

SAVING TRADITIONAL KNOWHOW IN AGRICULTURE

Pascal Bergeret, *CIHEAM*

Juliette Prazak, *FAO*

Caterina Batello, *FAO*

Developed down the ages, traditional knowhow¹ in agriculture, livestock keeping and fisheries is an integral part of the Mediterranean people's heritage. Rich and diverse, it is for the most part little known, since often it is limited to the communities in which it is implemented. Given the current threat, due to a variety of reasons that are described in this chapter, it is essential to do everything possible to protect this traditional knowhow, for it could well hold the key to the sustainability of Mediterranean agriculture – currently facing a range of challenges that are rapidly becoming more acute. Such knowhow, which is rarely written down, must not be wasted in the Mediterranean region, where oral culture is still dominant and where all human capacities are needed in order to mount an agronomic and technical response to the growing problem of producing enough food.

First of all, we examine how this traditional knowhow is created, then subsequently, we explore the reasons behind its erosion or neglect. Finally, in the third section, we discuss signs of a potential renewal of Mediterranean agriculture, partly driven by mobilization of traditional and other forms of knowhow, within new systems of knowledge and agricultural innovation.

Traditional knowhow in food and agriculture in the Mediterranean region

Despite the vicissitudes of its history, the Mediterranean region has sustained a very characteristic way of life based on agriculture, for more than several thousand years. This enduring identity is not the result of a coherent and static Mediterranean concept, but of profound changes, even devastation, which have occurred throughout the region's history, in biological, but also technical and cultural terms (Butzer, 2005). In particular, trade within the Mediterranean region has strongly helped to

1 - In this chapter, the notion of traditional knowhow is taken by commodity, to refer to reserves of knowhow accumulated by farmers, livestock keepers and fishers throughout history – knowhow which, far from being static, has evolved through trade or exchanges between cultures and civilizations.

shape the territory. Commercial exchanges of agricultural products, directly linked to the primary needs of governments and communities, serve as a valuable marker of centres of power, the advance of techniques and developments in the cultivation of certain varieties (Blanc, 2014).

Modeling Mediterranean landscapes from Antiquity to the Industrial Revolution

Use of territory in the Mediterranean during the Neolithic period appears to have been sedentary and diversified, servicing a varied economy based on the intensive exploitation of forests – abundant in the region at that time – and their resources (Williams, 2000). This period saw the first instance of the domestication and diffusion of endemic species (a wide range of cereals, legumes, nuts, oilseeds, fruit and vegetables, and animal species), which continued up to the classical era (500 BC) and was widely practised in the region down the centuries. But it was also during the Neolithic period that intensive deforestation of Mediterranean territory began, continuing until the Middle Ages. This period was marked by population growth, urban development, mineral extraction and regional trade, which transformed agriculture and the knowledge linked to it, gradually shaping the territory, ultimately producing the clearly recognizable Mediterranean landscape that exists today.

A commentary by Plato in the 3rd century BC assesses accelerated deforestation in Attica (the ancient city-state of Athens): “what remains now, compared with what existed before, is like the skeleton of a sick man, all the fat and soft earth having wasted away, and only the bare framework of the land being left.” Later, some Italian writers spoke of the *polpa e ossia* of the land – the flesh and bones. The Mediterranean region, defined by the original nature of its climate and vegetation and the uniqueness of its biodiversity, but also by its fragility in the face of environmental constraints, especially hydric stress and erosion (Council of Europe *et al.*, 2006), is in reality a formerly heavily forested area, mainly by conifers, which later suffered from the loss of protective forest cover. Its regeneration is problematic, especially given the risks of fire and overgrazing.

A massive producer, consumer and exporter of wheat, olive oil and wine – traditional and characteristic food products from the region – the Roman Empire went so far as to subsidize the purchase of wheat at different times in its history. It sold the surplus to other territories, such as Gaul and Spain (Kingsley and Decker, 2001). From the 9th to the end of the 13th centuries, the medieval economy enjoyed rapid growth. This period is considered to have been the greatest era of agricultural expansion since Neolithic times (Georges Raepsaet, quoted in Andersen *et al.*, 2014). At the same time, intra-regional trade and exchanges saw a massive increase. Trade with the Middle East, Asia, the Indian subcontinent and sub-Saharan Africa introduced the cultivation of peaches, apricots, aubergines and some citrus fruits, as well as that of hemp, cotton, rice and black-eyed peas (cowpeas) (Heywood, 2012), which, to varying degrees, shaped the Mediterranean territory and created new agricultural traditions. In terms of the age of the territory, and its long history, these upheavals are relatively recent. Between the 15th and 19th centuries, European agriculture showed fairly low levels of productivity and generally relied on rivers for irrigation.

This small-scale family farming was disrupted by the Industrial Revolution, urbanization of the European population and the transformation of agricultural products into objects of mass consumption.

Traditional knowhow in the Mediterranean region

The intensity and continuity of exchanges between cultures and civilizations, throughout the history of the region, slowly led to the emergence of traditional knowhow, although the reserves available only grew slowly when measured against the scale of a human lifetime or several generations. This knowhow can be classified as ecological, since it is the result of observations made over time on interactions between cultivated plants or animals. Adaptive by nature, it allows farmers and livestock keepers to adjust their techniques to the state of their environment and its changes (climate, soils, availability of water resources, etc.). New elements are only admitted once they have demonstrated their relevance in a specific local setting. Scientific knowhow is different, since universal. A scientific truth is independent of its context and is based on unalterable principles. Moreover, such knowledge is mobile and can be applied everywhere. These two types of knowledge are therefore clearly complementary, and there is no reason to suggest that one is more legitimate than the other.

Integrating local species in a territory and cultural fabric: the example of traditional pig rearing in the northern Mediterranean

Agroforestry, combining cultivated terraces, trees and pigs, is an ancient and widespread model in the northern Mediterranean. Pigs were allowed to roam free over large areas, where their presence represented the dominant economic activity, which conditioned all other types of landscape use. Humans deliberately sought this co-dependency of exchanges between animals, crops, soil fertility and trees, a complementary relationship between robust local breeds and their agroecosystem, and its implementation was refined down the centuries. A large number of these complex systems have been abandoned or simplified since the mid-20th century, particularly as a result of mass mechanization – poorly suited to terraced tree farming systems – the rural exodus, an outbreak of swine flu and successive crises in the price of pork meat. Local breeds were mostly replaced by high-yielding breeds. However, today, the market is seeing a clear renewal of consumer interest in regional and artisanal meat, reviving a niche sector that was previously very restricted, and encouraging growing official recognition of certain breeds by the competent national authorities (Kizos and Plieninger, s. d.). Local breeds reared in these particular systems represent an asset for future generations. For this reason, it is imperative that the wealth of their genetic patrimony, like the local cultural traditions that they represent, be preserved (Matassino, 2007).

Immersed in the culture, social practices and organizational methods of Mediterranean societies, traditional knowhow covers every aspect of material life. Much of it reflects the intimate relationship carved between farmers and their surroundings: this applies to water management and irrigation practices in oases of arid or semi-arid environments, which are key elements of cultural patrimony. In these same areas, nomadic pastoralism offers another example of traditional knowhow that is

closely linked to the culture and lifestyle of a society fully connected to its environment. The field of processing and adding value to agricultural products also benefits from traditional knowhow. Examples include the making of juices and jams from dates in southern Morocco, which is based on a deep knowledge of the characteristics of different varieties of date palms. Also worth mentioning is the rediscovery of Dittany of Crete (*Origanum dictamnus* L), a plant used in infusions since time immemorial and now reintroduced by modern cuisine into sweet and savoury recipes, reflecting the typical nature of Mediterranean ingredients. There is no end to the number of wild food plants that grow exclusively in the Mediterranean area, which are threatened to a greater or lesser degree and are still used in the cooking of the countryside – evidence that this ecological knowhow is still alive (Ali-Shtayeh *et al.*, 2008). An essential part of the social fabric of communities and a connecting and balancing factor between humans and their environment, traditional knowhow constitutes a veritable heritage for Mediterranean societies.

Loss and neglect of traditional practices in the Mediterranean region

In the northern Mediterranean

The European Union's (EU) common agricultural policy (CAP), launched in the 1960s against the backdrop of post-war economic development, was initially deployed in a rural setting characterized by a fundamentally traditional and family-run form of agriculture. This world was already suffering from the effects of long-standing depopulation of the countryside, due to the massive death toll of rural men in the two world wars of the 20th century, coupled with a slowing of population growth, strong industrialization – which was providing jobs in urban settings – and emigration towards countries in the New World (SESAME 2, 2014). While, as such, loss of traditional knowhow in Europe, and in the northern Mediterranean in particular, began well before the creation of the CAP, it is worth highlighting that this move certainly accelerated the process.

The sudden availability and massive use of synthetic inputs and agricultural machinery have enabled crops to be grown on historically poor or unstable soils in areas that were previously considered to be non-cultivable (Van Zanten *et al.*, 2014). With a longstanding goal of achieving agricultural self-sufficiency in Europe, the CAP strongly encouraged the concentration of land through a system of awarding subsidies per hectare or per head of livestock, in this way rewarding the biggest farmers (Jacquet, 2003), who showed little inclination to engage in traditional agriculture. In the Mediterranean, the effects have been heterogeneous, for the region has always been a “difficult” territory, characterized by severe water constraints and by a relief that is “devoured by mountains” (Fernand Braudel in SESAME 2, 2014), scattered with small-scale family farms with limited arable land where mechanization is often difficult and clustering farms together is not cost effective. More generally, it is modernity which, through a combination of social factors, has radically transformed Mediterranean agriculture. The advance of supermarkets, known for imposing suppliers with stringent specifications to achieve uniformity and consistency (in

appearance, taste and colour) that are incompatible with traditional and local varieties, has fostered the homogenization of horticultural varieties (Dedeire, 2009). Meanwhile, the globalization of the agri-food market and a new CAP reform in the 1990s have resulted in some of the less productive arable land in the more marginalized regions being simply abandoned (Van Zanten *et al.*, 2014).

Traditional hunting or poaching? When tradition counters nature protection: the case of songbirds in Malta and Cyprus

Malta, Cyprus and Italy are transit points for most migratory birds. Hunting these birds, many of which are from species that are actively protected in countries of northern Europe, is a traditional pastime that is part of the cultural and (at times) culinary patrimony of these countries (*ambelopoulia* in Cyprus, *pulenta e osei* in Brescia, Italy). The conservation status of large numbers of such birds has become very worrying in the past three decades. It has now been clearly demonstrated that the decline in populations of such migratory birds is in large part caused by their being trapped and hunted in Mediterranean countries, far more than by the destruction of their natural habitat due to agricultural intensification (Franzen, 2010). Paradoxically, far from bringing about a change of mindset and a shift towards a more developed ecological conscience, EU membership and greater prosperity have led to increased hunting and poaching of migratory birds in these regions, due to better roads and greater supplies of weapons. “Traditional” poaching has thus been established as a manly leisure pursuit, a marker of elevated social status and a symbol of rebellion in the face of the “foreign” power of Europe (McCullogh *et al.*, 2008).

Between 1970 and 2000, the 880 municipalities along the French coastline saw their total area of cultivated land decline by 20% – a loss of 200,000 hectares over thirty years. The main cause was pressure on land from construction (Daligaux *et al.*, 2013). Indeed, agricultural territories have been partly abandoned due to the explosion of land markets over the same period (General Council on Agriculture, 2009, quoted in Daligaux *et al.*, 2013), following the advent of paid leave and a leisure society, as part of the post-war boom. This phenomenon explains the virtual disappearance of agriculture in the urban area of Marseille and on the Côte d’Azur (Daligaux *et al.*, 2013). Although in poor condition, the hinterland has managed to survive. These fragile and marginalized areas have become “fall-back territories” – landscapes, but also reservoirs of traditional knowhow, which is often at the heart of tensions created by new social and economic challenges. There is now a shift towards a “rural renaissance” driven by new urban expectations of authenticity in rural territories, and a general rethinking of the functions assumed by agricultural spaces (Linck *et al.*, 2015) – all this in a context of extremely precarious access to land. This form of landscape reclamation mainly involves plots that cannot easily be worked by machinery, into which traditional varieties have been reintroduced. The process is frequently started by local actors keen to take advantage of tourist-related opportunities and strong gastronomic traditions (“culinary patriotism”) in a region that was a very early participant in the protection of various traditional systems producing typical food products (Dedeire, 2009).

In the southern Mediterranean

The current agricultural scenario in the southern and eastern Mediterranean is generally divided into two categories. Alongside large-scale agriculture that is “modern”, productive and linked to globalized trade, small-scale agriculture, which is often described as “archaic” and made up of smallholder family farms, revolves around subsistence requirements or sells off surplus output at very local markets. Onto this dual system, another has been added, which rejects irrigated agriculture – with high value addition per hectare (if not per litre of water used) – in favour of rainfed agriculture that produces lower and above all more uncertain yields. This is not the place to go into the history behind this duality – one that has seen a mix of local social dynamics and upheavals imposed by successive dominations: Persian, Greco-Roman, Arab and Ottoman empires, French and British colonization. Modern Mediterranean states have to manage these dualities in a particularly delicate context of social instability, market volatility and uncertain security. It is true that, since the end of the first decade of this century, several countries have embarked on a policy of agricultural revival, which tends to blur the agricultural duality, replacing it gradually with a more complex situation, where strong inequalities endure. As in the case of Morocco or Turkey, some countries have made a priority of the agriculture sector, while others, such as Algeria, are rediscovering its importance. Still others, such as Egypt, are attempting to claim new agricultural land from the desert, in the hope of boosting domestic output and reducing their strong dependence on food imports.

Common to all agricultural policies and strategies in countries of the southern and eastern Mediterranean is the fact that they attach little importance to traditional knowhow, which is mostly considered as archaic and an obstacle to the sector’s modernization. While the same observation can be made at global level, countries of the southern and eastern Mediterranean appear to be more closely touched by the trend, due to their geographical position at the gates of ultra-modern agricultural Europe and their strong involvement in globalization. There is now a common blend of traditional knowhow and the survival of forms of agriculture from a bygone age, which do not answer present needs in terms of agricultural production, food security and export promotion. Such “obsolete” agriculture accounts for the vast majority of farms, occupying the largest agricultural surface area and constituting the primary source of employment for rural communities. Far from gradually disappearing to make way for modern and “scientific” farming, traditional small-scale agriculture is developing in terms of numbers of farms. It does, however, remain marginal in terms of access to resources and markets. Confined to the often isolated hinterland, far from urban markets, let alone export markets, Mediterranean smallholder crop farmers and livestock keepers are crammed onto small plots of land, with exhausted and eroded soils, in a setting where natural resources (water and biodiversity) are increasingly exploited, engaged in agricultural production or in supplementing farmers’ income (food-gathering, non-timber forest products). Naturally, modern and “scientific” agriculture must also deal with the depletion of natural resources on which it depends: erosion and reduced soil fertility due to dry farming in rainfed areas, declining levels of groundwater due to overexploitation for irrigation, conflicts over use of surface water – all these factors also affect modernized agricultural entrepreneurs. Climate disruptions only serve to amplify these imbalances, generating challenges of unprecedented proportions.

Traditional fishing in the Mediterranean

Practised from small-sized vessels, traditional fishing offers definite benefits to the sustainability of the sector. Indeed, for small-scale fishing communities, the work of humans aligns with the laws of nature and water.

Small-scale fishing gains from comparisons with industrial practices, not just in terms of impact on species caught individually, but also in overall consistency with the wealth and biodiversity of marine environments. However, these practices are jeopardized by the triple impact of industrial fishing, pirate fishing and globalization (Jacquet and Pauly, 2008). Traditional tuna fishing, which is far less damaging to stocks, is practically extinct in the Mediterranean.

While small-scale fishing and industrial fishing each capture 30 million tonnes of fish per year for human consumption, the former employs 12 million people while the latter only employs half a million. Small-scale fishing captures 4 to 8 tonnes of fish per tonne of fuel used, while industrial fishing only captures 1 to 2 tonnes for the same energy input. Each year, industrial fishing discards 8 to 20 million tonnes of fish and other marine animals, while discards are almost non-existent for small-scale fishing.

Given such a situation, it would be folly not to try to use the entire reserve of available knowledge – both scientific and traditional – that has proven ecological value and is adapted to specific contexts. The challenge of agricultural and rural development lies in knowing how to draw on this knowledge and to give farmers the chance to put it into practice in decent conditions. For variable factors in agriculture (market access, price relationships, availability of infrastructures, organization of supply chains) are naturally still decisive. With its rich stock of genetic material, and crop farming and livestock keeping practices that have proved their resilience in adapting to local conditions, traditional agriculture is not necessarily negative. On the contrary, it can be a source of solutions. Unfortunately, this is not the path that has been pursued. One has only to look at the many examples of agricultural “development” that have been introduced despite existing knowhow, with unfavourable results: salinization of soil due to intensive irrigation around oases in the southern Maghreb or the destruction of traditional palm groves planted in lowland areas due to excess water.

Wasted traditional knowledge under colonial influence

One unfortunate example of this “wasted knowledge” can be seen in the case of misguided colonial agricultural policies in Algeria (Bessaoud, 2002): attempts to acclimatize exotic plants such as cocoa, coffee and groundnuts, or the subsequent policy of specializing in sheep production using the Australian model, were all conducted without regard for the realities of the country and ended in resounding failure. It was only later, with the appearance of agronomists who were attentive to local farming practices, that recognition of local agronomic conditions led to the design of far more pragmatic measures. These were closely aligned with the reality of local production systems (improvement of small tools, adapted techniques to prepare soil for sowing with cereal seeds, use of local varieties, irrigation of food crops etc.).

Can agroecology help to renew Mediterranean agriculture?

A new generation of Mediterranean farmers

In the north: the emergence of innovative agricultural systems, often introduced by young people, in response to new social demand. One of the major problems currently facing agriculture in the northern Mediterranean is generation renewal. This is exacerbated by the rural exodus, prohibitive prices for land access, and, to a certain extent, lack of social recognition for farming as a profession. Together, these factors have threatened an entire swathe of the Mediterranean economy over the past twenty years. While this wave of withdrawal from the agriculture sector has largely taken place unobserved, it is very much a reality, as can be seen by the case of France, which loses about four farms on a daily basis.

However, there are signs of a renewal of interest in agricultural activity within society, driven especially by young people in search of new career challenges or who feel “called” by the sector, although they do not themselves come from farming families. Today, this is the case for 30% of young people in France who have become heads of farm (SESAME 2, 2014). However, they must have strong ambition and a great deal of tenacity in order to gain access to the land they need to set themselves up. A recent survey commissioned by the French Ministry of Agriculture (Ministry of Agriculture, 2015) revealed that 13% of farmers plan to engage in agroecological activities in the next five years. In an encouraging trend, there are twice as many under-35s as other age groups seeking to achieve this ambition. These young farmers, who have made a deliberate choice to follow such a career path, view their job in a way that is closely aligned with a desire to practise agriculture in a more ecological manner.

This new generation is also highly connected and has instant access to information through Internet websites, which young people consult with a critical eye. They link up with virtual communities of young (and not so young!) farmers who are following a similar path. The agricultural history of France shows that young farmers have always been a critical force in the sector’s progress, for example urging successive governments to introduce laws on land tenure and to offer help in setting up farms or suitable training schemes. “When young people grow, so does agriculture” (SESAME 2, 2014). If these young farmers can be called pioneers, that is first and foremost because their agroecology is not something invented by technocrats (Hervieu, 2015), but the reflection of a desire within society as a whole.

In the south: the challenge of generation renewal and of implementing broken production systems by mobilizing the Mediterranean agricultural heritage. The agricultural challenges facing countries of the southern and eastern Mediterranean require innovative solutions. In the modernized as in the traditional sector, continuing the current trend of overexploiting resources that are increasingly scarce due to climate change can only lead to an impasse. Worryingly, alternatives being implemented that break with dominant production systems are rare, or at best, little known. However, a few exceptional but interesting examples can be found on the southern shores of the Mediterranean.

The beginning of conservation agriculture in the Maghreb

In the Maghreb, producer groups, supported by the FERT association, have been set up to pursue rainfed conservation agriculture, which is based on reduced working of the soil – right up to zero tillage – setting in place various crop rotations (cereals, legumes, forage crops) and permanent soil cover. These systems, which restore soil fertility, have shown their ability to perform better in periods of drought. They enable regular yields to be obtained and strengthen the sustainability of production. Their disadvantages lie in the difficulty of overcoming weeds and in the fact that direct sowing with zero tillage requires specific seeders, which are heavier and more expensive (Benaouda *et al.*, 2015).

The development in the southern and eastern Mediterranean region of agroecological production systems involves overcoming a range of difficulties. To date, only a few pioneers who head large farms and have a high level of education have made the attempt. The risks involved in shifting to this type of agriculture, coupled with the investments required (especially in material) discourages the majority of farmers, especially the smallest ones. Lack of professional agricultural structures, which through a collective approach to sharing risks and investment costs could help to develop agroecology, is also hampering the spread of breakthrough innovations. Another major obstacle is the fact that the agriculture sector, and particularly small-scale farming, is currently controlled by ageing farm owners. Members of the younger generation who have remained in rural areas, and are open to innovation, lack power and have to give way to the prudence and strong risk aversion of their elders. Therefore, as in the northern Mediterranean, albeit in a different context, there is an acute problem of generation renewal for agriculture. Detecting and identifying traditional knowhow, onto which agroecological principles could be grafted, could lead to the design and testing of new suitable production systems that are easier for farmers to assimilate.

Labels to rescue local knowhow?

Systems for controlled designation of origin were first developed to protect threatened products. The threat may be economic, linked to the appropriation of a name or the trivialization of a product. It may equally involve the intangible heritage or a *terroir* in danger of disappearing: traditional practices, biodiversity or local landscapes. Thus the first designation of origin and protected geographical indication (AOP-IGP) in France, for olive oil from Nyons, was the result of a dynamic initiative launched by the Tanche trade union (named after a variety of local olives) which, sensing a growing decline in business due to economic competition from colonial oil, together with the rural exodus and weather events that were catastrophic for olive trees between 1929 and 1956, obtained a judicial designation of origin in 1956.

Today, geographical indications are mainly economic policy tools – a form of economic and emotional soft power for a *terroir* that has become protagonist and protector of its own typicality, against the backdrop of globalization. Southern Europe alone accounts for 76% of geographical indications in the EU. Italy boasts 22% of joint AOP-IGPs (Ilbert, 2009), followed by France (18%), Spain (14.5%),

Portugal (11%) and Greece (8.5%). The products protected are mainly wine, cheese, fruit and vegetables, meat and oils (Antonelli and Ilbert, 2012). With a food supply that is increasingly standardized, labels and geographical indications offer an alternative for consumers by pinpointing recognizable local products that have a strong identity, offering a sign of typical knowhow and a lively tradition in their *terroir* of origin. It has been said that “there was more history than geography in a bottle of wine”, for a good wine is the result of cultural and traditional knowhow that has survived over time (Del Canto Fresno, 2009). Although it has endured an identity and chronic social crisis for a long time now, European and Mediterranean family farming has become an element of traditional culture, a sort of safe haven worth protecting. Throughout history, the banner of a strong, proud cultural identity (Bessaoud, 2009), the Mediterranean diet finds in geographical indications the means to unite an entire country behind it, way beyond the region of origin.

A people of citizens-consumers, often far removed from the world of farming, has made a symbolic and emotional investment in this traditional agriculture, participating through its purchasing decisions in the conservation of rural areas and *terroirs*, which it sees in a positive light, particularly through tourism, contributing to a certain “stage setting” and making a link between these territories and the products that hail from them (Rieutord, 2002). These new consumption patterns also reveal the erosion of dietary differences between northern and southern regions (Durbiano, 2000), fostered by greater ease of movement within a country (particularly for leisure), allowing repeated exposure to the regional characteristics of a *terroir*, which tourists-consumers want to rediscover once they return home.

By contrast, the “Mediterraneanization” of non-Mediterranean diets poses a problem of identity for typical products from the region. The global success of certain pillars of the Mediterranean diet, such as olive oil, olives, grapes and wine, leads to a massive increase in their export (particularly to China, Japan, the United States of America, Canada and Australia), and at the same time to an increase in their production outside the region. As Palma and Padilla (2012) put it: “international consumers have no soul: they demand more and more emblematic Mediterranean products but do not particularly care about their origins.” Such international demand against a background of growing competition leads to the export of the best traditional products, while at the same time depriving local consumers, who no longer find them on regional markets, or only at extremely high prices.

Need for a new knowledge system of agricultural innovations

The agricultural challenges faced by the northern and southern Mediterranean, and the issues that are linked to them, require that all types of knowhow be mobilized so as to resolve the problems as and where they arise. It must be said that this knowhow is currently either sidelined and undervalued (in the case of traditional knowledge) or highly inaccessible to a large proportion of farmers (in the case of scientific knowledge). Combining these types of knowledge holds the best prospects

for Mediterranean agriculture, provided that conditions favourable to the emergence of new production systems – breaking with the current trend of resource degradation and marginalization of rural areas – can be put in place.

One of these conditions is the development of new agricultural knowledge and innovation systems (AKIS), dedicated to resolving concrete problems, such as climate change adaptation or mitigation, by adopting new agricultural production methods. Clearly, at the heart of these new systems are the farmers and entrepreneurs who are implementing the knowhow. Also making a contribution are researchers, so long as they pay heed to the questions and needs expressed by the actors involved in food and agricultural production. Training institutions play a major role here, since teaching and strengthening capacities in individuals and producer organizations are essential prerequisites for mobilizing, transmitting and using knowledge. Lastly, knowledge brokers – extension agents and advisors of all kinds – have an important part to play.

These new AKIS operate in networks, linked to each other around a common issue or project. Information and communication technologies are used intensively as vessels of knowledge and support for its rapid circulation. Even more importantly, the multi-stakeholder nature of AKIS fosters the joint development of new knowhow, which is the fruit of cross-fertilization between different types of knowledge. The result is a new coordinated and synergistic way of doing research, teaching and disseminating knowledge.

Conclusion

Mediterranean agriculture faces a new turning point in its eventful history. Although the challenges differ between the north, south and east of the Mediterranean, the pathways for exploring and finding solutions draw the two shores closer together more than they drive them apart. In both contexts – that of an agriculture on the road to modernity and that of a small-scale agriculture that is marginalized and static in its development – agroecology appears to offer a middle way. Growing demand for food authenticity by northern consumers is slowly altering industrial production methods, while the south is becoming painfully aware of the impasse to which agricultural dualism is leading. Among other sustainable agricultural approaches with which it is often compatible, agroecology is an interesting avenue to explore. By blending traditional and cultural agricultural practices that have helped to shape the melting pot of identities – which are strong and inseparable from their context – with the scientific principles of modern agronomy to produce and understand natural phenomena and interactions within a biotope, agroecology appears to be an option capable of reconciling the imperatives of production and traditional knowhow. Today, it is important that political initiatives reflect the findings that have been identified in its favour for a number of years now by specialist research institutes in both the south and north of the region. Field research has shown agroecology to offer a viable and lasting solution to the production challenges facing Mediterranean agriculture, together with those of protecting habitats and social justice.

At a time when the EU is asking itself questions about the future of its agriculture, as well as the evolution of the CAP and the research policy it needs to pursue, at a time when the southern and eastern Mediterranean countries are searching for new approaches to agricultural and rural development, so as to respond to issues of food and territorial security, it is not unreasonable to suggest that coordinated or even joint efforts aimed at setting in place new agricultural knowledge and innovation systems may be an important part of the solution. This offers an interesting path to explore in the debate about the new neighbourhood policy that the EU and its partners are currently promoting.

Bibliography

Ali-Shtayeh Mohammed (S.) *et al.* (2008), "Traditional Knowledge of Wild Edible Plants Used in Palestine (Northern West Bank): A Comparative Study", *Journal of Ethnobiology and Ethnomedicine*, 4 (13), pp. 1-13.

Andersen (T.B.), Jensen (P.S.) and Skovsgaard (C.V.) (2014), "The Heavy Plough and the Agricultural Revolution in Medieval Europe", *Working Papers – European Historical Economics Society (EHES)*, 70 (http://static.sdu.dk/mediafiles/4/8/F/%7B48FEFDFF-12D8-4367-9A7F-61E2A5D3C294%7Ddpbe6_2013b.pdf).

Antonelli (A.) and Ilbert (H.) (2012), "Legal Protection of Mediterranean Products", in CIHEAM (ed.), *Mediterra 2012. The Mediterranean Diet for Sustainable Regional Development*, Paris, Presses de Sciences Po, pp. 327-344.

Benaouda (H.), Hassane Bourarach (E.H.) and Vadon (B.) (2015), "Produire mieux en s'adaptant au changement climatique. Des groupements paysans au Maghreb s'engagent dans des agro-systèmes innovants", *CIHEAM Watch Letter*, 32, April (www.ciheam.org).

Bessaoud (O.) (2002), "L'agriculture algérienne: des révolutions agraires aux politiques libérales (1963-2002)", in P. Blanc (ed.), *Du Maghreb au Proche-Orient: les défis de l'agriculture*, Paris, L'Harmattan, pp. 73-99.

Bessaoud (O.) (2009), "Dynamique de l'offre de produits de qualité, marchés et organisations des producteurs en Méditerranée", in Y. Tekelioglu, H. Ilbert and S. Tozanli (eds), *Les Produits de terroir, les indications géographiques et le développement local durable des pays méditerranéens*, Montpellier, CIHEAM, "Options méditerranéennes", série A, "Séminaires méditerranéens", No. 89, pp. 73-87.

Blanc (P.) (2014), "A Geohistory of Agricultural Trade: The Long Time Span that Enlightens the Present", in CIHEAM (ed.), *Mediterra 2014. Logistics and Agro-Food Trade. A Challenge for the Mediterranean*, Paris, Presses de Sciences Po, pp. 21-36.

Butzer (K.W.) (2005), Environmental History in the Mediterranean World: Cross-disciplinary Investigation of Cause-and-effect for Degradation and Soil Erosion, *Journal of Archaeological Science*, 32, pp. 1773-1800.

Council of Europe, European Parliament and CIHEAM (2006), *Pour une politique agricole rurale euro-méditerranéenne dans un cadre mondialisé*, Second Euro-Mediterranean Conference on Agriculture, Strasbourg, September 28 and 29.

Daligaux (J.), Minvielle (P.) and Angles (S.) (2013), “Paysages de l’agriculture littorale dans le Var. Éléments d’explication, points d’interrogation et pistes de réflexion”, *Méditerranée*, 120, pp. 87-98.

Dedeire (M.) (2009), “Qualifications territoriales des produits d’origine géographique et durabilité(s) des ressources”, in Y. Tekelioglu, H. Ilbert and S. Tozanli (eds), *Les Produits de terroir, les indications géographiques et le développement local durable des pays méditerranéens*, Montpellier, CIHEAM, “Options méditerranéennes”, série A: “Séminaires méditerranéens”, No. 89, pp. 39-52.

Del Canto Fresno (C.) (2009), “Développement territorial en zones rurales métropolitaines: rôle des produits alimentaires de qualité dans la région de Madrid”, in Y. Tekelioglu, H. Ilbert and S. Tozanli (eds), *Les Produits de terroir, les indications géographiques et le développement local durable des pays méditerranéens*, Montpellier, CIHEAM, “Options méditerranéennes”, série A: “Séminaires méditerranéens”, No. 89, pp. 255-269.

Durbiano (C.) (2000), “L’olivieraie provençale, production de qualité et requalification territoriale », *Méditerranée*, “Dynamiques spatiales des cultures spéciales”, 95 (3-4), pp. 17-27.

Franzen (J.) (2010), “Emptying the Skies”, *The New Yorker* (www.newyorker.com/magazine/2010/07/26/emptying-the-skies).

Hervieu (B.) (2015), “Il n’y a pas de prêt-à-porter de l’agroécologie!”, interview by Victor Siméon, *Les Dossier de la Chambre d’agriculture*, “Les groupes d’agriculteurs, moteurs d’innovations en agro-écologie”, 1039, p. 19 (www.chambres-agriculture.fr/fileadmin/user_upload/National/FAL_commun/publications/National/Revue_Chambres-agriculture_1039_2015_Dossier-groupes-agri-2.pdf).

Heywood (V.H.) (2012), “The Role of New World Biodiversity in the Transformation of Mediterranean Landscapes and Culture”, *Boccone*, 24, pp. 69-93.

Ilbert (H.) (2009), “Le marquage des terroirs par les indications géographiques: politiques internationales et stratégies nationales en Méditerranée”, in Y. Tekelioglu, H. Ilbert and S. Tozanli (eds), *Les Produits de terroir, les indications géographiques et le développement local durable des pays méditerranéens*, Montpellier, CIHEAM, “Options méditerranéennes”, série A: “Séminaires méditerranéens”, No. 89, pp. 121-134.

Jacquet (F.) (2003), “Politique agricole commune et développement durable”, in F. Jacquet and F. Lerin (eds), *Libre-échange, agriculture et environnement: l’Euro-Méditerranée et le développement rural durable. Etat des lieux et perspectives*, Montpellier, CIHEAM, “Options méditerranéennes”, série A: “Séminaires méditerranéens”, No. 52, pp. 167-182.

Jacquet (J.) and Pauly (D.) (2008), “Funding Priorities: Big Barriers to Small Scale Fisheries”, *Conservation Biology*, 22 (4), pp. 832-835.

Kingsley (S.) and Decker (M.) (2001), “New Rome, New Theories on Inter-Regional Exchange. An Introduction to the East Mediterranean Economy in Late Antiquity”, in S. Kingsley and M. Decker (eds), *Economy and Exchange in the East Mediterranean during Late Antiquity. Proceedings of a Conference at Somerville College, Oxford, 29th May, 1999*, Oxford, Oxbow, pp. 1-27.

Kizos (T.) and Plieninger (T.), “Agroforestry Systems Change in the Mediterranean: Some Evidence from Greek and Spanish Examples” (www.researchgate.net/profile/Tobias_Plieninger/publication/228462094_AGROFORESTRY_SYSTEMS_CHANGE_

IN_THE_MEDITERRANEAN_SOME_EVIDENCE_FROM_GREEK_AND_SPANISH_EXAMPLES/links/02e7e517a5d8c7fe20000000.pdf).

Linck (T.), Barthes (A.) and Navarro (H.) (2015), "La construction des arrière-pays d'une rive à l'autre de la Méditerranée", *Medinnlocal* (www.medinnlocal.net/wp-content/uploads/2015/01/dune-rive-%C3%A0-lautre-LMI-tlk-12-05-2015.pdf).

Matassino (D.) (2007), "The Role of National Focal Point", in L. Nanni Costa, P. Zambonelli and V. Russo (eds), *Proceedings 6th International Symposium on the Mediterranean Pig*, pp. 421-428 (http://amsacta.unibo.it/2513/3/Proceedings_6th_Symp_Mediterranean_Pig_3v.pdf).

McCulloch (M.N.), Tucker (G.M.) and Baillie (S.R.) (2008), The Hunting of Migratory Birds in Europe: A Ringing Recovery Analysis, *IBIS*, 34 (suppl. 1), pp. 55-65.

Ministry of Agriculture, Agri-Food and Forests (2016), *Perception de l'agroécologie par les agriculteurs français. Évolution depuis un an*, Survey of BVA.

Palma (G.) and Padilla (L.) (2012), "The 'Mediterraneanisation' of Food Fashions in the World", in CIHEAM (ed.), *Mediterra 2012. The Mediterranean Diet for Sustainable Regional Development*, Paris, Presses de Sciences Po, pp. 133-152.

Rieutord (L.) (2002), "Dynamiques rurales françaises et re-territorialisation de l'agriculture", *Revue du Mauss*, "Y a-t-il des valeurs naturelles?", 19 (1), pp. 221-240.

SESAME 2 (2014), *L'Agriculture familiale en Méditerranée et en Afrique de l'Ouest: deuxième séminaire international SESAME. Meknès, 25 and 26 April 2014*, Meknès, Ministry of Agriculture, Agri-Food and Forests-CGAAER-CGDA Morocco.

Van Zanten (B.T.), Verburg (P.H.), Espinosa (M.), Gomez-y-Paloma (S.), Galimberti (G.), Kantelhardt (J.), Kapfer (M.), Lefebvre (M.), Manrique (R.), Piore (A.), Raggi (M.), Schaller (L.), Targetti (S.), Zasada (I.) and Viaggi (D.) (2014), "European Agricultural Landscapes, Common Agricultural Policy and Ecosystem Services: A Review", *Agronomy for Sustainable Development*, 34 (2), pp. 309-325.

Williams (M.) (2000), "Dark Ages and Dark Areas: Global Deforestation in the Deep Past", *Journal of Historical Geography*, 26 (1), pp. 28-46.