Landoltia punctata 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Liliopsida	Arales	Lemnaceae

Common name dotted duckweed (English), dotted duckmeat (English), giant duckweed (English)

Synonym
Lemna punctata , G. Mey., Prim. fl. Esseq. (1818)
Lemna oligorhiza , Kurz in J. Linn. Soc. London 9 (1866)
Lemna melanorrhiza , F. Muell. ex Kurz in J. Bot. 5 (1867)
Lemna pleiorrhiza , F. Muell. ex Kurz in J. Bot. 5 (1867)
Spirodela oligorrhiza , (Kurz) Hegelm., Lemnaceen (1868)
Spirodela melanorrhiza , (Kurz) Hegelm. in Bot. Jahrb. Syst. 21 (1895)
Spirodela pusilla , Hegelm. in Bot. Jahrb. Syst. 21 (1895)
Spirodela pleiorrhiza , Hegelm. in Bot. Jahrb. Syst. 21 (1895)
Spirodela javanica , (Bauer) Hegelm. in Bot. Jahrb. Syst. 21 (1895)
Spirodela punctata , (G. Mey.) Thompson in Rep. Missouri Bot. Gard. 9 (1897)

Similar species *Spirodela polyrhiza*

Summary Native to Southeastern Asia and Australia and arguably to the United States, Landoltia punctata (dotted duckweed) has been introduced to several states in the U.S.A. and many European and Asian countries. It thrives in nutrient rich waters and prefers slow moving or stagnant ponds to enhabitat. Consequences of its introduction are unknown, but its capability to reproduce quickly, disperse rapidly and grow in low oxygen areas make it a potential threat to freshwater systems.

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Species Description
Landoltia punctata is a small, free-floating plant that has fronds which produce thin roots. The plants can grow into dense mats in stagnant water. (CAIP, 2002). Mature fronds are 1.5 to 2 times longer than wide, with widths between 1-5mm. Fronds are narrowly egg-shaped to slightly kidney-shaped and intensely green in colour. The name *punctata* comes from the sunken glands on the undersurface of the fronds. Fronds are not leaves; they may be a reduced form of stem and root. A waxy cuticle covers the fronds causing a sparkle when sunlight hits them; they also have a reddish-purple tint on the underside of the fronds due to anthocyanin production. *L. punctata* normally has between 2-4 roots but can have as many as 7.
L. punctata is distinguished by its reduced frond prophyllum, root tracheids, external anther locules, and also by well-supported molecular evidence provided by allozymes and cpDNA sequences. (Les & Crawford, 1999). \"All of the roots penetrate the prophyllum (a scale surrounding the base of the frond that covers the point of attachment of the roots).\" (Jacono, 2002). “Many duckweeds, including our native *Spirodela polyrrhiza*, survive climate in cold regions by forming an abundant supply of turions (rootless fronds rich in starch) that sink to the warm bottom to overwinter. The inability of *Landoltia punctata* to form turions accounts for its absence in the northern and Midwestern United States. Its fronds are sensitive to severe frosts and plants are reportedly limited by absolute minimum temperatures <- 20 C (- 4 F). Under long-day photoperiods *Landoltia punctata* may sometimes form resting fronds. These are small, delicate single fronds with only one fragmentary root. High in starch, they function comparably to turions in that they are more capable than normal fronds in surviving unfavourable conditions such as storms and light frost. However, they do not sink to the bottom and thereby do not provide overwintering protection in zones with severe winters.” (Jacono, 2002). *L. punctata* can survive drought by seed in arid regions such as Australia, which has led experts to believe that it has the potential to become established in arid southwestern US states. (Jacono, 2002).

Notes
After escape, *L. punctata* can be vectored by waterfowl, but less likely by raccoons, beavers and wild hogs. However, they die rapidly once removed from the water, drying out with 1/2 to 21/2 hours. (Jacono, 2002).

Uses
Valued as a waste water cleanup mechanism, *L. punctata* is grown on farms and in aquatic systems to clean/purify high nutient bodies of water.\" (Hanelt, 2001). Chaiprapat *et al* (2005) state that \"*Spirodela punctata* 7776 can remove N (mainly ammonium and P from anaerobically pretreated swine wastewater at rates as high as 2.32 and .51 g/m²/day (23.2 and 5.1kg/ha/day), respectively, under the climatic conditions of Raleigh, NC.\" It is also harvested as a substitute for alfalfa in cow and pig diets. (Hanelt, 2001). Because of its high Nitrogen content, it could also be used as a fertilizer. (Chaiprapat *et al*, 2005).

Habitat Description
L. punctata prefers \"small, quiet, nutrient rich waters such as ponds, ditches, swamps and backwaters; also seasonally intermittent waters.\" (Jacono, 2002).

Reproduction
Landoltia punctata reproduces *via* vegetative budding of the daughter fronds from the two pouches at the base of the frond. Daughter fronds stay attached to mother fronds by a short stipe, which gives a cluster-like appearance to the plant. *L. punctata* can also reproduce sexually, by seed, but this occurs seldomly. (Jacono, 2002).

General Impacts
Jacono (2002) states that*L. punctata's* impacts are generally unknown, but that it has the potential to become a serious nuisance due to its rapid colonization, easy distribution, and quick dispersal rate.

Management Info
Chemical: Diquat is a widely used and effective herbicide because it causes ion leakage in duckweed and other aquatic plants. A Florida study showed that after 20-30 years, *Landoltia punctata* developed resistance to Diquat and Paraquat herbicides. The mechanism of resistance to Diquat is independent of electron transport in photosynthesis, and therefore is not exclusive to photosynthesis. (Koschnick *et al*, 2006). A separate study by Koshnick *et al* (2004) indicated that *Landoltia punctata* was not adequately controlled by Carfentrazone-ethyl at the maximum proposed rate of 224g/ha Super(-1).

Pathway
L. punctata was introducted *via* the aquarium trade to the USA. (CAIP, 2002).*Landoltia punctata* is introducted to nutrient filled waste water ponds as a means to absorb excess nutrients. Also, *L. punctata* could potentially be utilized as a fertilizer. (Chaiprapat *et al*, 2005)

Principal source: Jacono, C.C. 2002. *Landoltia punctata*. U.S. Department of the Interior. U.S. Geological Survey.

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Expert review underway: Tyler J. Koschnick, PhD\ \ Aquatics Research Manager\ \ SePRO Corporation USA

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BIBLIOGRAPHY
12 references found for **Landoltia punctata**

Managment information
Chaiprapat, S., Cheng, J.J., Classen, J.J., & S.K. Liehr. 2005. Role of Internal Nutrient Storage in Duckweed Growth for Swine Wastewater Treatment. Transactions of the ASAE. Vol. 48(6): 2247-2258
Summary: A study conducted to determine the potential uses of *L. punctata* to aid in the clean up of high nutrient bodies of water.
Available from: http://asae.frymulti.com/request.asp?JID=3&AID=20088&CID=t2005&v=48&i=6&T=2 [Accessed 26 October 2006]
Jacono, C.C. 2002. *Landoltia punctata*. U.S. Department of the Interior. U.S. Geological Survey.
Summary: A wealth of information regarding many aspects of *Landoltia punctata*. Gives explicit identification characteristics and comprehensive native and non-native ranges.
Available from: http://nas.er.usgs.gov/taxgroup/plants/docs/la_punct.html [Accessed 25 October 2006]
Koschnick, T.J., Haller, W.T. & L. Glasgow. 2006. Documentation of *Landoltia* (*Landoltia punctata*) resistance to Diquat. *Weed Science*. Vol. 54, No. 4, pp. 615-619.
Summary: A study conducted to test the resistance mechanism in *Landoltia punctata* to Diquat.
Available from: http://wssa.allenpress.com/wssaonline/?request=get-document&issn=0043-1745&volume=054&issue=04&page=0615 [Accessed 24 October 2006]
Koschnick, T.J., W.T. Haller & A.W. Chen. Carfentrazone-ethyl Pond Dissipation and Efficacy on Floating Plants. Journal of Aquatic Plant Management 42: 103.
Summary: Management information concerning the ineffectiveness of a chemical on *L. punctata*.
Available from: http://www.aquatics.org/pubs/koschnik1.htm [Accessed 25 October 2006]

General information
Benson, A.J., Fuller, P.L., & C.C. Jacono. 2001. Summary Report of Nonindigenous in U.S. Fish and Wildlife Service Region 4. U.S.G.S. Florida Caribbean Science Center.
Summary: Information regarding introduction dates in many U.S. states of *L. punctata*.
Available from: http://cars.er.usgs.gov/R4finalreport.pdf [Accessed 24 October 2006]
CAIP-WEBSITE, 2006. University of Florida. Center for Aquatic and Invasive Plants. APIRS. *Landoltia punctata* (*Spirodela punctata*) [Online Database]
Summary: A brief description of *L. punctata*; its habitat and general characteristics.
Available from: http://aquat1.ifas.ufl.edu/lanpun.html [Accessed 30 October 2006]

Hanelt, P. & Institute of Plant Genetics and Crop Plant Research (Eds.) 2001: Mansfeld s Encyclopedia of Agricultural and Horticultural Crops. 1-6: 3716
Summary: A taxonomic history of *Landoltia punctata* denoting its name changes since its discovery.
Available from: http://mansfeld.ipk-gatersleben.de/mansfeld/Query.htm [Accessed 23 October 2006]
Les, D.H, & D.J. Crawford. 1999. *Landoltia* (Lemnaceae), a New Genus of Duckweeds. Novon: A Journal for Botanical Nomenclature: Vol. 9, No. 4, pp. 530–533
Summary: Provides a detailed scientific description of *L. punctata* and how it is distinguishable from other similar species.
Available from: http://apt.allenpress.com/aptonline/?request=get-abstract&issn=1055-3177&volume=009&issue=04&page=0530 [Accessed 25 October 2006]
Saeger, A. 1934. *Spirodela oligorrhiza* Collected in Missouri. Bulletin of the Torrey Botanical Club. Vol. 61 , No. 5, pp. 173-232.
Summary: This article describes the first documentation of *L. punctata* in the United States.
Swearingen, J. 2006. WeedUS database, Alien Plant Invaders of Natural Areas. *Landoltia punctata* Plant Conservation Alliance, Alien Plant Working Group.
Summary: A Distribution map that shows where *L. punctata* has been reported as invasive.
USDA-ARS, 2006. *Landoltia punctata* (G. Mey.) Les & D. J. Crawford National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland.
Summary: This source provides basic information as well as a detailed range of *Landoltia punctata*.
Available from: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?429295 [Accessed 25 October 2006]
USDA-NRCS. 2006. The PLANTS Database. *Landoltia punctata* National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
Summary: Explicit information about exactly where *L. punctata* has been seen in each reported U.S. state.
Available from: http://plants.usda.gov/java/profile?symbol=LAPU12 [Accessed 30 October 2006]