

# FARMERS' SELECTION, ENVIRONMENTAL VARIATION, AND THE DYNAMICS OF THE MAINTENANCE OF *IN SITU* CROP GENETIC DIVERSITY OVER SPACE AND TIME

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Crop landraces in Vavilovian centers of genetic diversity are important resources for global agriculture, especially because they are adapted to climates, soils, and topography that are variable and often marginal. Local farmers, using time-tested experiential knowledge and keen observation, husband this diversity. Sustainable conservation and use of this biodiversity requires in-depth knowledge of the plant biology, environmental and human factors that maintain it.

With support of the Institute of Biodiversity Conservation and Research (IBCR), IDRC, USC/Canada and IPGRI, 1992-93 research on “Factors maintaining sorghum landrace diversity in north Shewa and south Welo regions of Ethiopia” clearly demonstrated that: intraspecific variation closely accords with both folk and numerical taxonomies; as farmers’ increase their selection criteria, diversity at the field level increases; farmers’ knowledge of storability corresponds with laboratory estimates of resistance to rice weevil infestations; and both natural factors and farmers’ selection criteria shape sorghum diversity at the farm level.

A follow-up 2000/01 study, supported by IDRC, IBCR and Addis Ababa University, again investigated landrace diversity and distribution, field size and fragmentation, seed sourcing and the farmers’ selection criteria and management practices. The specific goals were to measure the dynamics of temporal and spatial variations of sorghum landraces over the intervening eight years and to address questions about the stability over time of factors supporting the maintenance of the crop genetic diversity. The same farmers were interviewed both times. Substantial changes were found in farmers’ selection criteria, field size fragmentation and landrace richness planted to each field. Mapping in 2000/01 shows “specialist” (niche specific) landraces restricted to certain microhabitats and “generalist” landraces widely grown across the agroecological gradients of the research area.

In all five farming communities, the field size planted to sorghum landraces has decreased significantly due to population growth, land redistribution policy, seasonal changes, and stagger cropping followed by interspecies crop displacement. Landrace richness increased significantly in two communities [Merewa ( $Z=2.07$ ;  $P<0.01$ ) and Borkena ( $Z=5.34$ ;  $P<0.0001$ )], but decreased significantly in three [Bati ( $Z=-1.61$ ;  $P<0.05$ ), Epheson ( $Z=-7.77$ ;  $P<0.0001$ ) and Hayk ( $Z=-1.76$ ;  $P<0.03$ )]. Landrace evenness for most landraces decreased significantly. Farmers’ selection criteria, which represent farmers’ need from the crop genetic resources have increased significantly (**10 in ‘92/’93 vs 16 in 2000/2001 at  $P<0.0001$** ).

The research findings will contribute directly to the sustainable conservation of the landraces and their use in heterogeneous, marginal and less-favored agricultural environments through favorable policy formulation, networking, community gene-banking and strengthening the complementarity between the *in situ* and *ex situ* conservation approaches.