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Estimation of ploidy level and associated traits signifying the positive impacts of genome size increase on leaf anatomical traits of *Morus* spp.

Raju Mondal[1,2], Prashanth A. Sangannavar[3], V. Nishitha Naik[1], and Yogesh Mishra[2]

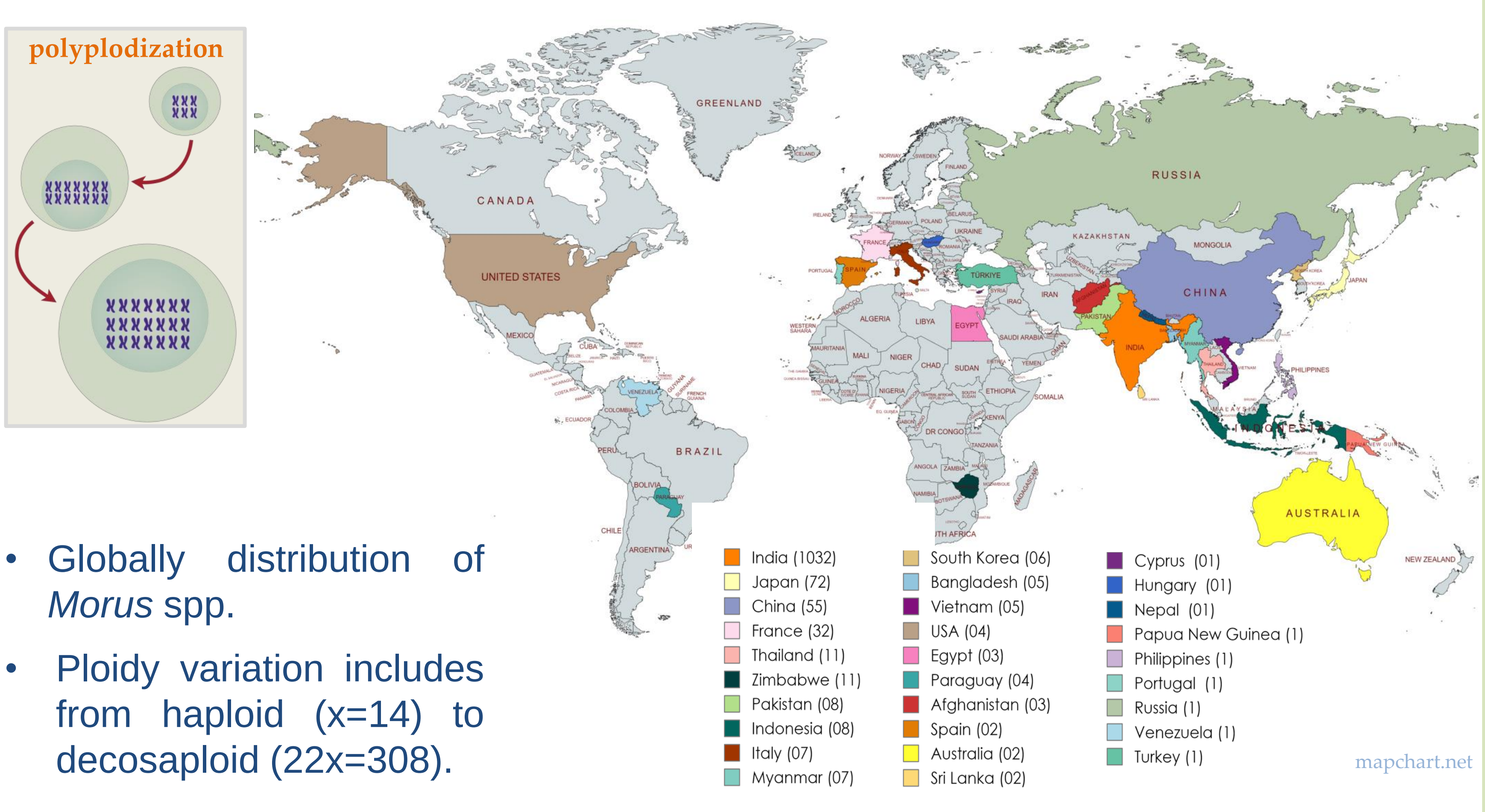
[1]CSB-Central Sericultural Germplasm Resources Centre (CSGRC), Hosur, Tamil Nady 635 109, India

[2]Department of Botany, Center of Advanced Study in Botany, Banaras Hindu University, Varanasi India-221005

[3]Central Silk Board, Bengaluru, Karnataka 560068, India

INTRODUCTION & AIM

- Genomic organization and its functional characteristics directly or indirectly associated with adaptability and diversity.
- Chromosomal information bears significant for plants including breeding, genetics and genome analysis.
- Cultivation of mulberry (*Morus* spp.) started in ~5000 BC to feed silkworms (*Bombyx mori*) for production of silk.



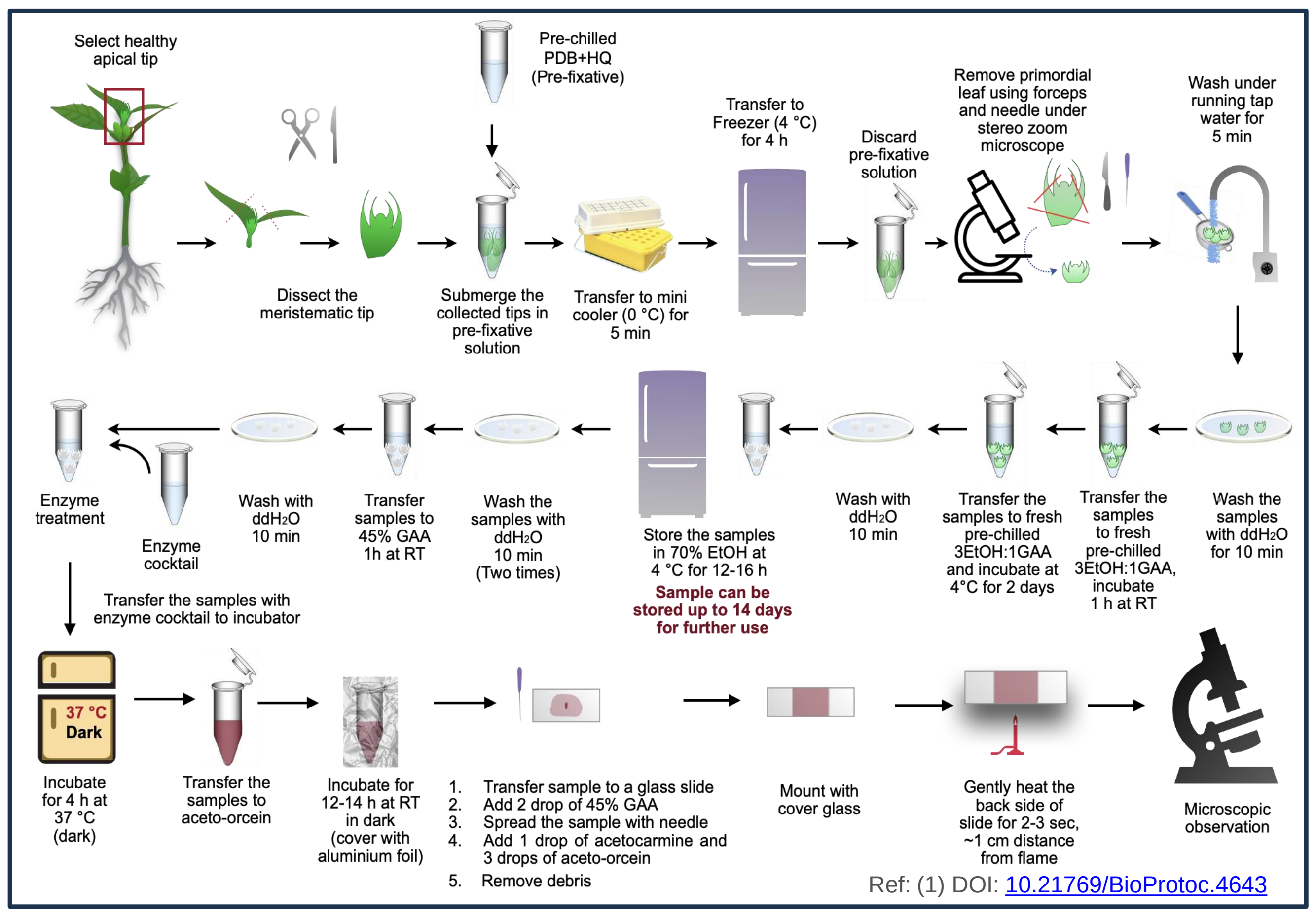
- Globally distribution of *Morus* spp.
- Ploidy variation includes from haploid (x=14) to decosaploid (22x=308).

- Aim of the study to identify the impact of polyplodization on growth, behaviour, survivability.

METHOD

Chromosome numbers of 20 mulberry accessions belongs to *M. alba, M. australis, M. bombycis, M. cathayana, M. indica, M. laevigata, M. latifolia, M. macroura, M. rotundiloba, M. serrata and* and *M. nigra* are selected for the study.

Metaphase study



Ref: (1) DOI: 10.21769/BioProtoc.4643

Flow cytometry

Young leaves ~0.5 cm^2 chopped in 2 mL of nuclear isolation buffer

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Filtered using 30 µm nylon mesh

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Incubate at 37 °C for 30 min

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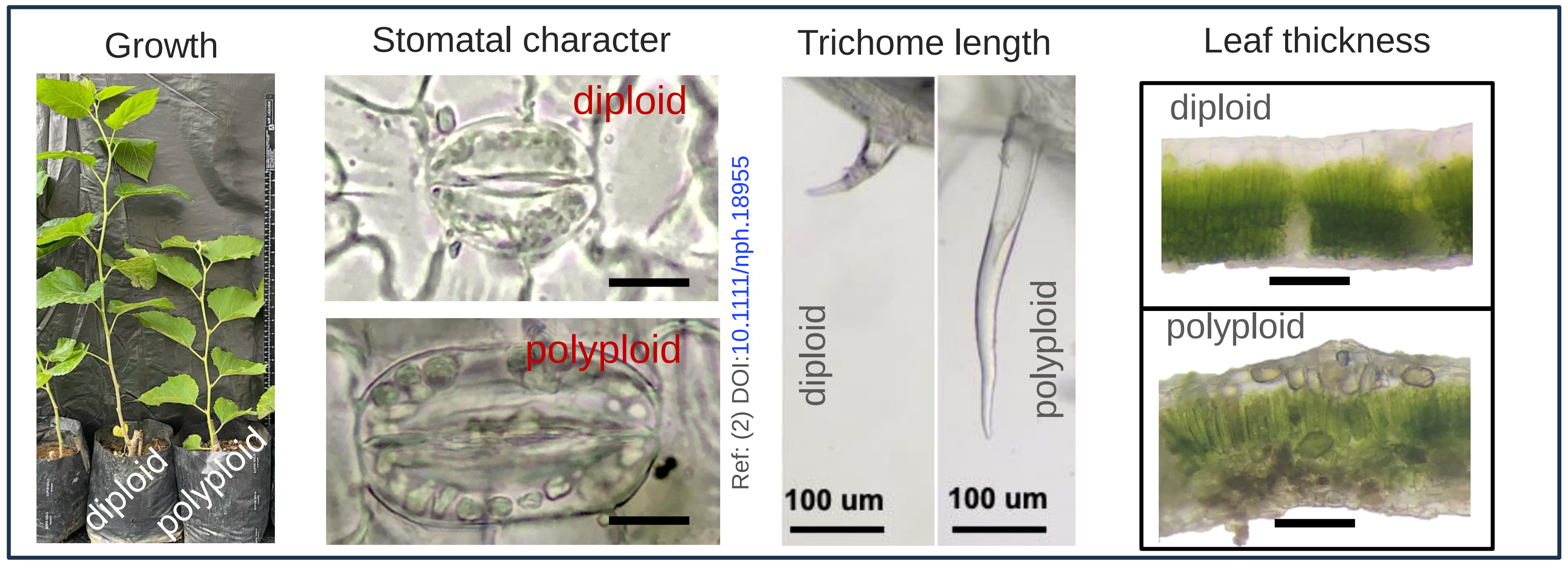
Analysis using dual laser FACSCaliburTM (BD Biosciences, United States)

Leaf anatomical traits



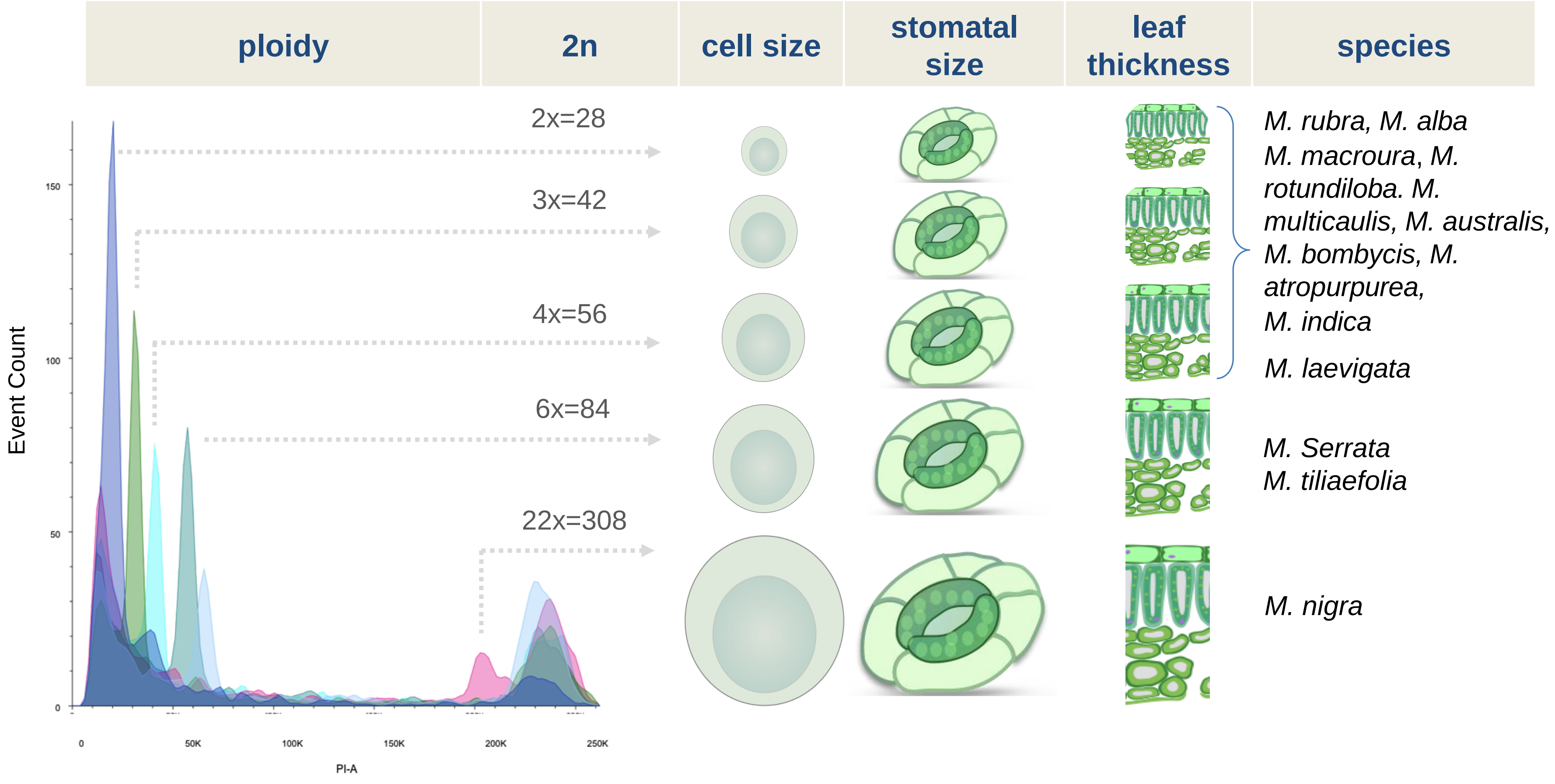
Ref: (2) DOI:10.1111/nph.18955

Softwires

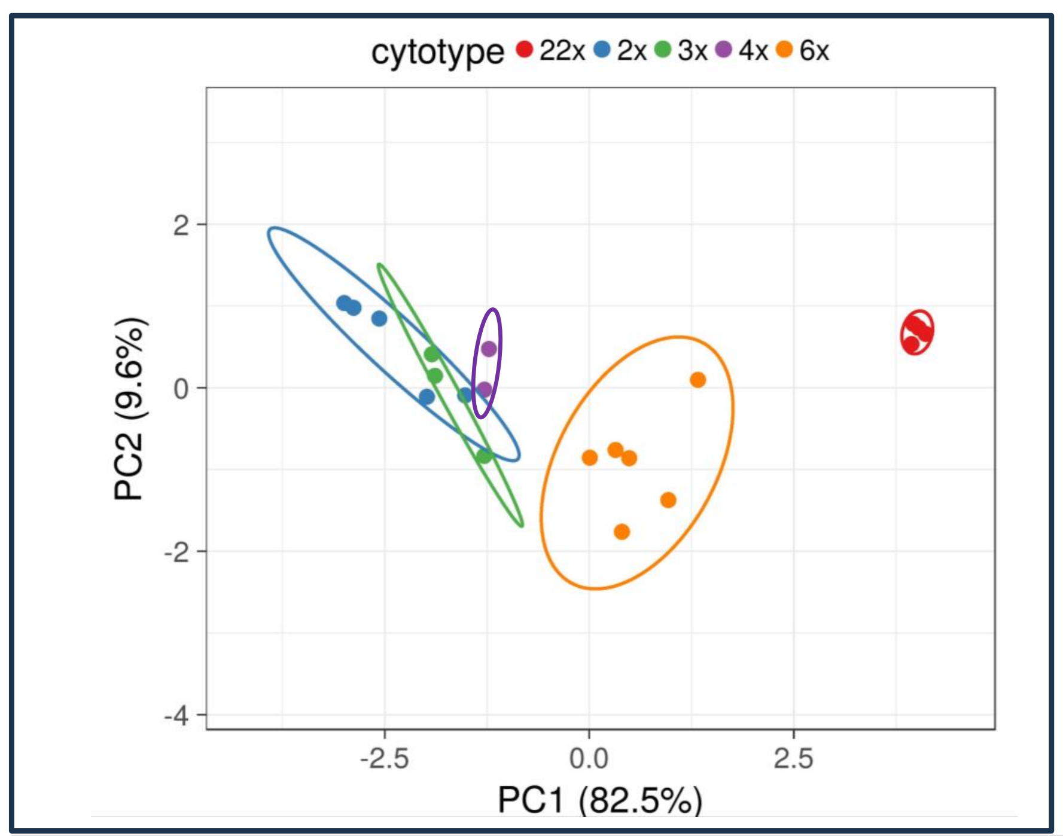
Cilika (Version 1.30), Medprime Technology Pvt. Ltd., image capture software; Keynote presentation software (Apple Inc. Version 10), and Floreada.io

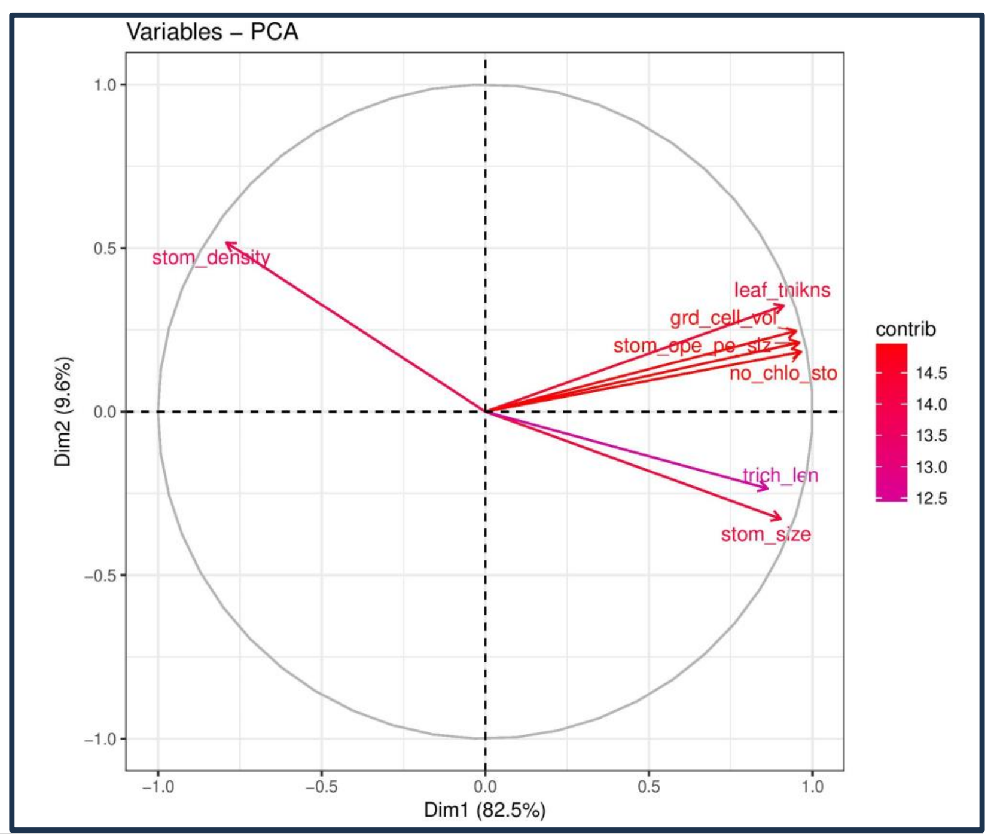
RESULTS & DISCUSSION

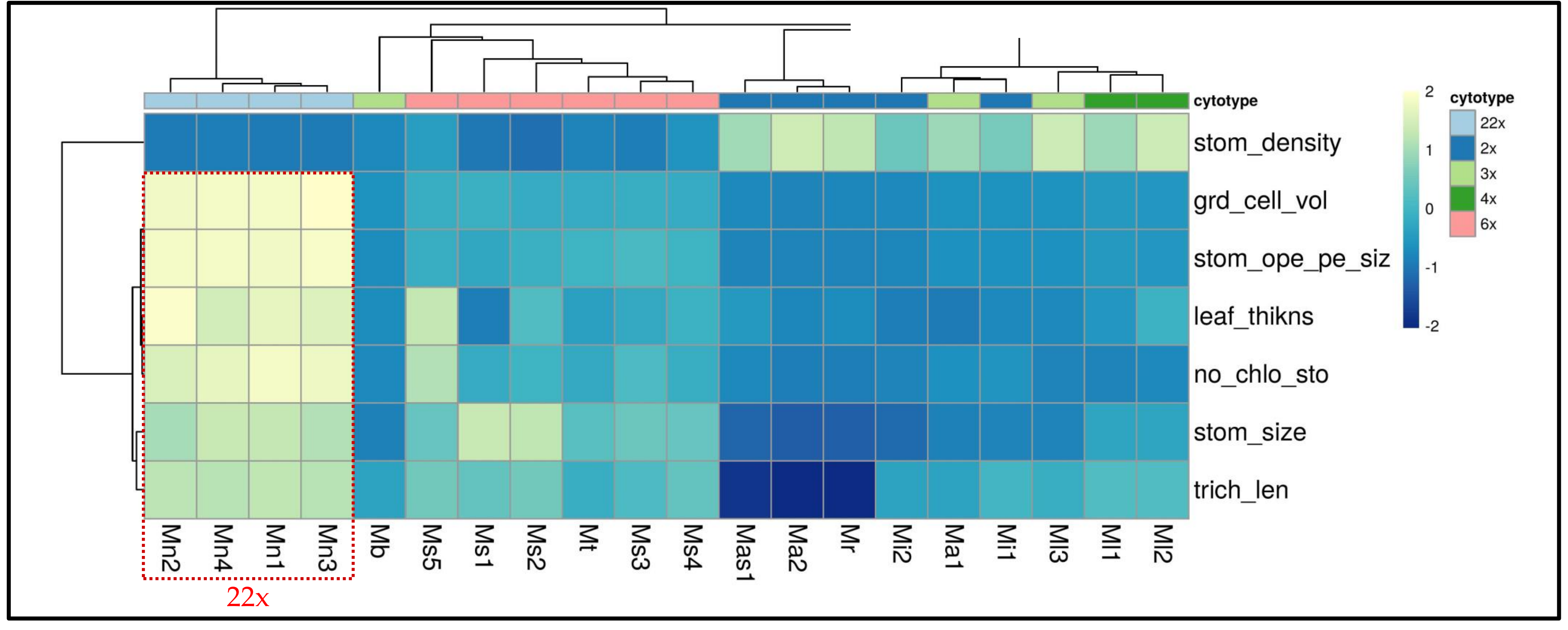
- Identified major cytotypes of *Morus* spp. are diploid (2n=2x=28), triploids (2n=3x=42), tetraploids (2n=4x=56), hexaploid (2n=6x=84), and decasoploid (2n=22x=308).
- Flow cytometry analysis was performed for the validation of chromosomal data.
- *Morus* species complex experienced significant polyplodization.



- Principal component analysis (PCA) and heatmap analysis suggests positive impact of increased genome size on leaf anatomical traits.







CONCLUSION

Increased genome size (GS) improves leaf anatomical traits, that may associated with increased tissue storage capacity (3) of mulberry polyploids.

FUTURE WORK

- Effect of increased GS on packaging and function of the tissue.
- Effect of increased GS on growth, behaviour, survivability.

REFERENCES

(1) Mondal et al., 2023. *Bio-protocol*, 13(17). 1-11.
(2) Šmarda et al., 2023. *New Phytologist*, 239(1), 399-414.
(3) Pacey et al., 2022. *Current Biology* 32, 18; 4057-4063.

RM, rmcrijaf@yahoo.in