IECE 2025 Conference

The 2nd International Electronic Conference on Entomology

19–21 May 2025 | Online

MDPI

Hybridization of Tephritid fruit flies: a cytogenetic study of *Bactrocera zonata* and *Bactrocera dorsalis* at lab condition

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INTRODUCTION & AIM

Genetic responses (fertility, survival rate, host preference etc.) are commonly studied in individual species but in case of hybridization (combination of two closely related species) genetic reconstruction is less studied. Because, it modifies the genetic structure of the individuals that affects the phenotypic stability depending on the genetic diversity of closely related species. Some cases it exposed strong heterotic characters or disrupted their developmental stabilities due to new interrogated and/or broken gene(s). To examine the process, we crossed *Bactrocera zonata* ♂ and *B. dorsalis* ♀ at 1:3 ratio and study their mitotic metaphase chromosomes following the air drying and C-banding techniques in CBR lab, IFRB, AERE, Dhaka.

- Karyotype study of the hybrid of *B. zonata and B. dorsalis*
- Comparative cytogenetic study of the hybrid and its parents at normal metaphase and C-banding level.
- To develop a phylogenic relationship among Tephritid fruit flies.

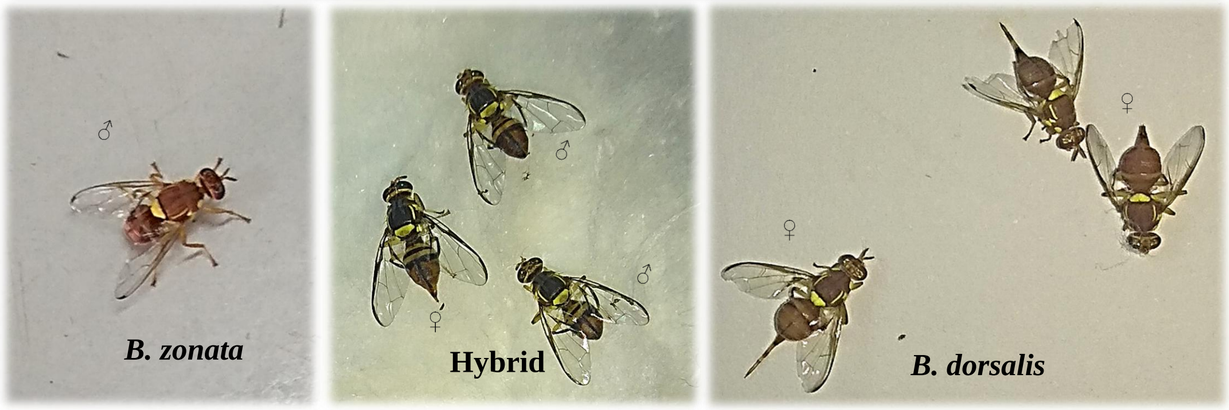
METHOD

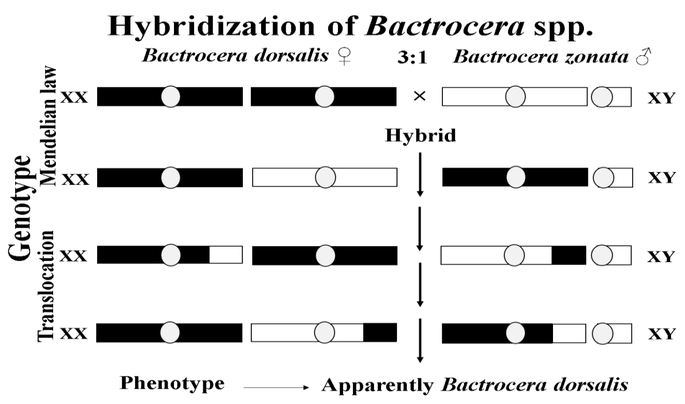
Mitotic metaphase chromosomes were isolated from 3rd instar larval neural ganglia and C-banded heterochromatin distribution were observed with modified procedure of Yesmin 2013 and Selivon and Perondini 1997.

RESULTS

1. Six pairs of chromosome; Autosome 5 pair (2-6), sex chromosome 1 pair; XX= female, XY= male
2. Chromosome 2 is the longest & 6 is the smallest in autosome
3. Pericentric heterochromatin accumulation located in autosomes
4. Chromosome 2 contains minimal & 6 composed of larger heterochromatin block
5. Long arm of X chromosome is almost heterochromatic &Y chromosome rounded and fully heterochromatic
6. Telomeric heterochromatin block located in short arms of X of *B. zonata* (parental father) but long arms of the hybrid and *B. dorsalis* (parental mother)
7. Male contains larger heterochromatin block than female
8. Morphology of autosomes of the hybrid is same as *B. zonata* but size almost same as *B. dorsalis*
9. Sex chromosomes of the hybrid are similar to *B. dorsalis*
10. Hybrid adult flies phenotypically show a combine characteristics of parents

Adult flies





Chromosome Morphology

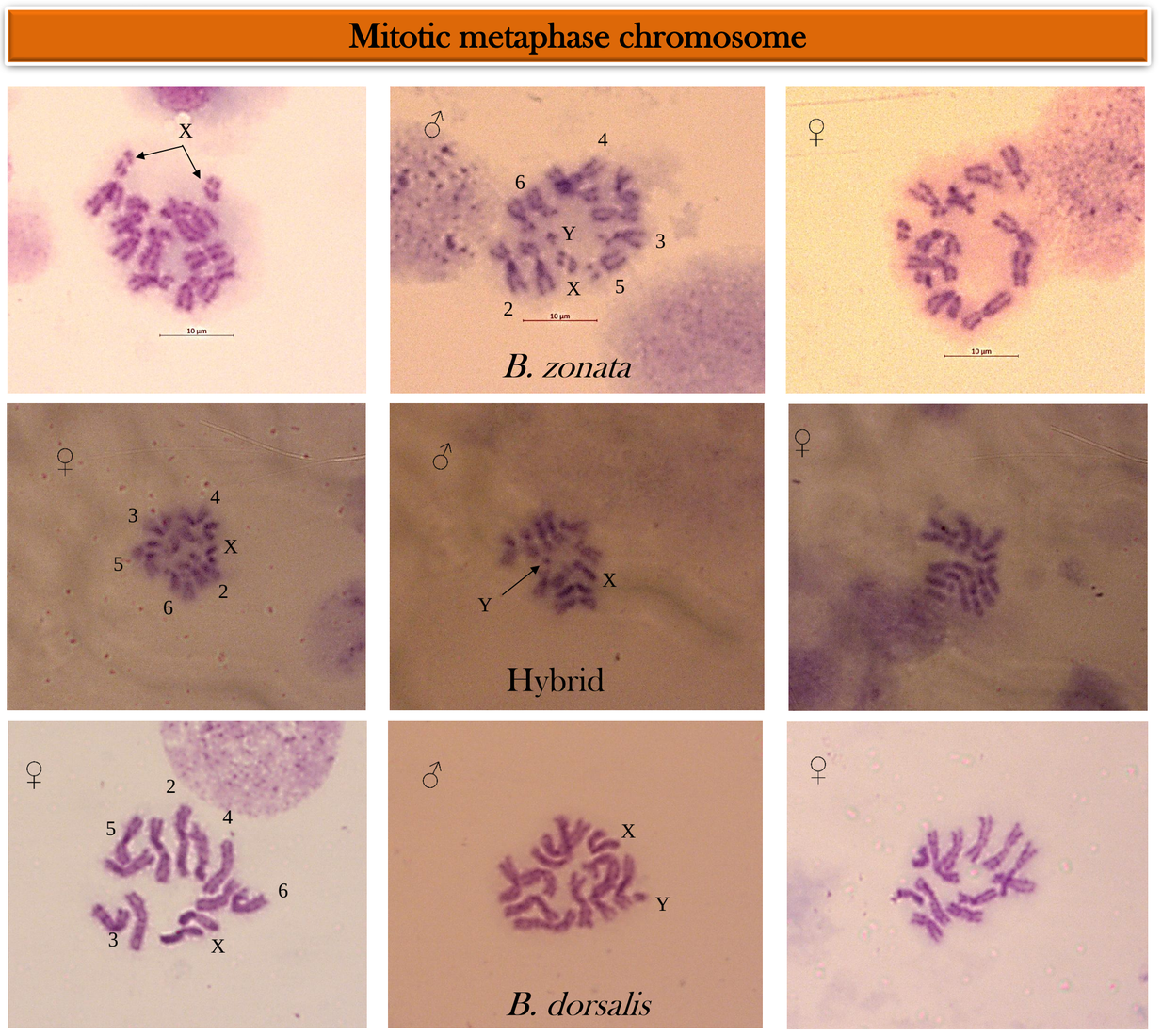
Chromosome no.	Autosome		
	B. zonata	Hybrid	*B. dorsalis*
2	sm	m	m
3	m	sm	sm
4	m	m	m
5	sm	sm	sm
6	sm	sm	Sm

X= m, Y= dot shape

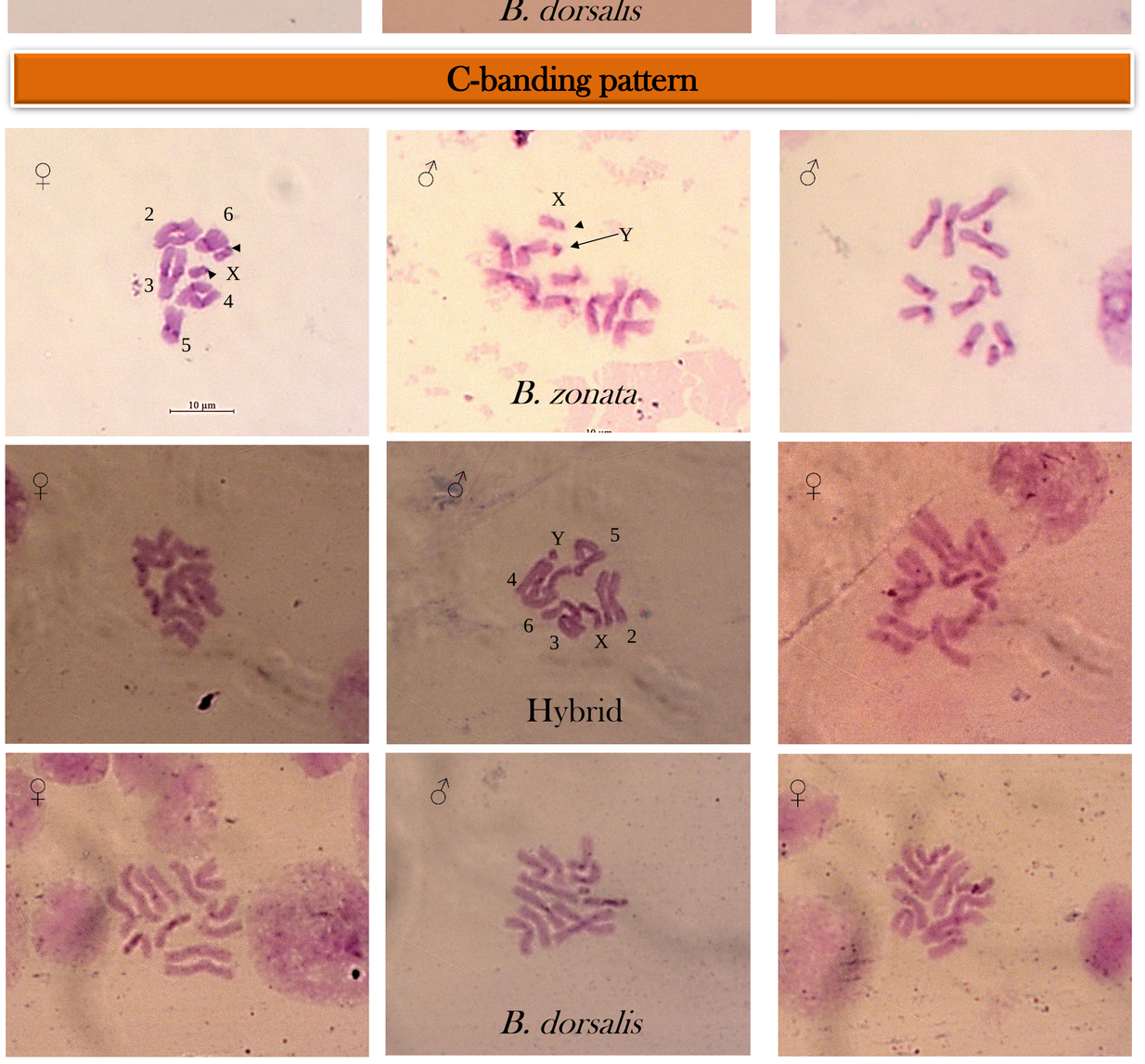
IMPLICATION OF HYBRIDIZATION

1. Induced behavioral and ecological changes that can negatively influence pest management strategy.
2. Possibility of altering sexual behavior and/or host plant use.
3. In some cases, it may disrupt the genetic entity of species resulting potential loss of biodiversity

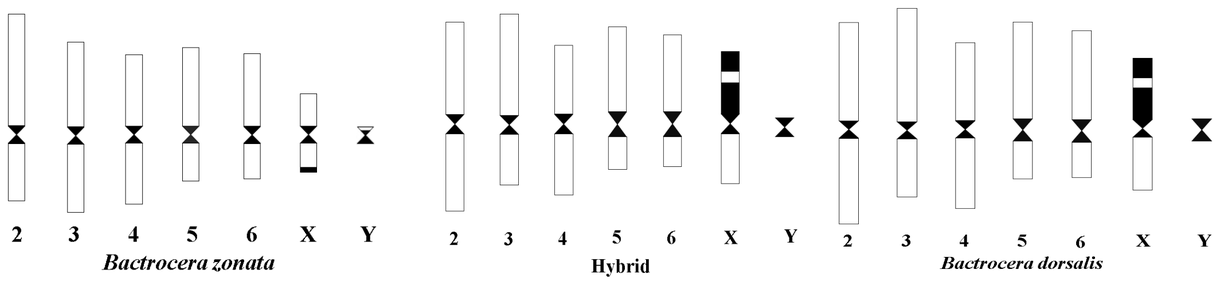
Mitotic metaphase chromosome



C-banding pattern



Ideograms of mitotic metaphase chromosome



CONCLUSION

Bactrocera zonata and *B. dorsalis* can potentially hybridize. Genetic material transmission has been occurred between them.