

INTERDISCIPLINARE SSAS 2021/2022

GROUP “VARIABILITY AND DIVERSITY”

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INTRODUCTION:

The goal of our group is to focus on the ways in which diversity and variability are affected by and reflected on practices associated with the food industry. At the same time we want to explore the ways in which concepts of variability and diversity can become important resources for moving towards a more sustainable planet.

In a first preliminary analysis, we tried to focus on the effects of the production of food on the environment by looking at how intensive farming, industries and the human diet affect the environment. The main effects are easily observed in the reduction of biodiversity, a fundamental element for a resistant and resilient ecosystem. We then moved on to a second phase in which we took pollinators as a case study. We highlight not only the impact that humans have on the latter but also, in a future perspective, some consequences that the loss of these pollinators would have on humans.

Considering diversity as a precious asset that has to be protected, we focused on the variability of the strategies that can be adopted as a possible solution. In Particular, we explored a variety of approaches of optimization in the intrinsic diversity of food industry issues. We analyzed the use of fertilizers, in the delicate balance between harvest maximization and soil conservation, the use of plastics and innovative material in packaging, showing their required property and limits, and a new technique of conservation, able to preserve food and the environment. Finally, we discussed space food as a special example of food industry optimization, not so far from Earth applications.

By way of conclusion, we focused on critical issues related to our Western diet. In practice not much has been done so far to significantly reduce meat consumption and encourage a dietary shift towards plant-based food. Yet plant-based food has beneficial effects not only on our planet, but also on our health. What should be done? We tried to make some proposals both at European and national level by targeting the main fields of action and looking at future perspectives.

GROUP I: How does food production affect the environment?

Speakers: Fabio Rivellini, Gabriele Pignalberi, Lucrezia Tondo, Flavia Vitale, Lorenzo Antonelli, Pietro Bertoldo

Food production takes a toll on the world's resources and alters its balance. In order to track the effects of human intervention, scientists have had to define what an ecosystem is, how it works and what makes it sustainable.

An ecosystem is the result of interactions between organisms and the environment surrounding them and it's characterized by properties such as the amount of organic matter or water or even the way energy flows through it. In this regard, we will analyze the essential role played by biodiversity and species richness in the stabilization of an ecosystem, making it less vulnerable to fluctuations of the abundances of its individual populations, and how the complexity and the coherence of its trophic structures influence its resilience to disturbances or other perturbations.

After analyzing what an ecosystem is, and what biodiversity is, we tried to focus on how human activity's impacts biodiversity. The expansion of agriculture has been one of humanity's largest impacts on the environment. It is one of the greatest pressures for biodiversity and it has transformed habitats (lands use of foods is largely dependent on the intensity of farming).

A particular case study has been analyzed, regarding a specific group of animals: pollinators. They contribute to important mechanisms such as carbon sequestration and biodiversity preservation. Furthermore, pollination is linked to food both from an economic and nutritional point of view.

In this regard, choices conditioned by the food industry are having a detrimental effect on pollinators, through both mechanisms directly influenced by humankind such as intensive agriculture and the excessive use of pesticides, and more large-scale phenomena, such as the introduction of alien species into different habitats or climate change.

In conclusion, we concentrate on how the loss of pollinators affects nutritional health. Individuals receive the majority of their nutrients from fruits and vegetables, and sometimes are unable to fully replace them. The potential for pollinator failure is reflected in vitamin A problems: 20–24% cause child mortality from measles, diarrhea and malaria and 20% of all-cause maternal mortality can be attributed to this condition.

GROUP II: "Techniques in the Food Industry, Innovation and Optimization"

Speakers: Saverio M. Currà, Filippo Moretti, Benjamin E. Birzu, Francesco Sena

The Food Industry consists of three main phases: production and collection of primary commodities, food processing in the finished product and distribution to consumers. Every step presents problems and possible optimizations. We focused our research on the diversity of proposed solutions inside the variability of the commodity chain at the aim to provide a wide view over the challenges the Food Industry has to deal with.

A brief introduction is dedicated to the two possible supply chains and their strong points. In the first instance we debate in detail the problem of fertilization, in balance between product maximization and soil conservation, and we present modern technologies in the control of the production field, techniques that take advantage of

collection and data analysis in order to act with precision and efficiency over the plantation demand.

In the second part we show the historical role and the evolution of packaging, from Sumer to the modern well-known plastics, making references to the main features that are required in that field. Starting from the recent necessity of biocompatibility and eco-sustainability, we explored the bioplastics perspective, and evaluated in particular the promising materials poly-lactic acid and starch. Moreover, we present the recently developed technique of high-pressure treatment as an innovative solution that can sterilize the food preserving its aroma.

Finally, we bring up to speed a special example of the food industry: space food. We examined the requirements that a food product must have in order to be usable in space, the main techniques employed for their production, packaging optimization for the space environment and the application that space production could have on earth.

GROUP III: Meat consumption and plant-based food: encouraging a dietary shift

Speakers: Alessandro Moscone, Celeste Gulli, Alessandro Modesto, Emilio Ferrante, Sveva Bertini, Martina Di Falco

It is nowadays unquestionable that our Western diet is no longer sustainable. Policymakers seem to have grasped this issue, but in practice not much has been done so far to significantly reduce meat consumption and encourage a dietary shift towards plant-based food.

A dietary shift towards plant-based food is necessary to protect our planet and curb global warming, but it also has important outcomes on our health. The beneficial effects of a plant-based diet are in fact both physical and mental: for example, those who follow a diet with a very low content of red meat lower their risk of dying from cardiovascular disease, but they also decrease the symptoms of depression.

We then focused on the situation in our country, Italy. In recent years, the pandemic has led to a decrease in the consumption of meat and changed the perception that the population has of food itself. Although Italian consumers are inclined to a dietary shift, in comparison with other European countries, Italy is still behind. There is in fact a gap between the will to consume and actual consumption. We, then, deconstruct a very strong prejudice regarding the plant-based diet. Does eating vegan cost more? An analysis of the difference in costs between a plant-based and an omnivorous diet shows us that this is a false belief.

Finally, we want to approach the future proactively. We make proposals both at European and national level for this purpose: the fields of action are substantially the Common Agricultural Policy, which should be reformed with stronger environmental features, taxation and the label and marketing regulation of food. Lastly, we identify climate-smart agriculture and its integrated approach as a powerful tool in order to address the interlinked challenges of food security and climate change and at the same time to promote the consumption of plant-based foods.

SPEAKERS:

Gruppo I:

Speakers: Fabio Rivellini, Gabriele Pignalberi, Lucrezia Tondo, Flavia Vitale, Sophie Magdalene Thomas, Lorenzo Antonelli, Pietro Bertoldo

Group II:

Speakers: Saverio M. Currà, Filippo Moretti, Benjamin E. Birzu, Francesco Sena

Gruppo III :

Speakers: Alessandro Moscone, Celeste Gulli, Alessandro Modesto, Emilio Ferrante, Sveva Bertini, Martina Di Falco

SEQUENCE OF EXPOSURE:

Group I, How does food production affect the environment?

Group II, Techniques in the Food Industry, Innovation and Optimization

Group III, Meat consumption and plant-based food: encouraging a dietary shift