *Taxus* at the nursery of A. van Nijnatten in Zundert were observed. Also the national collection of *Taxus* of UK at Bedgebury Pinetum has been observed.

All accessions are identified, described and photographed. For the grouping of cultivars, the most suitable types of characters have been selected by study of literature, field observations and discussions with growers. Standard cultivars are designated. The cultivar-groups are distinguished by:

- habit
- size of the plant (dwarf or not)
- size and form of the needles

## RESULTS

### Historical Survey of the Cultivar Classification of *Taxus*

In the 18<sup>th</sup> and 19<sup>th</sup> century the first cultivars of *T. baccata* were selected and named, mainly in England, but also in French and Germany. Among them were ‘Dovostoniana’, ‘Fastigiata’, ‘Fastigiata Aureomarginata’, ‘Ericoides’ and ‘Washingtonii’.

About 1900 T.D. Hatfield from the Hunnewell Pinetum, Wellesley, USA, crossed *T. baccata* with *T. cuspidata* and *T. cuspidata* with *T. canadensis*. These two interspecific hybrids were named by Rehder respectively *T. ×media* and *T. ×hunnewelliana*.

In the 20<sup>th</sup> century more cultivars were selected and named, not only in Europe, but also in USA, where many cultivars of *T. ×media* originated. Rehder (1927) classified most of the cultivars then known in the three species *T. baccata*, *T. cuspidata* and (less importantly) *T. canadensis* and in two interspecific hybrids *T. ×media* and *T. ×hunnewelliana*. The cultivars of *T. baccata* were classified into three groups: colour forms, upright forms and spreading forms, but he did not attach epithets for these groups.

This classification system with these binomials were also used by other authors that century (e.g. Krüssmann, 1985; Den Ouden and Boom, 1978; Welch and Haddow, 1993).

The second important attempt for defining cultivar-groups was made by Welch (1979). For the dwarf and compact cultivars of *T. baccata* he introduced the following four groups, based on habit, size of the plant (dwarf or not) and size and form of the needles: Adpressa Group, Fastigiata Group, Nana Group and Procumbens Group. Unfortunately no clear definitions of the groups were given. In the new classification system as proposed in this report, these four groups are largely adopted. (For differences see the discussion).

The principles of this classification are also recognised by Krüssmann (1985). He did not recognise epithets for the groups, but used the characters of habit and length of the needles in his survey. He also recognised colour of the needles as an important character. When compared with the system of Welch he recognised on basis of habit next to the dwarf forms and the fastigate forms a new group of semi-fastigate types (“Zwischenformen”).

Confusion and disagreement on using the correct binomial of cultivars occurs for a number of cultivars with the genome of *T. baccata* and/or *T. cuspidata*, especially the

semi-fastigiata types (see Rehder, 1927; Krüssmann, 1985; Den Ouden and Boom, 1978; Welch and Haddow, 1993; Welch, 1979; Welch, 1991; Harrison, 1975; Cope, 1986). Prominent examples are: 'Straight Hedge' (*T. ×media*, *T. cuspidata* or *T. baccata*), 'Groenland' (*T. ×media* or *baccata*), 'Pyramidalis' (*T. ×media* or *T. cuspidata*), 'Brownii' (*T. ×media* or *T. cuspidata*), 'Stricta Viridis' (*T. ×media* or *T. cuspidata*) and 'Hessei' (*T. ×media* or *T. baccata*). In practise the binomial *T. ×media* serves as a group for semi-fastigiata cultivars, the typical hedging plants.

### Binomials Applied to Cultivars

**1. *Taxus baccata* L. (English Yew).** Distribution: Europe, N. Africa and West Asia.

Shrub or tree, up to 12-20 m, crown broad, roundish or shrubby, more or less densely branched. Branches and branchlets usually spreading; needles often in two ranks, on erect shoots more or less radial. Scales of winter buds ovate, obtuse and strongly appressed. Needles 1-3 cm long, 2-2.5 mm wide, gradually tapering into a fine point, (dark)green and lustrous above, and pale green with faint stomatic lines below.

This species is the most well known ornamental, with numerous cultivars.

**2. *Taxus canadensis* Marshall (Canadian Yew).** Distribution: N. USA and Canada.

Low growing shrub, up to 1-2 m; the leading branches prostrate and rooting in the ground. Scales of winter buds yellowish-brown, more or less lanceolate. Needles densely set in 2 ranks, 1-2 cm long and 0.5-2 mm broad, abruptly short pointed at the top.

The hardiest of the Yews. Suitable as an evergreen ground-cover. Only a few cultivars have been classified in this species.

**3. *Taxus cuspidata* Sieb. & Zucc. (Japanese Yew).** Distribution: Japan, Korea and Manchuria.

Shrub or tree up to 15-20 m, crown erect or flattened, more or less irregularly branched. Branches and branchlets usually spreading; needles mostly not distinctly 2-ranked. Scales of winter buds oblong, at least the upper ones pointed and more or less loosely. Needles 1.5-3 cm long and 2-3 mm wide, straight or slightly curved, abruptly sharp pointed, dark lustrous green above and yellowish beneath.

Very valuable because of its hardiness (better than *T. baccata*). Introduced by Robert Fortune as a cultivated plant from a garden at Shanghai into Britain in 1854. Until now numerous cultivars have been classified in this species.

**4. *Taxus ×hunnewelliana* Rehder.** This is the hybrid of *T. cuspidata* and *T. canadensis*. Resembling *T. cuspidata*, but of slenderer habit and with slenderer and narrower leaves. The cross was first made by T.D. Hatfield, Hunnewell Pinetum, Wellesley, USA, about 1900. The cross has been repeated many times. Only a few cultivars have been classified in this hybrid.

**5. *Taxus ×media* Rehder.** This is the hybrid of *T. baccata* and *T. cuspidata*. Intermediate between the parents. Needles similar than those of *T. cuspidata*, but more distinctly 2-ranked. The cross was first made by T.D. Hatfield, Hunnewell Pinetum, Wellesley, USA, about 1900.

A lot of cultivars have been classified in this hybrid, but similarities make the correct listing of many cultivars uncertain. In practise this binomial is often used for the typical densely upright plants (semi-fastigiata), used for hedging.

### The Cultivar-Groups

The following six cultivar-groups are proposed and formally established following the Rules of ICNCP (1995).

#### 1. Adpressa Group.

- Description: Needles relatively short (< 15 mm) and broad (l/b <5), usually more or less appressed to the stem. Plants usually higher or broader than 1 m after 15 years.
- Use: solitary, mixed plantings.
- Standard cultivar: *T.* 'Adpressa'.
- Cultivars: 'Adpressa', 'Adpressa Aurea', 'Amersfoort', 'Fowle' and 'Rushmore'.

## 2. Fastigiata Group.

- Description: Habit fastigate (l/b: > 2.5); stems stiff upright. Needles linear, usually longer than 15 mm. Plants usually higher than 1 m after 15 years.
- Use: solitary, mixed plantings.
- Standard cultivar: *T.* 'Fastigiata'.
- Cultivars: 'Antony Wayne', 'Cappenberg', 'Fastigiata', 'Fastigiata Aureomarginata', 'Fastigiata Robusta', 'Flushing', 'Melfard', 'Raket', 'Sentinel', 'Standishii', 'Stricta Viridis' and 'Wojtek'.

## 3. Hedge Group.

- Description: Habit (broad) upright (l/b: 1-2.5), more or less dense. Needles linear, usually longer than 15 mm. Plants usually higher than 1 m after 15 years.
- Use: hedges, solitary, topiary, mixed plantings.
- Standard cultivar: 'Hicksii'.
- Cultivars: 'Brownii', 'Cheshuntensis', 'Golden Esch', 'Goldspitz', 'Groenland', 'Hatfieldii', 'Hicksii', 'Hicksii Gold', 'Hillii', 'Judith', 'Major', 'Overeynderi', 'Pyramidalis', 'Pirol', 'Semperaurea', 'Silver Spirit', 'Straight Hedge' and 'Westerstede'.

## 4. Nana Group.

- Description: Dwarf habit, very slow growth, usually not higher or broader than 1 m (after 15 years). Needles small, usually not longer than 15 mm.
- Use: rock garden, pot plant.
- Standard cultivar: *T.* 'Ericoides'.
- Cultivars: 'Aldenham Gold', 'Anny's Dwarf', 'Decora', 'Dwarf White', 'Ericoides', 'Green Diamond', 'Grüne Kugel', 'Little Gem', 'Micro', 'Nana', 'Nutans', 'Pygmaea', 'Wüst' and 'Zundert'.

## 5. Repens Group.

- Description: Habit prostrate to wide spreading (or sometimes, when supported by a stick, more or less weeping), more or less dense, usually not higher than 1-1.5 m. Needles linear, usually longer than 15 mm. Plants usually broader than 1 m after 15 years.
- Use: ground covering, planting in sections (seldom solitary, when supported by a stick).
- Standard cultivar: 'Repandens'.
- Cultivars: 'Cavendishii', 'Gracilis Pendula', 'Pendula', 'Procumbens', 'Prostrata', 'Repandens', 'Summergold'.

## 6. Washington Group.

- Description: Habit spreading to broad upright (l/b: 0.5-1.5), more or less open, usually with strong growth. Needles linear, usually longer than 15 mm. Plants usually broader and higher than 1.5 m after 15 years.
- Use: planting in high sections, broad solitary, rough (mixed) planting, undergrowth of trees.
- Standard cultivar: 'Washingtonii'.
- Cultivars: 'Adams', 'Booy', 'Canarie', 'Fairview', 'Farmen', 'Golden Jubilee', 'Green Mountain', 'Henryi', 'Nissen's Page', 'Nissen's Präsident', 'Nissen's Regent', 'Rustique', 'Thayerae' and 'Washingtonii'.

### Key for Cultivar-Groups

- 1.1 Dwarf habit (<1 m high or broad after 15 years); needles usually less than 15 mm long and/or very narrow: **Nana Group**
- 1.2 No dwarf habit; needles normal sized or relatively broad: 2
- 2.1 Needles relatively short and broad (l/b < 5) and usually more or less appressed: **Adpressa Group**
- 2.2 Needles normal sized: 3
- 3.1 Habit dense and fastigate or upright: 4

3.2 Habit dense or loose, prostrate, spreading or broad upright: 5

4.1 Habit fastigiata ( $l/b > 2.5$ ): **Fastigiata Group**

4.2 Habit (broad) upright ( $l/b 1-2.5$ ): **Hedge Group**

5.1 Habit prostrate to broad spreading ( $l/b < 0.5$ ), usually not higher than 1-1.5 m:  
**Repens Group**

5.2 Habit spreading to broad upright ( $l/b 0.5-1.5$ ): **Washington Group**

## DISCUSSION

*Taxus* is a good example of a recently domesticated genus. For strongly domesticated genera it is already clear that classification based on the taxon concept, is unsuitable for the cultigenic diversity. By using the traditional classification for *Taxus*, as started with Rehder in 1927, more and more confusion and disagreement can be expected. Not only in the semi-fastigiata cultivars (media-types), but also in other groups, because the genome of more and more new cultivars will show influence of more than one species. There seems to be no barrier for mixing *T. baccata*, *T. cuspidata*, *T. ×media*, *T. ×hunnwelliana*, *T. canadensis* and *T. brevifolia*.

For the classification of *Taxus* cultivars I have also chosen for the culton approach, as outlined by Hetterscheid & Brandenburg (1995). By using the cultivar-group and its nomenclature as outlined in the ICNCP (Trehane et al., 1995) a number of existing and future problems will be solved. Another important reason for choosing this new classification is the fact that it meets wishes of users. This is showed by the various attempts to classify cultivars of *T. baccata* in different groups, based on users criteria. But also the fact that in practise *T. ×media* serves as a group for semi-fastigiata cultivars.

As outlined before, the most serious attempt to classify cultivars in cultivar-groups is from Welch, 1979. His classification is used as the basis for the classification in this report. A few differences:

- In this new system clear definitions of the cultivar-groups are given and standards are attached.
- The Procumbens Group of Welch is named Repens Group, because the latter name is easier to work with; the cultivar 'Procumbens' is hardly known and the word procumbens has no meaning for most users.
- The new system is not only meant for cultivars of *T. baccata*, but for all cultivars of *Taxus*.
- Two extra cultivar-groups are defined:
  - Hedge Group: Which is in fact the group of all semi-fastigiata cultivars, as created by different authors/users (see last part of historical survey and binomial 5: *T. ×media*).
  - Washington Group: Which did not fit in Welch's manual of dwarf conifers, because most cultivars of this group are more or less open and have a very strong growth.

Using cultivar-groups for cultivars of *Taxus* will have the following advantages:

- The destabilizing effect of an uncertain assignment of cultivars to a species or interspecific hybrid is circumvented.
- The new cultivar-group classification uses only a few simple characters to define the cultivar-groups, which makes cultivar assignments easier, even for those not versed in taxonomy.

In conclusion I feel that the presented cultonomic classification of *Taxus* cultivars much better serves stability than the traditional classification system of Rehder or the derived forms, which are based on the taxon concept.

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