

**Supplementary Table S1. Selected works used for data extraction recovered from the systematic review.**

Number	Source	Title	Reference	Number	Source	Title	Reference
1	Manual	The occurrence of apiose in Lemna (Duckweed) and other angiosperms	Duff 1965	47	Manual	Survey of the total fatty acid and triacylglycerol composition and content of 30 duckweed species and cloning of a $\Delta 6$ -desaturase responsible for the production of $\gamma$ -linolenic and stearidonic acids in <i>Lemna gibba</i>	Yan et al. 2013
2	Manual	Isolation and partial characterization of apiogalacturonans from the cell wall of <i>Lemna minor</i>	Hart et al. 1970	48	Manual	Enzymatic saccharification of duckweed ( <i>Lemna minor</i> ) biomass without thermophysical pretreatment	Zhao et al. 2014
3	Scopus	Digestion of duckweed ( <i>Lemna spp.</i> ) by the grass carp <i>Ctenopharyngodon idella</i>	Van Dyke and Sutton 1977	49	Scopus	Chemical characterisation and analysis of the cell wall polysaccharides of duckweed ( <i>Lemna minor</i> )	Zhao et al. 2014
4	Manual	Duckweed as an aquatic crop: Evaluation of clones for aquaculture	Porath et al. 1979	50	Manual	Culture system for <i>Wolffia globosa</i> L. (Lemnaceae) for hygiene human food	Ruekaewma et al. 2015
5	Scopus	Duckweeds (Lemnaceae Family): A potential source of protein and amino acids	Rusoff et al. 1980	51	Scopus	The influence of duckweed species diversity on ecophysiological tolerance to copper exposure	Zhao et al. 2015
6	Scopus	Regulation of sulfate assimilation by nitrogen nutrition in the duckweed <i>Lemna minor</i> L.	Brunold and Suter 1984	52	Scopus	Utilization of duckweed (DW) in nutrient removal from agricultural waste water and producing alternative economic animal fodder	Nassar et al. 2015
7	Scopus	Boron tolerance and accumulation in the duckweed, <i>Lemna minor</i>	Frick 1985	53	Scopus	Steam explosion pretreatment and enzymatic saccharification of duckweed ( <i>Lemna minor</i> ) biomass	Zhao et al. 2015
8	Scopus	Biochemical changes in duck weed after cadmium treatment enhancement in senescence	Srivastava and Jaiswal 1990	54	Scopus	Effect of nitrogen and phosphorus deficiency on transcriptional regulation of genes encoding key enzymes of starch metabolism in duckweed ( <i>Landoltia punctata</i> )	Zhao et al. 2015
9	Scopus	Chemical characterization of pressed fibrous residues of four aquatic weeds	Chanda et al. 1991	55	Scopus	Positive effects of duckweed polycultures on starch and protein accumulation	Li et al. 2016
10	Scopus	Growth and energy budget in young grass carp, <i>Ctenopharyngodon idella</i> Val., fed plant and animal diets	Cui et al. 1992	56	Scopus	In vitro digestibility study of some plant protein sources as aquafeed for carps <i>Labeo rohita</i> and <i>Cyprinus carpio</i> using pH-Stat method	Sharma et al. 2016
11	Scopus	Effect of ration size on the growth and energy budget of the grass carp, <i>Ctenopharyngodon idella</i> Val.	Cui et al. 1994	57	Scopus	Effects of selenite on chlorophyll fluorescence, starch content and fatty acid in the duckweed <i>Landoltia punctata</i>	Zhong et al. 2016
12	Scopus	Performance of Broiler Chickens Fed Diets Containing Duckweed ( <i>Lemna Gibba</i> )	Haustein et al. 1994	58	Scopus	The influence of nitrogen and phosphorous status on glyphosate hormesis in <i>Lemna minor</i> and <i>Hordeum vulgare</i>	Cedergreen et al. 2016
13	Scopus	Composition and nutritive value of sewage-grown duckweed ( <i>Lemna minor</i> L.) for rats	Hanczakowski et al. 1995	59	Scopus	Nutritional value of duckweeds (Lemnaceae) as human food	Appenroth et al. 2017
14	Scopus	Ileal and in vitro digestibility in the pig of three floating aquatic macrophytes	Domínguez et al. 1996	60	Scopus	Improving biomass and starch accumulation of bioenergy crop duckweed ( <i>Landoltia punctata</i> ) by abscisic acid application	Liu et al. 2018
15	Scopus	The accumulation of amino-acids and humic substances in media conditioned by axenic and non-axenic duckweed ( <i>Lemna minor</i> L.) and their possible ecological significance	Thomas and Eaton 1996	61	Scopus	Nutritional value of the duckweed species of the Genus <i>Wolffia</i> (Lemnaceae) as human food	Appenroth et al. 2018
16	Scopus	Phytochrome-regulated Starch Degradation in Germinating Turions of <i>Spirodela polyrrhiza</i>	Dolger et al. 1997	62	Scopus	Mass production of <i>Lemna minor</i> and its amino acid and fatty acid profiles	Chakrabarti et al. 2018
17	Scopus	Ensilaged cassava leaves and duckweed as protein sources for fattening pigs on farms in Central Vietnam	Du 1998	63	Scopus	Phytotoxicity of amoxicillin to the duckweed <i>Spirodela polyrrhiza</i> : Growth, oxidative stress, biochemical traits and antibiotic degradation	Singh et al. 2018
18	Scopus	Digestion and N metabolism in Mong Cai and Large White pigs having free access to sugar cane juice or ensiled cassava root supplemented with duckweed or ensiled cassava leaves	Nguyen and Rodriguez 1998	64	Scopus	Potential impacts of dietary <i>Lemna gibba</i> supplements in a simulated ruminal fermentation system and environmental biogas production	Tirado-Estrada et al. 2018
19	Scopus	Nutrient quality of leaf protein concentrates produced from water fern ( <i>Azolla africana</i> Desv) and duckweed ( <i>Spirodela polyrrhiza</i> L. Schleiden)	Fasakin 1999	65	Scopus	Supplementation of duckweed diet and citric acid on growth performance, feed utilization, digestibility and phosphorus utilization of TGGG hybrid grouper ( <i>Epinephelus fuscoguttatus</i> x <i>Epinephelus lanceolatus</i> ) juvenile	Anthonius et al. 2018
20	Scopus	A test of two methods for plant protein determination using duckweed	Casal et al. 2000	66	Scopus	Structural and biochemical properties of duckweed surface cuticle	Borisjuk et al. 2018
21	Scopus	Manure based duckweed production in shallow sink: Effect of genera on biomass and nutrient yield of duckweed under the same nutritional and management conditions	Chowdhury et al. 2000	67	Scopus	Correlation of apiose levels and growth rates in duckweeds	Pagiuso et al. 2018
22	Scopus	In vitro selection of duckweed geographical isolates for potential use in swine lagoon effluent renovation	Bergmann et al. 2000	68	Scopus	Protein bioavailability of <i>Wolffia globosa</i> duckweed, a novel aquatic plants A randomized controlled trial	Kaplan et al. 2019
23	Scopus	Evaluation of sun-dried water fern, <i>Azolla africana</i> , and duckweed, <i>Spirodela polyrrhiza</i> , in practical diets for <i>Nile tilapia</i> , <i>Oreochromis niloticus</i> , fingerlings	Fasakin et al. 2001	69	Scopus	Slurry-grown duckweed ( <i>Spirodela polyrrhiza</i> ) as a means to recycle nitrogen into feed for rainbow trout fry	Stadlander et al. 2019
24	Scopus	Determination of the nutritive value of tropical biomass products as dietary ingredients for monogastrics using rats: Comparison of eight forage species at two levels of inclusion in relation to a casein diet	Phuc et al. 2001	70	Scopus	Effect of hydrothermal pre-treatment on duckweed ( <i>Landoltia punctata</i> ) biomass for simultaneous saccharification and fermentation process	Souto et al. 2019

25	Scopus	Duckweed as a protein source for fine-wool merino sheep: Its edibility and effects on wool yield and characteristics	Damry et al. 2001	71	Scopus	Salt Stress Induces Increase in Starch Accumulation in Duckweed ( <i>Lemna aequinoctialis</i> , Lemnaceae): Biochemical and Physiological Aspects	De Morais et al. 2019
26	Scopus	Evaluation of some aquatic plants from Bangladesh through mineral composition, in vitro gas production and in situ degradation measurements	Khan et al. 2002	72	Scopus	Evaluation of live duckweed, <i>Wolffia globosa</i> as an allochthonous feed for Labeo rohita fry during nursery rearing	Pradhan et al. 2019
27	Scopus	Digestibility, faeces recovery, and related carbon, nitrogen and phosphorus balances of five feed ingredients evaluated as fishmeal alternatives in <i>Nile tilapia</i> , <i>Oreochromis niloticus</i> L.	Schneider et al. 2004	73	Scopus	Postprandial amino acid, glucose and insulin responses among healthy adults after a single intake of <i>Lemna minor</i> in comparison with green peas: A randomised trial	Zeinstra et al. 2019
28	Scopus	Environmental contamination of chrysotile asbestos and its toxic effects on growth and physiological and biochemical parameters of <i>Lemna gibba</i>	Trivedi et al. 2004	74	Scopus	Linkage structure of cell-wall polysaccharides from three duckweed species	Sowinski et al. 2019
29	Scopus	Effects of dietary protein level and a duckweed supplement on the growth rate of local breed chicks	Khang and Ogle 2004	75	Scopus	Effect of the growth medium composition on nitrate accumulation in the novel protein crop <i>Lemna minor</i>	Devliamynck et al. 2020
30	Scopus	Morphological and metabolic alterations in duckweed ( <i>Spirodela polyrhiza</i> ) on long-term low-level chronic UV-B exposure	Farooq et al. 2005	76	Scopus	Dual function of <i>Lemna minor</i> and <i>Azolla pinnata</i> as phytoremediator for Palm Oil Mill Effluent and as feedstock	Kadir et al. 2020
31	Scopus	Ontogenetic diet shifts and digestive constraints in the omnivorous freshwater turtle <i>Trachemys scripta</i>	Bouchard and Bjorndal 2006	77	Scopus	Biosynthesis of the starch is improved by the supplement of nickel (Ni <sup>2+</sup> ) in duckweed ( <i>Landoltia punctata</i> )	Shao et al. 2020
32	Scopus	Toxic effect of arsenate and cadmium alone and in combination on giant duckweed ( <i>Spirodela polyrhiza</i> L.) in response to its accumulation	Seth et al. 2007	78	Scopus	Growth and digestive enzyme activities of rohu labeo rohita fed diets containing macrophytes and almond oil-cake	Goswami et al. 2020
33	Scopus	Effect of culture medium nitrogen, phosphorus and potassium on the yield and nutritive value of <i>Lemna gibba</i> L. (Lemnaceae)	Clostre and Suni 2007	79	Scopus	Energy-efficient and environmentally friendly production of starch-rich duckweed biomass using nitrogen-limited cultivation	Guo et al. 2020
34	Scopus	Nutritive value of some non-conventional feed resources of Ethiopia determined by chemical analyses and an in vitro gas method	Negesse et al. 2009	80	Scopus	Elucidating physiological and biochemical alterations in giant duckweed ( <i>Spirodela polyrhiza</i> L. Schleiden) under diethyl phthalate stress: Insights into antioxidant defence system	Sharma and Kaur 2020
35	Scopus	Ecophysiological tolerance of duckweeds exposed to copper	Kanoun-Boulão et al. 2009	81	Scopus	High Saccharification, Low Lignin, and High Sustainability Potential Make Duckweeds Adequate as Bioenergy Feedstocks	Pagliuso et al. 2020
36	Scopus	Ileal and total tract digestibility in growing pigs fed cassava root meal and rice bran with inclusion of cassava leaves, sweet potato vine, duckweed and stylosanthes foliage	Thanh Hang et al. 2009	82	Scopus	Molecular mechanism underlying the effect of maleic hydrazide treatment on starch accumulation in <i>S. polyrhiza</i> 7498 fronds	Zhu et al. 2021
37	Scopus	Effect of replacement of protein from soybean meal with protein from wolffia meal [ <i>Wolffia globosa</i> (L. Wimm.) on performance and egg production in laying hens	Chantiratikul et al. 2010	83	Scopus	High starch accumulation mechanism and phosphorus utilization efficiency of duckweed ( <i>Landoltia punctata</i> ) under phosphate starvation	Li et al. 2021
38	Scopus	Non-additive dietary effects in juvenile slider turtles, <i>Trachemys scripta</i>	Bouchard et al. 2010	84	Scopus	Effects of long-term exposure to oxytetracycline on phytoremediation of swine wastewater via duckweed systems	Hu et al. 2021
39	Scopus	The effect of different plant diets on the growth performance, gastric evacuation rate and carcass composition of <i>Tilapia rendalli</i>	Hlophe et al. 2011	85	Scopus	Effects of enzyme types and extraction conditions on protein recovery and antioxidant properties of hydrolysed proteins derived from defatted lemna minor	Tran et al. 2021
40	Scopus	Functional, physiochemical, and rheological properties of duckweed ( <i>Spirodela polyrhiza</i> ) protein	Yu et al. 2011	86	Scopus	Brassinolide enhances the level of brassinosteroids, protein, pigments, and monosaccharides in wolffia arrhiza treated with brassinazole	Chmur and Bajguz, 2021
41	Scopus	Dietary <i>Wolffia arrhiza</i> meal as a substitute for soybean meal: Its effects on the productive performance and egg quality of laying Japanese quails	Suppadit et al. 2012	87	Scopus	Effect of salt stress on proximate composition of duckweed ( <i>Lemna minor</i> L.)	Ullah et al. 2021
42	Scopus	Reproductive response of Ewes Fed with Taiwan Grass Hay ( <i>Pennisetum purpureum</i> Schum.) Supplemented with Duckweed ( <i>Lemna sp.</i> and <i>Spirodela sp.</i> )	Zetina-Cardoba et al. 2012	88	Scopus	Ammonium detoxification mechanism of ammonium-tolerant duckweed ( <i>Landoltia punctata</i> ) revealed by carbon and nitrogen metabolism under ammonium stress	Tian et al. 2021
43	Scopus	Physiological analysis of silver nanoparticles and AgNO <sub>3</sub> toxicity to <i>Spirodela polyrhiza</i>	Jiang et al. 2012	89	Scopus	Duckweed protein supports the growth and organ development of mice: A feeding study comparison to conventional casein protein	Roman et al. 2021
44	Manual	Improving production of bioethanol from duckweed ( <i>Landoltia punctata</i> ) by pectinase pretreatment	Chen et al. 2012	90	Manual	Agronomic and environmental performance of lemna minor cultivated on agricultural wastewater streams-A practical approach	Devliamynck et al. 2021
45	Scopus	Duckweed ( <i>Landoltia punctata</i> ) in dog diets decreases digestibility but improves stool consistency	Brown et al. 2013	91	Scopus	NDP-Sugar Pathways Overview of <i>Spirodela polyrhiza</i> and Their Relevance for Bioenergy and Biorefinery	Pagliuso et al. 2021
46	Scopus	Culturing duckweed in the field for starch accumulation	Xiao et al. 2013				