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Germplasm characterization and conservation of the silkworm, *Bombyx mori* L. in a changing climate

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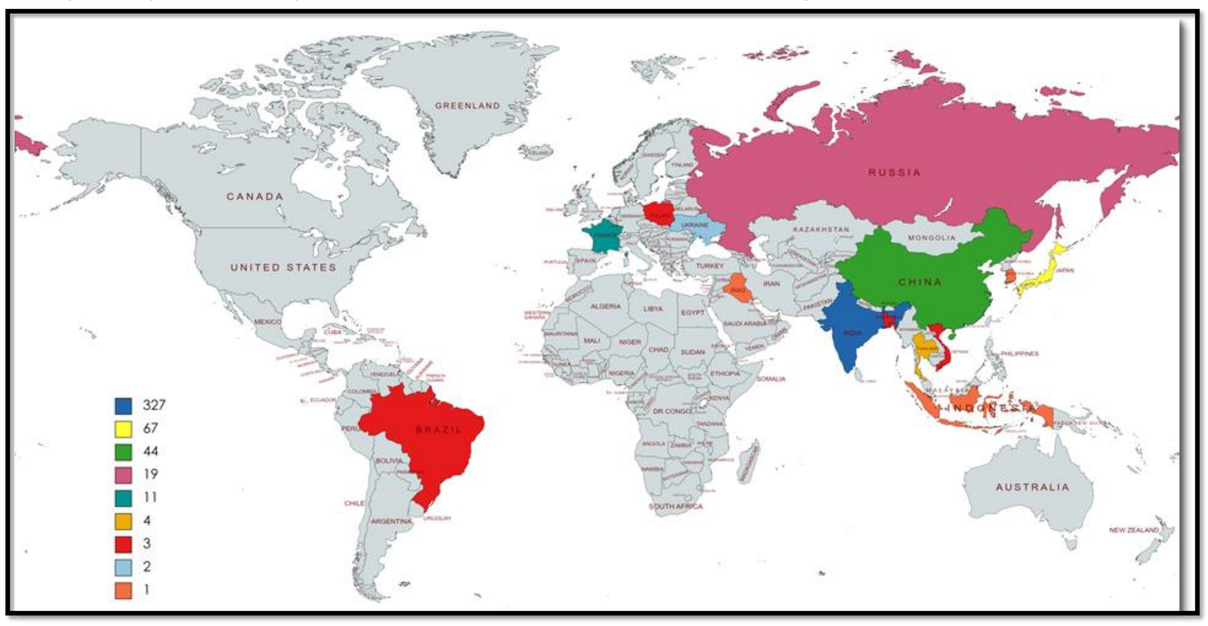
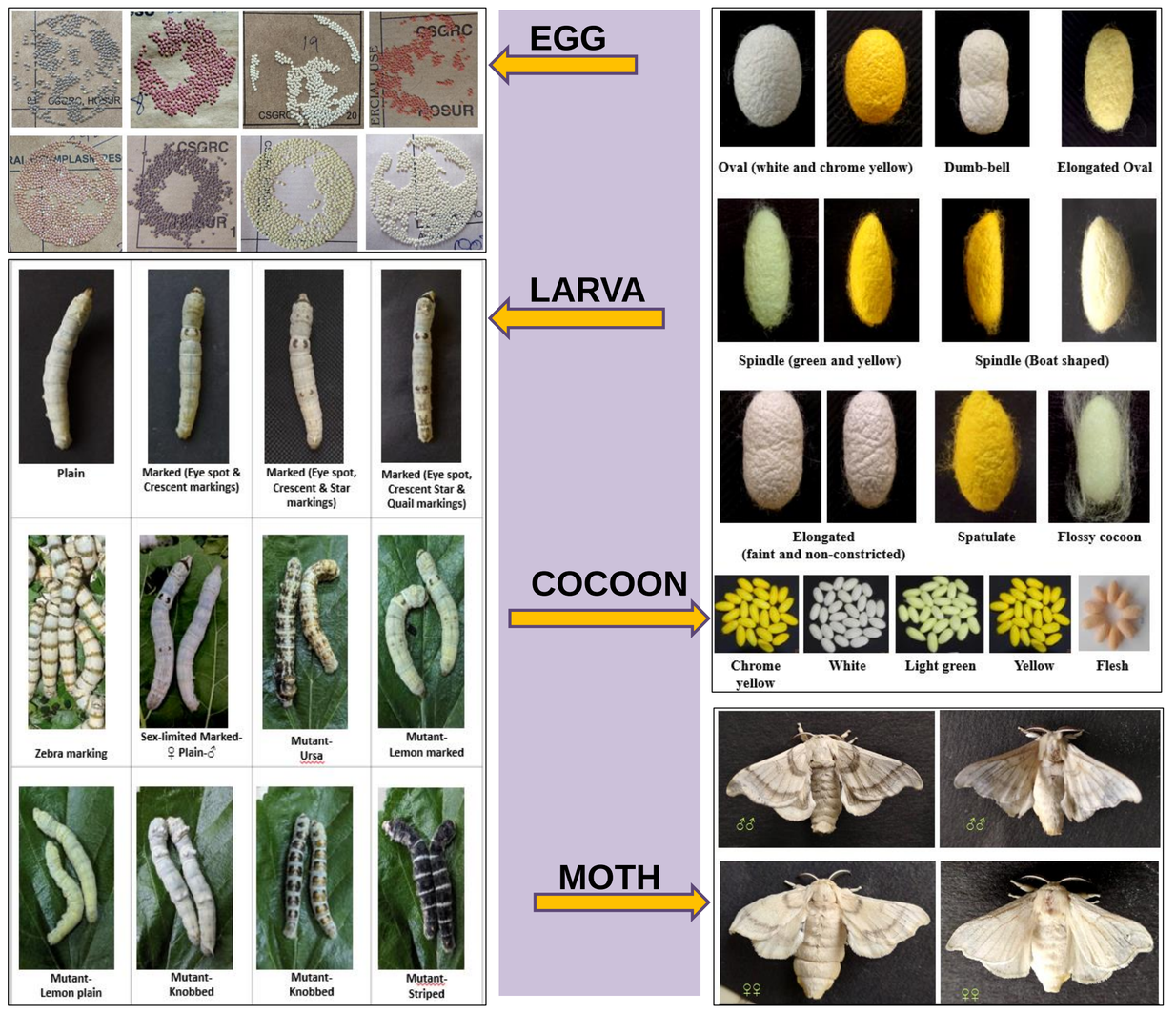
INTRODUCTION & AIM

- Silkworm, *Bombyx mori L.*, is a holometabolous Lepidopteran insect commercially cultured for the production of silk-the Queen of Textiles.
- Central Sericultural Germplasm Resources Centre, Central Silk Board, is the National repository of mulberry silkworms and conserves 490 silkworm genetic resources.



- Silkworm, being a poikilothermic insect, is highly sensitive to fluctuations in environmental conditions.
- Characterization is a crucial step in germplasm conservation as it reveals important information on the traits of the genetic resources.
- Under the increasing effects of climate change, germplasm characterization is gaining prominence as it is essential to identify the underutilized resources that are potentially resilient to changing environmental conditions.
- The paper aims to discuss characterization and evaluation of silkworm genetic resources at morphological and biochemical level to bring out the genetic variability in them.



METHOD

- **Morphological characterization:** Based on the phenotypic traits, variations in important morphological descriptors were recorded through visual observations.
- **Characterization through evaluation trials:** Productive silkworm genotypes were reared in varying environmental conditions in different agroclimatic zones of India and rearing performance was evaluated.
- **Biochemical characterization:**
- For thermotolerance: Selected productive silkworm genotypes were screened -
  1. For presence of heat stable esterase through isozyme profiling
  2. By using 4 SSR markers specific to thermotolerance, viz. LFL1123, LFL0329, SO809,SO813.

Table: Details of SSR Loci, Primer Sequences and Allelic Size

Sl. No	Primer	Locus	Sequence `5-`3	Tolerant Allele size	Susceptible Allele size
1	1123	LFL1123	FP-AAGTTCTTTACCAGTTCACAGACAGC RP-CGCCATGCAACTGTCGTCAC	230bp	250bp
2	0329	LFL0329	FP-GAAATCCGTTTGAAGAATCCACA RP-CATCCGTTGAATGAGTATCGTTTG	200bp	180bp
3	S0809	LFL0407	FP-AACATTTGCTTAGGACTGAATTTACAC RP-AATAATAACTTTTACACGCACCTACACTT	230bp	200 bp
4	S0813	S0813	FP-CCAGGAAATTCCAACCAGTAGCC RP-ACTTACCACTACACCAGACGGAC	500bp	480 bp

RESULTS & DISCUSSION

Morphological characterization: Number of variations were observed in each morphological descriptor of silkworm, *Bombyx mori.*

Descriptors	No. of variations	Descriptors	No. of variations
Egg shape	2	Cocoon shape	14
Egg colour	8	Cocoon grains	6
Serosa colour	13	Pupa colour	5
Colour of neonate	7	Moth colour	6
Larval Markings	3	Wing fasciations	6
Nature of integument	5	Moth eye colour	2
Body colour of V instar larva	20	Shape of antenna	1
Cocoon colour	14		

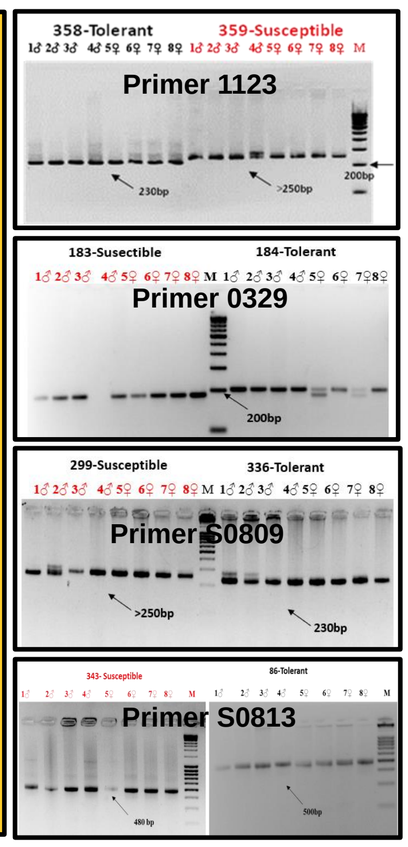
Characterization through evaluation

Environmental conditions	Suitable accessions
Temperate Region	BBE-0222, BBE-0183
Sub tropical region	BBE-0197
Tropical region	BBE-0183, BBE-0187
Temperate and tropical region	BBE-0183
Southern zone	BBI-0348, BBE-0216, BBE-0329
Sub tropical region	BBI-0348, BBE-0216, BBE-0329, BBE-0266
Eastern zone	BBI-0348, BBE-0216, BBE-0266
High temperature & high RH (autumn)	BBE-0266, BBE-0178 BBE-0198, BBE-0266
High temperature and low RH (abiotic)	BMI-0045, BMI-0025, BMI-0027, BMI-0060
High temperature and high RH (abiotic)	BMI-0040, BMI-0025, BMI-0027, BMI-0016
High temperature and high RH (biotic)	BMI-0027

Biochemical characterization

Thirteen genotypes – BMI-1,17,18,43, BME-49, BBE-5 ,9,10,12,48, BBI-286,324,359 showed presence of heat-stable esterase.

Five genotypes were identified through screening using thermotolerant markers- BBE-184, BBI-301, BBI-336, BBI-338 & BBI-339



CONCLUSION

- Conservation efforts of valuable silkworm resources can be justified only through characterization and identification of unique traits in the genotypes.
- The data generated from characterization will be of immense use to give identity to the germplasm, to know its genetic potential, to group or classify the germplasm into different category and to establish the relationship of characterisation data with other quantitative parameters.
- The trait-specific germplasm identified in this study will be useful to breeders in developing climate –resilient silkworm breeds, for continued silk production in a changing climate

FUTURE WORK / REFERENCES

- ***Exchange of germplasm*** *to broaden the genetic base and utilize in crop improvement programmes.*
- *To* ***establish the molecular identity*** *of accessions through DNA markers and to discern genetic relationship among genotypes and to eliminate duplicates, for efficient conservation.*
- *Exploring* ***cryopreservation*** *of genetic material as an alternative method of germplasm conservation. Efforts on cryopreservation of silkworm embryo have met with limited success.*

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