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Traditional agriculture in Iran and development challenges for organic agriculture

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SUMMARY

Iran occupies a vast area of land with diverse climatic conditions, encompassing a variety of production practices and rich biological diversity. Traditional agriculture was widespread less than 50 years ago and is still appreciated by some farmers (called 'ignored organic farmers') in Iran. However, such practices have been ignored in the context of current concenpts of organic agriculture. It may be impossible or not economically viable to return Iran to traditional production systems, but the long history of environmentally safe production systems could provide an incentive to increase development of organic agriculture and sustainable production systems in Iran. It will not be a question of whether the organic movement continues to grow in Iran (as it has in other countries), but meeting the challenges required to keep pace with this growth without fundamentally challenging or threatening the overall principles of organic agriculture.

INTRODUCTION AND BACKGROUND

Agricultural land area in the world will change in the near future due to environmental pollution, soil degradation and compaction, wind and water erosion, exhaustion of water resources, and other biological and environmental pressures caused by current worldwide production practices (Vetterli *et al.* 2003). The development of alternative production systems that can preserve productivity while minimizing the negative biological and environmental consequences have, therefore, high priority. Sustainable agriculture dictates that inputs currently provided by non-renewable petrochemical resources should be replaced by biologically-based renewable inputs (Quimby *et al.* 2002). Ecological and organic agriculture address these public demands and have the potential to improve health of agricultural systems, diminish pollution and improve human health (Boer 2003; Dabbert 2003). Traditional and organic production systems avoid or largely exclude the use of synthetic fertilizers, pesticides, growth regulators, and livestock feed additives and are therefore healthier for the environment and humans. They rely upon crop rotation, use of crop residues, animal manure, legumes, green manures, organic fertilizers, mechanical cultivation, mineral-bearing rocks and biological pest control to maintain soil nutrients and productivity and to control pests, diseases and

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weeds without or with least disturbance to the environment and to sustainability (Creamer 2003).

More farmers are now discovering that organic production is a legitimate and economically viable alternative enterprise. More than 20 million ha (Table 1) of cultivated land are certified as organic farms worldwide (Dabbert *et al.* 2001; Sligh and Christman 2003; Vetterli *et al.* 2003). Although the proportion of organic ally farmed land in the total agricultural area in the world is still very low, it is increasing and will continue to do so worldwide.

AGRICULTURE IN IRAN

Iran is the second largest country in the Middle East, with an area of 1.65 million km^2. It has been a centre for the evolution of agriculture, people engaged in agriculture first settled here some 10 000 years ago (Flanner 1962). Since Iran spans a wide range of latitudes and longitudes, it also has a diverse range of physiography, climate, vegetation and biological productivity. Rangelands constitute 55%, deserts and degraded lands 21%, forests 7.4%, agricultural land 14.4% and urban areas, lakes and other lands 2.2% of the total area of the country (Flanner 1962). Over 18 million ha of land are used for agriculture, producing 65 million tonnes of food, from field crops to horticultural products, for a population of 70 million. Iran ranks thirtieth in the world in terms of the amount of production, and eighth based on the diversity of products (MAIRI 1997, 2000). Currently, 3.4 million farmers in Iran cultivate 18.5 million ha (Heidari 2003). Different types of farming systems and land tenure can be found throughout the country, from commercial to subsistence farms, and both governmental and non-governmental organizations (NGOs) are actively involved in the farming sector. Although traditional agriculture still operates in some areas of so-called 'ignored organic farmers', this has not been recognized as organic agriculture. Authoritative statistics about the area under different agricultural systems in Iran are generally not available. Unfortunately, as in most other developing countries, application of agrochemical products is huge in Iran. For example, over 27 000 t of pesticides were used during 2000/01 (insecticides 33%, herbicides 30%, fungicides 20%, acaricides 6.2%, rodenticides 3.8%, nematicides 1.5% and others 5.5%) and the country spent US$125 million on pesticide imports in 2002 (Heidari 2003). The above data highlight the need for assessing and implementing alternatives to agrochemicals (pesticides and mineral fertilizers) and the need for development of more integrated safe approaches for agriculture in Iran.

Table 1 World land area in organic production in 2003 (Sligh and Christman 2003)

Continent	*Land area (million ha)*	*% of global total*
Oceania	10.6	46.3
Europe	5.1	22.6
Latin America	4.7	20.8
North America	1.5	6.7
Asia	0.6	2.6
Africa	0.2	1.0
Total	22.7	100.0

Traditional agricultural practices

Agriculture has a long history in Iran. It has been argued that dryland farming first evolved in the western part of the country about 10 000 years ago, simultaneously with the domestication of goats and sheep (Flanner 1962). Farmers have managed their traditional agroecosystems for centuries by focussing on sustaining long-term yields rather than maximizing yields in the short term. Formerly, farmers relied on locally available natural resources to maintain soil fertility and to combat pests and diseases. The farming systems evolved common principles and processes (Koocheki 1992), such as holistic utilization of natural resources, optimal use of local resources with low external inputs, consideration of genetic and physical diversity, protection and conservation of soil, risk minimization and local site-specific techniques.

Traditional small-scale farming once formed the foundation of farming in Iran and resulted in a tremendous accumulation of indigenous knowledge in farming practies and food production, based on integrated crop production and livestock grazing. The key to understanding traditional land use lies in the patterns of villages and nomadic pastoralism and their associated urban market centres. Land management was based on practices and knowledge associated with self reliance and family units within communities (Koocheki 1992). This system of land use evolved on the basis of the following structural and functional principles:

- Consideration of high species numbers and structural diversity in time and space (vertical and horizontal organization of crops and animals);
- Exploitation of a wide range of micro-environments (soils, water, temperature, altitude and fertility);
- Recycling practices for materials and waste;
- Reliance on biological interdependencies;
- Reliance on local resources plus human and animal energy (low input technology);
- Reliance on local crop varieties and incorporation of wild plants and animals;
- Implementation of collective production activities based on self-sustained and self-sufficient communities.

Ecological principles governing food production in traditional agriculture can be viewed from technical, social and economc rationales. In technical terms, the two main limitations of crop production, water supply and soil fertility, were solved by construction of subterranean canals (Qanat or Kariz) and effective use of wastes, by-products and animal manure. An example of a specific structure for the utilisation of valuable bird manure is the pigeon tower (see below). In social and economic terms, collective farming and sharecropping, together with a strong hierarchial nomadic command structure, constituted the farming systems of Iran.

Qanat

Qanat (Kariz) is a traditional method of groundwater extraction without external inputs (Figure 1) that is important in arid zones where water is scarce. It minimizes evaporative loss and provides 80% of the water for the central plateau of Iran. This system of water provision was developed to overcome the harsh and hostile environmental conditions. Qanat, and the culture that grew up around it, comprised a powerfully integrated communal system (Koocheki 1996; McLachlan 1998). Qanat irrigation systems are ancient (ca. 800 BC) and consist of underground tunnels constructed into a cliffs, escarpments or the base of mountains and follow an aquifer or river to bring water to the surface. In the late 1980s, an estimated 60 000 qanats were in use and new units were still being dug (US Library of

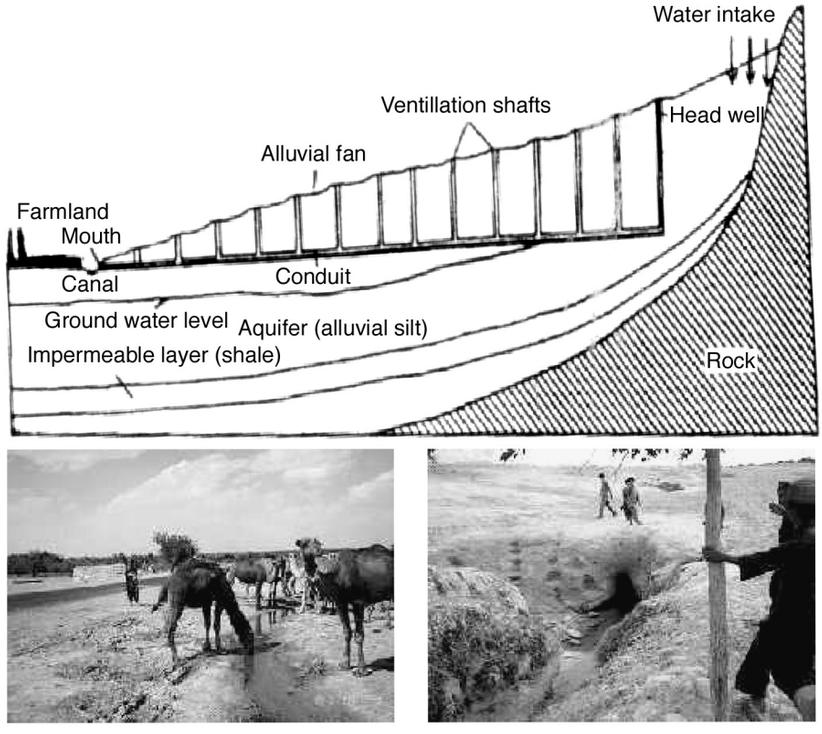

Figure 1 A traditional Qanat water system in Iran

Congress 2004). The number of qanats and the quantity water produced has decreased in recent years because of the mechanization of agriculture and replacing this sustainable water source with less stable wells. For instance, over 70 billion m^3 of groundwater were provided in the year 2000; of this, over 60% (42.5 billion m^3) was derived from wells (both deep and semi-deep) and approximately 12% (8.6 billion m^3) from Qanats (Haeri 2003).

Pigeon towers

Soil fertility, after water supply, is the most important factor in traditional crop production in Iran. Complex pigeon towers (Figure 2) were constructed to collect manure from the birds. In each tower, thousands of pigeon holes were arranged so that their faeces dropped into the middle of the floor for easy collection. Bird dung was thought to be the best manure for many crops, especially melons and cucumbers. Pigeon towers represent one of the most remarkable examples of eccentricity in Iranian architecture. The earliest of these structures is more than 1000 years old (Koocheki 1995).

Pastoral nomadism

Through the centuries, nomads and their herds have been an integral part of the natural ecosystems. As a biotic component of the system, they had their own functional properties and played an important role in energy flow and nutrient recycling of rangeland ecosystems (Koocheki 1992, 1993). Pastoral nomadism based on human and animal mobility was an ecological response to the harsh conditions of arid and semi-arid environments and comprised the following principles:

- Animal mobility, regulated by the phenological stages of rangeland plant growth and forage availability;
- Low external inputs, with self-sufficient closed systems and community-oriented markets;

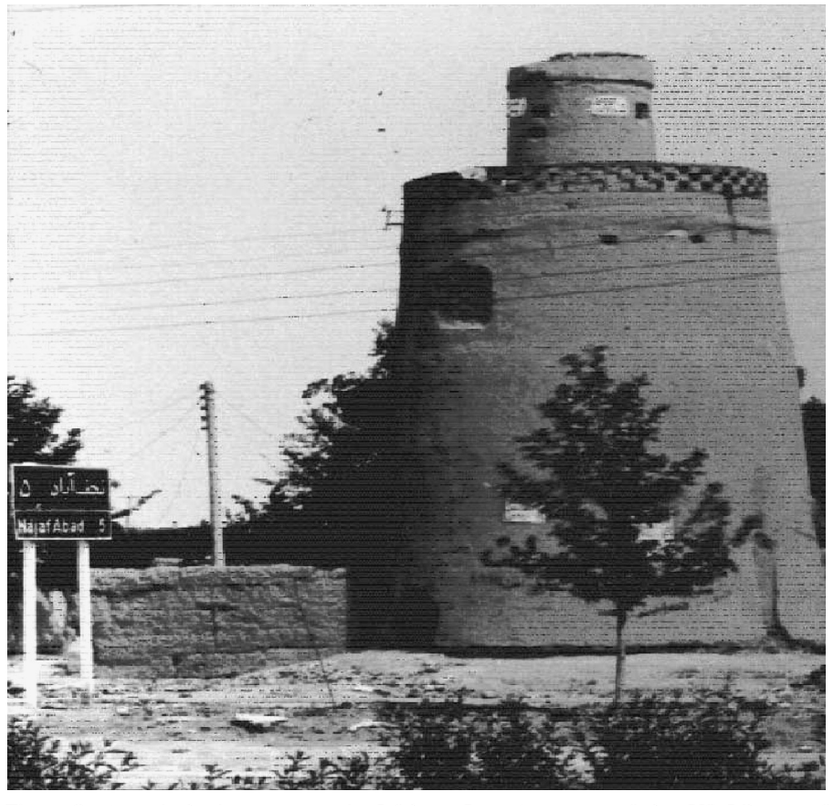

Figure 2 A typical pigeon tower in Isfahan, Iran (courtesy of the US Library of Congress)

- Utilization of resources in inaccessible areas;
- Herd size and a variety of different animal species;
- Rational land use for optimized resource utilization.

Sharecropping

Sharecropping in traditional agriculture was based on strong socio-economic incentives. A complicated division of cultivation activities into components of land, water, seed, labour and draught animals provided a rational system of incentives for farmers and involved almost the whole community in production. Community members often used land in common and supported each other by sharing or exchanging labour, animals, fields or farm products. Sharecroppers usually organized themselves into collective production units (Koocheki 1996).

CHALLENGES FOR ORGANIC AGRICULTURE IN IRAN

Modern agriculture, based on monoculture of crop varieties that require high inputs and depend on heavy applications of mineral fertilizers and chemical pesticides, is also a part of Iranian agricultural systems. Traditional food production systems which, in both technical and social terms are forms of ecological production, still operate in many areas. These small-scale 'ignored organic farming systems' produce more than 80% of agricultural products (Abdollahi 1998) and operate on the basis of ecological principles, such as using diversified crops and animals in an integrative rotation; using animal manure, wastes and by-products for soil improvement; mechanical and hand control of plant pests, diseases and weeds; and community cooperation, family labour and local market orientation.

Receptivity and acceptance of the organic agriculture concept is growing worldwide, in both local markets and by governments. In Asia, consumer demand for organic products is gradually increasing due to concern about the environmental and the potential health implications of conventional agriculture. Eighty three certification bodies (65 in Japan) have been identified as operating organic standards in Asia. Out of the 29 International Federation of Organic Farming Movements (IFOAM) accreditation certification bodies, only three are Asian, i.e. ACT (Thailand), JONA (Japan) and OFDC (China) (Willer and Yussefi 2004). Organic farming based on the standards of IFOAM is still rare, and there is no single certifying body at a national level in Iran. However, there is a growing tendency towards internal use of organic products and also for exports in Iran and in other countries. For effective expansion of organic food production, and in order to provide incentives for farmers, the most important priorities for Iran are listed below.

1. **Training and education**. This requires presentation of the hazards of modern agriculture and application of agrochemicals, and the benefits and shortcomings of short- and long-term planning of organic agriculture to the public, farmers, organizations and the government. Training in organic agriculture, from school to higher education levels, should be developed in order to obtain competent, reliable and well trained workers and managers.

2. **Standards and regulations**. For products to be labelled as organic, they must be certified by a third party organization as having been produced according to specific standards. Today, the basic standards of the IFOAM are used, more or less in the same way in different countries. Proper national organic standards, rules and regulations, based on internationally accepted standards should be carefully developed for organic growers in Iran.

3. **Certifying organizations**. Establishment of national and local certifying organizations with affordable sevices for inspection, certification and improving facilities is needed on Iran. Under current international organic regulations and labelling, subsidised government inspection and certification can be expected. Certification is expensive and needs to be designed and developed predominantly for the needs of the international market.

4. **Marketing**. Viable producer and consumer linkages and marketing of organic products must be developed nationally and internationally. Efficient trade regulation that is socially

fair, ecologically sound needs to be designed. Seasonal production and regional markets should be considered as important objectives. Export opportunities are buoyant and remain the major factor for conversion and, in the early stages, could focus on specific organic products such as pistachio, saffron and medicinal herbs.

5. **Financial support**. Support and funding from international organizations towards the introduction of ecological farming and sustainable agriculture is crucial. Subsidies and credit need to be given to farmers, at least in the early stages and during conversion from conventional to organic agriculture.

6, **Organic seed sources**. The possibility of organic seed production that complies with international standards and regulations should be carefully studied. Organic seeds must be labelled and not derived from genetically engineered varieties.

CONCLUSIONS

Today, there is growing concern and demand for healthy food, both from policy makers and the public. Demand for national and international organic food sources is a driving force requiring further consideration in Iran. Trends are emerging for production of organic herbs, spices, dried fruits and nuts for export. To comply with this demand, international regulations must be considered and proper national standards should be implemented. The development cost is often a major constraint, i.e. product development costs, including extension and training, are currently far too high for local private sector investment at current market size in Iran.

Iran has a long history of ecological agriculture, stretching back 10 000 years. A return to such ecological production systems in Iran could be a way to protect the fragile local environments, and may be the most important reason for using these systems as they could potentially provide benefits technologies for everybody on Earth.

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