



Genotyping Finger Millet Germplasm – Developing a Composite Collection

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About finger millet

- Finger millet [*Eleusine coracana* (L.) Gaertn.] belongs to family *Poaceae*. It is a tetraploid species with $2n=36$, and self-pollinating.
- Cultivated in 23 countries on 3.38 million ha producing 3.76 m t mainly in Africa and Asia.
- A very important crop in Uganda, Nepal, Kenya, Ethiopia, Eritrea and India.
- Nutritionally rich in protein, minerals and methionine amino acid.



Regeneration of finger millet germplasm.

Origin and gene pool

Finger millet was first domesticated in Eastern Africa, possibly in Ethiopia around 5000 BC. Two subspecies are known:

- E. coracana* subsp. *coracana* (cultivated form) with four races: *Elongata*, *Compacta*, *Plana* and *Vulgaris*
- E. coracana* subsp. *africana* with two races: *Africana* and *Spontanea*

Distinct nutritional traits of finger millet grains (100 g)⁻¹

| Nutritional trait | Finger millet | Wheat | Rice |
|---------------------------|---------------|-------|------|
| Protein (g) | 7.3 | 11.8 | 6.8 |
| Mineral matter (g) | 2.7 | 1.5 | 0.6 |
| Calcium (mg) | 344 | 41 | 45 |
| Iron (mg) | 46 | 0.1 | 0.02 |
| Methionine (% of protein) | 3.1 | 1.5 | 2.3 |
| Crude fiber (g) | 3.6 | 1.2 | 0.2 |

Status of finger millet germplasm in the ICRISAT genebank

- The entire collection (5949 accessions) has been characterized for eight qualitative and 14 quantitative traits.
- The entire collection represents 136 advanced cultivars, 50 breeding lines, 5658 landraces and 105 wild accessions.
- A core collection (622 accessions) based on origin and data on 14 quantitative traits has been developed (Upadhyaya et al. in press).
- A mini-core collection (65 accessions) has also been developed.



Diversity of spikes in finger millet germplasm.

Composite collection

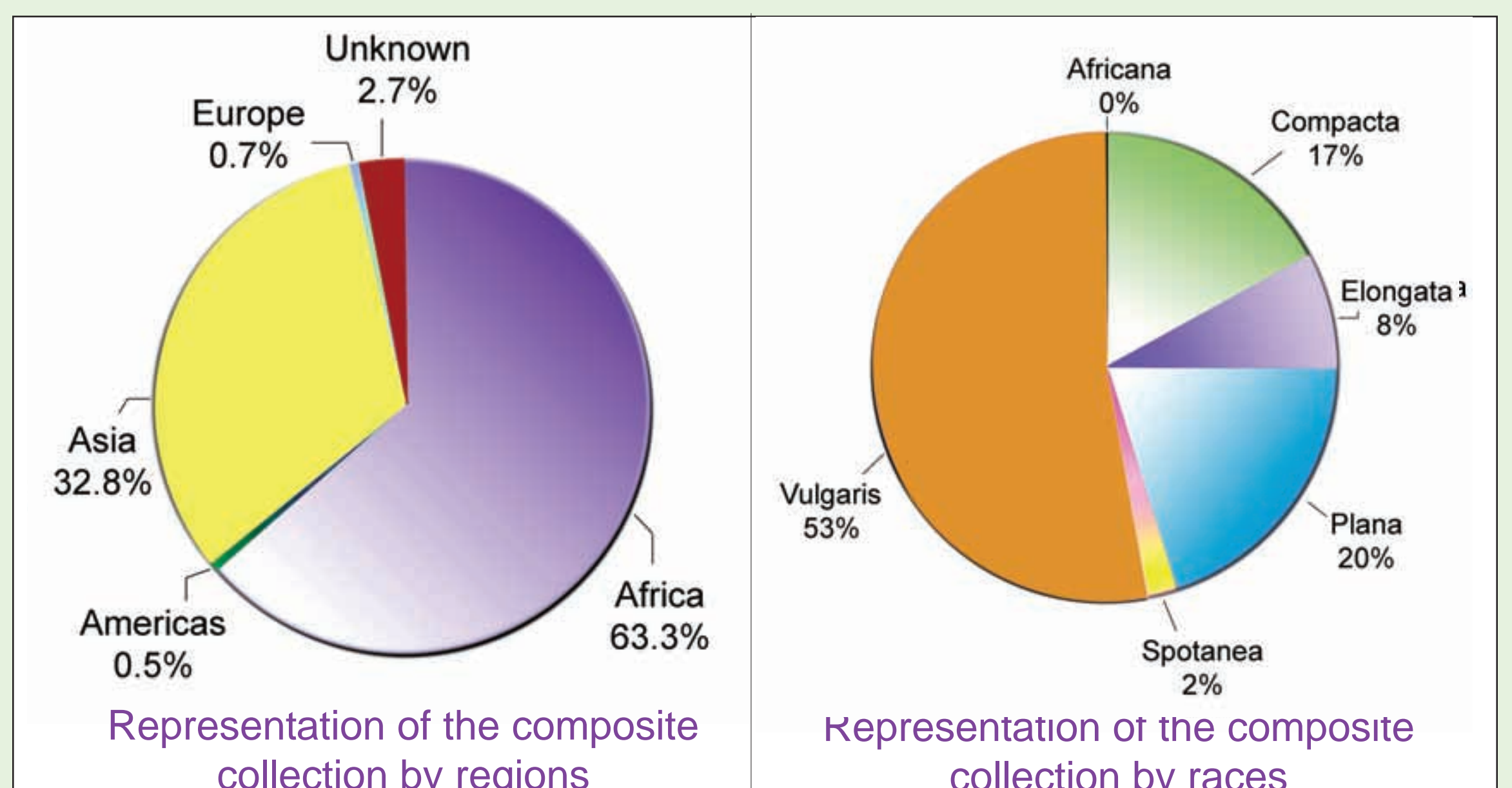
- A composite collection of finger millet germplasm (1000 accessions) has been constituted.
- The composite collection represents the entire collection by origin of accessions and races, and captures the maximum diversity available.
- The composite collection will economize and simplify the process of regeneration and distribution of germplasm. This will also enhance the possibility of multi-locational evaluation.

Major holdings of finger millet germplasm in the world

- 5844 cultivated and 105 accessions of *Africana* and *Spontanea* wild races accessions from 23 countries at ICRISAT.
- 6000 accessions at the All India Coordinated Small Millet Improvement Project (AICSMIP), UAS, Bangalore.
- 3623 unique accessions at UAS, Bangalore.
- 2000 germplasm accession in Uganda.
- 1318 accessions in Ethiopia.
- 1500 accessions in Kenya.
- 1000 accessions in Malawi.
- 778 accessions in Nepal.

Accessions in finger millet Composite Collection

| Particular | Number of accessions |
|-------------------------|----------------------|
| ICRISAT core collection | 622 |
| Agronomic traits | 222 |
| Indian NARS core | 50 |
| Resistance to stresses | 85 |
| Grain nutrition traits | 12 |
| Genetic diversity | 9 |
| Total | 1000 |



Future plan

The composite collection will be characterized for phenotypic traits and genotyped using 20 polymorphic SSR markers. A reference collection of 300 will be selected which will be evaluated for drought resistance and agronomic traits. Plant breeders will have access to genetically diverse parents to enhance yield potential.

Reference

Upadhyaya HD, Gowda CLL, Pundir RPS, Reddy VG and Sube Singh. (in press). Development of core subset of finger millet germplasm using geographical origin and data on 14 quantitative traits. Genetic Resources and Crop Evolution.