

# Characterization and Evaluation

## Need for characterization and evaluation

- ❖ To assess diversity in the collections
- ❖ To identify useful/new genotypes, and duplicates in the collections
- ❖ To classify the accessions and to add value to the collections

## Phenotypic Characterization

- ❖ It is recording of visual observations on highly heritable characters

## Preliminary evaluation

- ❖ It is recording of observations on important agronomic traits along with phenotypic characterization.

## Trait-specific evaluation

- ❖ Refers to screening of germplasm by pathologists, entomologists, physiologists and biochemists.
- ❖ Data obtained is fed back to germplasm database.



**Characterization of wild sorghum germplasm.**



**Characterization of pearl millet germplasm.**



**Evaluation of pearl millet germplasm for fodder traits.**



**Characterization of chickpea germplasm.**



**Characterization of wild pigeonpea germplasm.**



**Characterization of groundnut germplasm.**

## Partnership for evaluation

- ❖ ICRISAT collaborates with national and international agricultural research institutes, NARS, universities, private sector and NGOs in different countries for germplasm evaluation.



**ICRISAT-NBPGR collaborative evaluation of chickpea germplasm.**

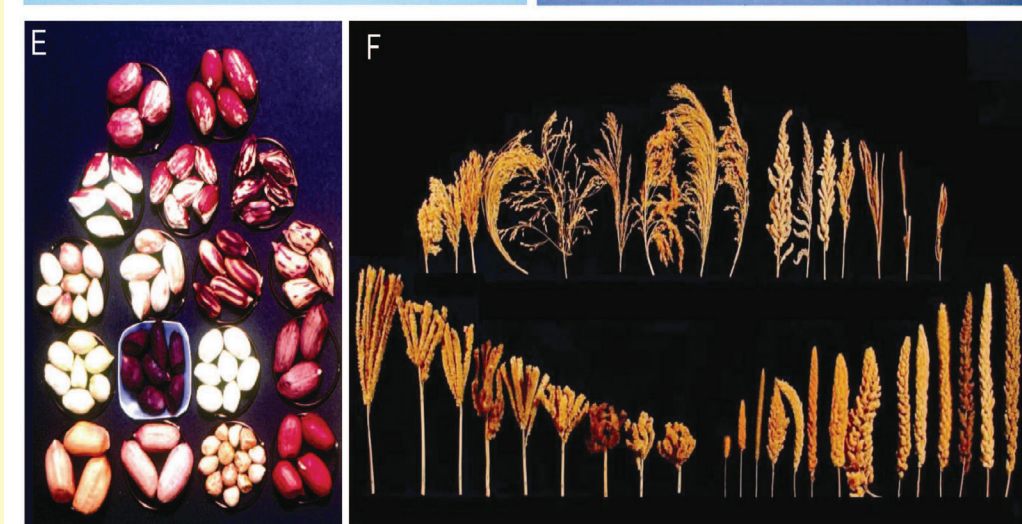


**ICRISAT-Pioneer International Collaborative evaluation of pearl millet germplasm for heat tolerance at Sanhore, India.**



**Collaborative evaluation of pearl millet germplasm in Namibia.**

## Diversity in collections



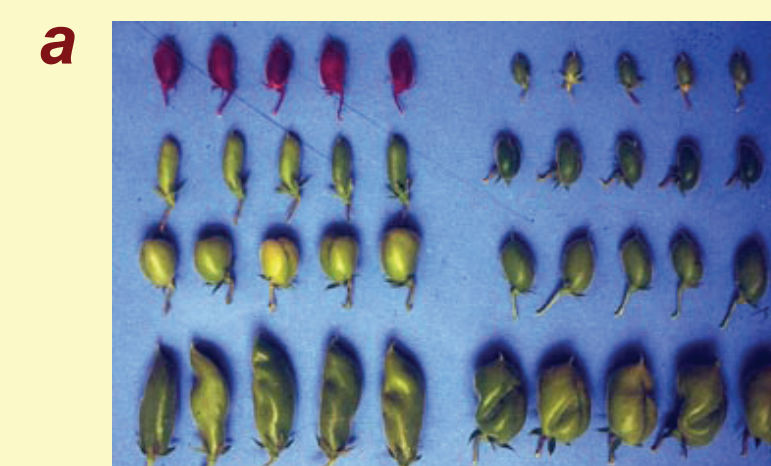
**Diversity for panicle and seed traits in sorghum (A), pearl millet (B), chickpea (C), pigeonpea (D), groundnut (E), finger millet and small millets (F).**



**Diversity for foliage color in chickpea.**



**Diversity for foliage color in groundnut.**



**Diversity for pod size and color in chickpea (a), pigeonpea (b), and groundnut (c).**

Range of variation in sorghum collection			
Character	Range	Mean	
Days to 50% flowering-rainy	31 - 199	91.4	
Days to 50% flowering-postrainy	36 - 154	72.3	
Plant height (cm)-rainy	50 - 655	326.8	
Plant height (cm)-postrainy	50 - 580	214.1	
Basal tillers per plant (no.)	1 - 14	2	
Panicle exertion (cm)	0 - 72	16.3	
Panicle length (cm)	2.5 - 90	22.4	
Panicle width (cm)	1 - 80	9.4	
Seed thickness (mm)	0.8 - 6	3	
100 seed weight (g)	0.1 - 9.4	3	

Range of variation in pearl millet collection			
Character	Range	Mean	
Days to 50% flowering-R	33-159	72.7	
Days to 50% flowering-PR	32 - 138	71.7	
Plant height (cm)-R	30 - 490	248.5	
Plant height (cm)-PR	25 - 425	161	
Total tillers (No.)	1 - 35	2.7	
Productive tillers (No.)	1 - 19	2.1	
Panicle exertion (cm)	-45 to 29	3.5	
Panicle length (cm)-R	5 - 135	28.9	
Panicle length (cm)-PR	4 - 125	25.8	
Panicle width (mm)-R	8 - 58	24	
Panicle width (mm)-PR	8 - 61	22.8	
1000-Seed weight (g)	1.5 - 21.3	8.5	

Range of variation in finger millet collection			
Character	Range	Mean	
Days to flowering-rainy	50 - 120	80.4	
Plant height (cm)-rainy	30 - 240	100.7	
Basal tillers number	1 - 70	5.2	
Peduncle length (mm)	18 - 450	215.5	
Panicle exertion (mm)	0 - 360	113.5	
Inflorescence length (mm)	10 - 320	93.1	
Inflorescence width (mm)	7 - 460	78.4	
Longest finger length (mm)	10 - 250	72.6	
Longest finger width (mm)	2 - 35	11.6	
Panicle branches number	2 - 27	7.7	

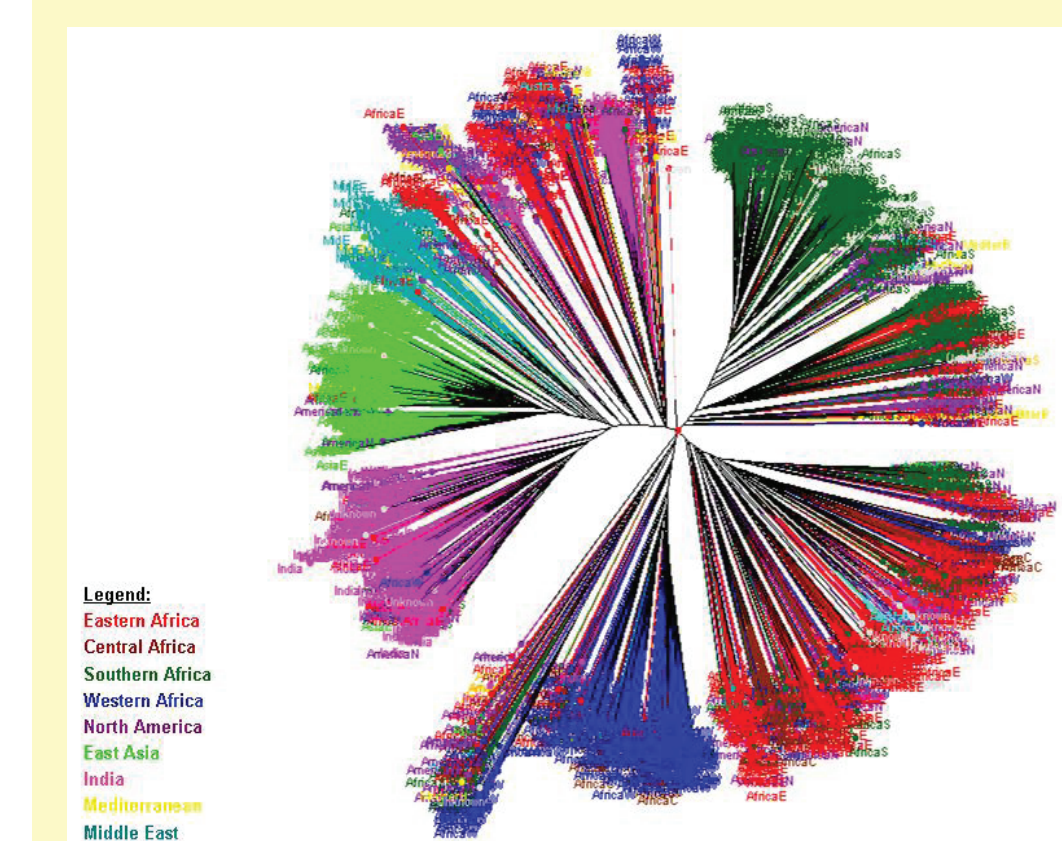
Range of variation in chickpea collection			
Character	Range	Mean	
Plant height (cm)	14 - 105.7	39.2	
Basal primary branches (no.)	1.0 - 15.7	2.8	
Apical primary branches (no.)	0 - 12	1.5	
Tertiary branches (no.)	0 - 24.8	1.3	
Days to 50% flowering	28 - 118	62.2	
Days to maturity	70 - 172	116.2	
Pods per plant (no.)	5 - 238	42.8	
Seeds per pod (no.)	1 - 3.2	1.2	
Seed yield (Kg/ha)	100 - 4270	1250.8	
Seed protein content (%)	10 - 29.6	19.5	

Range of variation in pigeonpea collection			
Character	Range	Mean	
Plant height (cm)	39.0 - 310.0	178.4	
Primary branches per plant (no.)	1.0 - 66.0	13.7	
Secondary branches per plant (no.)	0.0 - 145.3	31.3	
Days to 50% flowering	52 - 237	133.5	
Days to 75% maturity	97 - 299	192	
Pod length (cm)	2.5 - 13.1	5.7	
Pods per plant (no.)	6 - 1819	284.8	
Seeds per pod (no.)	1 - 7	3.7	
100-Seed weight (g)	2.7 - 25.8	9.3	
Seed yield per plant (g)	1.0 - 670.0	62	
Harvest index percentage	0.4 - 49.0	20.6	
Seed protein content (%)	13.0 - 30.8	21.3	

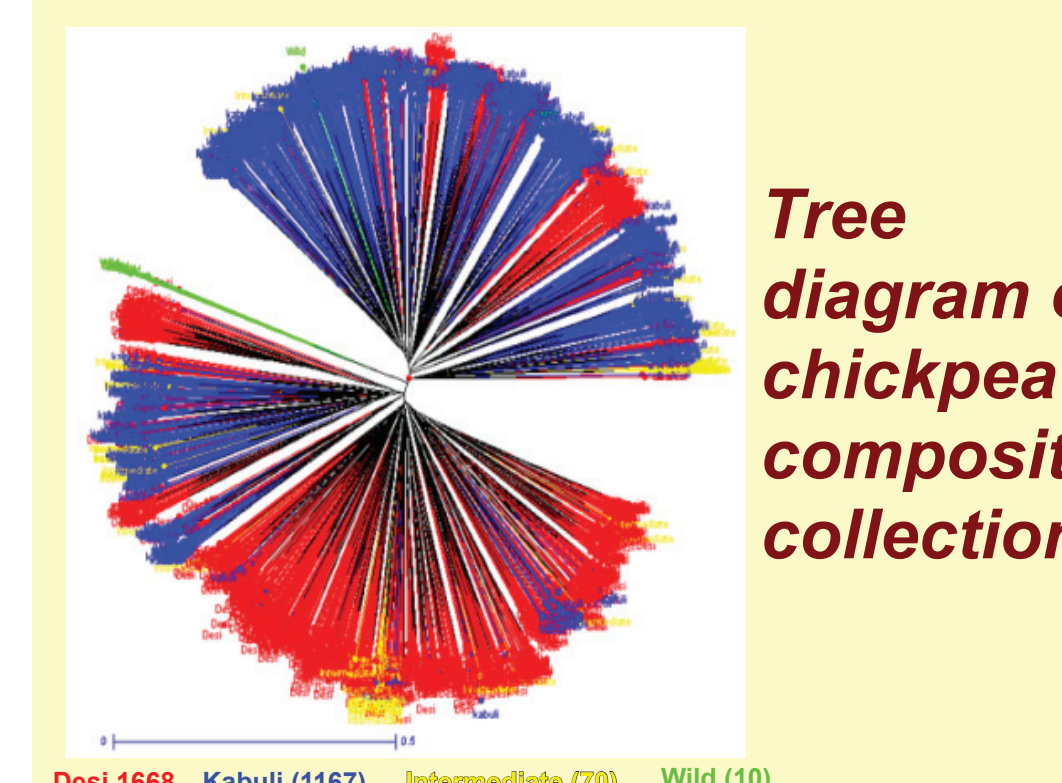
Range of variation in groundnut collection			
Character	Range	Mean	
Plant height (cm)	7 - 62	27.5	
Days to 50% flowering	15 - 45	25	
Pod length (mm)	12 - 60	28.7	
Pod width (mm)	7 - 19	12.3	
Seed length (mm)	8 - 22	13.3	
Seed width (mm)	5 - 12	7.8	
Seed weight (g)	10 - 120	43.2	
Pod yield (kg/ha)	110 - 5454	1891.7	
Protein content (%)	15.5 - 32.4	25.7	
Oil (%)	31.8 - 53.9	43.8	

## Molecular Characterization

- ❖ It is recording of observations at genome level using molecular markers
- ❖ Depending on the crop, 500-3365 accessions were characterized using 20-50 SSR markers
- ❖ Genotype based reference sets of 200-400 genetically most diverse accessions have been established.



**Tree diagram by region for sorghum composite collection and reference set.**



**Tree diagram of chickpea composite collection.**