7.1 Genetic diversity of *Capsicum*

1. The accessions collected from NE India displayed a wide range of genetic and phenotypic variation for both Bhut Jolokia (BJ) and non-BJ accessions.

2. For the first time, a modified method of AFLP, namely, TE-AFLP was standardized and used for analysis of genetic diversity analysis of *Capsicum*. The TE-AFLP profiles were clearer and superior than AFLP in case of *Capsicum* as it has a large genome (over 3000 mb).

3. This is also the first genetic diversity study involving such a large number of *Capsicum* accessions and landraces from NE India in general and Bhut Jolokia in particular.

4. Population structure analysis using STRUCTURE identified two major populations representing Bhut Jolokia and *C. annuum* accessions, respectively. The study showed that Bhut Jolokia is genetically distinct from *C. annuum*.

5. The identities of a number of non-descript varieties and landraces such as Lota Bhut, Krishna Jolokia, Mem Jolokia were resolved.

6. The high diversity observed in the accessions of NE India may be due to natural interspecific hybridization and selection pressure due to environmental and anthropogenic factors.

7. This germplasm would provide a rich source of *Capsicum* germplasm for further research and varietal improvement programs.
7.2 Variation of capsaicinoid content

1. This is the first study on analysis of capsaicinoid content involving such a large number of *Capsicum* accessions and landraces from NE India in general and Bhut Jolokia in particular.

2. The accessions collected from NE India displayed a wide range of variation in capsaicin, dihydrocapsaicin, total capsaicinoid content and cap/dhc ratio.

3. No clear relationship was found between the geographical origin of accessions and their capsaicinoid content.

4. The study revealed that all except 11 accessions had cap/dhc ratios lower than 1. All BJ accessions had cap/dhc ratios greater than 1.

5. The study identified the highest pungent genotype of Bhut Jolokia reported so far. The accession, CC004, contained 72 mg/g of total capsaicinoids with an equivalent pungency of 1,152,832.

6. The study also revealed that all Bhut Jolokia are not equally hot. The total capsaicinoid content within Bhut Jolokia ranged from 14.65 mg/g to 72 mg/g. Many of the BJ and non-BJ accessions had comparable levels of total capsaicinoids.

7. The accessions characterized in this study will be useful as a base for further utilization of this valuable resource in future research.
7.3 Linkage mapping and QTL mapping of pungency loci

1. This is the first study using a BC$_1$ population derived from Bhut Jolokia and C. annuum for linkage mapping and QTLs identification for pungency traits. This population and its derivatives can be further used for future studies on mapping and gene identification for a number of agronomically important traits.

2. The newly developed linkage map will help in fine dissection of QTLs associated with pungency in Bhut Jolokia.

3. The study identified a number of EST-SSR, AFLP and TE-AFLP markers tightly linked to pungency related traits which can potentially be used for marker assisted breeding.

4. The study also opens the avenues for genetic improvement of Bhut Jolokia for improved agronomic traits. Despite the premium price fetched in the market, the farmers are not keen on its cultivation due problems such as disease susceptibility, difficulty in overall cultivation and low yields. The study has laid the foundation for the improvement of this landrace Bhut Jolokia through molecular breeding and make it an economically attractive variety to farmers.