



WORKING GROUP DESCRIPTIONS

The objectives of the COST Action will be achieved through the vital work of seven WGs. Each WG will control its own advancement stages and deliverables, submitting progress reports to the Action Chair and MC every 12 months. The WGs will not work independently but interactively with other WGs without losing sight of the Action objectives and in constant coordination with the MC. This will avoid similar activities and maximise efficiency. In addition, the links among the WGs (described in Figure 1) will take place in the Workshops representative of each step of the production chain and attended by scientists, Ulva-based industry environmental NGO policymakers and end-users. The expertise of the core participants in the COST Action enables the establishment state of the art WG and to foster collaborations within the Action to tackle the following tasks:

WG 1. Ulva biology: the collective knowledge on the different aspects of Ulva biology, including systematics, genetics, reproduction, microbiome, diseases, and ecology, will be identified and prioritised. This will fulfil challenges (a,b). The WG activities include the following tasks:

Task 1.1 The inconsistent systematics and phenotypic plasticity of the Ulva genus will be clarified.

Task 1.2 The microbiome (bacterial - seaweed interactions) will be identified at the molecular level; D 1.1

Task 1.3 The seasonal and environmental impact factors on Ulva reproduction, growth, biochemical composition, and productivity (including nutrients, light, temperature, etc.) will be identified; D 1.1.

WG 2. Ulva in Aquaculture: collective knowledge on culture technologies (land and seabased), strains selection, fertilisation, seeding, biomass production, abiotic and biotic culture factors and harvesting of Ulva will be consolidated. This will fulfil challenge (a). The WG activities include the following tasks:

Task 2.1 Engineering and design concepts for cost-effective, large-scale biomass, land-based cultivation for high-value products, and sea-based facilities for food and feed, which will permit better control on growth in relation to environmental and operational conditions; D 2.1.

Task 2.2 Reproduction control will be established; seeding and preservation techniques will be improved and optimised;

Task 2.3 The potential impediments (biological, technological, and economical) for Ulva biomass production (including IMTA) will be evaluated and minimised; D 2.1.

Task 2.4 Facilitating bacterial-algal interaction to increase biomass production and maintain sustainable growth.

WG 3. Ulva as food and feed: The collective knowledge on Ulva food for human consumption, Animal feed, and use of Ulva as a source of biomaterials (e.g., food supplements) will be consolidated. The nutritional value of Ulva and its safety as food will be validated. The existing knowledge of Ulva biology and mariculture (WG 1, 2) will be identified concerning the food and feed production industries. This will fulfil challenge (b). The WG activities include the following tasks:

Task 3.1 The applications and nutritional values of Ulva spp. in humans and animal nutrition, including food processing, will be identified; D 3.1.

Task 3.2 Ulva as a source of new biomaterials will be investigated; D 3.1.

WG 4. Bioactive chemicals and Ulva-associated microorganisms: The collective knowledge on bioactive chemicals and Ulva-associated microbial (primary and secondary) metabolites, such as nutraceuticals, medicines, cosmetics, will be consolidated. The positive and



negative impacts of microorganisms on the seaweed will be elucidated. This will fulfil challenge (b).

The WG activities include the following tasks:

Task 4.1 The potential of extractable substances from *Ulva* to be utilised as food additives, in cosmetics and for various other purposes will be identified; D 4.1.

Task 4.2 The potential of *Ulva* bioactive extracts (primary and secondary metabolites) having antioxidant, antibacterial and antiviral activities will be identified; D 4.1.

WG 5. Ecosystem Services: The role and value of *Ulva* mass production within ecosystem services will be evaluated. Particular attention will be devoted to the removal and recycling of eutrophication nutrients from the water and climate-related effects (reduction of climate gas emissions and mitigation of ocean acidification). The negative aspects of *Ulva* (e.g., biofouling, epiphytic infestation of other organisms, *Ulva* 'green tides', etc.) will also be taken into consideration. This will fulfil challenge (c). The WG activities include the following tasks:

Task 5.1 The supporting services, such as uptake and recycling of nutrients and carbon; D 5.1.

Task 5.2 The provisioning services of *Ulva* as food, feed and novel biomaterials; D 5.1.

Task 5.3 The regulating services - carbon capture and climate regulation; D 5.1.

Task 5.4 Environmental challenges associated with negative aspects of *Ulva*; D 5.1.

Task 5.5 Cost-benefit economic aspects related to the ecosystem services provided by *Ulva* biomass production will be valorised. D 5.1

WG 6: Social, legal, and regulatory aspects: The government regulations will be summarised and the related social aspects will be consolidated. The Action will examine regulations relevant to *Ulva* production on a large scale, the acceptance of *Ulva* products by society, and the economic aspects, including risk assessment in different scenarios and geographical locations. This will fulfil challenge (e).

The WG activities include the following tasks:

Task 6.1 Government regulations on *Ulva* mass production (land- and sea-based) and algae marketing as food, feed and a source of valuable secondary metabolites (safety regulations and food quality control for different uses of *Ulva*) will be studied; D 6.1.

Task 6.2 The impact of *Ulva* cultivation, processing and marketing on various communities concerning social aspects (social acceptance of *Ulva* as food, improved nutrition in the communities as well as job creation, increasing community income and education) will be evaluated; D 6.1.

Task 6.3 Conflicts of interest regarding space for large scale production of *Ulva* vs. other maricultured organisms and with other users of the sea (shipping, fishing, leisure, etc.) will be tackled and the information will be transferred to related governments with suggestions for possible amendments; D 6.1.

Task 6.4 The economics of *Ulva* farming (land and sea-based), processing (e.g., biorefineries), marketing including risk assessment in different systems or scenarios will be analysed; D 6.1.

WG7: Coordination and result dissemination: WG7 will manage the core COST Action activities. It will acquire, coordinate and re-evaluate known and new data and will ensure that essential information is shared with partners, end users, and other interested parties. Administrative and scientific data will be exchanged every six months through regular meetings with the MC. WG7 will organise conferences, workshops, TS and STSMs (D7.2-7.3). It will also disseminate the COST Action's conclusions through social media (Skype, FB, etc.), scientific papers, and SME platform for professionals and public events (D7.4-7.9). Cutting-edge technologies, methods and conceptual



approaches for the culture of selected *Ulva* spp. will be adopted and presented to participants through workshops and conferences. End users will be provided with advice and support services, toward the development of new ventures related to *Ulva* production and marketing. WG 7 will oversee assembling all the information acquired by this COST Action and summarising it in a conclusive “*Ulva*: Tomorrow’s Wheat of the Sea” publication (D7.9)