

= Xerochrysum bracteatum =

Xerochrysum bracteatum , commonly known as the golden everlasting or strawflower , is a flowering plant in the family Asteraceae native to Australia . Described by Étienne Pierre Ventenat in 1803 , it was known as *Helichrysum bracteatum* for many years before being transferred to a new genus *Xerochrysum* in 1990 . It grows as a woody or herbaceous perennial or annual shrub up to a metre (3 ft) tall with green or grey leafy foliage . Golden yellow or white flower heads are produced from spring to autumn ; their distinctive feature is the papery bracts that resemble petals . The species is widespread , growing in a variety of habitats across the country , from rainforest margins to deserts and subalpine areas . The golden everlasting serves as food for various larvae of lepidopterans (butterflies and moths) , and adult butterflies , hoverflies , native bees , small beetles , and grasshoppers visit the flower heads .

The golden everlasting has proven very adaptable to cultivation . It was propagated and developed in Germany in the 1850s , and annual cultivars in a host of colour forms from white to bronze to purple flowers became available . Many of these are still sold in mixed seed packs . In Australia , many cultivars are perennial shrubs , which have become popular garden plants . Sturdier , long @-@ stemmed forms are used commercially in the cut flower industry .

= = Taxonomy = =

French botanist Étienne Pierre Ventenat described the golden everlasting as *Xeranthemum bracteatum* in his 1803 work *Jardin de Malmaison* , a book commissioned by Napoleon 's first wife Joséphine de Beauharnais to catalogue rare plants that she had collected and grown at the Château de Malmaison . The Latin species name *bracteatum* refers to the papery bracts (often mistakenly called petals) of the flower heads . Henry Charles Andrews transferred it to the genus *Helichrysum* based on the morphology of its receptacle in 1805 , and it was known as *Helichrysum bracteatum* for many years . Leo Henckel von Donnersmarck described it as *Helichrysum lucidum* in 1806 , and Christiaan Hendrik Persoon as *Helichrysum chrysanthum* in 1807 . It was given the name *Bracteantha bracteata* in 1991 , when Arne Anderberg and Laurie Haegi placed the members that are known as strawflowers of the large genus *Helichrysum* into a new genus *Bracteantha* , and designated *B. bracteata* as the type species . However , they were unaware that Russian botanist Nikolai Tzvelev had already placed *X. bracteatum* in the new , and at the time monotypic , genus *Xerochrysum* the previous year . This name was derived from the Greek words *xeros* " dry " , and *chrysum* " golden " , likely relating to the nature of the distinctive bracts . Confusion existed for a decade , with *Bracteantha* appearing in literature and the horticultural trade until it was clarified in 2002 that the latter name took precedence . Strawflower is the popular name for *X. bracteatum* in Europe , while in Australia it is known as an everlasting or paper daisy . An alternate name in 19th @-@ century Europe was *immortelle* . *X. bracteatum* itself is very variable and may represent several cryptic species . Alternately , the Tasmanian species *Xerochrysum bicolor* may be combined with it in future taxonomic revisions .

X. bracteatum and its relatives belong to the Gnaphalieae or paper daisies , a large tribe within the daisy family , Asteraceae . However , a 2002 molecular study of the Gnaphalieae has indicated the genus *Xerochrysum* is probably polyphyletic , as the two species sampled , *X. bracteatum* and *X. viscosum* , were not closely related to each other . *X. bracteatum* has been recorded hybridising with *X. viscosum* and *X. papillosum* in cultivation , and possibly also *Coronidium elatum* and *C. boormanii* .

= = Description = =

The plant is an erect perennial , or occasionally annual , herb that is simple or rarely branched at its base . It generally reaches 20 to 80 cm (8 to 31 @.@ 5 in) in height , but can have a prostrate habit in exposed areas such as coastal cliffs . The green stems are rough and covered with fine hairs , and are robust compared with those of other members of the genus . The leaves are lanceolate ,

elliptic , or oblanceolate in shape and measure 1 @. @ 5 to 10 cm (0 @. @ 59 to 3 @. @ 94 in) long and from 0 @. @ 5 to 2 cm (0 @. @ 20 to 0 @. @ 79 in) wide . They are also covered with cobwebby hairs . Sitting atop tall stems above the foliage , the flower heads range from 3 to 7 cm (1 to 3 in) in diameter . Occasionally , multiple heads arise from the one stem . Like the flowers of all Asteraceae , they are composed of a central disc which contains a number of tiny individual flowers , known as florets ; these sit directly on an enlarged part of the stem known as the receptacle .

Around the disc is an involucre of modified leaves , the bracts , which in *Xerochrysum* , as in most Gnaphalieae , are petal @-@ like , stiff , and papery . Arranged in rows , these bracts curl over and enclose the florets , shielding them before flowering . They create the impression of a shiny and yellow corolla around the disc . The intermediate bracts are sometimes white , while the outer ones are paler and often streaked reddish or brown (a greater variety of colours are found in cultivars) . These bracts are papery and dry , or ' scarious ' , with a low water content , unlike leaves or flower parts of other plants . They are made up of dead cells , which are unusual in that they have a thin primary and a thick secondary cell wall , a feature only found in sclerenchyma , or structural , cells , not cells of flowers or leaves .

The individual florets are yellow . Those on the outer regions of the disc are female , while those in the centre are bisexual . Female flowers lack stamens and have only a very short , tube @-@ shaped corolla surrounding a pistil that splits to form two stigmas , while bisexual or hermaphrodite flowers have a longer corolla , and (as in virtually all members of the family) five stamens fused at the anthers , with the pistil emerging from the center . The yellow corolla and pistil are located above an ovary with a single ovule , and surrounded by the pappus , the highly modified calyx of Asteraceae . It comprises a number of bristles radiating around the florets . Yellow in colour , they persist and are thought to aid in the wind dispersal of the 0 @. @ 3 cm (0 @. @ 12 in) long fruit . The smooth brown fruit , known as a cypsela , is 2 to 3 mm long with the pappus radiating from one end .

In the wild , *X. bracteatum* can be distinguished from *X. bicolor* in Tasmania by its broader leaves and cobwebby hairs on the stems , and from *X. macranthum* in Western Australia by the flower head colour ; the latter species has white flower heads whereas those of *X. bracteatum* are golden yellow . *Xerochrysum subundulatum* from alpine and subalpine areas of New South Wales , Victoria , and Tasmania is rhizomatous , and has markedly pointed orange bracts . The eastern Australian species *X. viscosum* may be distinguished by its rough and sticky leaves .

= = Distribution and habitat = =

Xerochrysum bracteatum occurs in all Australian mainland states and territories , as well as Tasmania . Widespread , it is found from North Queensland across to Western Australia , and in all habitats excluding densely shaded areas . It grows as an annual in patches of red sand in Central Australia , responding rapidly to bouts of rainfall to complete its lifecycle . It is common among granite outcrops in southwest Western Australia , and is found on heavier and more fertile soils in the Sydney region , such as basalt- , shale- , or limestone @-@ based soils , generally in areas with a high water table . Associated species in the Sydney Basin include blackbutt (*Eucalyptus pilularis*) in open forest , and the shrubs *Empodisma minus* and *Baloskion australe* in swampy areas . It has been reported growing in disturbed soil , along roadsides and in fields in the New England region in the United States .

= = Ecology = =

The brightly coloured bracts act as petals to attract insects such as hoverflies , native bees , and small beetles that pollinate the florets . Grasshoppers also visit the flower heads . The caterpillars of *Tebenna micalis* have been recorded on this species , as have those of the Australian painted lady (*Vanessa kershawi*) . The tiny fruits are dispersed by wind , and germinate and grow after fire or on disturbed ground .

Flower production is related to increasing day length , and in general , plants produced the most

flowers from December to March . Varying planting times or artificially changing light levels might be ways to increase production of flowers outside these months .

The water mould (oomycete) *Bremia lactucae* has infected commercial crops in Italy and California . In 2002 on the Ligurian coast , widespread infection of several cultivars , most severely ' Florabella Pink ' and to a lesser extent ' Florabella Gold ' and ' Florabella White ' , resulted in leaf blistering and the development of chlorotic lesions on the leaves , and white patches on the undersides , particularly in areas of poor ventilation . There was an outbreak of downy mildew in a cultivated crop of *Xerochrysum bracteatum* in San Mateo County , California in 2006 , in which the leaves developed large chlorotic lesions . A *Phytoplasma* infection damaged *X. bracteatum* crops in the Czech Republic between 1994 and 2001 , causing poor growth , bronzing of foliage , and malformation of flower heads . Genetically , the pathogen was indistinguishable from the agent of aster yellows . The root @-@ knot nematode (*Meloidogyne incognita*) attacks and forms galls on the roots , which leads to the morbidity or death of the plant .

= = Cultivation = =

X. bracteatum had been introduced to cultivation in England by 1791 . German horticulturist Herren Ebrißsch obtained material and developed it at his nursery in Arnstadt near Erfurt in Germany . He bred and sold cultivars of many colours from bronze to white to purple , which spread across Europe in the 1850s . The bracts of these early forms tended to remain cupped around the flower head rather than flatten out like the native Australian forms . These were also annual rather than perennial forms . Many were given cultivar names such as ' atrococcineum ' (dark scarlet flower heads) , ' atosanguineum ' (dark blood @-@ red flower heads) , ' aureum ' (golden yellow flower heads) , ' bicolor ' (red @-@ tipped yellow flower heads) , ' compositum ' (large multicoloured flower heads) , ' macranthum ' (large rose @-@ edged white flower heads) , and ' monstrosum ' (flower heads with many bracts) , although today they are generally sold in mixed seed for growing as annuals . Some coloured forms of South African *Helichrysum* are thought to have been introduced to the breeding program , which resulted in the huge array of colours . *X. bracteatum* was one of several species that became popular with European royalty and nobility from the early 19th century , yet were little noticed in Australia until the 1860s , when they became more prominent in Australian gardens .

Most of the cultivars brought into cultivation in Australia in the latter part of the 20th century are perennials . ' Dargan Hill Monarch ' was the first of these , and many more have followed . Profusely flowering , these grow in many colours including white , yellow , orange , bronze , pink , and red . Their commercial lifespans are generally around three years . Queensland @-@ based company Aussie Winners has a range of compact plants ranging from orange to white known as Sundaze . Plants of this series usually have larger leaves . This range won the Gran premio d 'oro at the Euroflora exposition in Geneva in 2001 , for the best new plant series in the previous three years . ' Florabella Gold ' , a member of the Florabella series , won the award for best new pot plant (vegetative) in the Society of American Florists ' competition of 1999 . The Wallaby cultivars are range of taller forms with narrow leaves and white , yellow or pink flowers . Other commercial ranges include the Nullarbor series , and Queensland Federation daisies , including ' Wanetta Sunshine ' and ' Golden Nuggets ' .

X. bracteatum is easy to grow both from seeds and from cuttings , although named cultivars only grow true from cuttings . Plants benefit from pruning of old growth in winter to allow for new growth in spring . Dead @-@ heading , or pruning off old flower heads , promotes the production of more flowers . Fresh seeds germinate in 3 to 20 days and require no special treatment . Plants grow best in acid , well @-@ aerated soils of pH 5 @. @ 5 to 6 @. @ 3 , with low levels of phosphorus . They are sensitive to iron deficiency , which presents as yellowing (chlorosis) of the youngest leaves while the leaf veins remain green .

X. bracteatum can be grown in large pots or window boxes , and is a good pioneer plant in the garden until other plants become more established . Lower @-@ growing cultivars are suitable for hanging baskets and border plantings . The flowers attract butterflies to the garden . Dried flowers

are long lasting ? up to some years ? and are used in floral arrangements and the cut flower industry . More robust longer stemmed forms are used for commercial cut flowers . The main factor limiting lifespan of dried flowers is the wilting of stems , so flowers are sometimes wired into arrangements . Immersing flowers in glycerol or polyethylene glycol also lengthens lifespan .

== = Cultivars == =

Xerochrysum ' Dargan Hill Monarch ' was a natural form collected around 1 @. @ 6 km (0 @. @ 99 mi) inland from Cunninghams Gap in southern Queensland in May 1961 , and registered in February 1977 . It is a low perennial shrub 60 to 80 cm (23 @. @ 5 to 31 @. @ 5 in) high and 1 @. @ 5 m (4 @. @ 9 ft) across . The foliage is grey and the large flowers are 7 ? 9 cm in diameter and golden yellow in colour . It grows best in full sun and fair drainage . Cuttings strike readily , as does seed , although seedlings may differ from the parent .

Xerochrysum ' Cockatoo ' arose as a spontaneous hybrid between ' Dargan Hill Monarch ' and a white @- @ flowered perennial form of *X. bracteatum* , in the garden of Victorian plantsman Doug McKenzie in Ocean Grove near Geelong in Victoria . He applied to the Australian Cultivar Registration Authority (ACRA) for registration , which was granted in 1980 . It is a dense perennial shrub which reaches around 1 m (3 @. @ 3 ft) high and wide . The oblanceolate leaves measure 6 to 12 cm (2 @. @ 5 to 4 @. @ 5 in) long and are covered with fine hairs that give them a greyish cast . Fine hairs also cover the stems . The flower heads have light lemon @- @ yellow bracts and orange discs and average 7 cm (3 in) in diameter . They are held on long stems around 12 ? 15 cm (4 @. @ 5 ? 6 in) above the foliage . Like all forms , it prefers full sun . Although a perennial , it loses vigour after a few years , at which time it is best replaced . The name ' Cockatoo ' was chosen as the shape and colour of the ray florets are reminiscent of the wing feathers of the sulphur @- @ crested cockatoo .

Xerochrysum ' Golden Bowerbird ' is a hybrid , bred by a deliberate backcross of ' Cockatoo ' to ' Dargan Hill Monarch ' by Doug McKenzie , who applied for registration with the ACRA in 1980 . (It was granted in 1981 .) It has much larger flower heads than both parents , yet is a smaller shrub , which reaches 40 cm (15 @. @ 5 in) high by 70 cm (27 @. @ 5 in) wide . Denser than that of other forms , the foliage is covered in fine grey hair . On stalks around 10 cm (4 in) above the foliage , the flower heads measure up to 9 cm (3 @. @ 5 in) in diameter , although larger ones up to 10 cm are occasionally seen . They have around 300 bracts per flower head , compared with 80 for ' Dargan Hill Monarch ' and 200 in ' Cockatoo ' , giving them a " doubled " look . It is reported as producing fewer flower heads than ' Princess of Wales ' .

Xerochrysum ' Princess of Wales ' is a spontaneous hybrid , arising from a cross between ' Dargan Hill Monarch ' and an annual form . Arising in the Australian National Botanic Gardens in Canberra , it was selected by employee Peter Ollerenshaw in summer 1983 . He applied to register the cultivar with ACRA in March 1985 . It was named in honour of a visit by Diana , Princess of Wales to the gardens in November 1985 , the same month registration was granted . With compact foliage , this form reaches 60 cm (23 @. @ 5 in) high and wide . Unlike its parent ' Dargan Hill Monarch ' , its foliage has hair only on the midrib on the leaf underside . It flowers very profusely , and the large flower heads are borne on stalks 5 ? 9 cm (2 ? 3 @. @ 5 in) above the foliage . Unlike other forms , the stems wither and die naturally after flowering , making way for more new growth and flowers . The flower heads are golden yellow and measure 6 cm (2 @. @ 5 in) across .

Xerochrysum ' Diamond Head ' was a natural form collected around Diamond Head in New South Wales , where it is quite common on bluffs and cliffs . John Wrigley , curator of the Australian National Botanic Gardens at the time , applied to the ACRA to have it registered , which it was in February 1977 . Found on an exposed headland in nature , it grows as a low mat @- @ like perennial shrub 8 cm (3 in) high and 60 cm (2 @. @ 0 ft) across . The foliage is green and rough and the flowers are 3 cm in diameter and yellow in colour with an orange disc . It makes an ideal plant for rockeries , and strikes easily from cuttings during the spring growing period .

Xerochrysum ' Hastings Gold ' was a natural form from Hastings Point to the east of Murwillumbah on the New South Wales far north coast . It is a perennial herb with green bushy foliage reaching 25

cm (10 in) high and 70 cm (27 @. @ 5 in) wide . The golden yellow flower heads measure 5 cm (2 in) across and are held on stalks 20 cm (8 in) above the foliage . It is smaller than the similarly coloured ' Dargan Hill Monarch ' and larger than ' Diamond Head ' .

Xerochrysum ' Nullarbor Flame ' was a selection introduced into cultivation in 1997 that produces abundant red flowers with yellow discs and a diameter of 4 @. @ 5 cm (1 @. @ 8 in) . The plant grows to 50 ? 70 cm (19 @. @ 5 ? 27 @. @ 5 in) tall and 50 ? 80 cm (19 @. @ 5 ? 31 @. @ 5 in) wide .

Xerochrysum ' Pink Sunrise ' was developed by Goldup Nurseries in Victoria in 1986 , of unknown origin , presumably a hybrid . It is a compact perennial that reaches 30 cm (12 in) high and 60 cm (23 @. @ 5 in) wide . The flower heads are pink in bud , before opening as cream with orange discs .

Xerochrysum ' White Monarch ' was a spontaneous garden hybrid that resembles ' Dargan Hill Monarch ' but with white flower heads with orange discs measuring up to 8 cm (3 in) in diameter .

Xerochrysum ' Lemon Monarch ' resembles ' Cockatoo ' , but its lemon @-@ coloured flower heads have fewer bracts . It has bushy foliage .

Xerochrysum ' Strawburst Yellow ' , patented as ' Stabur Yel ' , is a form with large bright yellow flower heads averaging around 6 @. @ 3 cm (2 @. @ 5 in) in diameter . The result of a planned breeding program in Gilroy , California , it was bred by Jason Jandrew of Goldsmith Seeds from a lemon yellow @-@ flowered form crossed with a yellow @-@ flowered form in 2005 . The pollination occurred in May , the resultant seed was sown in September , and what was to become the clone was chosen in December for its large flower size , colour and compact foliage .

Xerochrysum ' Lemon Princess ' is thought to be a hybrid between X. bracteatum and X. viscosum .