



INDIGO ROCK
MARINE RESEARCH STATION

ANNUAL REPORT FOR THE YEAR 2021

Indigo Rock Marine Research Centre company limited by Guarantee

RCN (Registered Charity Number) 20069568



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MISSION STATEMENT

“ Indigo Rock Marine Research Centre mandate is to make a valuable contribution to the development of Aquaculture, Marine Research and Education as it relates to food and health both nationally and internationally, through successful participation in research programmes, regional development and education initiatives.”

STATEMENT OF PURPOSE

Indigo Rock aims to

- Improve the sustainability of marine-related human activity, aquaculture, fisheries and recreational activities.
- Improve the competitiveness of more sustainable commercial marine activities and promote the sustainable utilisation of marine resources especially cultured seaweed biomass.
- Achieve applied research excellence that inform marine practices, policies and production.
- Integrate research and education
- Expand collaborative partnerships with world class institutions.
- Enhance the social and environmental benefit of research.
- Improve gender equality in aquaculture and marine sciences.
- Engage in climate change research on impacts and solutions for the marine environment and aquaculture, in particular how it relates to food sustainability and improves health and wellbeing.



ANNUAL REPORT FOR THE YEAR 2021

Chairpersons Address

Ladies and Gentlemen

Welcome everyone to the 2021 Indigo Rock Annual General Meeting and firstly I wish to offer my appreciation for all your hard work and dedication over the last 12 months.

Indigo Rock is contributing to crucial research through the various Interreg projects in which it participates. During the year the company played an active role in progressing the four projects in which it was involved. Post year end, two of these projects (Primrose and Seatraces) have concluded and the remaining two projects (Seafood Age and Nanoculture) are due to conclude in November of this year. The consortiums involved in all the projects have applied to the EU Commission for additional funds to build on the work advanced in the initial reports and the outcome of these applications will be known in the coming months.

I am delighted to inform the Board that following a thorough and protracted examination of all aspects of the company that Indigo Rock in the last number of months has been granted RPO (Research Performing Organisation) status by the Department of Agriculture, Food and the Marine. This key development will I believe open up opportunities in a range of areas to achieve the goals of the organisation. RPO status will allow the company to apply for a broader range of projects as some of these are restricted to eligible organisations with RPO status. Suitable new projects are under active consideration based on the criteria of thematic suitability, how important the research is vis a vis the goals of the organisation and how same can be undertaken within realistic budgets.

Finally I would like to thank the staff, management and Board for their dedication, commitment to good governance and for focussing on delivering on the objectives of the company.

Dan Tierney

ANNUAL FINANCIAL REPORT TO THE BOARD FOR THE YEAR ENDED 31st DECEMBER 2021

RCN : 20069568

1. Audited Financial Statements for the y.e. 31.12.21

Points to be read in conjunction with the Financial Statements

- Directors report on page 2 contains a paragraph confirming that Dan Tierney converted €250k of the loan balance owed to him and this was converted by way of donation to the company.
- Auditors report on page 5 confirms that the Financial Statements give a “true and fair view of the assets, liabilities and of the financial position of the company”.
- Auditors report on page 5 note the paragraph “Conclusions Relating to Going concern” and comment that no material uncertainties concerning same have been identified.
- Profit and Loss on page 8 reflects turnover of €402,393 with costs of €215,233 resulting in a profit of €187,160. Note that the turnover figure includes the €250k donation.
- Balance sheet on page 10 reflects positive Members funds of €14,536.
- Note 4 on page 14 confirms that in the event the company is wound up that members liability is limited to €2.
- Note 8 on page 16 reflects that €162,892 of the Debtors figure is due to Indigo at the year end for the various projects.
- Note 9 on page 16 includes an Other Creditors figure the bulk of which is accounted for by the €260k advanced by the company chairman as an interest free loan provided on a philanthropic basis.
- A detailed breakdown of the Turnover and the costs are included on the last page of the Financial Statements.
- As previously advised the company chairman has committed to fund the deficit on the existing 4 projects. This deficit is a consequence of the Interreg program whereby a maximum of 75% of the costs incurred on a project can be reclaimed.

2. Summary of the Individual Projects Income and Expenditure



Projects allow up to a maximum of 75% of eligible costs to be claimed.
All claims are audited by the National Coordinator/First Level controller and are subsequently approved by the Joint Secretariat at EU level before claims are approved and funds released
Modifications can be submitted for approval to transfer budgets between various cost categories

- Primrose Total Costs Budget €106,636, Costs incurred by the 31.12.21 €106,255, Unspent budget €381
- Seatracers Total Costs Budget €333,480, Costs incurred by the 31.12.21 €330,061, Remaining budget €3,420
- Seafood Age Total Costs Budget €205,265, Costs incurred by the 31.12.21 €188,301, Remaining budget €16,964
- Nanoculture Total Costs Budget €248,131, Costs incurred by the 31.12.21 €199,332, Remaining budget €48,799

3. Budget for the year to 31st December 2022

- Turnover is projected for 2022 at c.€47k
- Costs are budgeted at c.€92k with a projected loss of c.€44k

Nanoculture

Funding Body	Logo	Duration (months)	Start Date	End Date	No. of Partners	Total Budget	Indigo Budget
		48	01/2019	12/2022	6	€1.47m	€248k

Overview

The general objective of the project is to advance the risk assessment and mitigation of the worldwide presence of metallic nanoparticles (NPs) of TiO₂ and Ag. The focus is the fast-growing aquaculture sector along the Atlantic, specifically, the organisms destined for human consumption (cultured fish, molluscs, seaweed, etc).

The role of INDIGO is to deploy sensors and collect *in situ* data in order to make corrections or improvements in the sensor design and data analysis. We will also grow and supply seaweed and mussels for extraction/isolation of TiO₂ and Ag. In WP4, INDIGO will evaluate the distribution, accumulation and effects of exposure to NPs of TiO₂ and Ag in cells of seaweed and mussels. In WP5, we will grow and supply mussels to carry out *in vitro* bioavailability studies. We will assist in evaluating how the cooking process influences the bioavailability, cellular permeability and transport of NPs of TiO₂ and Ag and supply the waters of the different aquaculture species exposed to NPs of TiO₂ and Ag. We will provide one of two sites for a pilot test at an aquaculture site in WP6. We will deploy and maintain, collect data and display sensors in Bantry Bay, Ireland, and provide *in situ* data to modelers.

Tasks carried out in 2021

Bioaccumulation Trials:

- After completing the first five trials between October 2019 and December 2020, the sixth trial, which paired *Ulva fenestrata* and Ag nanoparticles, ran between February 3rd and March 3rd 2021. The Sea Lettuce was once again sourced from various intertidal locations in West Cork (i.e. Barley Cove, Ballyrisode and Gearhies – Figure 1). As in previous trials, all samples resulting from the experiment were processed, stored appropriately and sent to the International Iberian Nanotechnology Laboratory (INL – Braga) and The University of Santiago de Campostela (USC) for microscopic and chemical analysis. The only issue arising from the trial was the observed accumulation of a black scum at the surface of the six NP-treatment tanks, which was also observed in Trial 2 and subsequently in Trial 7. Samples of the scum were collected and sent for analysis at USC. Analysis results all indicated that the scum was composed of the Ag nanoparticles.
- The seventh trial overall also focussed on *Ulva fenestrata* and the 5nm Titanium dioxide (TiO₂) nanoparticles. The trial ran between June 9th and July 7th 2021. The Sea Lettuce was sourced at low tide from Barley Cove, West Cork.

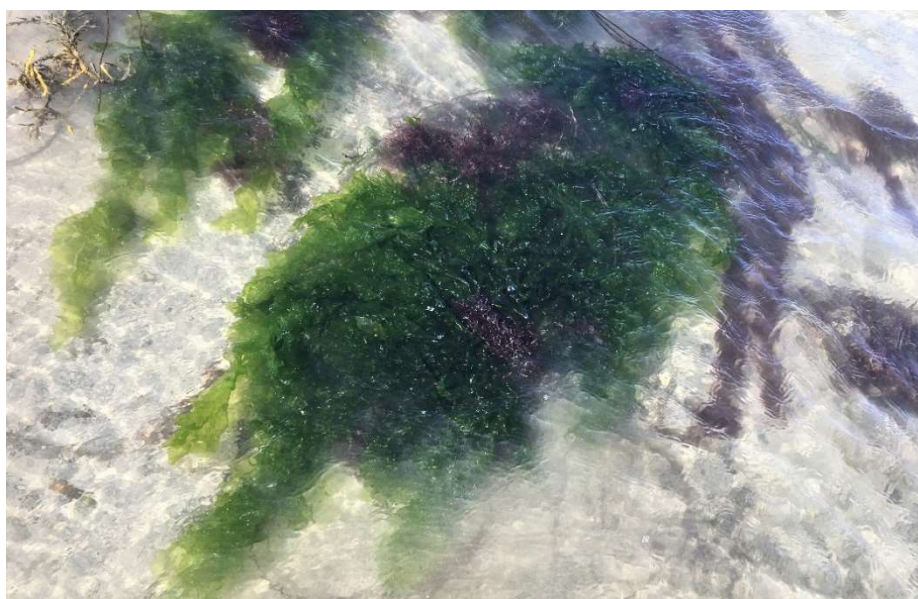


Figure 1. Sea Lettuce (*Ulva fenestrata*) at low tide at Ballyrisode beach, West Cork.

- The eighth bioaccumulation trial to be carried out at the IRMRS involved the red alga commonly known as Dulse (*Palmaria palmata*) and the 5nm TiO₂ nanoparticles. The trial ran between August 4th and September 1st 2021. The tissue degradation observed in the third bioaccumulation trial, due to a small worm infestation, was not an issue. The Dulse was collected by Paul Leighton (Castletownbere) from an undisclosed intertidal location in Co. Kerry.
- Some preliminary results from the early bioaccumulation trials began to filter through from USC:

Figure 2 shows the accumulation of P25 TiO₂ NPs in *Ulva fenestrata* at the low (0.1 mg/L) and high (1 mg/L) dose exposure of the nanoparticles in a trial conducted between September and October 2020.

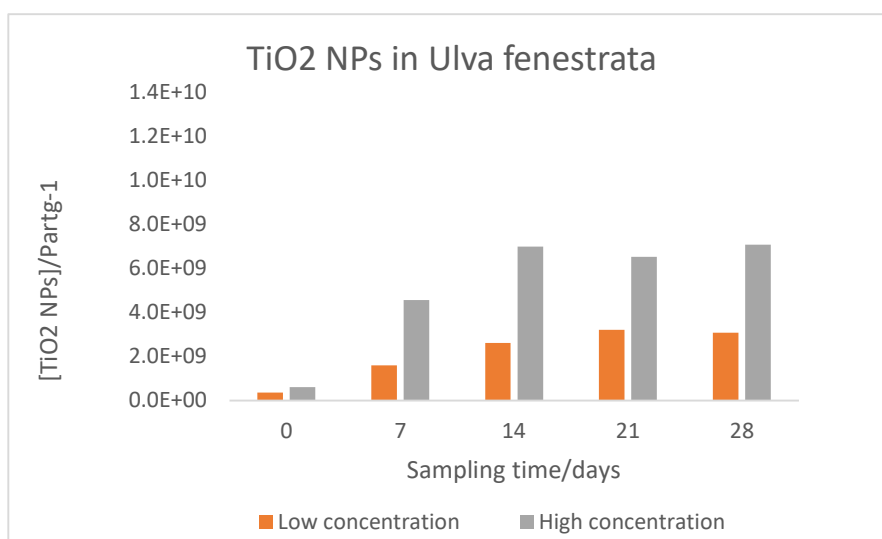


Figure 2: Bioaccumulation of P25 TiO₂ NPs in *Ulva fenestrata*.

The concentration of nanoparticles increased with the dose, and with sampling time until day 14. Afterwards, it remained stable for the final two weeks (i.e. T21 and T28).

That behaviour was slightly different from *Palmaria palmata* that showed a linear increase of the content of TiO₂ nanoparticles with sampling time at high concentration (Figure 3).

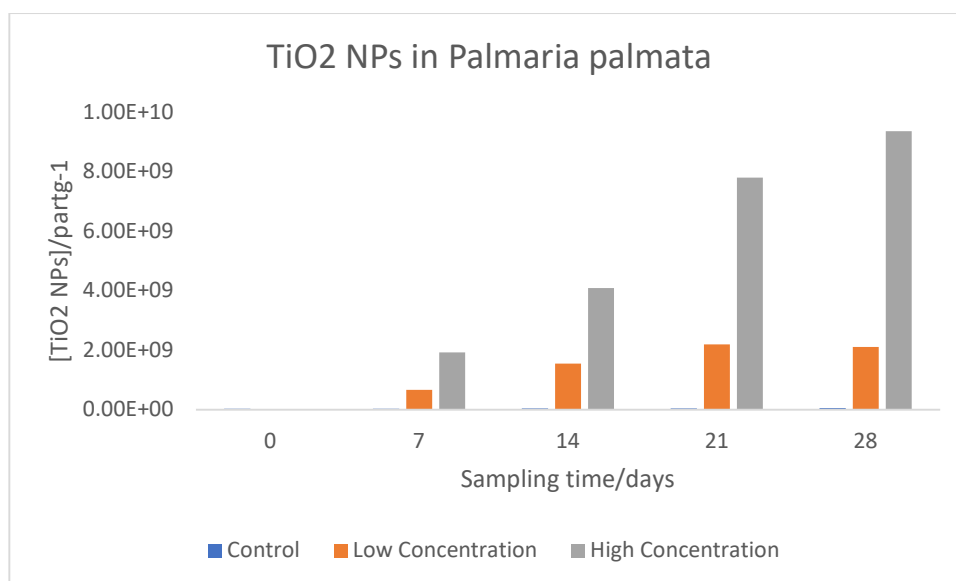


Figure 3: Bioaccumulation of P25 TiO₂ NPs in *Palmaria palmata*.

However, the concentration of total Titanium accumulated was higher in *Ulva fenestrata* (Figure 4) than in *Palmaria palmata* (Figure 5).

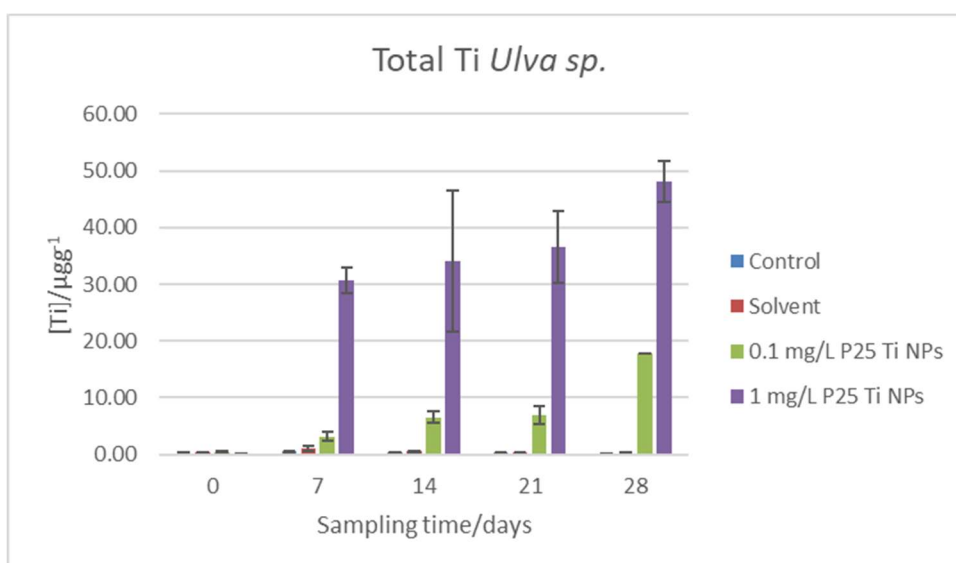


Figure 4. Total Titanium accumulation in *Ulva fenestrata*.

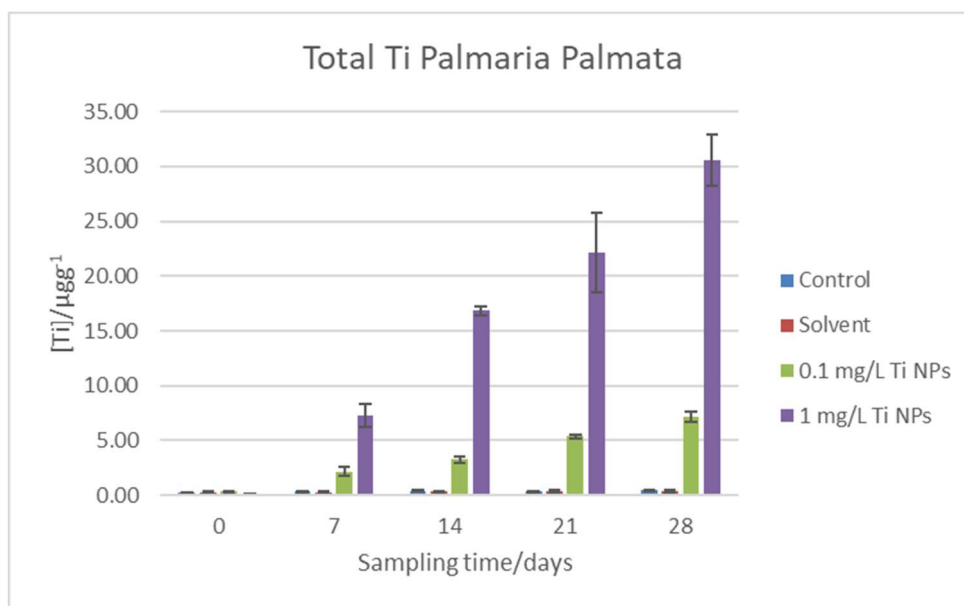




Figure 5. Total Titanium accumulation in *Palmaria palmata*.

Case Studies:

- Preliminary work began on assessing the suitability of using the brown alga farmed at Gearhies and Castle Point, *Alaria esculenta*, as a test species for the WP6 Case Study. The case study will focus on the presence / absence of nanoparticles in the natural environment. Algal and water samples will be taken from three locations (i.e. Gearhies, Castle Point & Castletownbere), and analysed for both Ag and TiO_2 nanoparticles using the same methods as those employed in the Bioaccumulation Trials.

PRIMROSE

Funding Body	Logo	Duration (months)	Start Date	End Date	No. of Partners	Total Budget	Indigo Budget
		42	11/2017	5/2022	10	€2.73m	€107k

Overview

PRIMROSE builds on the existing HAB forecasting systems developed within the award winning FP7 funded project “ASIMUTH”. PRIMROSE will deliver improved forecasts of HABs, microbial risks and climate impacts in aquaculture locations the length of Europe’s Atlantic Arc from the Shetland Islands in the north to the Canary Islands in the South.

INDIGO is the WP7 leader (impact and end user engagement). We will create value from the results thus ensuring the long-term sustainability of the project outputs by providing input into the design of the system and identifying the needs of the aquaculture sector. We will carry out evaluations of the new services and define the practical and economic costs associated with improved knowledge by using the system.



INDIGO has created questionnaires and surveys and conducted interviews for engaging with different stakeholders involved in aquaculture. The questionnaires and surveys were translated into French, Spanish (Basque and Galician) and Portuguese. We also designed and distributed a leaflet.

Tasks carried out in 2021

The final deliverable (D7.4 Success report) was submitted in May 2021. For this deliverable we analysed the accuracy of the forecast. Every week the HAB bulletin publishes the predicted risk of Amnesic Shellfish Poisoning (ASP), Azaspiracid Poisoning (AZP), Diarrhetic Shellfish Poisoning (DSP) and Paralytic Shellfish Poisoning (PSP) for the following week. The accuracy of the predictions was verified by comparing the predicted data published each week, with the sites closed the following week. The results showed that 87.25% of the predictions were correct. The incorrect predictions were always caused by over-estimation of the risk of a harmful event. Hence, all the occurred harmful events were predicted.

Even though the project officially finished in May 2021 a project extension with extra funding was applied for and we are still awaiting the outcome.

SeaFood-Age

Funding Body	Logo	Duration (months)	Start Date	End Date	No. of Partners	Total Budget	Indigo Budget
		42	01/2019	12/2022	20	€2.93m	€205K

Overview

SEAFOOD-AGE tackles a common social and economic challenge in the Atlantic Area: an ageing population. Healthy ageing requires a healthy diet, and seafood products provide essential nutrients not always accessible to older adults. The project will exploit the maritime dimension of the Atlantic Area regions and will adopt circular economy concepts to generate ready-to-eat seafood for healthy ageing, produce novel eco-packaging and develop a smart label for better quality, safety and minimum food waste.

INDIGO will be involved in the sustainable production of algal ingredients for ready-to-eat seafood, particularly process and product optimization for maximum quality, and develop competencies for innovation. We will mostly be involved in WP4 where we will determine the effect of the deployment time and harvesting time of near-shore long-line cultivation of the seaweed *Alaria esculenta* on compounds such as phlorotannins, fucoxanthin and other yet-to-be-determined bioactives, and their effect on *in vitro* antimicrobial and antioxidant activity. We will optimise processes to ensure the highest quality product with high levels of active compounds and as part of WP5, contribute to co-design and marketability of the bioactive compounds identified and the potential of the seaweed final product as an ingredient in ready-to-eat seafood for the elderly.

Tasks carried out in 2021

WP1 – PROJECT COORDINATION

- Mick Mackey and Silvia Blanco attended the 5th Coordination Meeting for the Seafood Age project via Zoom on May 5th, where Silvia presented a summary of IRMRC's contribution.
- Julie Maguire attended the 6th Coordination Meeting for the Seafood Age project held at the International Iberian Nanotechnology Laboratories (INL) in Braga on November 8th & 9th, where Julie presented a summary of IRMRC's contribution.

WP4 - SUSTAINABLE PRODUCTION OF INGREDIENTS FOR RTE SEAFOOD

Alaria Harvest 2021

- The first harvest took place on March 30th and sent to Castletownbere for drying in warm air units. 1m strips were left on the line for subsequent monthly sampling for IPMA.
- The second harvest took place on April 7th and collected by Connemara Seaweed Company for drying.
- The final harvest took place April 20th. Most was sent to Castletownbere for drying. One line was processed into silage at Indigo Rock
- Freeze-dried *Alaria* from four separate sampling dates were sent to IPMA (Portugal) for bioactive composition analysis. IPMA were investigating to see if the bioactive composition changed post the regular harvesting season. A summary of each sampling date follows:
 - On May 14 and May 27, samples were collected from the holdfast, mid-blade and blade tip from Lines 1 and 4, and freeze dried;

- On June 12, samples were only collected from the holdfast and mid-blade, as the tip of the blade had deteriorated – also from Lines 1 and 4 in Gearhies, Bantry Bay;
- On July 22 we collected samples from only the holdfast and mid-blade, as the tip of the blade had deteriorated further. In fact, these samples were in very poor condition. We were unable to access the lines earlier in July due to weather constraints.
- An additional 750g of dried *Alaria* was sent to IPMA in July to generate 150g of seaweed extract for the development of the *Alaria* sauces.
- The average *Alaria* yield for the 2020/2021 growing season was approximately 8.0kg/m.

***Alaria* Deployment 2021**

- All mooring lines were lifted to the surface and cleaned of the mussel-dominated fouling, which places extra strain on the lines.
- Entangled lines were disentangled and tied away.
- Concrete mooring blocks were replaced where necessary due to mooring line breakages.
- Two lines were deployed on November 5th at the Gearhies seaweed site.
- A further six lines were deployed on November 10th at the Gearhies site, for a total of eight lines for the 2021/2022

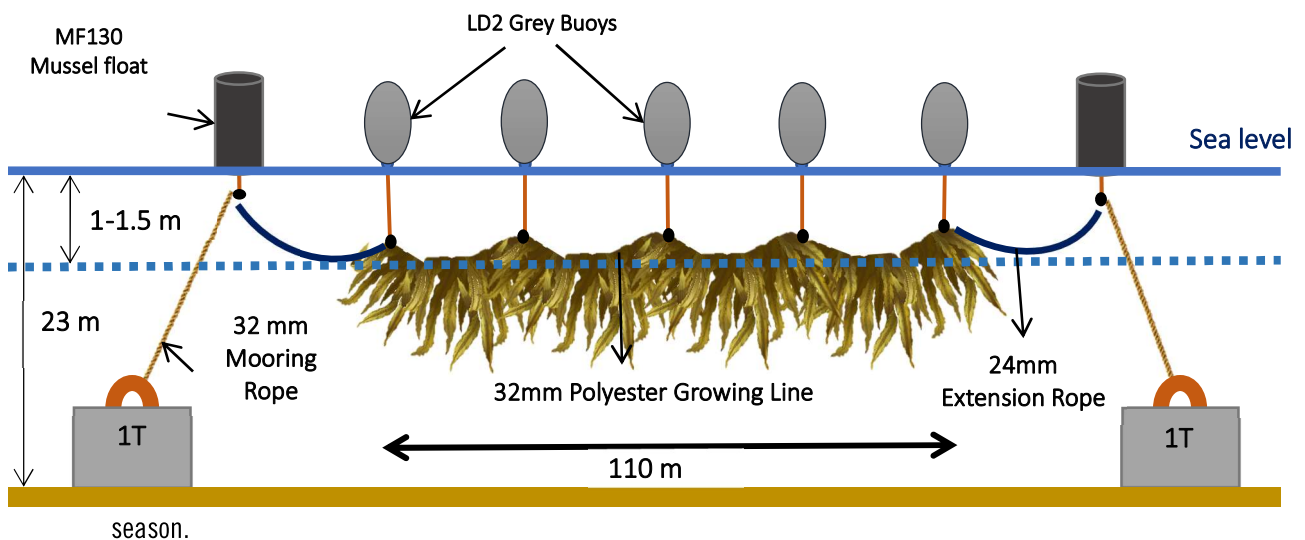




Figure 6. Long line set up

WP 5 - NEW HEALTHIER, SAFER and HIGH-QUALITY RTE SEAFOOD FOR OLDER CONSUMERS

The IRMRC supplied data and information as required to produce a Life Cycle Analysis (LCA) for the operation and processes involved in generating our annual crop of *Alaria esculenta* at the Gearhies seaweed farm. Much of the data supplied came from a Masters thesis entitled “Economic and Environmental Analysis of Macroalgae Production in Ireland and the Potential Revenue to be Generated from Seaweed Carbon Offsets” by Niall Collins (2020). Additional data concerning fuel and power consumption, field equipment specifications and usage rates were also supplied on request.

SEATRACES

Funding Body	Logo	Duration (months)	Start Date	End Date	No. of Partners	Total Budget	Indigo Budget
		48	01/2018	12/2022	19	€3.54m	€333k

Overview

SEATRACES aims to improve seafood labelling and traceability to valorise fisheries and aquaculture in the Atlantic area. The project developed a set of tools for implementing traceability and seafood labelling using smart-phones and other innovative technologies, thus facilitating sustainable seafood production.

Indigo Rock was the partner leading work package 7, which aimed to identify strategies to create added value for seafood products. As part of action 1, Indigo and other partners designed a study to verify the compliance of seafood products to European labelling legislation. Seafood products were surveyed in supermarkets and fishmongers in Ireland, UK, Spain, France, Portugal and Germany. Indigo then analysed the results of the labelling survey and prepared a paper that was published in Marine Policy in October 2021. Indigo Rock also conducted a socio-economic analyses of oyster farming in Galway Bay and produced a report of the analysis results. Moreover, Indigo Rock was involved with the dissemination and capitalization of the project.

Tasks carried out in 2021

Study on compliance of seafood labels to European legislation

An efficient seafood labelling system can help to prevent fish fraud. European Community's regulations indicate the information that must be provided in labels attached to sold seafood. This information help consumers to make an informed choice when they purchase seafood. Moreover, an accurate labelling system enable seafood traceability and reduces the risk of fish fraud. A labelling system that indicates specific areas of production can also represent an added value to the product. The compliance of seafood labels to EU regulations was monitored in sever European countries.

The labels of seafood products sold in different European countries were analysed in order to verify the presence of mandatory information required by EU regulations currently in place (EU No.1169/2011 and EU No 1379/2013, the European legislative tools that specify the mandatory information that must be present on seafood labels). The study was a joined effort of partners from UK, Ireland, Spain, Portugal, France, and Germany. For each country, samples were collected in cities from three NUTS level 2 (Nomenclature for territorial units for statistics). From each city, samples were examined in three supermarkets and three fishmongers. The label information regarding species obtained across the different European regions was recorded according to the approved official name of the fish product in each country.

The results show that there is a difference in compliance among groups of products and among countries. The country with the lowest level of compliance was the United Kingdom (still part of EU when the study was carried out), with an overall compliance of 63.7%. The country with the highest level of compliance was Portugal (87.2%). Across all the countries analysed, supermarkets were more compliant than fishmongers and Processed Prepacked products conformed best to the EU labelling legislation when compared to Unprocessed Non-Prepacked products. Variations within different areas of the same country were also observed. Fishing gear, scientific name, fishing/production method and date of freezing were the types of information most frequently missing on the labels examined. The results of this study will form the foundation for further action that can be taken by relevant institutions to improve compliance throughout the supply chain.

The results of this study were published on Marine Policy:

Paolacci S., Mendes R., Klapper R., Velasco A., Ramilo-Fernandez G., Muñoz-Colmenero M., Potts T., Martins S.,

Avignon S., Maguire J., De Paz E., Johnson M., Denis F., Pardo M. A., McElligott D., Gonzalez Sotelo C. (2021) Labels on seafood products in different European countries and their compliance to EU legislation. *Marine Policy*, 134, 104810. <https://doi.org/10.1016/j.marpol.2021.104810>

Socio-economic analyses of oyster farming in Galway Bay

Galway Bay is one of the hotspots for oyster production in Ireland. More than 24 hectares of Galway Bay are licensed for oyster farming. More than 50% of the total transitional and coastal water bodies monitored in the bay scored an ecological status of High during 2010–2015 [1]. The ecological status of the bay is directly linked to the quality of the oysters produced and the quality of oysters farmed in Galway Bay is internationally recognized. Indigo Rock's contribution focused on the evaluation of the socio-economic impact of oyster farming in Galway Bay.

Survey of oyster consumers

A survey for consumers was distributed through social media and academic mailing lists. Of the 110 people who participated in the consumer survey, nearly 64% were between the ages of 35 and 54. 18% of participants were between the ages of 25 and 34, while around 14% were over 55, and less than 4% were aged 24 and under. 47.7% were male, and 52.3% were female, with 80% describing their nationality as 'Irish', while the remaining 20% identified themselves as 'other'; 'other' included Italian, German, Spanish, Polish, French, British, American, Portuguese, Trinidadian, Brazilian, Russian, Australian and Belgian. Just over 5% of those surveyed had a secondary school education as their highest level of education, while 29% had a bachelor's degree, and 58% had a masters or higher qualification. The average annual income of participants ranged from under €15,000 to over €150,000, with 57% earning between €30,000 and €74,999. Around 10% earned less than €29,999, and approximately 35% earned over €75,000 annually.

Of the 110 participants, 56% described gastronomy as being a 'very important' feature of their travels, with 25% considering it to be a 'fundamental' aspect. Around 18% thought it to be either 'a little important' or 'important', and 1% considered it not to be important. Landscape and cultural offers were described as 'very important' by 49% and 47% of participants respectively. 21% considered landscape to be a 'fundamental' feature, while around 30% thought it to be somewhere between 'a little important' and 'important'. In contrast, 14% described cultural offers as 'fundamental', while around 39% thought it to be a feature that was either 'a little important' or 'important'. Out of those surveyed, no one considered either the landscape or cultural offers to be unimportant aspects of their travels. Additionally, 75% of people said that they would be willing to travel for a gastronomy festival.

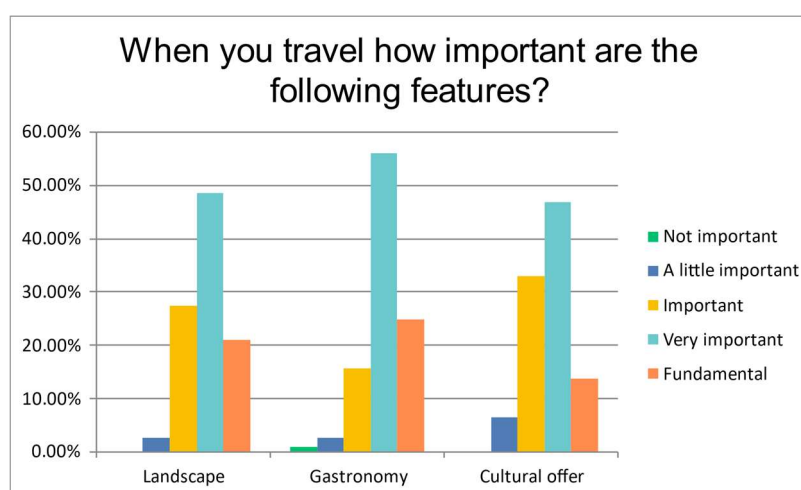


Figure 7. Survey results, importance of landscape, gastronomy and cultural offer.

Only 40% of those surveyed had ever visited an oyster farm, and 40% also believed oyster farms to have an impact on natural landscapes. 80% of participants believed that geographic origin is an important factor in

determining oyster quality, and the survey went on to ask which Irish county produced the best oysters in the participants' opinions; while 30% either did not hold an opinion or chose to skip the question, around 42% said Galway. Other counties mentioned included Cork, Donegal, Clare, Kerry, Mayo, Waterford, Sligo, Louth and Down. 80% of people said that they regarded oysters from Galway Bay to be of high quality, while 77% said that the wider perspective of Irish people was that Galway Bay's oysters were high quality. When asked to choose between native flat oysters (*Ostrea edulis*) and farmed giga oysters (*Crassostrea gigas*), 56% said 'both', while around 38% showed a preference for 'native only', and only 7% for 'gigas only' (although it should be mentioned that 45% of those surveyed chose to skip the question).

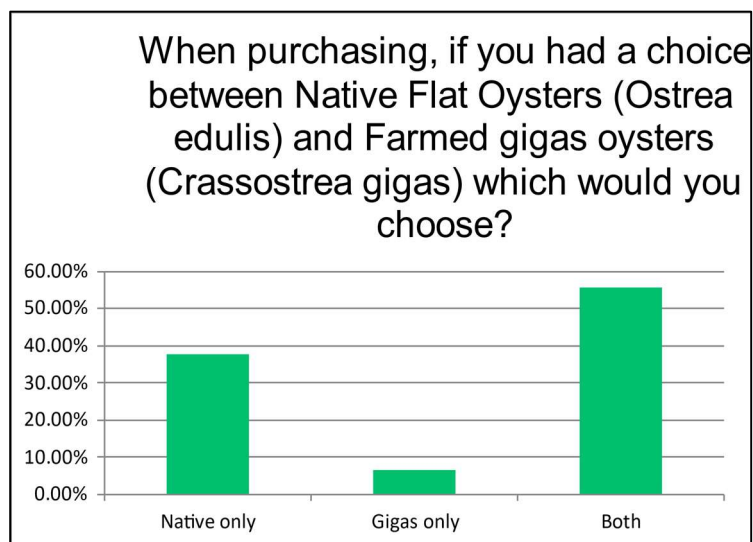


Figure 8. Survey results, importance of species of oyster to consumers.

The participants were also asked how many euros they would be willing to pay for a dozen of 'locally produced oysters', 69% said between €8-21, with 27% willing to pay over €22, and 2% said they would pay a maximum of €7. For a dozen of 'sustainably produced oysters', 60% would pay between €8-21, while 37% would be willing to pay over €22, and 2% would pay a maximum of €7. For 'French oysters', 76% said they would pay between €8-21 per dozen, with 9% willing to pay over €22, and around 15% willing to pay €7 maximum.

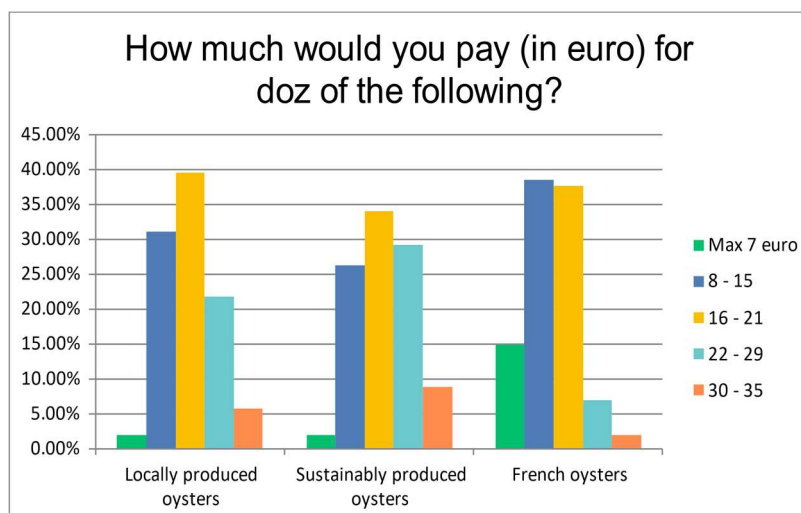


Figure 9. Survey results, consumers' willingness to pay for locally produced, sustainably produced and French oysters.

Interviews of oyster farmers

Four oyster farmers based in Galway Bay were interviewed for this study. All the farmers interviewed were males over 45 years old. Two of them have secondary school education, while the other two own a bachelor's

degree. Three of them identified their business as 'family company'. The size of their farms vary between 1 ha and more than 5 ha. Two farmers produce less than 10 tonnes of oysters per year, one of them produces between 10 and 30 tonnes per year and one of them produces between 50 and 80 tonnes of oysters per year. All the farmers interviewed grow their oysters using bags and trestles, one of them also use floating trays and two of them also grow the oysters on the seabed. The Pacific oyster (*Crassostrea gigas*) is farmed in all four farms. Two of the farms also grow native oysters (*Ostrea edulis*). Two of the farmers interviewed are directly involved with farm-related fieldwork (e.g. perform tasks such as harvesting, cleaning, etc.), while the other two are rarely involved. Two farmers had less than 5 workers, the other two have between 5 and 10 workers. Only one employs seasonal workers. All farmers have at least one part-time employee working between 8 and 25 hours per week.

More than 50% of the oysters produced by two of the farmers interviewed are destined for export, while the other two farmers declared that they export between 30% and 50% of their production. The market destinations of the exported oysters are, in decreasing order, France, other EU countries, Asia, and other miscellaneous countries. Non-exported produce is sold to national retailers, fishmongers, restaurants or directly to the final consumer.

The farmers were asked to approximate the average total expenditure per year (including fixed costs, staff, fuel, electricity, purchase of the seed, miscellaneous supplies, repair and maintenance, etc). Two of them declared an outlay of less than €22000 per year, while the other two spent more than €10000 per year. Only two of them receive a subsidy or grant.

Expenditure breakdown (in decreasing order) can be summarised as:

- Staff;
- Innovation, marketing, and traceability;
- Seed and maintenance; &
- Others.

Three farmers interviewed sell their oysters for less than €5 per kg, while one of them sells his oyster at between €5 and €8 per kg.

All the farmers interviewed are involved in some type of formation/collaboration with discussion groups or similar. One of them joins the Irish Shellfish Association (ISA) and one of them is part of the Co-ordinated Local Aquaculture Management Systems (C.L.A.M.S.). They all declared to be compliant with basic regulations of the Environmental Management System (EMS) practices, but none has 'Origin Green' membership. All the farmers believe the origin of the oyster is important or very important. According to them, to improve labelling and traceability of the product would be easy (one of them), could be done with some effort (two of them) or it would be difficult (one of them). Three of them also believe that it would be worthwhile to invest more on proper labelling/ certification of oyster origin regarding either sales or Gross Value Added.

Interviews of direct workers

Five people employed in the oyster industry in Galway Bay were interviewed in order to acquire knowledge about the working conditions and to investigate the workers' perspective of this industry. The workers interviewed are aged between 20 and 42, they are all males, Irish, and originally from county Galway. Their highest education certificate is the secondary school diploma. Three out of five workers are employed part-time and have a fixed-term contract, while two are full-time workers with a permanent contract. The average annual income is €20000 for a full-time position. All workers stated that they have another source of income outside of their job in the oyster farm. However, their work with oysters contributes up to 75% of their total annual income. All the workers perform multiple tasks such as onshore work, oyster cleaning, boating, quality control and general maintenance. Only one of the interviewed had previous experience in aquaculture (mussels and scallops) before starting his job at the oyster farm. All the workers interviewed said that it was easy to get the job, three of them chose the job because they had an interest in aquaculture, while two of them stated that it was a straightforward job. Only one of them had another person in their family working in the oyster farming industry. All the workers interviewed would recommend this job to others, they believe it is a healthy job and

it allows people to work in their own local area. However, two workers believe that the industry needs to be developed further. The workers stated that they very rarely suffer from stress, headaches, muscular fatigue or pain. Injuries are very uncommon; if they happen, they are usually cuts with no consequences.

The workers interviewed believe that the geographic origin of the oysters is very important in determining their quality and they all consider the quality of oysters produced on their employer's farm to be very high. One of the workers interviewed added that the quality of the oysters is associated with water quality; he believes that the best oysters produced in Ireland are farmed in county Donegal. The workers also believe that both the local community and Irish people in general consider oysters farmed in Galway to be a very high-quality product. When the workers interviewed were asked whether they believe the oyster farming in Galway Bay contributes to support the local economy, they all answered yes.

Conclusions

The study investigated how traceability of oysters can create added value. It was demonstrated that indicating the geographic origin of oysters on the label can be a valuable marketing strategy. Moreover, the study investigated the socio-economic impact of oyster farming in Galway Bay. The surveys highlighted how oyster farming is well rooted in the area, with most of businesses being family-scale farms. Both owners and workers are usually strongly motivated and passionate about their work.

Oyster farming in Galway Bay supports local economy. The answers given by consumers also highlight that oysters produced in Galway Bay are particularly appreciated in Ireland and attract tourists to the area.

Other Work packages.

We produced various dissemination materials and took part in on-line events (workshops/webinars).

ANNUAL FINANCIAL REPORT TO THE BOARD OF INDIGO ROCK
Summary of Project Financials

Primrose	Costs Budget (After Modifications) €	Costs incurred to 31.12.21 €	Remaining Costs per the budget €
Preparation Costs	800	800	-
Staff costs	85,100	85,048	52
Office and administrative expenditure	12,765	12,757	8
Travel and accommodation	4,505	4,498	7
External expertise and services	3,071	2,853	218
Equipment (including, laboratory goods, consumables, etc.)	395	298	97
Small Infrastructure and works	-	-	-
	<u>106,636</u>	<u>106,255</u>	<u>381</u>

Maximum available income for the Primrose project

79,977

Seatraces	Costs Budget (After Modifications) €	Costs incurred to 31.12.21 €	Remaining Costs per the budget €
Preparation Costs	530	530	-
Staff costs	240,740	240,740	-
Office and administrative expenditure	36,111	36,111	-
Travel and accommodation	5,843	5,843	-
External expertise and services	47,498	44,078	3,420
Equipment (including, laboratory goods, consumables, etc.)	2,758	2,758	-
Small Infrastructure and works	-	-	-
	<u>333,480</u>	<u>330,061</u>	<u>3,420</u>

Maximum available income for the Seatraces project

250,110

Seafood Age	Costs Budget (After Modifications) €	Costs incurred to 31.12.21 €	Remaining Costs per the budget €
Preparation Costs	600	600	-
Staff costs	123,517	112,261	11,256
Office and administrative expenditure	18,528	16,839	1,688
Travel and accommodation	4,308	2,801	1,507
External expertise and services	28,453	27,952	501
Equipment (including, laboratory goods, consumables, etc.)	21,744	19,732	2,012
Small Infrastructure and works	8,115	8,115	-
	<u>205,265</u>	<u>188,301</u>	<u>16,964</u>

Maximum available income for the Seafood Age project

153,949

 ** **A final modification needs to be done in 2022 but the figures are not reflected here.**

Nanoculture	Costs Budget (After Modifications) €	Costs incurred to 31.12.21 €	Remaining Costs per the budget €
Preparation Costs	1,000	1,000	-
Staff costs	167,462	135,102	32,360
Office and administrative expenditure	25,119	20,265	4,854
Travel and accommodation	8,250	4,494	3,756
External expertise and services	27,700	22,457	5,243
Equipment (including, laboratory goods, consumables, etc.)	17,304	14,782	2,522
Small Infrastructure and works	1,296	1,232	63
	<u>248,131</u>	<u>199,332</u>	<u>48,799</u>

Maximum available income for the Nanoculture project

186,098

BUDGET FOR THE YEAR 2022

Year 2022



Detailed Monthly Profit and Loss Account

12 mths

Sales	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	YTD
	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	€	€	€	€	€	€	€	€	€	€	€	€	€
Seatraces Income	-	-	-	-	-	-	-	-	-	-	-	-	-
Primrose Income	-	-	-	-	-	-	-	-	-	-	-	-	-
Nanoculture Income	2,905	2,905	2,905	2,905	2,905	2,905	2,905	2,905	2,905	2,905	2,905	2,905	34,860
Seafood Age Income	1,037	1,037	1,037	1,037	1,037	1,037	1,037	1,037	1,037	1,037	1,037	1,037	12,444
Consultancy Income	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Incomes	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sales	3,942	3,942	3,942	3,942	3,942	3,942	3,942	3,942	3,942	3,942	3,942	3,942	47,304
Cost of Sales													
Laboratory Costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Carriage on Delivery	-	-	-	-	-	-	-	-	-	-	-	-	-
Packaging & Ropes	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Cost of Sales	-	-	-	-	-	-	-	-	-	-	-	-	-
Direct Costs													
Labour and Pension	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(50,028)
Commission	-	-	-	-	-	-	-	-	-	-	-	-	-
Sales Promotion/Sales Advertising	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Direct Costs	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(4,169)	(50,028)
Margin	(227)	(227)	(227)	(227)	(227)	(227)	(227)	(227)	(227)	(227)	(227)	(227)	(2,724)
Operating expenses													
Salaries	-	-	-	-	-	-	-	-	-	-	-	-	-
Rent & Services	(1,538)	(1,538)	(1,538)	(1,538)	(1,538)	(1,538)	(1,538)	(1,538)	(1,538)	(1,538)	(1,538)	(1,538)	(18,456)
Office expenses - printing, stationery, cleaning, postage	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(360)
Travel/Entertainment/Subsistence	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(220)	(2,640)
Telephone/Computer Expenses & Subscriptions	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(372)
Laboratory Expenses	-	-	-	-	-	-	-	-	-	-	-	-	-
Accountancy/Professional /Seconded staff	(1,045)	(1,045)	(1,045)	(1,045)	(1,045)	(1,045)	(1,045)	(1,045)	(1,045)	(1,045)	(1,045)	(1,045)	(12,540)
Repairs & Maintenance	(50)	(50)	(50)	(50)	(50)	(50)	(50)	(50)	(50)	(50)	(50)	(50)	(600)
Insurance	(83)	(83)	(83)	(83)	(83)	(83)	(83)	(83)	(83)	(83)	(83)	(83)	(996)
Bank Interest and Charges	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(372)
Misc Expenses (incl equip & small infrastructure)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(168)
Depreciation	(417)	(417)	(417)	(417)	(417)	(417)	(417)	(417)	(417)	(417)	(417)	(417)	(5,004)
Total operating expenses	(3,459)	(3,459)	(3,459)	(3,459)	(3,459)	(3,459)	(3,459)	(3,459)	(3,459)	(3,459)	(3,459)	(3,459)	(41,508)
Total Costs	(7,628)	(7,628)	(7,628)	(7,628)	(7,628)	(7,628)	(7,628)	(7,628)	(7,628)	(7,628)	(7,628)	(7,628)	(91,536)
(Loss)/Profit	(3,686)	(3,686)	(3,686)	(3,686)	(3,686)	(3,686)	(3,686)	(3,686)	(3,686)	(3,686)	(3,686)	(3,686)	(44,232)