



Deutscher Tropentag, October 8-10, 2003, Göttingen

“Technological and Institutional Innovations
for Sustainable Rural Development”

Exploration and Geographical Trait Diversity in *Vernonia galamensis* — A Potential New Industrial Crop for Dry Regions

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Abstract

Vernonia galamensis is a new potential industrial crop with very high content of vernolic acid (12, 13-epoxy-cis-9-octadecenoic acid) in the seed oil. The species is limited in distribution and endemic to drier parts of East African countries. In order to study the existing eco-geographical and morphological diversity and seed quality traits diversity in Ethiopia, germplasm collection and field evaluation were carried out. A total of 480 accessions were collected, in all regions where *Vernonia* is growing. Altitude of collecting sites varied between 1,250 and 2,050 m, soil pH from 5.1 to 8.5, the most common soil type was sandy loam, and the organic matter content varied from 0.2 to 12.9%. The mean vernolic acid content of the seed oil of the accessions was 74%, and ranged from 34 to 87%. Shannon-Weaver Diversity Index (H') showed that most traits are polymorphic and the highest H' was noted for internode size (0.93) and the lowest for stem color (0.47). The overall diversity index for all traits was 0.76. The majority of the genetic diversity, 89% and 95%, was observed within region of origin and altitudinal group, respectively. Clinal pattern of variation was observed for traits such as flower color from purple to white, stem color from purple to green in the direction of lowland to highland. Principal component analysis and dendrogram constructed from H' indicated the close relationship of Sidamo and Shewa regions and the large difference of introduced accessions from accessions collected in Ethiopia. It was concluded that regions/altitudinal classes with highest diversity could be suggested for germplasm conservation strategy, either for *in situ* or *ex situ*.

In the collection mission, it was not possible to find *Vernonia* in some locations that were earlier indicated by herbarium specimens collected since 1840. This could be an indication of change in land use system and environmental degradation and, hence, loss of genetic resources of the species.

Keywords: Altitudinal diversity, collecting expedition, dry land crop, new crop, regional diversity, shannon-weaver diversity index, *Vernonia galamensis*