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On-farm conservation of some vegetable landraces in Korça region

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Abstract

The paper explores the status of the diversity of local cultivars in some vegetables and the knowledge associated with them in the communities of Korça region. Out of 10 vegetable species studied, significant number of landraces exists for onion (4), cabbage (2), melon (2), pepper (2), and others by 1 (tomato, pumpkin, lettuce, leek, garlic, and string bean). It was found that these vegetables are cultivated mainly for family consumption and with minimal inputs. But when they are cultivated for commercial purposes, it seems that there is a change in management and inputs used. Overall, it was concluded that the level of landrace diversity has inversely direction to urbanization. Contrary to this belief, the study found that the market can increase their diversity; landraces offered are successfully commercialized. Indigenous vegetable gardens, cultivated for the market, are technically assisted by specialists of the region. After analyzing the findings of the study, for on farm conservation and sustainable use of traditional cultivars, five ways are suggested: a) promote the added value of products; b)consolidation of specialized markets that efficiently utilize their organoleptic qualities; c) creation of awareness at different levels; d) restoration and reintroduction of traditional cultivars through crop improvement processes; e) subsidies on-farm conservation of vegetable landraces, because their conservation and management can be considered as a service that should be rewarded by society.

Keywords: *conservation, landraces, on farm, vegetable crops.*

1. Introduction

Plant genetic resources represent an important component of agriculture and foods. For tens of hundreds of years, farmers have been responsible for the conservation of these valuable resources. In the agricultural production process to fulfil the needs and preferences, farmers conserve and improve local varieties that are adapted to agro-ecological conditions. However, in recent decades, the conditions and the efforts of the production for providing income to cover the needs of farmer families, is waning desire for quality products based on tradition cultivars, which increases the threat of genetic erosion.

Through the modernization of agriculture, many farmers are focused on a few crops,modern cultivars, and production practices, associated with intensive use of fertilizers and pesticides.

The process of globalization and food consumption patterns has created markets and social-economic conditions that support development of agricultural systems almost uniform. On the other hand, environmental factors, such as climate change and habitat destruction have caused the loss of biodiversity.

Our preliminary research results indicate that, in the villages, there is still a significant asset of the local forms (called landrace, traditional cultivar, farmer cultivar, indigenous variety or local variety) of plant species cultivated in general, and in particular vegetable. The maintaining and preserving of local varieties at the home gardens it is known as "on farm conservation"[9]. So, on conservation, as defined earlier Bellon [1], is a continuation of cultivation of crop genetic resources in agricultural systems where they have evolved. Maintainingof traditional cultivars or heterogeneous populations, in real conditions of the farm, is still a common practice in some communities in the country. There are various reasons why farmers continue their cultivation. In general, conservation is not a conscious effort made by farmers, but is an integral part of management practices on the farm crops. Such practice not only conserves the genetic resources of crops and evolutionary processes that involve diversity, but also the traditional knowledge

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system [3, 8]. It requires progress in research into the social, economic and genetic conservation in the farm, including crops and different species, .

2. Material and method

The study was conducted during 2011-2014 years in the Korça region, in the southeast of the country. In this region includes six municipalities and 31 rural communes (now known as administrative unit); it lies on a total area of 366,024 ha and 86,108 ha of agricultural land [5, 10]. This study is focused in 7 communesand 11 villages, including 164 farms that grow vegetable crops. Observations are focused on the traditional cultivars (landrace) and modern ones cultivated in this area, for 10 vegetable species.

The method of this research work was based on:

a) Field visits in different villages and communes, holders of vegetable diversity, as well as monitoring of localand modern varieties of vegetable species cultivated;

b) Interview with the farmers, to document the diversity of vegetable crops at the farm level, the reasons for the erosion of species and varieties, production characteristics and preferences for landraces, etc. The interviews were conducted with 12 farmerfamilies with high reputation as conservation of landraces.

c) Interviews with consumers in local markets, their preferences for vegetables in the market.

d) Analysis and information processing. The collected material was processed statistically and presented in tableswhen the results were discussed. The material object of the interviews is designed, computerized and analyzed for average, standard deviation, level of variation, and level of signification.

3. Results and discussions

3.1.Characteristics of selected area

Korça region is among the regions where land reform has led to extreme fragmentation of agricultural farm. The average farm size ranges from 0.54 ha in Pogradec to 1.48 hectares at Kolonjë, with its internal fragmentation in 4-8 parts [5, 10]. The small size of the parcel, the relatively large number of people in farm families, low level of intensification, etc., are the reasons that farmers, with their agricultural products, have a relatively low participation in the market (Table 1).

because the management of diversity by farmers varies between farming communities.This is the purpose of the study we are presenting.

Table 1. Participation of farms in market *(INSTAT 2013)*

Districts	Farms selling the product at the market (in %)
Korçë	66,3
Devoll	62,3
Pogradec	41,8
Kolonjë	78,6

However, even in these conditions can be produced vegetables for local markets, having high economic efficiency. Compared with 1990 in 2013 the area planted with vegetables in this region increased by 4 times, while production 2.6 times (Table 2).

Table 2. Area, yield and vegetable production*(INSTAT 2013)*

Indicators	**Years**		
	1990	**2003**	**2013**
Area, ha	612	1553	2507
Yield, kg/ha	41200	29300	26000
Production, ton	25200	45474	65185

The tendency of growth of the vegetable area has coincided with the introduction in the production of cultivars with high genetic production potential.

The main characteristics of the selected communes are presented in Table 3. The commune "Qendër" in the district of Korça is known for the cultivation of fresh vegetables for the market.A wide range of vegetable crops such as white cabbage, lettuce, leek, onion, garlic, tomatoes, pepper and melons are produced for home consumption and the market. Farmers in Dishnicë are known for the production and marketing of tomatoes, onions, melons, peppers and leeks. The “Bulgareci”

farmers, in addition to the above crops, distinguished for lettuce (called “marule”), garlic, beans and melons (reticulates type, called “qarrës”).

The farmers of the Voskop, being a little too far from the market, compared with those Bulgarec, have good experience in production and marketing of pepper, white cabbage and pod beans (in Korça region called "mashurka").In recent years the farmers of this commune, thanks to improvement of road infrastructure, have diversified their crops growing leafy vegetables, legumes, onions, etc, for the Korça market.

In communes Miras and Bilisht, in the district of Devoll,the vegetable crops produced for market mainly are onion, white cabbage and bean (local bean called “pllaqi”). The communes “Hudënisht” and “Buçimas” in the Pogradec district, in contrast to the others, having shallow soil, mainly have produced drybulbingonion, but even small amounts of other vegetables, such as leafy vegetables, legumes, melons and fruit vegetables (tomato, pepper and eggplant), for marketing in Pogradec city. In this district, but also in Kolonjë and Devoll,only a limited number of households are involved in vegetable cultivation for market purpose.In these districts, the vegetable cultivation is mainly oriented to household consumption and the production activity takes place in the form of the home garden.

Table 3. Major characteristics of the communes in the study

Nr	Communes	Commercialisation level	Presence of roads	Land type	Altitude (m, asl)
I	*Korça district*				
1	Qendër	High	High	Flat	826
2	Voskop	Middle	High	Flat	848
II	*Devolli district*				
3	Miras	Middle	High	Sloped	969
4	Bilisht	High	High	Flat	926
III	*Pogradeci district*				
5	Buçimas	Middle	High	Flat	706
6	Hudënisht	Middle	Middle	Flat	767
IV	*Kolonjë district*				
7	Barmash	Middle	Middle	Sloped	901

3.2.Conservation and use of local varieties

Conservation of local varieties by Korça farmers is realized by using them in the local production system for household consumption and market. Usually farmers produce their own seeds, as they have more confidence in their seeds. For this reason they produce greater amounts than the annual needs, usually produce the amount they need for 2-4 years. Interesting fact is the seed exchange among experienced farmers. Seed supply system becomes more dynamic by exchange of seeds from farmers to farmers [6, 11]. So, diversity becomes easily accessible. With seed materials that retain and have available in the area, they have encouraged farmers to select and develop the most suitable varieties based on their needs and preferences in terms of local farming. In this way, the sensitivity of farmers to save, conserve, exchange and use of local varieties, which constitute valuable genetic resources in vegetable plants, is strengthened.

It is important to note that different strategies that contribute to the conservation of traditional varieties on the farm (on-farm conservation) are closely related to their use by farmers. The farmers maintain those cultivars that are useful to them, for the present and the future. Thus, on farm conservation of local cultivars is

completely dependent on their use by farmers [2, 7].

At the same time, as evidenced by the old breeders in the region, the farmer' varieties are not static, but evolve over time, and older cultivars can be replaced with the selected ones.

Analysis of marketing and the production factors has determined that the expansion of agricultural area managed by farm families, cultural identity, the use of traditional techniques of production, and the satisfaction of the farmers and their families with production and incomes, are important factors affecting on the number of traditional varieties maintained by farmers. The performance realized and organleptic qualities are considered by people as key features for selecting and determining of varieties that have priority for conservation.

3.3.Varietal diversity at local vegetables

In the monitoring area, per 10 species of vegetable crops, are registered 36 cultivars, of which 19 are modern cultivars (tomatoes 3, peppers 3, melon 2, pumpkin 1, onion 2, garlic 1, white cabbage 3, lettuce 2, and pole bean 2) and 17 local cultivars. More diversity of vegetable landraces, managed per family per year, is observed in communes"Qendër" and "Voskop" in Korça district, which are closer to the market.

From visits to local farms, interviews and analysis for the crop structure result that the need of farmers for varietal diversity on vegetables cannot be over emphasized.

Discussions with some groups of farmers at various communes shows that most of them do not perceive the importance of varietal diversity in vegetable crops, therefore they do not make deliberate effort to maintain varietal diversity and use it. This is a global problem [6, 11].Furthermore, the level of diversity depends on various factors, described in the following analysis.

It is interesting to note that vegetable crops such as leeks and lettuce, although they are among the most common and important of winter vegetables, do not have many landraces. These two crops have one landrace each. The same is observed for vegetables such as tomatoes and squash, although common and important for the summer season in this region; they are represented with one landrace. Even, the lettuce and summer squash are produced in only a few farms. Since the plant part used as vegetable in leek, lettuce, white cabbage, is different from the fruit in these vegetables, farmers neglect the seed production.

For production in the following yearsfarmers mostly use the seeds from neighbours or relatives, and unable, seeds bought from the market. This has made their traditional skill, preserved and cultivated for years, already has been lost. Table 4 shows the inventory of present vegetable landrace at different communes and farms in the study region. The presenceof vegetable species in Korça region is variable, depending on the seasons. For the important vegetables at different villages it is almost consistent. Tomato, pepper, eggplant, beans, melon, squash and broad beans are important traditional vegetables for the summer season. For winter season,white cabbage and leeks are the two most important vegetable crops.More diversity of vegetable landraces are observed in onion, pepper and melon, mainly because there is less interference from the seed suppliers, but also the local cultivars better meet customer requirements. Different situation is for vegetable crops such as tomato, pumpkin, lettuce, leek, garlic, and string bean, especially for cabbage and tomatoes, where a lot of intervention has been done from outside. Similar experiences were also observed in other countries [6, 11]. As a result, farmers even in remote villages are used to growing less local cultivar of cabbage and tomatoes, even in their home garden for household consumption.

Table 4. Landrace, number of farm, surface and expansion area
(Average 2011-2014)

No.	Cultivars	Number of farms(*)	Surface, dyn(**)	Village	Commune	District
1	Onion of Dishnicë	11	21,1	Dishnice	Qendër	Korçë
2	Leek of Belortasë	11	10,3	Belorta	Qendër	Korçë
3	Melon “Korrovec”	11	19,1	Bulgarec	Qendër	Korçë
4	Garlic of Korçë	12	45,5	Bulgarec	Qendër	Korçë
5	Melon “Farashuk”	14	12,0	Dishnice	Qendër	Korçë
6	Pepper “ Gogozhdare”	13	9,7	Dishnice	Qendër	Korçë
7	Lettuce “Marule” of Korçë	7	1,1	Qendër	Qendër	Korçë
8	Pumpkin of Korçë	7	1,0	Qendër	Qendër	Korçë
9	Pod bean “Pllocak verdhe”	11	23,0	Dersnik	Voskop	Korçë
10	Pepper “Vëthkë”	12	4,4	Goskovë	Voskop	Korçë
11	Pepper “Poçe verdhë”	6	14,0	Goskovë	Voskop	Korçë
12	Cabbage of Voskop	6	7,8	Goskovë	Voskop	Korçë
13	Onion of Mirasit	12	32,5	Menkulas	Miras	Devoll
14	Cabbage “Mishe” of Bilishti	5	4,0	Bilisht	Bilisht	Devoll
15	Onion of Tushemishti	3	3,0	Tushemisht	Bucimas	Pogradec
16	Onion of Lini	13	26,0	Lin	Hudënisht	Pogradec
17	Tomato “Sanjollasi”	10	9,2	Sanjollas	Barmash	Kolonjë
	Total	164	243,7	11	7	4

(*)number of farms that maintain and cultivate vegetable landraces; (**)1 dyn=0,1 ha

Farmers justify the purchase of cabbageseeds with a long crop period for the seed production (two years). For tomato production for market, mainly the farmers receive seeds to import suppliers; because in the market most customers require product "with beautiful views" and that there is no difference in the market price of the product between traditional and improved cultivars.They expressed that it is easier and cheaper to buy seed from the market than to produce seeds for these crops by themselves. These factors will certainly have negative impacts for on farm conservation program of the local vegetable cultivars. Therefore, the elaborate of opinion and understanding of decision-making of the farming household for maintaining local varieties at the farm level is important [6]. Maximum varietal diversity in the region was recorded for onions, peppers and beans. White cabbage, melon, pumpkin, leeks and beans are other crops that have a satisfactory diversity in different areas. The favourable factors contributing to the diversity of varieties in the case of melons includes the ease of seed maintenance and high rate of multiplication [11]. Other vegetable crops, however, have little varietal diversity (Table 4).

3.4.The knowledge of farmers on vegetable landraces diversity

To understand the farmers' perception on vegetable landraces diversity, they were asked a few questions. The responses indicate that their knowledge of the local vegetablegenetic resources varies from farmers to farmers and from commune to commune.

Farmers at all communes were generally well aware of the existence of diversity in vegetables. But their knowledge on present use and future of diversity were found to be insufficient. At many communes or villages, they have enough knowledge on the dynamics of varietal replacement process over the years. This was reflected by the fact that farmers counting some landraces, which have disappeared over the years from their villages. In some cases, they can reveal the possible reasons for such a change. Farmers in Bulgarec, Dishnicë, and Bilishti villages not only knew better cultivation practices, but they knew how the pollination of vegetables that maintained and cultivated. Despite this, farmers in Bulgarec village expressed difficulties exist due to cross pollination to maintain melon "Korrovec" preferred about the smells, flavor and

sweetness.But although they know best feature of crop pollination, the difficulties for maintain and production of cultivar seed,did not practice the special techniques, such isolation in space, bags of insulation and artificial pollination.

3.5.The home garden in the study area

In many communes and villages farmers produce food crops, including ten vegetables for household consumption. In a Korçatypical farm, home garden is an integral part of the household, and plays an important role in supplying the families with delicious food. Therefore, in the study area, it was not difficult to find farmers who growing different kinds of vegetables in their home garden. However, the nature, practices and factors influencing to maintain a home garden are also quite variable.

In Bulgarec village, most of the farmers are producing vegetables for commercial purposes, and only a few farmers practicing home gardening. It was observed that farmers producing for the market do not maintain a special home garden for household consumption. In villages of commune“Barmash”, which is far from the customer, at the city of Erseke, most of the local farmers are growing vegetables for household consumption, without using chemical fertilizers or pesticides. This practice is known for its vegetable crops other than tomato. As expected, some farmers maintain home garden more actively than others. Similar is the case at“Hudenisht” and “Buçimas” communes. Only a limited number of farmers buy and sell vegetables in the villages. In them, home gardening is a key practice to supply vegetables to the household. In Voskop, 7 villages and nearly 90% of households had home garden, however, only 24 of them are maintained actively, especially in Goskove village. The farmers, whomaintaining home garden actively, keeps the seed for the next planting season and are interested in selecting and preservation of the seeds. Other farmers do nothing but look for seeds from active farmers. Farmers at this area expressed, about 25-30 years ago all the farmers have had an actively home garden. Nowadays the situation has changed due to the easy access to the Korça market and increasing opportunity for employment outside the farm. This is a global phenomenon known in other countries [6, 11].

3.6.The market of local vegetables

From the interviews conducted in the market, show that consumers like the products that come from local cultivars. Particularly noted is this group of consumers aged over 40 year’s old, educated consumer with the quality of local cultivars. They even differentiate and request in the market vegetables that are grown with traditional methods, mainly those coming in the market from the home gardens.On the other hand the younger generation of consumers are fearful of industrial production, the use of chemical fertilizers and pesticides, have begun and are becoming preferential consumer of local vegetables [4].

Promotion of the market for local cultivar, with reasonable performance and other favourite features (taste, flavour and other organoleptic qualities), can provide incentives for growers to maintain their "on-farm". Exploring ways to sensitize customers to develop a preference for local vegetables could be an important step to go forward. One of the most effective ways of promoting vegetable landrace can be cooperation with hotels and restaurants, applying knowledge and local culinary recipes. At the same time, identifying markets, marketing channels, marketing mechanisms for these products at the local, regional and national level, ultimately will facilitate the process in expanding and strengthening the opportunities for trade in such products.

4. Conclusions

From the study it is clear that vegetable landraces and community knowledge for them are reduced. But the rate of erosion appears to be higher in villages closed cities and those producing for the market. This is a phenomenon associated with urbanization and development process. The study also found that the level of management significantly improves the production of vegetable landraces even when they are growing for market.

This gives a strong indication that the vegetable germoplasm can be effectively conserved in conditions "on-farm", which gives incentives for farmers to produce for the market. Eliminate undesired traits through selection may also contribute to this process.

So, two activities, the research and promoting, might favor landrace conservation with "on-farm" method. Korça is rich region for traditional vegetable cultivars; it has kitchen and consumers

with specific culinary requirements. For on-farm conservation and sustainable use of traditional cultivars, five ways are suggested: a) promote the added value of products; b) the consolidation of specialized markets that efficiently utilize their organleptic qualities; c) creation of awareness at different levels; d) restoration and reintroduction of traditional cultivars through crop improvement processes; e)subsidies on-farm conservation of vegetablelandraces, because their conservation and management can be considered as a service that should be rewarded by society.

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