

## Information Sheet Stoneworts

The Characeae (Charophytes or Stoneworts) are among the largest and most complex of the green algae. The main axes (stems) have whorls of short lateral branchlets at intervals so the plants bear a superficial resemblance to *Equisetum* or *Ceratophyllum*. They are submerged species (although some are able to survive on wet mud, drying out for short periods) anchored to the substrate by rhizoids (hair-like filaments). Gaseous exchange and absorption of nutrients take place over the whole surface of the plant, although nutrients are also taken up through the rhizoids. Normal metabolic activity results in a layer of calcium carbonate over the surface of many species and, in some, a distinctive smell reminiscent of stale garlic is apparent. The cause of the smell is unknown.

Charophytes have been credited with an inhibitory or larvicidal effect on insect pests like mosquitoes. Charophytes are fast growing, *Chara globularis* having been observed to grow 20cm in two weeks.

Charophytes are found in lakes, ponds, ditches, streams, canals bog-pools concrete tanks, reservoirs and excavations such as gravel pits. They are characteristic of a disturbed habitat where periodic drastic change creates less favourable conditions for growth of other species. They are often the first plants to colonise newly dug or cleared ponds and ditches and some species are characteristic of ephemeral water bodies which dry up completely in summer. The fast maturing charophytes have an advantage over slower-growing macrophytes in these habitats. Charophytes are usually at a competitive disadvantage in shallow, moderately productive habitats, but tend to dominate in deeper water at low light intensities, particularly where the water has a high pH value. They are more often found in mesotrophic and eutrophic waters which are hard water, calcium rich and low in phosphate. They grow in silt, mud, peat or sand. They often form a dense carpet, known as a charophyte meadow, which restricts colonisation by other macrophytes. The more common species do not die down in winter. They have been recorded growing down to 60m deep in clear water, but generally prefer depths between 1 and 10m.

Reproduction is by oospores which germinate either later in the same season as they are produced or in the following season, or even after a period of several years. This delayed germination may account for the sudden appearance of Charophytes in waters where they have not previously been recorded. In several species, vegetative propagules known as bulbils are formed at rhizoid joints and become buried in the substrate to germinate later. Charophytes are known to be spread by birds, stem fragments and bulbils have been found in the stomachs and crops of wildfowl. Oospores will survive the gut and be transported with the birds to colonise other areas.

Charophyte beds are ecologically important in several ways. They have a high biomass and therefore accumulate large concentrations of nutrients which they retain for long periods due to their slow rate of decomposition. Their large surface area is colonised by micro-organisms which can support a large invertebrate population throughout winter (when other macrophytes have died back). They often support good fisheries.

## Mechanical control

Charophytes are easily removed by dredging and cutting. Regrowth from bulbils and oospores will occur in the following season and some regrowth from cut material will occur later in the same season.

## Chemical control

Charophytes are best controlled by dichlobenil. Applications should be made early in growing season, when growth resumes after the winter, although timing is not as critical for these species as it is for submerged macrophytes.

## Biological control

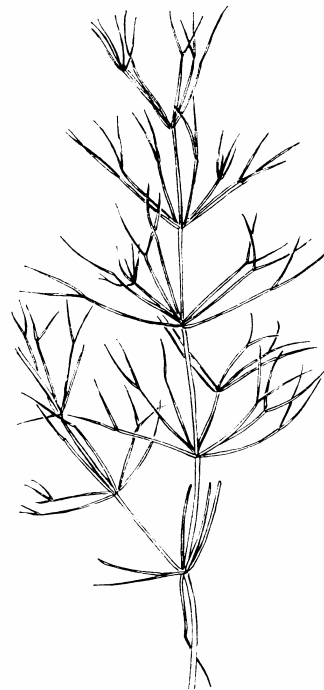
Charophytes tend to be unpalatable to grass carp. They are susceptible to turbid conditions created by the behaviour of bottom feeding fish such as carp and bream, but this method is unlikely to work because of the dense carpet formation of most charophyte species.

## Environmental control

They are susceptible to dense shade and are often out-competed by other submerged macrophyte species, or species with floating leaves. The charophytes are the only group of algae resistant to decomposing barley straw.

## Best option

Treat with dichlobenil in the spring or early summer (April - June).



Nitella