

W.16 WATER FERN/ROOIWATERVARING

(*Azolla filiculoides* Lam.)

Family: Azollaceae

(Compiled by the Botanical Research Institute, Pretoria)

Water fern is a small, green to reddish-brown or purplish, free-floating annual or perennial rarely longer than 25 mm. The short, branched stem bears roots and is densely covered with small leaves which are 1 to 1,5 mm long and overlap in a scale-like manner. Each leaf is two-lobed. The upper lobe contains chlorophyll, while the lower one is colourless. A blue-green alga is present in cavities in the upper lobe of each leaf. From October to February spores are produced in two types of very small, rounded fruiting bodies borne in the axils of leaves.

Related species

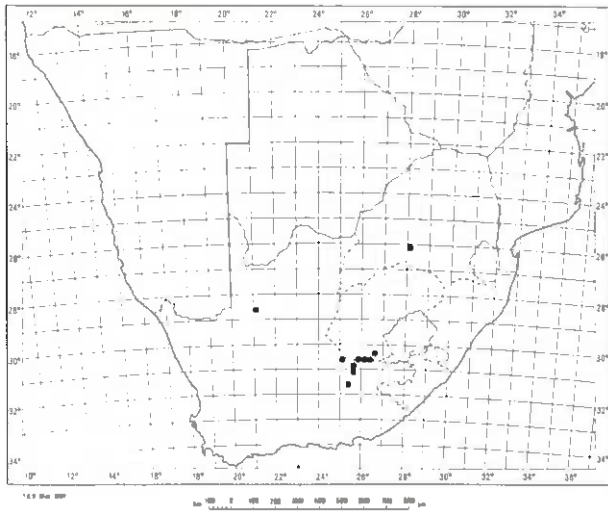
Three species of *Azolla* occur in Africa and two of them, *A. filiculoides*, a native of South America, and the indigenous *A. pinnata* R. Br., are found in South Africa and farther north. The third species, *A. nilotica* Decne., has been recorded from the Sudan to Malawi, Zimbabwe and Mozambique. *A. nilotica* is easily distinguished due to its large size (100 to 200 mm), while the other two species are separated by the differences listed below:

Feature	<i>A. filiculoides</i>	<i>A. pinnata</i>
1. Size of adult plant	Up to 25-35 mm long	Up to 15 mm long
2. Branching habit	Loosely alternate	Regularly pinnate
3. Length of leaves	1-1,5 mm	0,8-1,1 mm

Distribution

Water fern is native to South America and has been introduced to North America and Europe. It was brought to South Africa some 30 years ago, presumably as an aquarium plant. Today it occurs widely in the area of the Hendrik Verwoerd Dam in the North-Eastern Cape and Lesotho. The





occurrence of the plant further down the Orange River at Upington is undoubtedly due to the distribution of plants or spores by flood waters. Plants from the Hendrik Verwoerd Dam were introduced into a Johannesburg bird sanctuary in 1972.



Ecology

Water fern grows within a wide temperature range and can withstand short periods of freezing. The African variety of the related *Azolla pinnata* is much more sensitive to low temperatures. The growth of both species is apparently inhibited by wind and wave action and this accounts for their rather limited occurrence in large water bodies. The association between water fern and a blue-green alga, *Anabaena azollae* Strasb., is capable of fixing sufficient atmospheric nitrogen to supply all the nitrogen needs of the fern. In a single growing

season a mat of water fern may assimilate nitrogen at the rate of 100 to 160 kg per hectare, at least half of this being derived from the atmosphere. During sexual reproduction the alga is passed on to the new fern generation.

Importance

Water fern is able to rapidly colonise an open water surface by vegetative reproduction. In the catchment area of the Hendrik Verwoerd Dam thick mats up to 1,4 km long have developed in several streams. Plants and spores can be transported by floods over long distances. Cattle and other animals may drown through stepping on to a seemingly solid mat of water fern. For centuries *Azolla* plants have been used as green manure in rice paddies in South East Asia. In certain countries water fern is also used as pig and duck food. Research is at present being carried out in the USA on the potential use of *Azolla* plants for the large-scale production of hydrogen.

Legislation and control

There is no legislation for the control of water fern. For control measures see Steyn, Scott, Ashton & Vivier (1979).

Notes

The name *Azolla* is derived from the Greek *azo* = to dry, and *olloyo* = to kill, referring to the fact that the plants are killed when dried; *filiculoides* comes from the Latin *filix* = fern, and *oides* = resembling.

Species Number: 0000.200-00100

Literature

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