

Natural Resources
Adelaide and Mt Lofty Ranges



Samphires

of the Adelaide and Mt Lofty Ranges region



Government
of South Australia

This pocket guide covers the samphires of coastal Adelaide, the Northern Adelaide plains and the northern Fleurieu Peninsula. Please take this guide to the plant, not the plant to the guide!

Samphires are the dominant life form in our temperate saltmarshes, and the variety of these amazing plants reaches a peak in southern Australia.



Contents

What are samphires?	05
Where are samphires found?	06
Threats	06
Overall structure	07
Telling samphires apart	08
Look closely	08
C3 plants	08
C4 plants	09
Other things to look for	10
Easy local key	12
Species profiles	14
<i>Sarcocornia quinqueflora</i> (Bearded or Beaded Glasswort)	14
<i>Sarcocornia blackiana</i> (Thick-headed Glasswort)	16
<i>Tecticornia flabelliformis</i> (Fan or Bead Samphire)	18
<i>Tecticornia arbuscula</i> (Shrubby Samphire)	20
<i>Tecticornia halocnemoides</i> ssp <i>halocnemoides</i> (Grey Samphire)	22
<i>Tecticornia pergranulata</i> ssp <i>pergranulata</i> (Blackseed Samphire)	24
<i>Tecticornia indica</i> ssp <i>bidens</i> (Brown-headed Samphire)	26
<i>Tecticornia pruinosa</i> (Waxy Samphire or Bluish Glasswort)	28
<i>Tecticornia syncarpa</i> (Bracelet Samphire or Fused Glasswort)	30
Glossary	32
References	34
Acknowledgements	34



What are samphires?

Samphires, or glassworts, are succulent herbs and small shrubs belonging to the tribe Salicornieae within the family Chenopodiaceae. These unusual looking plants have jointed (articulated) branches that look like a string of beads. These articles function as both leaf and stem, providing the structure of the plant, the location for photosynthesis and a large water-holding capacity. The latter function allows these plants to live in very dry locations, or in tidally inundated areas that are “physiologically dry” because all the water present is saline.

The name “samphire” is a corruption of “Saint Pierre” or Saint Peter, the patron saint of fishers, and reflects the preference of these plants and their overseas relatives for

growing near the coast, although in Australia they are frequently found inland, adjacent to our extensive salt lakes. Fishers pickled the low-growing, sward forming species and samphire pickle (“sampha”, “sampkin” or “sea pickle”) is still commonly served in European and British pubs.

The ash from burnt samphire is very alkaline and was used in glassmaking (hence “glasswort”) and soap making in Medieval times. This use continued in less prosperous communities right up until the 1800s. In the early days of South Australian settlement a glassworker operated in the saltmarshes south of Saint Kilda. Small pieces of glass slag can still be found in the saltmarshes between St Kilda and the Little Para River.



Where are samphires found?

The remarkable water-holding capacity and salinity tolerance of samphires results in them being the dominant plant species in temperate and Mediterranean saltmarshes, and around inland salt lakes and saline scalds.

The southern saltmarshes of Australia have been afforded protection under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as a Vulnerable ecological community (Threatened Species Committee 2013).

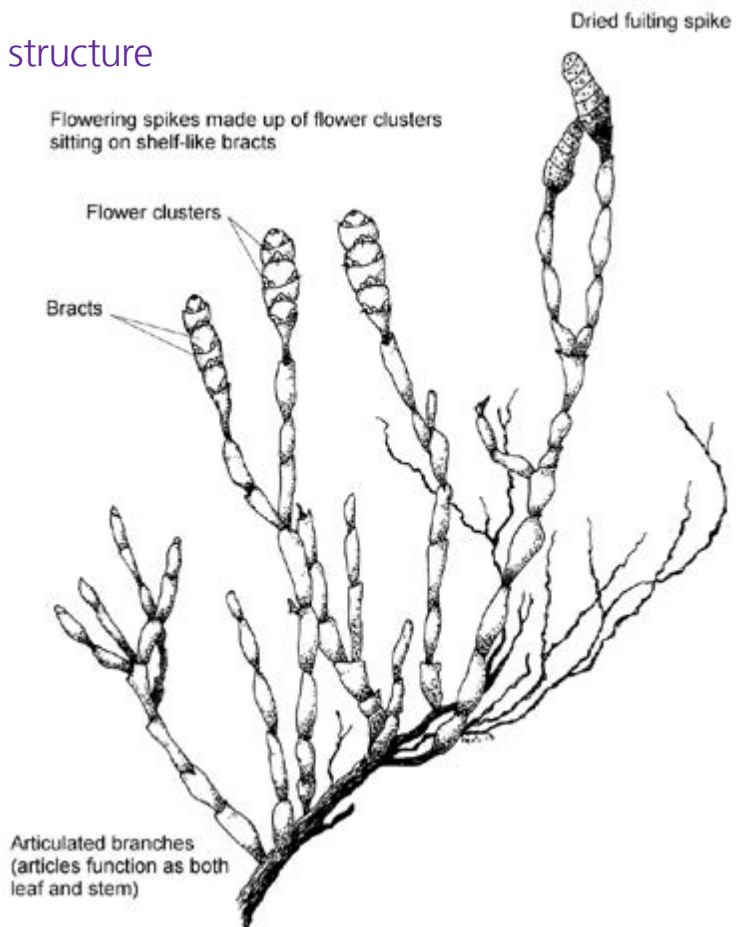
Saltmarshes are tidal wetlands. As such they function to settle land-sourced runoff into sediment so that water reaching the marine environment is clean. These tidal wetlands also contribute to fisheries productivity, as crab and gastropod larvae released from the populations living in the saltmarsh provide an excellent food source for juvenile fish (Mazumder *et al.* 2004).

Threats

Threats to saltmarshes include the draining and filling of marshes for use as industrial or residential land and dredging to form marinas. More localised impacts include dumping, grazing, use of the areas by off-road vehicles, and weed infestation. Climate change in Australia has been accompanied by measurable sea level rise over the past half century and mangroves both in the local region (Coleman 1998) and around Australia have begun to colonise across the saltmarsh, which is being squeezed between the mangroves and developed areas (Saintilan & Williams 1999).



Overall structure



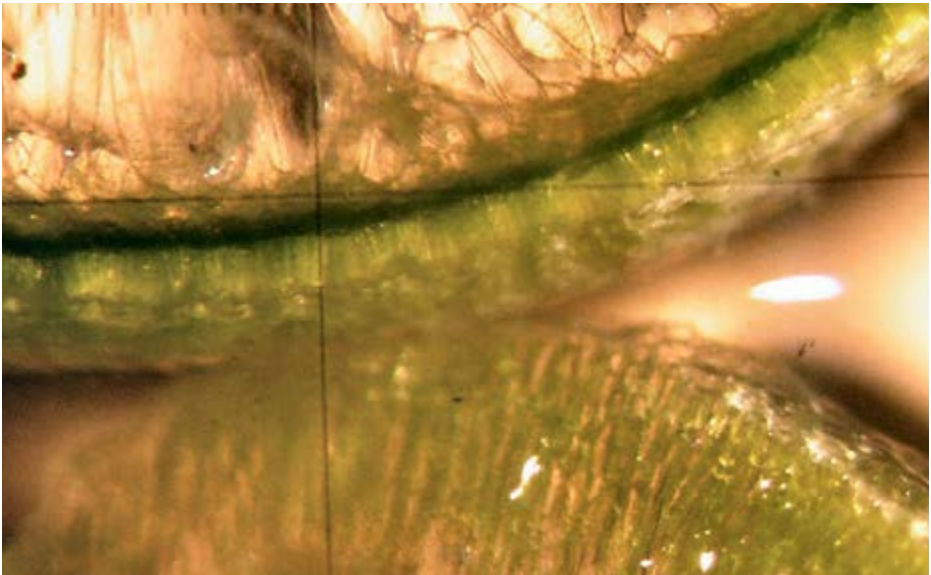
Telling samphires apart

Look closely

If you have a hand lens or a dissecting microscope you can see details that differentiate various samphire species. Seed colour, shape and ornamentation are helpful, with the seeds of each species illustrated in this guide.

C3 plants

In most samphires the surface epidermal (skin) cells are underlain by a photosynthetic palisade made up of several layers of green (photosynthetic) cells. Occasional clear “passage cells” can be found in the palisade and a reflection of these clear cells can be glimpsed in the reticulated surface patterning of the epidermis. This palisade arrangement is typical of C3 plants. C3 species have either a temperate distribution, or are restricted to very wet habitats in tropical climates.



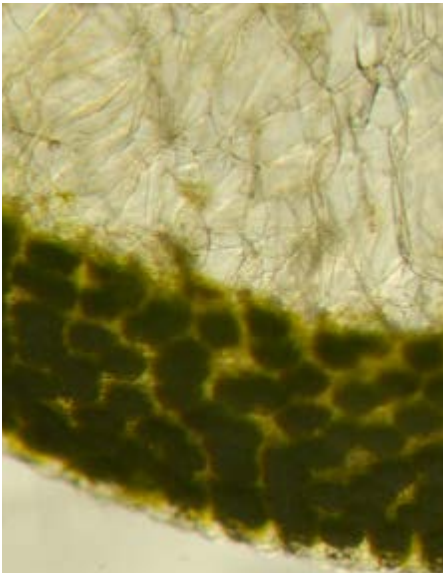
Cross-sections of *Tecticornia indica* (top) and other *Tecticornia* species

C4 plants

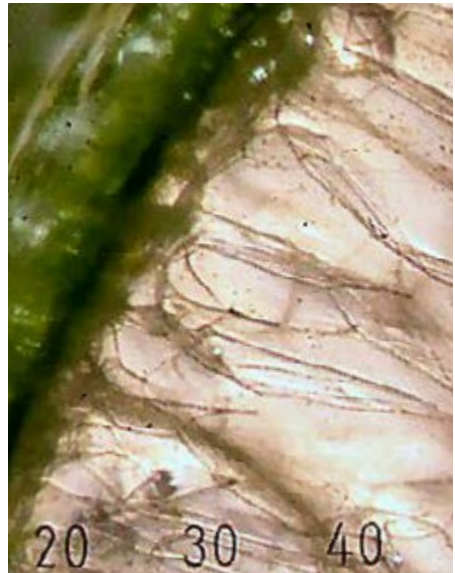
In one local species (*Tecticornia indica*, Brown-headed Samphire) the palisade comprises two distinct layers. The upper layer contains clusters of green photosynthetic palisade cells located below each stomata, with larger clear cylindrical cells forming the rest of the palisade. The lower layer is formed by tightly packed, thick walled cubic dark green cells. Viewing the articles with a hand lens will reveal the “clusters” of green palisade cells, and

a cross-section will show the narrow palisade with a dark green line underneath the palisade. This 2-layer arrangement of the palisade is typical for C4 plants and reflects the very widespread nature of Brown-headed Samphire, which has subspecies and close relatives in tropical as well as temperate Australia.

Under the palisade cells, closer to the centre of the stem, clear water-holding cells surround a central stele (vascular bundle).



Oblique view of *T.indica* showing clustered palisade cells.



Cross section of *T. indica* showing the underlying layer of dark green cubic cells, and the irregular look of the clustered palisade cells above that.

Other things to look for

Growth forms

When you look at a saltmarsh you may see samphires of different growth forms – some are a lawn-like sward and others grow as densely branched small shrubs.

The sward-forming samphires may be *Sarcocornia quinqueflora* (Bearded, or Beaded Glasswort), *Sarcocornia blackiana* (Thick-headed Glasswort) or *Tecticornia flabelliformis* (Fan or Bead Samphire).

Bearded Glasswort is always decumbent, that is, it puts down roots from stem nodes and grows from “runners” to make a dense mat. Thick-headed Glasswort can grow in a similar manner, and may be mixed in with Bearded Glasswort in waterlogged conditions. It can also be found in drier situations, where it can grow as a tufted dwarf shrub. Mature Fan Samphire plants are usually dwarf shrubs, but the juvenile tufts may grow so closely that they look like a sward of *Sarcocornia*.

Fruiting spikes

Look at the fruiting spikes. Are the seeds held on the bush for a year or so, or do the seeds blow away as soon as they ripen? Are the fruiting spikes hard or soft, light or dark coloured, do they break up or hold together? Do they grow at the end of the branch (terminal) or are they intercalary (the branch soon starts to grow on, past the end of the fruiting spike)? Are the seeds black, reddish brown, creamy or yellow?

Location

The overall size and shape of the plant as well as its location in the environment often aids identification. The Shrubby Samphire *Tecticornia arbuscula* grows much larger than most of the other samphires and prefers to grow along the edge of tidal creeks just inland from the mangroves. Other samphires that like regular tidal inundation are the two *Sarcocornia* species.

Open saline clay pans (sabhkas) are very hostile environments. The low-growing samphires found on pans are usually *Tecticornia halocnemoides* (Grey Samphire) or Fan Samphire, both of which can tolerate hypersalinity.



Easy local key

The following key is designed to separate the nine species of samphires found in the local region into smaller groups. The rules it uses to differentiate the species do not represent rules that are applicable more widely. For example, in other regions you cannot use the number of flowers in each cluster to separate *Sarcocornia* from *Tecticornia* – there is a species of *Sarcocornia* with clusters that contain only three flowers each, and some *Tecticornia* species with 5-7 flowers per cluster or that only flower in each leaf axil.





- 1a** Flowers in clusters of 5 or more on each side of the flower spike (10 or more per “level”)

Sarcocornia quinqueflora
Sarcocornia blackiana



- 1b** Flowers in clusters of 3, although in some species you may only see 1 protruding, on each side of the flower spike (max of 6 per “level”)

Go to 2



- 2a** The bracts that support the flower clusters are fan shaped and do not go all the way around the flower spike

Tecticornia flabelliformis



- 2b** The bracts that support the flower clusters are continuous and can be traced right around the flower spike

Go to 3



- 3a** Only the middle flower of each cluster is bisexual, giving the appearance of only one flower per cluster. The styles of these central florets harden and remain protruding in the fruit

Tecticornia arbuscula



- 3b** The flowering clusters are large and cover part of the bracts above them, giving the bracts a “bow-tie” appearance. The fruiting spikes have an uneven silhouette

Tecticornia halocnemoides
Tecticornia pergranulata



- 3c** The flowering clusters are entirely or mostly obscured by the bracts. Fruiting spikes vary from having an even to uneven silhouette

Tecticornia indica
Tecticornia pruinosa
Tecticornia syncarpa



Species profiles

Sarcocornia quinqueflora (Bearded or Beaded Glasswort)

Sarcocornia quinqueflora (Bearded Glasswort) is usually a decumbent low-growing samphire that forms extensive swards or meadows landward of the mangrove fringe, that are about 15 cm tall. Meadows are formed when the plants root from joints along their branches. In drier conditions, or where the species grows with other bushy samphires such as *Tecticornia arbuscula*, it may grow more erectly to about 50 cm high or even form a scrambling subshrub.

Bearded Glasswort is frequently found in tidally inundated areas that are submerged twice daily, such as estuaries and saltmarsh flats. It is also found further inland around salt lakes, but always in very wet situations.

The extensive swards change colour seasonally and are frequently punctuated with bare “pans” that hold water at low tide. This species is one of the most common coastal samphires in the Adelaide and Mount Lofty Ranges region.

The flowering spikes can be very long, up to 50 mm, although they are usually shorter. The opposite bracts are united (continuous) and the flowers are arranged in single-row linear groups (cymules) of 5-9 florets on either side of the spike. The central floret in each cymule tends to be oblong or wedge shaped. During flowering, the paired stigmas that protrude from each floret form an encircling “beard” around the flower spike.

The fruiting spikes are pithy in texture and the almost circular seeds are a little over 1 mm long, with an opaque creamy fawn colour. The seeds are decorated with acutely tapering hairlike projections that may have a hooked end. Inside, should the outer testa be stripped away, the embryo can be seen tightly bent into a horseshoe shape.

Sarcocornia quinqueflora meadows are recognised as providing important habitat for several species of migratory shorebirds and for the endangered Orange-bellied Parrot (*Neophema chrysogaster*). The *Sarcocornia* zone of coastal saltmarshes is the preferred habitat of the small mud crab, a keystone species for many estuarine fisheries, as the

larvae of these crabs provides a major food source for juvenile fish.

A locally-significant threat to Bearded Glasswort is sea-level rise, which is occurring at a rate higher than the global average in Barker Inlet. Rising levels of inundation have already resulted in mangroves migrating landward by nearly 1.5 km across the wide flats of the estuary of the Little Para. Nearly all the land transgressed supported Bearded Glasswort meadows. Other local threats include the impacts of inappropriate use of off-road vehicles, clearance to provide hard stand areas for boats and loss resulting from intensive bait digging.



Autumn



Beard



Cross section



Fruit



Seed



Sarcocornia blackiana (Thick-headed Glasswort)

Sarcocornia blackiana (Thick-headed Glasswort) is very similar in its general appearance to *Sarcocornia quinqueflora*, particularly where the two species grow together in wet conditions. In drier conditions where the Bearded Glasswort does not occur, the Thick-headed Glasswort tends to grow in a distinct, tufted form, and may reach 60 cm tall, even though it still tends to root along its branches at the nodes. In these drier conditions the plants usually also have thicker articles than when found in wet conditions.

If you examine the palisade tissue of the Thick-headed Glasswort under a microscope you will often see spirally thickened “sclereids” (hard cells that impart a gritty texture to the plant tissue), and this can assist in determining whether a non-flowering specimen is a Bearded or a Thick-headed Glasswort.

The flowering spike of the Thick-headed Glasswort thickens up as the fruit start to ripen. At this point the plant is at its most distinct, in the field. The fruiting spike can reach 8 mm in diameter. As with the Bearded Glasswort, the opposite bracts are united (continuous) and the flowers are arranged in linear groups (cymules). The number of florets can be 5-13 on either side of the spike, and frequently the central flower may be doubled up into two tiers. In fact this probably occurs in most rows, but the lower floret can be so shrunk it may not be easily observed. This doubling of the central floret is the best aid to identification in the field, for flowering and fruiting specimens.

The fruiting spike is pithy and as the fruits ripen the spike turns a light fawn colour. When the fruitlets have dropped from the spike you may still be able to see the evidence of the double tier of the central florets as a double set of dips in the axis of the spike.

A close look at the seed under magnification will also allow the separation of the two *Sarcocornia* species. Thick-headed Glasswort seeds are almost circular and an opaque creamy fawn colour, however they are often a little larger than the seeds of the Bearded Glasswort (up to 1.4 mm) and their decoration is different. The hairlike

projections are papillose, which means that they have a nipple-like or globular end, instead of being acute or hooked.

Thick-headed Glasswort is not found as commonly as Bearded Glasswort. It grows in periodically waterlogged soils, but can also be found on limestone platforms that are wet by sea spray.



Flower



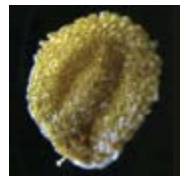
Spiral sclereids



Young fruit



Old fruit



Seed



Tecticornia flabelliformis (Fan or Bead Samphire)

Tecticornia flabelliformis (Fan Samphire) is a tufted-looking bright apple-green dwarf shrub that is usually less than 20 cm high. Its branches tend to spring from low on the plant, are not much divided and have large terminal flowering spikes, so the plant does not have a “bushy” look to it, unless it is very old. In fact, when swathes of juveniles are seen the plants can look like a sward of *Sarcocornia*. This samphire is the only one in the region that is considered to be deciduous, with its fleshy articles turning red and sloughing away in the coldest months of the year, leaving small twisted dry branches. As a result this samphire species is often overlooked in surveys, unless they are undertaken after late October and before

early April, when the bright colour of the articles makes the plants readily visible.

The prominent flowering and fruiting spikes seen in summer are commonly 20 mm long and may reach 40 mm in wetter locations. Close examination of the spikes shows that the bracts supporting the triads of flowers (groups of three) do not continue right around the spike, but instead appear to be separate. This is the only species in the region that has this “fan-shaped” arrangement of bracts, making identification simple.

Seeds of this species are a little less than 2 mm long and are translucent yellow to brown in colour, with prickles round the outer edge of the seed (over the curved embryo) but smooth over the perisperm.

Fan Samphires are listed as a Vulnerable species under the EPBC Act as they have a very restricted range and require distinct soil conditions that are not common. They are found on small parts of the extensive network of sabkhas (salt clay pans) located along the edge of Gulf St Vincent north of Adelaide. The plants are gypsophiles and grow on the clay pans where there is wet saline clay above hardened layers of soil impregnated with gypsum (fragipans). The salt concentration in these soils is very high.

These specific soil conditions provide a habitat that precludes other species. Small changes to the soil moisture or salinity result in Fan Samphires being outcompeted by other

samphires. For example, additional tidal inundation sees the Fan Samphire replaced with *Sarcocornia* species, while additional drying allows *Tecticornia halocnemoides* (Grey Samphire) to invade the Fan Samphire niche. There are locations in the region (Light River delta, Torrens Island) where sea level rise has already impacted on several populations of Fan Samphires.

Other threats to Fan Samphires include grazing (the flowering and fruiting spikes taste sweetish and the plants appear to be preferentially grazed), off-road vehicle use and alterations to the hydrology of the sabkhas by road building, dredging, and extraction of the underlying salt water.



Bract



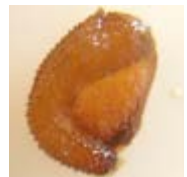
Deciduous



Pollen



Tuft



Seed



Tecticornia arbuscula (Shrubby Samphire)

The largest of the local samphires, *Tecticornia arbuscula* (Shrubby Samphire) can grow to 2 m high where it grows right next to tidal creeks. It is found most commonly in the riparian of tidal creeks, just landward of the mangroves where inundation with fresh tidal water is regular, or landward of shelly ridges that allow percolation of seawater. Much smaller specimens of Shrubby Samphire can be found further from a water source.

The tendency of Shrubby Samphires to occur in very tidally wet areas, forming dense shrub lands, protects them from off-road vehicle disturbance and weed invasion. However their closeness to the mangroves means they are amongst the first samphire species to be impacted as mangroves move inland as a result of sea level rise.

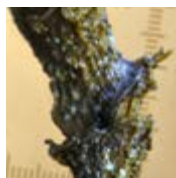
It is the dense branches and ascending form that results in the development of thick shrub land where these bushes grow in close proximity. This provides habitat for the Slender-billed or Samphire Thornbill (*Acanthiza iredalei rosinae*), which is restricted to the northern shores of Gulf St Vincent and has a State conservation rating of Vulnerable.

The short (only a few articles long) flowering spikes are usually (not always) terminal. They occur on both the main and small lateral branches, so can be oriented in all directions. The supporting bracts of the flowering spikes are continuous – the bracts go right around the spike and almost cover the triads of flowers. Each triad has only one bisexual flower – the central one.

The two flowers on either side of the central flower are male and can only be seen when their pollen anthers push out from between the bracts. The central female flower has a solid stigma with two styles, which can easily be seen protruding on opposite sides of the flowering spike. The style hardens and persists in the fruiting spike and can be seen protruding long after the fruit has shrivelled to dryness. Fruits can be held on the plant for some time although the spike eventually breaks up into separate articles which fall away. A few old fruit can be found on the

bushes at all times of the year. The protruding style in the flowering and fruiting spikes is the most obvious aid to recognition of Shrubby Samphires.

Seeds of the Shrubby Samphire are enclosed in a hard, vaguely pyramid-shaped pericarp which, once cracked, reveals the narrow seeds (more than twice as long as they are broad). About 1.5 mm long, the seeds are golden brown, transparent and unornamented. The embryo is almost straight and lies next to a large volume of perisperm.



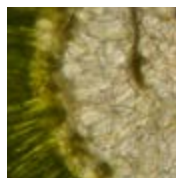
Old fruit



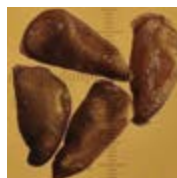
Flower



Early fruit



Cross section



Seed



Tecticornia halocnemoides ssp *halocnemoides* (Grey Samphire)

Tecticornia halocnemoides (Grey Samphire) is not always grey. The rather small articles (3-5 mm long) can be green or red, and may be glossy or dusty looking. Grey Samphires are low growing, being generally only about 15 cm high, although there are stands in the northern part of the region that are closer to 20 cm high. The plants have the form of a much branched very low shrub with a contorted grey woody trunk. The branchlets soon lose the fleshy cortical material so there are usually only short lengths of fleshy articles at the ends of the dry branchlets.

The flowering and fruiting spikes are terminal (at the ends of the branches) and can be up to 2.5 cm long, comprising more than a dozen articles. Although the bracts are continuous around the spike, the triad clusters of flowers

are large and obscure much of each bract, giving the bract a “bow-tie” appearance. The bracts bulge where there are no flower clusters, so the outline of the spike tends to have an undulating silhouette.

All three flowers in each triad are fertile, and the seeds are held for only a short time on the plants. The papery bag formed by the drying perianth (flower) holds a small (1 mm) reddish-brown opaque seed that is ornamented with tiny raised bumps over the curved embryo (outer edge of the seed) and has a slightly rippled surface overlying the side faces that mark the location of the seed’s perisperm. In late autumn the ripe seeds blow away from the plant in their papery bags, leaving the empty bracts on the plants. These empty remains look like small Japanese pagodas

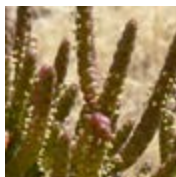
standing on the tips of the branches, until the winter storms knock them from the bushes.

This samphire is one of the most common samphires in the region. It tolerates a wide range of seasonally waterlogged saline habitats and can tolerate extended periods of dryness and very high salinity. Saltmarshes that receive only occasional tidal inundation are often dominated by this species, which is also found edging the huge network of sabkhas that occur along the northern parts of Gulf St Vincent, where it is found on slightly drier and higher land than *Tecticornia flabelliformis*.

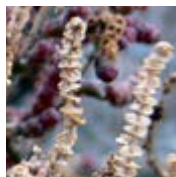
Threats to this species include off-road vehicle use, and “reclamation” of the areas it lives in by filling, usually for coastal residential or industrial lands. Placement of roads across saltmarshes often results in the “stranding” of large areas of this species. While the adult plants rarely die outright in this situation, new recruitment ceases and the old plants become less resilient.



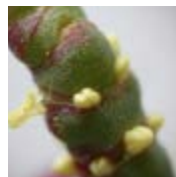
Fruit spikes



Flowering



Pagoda shapes



Pollen



Seed



Tecticornia pergranulata ssp pergranulata (Blackseed Samphire)

Tecticornia pergranulata (Blackseed Samphire) is a low shrub that can reach half a metre in height when it grows in an upright manner. It sometimes grows in a lower, more spreading form. Blackseed Samphire has articles that tend to be dull and the colour varies widely from a dusty blue-green through green to pinkish purple. The size of the articles varies considerably.

Flowering and fruiting spikes of Blackseed Samphire are terminal on the branches and upward facing lateral branchlets. The spikes may reach 5 cm long. As with the Grey Samphire, Blackseed Samphire has continuous

bracts that circle the spike and that are partially obscured by the opposite triads of flowers, producing a “bow-tie” appearance to the bracts. The silhouette of the fruiting spike tends to be undulating, reflecting the alternating bulges of the bracts.

Unlike the Grey Samphire, the seeds of Blackseed Samphire are retained in the fruiting spikes on the plant for a considerable time. The spikes tend to become softly corky and hang down from the branch tips, so that for much of the year the bushes appear to be covered with lambs’ tails. Hidden in the corky spikes are the seeds – round to oval, black

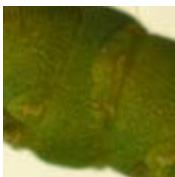
(sometimes reddish-black) and opaque, the seeds are sized from a little less to a bit more than 1 mm long. Simply rubbing the grey fruiting spike between your fingers allows the black seeds to fall out into your palm, where they are very visible amongst the light grey detritus of the fruiting spike. This is the most obvious identification aid for Blackseed Samphire.

The distinctive black seeds are ornamented with mammilate projections that are packed tightly into concentric ribs. In most local plants these ribs extend over the entirety of the seed, completely obscuring the underlying curved embryo, however there is a local variety where the seeds are reddish black and the ribbing does not extend to the centre of the seed faces, above the perisperm.

Blackseed Samphire is less tolerant of salinity than the Grey Samphire, and is found as the dominant samphire along the higher, inland edges of estuarine saltmarshes and in brackish wetlands. It also occurs on slightly elevated shelly sand ridges in saltmarshes dominated by other species. The habitat preferred by Blackseed Samphire is often characterised as “high marsh” and this habitat is frequently used for grazing. In many areas high marsh has been cleared to allow planting of salt tolerant (mostly exotic) pastures.



Crushed fruit



Flower



Flowering



Fruit spike



Seed



Tecticornia indica spp *bidens* (Brown-headed Samphire)

Tecticornia indica (Brown-headed Samphire) is a heavily built blue-green to yellowy-green shrub that can reach 2 m high although it is usually lower growing than this locally.

The large, stout articles can reach 1 cm long, and have “keels” on their lobes, as do the flower spikes. The keels may be clear or coloured, and sometimes have a reddish hue. The epidermis (skin) of the articles, when examined with a hand lens, shows an unusual clustered arrangement of the green palisade cells, which is typical of the “tropical” C4 samphire species. Cross-sections of the articles reveal a single layer of palisade cells underlain by a narrow band of tightly packed dark green cubic cells (see “Telling samphires apart”).

The flowering and fruiting spikes of Brown-

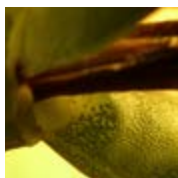
headed Samphire have a smooth outline, with bracts that continue right around the spikes in even rings almost concealing the triads of flowers. The spikes have a larger, deeply lobed lowest bract, succeeded by slightly smaller bracts. The mature fruiting spike is corky to feel, and remains on the plant for much of the year, gradually changing colour from straw to grey. Small nodules, hardly noticeable on the newer fruiting spikes, gradually darken and form small black spots across the surface of the older spikes. Wet spikes swell and soften and eventually fall apart.

Extracting the seed is tricky, as it is surrounded by a very hard pericarp. Cracking the fruitlets open tends to result in bits of fruitlet and seed flying off in all different directions. If you manage to obtain some seeds you will

observe that the golden brown seed is a little less than 1 mm long, smooth, unornamented and translucent. The straight to slightly curved embryo may be visible through the seed's testa as a darker area along the seed's outer edge, with a large light coloured perisperm adjacent to it.

Brown-headed Samphire prefers well drained soils of only moderate salinity. Locally it can be found in sandy elevated areas above the "beaches" edging the sabkhas of northern Gulf St Vincent. It is fairly common in the coastal reserves north and south of Thompson Beach. While Brown-headed Samphire is

considered to be widespread in Australia, it is not particularly common in this region, probably because it occurs on land that has potential for other uses. South of the Gawler River much of this species' habitat has been converted to agriculture, especially in the area west of Port Wakefield Road. However occasional plants still exist growing in the shelter of wire fences along St Kilda Road.



Epidermis



Small nodules



Keel



Fruit spike



Seed



Tecticornia pruinosa (Waxy Samphire or Bluish Glasswort)

Tecticornia pruinosa (Waxy Samphire or Bluish Glasswort) is another species that prefers well drained soils of moderate salinity. It is often found where alluvial soils have washed into the edge of a saltmarsh forming a “fan” of soil that may be a distinctly different colour to the rest of the soils in the saltmarsh.

This species is very common locally, occurring in the high marsh where saltmarsh intergrades with saltbush habitats, along embankments in saltmarshes, in depressions in coastal dune

systems and edging sabkhas along the coast. Waxy Samphire is also commonly found across inland Australia, where it grows in depressions and adjacent to salt lakes. The drier nature of the soils utilised by this samphire makes them vulnerable to damage from off-road vehicles and other forms of trampling.

Waxy Samphire is a solid looking low shrub that may reach a metre high but is more usually around 40 cm tall. The bush is generally a dull (waxy looking) blue-green in colour and has

medium sized articles. Pink or purple colours often flush the older articles in winter.

The flowering and fruiting thyrses form terminal spikes on the branches and laterals.

The flowering spikes of the waxy samphire have a smooth outline, with overlapping bracts. These bracts continue right around the spikes in smooth rings that totally conceal the opposite triads of flowers.

The bracts remain swollen in the fruiting spike, which is spongy or corky to feel. Fruiting spikes remain on the plant for much of the year, gradually changing colour from light to dark brown as they mature. The mature fruiting spikes break easily into rings that reveal the opposite triads of fruitlets in a star shaped pattern.

In the field the dark brown, smooth fruiting spikes that break apart easily, revealing the star pattern of fruitlets is fairly distinctive, and this provides a helpful aid to identification.

The fruitlets are fibrous pyramids that easily separate from each other and break apart to reveal the seeds covered in a thin membranous dark brown pericarp. The golden brown translucent seed is small (about 0.7 mm) and smooth, although it sometimes has a slightly grainy appearance over the outer edge where the almost straight embryo is located. The lighter coloured, abundant perisperm forms an obvious lateral bulge next to the embryo.



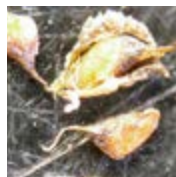
Bracts



Flower spikes



Fruit spikes



Seed



Seed arrangement



Tecticornia syncarpa (Bracelet Samphire or Fused Glasswort)

Tecticornia syncarpa (Bracelet Samphire or Fused Glasswort) is a low shrub locally growing to a maximum of around 0.5 m tall, although it is recorded in other parts of Australia as growing somewhat taller than this. Here it tends to either form a low erect bush about as wide as it is tall, or it may sprawl, forming a ground hugging low mound.

The vegetative articles of Bracelet Samphire have “apiculate” lobes – almost miniature keels. As a result the articles are often described as “heart shaped”. In colour the articles are mid to bright green, and are often suffused with a red blush.

The flowering spikes tend to be a lighter green and initially form at the ends of the branches, however the branch tips quickly grow on, leaving the flowers, and later the fruits, behind. These stranded fruit spikes (intercalary) look like sets of bracelets on the branchlets.

The bracts of the flowering spikes are continuous, completely encircling the spike and almost entirely obscuring the triads of flowers. Only the very tip of each flower is visible. The outline of the flowering spike may be smooth or undulate, depending on how “bulgy” the bracts are.

In each triad of flowers the individuals are joined together and the triads are also joined to the bract above, leading to the second common name, Fused Glasswort. As the fruiting spike matures the intervening bracts shrink a little, so that the triads of fruits become obvious and the fruiting spike tends to have an undulate outline.

The fruitlets are quite leathery, so extracting the seeds can be a challenge. Once free of the fruitlet, the seeds can be seen to be covered with a crusty dark brown pericarp that is usually torn at the base, revealing the relatively large (a little more than 1 mm long) golden brown seed. The pericarp itself sticks obstinately to the seed, but once fully extracted you can see that the seed is opaque

with a distinct granulation of concentric lines over its longer edge and sides where the curved embryo is located.

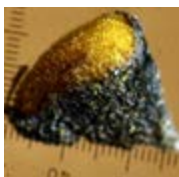
Bracelet Samphires are generally found on the higher beaches around the edges of salt lakes inland and around coastal playa lakes. Locally they are not particularly populous. They can be found most commonly along the embankments of the Dry Creek Saltfields and for a short distance north and south of St Kilda. It is possible this species was once more widely spread in this region, however little is known about its historic distribution locally, so while the species may have been reduced through clearance, it may just as easily have always had a restricted distribution across the local landscape.



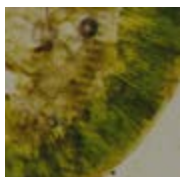
Bracelet



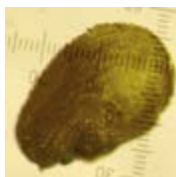
Flower



Pericarp



Section



Seed

Glossary

Apiculate – ending abruptly in a short point.

Article – jointed organ that functions as leaf /stem of the plant.

Bract – small leaf-like structure that forms a “shelf” under the flower clusters.

C3/C4/CAM plants – photosynthesis and respiration in plants varies according to the environment they find themselves in. The names reflect the carbon pathways in the plants, but essentially C3 plants are the most common, they open their stomata in the day and live in temperate conditions, C4 and CAM plants have evolved ways to utilise higher light intensities and temperature and conserve water used in respiration. C4 plants are usually tropical or are summer annuals, CAM plants live in arid areas.

Cortical – relating to the outer fleshy material between the stem and the epidermis.

Cymule – smaller form of the “cymose” flowering arrangement where the main axis of the flowering arrangement ends in a flower.

Decumbent – branches lie on the ground but turn up at the ends.

Gypsophiles – plants that live in gypsum-rich environments.

Intercalary – where the branch continues to grow on after flowering, leaving the fruits inserted along the stem.

Keels – projecting ridge along the middle of a flat or convex surface (similar to a boat).

Mamillate – similar shape to mammary glands.

Ornamentation – patterns of ridges and lumps found on seeds.

Palisade cells – long cells filled with chlorophyll, aligned perpendicular to the upper leaf surface.

Papillose – covered with papillae (small nipple-shaped structures).

Perianth – floral envelope, comprises the calyx (sepals) and corolla (petals)

Pericarp – the fruit wall (around the seed).

Perisperm – nutritive material next to the embryo, found inside the seed.

Sabkhas – supratidal salt flats or playas, forming along arid coastlines that are characterised by salt, gypsum and carbonate within a mineral clay matrix.

Sclereids – strongly thickened cell, also called a stone-cell.

Spike – flowers and fruits of samphires have a simple spike-shaped arrangement.

Stigma – point or head of the style of the female reproductive apparatus.

Stomata – minute pores on leaf used in respiration.

Style – narrow upper part of the female reproductive apparatus, that sits atop the ovary and below the stigma.

Testa – seed coat.

Thryses – flowering arrangement where the primary axis bears flowers all along it on little stalks (**racemose**) and secondary axes have a single flower at their ends (**cymosa**).

References

Coleman, PSJ (1998) 'Changes in a mangrove/samphire community at North Arm Creek, South Australia', *Transactions of the Royal Society of South Australia*, 122(4): 173-178.

Mazumder, D, Saintilan, N, Williams, RJ & Szymczak, R (2004) 'The ecological contribution of saltmarsh to estuarine fish in temperate Australia', *Proceedings of the Coastal Zone Asia Pacific Conference*.

Saintilan, N and Williams, R (1999) 'Mangrove transgression into saltmarsh in south-east Australia', *Global Ecology and Biogeography Letters*, 8: 117-124.

Threatened Species Committee (2013) Environment Protection and Biodiversity Conservation Act 1999 (s266B) *Conservation Advice for subtropical and temperate coastal saltmarsh*.

Acknowledgements

Text and photographs by Peri Coleman.



Adelaide and Mount Lofty Ranges Natural Resources Centres

Eastwood: 8273 9100

Willunga: 8550 3400

Black Hill: 8336 0901

Gawler: 8523 7700

www.naturalresources.sa.gov.au/adelaidemtloftyranges



Copyright

Licensed under Creative Commons Attribution 3.0 Australia License

www.creativecommons.org/licenses/by/3.0/au

Copyright owner: Crown in right of the State of South Australia 2016

Disclaimer

While every reasonable effort has been made to verify the information in this booklet use of the information contained is at your sole risk. The department recommends that you independently verify the information before taking any action.



Government
of South Australia



Natural Resources
Adelaide and Mt Lofty Ranges