

Local Varieties and Their Importance

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Abstract

Local varieties, which are one of the important elements of cultural heritage, continue to exist today by being carried from generation to generation. These varieties, which are called by different names such as local varieties, village varieties-village populations, old varieties, amateur varieties, are defined as medium-yielding, variable populations with high adaptation and stress tolerance, used by our ancestors in the past, continuously improved by local producers using traditional methods. Local varieties, which are the common heritage of biodiversity and culture, are subject to genetic erosion due to many reasons such as the increasing use of high-yielding modern varieties and the old age of the people who protect these varieties. Our local varieties, which are also very valuable for breeding studies, are important for food safety, the continuation of local traditions and flavors, and human and environmental health. In this review article, local varieties, their importance and historical process are discussed with related studies.

INTRODUCTION

Rapid population growth and increasing demand for natural resources all over the world threaten biodiversity. Studying local varieties, which are the important part of biodiversity and cultural heritage, can contribute to their sustainability.

Local varieties are populations used by farmers and breeders, and are enormous genetic variations that can date back thousands of years. These locally adapted traditional, ancestral, farmer or indigenous varieties have evolved and continued to evolve through a complex process of human selection and diversification in response to dynamic socio-ecological environments (Villa et al., 2005; Tiranti and Negri, 2007; Choudhury et al., 2013). Local varieties have survived to the present day due to their

geographical and ecological isolation and belonging to species that are not widely cultivated (Taş et al., 2017).

Due to many reasons such as the increase in the population of various diseases and pests due to the continuous cultivation of the same crop in the same production area, the preference for hybrid varieties resistant to diseases and pests, and the fact that producers are mostly elderly; the preference rates of local varieties, which protect the cultural identity of farmers and rural communities, provide medium yields, and are the basic tool for adaptive capacity and food security, have decreased over time. The global climate crisis, the consequences of the climate crisis and many other factors increase people's interest in nature and the natural including local varieties. For this reason, it is very valuable to

recognize and identify these varieties and contribute to their transfer to future generations. Because local varieties are not only a resource but also our biocultural assets that have local heritage characteristics.

Local Varieties and Definitions

Local varieties can be defined as heterogeneous local adaptations of cultivated plants that have a historical root, a distinct identity, often associated with genetic diversity, farmers' seed selection and field practices. These are some of the characteristics that distinguish local varieties from modern varieties and are important in the naming and identification of local varieties.

Although it can be difficult to define local varieties precisely, there are two types of definitions for local varieties (Maxted et al., 2013). The first is a dynamic population(s) of cultivated plants with distinct characteristics, often genetically distinct, lacking formal plant breeding, locally adapted and incorporated into the traditional agricultural system, with a historical background (Camacho et al., 2005). Secondly, a local variety of a seed-propagated plant can be defined as a recognizable variable population, usually with a local name. Lacking formal plant breeding, local varieties are characterized by their special adaptation to the environmental conditions of the cultivated area (tolerance to biotic and abiotic stresses) and are closely linked to the celebration, dialect, habits, knowledge and traditional uses of the people who developed and continue to cultivate them (Taş et al., 2017).

The term "native species" as commonly used in the literature encompasses a number of different concepts that have changed over time, depending on prevailing trends in the use and conservation of genetic resources. After the early period when it was important to preserve local varieties to conserve biodiversity, today local varieties are often considered to have superior nutritional and sensory characteristics (the belief in the "flavor of the past") and this has influenced the concept of local varieties (Casañas et al., 2017). After von Rümker (1908) coined the term "local variety", it has been used for varieties that developed without conscious selection. According to Zeven (1998), an indigenous local variety is a local variety that has been grown for

a long time in the relevant agricultural system. Local varieties are defined as the varieties developed by local producers using traditional methods and for their own purposes as a result of the conscious choices they have made over the years, called village populations, local varieties or old varieties adapted to the region. Agricultural products that have been passed down from generation to generation for thousands of years within the traditional agricultural system have been continuously improved by farmers, and "local varieties" that best adapt to the climate and land conditions of the region have been obtained (Anonim, 2012). For thousands of years, farmers have produced high-yielding, palatable and attractive local varieties by first selecting the most suitable types from wild plants, growing them and selecting among them again, and in later stages by selecting spikes, pods, capsules, fruits and seeds from cultivated varieties that have lost their wildness. Villa et al. (2005) define a local variety as "a dynamic population of a cultivated plant that has a historical origin, a distinct identity and lacks formal crop improvement, but is also usually genetically diverse, locally adapted and associated with traditional farming systems".

Historical Background of Local Species

Local varieties can be defined as heterogeneous local adaptations of cultivated plants that have a historical root, a distinct identity, often associated with genetic diversity, farmers' seed selection and field practices. These are some of the characteristics that distinguish local varieties from modern varieties and are important in the naming and identification of local varieties.

The origin of landraces encompasses both the temporal and spatial components of where landraces were first developed. They (landraces) have a relatively long history, significantly more than the ephemeral lifespan of modern cultivars. Many authors suggest that landraces have been growing 'since time immemorial' (Rümker, 1908), 'over long periods of time' (Frankel et al., 1998), 'over hundreds even a thousand years' (Tudge, 1988), 'for many years even centuries' (Villa et al., 2006), 'for generations' (FAO, 1998) 'for many centuries' and 'over a period of time' (Almekinders and Louwaars, 1999). Nevertheless, few are explicit about the amount of time a

landrace must be grown to be considered a landrace. However, Louette et al. (1997) indicated for maize that the period of time must be 'for at least one farmer generation (i.e. more than 30 years)', while Astley referred to vegetable landraces being grown for '50–70 or even 100 years'. Hawkes (1983) opined that landraces are associated with one specific geographical location, in contrast to cultivars which are bred remotely, trialed in several locations and subsequently cultivated in diverse locations. Therefore, landraces are closely associated with 'specific locations' and often will take the name of the location (Rümker, 1908). Two types can be distinguished within local varieties (Kell et al., 2009). These are a) Primary Local Variety: It is a variety developed for specific traits by repeated in situ breeder selection and certainly not by formal plant breeding. These can be divided into autochthonous (native/autochthonous) and allochthonous (non-native-allochthonous).

a.1) Autochthonous (indigenous): a local variety that has been developed by breeder selection for certain traits in the region where it is grown and whose genetic and socioeconomic characteristics are particularly associated with the region where it is grown.

a.2) Allochthonous (non-indigenous): a variety that has been developed by breeder selection for certain traits but has subsequently been transferred elsewhere for permanent cultivation (Zeven, 1998). b) Secondary Local Variety: Official plant improved by breeding but is currently being repeated in situ. Sustained by breeder selection and seed preservation genetically original, possibly genetically original breeding is the variety that differs from the material (Taş et al., 2017).

When we look at the bibliographies, it is seen that the first reference to local varieties as a genetic resource dates back to 1890, and local variety descriptions were published about 20 years later.

In the period 1909–1952 several definitions of the term landrace have been presented. No definitions were discovered in articles published in the period 1953–1974. New definitions have been presented since 1974. Although many researchers have used expressions such as complex, indefinable, undefinable, and cannot be given an all-encompassing definition, it is generally defined

as dynamic populations of cultivated plants with high biotic and abiotic stress tolerance, high yield stability in a low-input agricultural system, and medium yield level, which have survived to the present day through natural and artificial selection.

Local Varieties and Biodiversity

The characteristics of landraces about the magnitude of allelic and genetic diversity in contrast to cultivars are considered to be significantly more genetically diverse (Fowler and Mooney, 1990) Thus, a landrace is a 'highly variable population in appearance' (Harlan, 1975), 'highly diverse populations and mixtures of genotypes' (Hoyt, 1992), 'genetically heterogeneous' (Villa et al., 2006), 'not genetically uniform and containing high levels of diversity' (FAO, 1998), 'local diverse crop varieties' (Brush, 1999), 'heterogeneous crop populations' (Brown, 1999) and 'materials with variable levels of heterogeneity'.

Some authors have used the term 'meta-population' when referring to the diversity structure of a landrace. As such, a landrace constitutes a group of farmers' seed lots that are highly diverse both between and within themselves (Azeez et al., 2018).

The origins of the world's food sources can be traced back to antiquity. Many plants used in human nutrition today were domesticated thousands of years ago.

Local varieties have been in existence since the beginning of agriculture and have been subjected to human interactions, biotic and abiotic factors and genetic change for hundreds of years, and have been a fundamental resource in agricultural production and breeding studies worldwide.

For many years, the planting of seeds by farmers or local people, harvesting and saving them for use the following year, has encouraged special diversity and created a rich genetic pool. This cycle of sowing by farmers or local people, intentionally or unintentionally, continued until the beginning of plant breeding and the production of higher-yielding varieties, which over the years have been replaced by modern varieties.

Local varieties are generally used in the development of new varieties in plant breeding. Today, local varieties still offer a unique specific

resource for pest and disease resistance, environmental tolerance to a particular region, and food quality. For this reason, it is thought that various factors negatively affect the use of local varieties, such as the replacement of homozygous modern varieties with local varieties, leading to increased genetic erosion. This situation is of great concern both for the conservation and maintenance of biodiversity and cultural heritage and for breeders.

CONCLUSION

Reviewing the descriptive characteristics of local cultivars, which have historical origins, are genetically diverse, adapted to the region, associated with the traditional agricultural system, and are the dynamic population of cultivated plants, is very important for the conservation of local cultivars, which are important gene pools, sustainability of food security, and coping with the current and future impacts of climate change.

REFERENCES

- Anonim, (2012). Atalık Tohum İçin Yetiştirme Rehberi. Buğday Ekolojik Yaşamı Destekleme Derneği Yayınları. Erişim: <https://www.bugday.org/blog/wp-content/uploads/2020/04/tohum-rehberi.pdf>
- Almekinders, C. J.M., Louwaars, N. P. (1999). Farmer's Seed Production: New Approaches and Practices. London: Intermediate Technology Publications.
- Azeez, M. A., Adubi, A. O., Durodola, F. A. (2018). Landraces and Crop Genetic Improvement. InTech. doi: 10.5772/intechopen.75944.
- Brush, S. B. (1999). The issues of in situ conservation of crop genetic resources. In: Brush S, editor. Genes in the Field. Rome: International Plant Genetic Resources Institute; pp. 3-26.
- Brown, A. H. D. (1999). The genetic structure of crop landraces and the challenge to conserve them in situ on farms. In: Brush S, editor. Genes in the Field. International Plant Genetic Resources Institute: Rome; pp. 29-48.
- Casañas, F., Simó, J., Casals, J. and Prohens, J. (2017). Toward an Evolved Concept of Landrace. Front. Plant Sci. 8:145. doi: 10.3389/fpls.2017.00145.
- Camacho Villa, T. C., Maxted, N., Scholten, M. A., Ford-Lloyd, B. V. (2005). Defining and identifying crop landraces. Plant Genet. Resources: Characterization Utilization. 3, 373-384.
- Choudhury, B., Khan, M. L., Dayanandan, S. (2013). Genetic structure and diversity of indigenous rice (*Oryza sativa*) varieties in the Eastern Himalayan region of northeast India. SpringerPlus. 2, 228. doi: 10.1186/2193-1801-2-228.
- Fowler, C., Mooney, P. (1990). Shattering: Food, Politics and the Loss of Genetic Diversity. Tucson: University Arizona Press.
- Frankel, O. H., Brown, A. H. D., Burdon, J. J. (1998). The Conservation of Plant Biodiversity. 2nd ed. Cambridge: Cambridge University Press, pp. 56-78.
- FAO (Food and Agricultural Organisation) (1998). The State of the World's Genetic Resources for Food and Agriculture. Rome, Italy: FAO.
- Harlan, J.R. (1975). Our vanishing genetic resources. Science, 188:618-621.
- Hawkes, J. G. (1983). The Diversity of Crop Plants. Cambridge, MA: Harvard University Press; p. 102.
- Hoyt, E. (1992). Conserving the Wild Relatives of Crops. Rome: IBPGR, IUCN, WWF.
- Kell, S.P., Maxted, N., Allender, C., Astley, D., Ford-Lloyd, B.V. and contributors (2009). Vegetable Landrace Inventory of England and Wales. The University of Birmingham, UK. 117 pp.
- Louette, D., Charrier, A., Berthaud, J. (1997). In situ conservation of maize in Mexico: Genetic diversity and maize seed management in a traditional community. Economic Botany, 51:20-38.
- Maxted, N., Magos Brehm, J., Kell, S. (2013). Resource book for preparation of national conservation plans for crop wild relatives and landraces. pp.1-463.
- Rümker, K. (1908). Die systematische Einteilung und Benennung der Getreidesorten für praktische Zwecke. Jahrb. Dtsch. Landwirtschaft. Ges. 23, 137-167.
- Tudge, C. (1988). Food Crops for the Future. Oxford: Basil Blackwell, p. 83.
- Tiranti, B., Negri, V. (2007). Selective micro-environmental effects play a role in shaping genetic diversity and structure in a *Phaseolus vulgaris* l. landrace: implications for on-farm conservation. Mol. Ecol., 16, 4942-4955.
- Taş, N., Kırçalıoğlu, G., K. Kırıcı, K., Özer, U. (2017). Türkiye Yerel Çeşit Genetik Kaynaklarının Muhafazası. Türk Bilimsel Derlemeler Dergisi, 10 (1): 48-52.
- Villa, T. C., Maxted, N., Scholten, M. A., Ford-Lloyd, B. V. (2005). Defining and identifying crop landraces. Plant Genet. Res. 3, 373-384. doi: 10.1079/PGR200591
- Villa, T. C. C., Maxted, N., Scholten, M., Ford-Lloyd, B. (2006). Defining and identifying crop landraces. Plant Genetic Resources, 3(3):373-384.
- Zeven, A. C. (1998). Landraces: A review of definitions and classifications. Euphytica, 104,127-139. doi: 10.1023/A:1018683119237.