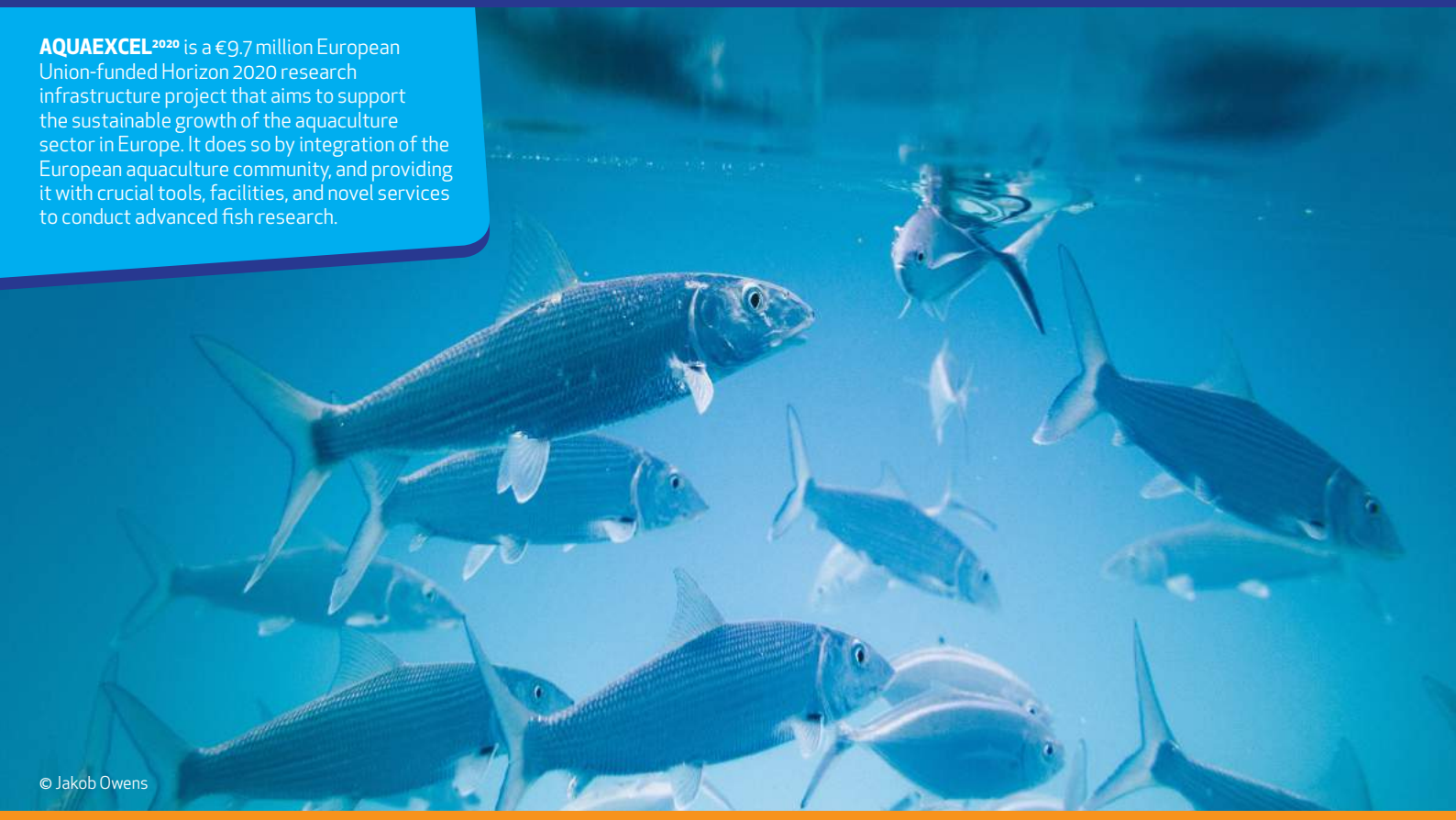
AQUAculture infrastructures for EXCELlence in European fish research towards 2020

Project News

ISSUE 3 SEPTEMBER 2017

AQUAEXCEL²⁰²⁰ is a €9.7 million European Union-funded Horizon 2020 research infrastructure project that aims to support the sustainable growth of the aquaculture sector in Europe. It does so by integration of the European aquaculture community, and providing it with crucial tools, facilities, and novel services to conduct advanced fish research.



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WELCOME TO ISSUE 3 OF THE AQUAEXCEL²⁰²⁰ PROJECT NEWSLETTER

IN THIS ISSUE:

AQUAEXCEL2020 News and Highlights

A Transnational Access (TNA) success story: Lactic acid bacteria improve growth and health, and reduce potentially pathogenic bacteria levels in larval pike-perch

A major feature of **AQUAEXCEL2020** is its TNA programme, allowing external research teams to access the partners' facilities via submission of research proposals, which are funded based on the evaluation by an independent selection panel. The research described below was enabled through access to the Indoor System for Fish Disease Challenge (SDC) at the National Agricultural Research and Innovation Centre, Research Institute for Fisheries and Aquaculture (NAIK-HAKI) in Hungary, through the **AQUAEXCEL2020** TNA programme. To learn more about the TNA programme, see page 5.

A growing concern faced by pike-perch breeders is high stress sensitivity of pike-perch to human handling and crowding. This is of special importance during early weaning, due to poor development of the digestive tract in larval fish, which complicates the acceptance of a formulated diet. This, in concert with low stress resistance, deleteriously affects fish survival, growth, skeletal development and immune defence, the latter leading to overgrowth of potentially pathogenic bacteria on fish mucosal surfaces.

Lactobacilli are beneficial bacteria widely used as probiotics for humans and other animals, and although there are numerous reports of their successful use in aquaculture, no such beneficial application has been previously reported for pike-perch larviculture.

A new study by NAIK-HAKI, together with the Institute of Molecular Genetics and Genetic Engineering (IMGGE) at the University of Belgrade (UOB) and the Institute for Virology, Vaccine and Sera "Torlak" in Serbia, concludes that the addition of lactic acid bacteria (LAB) significantly improved skeletal development and protein utilisation efficacy in pike-perch, the latter being an indicator of improved fish growth and improved nutritive quality of reared fish. Additionally, when lactobacilli were supplemented via *Artemia*, fish growth was also boosted. The supplementation via a formulated diet on the other hand reduced the level of pathogenic microbiota, which might substantially lower the incidence of infection outbreaks later in life.

Researchers in fish rearing facilities and laboratories in HAKI-NAIK during the trial (from left to right): Dr Jovanka Lukic, Ms Tijana Ristovic and Mr Uros Ljubobratovic ©Jovanka Lukic and the TNA project team

Another part of the experiment was done in the IMGGE, UOB, Serbia. Lead researcher of the TNA project was Dr Jovanka Lukic (IMGGE, UOB).

As a continuation to this study, further optimisation of the lactobacilli supplementation regime will be performed throughout the team's next TNA project, which will commence in autumn 2017.

Related publication: Ljubobratovic U, Kosanovic D, Vukotic G, Molnar Z, Stanisavljevic N, Ristovic T, Peter G, Lukic J, Jeney G (2017). Supplementation of lactobacilli improves growth, regulates microbiota composition and suppresses skeletal anomalies in juvenile pike-perch (*Sander lucioperca*) reared in recirculating aquaculture system (RAS): A pilot study. *Research in Veterinary Science*, 115, 451-462. **DOI:10.1016/j.rvsc.2017.07.018**

The audio presentation featuring the results of this is available at the following link: **bit.ly/2jIN4Se**

Past Events

The **AQUAEXCEL2020** Executive Committee, comprising all work package (WP) leaders and associates, met in Brussels in June 2017 to discuss the project's progress since the Annual Meeting in October 2016. Interesting science progress and results were shared, including progress on new isogenic salmon lines, digital data access, TNA projects, model development for virtual laboratories, procedures for fish transfer and management, algorithms for developed biosensors, management protocols, and communication and interaction with stakeholders from the aquaculture industry, the scientific community and the general public.

AQUAEXCEL2020 WP leaders and associates. From front left: Dr Ronan Pendu (WP9, Project Manager; INRA Transfert), Dr Marc Vandeputte (Project Coordinator; INRA), Dr Åsa Maria Espmark (WP6; Nofima AS), Dr Adelino Canario (WP3; Centro de Ciências do Mar do Algarve - CCMAR), Dr Jaume Pérez-Sánchez (WP8; Agencia Estatal Consejo Superior de Investigaciones Científicas - CSIC), Ms Marieke Reuver (WP4; AquaTT), Mr John Bostock (WP1; The University of Stirling), Dr Gunnar Senneset (WP5; SINTEF OCEAN AS), Ms Catherine Pons (WP2; EATiP). ©AquaTT

Continued on next page

Past Events

AQUAEXCEL²⁰²⁰ has established an Industry and Research Advisory Panel (IRAP) which provides strategic direction and leadership to the project by acting as a proactive interface between the research community and the aquaculture industry. The IRAP's major tasks consist of i) providing recommendations about focus areas for use in TNA calls following the EATiP Strategic Research & Innovation Agenda (SRIA), and ii) assessing individual OUTPUTS from research within **AQUAEXCEL²⁰²⁰** and from TNA projects, to promote promising results that are of benefit to the aquaculture sector. The second IRAP meeting took place following the Executive Committee meeting in June 2017, taking advantage of the WP leaders already being in Brussels. All 18 participants discussed the OUTPUTS from the **AQUAEXCEL²⁰²⁰** project and its TNA programme, and selected those which should be prioritised for transfer to the aquaculture industry. One of these is ready to be presented during the **AQUAEXCEL²⁰²⁰** industry brokerage event at Aquaculture Europe in October 2017 (for details about the event and all OUTPUTS which will be featured, check page 4). Other OUTPUTS look very promising but are not ready for industry transfer yet. Stay tuned for some exciting updates on those in the coming year!

To learn more about the work of the IRAP and to meet its industry experts, see page 8, and our webpage here: **www.aquaexcel2020.eu/industry-research-advisory-panel-irap**

AQUAEXCEL²⁰²⁰ IRAP members during a cooling break in Brussels, from left to right: Mr John Bostock, Dr Hamish Rodger, Ms Pavlina Pavlidou, Ms Catherine Pons, Ms Marieke Reuver, Dr Åsa Maria Espmark, Dr Gunnar Senneset, Mr Antonio Coli, Mr Kjell Maroni, Dr Fernando Torrent, Dr Richard Leboucher, Dr László Varadi, Mr Courtney Hough, Dr Marc Vandeputte, Dr Ronan Pendu, Dr Adelino Canario ©AquaTT

Training Course on Fish Nutrition Research: Recent Advances and Perspectives

Research results from **AQUAEXCEL²⁰²⁰**, together with main results and conclusions from other EU funded projects ARRAINA (**www.arraina.eu**) and ParaFishControl (**www.parafishcontrol.eu**), were recently presented at a unique training course on "Fish Nutrition Research: Recent Advances and Perspectives" in Spain.

Visiting the IATS-CSIC facilities. **AQUAEXCEL²⁰²⁰** partners Dr Jaume Pérez-Sánchez and Dr Ariadna Sitjá-Bobadilla in the front right of the photo ©IATS-CSIC.

The course was organised in June 2017 by the Nutrigenomics and Fish Growth Endocrinology Group of the Institute of Aquaculture Torre de la Sal (IATS-CSIC). The course was sponsored by the US Soybean Export Council (USSEC) and was directed to Research & Development personnel of the aquaculture sector working in fish nutrition and health.

The course was completed with a visit to IATS-CSIC facilities. For more information about this course, visit: **www.nutrigroup-iats.org/ussec**

Feature Articles "Joining forces for a sustainable European aquaculture sector of the future"

The **International Aquafeed magazine**, March edition 2017, **pages 26-29**. To read the full article, please visit: **www.aquafeed.co.uk/IAF1703**

The **Milling and Grain magazine**, April edition 2017, **pages 58-61**. To read the full article, please visit: **https://issuu.com/gfmt/docs/mag1704_w1**

Upcoming Events

Aquaculture Europe 2017 (AE2017), Dubrovnik (Croatia), 17-20 October 2017

'Cooperation for Growth' is the motto for this year's Aquaculture Europe (AE2017) conference in Croatia. Turning policy into growth can be achieved by diminishing competitive forces through common actions using regional cooperation, public-private partnerships and other initiatives that help to reduce conflicts. Increased cooperation between operators may therefore foster positive growth in the European aquaculture sector.

Aquaculture Europe events are all about communication with the sector. AE2017 will feature a special international trade exhibition, where Croatian and international companies will present their latest products and services.

A special forum will be arranged for students attending AE2017 to enable networking and exchange of ideas. The forum will have a dedicated programme and include a special student reception.

For more information regarding the event, please visit: bit.ly/2upsvPG

First AQUAEXCEL^{2020} industry brokerage at Aquaculture Europe, Dubrovnik, 19 October 2017

The first **AQUAEXCEL^{2020}** industry brokerage event will be hosted as part of the AE2017 EATiP Industry Day by EATiP and AquaTT.

The overall objective of this brokerage event is to create a forum for engagement and exchange between researchers and potential beneficiaries of the research results generated from **AQUAEXCEL^{2020}** and its precursor, the AQUAEXCEL project.

Specifically, the brokerage event is expected to: i) assure effective and constructive contact between aquaculture researchers and industry stakeholders, through dialogue and two-way exchange; ii) present OUTPUTS from (research) activities conducted as part of the **AQUAEXCEL(2020)** legacy – from core project research (both Joint Research Activities (JRA) and Networking Activities (NA)) and TNA projects; iii) discuss exploitation potential of presented OUTPUTS; and iv) invite industry to provide guidance on European aquaculture industry needs and anticipated impacts.

For more information regarding the event, please visit: bit.ly/2upsvPG

The following OUTPUTS from TNA projects will be presented by researchers involved in the studies:

1. Insect Meal to Feed European Sea Bass – **Dr Laura Gasco**
2. A Toolset to Assess Intestinal Health Benefits of Feed Additives – **Dr Jaume Pérez-Sánchez**
3. 3DFISH - 3D Monitoring of Fish – **Dr Petr Císař**

Further details will be posted on the project website as they become available, so keep an eye on the news: **www.aquaexcel2020.eu/news**

AQUAEXCEL^{2020} Recent Publications

Liu J, Plagnes-Juan E, Geurden I, Panserat S, Marandel L (2017). Exposure to an acute hypoxic stimulus during early life affects the expression of glucose metabolism-related genes at first-feeding in trout. *Scientific Reports*, 7. **DOI:10.1038/s41598-017-00458-4**

Ljubobratovic U, Kosanovic D, Vukotic G, Molnar Z, Stanisavljevic N, Ristovic T, Peter G, Lukic J, Jeney G (2017). Supplementation of lactobacilli improves growth, regulates microbiota composition and suppresses skeletal anomalies in juvenile pike-perch (*Sander lucioperca*) reared in recirculating aquaculture system (RAS): A pilot study. *Research in Veterinary Science*, 115, 451-462. **DOI:10.1016/j.rvsc.2017.07.018**

Martos-Sitcha JA, Bermejo-Nogales A, Calduch-Giner JA, Pérez-Sánchez J (2017). Gene expression profiling of whole blood cells supports a more efficient mitochondrial respiration in hypoxia-challenged gilthead sea bream (*Sparus aurata*). *Frontiers in Zoology*, 14(1), 34. **DOI:10.1186/s12983-017-0220-2**

Pike-perch ©Wikimedia Commons, Etrusko25

AQUAEXCEL2020 Transnational Access (TNA) Programme

A major feature of **AQUAEXCEL2020** is its TNA programme, allowing external teams to access the partners' facilities via submission of research proposals, which are funded based on evaluation by an independent selection panel. Access is offered to 39 unique research facilities, with experimental costs, travel and subsistence supported by **AQUAEXCEL2020**.

TNA – Calls for Access

AQUAEXCEL2020 calls for access are published on a regular basis, and invite proposals from European scientists who wish to utilise the facilities available at any of the participating aquaculture research infrastructures. Check out: **www.aquaexcel2020.eu/transnational-access/call-access**

Do you have a project idea but need help to find the right facility? Please contact the **AQUAEXCEL2020** orientation committee at **aquaexcel-OC@inra.fr**

Upcoming calls in 2017/2018:

Call#	Activity	Date
Call 8	opens	31 October 2017
	deadline	12 December 2017
Call 9	opens	22 January 2018
	deadline	05 March 2018
Call 10	opens	02 April 2018
	deadline	14 May 2018
Call 11	opens	11 June 2018
	deadline	13 August 2018

AQUAEXCEL2020 Transnational Access Facilities

In the Spotlight: TNA facility #3 – National Agricultural Research and Innovation Centre (NAIK): Research Institute for Fisheries and Aquaculture (HAKI) Hungary

Location: Szarvas, Hungary
Website: www.naik.hu
Contact: Galina Jeney, jeneyg@haki.hu

HAKI is part of a chain of agricultural institutes belonging to the Hungarian Ministry of Agriculture (NAIK), established in 2014. NAIK offers important possibilities for research areas such as immunology, nutrition, technology, reproduction, genetics and water analysis.

Users will have full access to NAIK services and infrastructures. The appropriate researchers and technicians will be appointed to support work in infrastructures and laboratories.

The NAIK infrastructure is composed of an outdoor experimental pond system (OEPS) and indoor system for disease challenges (SDC).

The pond system is suitable for experiments for different purposes e.g. feeding tests, testing different production, management and technological elements (pond-in-pond tanks, cages, etc.) and ecosystem modelling. Besides the experimental ponds, a constructed wetland system is also operated as a part of the experimental station.

The indoor system for disease challenges (SDC) currently has 24 small fish tanks (100 L) and two bigger, 500 L fish tanks. The SDC system is used for challenge tests with bacteria (*Aeromonas hydrophila*) and equipped with UV equipment placed both on the effluent and influent pipes.

During the **AQUAEXCEL2020** Executive Committee meeting in May 2016, members had the opportunity to visit the brand new outdoor and indoor facilities (see images).

Participants at the Executive Committee meeting 2016 exploring the new Nemzeti Agrárkutatási és Innovációs Központ (NAIK) facilities in Szarvas, Hungary ©AquaTT

Please support the promotion of the important activities of the AQUAEXCEL2020 project, including the many free training courses and TNA opportunities, by distributing this newsletter among your colleagues, organisations and wider networks.

AQUAEXCEL^{2020} Training Courses

AQUAEXCEL^{2020} training courses aim to educate a new generation of aquaculture researchers and industry stakeholders to use their new knowledge, skills and tools to advance an innovative and sustainable aquaculture sector. In total, nine unique state-of-the-art training courses will be offered between April 2016 and November 2019. Course registration and attendance is free of charge but participants are expected to cover their own travel and subsistence costs. All courses are open to anyone interested in the subjects offered. For an overview of all courses and further details please visit the **AQUAEXCEL^{2020}** website training course page: **www.aquaexcel2020.eu/training-courses/aquaexcel2020-training-courses**

RAS course ©Ifremer

Fish'n Co.

Fish Profile # 3: Temperate basses – European (sea) bass *Dicentrarchus labrax*

The Moronidae are a family of perciform (perch-like) fishes, consisting of at least six freshwater, brackish water, and marine species. The members of this family are most commonly found near the coastal regions of eastern North America (including the Gulf of Mexico), northern Africa, and Europe.

The European bass (*Dicentrarchus labrax*) is a primarily coastal fish that is most commonly around 0.5 m in length, but which can reach sizes of up to 1 m and 12 kg in weight. Individuals are silvery grey in colour and sometimes a dark-bluish colour on the back.

It is found in the waters in and around Europe, including the eastern Atlantic Ocean (from Norway to Senegal), the Mediterranean Sea, and the Black Sea. It is a seasonally migratory species, moving further inshore and north in summer.

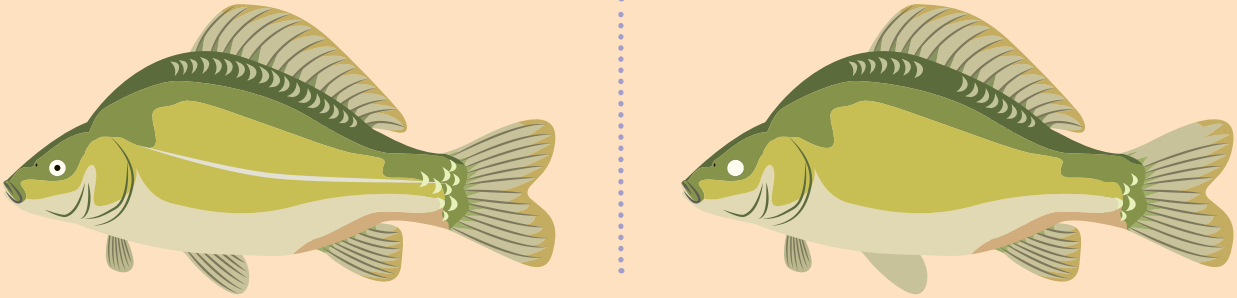
The European bass is both fished and raised commercially, and is one of the most important fish currently cultured in the Mediterranean. It is marketed under a variety of names, including "sea dace", "sea bass", and "Mediterranean sea bass", with aquaculture fish representing more than 90% of the sea bass consumed, although its culture started only in the mid-

European sea bass selected for growth (bottom) vs. control, after one generation ©M Vandeputte

80's, when key larval rearing bottlenecks were solved.

European basses in the wild are mostly night hunters, feeding on small fish, polychaetes (bristle worms), cephalopods (such as octopuses, squid and cuttlefish), and crustaceans, while in culture they are fed formulated pellets with high protein content. They have a high potential for selective breeding for growth (see photo), disease resistance, flesh fat content and sex ratio.

Fish Quiz - Can you spot the six differences between the two images below?



Send your answers to claudia@aquatt.ie. We will acknowledge the first one who got it right in the next newsletter.
Stay tuned until we resolve the mystery at: www.aquaexcel2020.eu

Pan-fried sea bass with citrus-dressed broccoli, ©Good Food magazine – February 2009

Satisfy your Tastebuds!

Tasty Recipe #3 – Pan-fried sea bass with citrus-dressed broccoli

INGREDIENTS
(serves 2)

Approx. 30 mins

2 sea bass fillets, (about 140g each)

1 small head of broccoli

1 orange

6 tbsp olive oil

4 tbsp small capers

6 anchovies roughly chopped

1 lemon

PREPARATION

1. Trim each sea bass fillet so they are both the same shape, then score the skin, cutting into the flesh slightly, five or six times at about 1 cm intervals. Set aside.

2. Segment the orange – slice off the top and bottom, then cut away the skin and pith. Cut away each segment, then squeeze out the juice from the rest of the orange into a bowl. Cut the broccoli into medium-size florets.

Warm Broccoli Salad

1. Cook the florets in a pan of boiling salted water for 1 min until just cooked. While the broccoli is cooking, put a frying pan on to heat. As soon as the broccoli is cooked, drain it, then tip straight into the hot frying pan to 'scorch' out all the moisture.

2. Turn off the heat, then scatter the orange segments over the broccoli. Toss for a few moments just to heat through, then tip into a bowl and dress with the orange juice and 2 tbsp olive oil. Season with pepper and a small sprinkling of sea salt, then set aside.

Sea Bass

1. Wipe out the pan. Season the fish with a little salt and pepper just before cooking. Heat the frying pan until very hot, then add 2 tbsp oil. Lay the fish fillets in the pan, skin-side down. As soon as it goes in, press each fillet down with your fingers or a fish slice to stop it from curling up.

2. Reduce the heat to medium, then leave the fish to cook for 3-4 mins, undisturbed, until you can see that the flesh has cooked two-thirds of the way up and the skin is crisp and brown.

3. Flip the fillets over, then fry on the flesh side for about 2 mins until just done, basting the skin with the oil in the pan as it cooks. Leave to rest on a warm plate, skin-side up, and baste with the hot oil and juices from the pan.

4. Pour 2 tbsp olive oil into the pan and place it back on a high heat. Scatter in the capers and anchovies, then cook until they start to crisp. Grate over the lemon zest and squeeze in the juice of ½ the lemon. If there aren't enough juices in the pan to drizzle over both plates, add a splash more oil. You are now ready to plate up.

Tip: Enjoy with a nice glass of Assyrtiko from Santorini, a bone dry, mineral wine with citrus and smokey tones on a long, clean finish. Cheers!

(Suggested wine pairing brought to you by your coordinator and wine enthusiast, Marc)

www.bbcgoodfood.com/recipes/9111/panfried-sea-bass-with-citrusdressed-broccoli

AQUA EXCEL 2020

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WWW.AQUAEXCEL2020.EU

Introducing the AQUAEXCEL2020 Industry Experts in the IRAP

Currently, the Industry and Research Advisory Panel (IRAP) consists of 12 external aquaculture industry experts from eight European countries (see table below), as well as nine **AQUAEXCEL2020** work package leaders and four affiliates.

Please visit our website for more details on the IRAP and its members: **www.aquaexcel2020.eu/industry-research-advisory-panel-irap**

Name	Current position/affiliation	Expertise	Country
Mr Antonio Coli	Head of Group Fry division at Selonda AS	Hatcheries, Bass & Bream, Sales, Transportation & Logistics	GR
Mr Arnault Chaperon	President of Caviar Pirinea	Fish farming, Fish processing and market	FR
Dr Arne Sorvig	Managing Director at Bocuse d'Or	Gastronomy, Marketing	NO
Mr Doug Mc Leod	Seafood Safety Assessment Ltd (SSAL); Representative and technical support to the British Trout Association	Trout, Molluscs, Education	UK
Dr Fernando Torrent	Universidad Politécnica de Madrid	Hatcheries, Turbot, Bass & Bream, Besugo, Seriola, Salmon, Research	ES
Dr Hamish Rodger	Global Managing Director of Fish Vet Group and FVG Norge AS; Veterinary Director with Benchmark Breeding & Genetics; Practice principal & founder of Vet Aqua International	Fish Health	IE
Mr Kjell Maroni	Director R&D aquaculture at Norwegian Seafood Research Fund (FHF)	Research Coordination (Environment/Water)	NO
Dr László Varadi	President of the Hungarian Aquaculture Association (MASZ); President of the Network of Aquaculture Centres in Central and Eastern Europe (NACEE); Chief Editor of "Halaszat" Hungarian Journal of Aquaculture and Fisheries; Advisor for Vitafort Co.	Integrated Aquaculture, International Expertise (European Aquaculture Society (EAS), The Food and Agriculture Organisation of the United Nations (FAO), NACEE)	HU
Mr Leonidas Papaharisis	Quality R&D Manager at Nireus Aquaculture SA	Quality, R&D	GR
Mr Ole Christensen	Vice President EMEA Division at BioMar	Fish Feed (Activities and Sales)	DK
Ms Pavlina Pavlidou	R&D and Technical Consultant at Selonda SA	Hatcheries, Breeding, Biosecurity	GR
Dr Richard Le Boucher	Manager, Disruptive Innovation and Aquaculture at IMV Technologies	R&D Management, Genetics, Nutrition and Health	FR

Industry experts at the second IRAP meeting in Brussels in June. From left to right: Dr Fernando Torrent, Dr Hamish Rodger, Ms Pavlina Pavlidou, Dr László Varadi, Mr Antonio Coli, Mr Kjell Maroni, Dr Richard Leboucher ©AquaTT

IRAP meeting, June, Brussels ©AquaTT

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 652831. This output reflects the views only of the author(s), and the European Union cannot be held responsible for any use which may be made of the information contained therein.

Designed & developed by AquaTT