

Genetic Diversity of Jackfruit in Asia

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Introduction

- ❖ Jackfruit (*Artocarpus heterophyllus*) is one of the biggest fruit structures in the world, ranging from 5 - 100 lbs or more!
- ❖ It is thought to originate in India (Bangladesh is a possible secondary center of diversity), but it is now found throughout tropical regions.
- ❖ Jackfruit is an important part of people's lives in many parts of Asia.
- ❖ Maintaining high levels of genetic diversity in crops is important so they can adapt to changing environments.

Objective: Determine genetic diversity & structure of Asian jackfruit. **Hypothesis:** Genetic diversity will vary across Asia, with India (center of origin) being most diverse.

Methods

1. Extract DNA via CTAB procedure from 44 leaf samples from Thailand and Malaysia.
2. Replicate the targeted DNA non-coding regions for 5 microsatellite primers¹ via PCR method.



3. Run the replicated DNA on a genetic analyzer (Beckman), which displays chromatograms of DNA fingerprints
4. Record alleles and assess genetic diversity of samples from current study and previous studies (samples from India, Bangladesh), using GenAlEx and Structure.

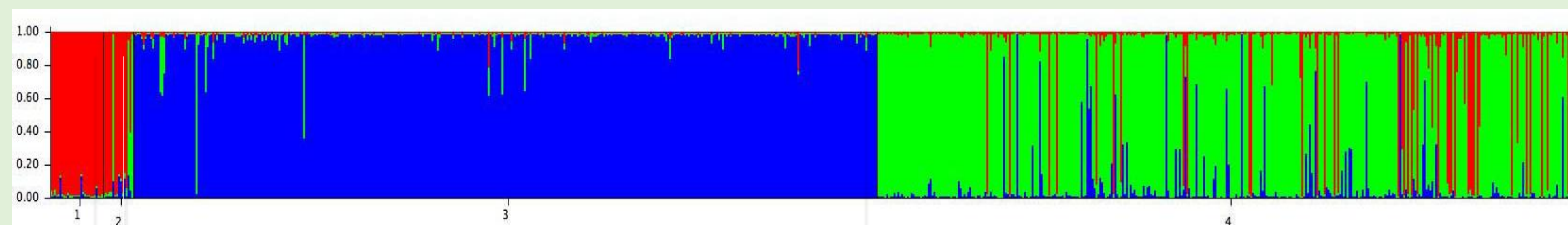


Figure 1. Genetic structure of jackfruit in Thailand (1), Malaysia (2), Bangladesh (3), and India (4) samples (K = 2)

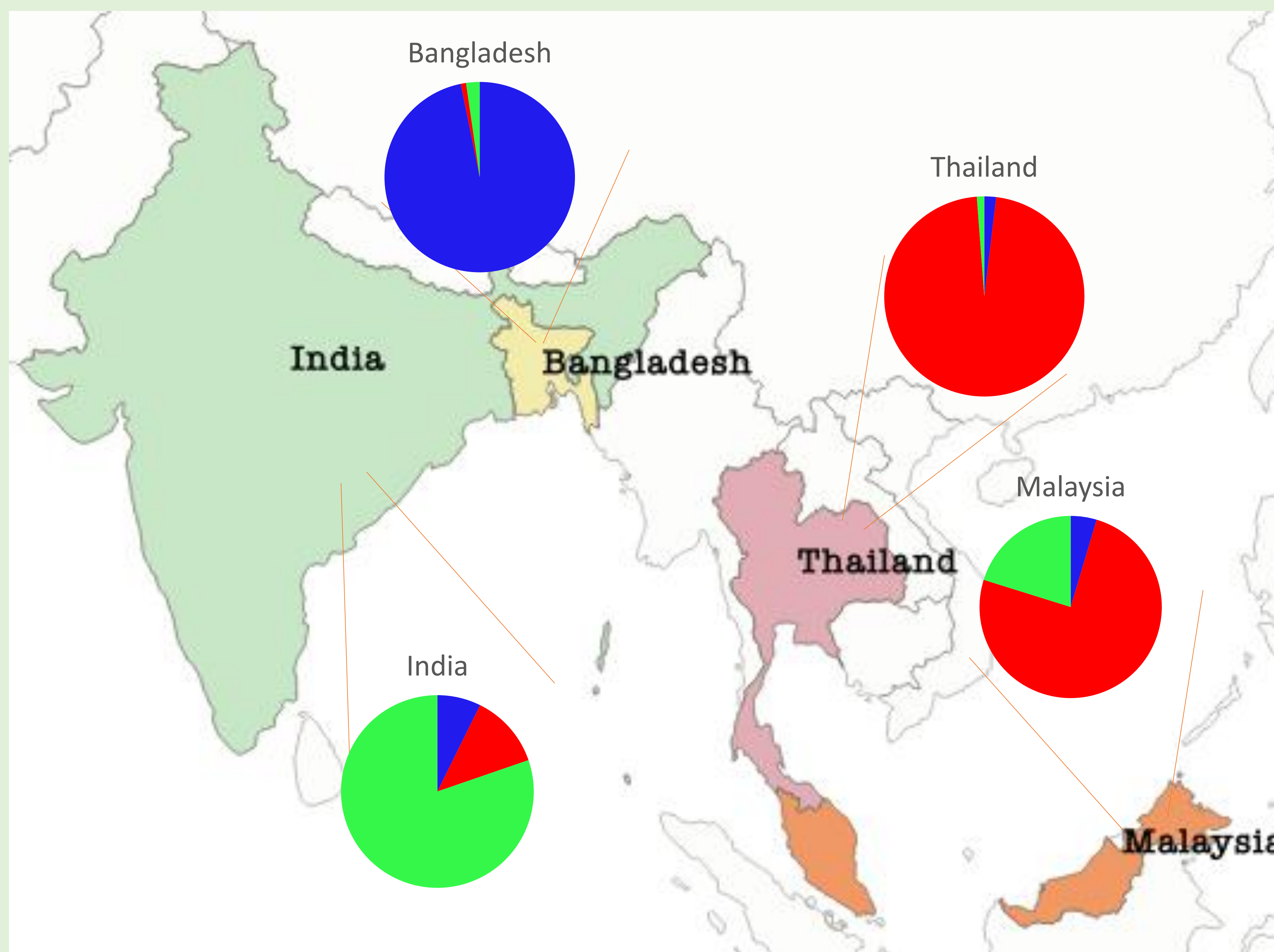


Figure 2. Geographic distribution of genetic structure of jackfruit in Thailand, Malaysia, India, and Bangladesh (K = 3)

Table 1. Genetic Diversity of Jackfruit

| Pop | N | Na | Ne | He | F |
|------------|-----|--------|-------|-------|--------|
| Thailand | 28 | 3 | 1.833 | 0.391 | 0.002 |
| Malaysia | 16 | 4.167 | 2.364 | 0.553 | -0.043 |
| Bangladesh | 394 | 7.833 | 1.632 | 0.342 | 0.132 |
| India | 373 | 15.167 | 2.902 | 0.603 | 0.139 |

Sample Size, N=Average No. Alleles, Na=Average No., Ne=Effective Alleles, He=Expected Heterozygosity, and F=Fixation Index

Discussion

When considering data from all four countries in the study, jackfruit from India has the greatest level of genetic diversity (Table 1). Thai and Malaysian jackfruit are largely genetically similar to one another, whereas Indian and Bangladeshi samples represent distinct diversity (Figures 1 & 2). Because India is thought to be the area of origin of jackfruit, it makes sense that India has the greatest amount of genetic diversity. Additionally, jackfruit is not native to Thailand and Malaysia, and the data suggest that jackfruit introduced into these countries may have originated from a subset of the diversity found in India.^{2,3} Bangladesh, however, is thought to be a possible secondary center of jackfruit diversity, which is supported by its distinct diversity (Figs. 1 & 2)^{2,3}. Future studies should assess jackfruit diversity more globally and use more equal sample sizes between regions. The results suggest that jackfruit diversity in Asia differs across countries and that both *in situ* and *ex situ* approaches should be employed to best conserve and utilize the diversity of this crop that is important in Asia and gaining significance worldwide.

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