

Field horsetail – a relic of the past

As growers we have to pay our respects to those weeds we do battle with, for their ability to adapt to new situations and keep coming back. If we see weeds as 'the enemy' then we need a good understanding of what makes them tick. However, it is a healthier attitude to consider weeds as our fellow travellers. Knowledge of where they come from and of their needs and destination, will better inform us of the nature of the ground we share and help us in our growing journey.

Horsetail (*Equisetum arvense* L.) is an unusual adversary, a throwback to pre-historic times, surviving from the Devonian geological period through the age of the dinosaurs to the present day. It may have survived that long by adapting itself to become inedible to grazing animals, and indeed horsetail contains high levels of alkaloids which can be toxic to livestock. In monogastric animals such as horses, consumption of field horsetail can cause vitamin B1 deficiency. The appearance of horsetail has led to alternative names such as 'bottle brush', 'horse pipes', 'snake grass' and 'poor man's pine.'

The fronds of horsetail are covered with tiny crystals of silica, which makes them quite abrasive and in his excellent book *Weeds*, Richard Mabey points out that they were once used to polish pewter and arrow shafts. Horsetail also has the ability to accumulate gold in its tissues as well as cadmium, copper, lead and zinc. Mining engineers consider field horsetail an indicator species of gold, but not, sadly, a viable commercial source. Extracts of field horsetail make an effective fungicide and have been used to treat blackspot on roses and rust in mint. It has herbal uses, too, including strengthening nails, as a diuretic and to control haemorrhaging. It is an important plant for biodynamic agriculture (see box).

Occurrence

Many weeds are good indicators of particular soil conditions and horsetail is usually the sign of badly drained soil. It thrives in damp conditions and seems to have a preference for stone-free abandoned sites. When I took on the walled garden at Cotesbach it was present in some of the borders adjacent to the walls, where perhaps there was more compaction. The soil was mostly freely drained and after ten years of cultivation and competition from vegetable crops it had largely disappeared. It is widely distributed in the UK in meadows, gardens and on wasteland. It grows strongly on arable land and grassland but it can be a particular problem in fruit and other perennial crops and in nursery stock production.

Biology

Horsetail is an unusual beast. A rhizomatous perennial, it produces fertile, non-photosynthetic spore-bearing stems in March-April followed by green vegetative stems in the late spring. The cone-bearing fertile stems develop from subterranean buds formed the previous summer and persist for about ten days after emergence.

Horsetail preparation

Rudolf Steiner first suggested using horsetail tea or liquor to combat fungus attacks. He based this on its silica content and the particular growth dynamics of the plant with the leafy fronds produced separately from the spore-bearing stems. This duality, with the 'fungal' element eliminated in advance, is said to indicate its actions.

Guidelines produced by the Biodynamic Agricultural Association suggest cutting the shoots off at ground level in the spring and drying them out of the sun.

The dried herb should be added to a pan containing rain water (25g per litre) and simmered gently for twenty to thirty minutes and left to stand for 24 hours. The liquid should then be strained into a bottle or barrel and then either used immediately or kept cool until needed. Prior to use it should be diluted 1:5 with rain water and stirred for 20 minutes in the biodynamic fashion.

Alternatively 25g of dried horsetail can be fermented in 2-3 litres of rainwater and then left to stand in an earthenware crock in a cool, dark place for about three weeks and then strained into a glass container and stored until needed (for 6 months or more). This liquor is stronger and can be diluted 1:10 and will be effective on twice the area. This is meant to be particularly effective for treating the soil.

Spraying is best done prophylactically in the autumn and early spring during humid weather conducive to fungal growth, ideally during the period leading up to a full moon.

Where fungal infection has already taken hold, the advice is to spray a dilute solution (1:10 up to 1:50) every ten days, ensuring both surfaces of leaves are covered. In more severe cases, spraying the more concentrated solution on and around the affected plants for three days in succession at exactly the same time of day is recommended.

The single cone on each fertile stem can release 100,000 spores that germinate quickly on moist surfaces to produce male and female gametophytes that mature only under very specific conditions. After fertilisation, cell division results in the formation of a shoot apex and roots. These sporelings soon become rhizomatous and quickly develop successive layers of horizontal rhizomes at 30 cm intervals as growth continues downwards.



Dense infestation of horsetail in potatoes

The early stages of development are very susceptible to desiccation and few new plants are produced from spores but once established the plants become resistant to dry conditions.

Maximum vegetative growth of field horsetail occurs in July. Stored food reserves are used up from late April to mid-May and the reserves are replenished from mid-May to August. The rhizomes grow rapidly in June-July and continue to elongate beyond October. The rhizome system can be extensive both horizontally and vertically and may reach over 1.5 m deep depending on substrate and water table. Over half the rhizomes are found in the upper 25 cm of soil. In fallow soil and where there is little crop competition, more rhizomes are found at shallower levels. Tubers are produced at the nodes of the rhizomes and may be present singly or in strings of two to four. Tubers are initiated in July and formation is thought to be influenced by soil pH and soil type. Tubers may continue to grow in size and number until November. Rhizomes may produce numerous tubers, 300-1,000 per m³ of soil. Most of the tubers are found below 50 cm depth, which makes dealing with the weed by cultivation particularly tricky!

Vegetative reproduction and regeneration is by detached rhizome sections or tubers. Rhizome buds may remain dormant or develop into aerial shoots or new rhizomes. Regeneration of single node fragments is mainly in March-May and October-November. Tubers germinate when separated from the rhizome system and can remain viable for long periods in soil. Tubers that remain attached to the parent rhizome do not germinate.

Persistence and Spread:

Vegetative reproduction via rhizomes and tubers is probably the most important means of spread. A 10 cm length of rhizome has been shown to produce a total of 64 m of rhizome in one year. It has been estimated that horsetail has the potential to infest an area of 1 hectare within 6 years of introduction.

Management:

Horsetail is difficult to control by cultivation because new stems regenerate from rhizome fragments and from tubers. Black plastic sheeting has been found to kill or suppress rhizomes in the upper layers of soil, however, the emerging vegetative stems can penetrate some woven polypropylene mulches. Horsetail can survive periods of flooding and burning but may be sensitive to water stress in drought conditions, especially in competition with other plants.

Control measures on arable land include soil drainage, liming, deep cultivation, improvements in soil texture and persistent cutting of vegetative and spore-bearing shoots. In grass, regular mowing over a period of years may eliminate horsetail. Horsetail is not very competitive in tall crops as the lack of functional leaves may make it intolerant of shading. Horsetail does not respond as quickly as cereals to increased soil fertility. Ultimately, the key to controlling horsetail lies in providing the best conditions for your crops and growing healthy crops that will out-compete it.

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*This article draws extensively from the information on the Garden Organic Organic Weeds website (www.gardenorganic.org.uk/weeds/field-horsetail), including the review *The Biology and non-chemical control of Field Horsetail* (2007) by Bond, Davies and Turner.*



Horsetail at Cotesbach Gardens in 2003