

Review

Indigenous knowledge in agriculture with particular reference to black cumin (*Nigella sativa*) production in Iran

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The term indigenous knowledge, traditional knowledge and ethno science have been used interchangeably to describe the knowledge system of an ethnic rural group that has originated locally and naturally. Indigenous knowledge is an essential cultural and technological element of human societies. It is unique to a particular culture and acts as the basis for local decision making in agriculture, health, natural resource management and other activities. It is embedded in community practices, institutions, relationships and rituals. Indigenous people view the world they live in as an integrated whole. Their beliefs, knowledge, arts and other forms of cultural expression have been handed down through the generations. Food production in these societies is focused more on long term sustainability rather than on short term yield increase and hence, enhanced biodiversity. This helps to reduce ecological and economic risks, promotes diet diversity and allows proper temporal and spatial distribution and utilization of resources. An attempt was made to review the indigenous knowledge associated with agriculture with an emphasis on black cumin production in Iran. First, technological, socio-economic and cultural aspects were considered in a context of a production system and then a case study was performed in some areas with a long history in black cumin production. Based on the analysis of the data obtained and comparison made with the conventional scientific finding, production practices were identified and recognized.

Key words: *Nigella sativa*, culture, indigenous knowledge, ethno science, Iran.

INTRODUCTION

Emergence of environmental considerations as a crucial factor in agricultural technology design, development and performance has been seen in recent years. In the context of sustainable agriculture, indigenous knowledge which deals with the farmers adaptive strategies to the natural, physical and socio-economic environments of an agro ecosystem, has gained prominence (Bonny and Voliebenstein, 2001). It is estimated that there are 190 million indigenous people in Asia; about 70 million live in India and 30 million in South-East Asia (Bengwayan, 2003). Indigenous people view the world they live in as an integrated whole. Their beliefs, knowledge, arts and other forms of cultural expression have been handed down through the generations. This type of knowledge is unique to a particular culture and society. It is the basis for local decision making in agriculture, health, natural

resource management and other activities. It is embedded in community practices, institutions, relationships and rituals, and is essentially a tacit knowledge that is not easily codifiable.

Indigenous knowledge provides the basis for problem-solving strategies for local communities, especially the poor and is an underutilized resource in the development process (World Bank, 1998). These practices are virtually always more "low- tech", using relatively plentiful and cheap labor more intensively than relatively scarce and expensive capital and are based on low input and inexpensive approaches (Altieri, 1955, 2003). Indigenous knowledge is adapted to the natural, social and cultural environments and also to the immediate needs for the local communities, hence, their strong ecological and participatory nature.



Figure 1. *Nigella sativa*.

TRADITIONAL AGRICULTURE AND INDIGENOUS KNOWLEDGE

About 60% of the world's cultivated land is still farmed by traditional and subsistence methods, this type of agriculture has benefited from centuries of cultural and biological evolution that has adapted to its local condition (Gliessman, 1998). Basically, production in traditional agriculture is based on sustainability in long term rather than maximizing the yield in short term (Koocheki, 1994, 1996). Maintaining sustainability of production on marginal and low input lands, and increasing the biodiversity in order to reduce the economic risk and facilitate a better distribution of labor temporarily and spatially, are the foundation of traditional agriculture. Most of traditional agro ecosystems have evolved in the center of diversity of agricultural crops. Therefore, they are rich not only in terms of local races and genotypes but also in farming practices, cultures of food production and food consumption habits with other social, technical and cultural identities (Koocheki, 1996).

TRADITIONAL SYSTEMS OF BLACK CUMIN PRODUCTION IN IRAN

Agriculture has a long history in Iran and it has been evident (Koocheki, 1996) that farming first evolved simultaneously with domestication of goat and sheep in western part of Iran, about 10000 years ago. Farmers managed their traditional agro ecosystems for centuries based on sustainability of yield with reliance on locally available resources. Black cumin production as a system has a long history in Iranian agriculture and it has evolved

as a unique technical and socio- cultural entity in black cumin growing communities and particularly in Fars, Khorasan and Qazvin provinces which are the main black cumin growing area of the country. Therefore, black cumin production system in Iran can be viewed from the following prospect (Figure 1).

Technology

Water scarcity in arid area of Iran is the main constraints for crop production. To overcome this problem, farmers have developed two unique methods of underground water extraction called Qanat (in local language) and wells. These traditional methods of water provision were adjusted to harsh and hostile environmental conditions (Koocheki, 1996). Although black cumin is a low water demanding plant (These are generally short-lived annuals, typical of disturbed soils or natural communities of semi-arid areas, with a dominance of therophytes), primary irrigations and particularly the early and latest ones are very crucial to timeliness of flower emergence and therefore, availability of water along the growing season is very important. Nutrient requirements of black cumin were provided by animal manure and this is still a normal practice, despite an easy access to chemical fertilizers, thus production of black cumin could be regarded as "organic" (Koocheki, 1994).

Socio- economic and cultural

Labor requirements for production practices and processing were provided by the families, hired persons

or in some cases sharecropping. The latter feature of traditional agricultural waste was based on strong socio-economic incentives. Culturally, black cumin has been a constant ingredient of many Iranian cuisines and inclusion of black cumin in confectionery (cookie), pickles and some foods has been regarded prestigious (Filippo et al., 2002). *Nigella* is used to flavour meat and vegetables dishes, pickles which is a minor ingredient in curries, fruit pies and other confections and in sauces, vinegar and alcoholic beverages. Crushed seed is commonly mixed with dough or sprinkled on bread before baking, which produce dark grey to almost black loaves (Filippo et al., 2002).

CULTIVATION AND HARVESTING OF BLACK CUMIN

The cultivations required for umbelliferous crops are suitable for *Nigella*. *Nigella* is propagated by seed, or can be sown in seedbeds and transplanted, but this is difficult and the mortality rate is high, hence, the seed should be sown in order for it to grow. A seed rate of 20 to 30 kg ha⁻¹ in 25 to 40 cm rows and spacing of about 15 cm between plants is common. *Nigella* is not usually irrigated, as a crop is commercially unprofitable, if it cannot be grown on available rainfall. Time of application and amount of water can affect the rate of plant growth, maturity, and essential oil yield and constituents. *Nigella* is sometime intercropped with barley and wheat in Iran. Plants are cut either by hand or reaper/binder when the majority of pods are mature, turning yellow but not fully ripe, as pod shatters easily. Yield of *Nigella* is normally low, often only a few hundred kilogram per hectare, and reflects the generally poor standards of husbandry, subsistence cropping systems, scattered farming, use of unimproved varieties and lack of integration. It has been demonstrated that good agro- technological practices (GAP) can produce high yield and desirable quality of *Nigella* (Filippo et al., 2002; Henle, 1996; Paroda, 1993).

CONCLUSION

Conclusively, traditional knowledge of farmers is important in *nigella* production and processing. There are diverse type of practices, which could be recognized, documented and if necessary modified to new technologies. However, it must be borne in mind that

traditional knowledge like any other phenomenon is in a constant state of change and as each generation matures, skills perceived as immediately useful, are gained while others with lesser perception of immediate value may be lost. Thus the body of traditional knowledge is never static but rather dynamic in its shape and substance. Finally, although indigenous knowledge has originated quite independently of (and not in competition with) science, and generally also quite independent of western culture, these two should be seen as two systems of knowledge that can supplement, rather than compete, with each other (World Bank, 1998).

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