# Bulletin of the *Cupressus* Conservation Project

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# Contents

Volume 1 Number 2



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**Cover photo by Jeff Bisbee** : *Cupressus butanoensis* in its natural habitat on Butano Ridge, San Mateo County, California, USA.

## ***Cupressus pygmaea*** (Lemmon) Sargent 1901

# ***Cupressus pygmaea* is a valid species**

In 1895 Lemmon described a new taxon from Mendocino County, and recognising its affinity with *Cupressus goveniana* Gordon (1849), but with enough differences to separate it from the later, he described it as a variety *Cupressus goveniana* var. *pigmaea* [1]. Six years later, considering the tiny black seeds and that

> the isolation of the region which it inhabits remote from that occupied by other Species make it possible and convenient to separate this northern tree from the *Cupressus Goveniana* of central and southern California,

Sargent (1901) raised this taxon to specific rank as *Cupressus pygmaea* [2]. C.B.Wolf (1948) acknowledged this view and stressed the fact that it is necessary and possible to look for distinct characters not visible on dry herbarium material.

E.Little (1953) chose to reduce several new world *Cupressus* species to synonymy. *Cupressus pygmaea*, *Cupressus abramsiana* Wolf and *Cupressus sargentii* Jepson were simply merged into *Cupressus goveniana* [3] and given as synonyms. In 1970, he revised his opinion of systematic synonymisation, but did not choose to return them back to species rank. He reduced the different *Cupressus* species to varietal rank, four as *Cupressus arizonica* Greene varieties, two as *Cupressus goveniana* varieties, one as a variety of *Cupressus guadalupensis* Watson, and finally admitting *Cupressus sargentii* as a valid species. Despite Wolf, and arguing about the fact that this author gave hint that these new combinations could be acceptable, he justified his choice almost exclusively by very broad morphological considerations. It is to be noted that, except for *Cupressus pygmaea*, all the other taxa were first described by their respective authors at specific rank. Insufficient observations, of seeds for instance, failed to understand that *Cupressus abramsiana* is closer to *Cupressus sargentii* than to *Cupressus goveniana*.

Since that time various authors have followed either Wolf or E.Little without giving much further support to their choice ; their arguments are limited to a few disputable morphological characters. See Appendix 2 (page 33) for a summary of different authors' choice.

A review of these two taxa brings new elements which help to decide on the rank of the Mendocino Cypress. Because the morphological characters of both taxa (cones and foliage) are variable and because it is difficult to identify each one considering only these characters when the trees are fully mature, it is necessary to make use of other sets of characters involving physiology, phenology, discarded morphological traits, geography and molecular analysis. Growing both taxa in the same field side by side when the edaphic, exposure and climatic conditions are identical allowed us to conlude several distinct observations.

### Physiology

*Growth* : except on a podsolic soil, the Mendocino Cypress grows (much) faster than the Gowen Cypress. *Scent* : the scent of both taxa is quite different. The Mendocino Cypress foliage when crushed emits an odour reminiscent of lemon, while the foliage of Gowen Cypress has a petroleum scent. *Acidity of the soil* : according to a study conducted by McMillan (1959 and 1964), the Gowen Cypress cannot grow where the acidity of the soil is *p*H=3.8-4.0, yet the Mendocino Cypress will survive.

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[1] As noted by E. Little (1970), Lemmon's original spelling "var. *pigm a*" was « corrected in ink to "*pigm*ae*a*" ».

[2] In the protologue Sargent wrote the Latin name with a *y*. This is the spelling to retain at species rank, for there is no obligation to keep the same spelling or same name when changing the rank of a taxon.

[3] A the same time he merged *Cupressus glabra* Sudw., *Cupressus nevadensis* Abrams and *Cupressus stephensonii* Wolf into *Cupressus arizonica* Greene, and *Cupressus forbesii* into *Cupressus guadulapensis* S.Watson.

## Phenology

In a normal soil, not a podsolic one, the Gowen Cypress will already be able to begin to pollinate when smaller than 60 cm, and will be able to produce seed cones before it gets to a height of one metre and at least one year before its northern relative. In the same conditions, the Mendocino Cypress was never observed with cones before attaining a height of 1.50 metres. Both taxa are shedding their pollen in winter, usually in February. In 2012, a difference in pollen cone maturity was observed, the Mendocino Cypress being able to pollinate before the Gowen Cypress. Further observations during the next years is necessary to understand if the trees placed in the same fields will show distinct pollination periods or if there is an overlap, allowing any hybridisation. At the end of May 2012, the new seed cones were bigger on the Mendocino Cypress than on the Gowen Cypress.

## Morphology

*Cotyledons* : one of the main differences between the two taxa is shown by the cotyledons. While Gowen Cypress displays 3 and 4 cotyledons, the seedlings of Mendocino Cypress bear 2, 3 or 4 cotyledons. This morphological character was first noticed by McMillan (1953; see table I for McMillan's data).

Table I : Frequency of cotyledon number in two populations of *Cupressus pygmaea,* from McMillan (1953, p. 29).

| Mendocino City | | | | | |
|---|---|---|---|---|---|
| Cotyledons | 2 | 3 | 4 | 5 | Total |
| Seedlings | 18 | 138 | 8 | 0 | 164 |
| % | 10.98 | 84.15 | 4.88 | 0.00 | 100.00% |

| Anchor Bay | | | | | |
|---|---|---|---|---|---|
| Cotyledons | 2 | 3 | 4 | 5 | Total |
| Seedlings | 7 | 108 | 14 | 0 | 129 |
| % | 5.43 | 83.72 | 10.85 | 0.00 | 100.00% |

Silba (2008) became aware of this distinct character and B.Huang made a new species of it under the name *Cupressus silbae*. Here at the *Cupressus* Conservation Project in 2005 a first set of germinating seeds of the Mendocino Cypress gave a certain amount of seedlings with 2 cotyledons, but no statistical record was done at that time. More recent observations (2010-2011) with two sources of Mendocino Cypress, one from the main stand around Fort Bragg, Mendocino County (courtesy of John Silba) the second from Salt Point near Plantation, Sonoma County (courtesy of Joey Malone) gave the following results, which confirm McMillan's observations :

Table II : Frequency of cotyledon number in two populations of *Cupressus pygmaea*.

| Fort Bragg | | | | | |
|---|---|---|---|---|---|
| Cotyledons | 2 | 3 | 4 | 5 | Total |
| Seedlings | 52 | 212 | 11 | 0 | 275 |
| % | 18.91 | 77.09 | 4.00 | 0.00 | 100.00% |

| Salt Point | | | | | |
|---|---|---|---|---|---|
| Cotyledons | 2 | 3 | 4 | 5 | Total |
| Seedlings | 4 | 93 | 10 | 0 | 107 |
| % | 3.74 | 86.92 | 9.35 | 0.00 | 100.00% |

The number of seedlings with 4 cotyledons is much lower in the first population than those with 2 cotyledons, and remains low in the second (under 10%). For *Cupressus goveniana*, McMillan (1953) gives the following statistics :

Table III : Frequency of cotyledon number of *Cupressus goveniana*.

| Huckleberry Hill | | | | | |
|---|---|---|---|---|---|
| Cotyledons | 2 | 3 | 4 | 5 | Total |
| Seedlings | 0 | 78 | 28 | 0 | 106 |
| % | 0.00 | 73.58 | 26.42 | 0.00 | 100.00% |

It was observed that the seedlings with 2 cotyledons are displaying normal growth in containers, among the tallest after one and an half years. A survey of the cotyledon numbers by different authors is given in Appendix 3 (see page 33). Only very few authors are giving this information, when it is a key character allowing to distinguish both species.

*Crown* : while still young, the two taxa show different crown shapes. The branches of the Mendocino Cypress are spreading at an angle quickly away from the trunk and the leader shoots up. The Gowen Cypress has a more narrow shape when young.

*Height* : the height of both taxa is a major trait to distinguish them. Contrary to one common name 'Pygmy Cypress', the Mendocino Cypress is able to attain a height of 60 metres when growing in a fertile soil. Mathews (1929) mentions a tree with a girth of 8.23 m (27 ft) and a height "well over" 45 m (150 ft). The Gowen Cypress merely gets to 20 metres. This is consistent with the growth rate of both species. See appendix 4 (page 33) for the details of Mathews (1929) measurements.

*Foliage colour* : the foliage of *Cupressus pygmaea* is darker than that of *Cupressus goveniana* (Wolf 1948). When grown in the same field, with the same edaphic conditions and exposure, this observation is easy to verify (see fig. 1).

Figure 1 : Foliage of *Cupressus pygmaea* appears darker green than the one of *Cupressus goveniana*. Two *Cupressus goveniana* in the foreground and behind them a row of *Cupressus pygmaea*, cultivated trees ; note also the different sizes of trees planted at the same time – August 2012.

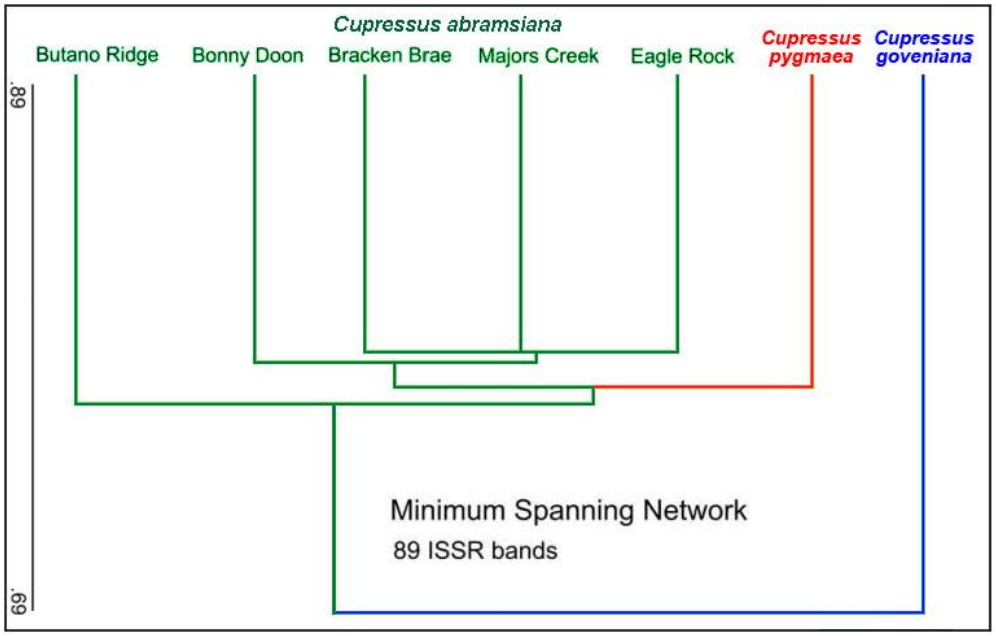
The others morphological traits are so variable that they are likely to overlap. To find any difference, a statistical approach is required.

**Molecular analysis**

The results of various molecular analyses are unambiguous and confirm the placement of the Mendocino Cypress as a valid species. See D.P. Little 2004, p. 1878, fig. 2, D.P. Little 2006, p. 466, fig. 1, and also Adams & Bartel (2009a and 2009b).

The cladogram by Adams & Bartel (2009b, p. 292, fig. 3, presented simplified here) shows that *Cupressus goveniana*, as a species including its northerner relatives as synonyms or as varieties or subspecies, would make this taxon paraphyletic.

Figure 2 : Simplified cladogram (after Adams & Bartel, 2009b, fig. 3, p. 292.) showing that *Cupressus goveniana* as a species including the Mendocino population either as a synonym or at a varietal or subspecies rank would be considered paraphyletic.




## Geography

The two cypresses, as noted by Sargent, have completely distinct distribution ranges along the Pacific coast of California: the Gowen Cypress in central California (Monterey County) with only two localities, and the Mendocino Cypress with a wider range in northern California (Mendocino to Sonora Counties). The main population is growing around Fort Bragg, and there are two other smaller stands south of it at Anchor Bay (Mendocino County) and in the Salt Point State Park (Sonora County). These two taxa of *Cupressus* are isolated from each other by a distance of 250 km in a straight line and any natural hybridisation – even if their pollination period overlaps – is effectively impossible due to the direction of the main winds. This is an important factor allowing speciation.

## Conclusion

Considering all these observations, the Mendocino Cypress is best considered as a valid taxon at species rank. See Appendix 1 (page 32) for a summary of the main differences.

***Cupressus pygmaea*** (Lemmon) Sargent, North American Trees. *Botanical Gazette (Crawfordsville)* 239 (31 April 1901).

**Basionym :** *Cupressus goveniana* var. *pigmaea* Lemmon, *Handbook of West-American Cone-Bearers*. 3rd ed.: 77 (1895).

**Synonyms :**

≡ *Cupressus goveniana* subsp. *pygmaea* (Lemmon) Camus, *Les Cyprès* 50. (1914).
≡ *Callitropsis pygmaea* (Lemmon) D.P.Little, *Systematic Botany* 31 (3): 474. (2006).
≡ *Cupressus silbae* B.Huang bis, *J. Int. Conifer Preserv. Soc.* 15 (1): 10. (2008).
≡ *Hesperocyparis pygmaea* (Lemmon) Bartel, *Phytologia* 91 (1): 182. (2009).
≡ *Neocupressus goveniana var. pygmaea* (Lemmon) De Laubenfels, *Novon* 19 (3): 303. (2009).
≡ *Hesperocyparis goveniana var. pygmaea* (Lemmon) De Laubenfels, *Novon* 22 (1): 13. (2012).

**Type :** *J.G.Lemmon and wife 188*, as *Cupressus goveniana*, var *pygmaea*. n. var. ined. White, ashy Plains, near Mendocino, lectotype designated by Wolf (1948): 200 – UC 185946.

## Acknowledgments

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## Appendix 1 : Summary table : comparison between *Cupressus pygmaea* and *Cupressus goveniana*.

| Characters | *Cupressus pygmaea* | *Cupressus goveniana* |
|---|---|---|
| Height | To 60 m. | Below 20 m. |
| Growth [1] | Quick | Not as quick |
| Scent of foliage | Lemon scent | Oil scent |
| Foliage colour [1] | Dark green | Bright green |
| pH | Survives on very low pH | Does not survive on very low pH |
| Crown (saplings) | Branches large spreading when young | More narrow habit |
| Cotyledons | 2-3-4 | 3-4 |
| First pollination [1] | After 1 m. | Before 60 cm. |
| First cones [1] | Above 1 m. | Below 1 m. |
| Seeds | Thin, black, smaller | Thick, light red or brown, longer |

[1] Observations on cultivated trees, close to each others in soil pH from 5.0 to 8.5.
Further statistical studies are underway.

## Appendix 2 : The rank of *Cupressus pygmaea* according to several authors.

| Authors | | Genus | Species | | | |
|---|---|---|---|---|---|---|
| Gordon [1] | 1849 | *Cupressus* | *goveniana* | | | |
| Lemmon | 1895 | " | *goveniana* | var. *pigmaea* | | **new** |
| Sargent | 1901 | " | *pygmaea* | | | **new** |
| A. Camus | 1914 | " | *goveniana* | subsp. *pygmaea* | | **new** |
| Wolf | 1948 | " | *pygmaea* | | | |
| McMillan | 1953 | " | *pygmaea* | | | |
| E. Little | 1953 | " | *goveniana* | synonym | | |
| Den Ouden | 1965 | " | *goveniana* | synonym | | |
| Dallimore & Jackson | 1966 | " | *pygmaea* | | | |
| Gaussen | 1968 | " | *pygmaea* | | | |
| E. Little | 1970 | " | *goveniana* | var. *pigmaea* | | |
| Griffin & Critchfield | 1972 | " | *pygmaea* | | | |
| Callen | 1976 | " | *pygmaea* | | | |
| Krüssmann | 1985 | " | *goveniana* | var. *pygmaea* | * | |
| Silba | 1986 | " | *goveniana* | synonym | | |
| Rushforth | 1987 | " | *goveniana* | var. *pygmaea* | * | |
| Bartel | 1991 | " | *goveniana* | subsp. *pigmaea* | * | |
| Silba | 1998 | " | *goveniana* | var. *pigmaea* | | |
| Lanner | 1999 | " | *pigmaea* | | * | |
| Farjon | 2005 | " | *goveniana* | synonym | | |
| Silba | 2005 | " | *goveniana* | subsp. *pigmaea* | * | |
| Schulz | 2005 | " | *goveniana* | synonym | | |
| D. Little | 2006 | *Callitropsis* [2] | *pigmaea* | | * | **new** |
| Silba | 2008 | *Cupressus* | *silbae* | | | **new** |
| Bartel | 2009 | *Hesperocyparis* | *pygmaea* | | | **new** |
| Eckenwalder | 2009 | *Cupressus* | *goveniana* | var. *pigmaea* | | |
| de Laubenfels | 2009 | *Neocupressus* [2] | *goveniana* | var. *pygmaea* | * | **new** |
| Debreczy & Rácz | 2011 | *Cupressus* | *pygmaea* | | | |
| de Laubenfels | 2012 | *Hesperocyparis* | *goveniana* | var. *pygmaea* | * | **new** |
| Earl | 2012 | *Cupressus* | *goveniana* | var. *pigmaea* | | |
| CCP | 2012 | " | *pygmaea* | | | |

The correct spelling for each rank according to the nomenclature rules is in **blue**.

To be noticed that the correct Latin spelling is *pygmaea*

**new** = new combination * Faulty spelling

[1] Until 1895 and the beginning of the 20th century, *Cupressus sargentii*, *pygmaea* and *abramsiana* were not distinguished from *goveniana*.

[2] Invalid

**Appendix 3 : Cotyledons number according to several authors.**

| Authors | | *C. goveniana* | *C. pygmaea* | |
|---|---|---|---|---|
| A. Camus | 1914 | 3-4 | - | subspecies |
| Wolf | 1948 | 3-4-5 | 3-4 | species |
| MacMillan | 1953 | **3-4** | **2-3-4** | species |
| Silba | 1986 | 3-4-5 | 3-4-5 | synonym |
| Silba | 1998 | 3-4-5 | 3-4-5 | variety |
| Farjon | 2005 | 3-4 | 3-4 | synonym |
| Silba | 2005 | 3-4-5 | 3-4-5 | subspecies |
| Schulz | 2005 | 3-4-5 | 3-4-5 | synonym |
| D. Little | 2006 | 3-4 | 3-4 | species |
| Eckenwalder | 2009 | 3-4(-5) | 3-4(-5) | variety |
| CCP | 2012 | 3-4 [1] | **2-3-4** | species |

1 Trusting the data by McMillan ; to be confirmed by new observations on seedlings of the two known populations.
**Data in blue :** statistical data with reference to the number of observations.

**Appendix 4 : *Cupressus pygmaea* measurements by Mathews 1929.**

| inch = 0.0254 | | height | | circumference | | | diameter | | | Measurement height | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| foot = 0.3048 | | feet | m. | feet | inches | m. | feet | inches | m. | feet | inches | m. |
| Situation 1 | 1 | 100 | **30.50** | | 100 | **2.50** | | | **0.80** | | 30 | **0.80** |
| | 2 | 80 | **24.50** | | 80 | **2.00** | | | **0.65** | 5 | | **1.50** |
| | 3 | 70 | **21.50** | | | **3.50** | | 44.5 | **1.10** | | 47 | **1.20** |
| | 4 | 100 | **30.50** | | 115 | **2.90** | | | **0.95** | 5 | | **1.50** |
| | 5 | 80 | **24.50** | | 80 | **2.00** | | | **0.65** | 5 | | **1.50** |
| | 6 | 85 | **26.00** | | | **1.90** | 2 | | **0.60** | | | |
| | 7 | 100 | **30.50** | 11 | 3 | **3.40** | | | **1.10** | | | |
| | 8 | > 50 | | 14 | 9 | **4.50** | | | **1.40** | 6 | | **1.80** |
| | 9 | 90 | **27.50** | | 102 | **2.60** | | | **0.80** | 6 | | **1.80** |
| | 10 | 136 | **41.50** | | | **3.00** | | 37 | **0.95** | 3 | | **0.90** |
| | 11 | ? | | | | **3.00** | | 38 | **0.95** | 4 | | **1.20** |
| | 12 | 200 | **61.00** | 11 | | **3.40** | | | **1.10** | | | |
| Situation 2 | 13 | 150 | **45.50** | 27 | | **8.20** | | | **2.60** | 5 | | **1.50** |
| ***Average*** | | | ***31.80*** | | | ***2.89*** | | | ***0.92*** | | | |

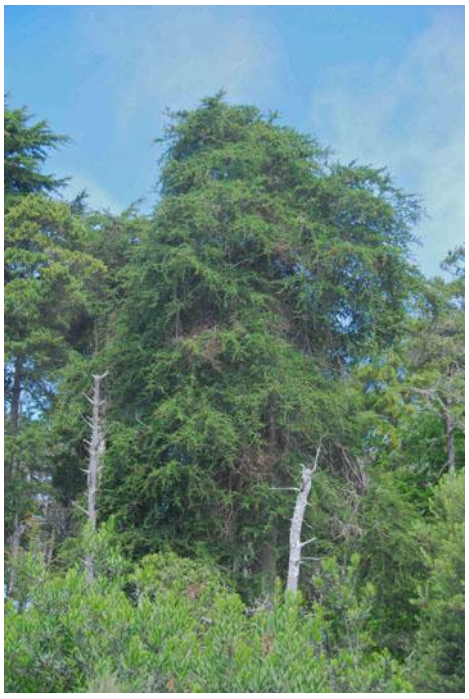
Figure 3 : *Cupressus pygmaea*, Anchor Bay, Mendocino County, California. **Photo :** Jeff Bisbee

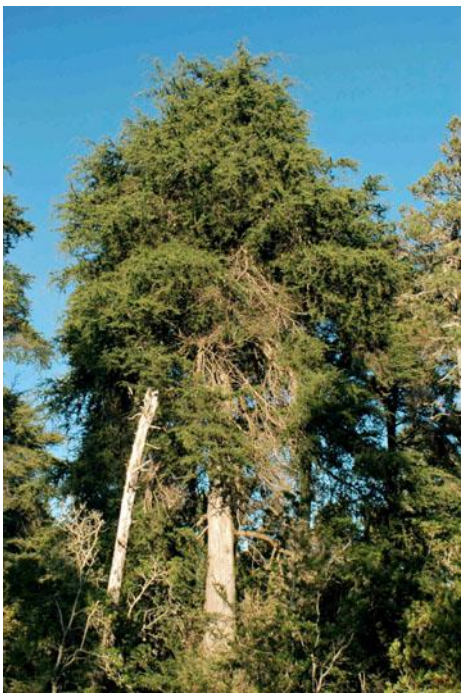
**Jeff Bisbee**

# *Cupressus pygmaea* (Lemmon) Sargent 1901

# MENDOCINO CYPRESS

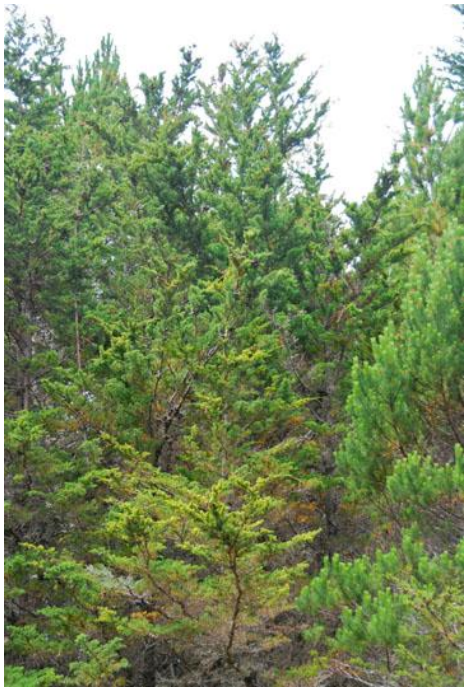
**Photos taken in the Fort Bragg, Mendocino area of Mendocino County, California, USA.**









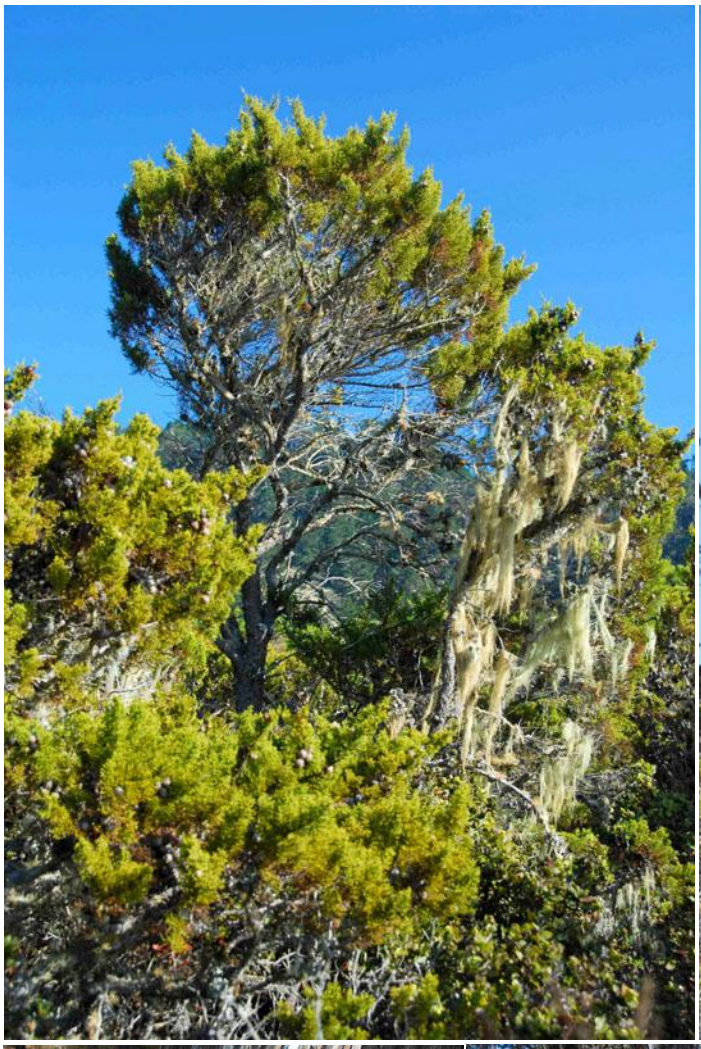


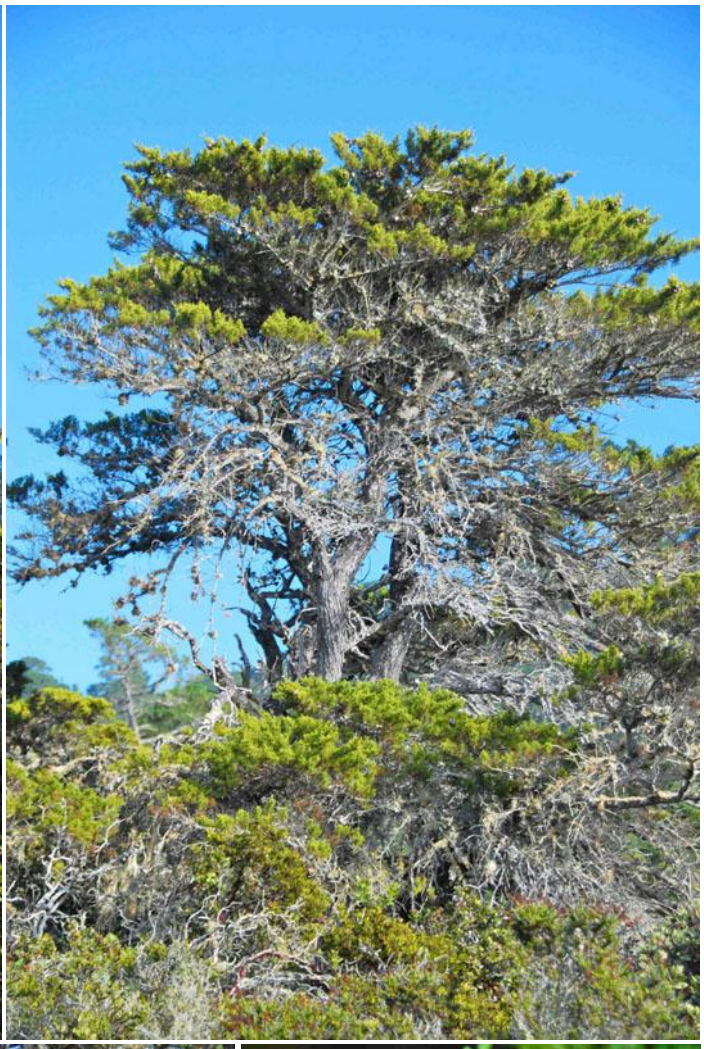
**Jeff Bisbee**

# *Cupressus goveniana* Gordon 1849

# GOWEN CYPRESS

**Photos taken at Gibson Creek, extension of Point Lobos State Park, California, USA.**










## *Taiwania cryptomerioides* Hayata 1906

# Etat des lieux de l'introduction en France de *Taiwania cryptomerioides* Hayata

**Résumé :** Cet article présente la situation passée et actuelle de *Taiwania cryptomerioides* en France, au travers de grandes collections botaniques publiques comme l'arboretum national des Barres mais aussi de jardins privés. Les conditions écologiques des lieux de culture ainsi que les dimensions des principaux sujets sont abordés.

Cet arbre est mal connu en France et son introduction a souvent souffert du manque de connaissance sur son écologie.

Aujourd'hui, et en dépit du contexte des changements climatiques, sa présence dans notre pays, semble promise à un meilleur avenir, notamment grâce à l'observation précise du comportement des premiers sujets introduits et les enseignements que l'on a pu en tirer.

## Historique et comportement des premiers *Taiwania cryptomerioides* introduits en France

Contrairement à son parent éloigné, *Cryptomeria japonica*, connu en Europe dès 1842 l'introduction de *Taiwania cryptomerioides* s'effectua beaucoup plus tardivement.

En Europe, c'est le célèbre et infatigable botaniste explorateur anglais Ernest Henry Wilson (1876-1930) qui récolta les premières graines en 1920. Celles-ci furent ramassées dans l'aire naturelle, dans les Zhongyang shan, sur le versant occidental du mont Morrison (3 997 m d'altitude) appelé la Montagne de Jade et situé au centre de l'île de Taiwan dont il est le point culminant.

En France, c'est à Nogent-sur-Vernisson, à l'arboretum des Barres, aujourd'hui collection botanique nationale, que le premier *Taiwania* fut planté à partir d'un semis réalisé en 1925.

Cet arboretum a été crée par Philippe de Vilmorin en 1821. Cet homme, visionnaire, acheta ce domaine situé à 130 km au sud-est de Paris, pour y comparer entre elles, différentes espèces d'arbres comme les chênes américains (*Quercus rubra* ; *Q. velutina*) et les pins (*Pinus sylvestris*, *Pinus nigra* subsp. *salzmannii* var. *corsicana*). Il fut en quelque sorte le pionnier de la génétique forestière moderne en mettant en évidence le concept de provenance chez les arbres.

L'introduction de *Taiwania cryptomerioides* fut effectuée avec la plus grande prudence au regard de ce que l'on connaissait des conditions climatiques de son aire d'origine. On serait même tenté de dire aujourd'hui que ces premières implantations ont été réalisées avec un petit excès de précautions.

Bien entendu, la situation géographique de l'île traversée par le tropique du Cancer laissait supposer que sa rusticité vis-à-vis des basses températures était probablement faible, en particulier par rapport à *Cryptomeria japonica*, introduit depuis plus de 80 ans sur notre territoire.

C'est ainsi que les premiers *Taiwania* furent plantés, comme les sylviculteurs le pratiquaient pour les sapins (genre *Abies*), c'est à dire sous abri de la canopée d'arbres installés précédemment. Ce *Taiwania* de l'arboretum des Barres avait été planté dans une collection de type systématique appelée *Pinetum*, dont les premiers sujets remontaient à 1896 et dans lequel figurait notamment le premier *Pinus armandii* planté en Europe, reçu un an plus tôt. Le sol de cette collection est à pH acide et sa texture est sableuse.

D'un point de vue climatique, l'arboretum des Barres est soumis à un régime océanique dégradé et une légère influence tempérée du fleuve Loire, situé à 20 km plus au sud mais avec quelques influences continentales occasionnant des températures hivernales pouvant être inférieures à –15°C.

Ce premier arbre a vécu abrité durant toute son existence, ce qui, ajouté au climat nettement moins favorable que dans son île natale, explique ses dimensions assez modestes. A sa mort, en 1983, il ne mesurait que 8,5 m de hauteur pour un diamètre de 18 cm. Cet arbre avait atteint la moitié de sa taille maximale au bout de 26 ans, en 1951. Sa croissance avait donc été lente mais assez régulière. Son origine est malheureusement inconnue : on suppose cependant, au vu de la date (1925) qu'Ernest Wilson qui échangeait des semences avec l'arboretum français en fut le fournisseur…

Un autre sujet, planté en 1929, probablement plus exposé ou récolté à une altitude inférieure eut moins de chance car il périt dès 1942 où l'hiver fut long et froid. Il mesurait alors 3,5 m de hauteur. Cet arbre devait être issu du même lot de graines que le précédent, **envoyées du Japon**, probablement par le

biais d'un botaniste nippon[1], en relation avec la famille de Vilmorin ou Léon Pardé, directeur du site à l'époque et responsable de l'école forestière installée aux Barres.

Entre 1929 et 1940, quatre autres sujets ont été plantés dans cet arboretum. Ils connurent des destins variés. Tous en provenance de l'archipel nippon, ils furent toujours plantés sous la protection d'autres arbres à l'exception d'un d'entre eux, planté en pot et qui mourut dès sa seconde année de végétation en 1941.

Il reste aujourd'hui **deux arbres** de cette époque, semés en 1929. Les dimensions du plus grand sont aujourd'hui les suivantes : 9,2 m de hauteur pour 0,18 cm de diamètre à 1,3 m du sol.

**Ces arbres** ont toujours manqué de lumière et la concurrence lui a aussi été préjudiciable, notamment durant les épisodes de sécheresse. Aujourd'hui sa tête est sèche sur plusieurs mètres de hauteur.

Cependant, il faut signaler que **ces deux sujets** ont tout de même supporté –18°C le 6 janvier 1938 et –20,2°C durant l'hiver 1985-1986, dernier grand hiver froid en France.

## Comportement des derniers spécimens observés depuis le dernier quart du 20ème siècle

Il se passa ensuite plus de trente ans pour que cette espèce revienne aux Barres sous forme de graines. En 1974, on planta un nouvel arbre issu de semences envoyées par les services forestiers taiwanais, puis deux autres en 1976, issus du même lot. Ces deux derniers sujets sont encore présents et se portent fort bien. Ils mesurent aujourd'hui respectivement 13,8 et 13,1 m de hauteur pour 0,33 et 0,29 m de diamètre à 1,3 m du sol.

Ils ont eux aussi été plantés au milieu d'autres arbres plus âgés mais bénéficiant d'une « cheminée » de lumière. Cependant la situation était moins ombragée que pour leurs prédécesseurs et, depuis les années 1990, d'autres arbres proches ont disparu, mettant les *Taiwania* encore un peu plus en lumière. Il est à signaler qu'en un autre point de l'arboretum d'autres sujets sont morts gelés au début janvier 1979 lors d'une chute brutale de température où celle-ci est tombée de 11°C à –9°C en seulement deux heures !

Dans un autre site prestigieux, l'arboretum de Jouéou, situé à la frontière espagnole, Henri Gaussen (1891-1981), éminent biogéographe, avait voulu installer le prestigieux conifère. Malheureusement, les quatre *Taiwania* qui y furent plantés dans les années trente ont rapidement disparu. Ils provenaient directement de Taiwan. Le climat assez rude de Jouéou et la malchance de les avoir installés durant la première moitié du siècle précédent où les hivers rudes furent nombreux, doivent nous permettre d'expliquer ces échecs.

En climat nettement plus doux, au jardin des Cèdres de Saint Jean-Cap-Ferrat, sur la Riviera française, un *Taiwania* d'origine inconnue a réussi à se développer correctement. Probablement l'un des premiers à avoir été planté en France, il mesure aujourd'hui fièrement 20 m de hauteur pour 180 cm de circonférence et il est l'un des arbres remarquables de ce qui est le plus riche jardin subtropical d'Europe. Le sol est une « terre rouge » acide.

A priori et en l'absence du contraire, aucun autre arboretum français n'a accueilli de *Taiwania cryptomerioides* avant les années 1970. Cette lacune correspond à la période de déshérence des arboreta français où très peu d'arbres furent installés entre le lendemain de la seconde guerre mondiale et le milieu des années 1980.

C'est ainsi que l'autre arboretum national, celui de Chèvreloup, attenant au parc du château de Versailles, s'est enrichi de plusieurs spécimens à partir de 1975. L'un d'eux, planté cette même année, mesure aujourd'hui 5 m de hauteur pour 0,2 m de diamètre. Ensuite, à partir de graines provenant des services forestiers de Taipei par l'intermédiaire d'Albert Dumas, six autres sujets, tous récoltés dans l'aire d'origine furent plantés entre 1998 et 2004.

Le jardin botanique de Strasbourg, au nord-est de la France à la frontière allemande, réputé pour ses nombreux arbre et arbustes rares, renferme un *Taiwania* planté en 1981. Le climat y est continental et le sol est de nature graveleuse avec un pH de valeur 8 (dimensions : 5,5 m de haut pour 0,53 m de diamètre à 1,3 m du sol).

Enfin, l'une des meilleures réussites reste le *Taiwania* planté au jardin des Plantes de Toulouse dans le sud-ouest de la France. Il mesure actuellement environ 14 m de hauteur pour 161 cm de circonférence. Voir note de Vassal à la fin.

C'est aussi dans les collections privées que l'on peut observer cet arbre fascinant. En 1987, M. et Mme Dénarié, résidant près de Bordeaux au sud-ouest de la France, ont planté un *Taiwania* qui

[1] Les botanistes japonais ont fait de nombreuses récoltes à Formose au début du XXe siècle. (*N.D.L.R.)*

aujourd'hui est fort honorable. Ses dimensions l'attestent : 12 m de hauteur pour autant d'envergure de couronne. Le climat est d'influence océanique et les températures basses assez rares : cet arbre a néanmoins supporté –12°C en 1985 mais a vu la partie ouest de son feuillage brûlée par le sel lors de la tempête du 26 décembre 1999. Depuis, cet arbre a retrouvé un meilleur aspect.

En Bretagne, au nord-ouest de la France où les conditions pédo-climatiques (sol acide et léger, climat océanique) sont favorables au *Taiwania*, le jardin du Kestellic peut s'enorgueillir de posséder un joli sujet planté en 1989 et qui mesure 11 m de hauteur. Son origine n'est malheureusement pas très précise car il provient des pépinières néerlandaises Esveld.

Mais c'est chez Albert Dumas, collectionneur privé à Saint-Barthélemy-de-Séchilienne (lat. 45° 30' N, lon. 5° 49' E), dans le massif des Alpes, que les dernières plantations françaises semblent les plus prometteuses. La pluviométrie y est comprise entre 960 et 1'500 mm par an. Les graines ont été reçues le 3 juin 1992 de la Seed Bank of Tree Seed Laboratory du Taiwan Forestry Research Institute de Taipei. Elles commencèrent à germer 20 jours plus tard. Ces *Taiwania* ayant atteint entre 0,40 et 1,14 m de haut furent plantés dans un arboretum entouré de forêts, entre 530 et 550 m d'altitude, sur *colluvium* à tendance argileuse, ainsi que dans un haut de versant de torrent, sur sol graveleux et pierreux à 450 m d'altitude. Le pH a pour valeur 7 sur les deux sites.

Aujourd'hui, les deux premiers sujets, plantés le 24 septembre 1994, mesurent entre 5,5 et 7 m de hauteur et le troisième, installé le 16 octobre 1999, mesurait 3 m en septembre 2007. Les deux arbres présents dans le versant du torrent et plantés le 11 octobre 1997 mesurent aujourd'hui entre 3,5 et 5 m de hauteur. Ces individus sont tous vigoureux et ont supporté, alors qu'ils étaient jeunes et sans protection particulière, un minimum de –12°C. Il s'agit donc et potentiellement au vu des conditions stationnelles, les plus beaux jeunes spécimens de *Taiwania* en France.

Il faut enfin signaler que même sur les plus beaux sujets installés en climat plutôt favorable en France nous n'avons jamais pu observer de fructifications. Et le feuillage juvénile est toujours fortement présent même sur des arbres que l'on sait âgés de plusieurs décennies ! J'avais par ailleurs réalisé le même constat sur un grand *Taiwania*, lors d'une visite de l'Huntington arboretum de Pasadena, en Californie ou à la Villa Taranto, en Italie. La persistance de ce feuillage juvénile ou éventuellement sub-adulte (les feuilles sont plus courtes qu'au stade juvénile mais pas encore complètement matures) sur tous ces arbres en culture depuis plusieurs décennies, permet d'expliquer qu'ils n'ont pas atteint leur maturité sexuelle et de fait, ne fructifient pas…

L'une des explications serait une température moyenne annuelle pas assez élevée, associé probablement à un niveau d'ensoleillement insuffisant, la position zénithale du soleil en Europe n'étant pas aussi verticale que dans l'aire naturelle située en zone tropicale.

Alors à ce jour, la seule observation de cônes a été faite en 2005 en Europe sur un sujet de 18 m de haut cultivé en serre au jardin botanique de Düsseldorf, en Allemagne (*Deutsche Dendrologische Geselchaft* n° 92).

Malgré tout, il reste un espoir d'observer pour la première fois un *Taiwania* fructifère, cultivé en plein air en Europe : le spécimen du Jardin des Cèdres de Saint-Jean-Cap-Ferrat porte des feuilles squamiformes au niveau de sa cime depuis quelques années seulement… il faudra encore attendre plusieurs années avant que les fleurs femelles ne s'installent dans la partie supérieure de la couronne, car elles ne sont **jamais présentes** parmi les branches les plus **sommitales**.

## Avenir du *Taiwania* en France et enseignements qu'il faut tirer des plantations passées

Comme partout dans le monde, les changements climatiques se font sentir dans notre pays. *Taiwania cryptomerioides* est un arbre exigeant en pluviométrie mais aussi en hygrométrie. Or, depuis août 2003, puis en juillet 2006, une chute drastique du taux d'hygrométrie s'est conjugué à de fortes températures estivales de type caniculaire (supérieure à 40°C le jour et au minimum entre 22° et 25°C la nuit). On serait donc tenté de craindre pour l'acclimatation de ce conifère dans nos jardins. Malgré tout, aucun spécimen en culture n'a fait preuve de sensibilité à ces chaleurs sèches, inhabituelles dans son biotope naturel. L'irrégularité et/ou la baisse de la pluviométrie seraient davantage à redouter.

On peut cependant affirmer que cet arbre est beaucoup plus résistant au froid qu'on le pressentait au début du vingtième siècle. Il convient juste de le protéger les toutes premières années, notamment vis-à-vis des vents hivernaux froids et des gelées printanières, à l'aide par exemple d'une haie et d'un simple paillage de feuilles de fougères.

L'autre enseignement important est de planter *Taiwania cryptomerioides* en pleine lumière. Le manque de lumière et donc la concurrence des arbres voisins sont à l'origine des dépérissements et des mortalités enregistrées en France, les arbres étant trop faibles pour supporter ensuite tout stress climatique.

Bien entendu, le choix de la provenance est primordial, mais les altitudes maximales possibles pour les récoltes (1750-2900 m) ne semblent pas forcément être indispensables dans les arboreta français situés en zone 7 (minima compris entre –12°C et –17°C).

Tout en veillant à l'altitude des récoltes ainsi qu'à la diversité génétique des semences que l'on pourrait recevoir de Taiwan, c'est en respectant les recommandations présentement évoquées que l'on pourra continuer d'installer cet arbre majestueux et trop peu connu dans nos jardins tant publics que privés. Ainsi, on peut espérer qu'il devienne au moins aussi fréquent que *Cryptomeria japonica* avec lequel il est encore trop souvent confondu.

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## Remerciements

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Cet article a été initialement publié ainsi : Status of the introduction of *Taiwania cryptomerioides* Hayata in France - International symposium of *Taiwania cryptomerioides*, 8-10 december, 2007 – The experimental national forest, National Taiwan University (pages 19-23).

Figure 1 : Arboretum de Chèvreloup, 8.2010.

**Photo :** Edwin Smits

Figure 2 : Arboretum national des Barres, 11.2001.

**Photo :** Arboretum de Villardebelle

## *Taiwania cryptomerioides* Hayata 1906

# *Taiwania* cones – new observations in Europe

In 2007 Armin Jagel published an observation of a *Taiwania cryptomerioides* producing cones in a greenhouse at the botanical garden of Düsseldorf (Germany). In this article he mentions observations done outside in Ireland and in western France, but to our knowledge these flowerings were not recorded in writing and no photo was taken. The following observations show that in southern Europe[1] several trees are now mature enough to produce both pollen and seed cones.

During a conifer conference in September 2009 hosted at Polidora Garden, a tour was organised to visit several of the botanical gardens around the Lago Maggiore (Italy and Switzerland). At the Otto Eisenhut nursery (Switzerland), at the north-east side of the lake, there is a nice garden displaying several of the trees sold by the nursery. Magnolias and conifers occupy a large place in this garden installed on a steep slope some 130 metres above the lake. Close to a *Sequoiadendron giganteum*, but not as large, is a *Taiwania cryptomerioides*. MF was quick to spot the weathered small seed cones fallen from that tree on the ground. Looking with binoculars at the top of this tree (about 18 metres tall), it was possible to see numerous new seed cones, still green on 10 September (figures 1 to 4). It looks like a pecularity of this species that the seed cones are only produced in the top of the crown and only on trees over about 50 years old.

More recently in March 2012, while one of us (DM) visited the private garden Les Cèdres at Saint-Jean-Cap-Ferrat (France), a second *Taiwania* was discovered bearing both pollen and seed cones (figures 5 & 6). Once again the seed cones were first seen on the ground, from a fallen branchlet. There are lots of parrots in this garden with the habit of cutting small branches high on the trees.

At the Botanical Garden of Geneva, the *Taiwania cryptomerioides* never grew in height, unable to develop a leader and consequently is more broad than tall. For the first time since it was planted in 1987, it produced an abundance of pollen cones in March 2012. No seed cones could be observed (see figures 7 to 10).

This taxon is not rare in the botanical gardens of western and southern Europe (France, Switzerland, Italy), where it has proved to be completely hardy so far (at least hardiness zone 8). In protected places it has withstood frosts to -17°C (Arboretum des Barres, France; Saint-Barthélémy-de-Séchilienne, France). Some of the most exposed branches of a young tree were scorched and turned brown and dry when subjected to strong winds and temperatures down to at least -12°C. The species can support some summer drought, and went through the heat and drought wave of the summer 2003 (which struck all of western Europe) without harm. Some of these trees are as tall as those observed with cones, but still have not produced any.

### Taxonomic note

Although morphological distinctions between Taiwanese and Asian Mainland populations are minimal and still under evaluation, the strong genetic differentiation resulting from between 3.23–3.41 million years separation (Chou et al. 2011), makes recognition of the Mainland populations at varietal rank, as *Taiwania cryptomerioides* var. *flousiana* (Gaussen) Silba, appropriate. The foliage colour, often cited as a distinction, does not appear to be very reliable. Where the origin of specimens is documented, the variety is given in Appendix 1, though these identities have not been verified by genetic analysis : **blue colour** : var. *cryptomerioides* ; **green colour** : var. *flousiana* ; **black colour** : origin unknown.

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Jagel, A. & P. Knopf. (2007). Blühende Zapfen der Taiwanie (*Taiwania cryptomerioides* Hayata *Cupressaceae* s.l.) im Botanischen Garten Düsseldorf. Erstmals in Mitteleuropa? *Mitt. Dtsch. Dendrol. Ges.* 92: 117-124.

[1] Armin Jagel wrote: “In South Europe to our knowledge this species is planted in favourable places, but it is not fit for an extensive plantation there because of drought.” (pp. 119-120)

## Photos

Figures 1 to 4 : Otto Eisenhut Botanical Garden (Switzerland), 10.9.2009.

## Appendix 1 :

List of some cultivated *Taiwania cryptomerioides* in France, Switzerland and Northern Italy.

**France :**

- First *Taiwania* planted at the **Arboretum national des Barres** from sowing in 1925.
- One planted in the **Botanical Garden of Toulouse** by Henri Gaussen between 1946 and 1958.
- Several specimens, among which some offered by Albert Dumas at the **Arboretum national de Chèvreloup** from 1975 onward.
- One planted in the **Botanical Garden of Strasbourg** in 1981.
- One planted in **Bordeaux** in 1987.
- One planted in the **Jardin de Kestellic** in Bretagne in 1989. [continues on page 45]

Figures 5 & 6 : Les Cèdres, France, 20.2.2012. Male cones before pollen release, and seed cone after seed release.

Figures 7 to 10 : Botanical Garden of Geneva, 17.3.2012.

**Appendix 1** [continued from page 43] **:**

**France :**

- Two trees planted at **Saint-Barthélemy-de-Séchilienne**, Isère, in 1994, three in 1997 and one in 1999.
- **Jardin Botanique Les Cèdres**, Alpes maritimes.
- **Faculté d'Orsay**, Université Paris-Sud, Essone.

**Italy :**

- **Villa Taranto Botanical Garden**, Verbania.
Height : 12-13 m (before it lost its top, about 2.5-3 m, in August 2012 because of a local tornado) ; circumference : 125 cm at 1 m ; planted between 1989 and 1990. Origin: Otto Eisenhut Nursery.
- **Isola Madre Botanical Garden**, Lago Maggiore.

**Switzerland :**

- **Otto Eisenhut Botanical Garden**, San Nazzaro, Ticino.
- **Conservatoire et Jardin Botanique de Genève**, Genève.

Figure 11 : Faculté d'Orsay, September 2010.

Figure 12 : Saint-Barthélemy-de-Séchilienne, Isère, 2007.
Planted October 1997 – Altitude 450 m.

Figure 13 : Isola Madre, 9.2011.

**Photo credit** : fig. 1 to 11 : Arboretum de Villardebelle – fig. 12 : Albert Dumas – fig. 13 : Ernesto Toga.

**Addendum : *Cupressus revealiana* (Silba) Bisbee, *comb. nova*, validation as a new species.**

Morphological differences between *Cupressus stephensonii* Wolf and *Cupressus revealiana* (Silba) Bisbee, see *Bull CCP* 1 (1): 3-15. More observations were conducted on both species :

- On young saplings the colour of the trunk is different; olive-green or yellowish on the Cuyamaca Cypress and grey on El Rincon Cypress (see figures 1 & 2). This character is quite constant, on all cultivated individuals observed. Diameter of the stems in the photos : *Cupressus stephensonii* – 2.4 cm ; *Cupressus revealiana* – 2.5 cm.

Fig. 1 : *Cupressus stephensonii*, cultivated.

Fig. 2 : *Cupressus revealiana*, cultivated.

- On the ultimate shoots, the branching pattern is quite different. For the same size of branchlets, *Cupressus stephensonii* shows one more branching step than *Cupressus revealiana*. The following illustration (fig. 3) demonstrates it. Also note that opposite branching is more frequent on *Cupressus stephensonii* than on *Cupressus revealiana*, where alternate branching is dominant.

Fig. 3 : branching pattern of *Cupressus stephensonii* (left) and *Cupressus revealiana* (right) – ultimate shoots, rank 3.

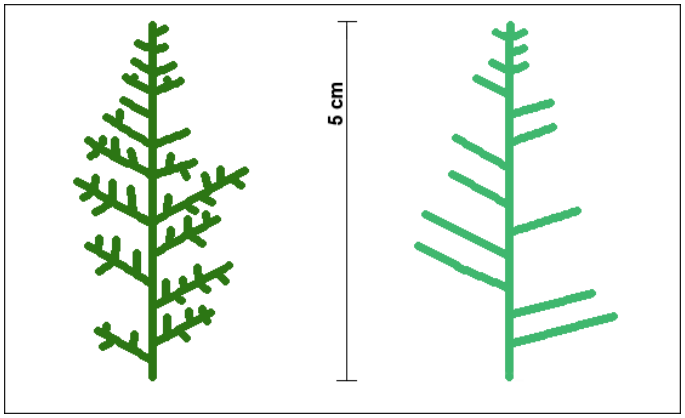


Figure 3 was drawn from actual shoots. The following photos show these branchlets.

Fig. 4 : *Cupressus stephensonii*, cultivated, branching pattern of ultimate shoots.

Fig. 5 : *Cupressus revealiana*, cultivated, branching pattern of ultimate shoots

For further examples with herbarium material from wild populations, see p. 54.



## Addendum : new measurements on *Cupressus sempervirens* L. cones.

Data given by A.Camus (1914) on *C. sempervirens* maximum length and number of cone scales.

| | Year | Max. length | Scale number |
|---|---|---|---|
| A. Camus | 1914 | 42 mm | 14 |

Camus, A. (1914). *Les Cyprès, (genre* Cupressus*), monographie, systématique, anatomie, culture, principaux usages*. P. Lechevalier, Paris, France. (p. 29)

**Jeff Bisbee**

# *Cupressus stephensonii* Wolf 1948

# CUYAMACA CYPRESS

**Photos taken at Upper King Creek, Cuyamaca Peak, San Diego Co., California, USA.**





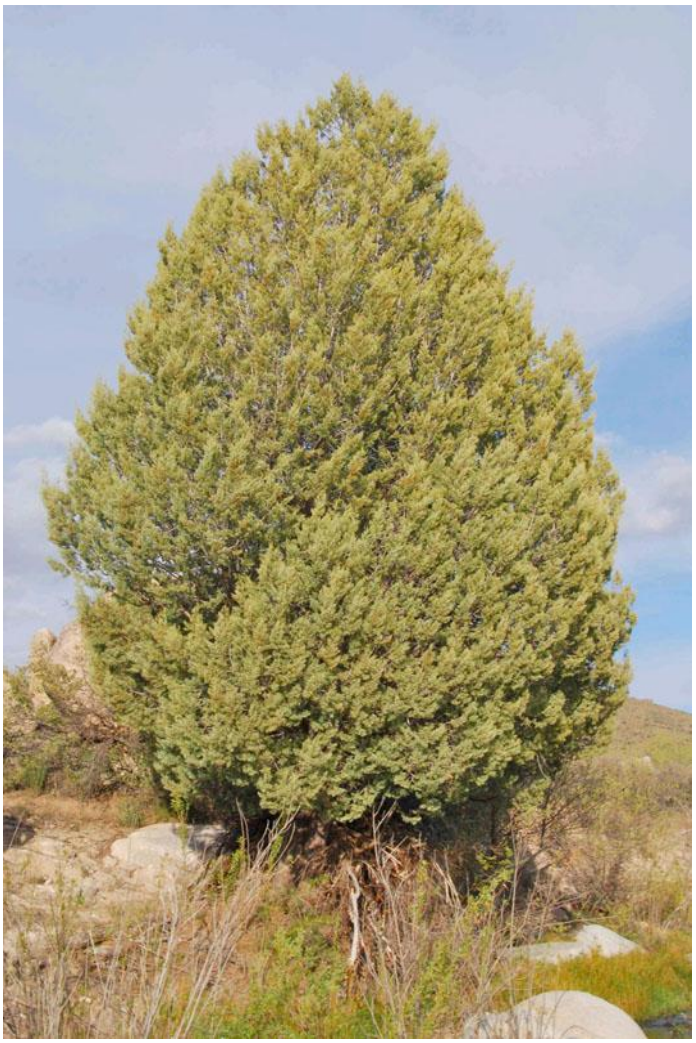


**Jeff Bisbee**

# *Cupressus revealiana* (Silba) Bisbee 2012

# EL RINCON CYPRESS

**Photos taken at El Rincon, south end of Sierra Juarez, Baja California, Mexico.**







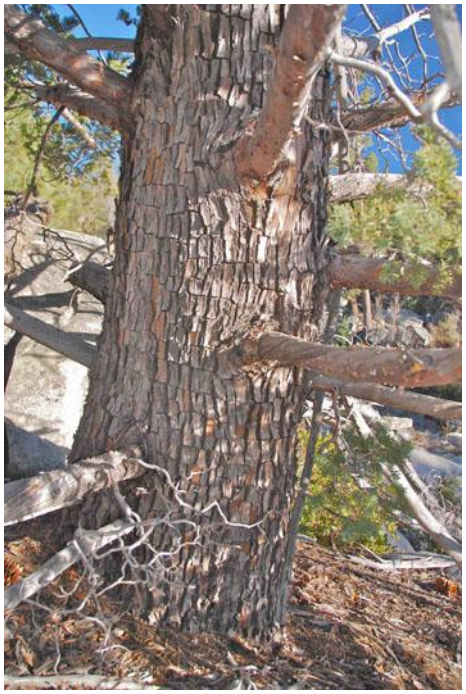

**Jeff Bisbee**

# *Cupressus montana* Wiggins 1933

# SAN PEDRO MARTIR CYPRESS

**Photos taken 4 miles south of trailhead to Botella Azul, San Pedro Martir, Baja California, Mexico.**







**Appendix 1**: Details of foliage (fresh herbarium material) – **Figure 1 :** *Cupressus stephensonii*

**Figure 2 :** *Cupressus revealiana*

**Figure 3 :** *Cupressus montana*

# *Cupressus butanoensis* (Silba) Malone & Bisbee, a new cypress species

C.B.Wolf (1948) in his monograph of the New World Cypresses described two new species. One of them [1], *Cupressus abramsiana*, had until then been included in *Cupressus goveniana* Gordon from Monterey County. In the distribution of this new taxon, Wolf described the three populations known at that time : Bonnie Doon, Eagle Rock and Butano Ridge, but this last one only "with considerable hesitancy", for he was not able to visit the actual stand – difficult to access if not given the proper direction – but relied on herbarium material and only made a supposition as to its placement under *Cupressus abramsiana*. Silba (2003) visited all currently known stands of this species and described every population as a subspecies of *Cupressus abramsiana* (see Appendix 1 for the complete list, p. 57), the one on Butano Ridge being described as *Cupressus abramsiana* subsp. *butanoensis* Silba.

Butano Ridge lies at the south of the San Mateo County in California. The population occupies a small area on thin sandstone soil, where other conifer species are unable to grow.

## Morphology

*Cones* : as already noted by Wolf and McMillan (1952), the Butano Ridge cones are larger (see table I for comparison of McMillan's data with ours). In our too small sample of cones, this could not be verified in comparison with the Eagle Rock material. Some of the cones are presented in figures 2 to 5 (page 58) and the details of a whole series of new measurements from a limited sample in table V (page 59). This first dataset will be supplemented by further studies.

Table I : Size of cones of the five different populations classified under *Cupressus abramsiana*. The cone sample size is in blue.

| mm | #cones | max.length | average length | McMilllan |
|---|---|---|---|---|
| **Butano Ridge** | **81** | 42.0 | 29.5 | 28 |
| **Eagle Rock** | **13** | 35.2 | 28.3 | 24 |
| **Bonny Doon** | **99** | 34.5 | 18.0 | 21 |
| **Bracken Brae** | **61** | 29.1 | 21.0 | – |
| **Majors Creek** | **32** | 27.9 | 20.3 | – |

*Cone scales* : on average, the number of cone scales is distinctly higher in the Butano Ridge trees, again except for Eagle Rock (see table II). As with table I, the McMillan data (1952, last column) are based on 100 randomly collected cones in each population.

Table II : Number of cone scales of the different populations classified under *C.abramsiana*. The cone sample size is in blue.

| **Cones scales** | | **6** | **8** | **10** | **12** | **14** | Total | **Average** | **McMillan** |
|---|---|---|---|---|---|---|---|---|---|
| Butano Ridge | | **1** | **7** | **41** | **26** | **6** | **81** | **10.72** | **10.40** |
| | % | **1.23** | **8.64** | **50.62** | **32.10** | **7.41** | **100** | | |
| Eagle Rock | | | **4** | **6** | **3** | | **13** | **9.85** | **8.70** |
| | % | | **30.77** | **46.15** | **23.08** | | **100** | | |
| Bonny Doon | | **15** | **68** | **12** | **4** | | **99** | **8.10** | **8.40** |
| | % | **15.15** | **68.69** | **12.12** | **4.04** | | **100** | | |
| Majors Creek | | **3** | **16** | **12** | **1** | | **32** | **8.69** | – |
| | % | **9.38** | **50.00** | **37.50** | **3.12** | | **100** | | |
| Bracken Brae | | **15** | **30** | **16** | | | **61** | **8.03** | – |
| | % | **24.59** | **49.18** | **26.23** | | | **100** | | |

[1] The second one is the critically endangered species *Cupressus stephensonii*.

*Foliage colour* : the colour of the Butano Ridge Cypress leaves is distinctly glaucous, while the other Santa Cruz Cypress populations have bright green leaves.

*Seedlings* : they already have a glaucous colour at the end of the first growing season.

*Seeds* : research into observed differences in the seeds is continuing and will be published in the next Bulletin.

*Cotyledons* : one of the main morphological difference is observed with the number of cotyledons (see table III, McMillan 1953 and table IV), when the available statistical data show a clear shift of the Butano Ridge Cypress towards a greater number of cotyledons. The presence of a significant number of seedlings with 5 cotyledons is characteristic of this taxon, although the similarity with the Eagle Rock population will be investigated further taking into account the small number of specimens observed by McMillan.

Table III : Number of cotyledons (McMillan 1953).
The seedlings sample size is in blue.

| **Cotyledons** | **3** | **4** | **5** | Total | **Average** |
|---|---|---|---|---|---|
| Butano Ridge | 15 | 125 | 45 | 185 | **4.16** |
| % | 8.11 | 67.57 | 24.32 | 100 | |
| Eagle Rock | 0 | 19 | 6 | 25 | **4.24** |
| % | 0.00 | 76.00 | 24.00 | 100 | |
| Bonnie Doon | 56 | 56 | 1 | 113 | **3.51** |
| % | 49.56 | 49.56 | 0.88 | 100 | |

Table IV : Number of cotyledons, new observations.
The seedlings sample size is in blue.

| **Cotyledons** | **2** | **3** | **4** | **5** | **6** | Total | **Average** |
|---|---|---|---|---|---|---|---|
| Butano Ridge | | 19 | 116 | 26 | 1 | 162 | **4.06** |
| % | | 14.29 | 71.43 | 13.49 | 0.79 | 100 | |
| Bracken Brae | | 51 | 51 | 1 | | 103 | **3.51** |
| % | | 47.13 | 51.72 | 1.15 | | 100 | |
| Bonnie Doon | 1 | 126 | 112 | 7 | | 246 | **3.51** |
| % | 0.41 | 51.22 | 45.53 | 2.85 | | 100 | |

## Ecology

Although all populations so far classified under *Cupressus abramsiana* are growing on sandstone derived soils, most of the Butano Ridge trees grow on a very shallow soil, limiting their height to some 10 m while at some better places they reach 23 m (McMillan 1952). JM noted that many trunks are lying on the ground, unable to anchor their roots firmly. The grove is installed on a south-western slope. The plant community is very different from the other stands.

## Geography

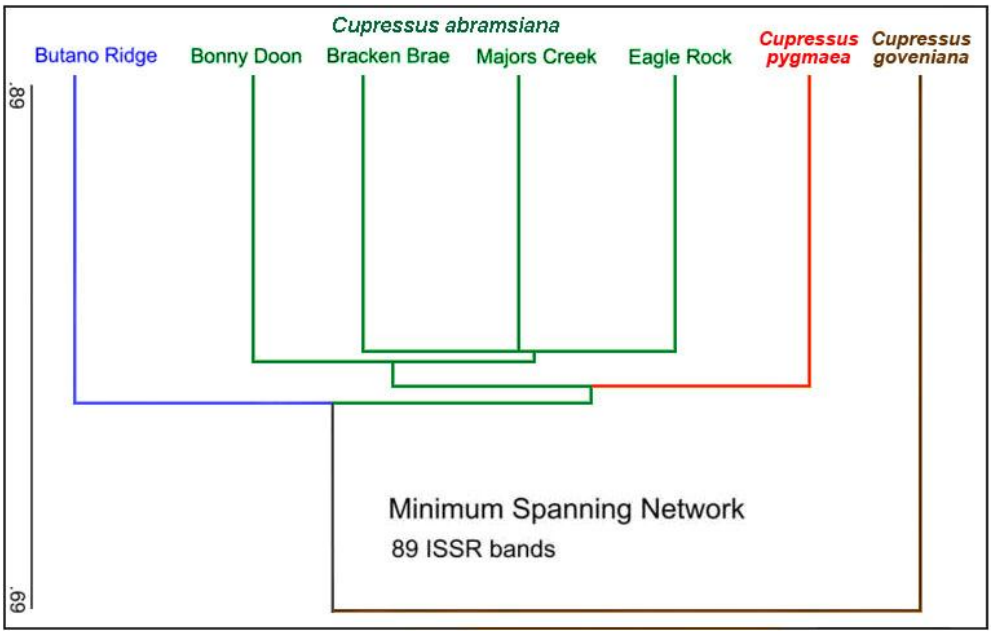
The Butano Ridge population is isolated from the other stands and surrounded by forest of *Sequoia sempervirens*, *Pinus* sp. and *Pseudotsuga menziesii*. The closest *Cupressus abramsiana* locality at Eagle Rock is 11 km away in a straight line to the South. McMillan (1952) estimated that this “isolation [..] is sufficient to preclude any free interchange of genic material”.

## Molecular data

Adams and Bartel (2009) proposed to test the validity of the 5 subspecies described by Silba by submitting specimens of all stands to molecular analysis. Their results placed the first four populations close enough and – according to them – do not justify any distinct variety or subspecies. On the other hand the Butano Ridge samples were significantly distinct (see figure 1 below, simplified cladogram after Adams & Bartel summarising the molecular data). Unfortunately *Cupressus sargentii* was not included in this study.

From this cladogram, the clustering of *Cupressus pygmaea* inside the acknowledged *Cupressus abramsiana* taxa means that this species is paraphyletic when the Butano Ridge population is included. It gives a decisive argument to treat the Butano Ridge trees as a separate species.

Figure 1 : Simplified cladogram (after Adams & Bartel, 2009, fig. 3, p. 292.) showing that *Cupressus abramsiana* – as a species including the Butano Ridge population – is paraphyletic.




## Conclusion

These observations lead us to raise the Butano Ridge cypress to specific rank.

***Cupressus butanoensis*** (Silba) Malone & Bisbee, *comb. et stat. nov.*
**Basionym :** *Cupressus abramsiana* subsp. *butanoensis* Silba, *Journal Int. Conifer Preserv. Soc.* 10 (1): 34 (2003).
**Synonym :** ≡ *Hesperocyparis abramsiana* var. *butanoensis* (Silba) Bartel & R.P.Adams, *Phytologia* 91 (2): 296 (2009).
**Type :** Butano Ridge, San Mateo County, *C.McMillan 1620*, 1.9.1951 – holotype : NY 9515.

## Bibliography


Adams, R.P. & J.A. Bartel (2009). Infraspecific Variation in *Hesperocyparis abramsiana*: ISSRs and Terpenoid Data. *Phytologia*, 91 (2): 287-299.
McMillan, C. (1952). The Third Locality for *Cupressus abramsiana* Wolf. *Madroño*, 11: 189-194.
McMillan, C. (1953). Variation in Seedlings of *Cupressus abramsiana* Wolf. *Madroño* 12: 28-30.
Silba, J. (2005). Studies on Population Dynamics in *Cupressus abramsiana* C.B.Wolf, (Cupressaceae). *Journal International Conifer Preservation Society* 12 (1): 1-11.
Silba, J. (2003). Field Observations of *Cupressus* in central and coastal California July 2002 to January 2004. *Journal International Conifer Preservation Society* 10 (1) : 1-58.
Wolf, C.B. (1948). Taxonomic and distributional studies of the New World cypresses. *El Aliso* 1: 1–250.


**Appendix 1 : Subspecies of *Cupressus abramsiana* according to Silba (2003).**

| Locality | County | Silba subspecies |
|---|---|---|
| Bonny Doon | Santa Cruz | *abramsiana* |
| Bracken Brae | Santa Cruz | *opleri* |
| Eagle Rock | Santa Cruz | *locatelli* |
| Majors Creek | Santa Cruz | *neolomondensis* |
| Butano Ridge | San Mateo | *butanoensis* |


**Figures 2 to 5 :** all cones at the same scale.
2. Upper left : *Cupressus butanoensis*
3. Upper right : *Cupressus abramsiana* Eagle Rock
4. Lower left : *Cupressus abramsiana* Bonnie Doon
5. Lower right : *Cupressus abramsiana* Bracken Brae

On the printed page, the cones appear at their actual size.

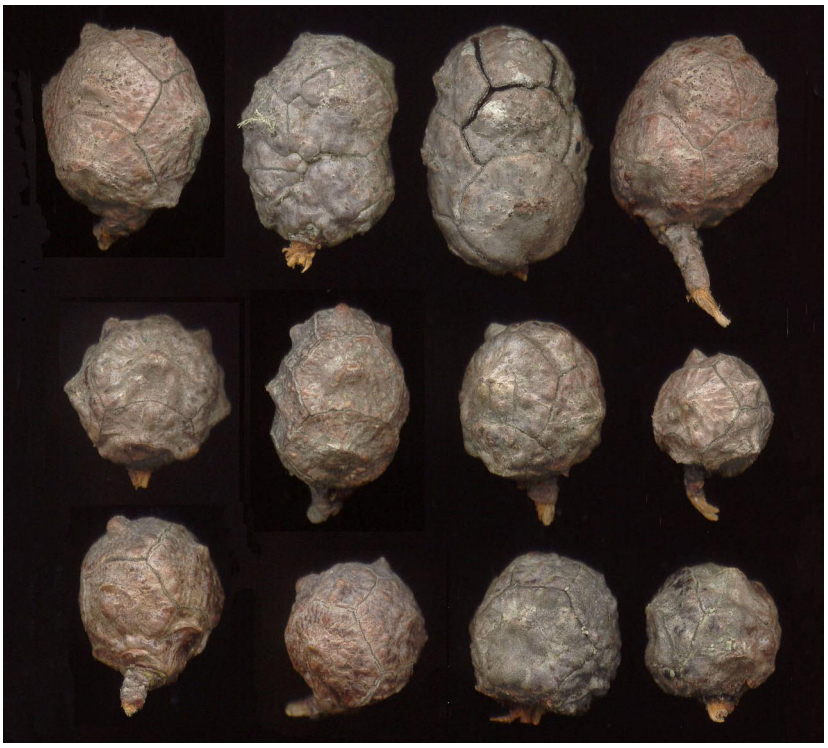


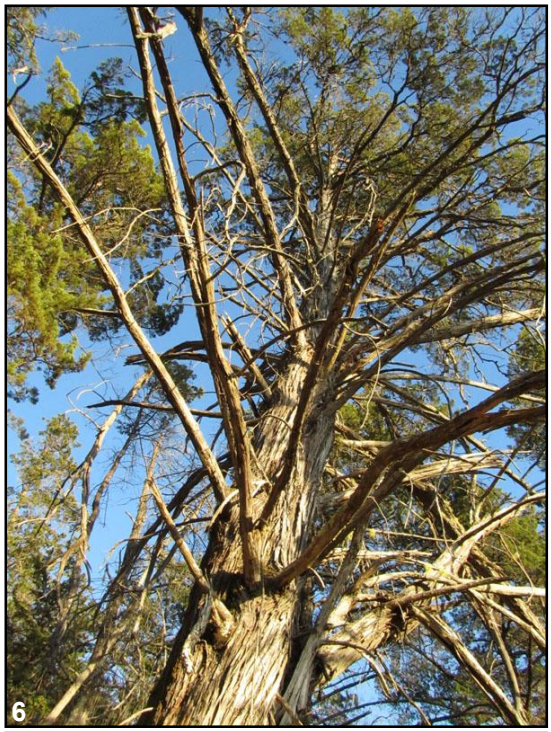
Table V : Statistical data for cones of the Santa Cruz and San Mateo cypresses.

| | Max. length | Min. length | Max. width | Min. width | Average length | Average max.width | Indice 1) | Average min.width | Indice 2) | Indice 3) | Sample size |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Butano Ridge** | 33.0 | 22.0 | 32.0 | 18.0 | 27.4 | 24.4 | 1.13 | 22.6 | 1.08 | **15.09** | **10** |
| **Eagle Rock** | 35.2 | 22.3 | 30.6 | 19.5 | 28.3 | 24.7 | 1.14 | 22.4 | 1.10 | **15.70** | **13** |
| **Bonny Doon** | 34.5 | 17.0 | 23.9 | 15.4 | 23.5 | 20.8 | 1.12 | 19.6 | 1.06 | **9.53** | **17** |
| **Bracken Brae** | 29.1 | 17.4 | 22.7 | 15.5 | 23.3 | 19.3 | 1.20 | 18.0 | 1.07 | **8.06** | **19** |
| **Major Creek** | 27.9 | 14.3 | 24.2 | 14.6 | 20.3 | 19.6 | 1.04 | 18.3 | 1.07 | **7.28** | **32** |

1) Average length/average max.width
2) Average max.width/average min.width
3) Average length * average max.width * average min.width

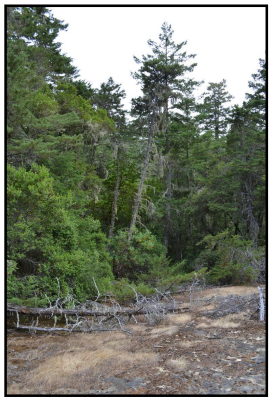
The three indices help to describe the shape and size of the cones.

**Figures 6 to 11 :** Butano Ridge cypress. Note the sandstone soil in photos 7, 8 and 10 and the fallen trunks on photos 10 and 11. Photos : Joey Malone










**Jeff Bisbee**

# *Cupressus butanoensis* (Silba) Malone & Bisbee 2012

# BUTANO RIDGE CYPRESS

**Butano Ridge, San Mateo County, California, USA.**








**Jeff Bisbee**

# *Cupressus abramsiana* Wolf 1948
# SANTA CRUZ CYPRESS

**Upper left : Bonnie Doon grove, Santa Cruz County. Upper right : Bracken Brae grove, Santa Cruz County.**
**2nd row : left : Bonnie Doon ; middle and right : Bracken Brae.**





**Left column : Bonnie Doon,**
**Santa Cruz County, California, USA.**

**Right column : Bracken Brae,**
**Santa Cruz County, California, USA.**








# TAXONOMY OF THE GENUS *CUPRESSUS*

The following list contains the species currently acknowledged by the *Cupressus* Conservation Project. All taxa are sufficiently distinct to be recognised at the species rank. Twenty-nine out of the thirty-two were first described by their authors at this taxonomic level. Reducing many of these taxa at the variety or subspecies level is not supported by our observations. Articles are in preparation to sustain these choices, when necessary. The conservation needs are better sustained by this taxonomy.

1. *Cupressus sempervirens* Linnaeus (1753)
2. *Cupressus dupreziana* A.Camus (1926)
3. *Cupressus atlantica* Gaussen (1950)
4. *Cupressus torulosa* D.Don in Lambert (1824)
5. *Cupressus tortulosa* Griffith (1854)
6. *Cupressus austrotibetica* Silba (1988)
7. *Cupressus gigantea* W.C.Cheng & L.K.Fu (1975)
8. *Cupressus chengiana* S.Y.Hu (1974)
9. *Cupressus duclouxiana* Hickel in Camus (1914)
10. *Cupressus funebris* Endlicher (1847)
11. *Cupressus tonkinensis* Silba (1994)
12. *Cupressus vietnamensis* (Farjon & Hiep) Silba (2005)
13. *Cupressus nootkatensis* D.Don in Lambert (1824)
14. *Cupressus bakeri* Jepson (1909)
15. *Cupressus macnabiana* A.Murray bis (1855)
16. *Cupressus stephensonii* C.B.Wolf (1948)
17. *Cupressus revealiana* (Silba) Bisbee (2012)
18. *Cupressus glabra* Sudworth (1910)
19. *Cupressus arizonica* Greene (1882)
20. *Cupressus nevadensis* Abrams (1919)
21. *Cupressus montana* Wiggins (1933)
22. *Cupressus goveniana* Gordon (1849)
23. *Cupressus pygmaea* (Lemmon) Sargent (1901)
24. *Cupressus abramsiana* C.B.Wolf (1948)
25. *Cupressus butanoensis* (Silba) Malone & Bisbee (2012)
26. *Cupressus sargentii* Jepson (1909)
27. *Cupressus macrocarpa* Hartweg ex Gordon (1849)
28. *Cupressus guadalupensis* S.Watson (1879)
29. *Cupressus forbesii* Jepson (1922)
30. *Cupressus lindleyi* Klotzsch ex Endlicher (1847)
31. *Cupressus benthamii* Endlicher (1847)
32. *Cupressus lusitanica* Miller (1768)