

YPARD, a partner in the EU-COST project:

**Coordinated by
University of Sussex, United Kingdom**

Introduction:

The growing human population presents a huge challenge to world agriculture. As more than 40% of the Earth is arid or semi-arid and most of the planet's water is saline, we advocate the sustainable use of these under-exploited resources for human benefit. Halophytes have evolved in saline habitats and are an untapped source of food, fibre and bioenergy. Deepening our understanding of saline ecosystems and halophytes will help combat salinization, soil erosion, loss of biodiversity and bioproductivity. Our goal is to create an interdisciplinary group of scientists to bridge gaps among disciplines by jointly exploring the biodiversity of halophytes, re-evaluating their uses as crops, including bioenergy, as sources of salt-resistance genes, and for use in the restoration and rehabilitation of salinized or contaminated land. The Action will tackle the problems of salt-affected agricultural land and support the timely development of a saline agriculture using brackish water as a replacement or a supplement for diminishing freshwater. The Action will produce a global database of halophytes, an expert network and research proposals for the economic utilization of halophytes and the revitalization of degraded salinized land.

Keywords

Saline-ecosystems, bioenergy, halophytes, restoration-ecology

Advantages of a COST Action

The Action will form a platform for a multi-national, interdisciplinary scientific exchange that will be of great value for fundamental and applied research and development. This will aid the co-ordination of nationally-funded research programmes, and help to ensure that Europe has a strong and competitive place in what will be an important aspect of life of the twenty-first century. Since the problems of salinization and ecosystem degradation are global, the ease of access and participation of researchers and institutions from non-member countries makes COST a particularly appropriate tool for this Action.

The members of the COST programme will contribute to and benefit from the outputs of the Action through:

- meetings and workshops that will focus on the different facets of the Action's topic;
- sharing approaches and exchanging points of view of scientists from different disciplines;
- mentoring of young scientists in basic and applied aspects of halophyte biology and of halo-agriculture;
- releasing a new electronic database of halophytes to be used by all scientists working in this field and
- publishing a treatise to be entitled: "Halophytes: from genes to ecosystems" for researchers, students, land managers and policy makers.
- The main objective of the Action is to assemble an interdisciplinary group of plant, soil, ecological, horticultural and agricultural scientists who will collate existing knowledge of halophytes, from proteomics to ecosystems, in order to delineate future directions of research that will impact on conservation and management of saline environments, restoration and revitalization of degraded lands and wetlands,

agricultural and horticultural products of nutritional, pharmaceutical, environmental or industrial interest.

The 'rewards' and deliverables will come in the form of journal publications, a book-length treatise, and regular reports. The establishment of a web site for information dissemination among scientists of different disciplines, discussions among scientists of different WGs, and active dialogues among scientists of different countries will also contribute to achieving the objectives.

It is expected that the exchange of information among researchers with complementary backgrounds and end-users will stimulate a dynamic exchange of information and ideas, and lead to practical and applicable results. The Action will:

- strengthen dialogue with end users, thereby aiding scientists, planners and the general public by providing a database for the botanical, physiological and agronomical characteristics of halophytes with potential uses;
- develop a forum among specialists of different disciplines to understand better the interactions of halophytic plants with their environment and with other organisms, as well as regulatory mechanisms at the tissue, cellular, and sub-cellular levels.
- devise an expert network for selecting the halophytes most appropriate for restoration of given pedologic, climatic, ecological and social conditions and provide suggestions of indicators of salinization that could be used by agronomists and soil scientists;
- generate guidelines for monitoring vegetation, soil salinity and water conditions in saline habitats to enable the detection of environmental change, the use of halophytes in phytoremediation of salinized or contaminated areas and provide a treatise "Halophytes: from genes to ecosystems";
- suggest clear targets for future research.

Since salinization is a global problem, the Action will produce a saleable knowledge-base for the sustainable economic use of saline water and salt-affected soils (e.g., for cash crops for biofuel production or for specific secondary compounds) and generating research programmes that will aid wealth generation for European companies and agencies involved in such activities.

The Programme will also benefit the EU by:

- identifying expertise and establishing an advisory forum;
- providing guidelines for the restoration, use and conservation of endangered saline habitats;
- providing guidelines for monitoring vegetation, soil and water conditions in saline habitats to detect environmental changes;
- reducing duplication in research efforts;
- identifying the biodiversity of halophytes and their potential uses as crops and ecosystem service providers.

The outcome of the proposed Action should also aid more efficient selection of salt-resistant plants for breeding purposes through advising plant molecular biologists of important aspects of the genomics and metabolomics of salt tolerance that link genes to plant traits expressed in the field.

The Action is aimed at:

1. farmers and foresters; scientists and students of research institutes in agriculture, forestry and nature-conservation,
2. environmentalists,
3. landscape planners, city planners,
4. policy-makers, both local and international.

The outputs of the COST programme will be linked to that of other programmes such as ‘YPARD’ (www.ypard.org); the ERA-Net – in Plant Genomics (<http://www.erapg.org/everyone>), the European Science Foundation (ESF) Programme on Plant Adaptation, or its related programmes, the Natura 2000 network (<http://www.natura.org/>) and the biotechnology working group of the German Society of Engineers at www.vdi.de.