Early Agricultural Remnants and Technical Heritage (EARTH)

The dynamics of non-industrial agriculture: 8,000 years of resilience and innovation

An ESF scientific programme

From the beginning of the Neolithic to the Industrial Revolution, agriculture has been one of the main focuses of human action and decision-making. The daily activities and concerns of people producing their food structured their relationships, their communities and the overall organisation of the societies in which they lived. Knowledge of crops, soils and climate was complemented by the skills of cultivating, processing and tool-making, and all of these took place across a complex natural, anthropogenic and social landscape.

The overall aim of the EARTH programme is to investigate the dynamics of non-industrial agriculture, based on a long-term perspective and a deep understanding of the social and cultural context. Much valuable research has been done on the plant remains, tools, structures and landscapes relevant to agricultural practice. We aim to build on these achievements by focusing not so much on specific artefacts or structures as on people in action – their knowledge, skills, perceptions and experiences.

Non-industrial agriculture has often been regarded as being mainly static, belonging to some 'traditional' or unchanging past. This has been ascribed to people's lack of ability to innovate, or by contrast because they belonged to some Golden Age of 'sustainability'. We reject this stereotype, and view agriculture, like society, as a complex of ongoing dynamic processes, continuously oscillating between stability, change, resilience, crisis and innovation.

The European Science Foundation acts as a catalyst for the development of science by bringing together leading scientists and funding agencies to debate, plan and implement pan-European initiatives.

Aims and objectives

Agriculture and its origins have long been lively and innovative subjects of research, involving people working in a variety of disciplines. This is why there is such a wealth of methodological approaches used today, ranging from the study of ancient and ethnographic tools, the analysis of crop remains, field experiments, the examination of historical documents, interviewing practitioners, and the mapping of agricultural structures and facilities.

Although it is becoming increasingly clear that old disciplinary boundaries are shifting, we still need a structure enabling us to join up and intertwine the routes and streams of the various research initiatives. Despite the quality of national projects, only a European-wide programme can provide us with the means to accomplish this. The originality of this programme lies in the means it provides for unusual networking methods, and for innovative forms of output such as an online database of films, images and other research documents. In this way we will find new common ground for integrating our approaches, and fit them together into a form which can be effectively transmitted for research and teaching, as well as for heritage and training.

We take a resolutely human-centred approach, investigating the knowledge, skills, perceptions and experiences of the farmers both of the past and of the present. Scientific techniques and approaches such as the analysis of botanical remains, tool function, soils and climate are essential for answering our research objectives, but they are only the means to an end. In spite of our wide disciplinary background, we share an enthusiasm for understanding the knowledge, relationships and experiences of individuals, groups and societies in their agricultural activities.

The time period of our proposed programme runs from the Neolithic to the onset of industrial production, at whatever point that has happened (in a few cases it has still not taken place). We consider this long-term perspective to be essential for understanding the relationship between stability, change and resilience. We expect this perspective and our integrated approach to shed light on the nature of early agricultural systems, though we do not intend to enter into the well-rehearsed debate on the origins of agriculture. The great time-depth of many agricultural technologies is very striking, particularly when contrasted with the dynamism of the societies which used them. The social context in which agricultural knowledge is transmitted from one generation to another is crucial here.

The geographical scope of the programme is European, Mediterranean and Near Eastern. The south-west Asian origin of many European crop species and processes gives a clear coherence to the body of material we are studying, while the considerable socio-historical and environmental diversity of these regions allows for contrast and comparison. The diffusion of European tools and methods into very different systems, such as those of the New World, is an essential area of study, throwing complementary light on specific research aims such as agriculture's role in colonialism.

Threshing of broad bean (*Vicia faba*) with a threshing sledge in Southern Syria. The sledge, which is also used to work other legumes and cereals, cuts the straw into small pieces and removes the grain. Winnowing and sieving separate the grain, which is for human consumption, from the various chopped straw fractions, which are used primarily for animal fodder.
Dama, June 2004.
Photo: Patricia C. Anderson, © CNRS

As well as examining specific research goals, the workshops and conferences of the programme will address the methodologies necessary for achieving such goals on a wider basis. These involve working at the interface of all the mainstream research methods. The core of this will consist of using digital technologies to produce and integrate interdisciplinary data. The development and integration of these methodologies will extend our networking from the production of specific research products, such as books or DVDs, to the facilitation and development of the field by elaborating common procedures for recording and exchanging data.

Our objectives can be summed up as follows:

- to investigate non-industrial agriculture by considering it as an ongoing dynamic process
- to examine the development of agricultural practice in a long-term perspective, from the Neolithic to the onset of production on an industrial scale
- to focus on the human aspects of agriculture, particularly the knowledge, skills, perceptions and experiences of individuals within specific communities and societies
- to apply a broad-based interdisciplinary methodology which has at its heart the digital communication of data and ideas, in order to build on previous national research projects which dealt with specific aspects and used specific approaches
- to encourage and facilitate the recording, preserving and dissemination of local knowledge of agricultural crops, techniques and organisation, and of their social and cultural context
- to provide training and experience for young scholars and research students, for the future growth and development of this interdisciplinary research field.

The ESF research programme

Team 1: Crop Choice and Diversity

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Research carried out over the last twenty years suggests that the earliest domestication of crops in the Middle East was not driven so much by famine or a rapidly increasing population, as by people's preferences for these particular species. It is becoming clear that individuals deliberately chose specific foods for reasons other than the merely 'functional' or 'opportunistic'. The taste, colour and smell of food played an important role in people's choice of what they preferred to grow, gather and eat, while social perceptions, memories and religious beliefs enabled the transmission of those preferences to new generations.

What stands out in all of this is the importance of the cultural factor. Why have different societies apparently specialised in a few varieties of crops, while others have deliberately increased the diversity of their plant resources? What role has colonisation played in increasing or narrowing the range of crops exploited? Questions such as these are now at the forefront of the research agenda. Twenty years of careful collection of botanical, archaeological, ethnobotanical and historical data mean that researchers have the material to answer them. This series of workshops is intended to provide the all-important infrastructure to bring them together and integrate their findings. It will give them the opportunity to see patterns and overarching explanations for stability, reaction to crisis and change, and the role of society and culture in the functioning of agricultural processes.

This team is composed of researchers from many disciplines, with backgrounds in the biological and life sciences as well as in the human sciences of history and ethnography. Typical examples of the former are chemistry and archaeobotany, the study of seeds, pollen, starch and phytoliths. Our field areas cover the eastern and western Mediterranean, south-west Asia, the Balkans, Atlantic Europe, the Nordic-Baltic states, and the New World. Together we will examine the evidence for the choice of crops and variations of diet. Central to this research will be the role of social organisation in agricultural production, including distinctions of gender, class and ethnicity, and local perceptions of time and space. Several members of this team have carried out ethnoarchaeological investigations to compare activities in present-day societies with remains in archaeological sites and in the landscape.

Many themes will come up in all three workshops, and will find resonance with topics discussed by the other teams. Wild plants continued to be collected and maintained within the agricultural system, and played an essential role in maintaining a balanced diet, providing emergency foods, and satisfying cultural preferences, as well as having other uses such as medicine, fuel and fodder. The preparation of bread, the choice of its ingredients, and its form and decoration can play a central role in feasting, religion and cultural identity. The work

of the experimenters on the team is particularly important for measuring the yield and behaviour of crops under different cultivation regimes and environmental conditions, and comparing them with the historical and archaeological record.

An important by-product of our work will be the examination of present-day programmes for preserving ancient crops. The most striking example of this consists of hulled cereals, which were widely used until recently, but abandoned in the 1950s because of increased time and labour costs, as well as their apparently lower yield. The modern revival of traditional crop varieties can bring back the tastes, appearances, and techniques of the past, as well as providing modern health foods. They are also an important resource for crop breeding in the future, and field programmes can preserve greater biodiversity than the limited amounts of grain stored in gene banks and botanic gardens. This team is aware of the urgency of studying these crops, their variability, and their field context, and of preserving them on a large scale. Our reports can inform agricultural policy makers and heighten awareness of these invaluable resources.

Mother and daughter carrying *karaavlik* (*Chondrilla juncea* L.) in Niğde, central Turkey, 1999. This is normally used as animal fodder, but is also edible when tender. Crops, wild plants and livestock are all integral parts of the agricultural and social system.
© Füsun Ertuğ

Team 2. Skills, Processes and Tools

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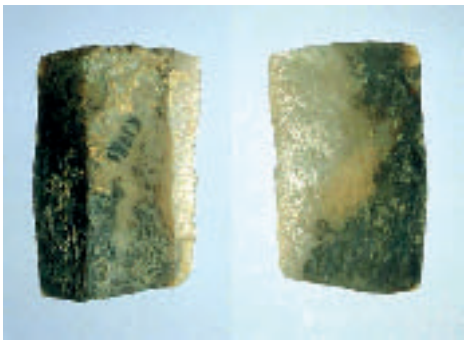
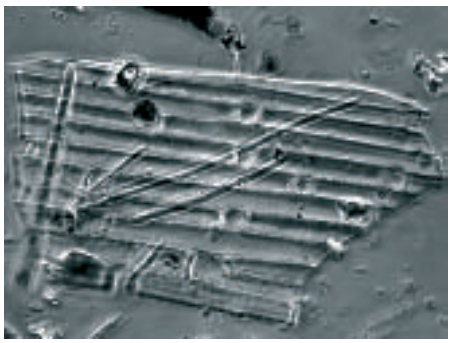
The scholars participating in this team aim to improve and renew current scientific knowledge about the skills and implements used in non-industrial agricultural activities since their origins 8000 years ago. We will highlight regional and historical diversity, but also examine the surprising continuities in routines of crop production, storage and use, which can often last for several millennia. Such routines and techniques are *chaînes opératoires* carried out by specific individuals and groups, and need to be seen in the context of their social organisation.

To achieve these goals we need to establish dialogues among specialists from the humanities (archaeology, history, social anthropology), life sciences (botany, paleobotany, geology, phytosociology, ecology, physical anthropology), and applied sciences (agronomy, ergonomy).

Since its beginnings, one of the characteristics of non-industrial agriculture has been the great stability of the plant species chosen to be cultivated, whether for human consumption, to feed animals, or for the production of material goods. But this rather limited number of species has been cultivated with an almost infinite number of different tools, skills and varieties of human interaction. The study of tools and techniques 'in action' is situated at the interface between the physical world and human society, and will allow us to analyse and compare the technical solutions and skills that specific groups have put in place in different historical and ecological contexts.

Such research can only be done on a collaborative and interdisciplinary basis.





Left: 'Canaanean' blade segment, from Kutan (Eski Mossoul, Iraq), 3rd millenium BC. The microscopic wear traces observed in the gloss area resemble those found on flint inserts in threshing sledges, both in ethnographic contexts and experimental reconstructions. The black material is bitumen (tar) which was used to glue it into the sledge. Length: 5.1 cm. Photo: Benoit Bireaud, © CNRS

Right: A phytolith (plant silica from the leaf sheath of a cereal stem), seen magnified 400 times, from a probable storage structure at late Neolithic Halula in North Syria (c. 6,000 BC). Similar cut marks and edge profiles occur on phytoliths from cereal stems worked with threshing sledges today, and show that the threshing sledge was used at Halula as early as the Neolithic period. Photo: Patricia C. Anderson, © CNRS

Investigating a particular tool, for example, requires an archaeological examination of its morphology and any microscopic wear traces, the analysis of historical texts and images, comparison with ethnographic data, and experimenting with the tools themselves, using reconstructions. Specific tool use and regular work patterns, such as carrying heavy items on the head or the back, can also be seen in the skeletal deformations detected by physical anthropologists.

As well as encouraging participants to develop new research, we hope that these workshops will stimulate broad-based initiatives to preserve the heritage of local skills and human knowledge which is clearly endangered by the rapid spread of industrial agriculture.

Team 3: Agricultural Landscapes

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Agriculture is a complex and wide-ranging activity, which embraces far more than crops, tools and fields. Transport of crops, materials for making equipment, settlements and communication routes are all integral parts of agricultural activity. The only scale on which the organisation of such disparate and widely-spread activities and resources can be analysed is that of the landscape.

The effect of the physical landscape is clearly of major importance. Where are the best arable soils and water sources? Does the terrain require hillslope terraces or drainage ditches? Are special arrangements such as irrigation needed to cope with a marginal environment or climate? Any agricultural landscape, however, is by definition cultural. By removing the previous vegetation, managing the soil, and carrying out the necessary ploughing, sowing and reaping, people have made large tracts of landscape into places every bit as human and artificial as a settlement or city. Landscape and people live in a dynamic where each is constantly affecting and influencing the other.

Because people work and interact there every day, agricultural landscapes become one of the most important arenas of social organisation and interaction in their lives. Every landscape is more than a map of its physical properties. Deeply embedded within the soils and hillslopes are the memories, knowledge and associations of generations of inhabitants and farmers. This is where my grandfather taught me to use a sickle; I have walked along this path to my fields every day for sixty years; this is always the worst part of the field to plough.

The aim of the Landscape Team is to address the issues of stability, crisis and resilience in agriculture by examining agricultural practice in its landscape context. Most of our members are involved in large-scale landscape projects from across the region, from Estonia in the north to the Negev desert in the south, from Andalusia in the west to Ukraine in the east, and in areas of European colonisation such as Peru. Others are specialists in particular techniques which are required to undertake this kind of holistic and interdisciplinary research, such as micromorphology, pollen analysis and GIS.

18th and 19th century agricultural settlement of Arineckaig, Wester Ross, western Scotland. The inhabitants cultivated the valley bottom with rig and furrow, dried their barley in grain-drying kilns, and grazed their cattle on the hillslopes and upland pastures.
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Young scholars grants

The EARTH programme will launch a young scholar grant scheme in summer 2005, allowing research students and young researchers to visit field areas, field projects, laboratories, institutions and archives associated with the programme, and to participate in EARTH workshops and conferences. More details about these grants can be found on the EARTH website (www.esf.org/earth).

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For the latest information on this programme consult the *EARTH* home page: *www.esf.org/earth* and *www.earth.arts.gla.ac.uk*

Cover picture: 'Harvest scene', Denmark. Painting by Peter Hansen (1910), showing men and women scything grain and tying the sheaves. © Faaborg Museum, Denmark

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