AQUAPONICS IN SOUTH AUSTRALIA

KOORALBYN ROSES
The perfect bloom

PRINCIPLES OF PLANT SPACING
Considering plant density and arrangement

GREENHOUSE TOMATOES
Steering by plant management

NEW BUMBLEBEE CAMPAIGN
Greenhouse crop pollination in Tasmania
In South Australia’s lush Riverland region, one grower has plans to use his business to help at-risk Indigenous youth learn about aquaponics.

A conversation with South Australian aquaponics grower, Dominic Smith, gives new insight into the phrase: “giving back.” Himself a beneficiary of professional mentoring, Dominic runs Pundi Produce, an aquaponics operation at Monash in the Riverland and is keen to use his business as a platform to help train young Indigenous locals in the science of aquaponics, something that is close to his heart.

Normally associated with citrus and stonefruit production, South Australia’s Riverland is rapidly becoming a new production centre for aquaponics. Besides offering easy access to water, the Riverland is ideal for aquaponic production thanks to its low pest and disease pressure.

“I was first involved in aquaculture at Urubrae Agricultural High School and decided to move into aquaponics a few years ago, building my system this year,” Dominic says. “Natural Resources Management have been a big help in getting me to the recent World Aquaculture Conference in Adelaide, which was amazing. They are also continuing to support me in my business venture.

“I have received a lot of support and advice from my mentor, Andrew Dezsery, who is an aquaculture and aquaponics consultant. “I’d obviously like to expand the business and upgrade into the future, but I’d also like to go down the track of hiring troubled youth and trying to help guide them down the right track,” says Dominic who himself boasts Indigenous heritage.

“Aquaponics combines fish farming and horticulture in a system combining the production of freshwater fish and hydroponic vegetables. It results in high yields and quality with low input costs and efficient water use.”

Aquaponics uses water-saving recirculation technology—fish housed in tanks produce the fertiliser for the plants, the waste is filtered and pumped out to the plants to use the nutrients, the clean water then flows back through another filter to the fish tanks.

At Pundi Produce, the system uses Central Irrigation Trust water straight from the River Murray. “For a traditional crop of vegetables at, say, Virginia, we’d be looking at 36,000 litres to grow $100 of produce,” Andrew Dezsery says.

“Hydroponics is 400L, whereas with aquaponics it’s 175L because we’re recultivating that water. It’s been calculated out that we can grow 222 tonnes a hectare, which is absolutely mind-blowing.”

Recent findings show that, increasingly, produce from aquaponics systems is favoured by chefs and consumers looking for pesticide-free herbs and vegetables.

“At Pundi Produce, we grow herbs and vegetables, such as coriander, basil and strawberries without using pesticides, herbicides and fertilisers,” Dominic says. Other crops include spring onions, bok choy and various lettuce.

“Our customers prefer to eat produce that is fresh and healthy, not contaminated through pesticides.”

In addition to selling direct to the public at Riverland farmers’ markets, Dominic has been supplying home delivery service to Riverland Fresh and local restaurants. He also adds value by selling pesto produced using his basil crop.

“Dominic’s already producing pesto, dried products and has received good reviews from chefs and supermarkets for the product,” says Andrew. With Andrew’s help, Dominic first started his aquaponic operation with a 3000-litre tank of silver perch and a 15-metre by 15-metre area of hydroponic tables and beds. Three weeks after the fish were released into the tank, the first crop of herbs and vegetables were planted.

“What’s growing Dominic’s produce is basically a waste product of fish farming,” Andrew says.

“Normally, this would get disposed of using backflushing or water exchange methods because the nitrates become toxic, but here we’re removing those toxins by recirculating water with plant production and producing food we can eat.

“Eighty per cent of the cash flow comes out of the horticulture side, and that’s run on our waste product,” he says.

“We’re recycling the nutrient all the time, we’re not losing it. When we feed the fish, it’s like putting fertiliser in, but in this case nature breaks it down and gives us the nutrient-filled water for plants, and then biologically ‘polished’ water back for the fish.

“The food is delivered straight to the root zone, and it’s always there, so the plant can take up whatever nutrients it needs.”
Pioneering aquaponics training in Australia

Andrew Dezserz has been involved in the aquaponics movement since 1996, and says more and more people are becoming aware of the benefits farming this way can provide.

With a Masters Degree in Aquaculture Science and over 25 years’ experience in the aquaculture and fisheries industries, Andrew is principal of Aquaculture Advantage and #1 Aquaponics. He has spent five years developing and running a successful pilot commercial aquaponics facility at Lewiston, South Australia with business colleague Dr Neil Griffiths and technician Gavin Smith. The trio went on to further value-add the integrated farming process of aquaponics by combining rabbit meat production utilising the wasteage from the horticulture grown produce with commercial profitability.

Once this project was completed he became involved in setting up a new project at Loxton in South Australia’s Riverland under the auspices of the Australian Government’s incentive, Caring for our Country and the Loxton to Bookpurnong Local Action Planning (LBLAP) Committee. Andrew designed and installed two commercial aquaponic facilities and has taught this new style of farming statewide—one of them was Dominic Smith from Pundi Produce.

Australia’s first aquaponics training facility in Loxton taught these local growers how to develop sustainable farming practices and turn soluble fish waste into plant food, with a minimal amount of water use.

The LBLAP Committee, with the help of Andrew Dezserz and the South Australian Murray Darling Basin Natural Resource Management (SAMBRNR), developed the project after a public meeting on aquaponics in 2008, which generated considerable interest.

The committee’s project manager, Craig Ferber, says it is a sustainable way to improve farming practices and biosecurity.

“The desired outcome I suppose is to maximise the potential of the water,” he said.

“Obviously, that's a resource that's becoming more and more valuable. With aquaponics, the only water lost is a bit of evaporation and what the plants actually utilise.” Mr Ferber says it has plenty of benefits for the horticulture industry.

“We're hopeful that there will be a take-up of this industry in the local area, that's part of the project to test this as a proof of concept, so we're in the throes of proving that and we're pretty confident it will do,” he said.

The public-funded facility is now solely in control of a private farmer at the closure of the project in June 2013, and Andrew works as an extension officer, mentor and trainer, furthering the benefits of this work in the Riverland region for the SAMBRNR.

A fishy tale

Andrew Dezserz says that aquaculture-grown species suitable for aquaculture include but are not limited to: Barramundi, Jade Perch, Murray Cod, Silver Perch, Golden Perch, Rainbow Trout, Yabbies and Redclaw in Queensland territories.

“At Pundi Produce, we have Silver Perch and Rainbow Trout, which are hardy species,” Dominic says.

The trout—which thrive in cool water—have been added into a second tank to keep water nutrient levels high as perch growth slows over winter. The fish will be harvested in eight to nine months.

“As plant nutrients in aquaponics are obtained from food fed to fish, 10 of the 16 essential nutrients required for plant growth are delivered through fish waste,” Andrew says.

With some medication, a variety of Australian aquaculture species may be used in aquaponic production. Some will require different tank depths, shape and hydrodynamics. However, it is the protein efficiency and content of the feeds used in production that will dictate the production efficiencies of integration into aquaponics. Protein requirements for Australian species are almost one-third higher than omnivorous species such as tilapia, which are grown in USA-based aquaponic systems, Andrew says.

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The integration of aquaculture and horticulture in the USA and Canada is targeted at the water consuming industry. Aquaponic production combining fish and horticulture is the most efficient means of operation.

“The average raft culture system in commercial aquaculture use, based on UVI methodology, has a 110 cubic metre water-holding capacity that can produce around 12 tonnes of food per year. Per acre, this extrapolates to around 90,000 kilograms of food production,” he says.

“Not only are integrated aquaponic footprints more efficient compared to field crops, but also plants grown in aquaponic systems tend to grow more rapidly, have ample water and nutrients, and enjoy a competitive weed-free environment. Consequently, aquaponic systems are small and cost efficient.”

Andrew says that in Australia, aquaponics can be both environmentally sound and commercially viable, especially in a dry region such as South Australia.

“Australia’s status as an environmentally friendly producer of aquatic food provides the domestic aquaculture sector with a significant comparative advantage in export markets. Quality assurance accreditation policies and international standards have been developed by the industry sectors. Industry training is also well underway to ensure accreditation standards for

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Andrew and Dominic inspecting Bokchoy for any pests.

Basil crop (five weeks old) in sG50 NFT channel—April 2014.

Andrew S. Dezsezy hanging out the basil and spring onions to dry.

Pundi Produce, located in South Australia’s Riverland region.
Aquaculture exports are maintained. Growth of the Australian aquaculture industry has been assisted by organisations such as the Cooperative Research Centres (CRC) and Fisheries Research and Development Corporation (FRDC), who have funded numerous collaborative research and development projects,” Andrew says.

“If integrated inland aquaponic farming is to survive and prosper, existing and prospective industry participants will need to have access to appropriate training and professional development support.”

In his opening address, Chair of the June 2014 World Aquaculture Conference in Adelaide, Graham Mair delivered the following thoughts on the growth of the aquaculture industry in South Australia:

“The South Australian aquaculture industry is highly regarded around the world and is leading the way in implementing dedicated aquaculture management legislation. Sustainable aquaculture is acknowledged as the greatest opportunity to meet the demand in growth of the world’s future seafood needs. South Australia has in place good governance and procedures to regulate and facilitate the development of aquaculture industries.

“The framework established by the South Australian Government and industry stakeholders ensures ecological sustainable development while providing certainty and opportunity for industry investment. “The industry has taken a cooperative approach to research, planning, management and environmental monitoring processes that are seeing the industry make significant inroads in international and domestic markets, with significant growth expected.”

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About the author
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Domestic Smith is keen to use his business as a platform to help train Indigenous locals in the science of aquaponics.

This commercial hydroponics growers manual was produced by researchers from South Australia R&D Institute (SA RDI) and the NSW Department of Primary Industries in collaboration with growers and consultants.

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