

# Comparative genomics of *Lactobacillus* species to identify indigenous probiotic strains



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## INTRODUCTION

Preterm births (PTB) account for approximately 13% of all births in India. One potential risk factor for PTB is the presence of specific bacterial communities or specific taxa in the vaginal milieu of pregnant women. Thus, in order to gain functional insights, different *Lactobacillus* species associated with birth outcomes were isolated and their whole genome sequences were decoded by shotgun sequencing.

## OBJECTIVE

To understand the genomic repertoires of different *Lactobacillus* species isolated from the vagina of pregnant Indian women for anti-inflammatory and antimicrobial properties.

## METHODS

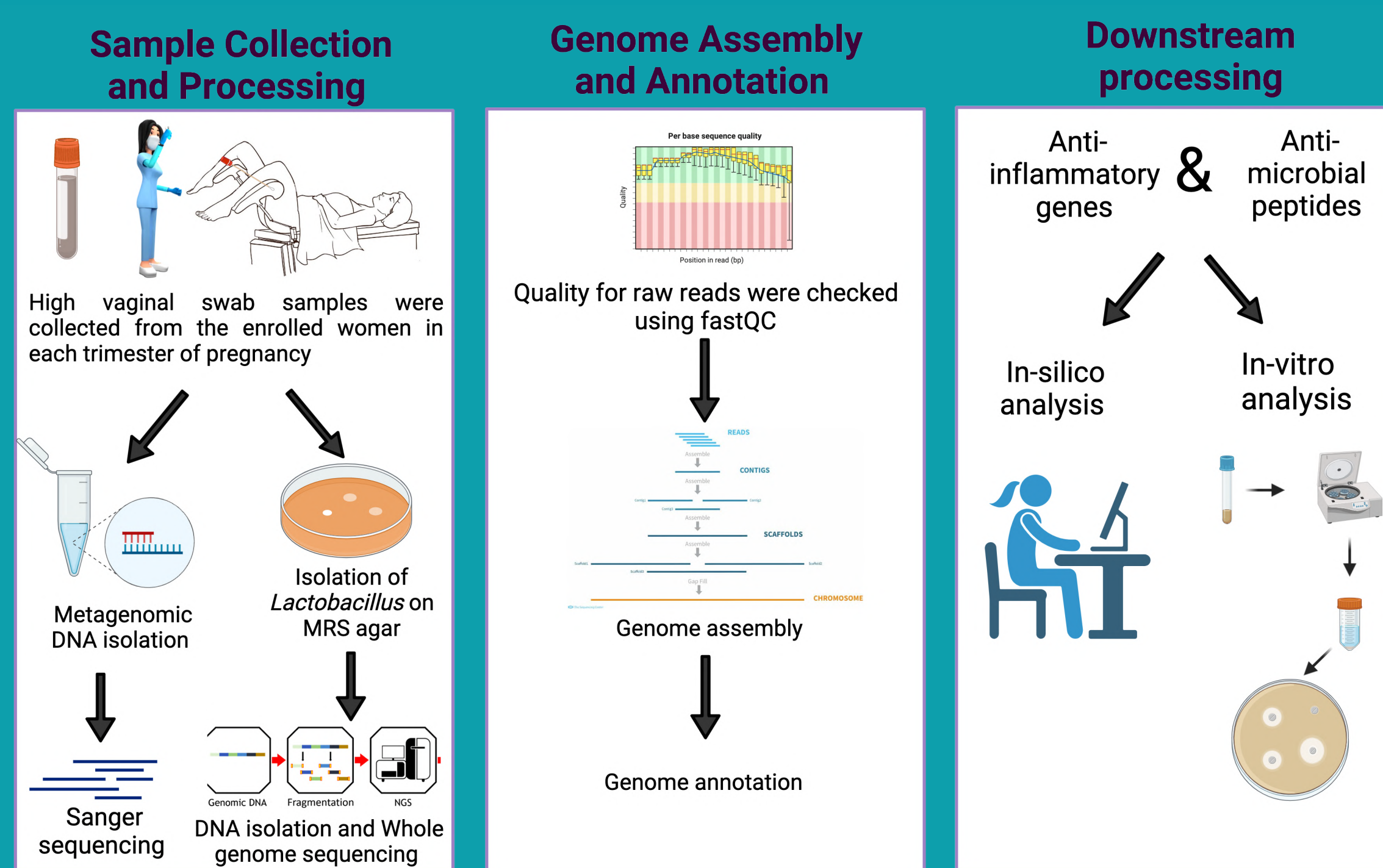


Fig 1:- Methodology followed during research

## CONCLUSION

Our findings indicate the beneficial role of *L. crispatus* in reducing vaginal infection and preventing preterm birth. Thus, it can be considered a potent candidate for oral or vaginal probiotic to reduce infection and dampen inflammation as a means to prevent preterm birth.

## RESULTS

- The pangenome-based analysis reveals that *Lactobacillus* species have several unique genes acquired through horizontal gene transfer.
- Analysis of the representative genomes of *L. crispatus*, *L. jensenii* and *L. vaginalis* indicate the presence of several secretory transcriptional regulators and several ribosomally (ripp-like) and non-ribosomally (NRPS) synthesized antimicrobial peptides.
- CRISPR-Cas having Type IIA cas9 genes were identified in the genome of *L. crispatus* and *L. jensenii*.
- Culture supernatant of *L. crispatus* inhibits the growth of opportunistic pathogens like *E. coli*.

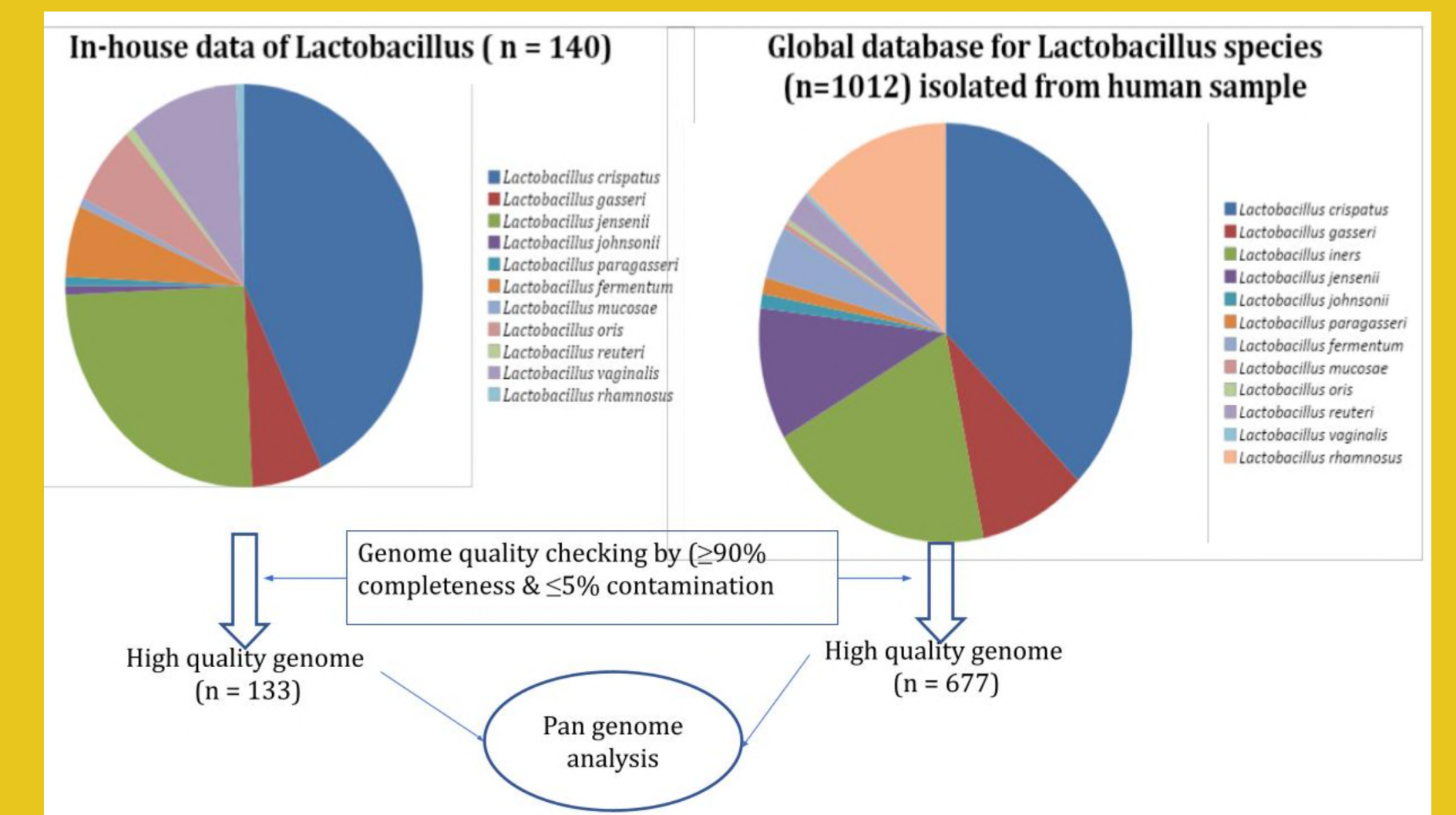


Fig 2:- *Lactobacillus* genome from in house data and from public available database

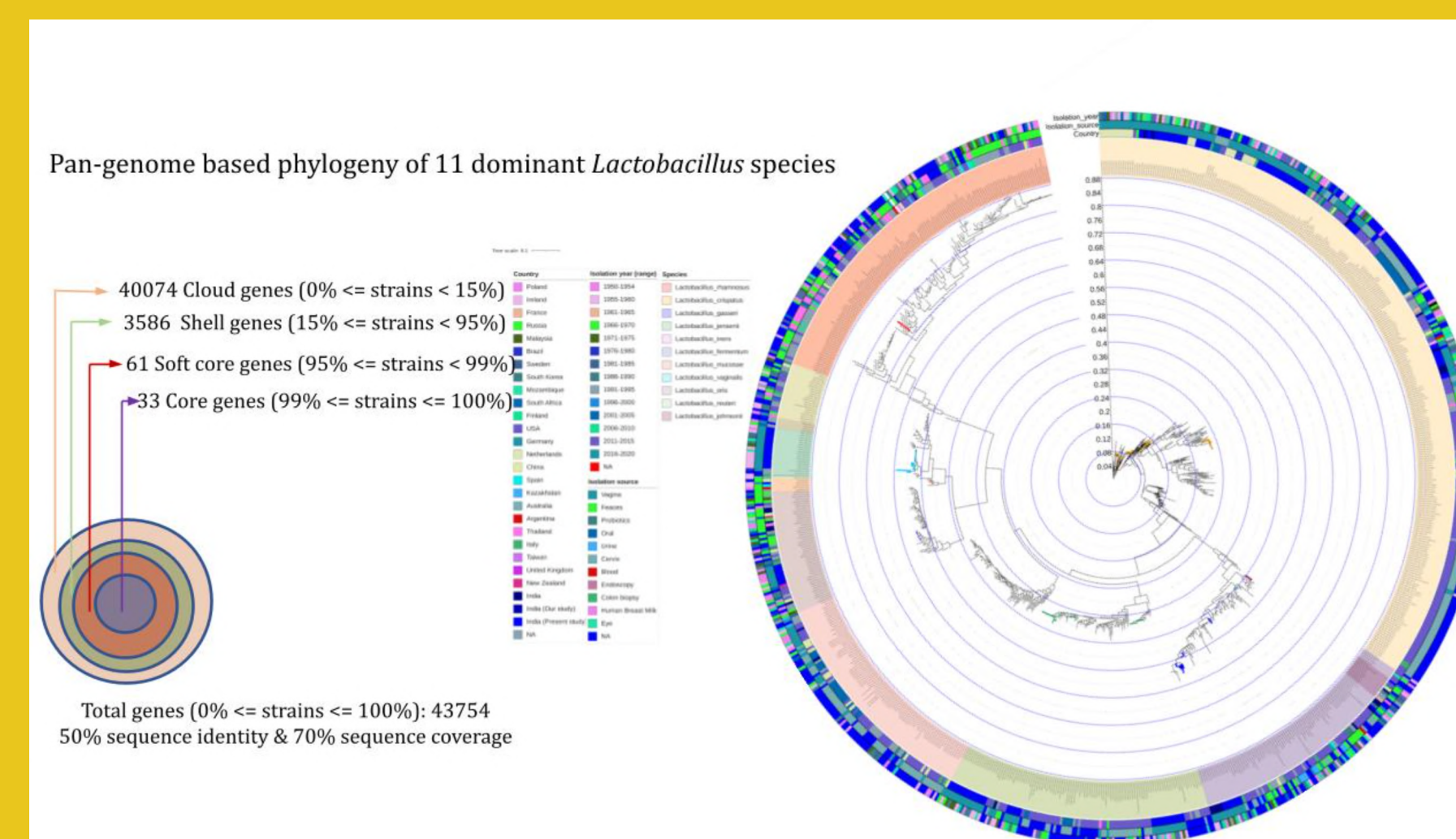


Fig 3:- Pan and core genome based phylogeny of 11 dominant *Lactobacillus* species (Database : Prokka and Roary)

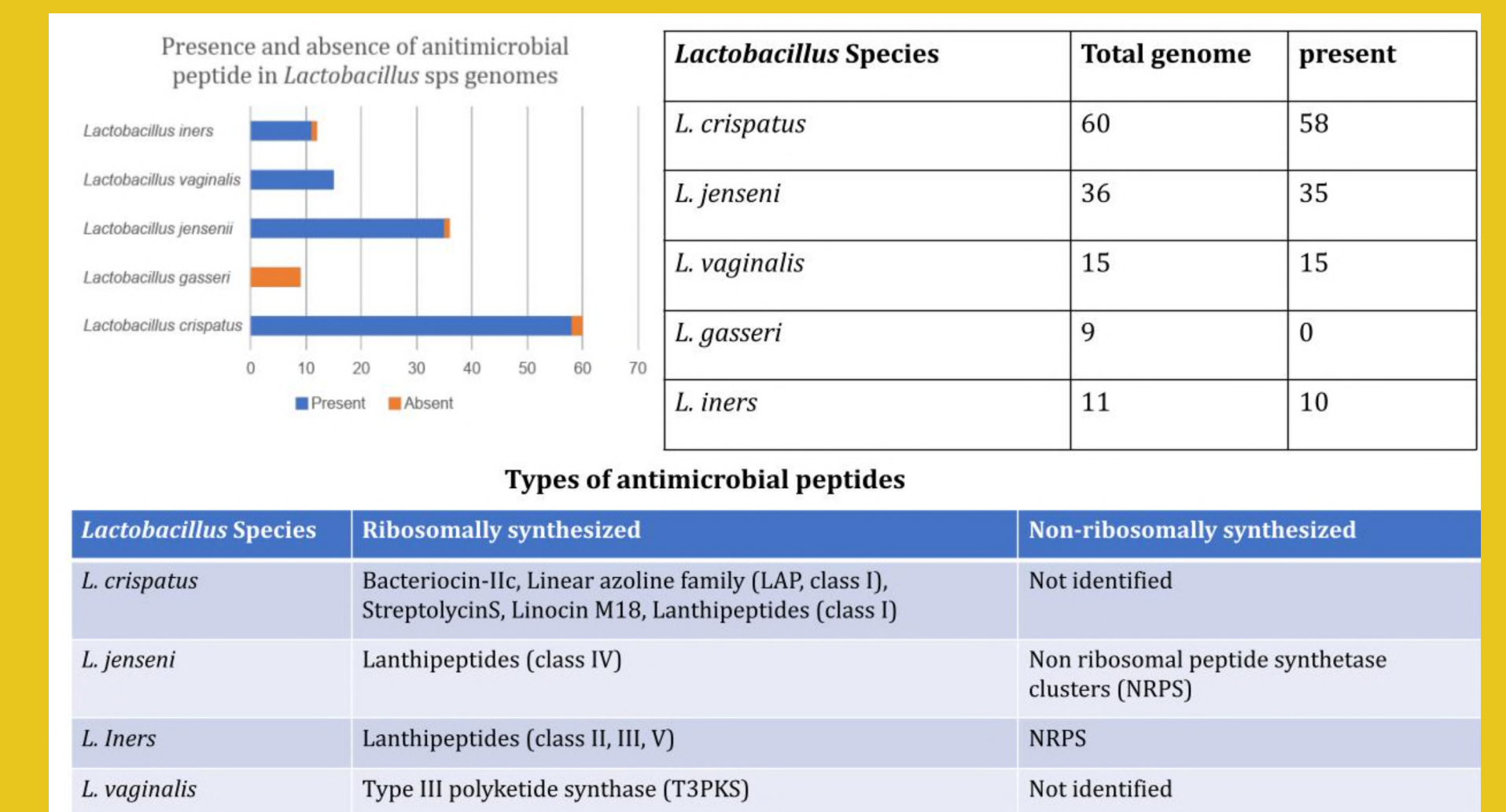


Fig 4:- Number of Antimicrobial peptides identified in different *Lactobacillus* spp (Database: Antismash V6)

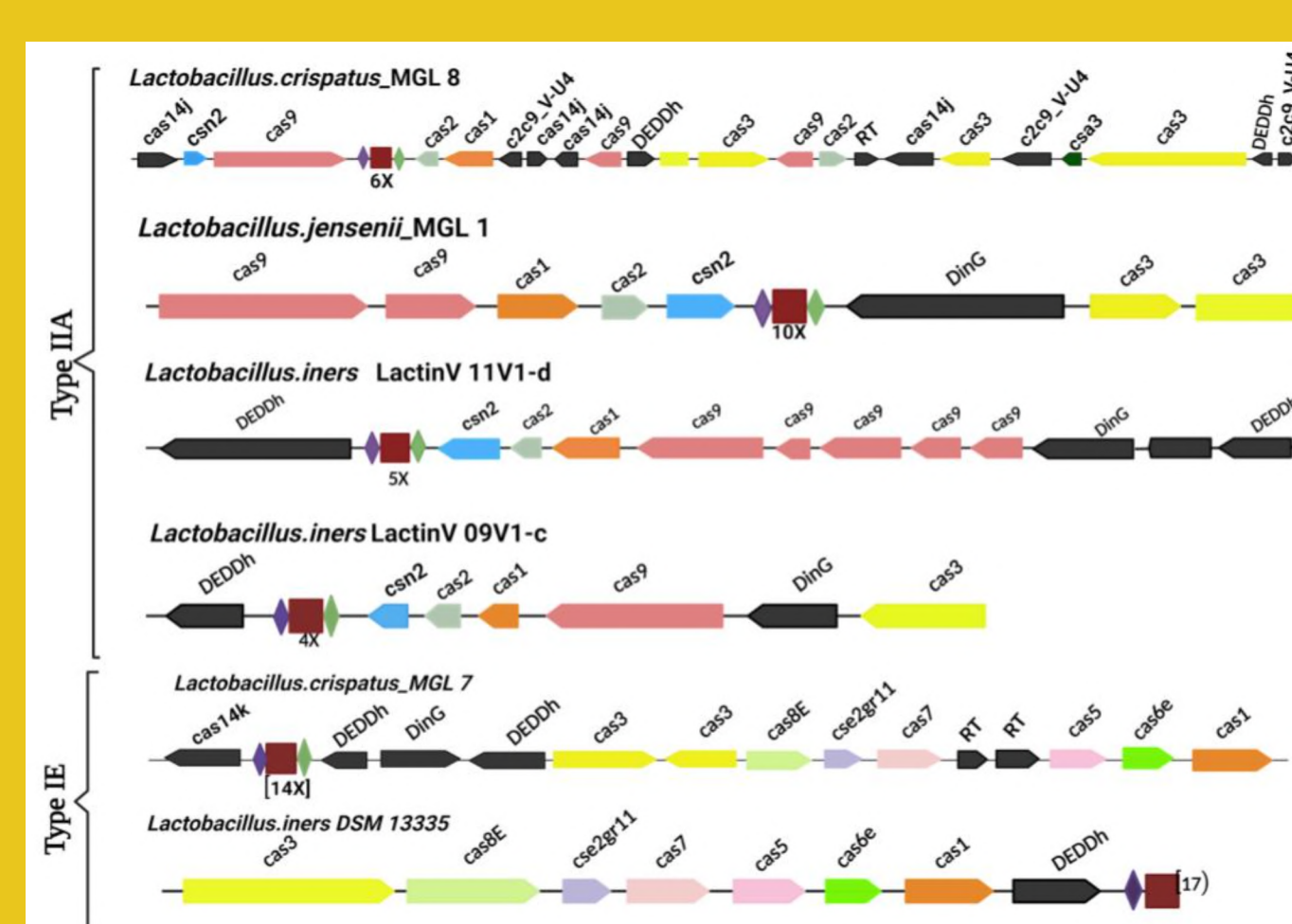


Fig 5:- Computational based screening of CRISPR/Cas system in *Lactobacillus* sp. (Database: CRISPR cas FINDER, CRISPRminer)

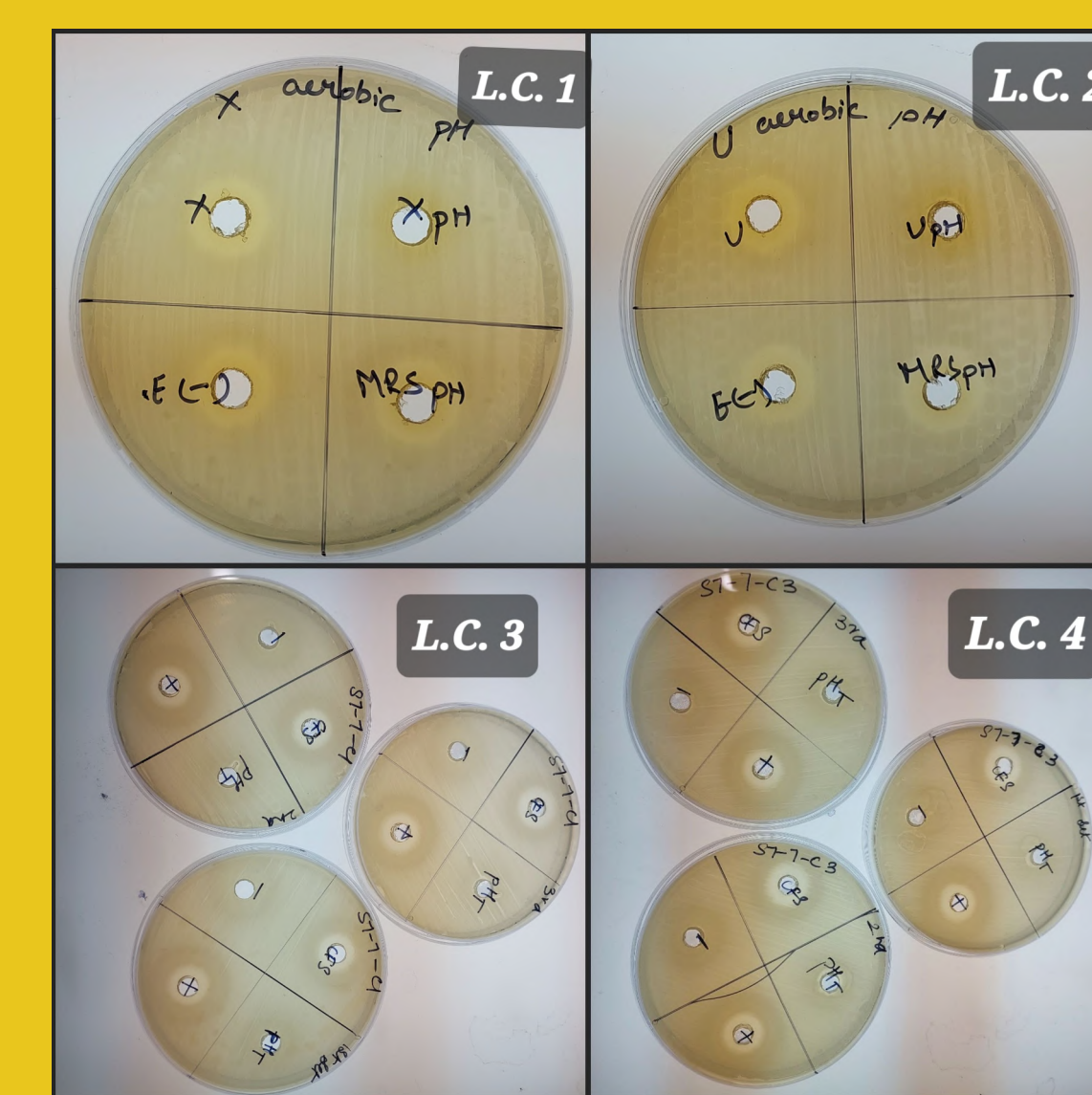


Fig 6:- Antimicrobial assay of cell free supernatant of different *Lactobacillus crispatus* isolates using well diffusion method against *E. coli*

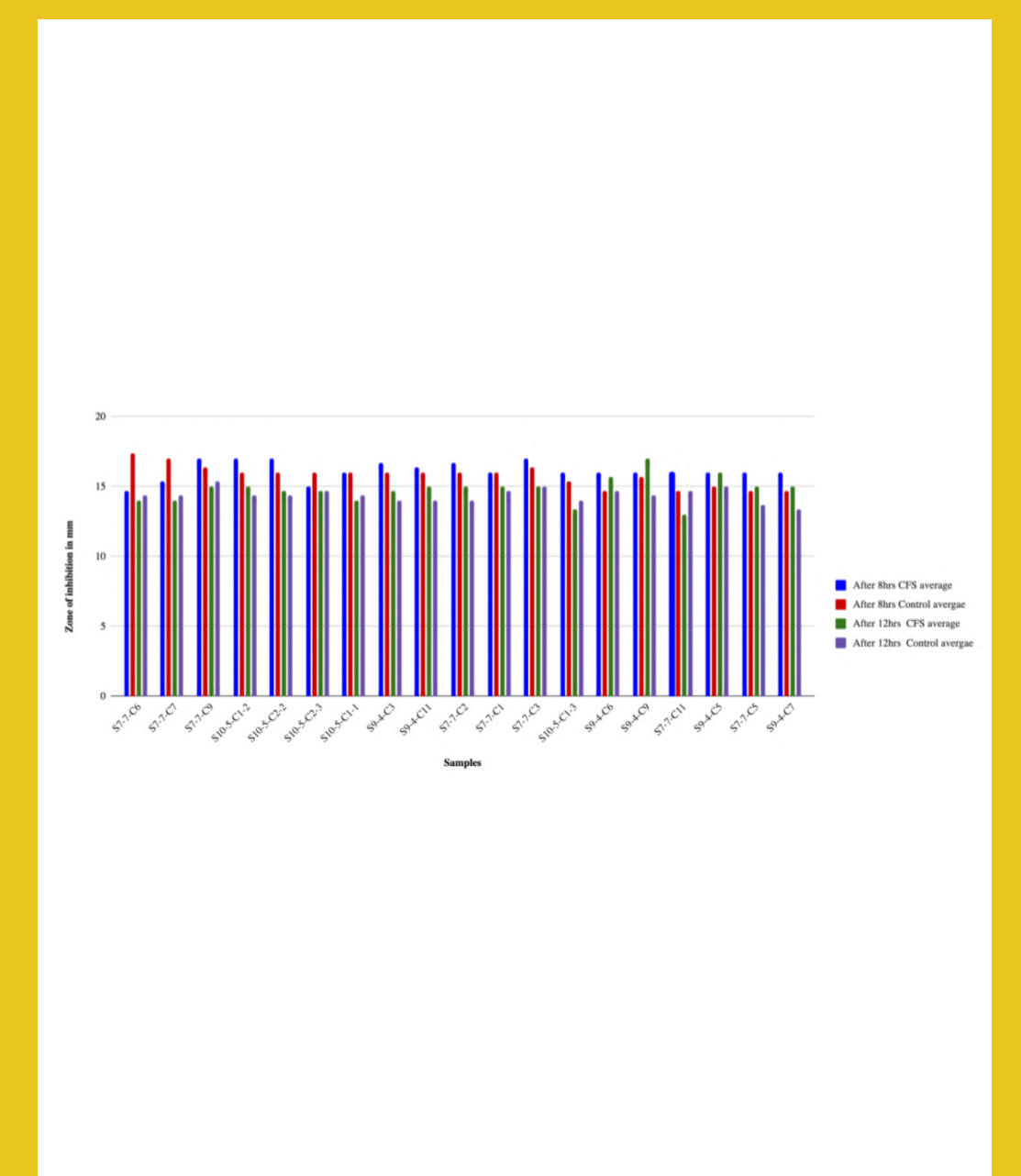


Fig 7:- Antimicrobial activity of cell free supernatant of *Lactobacillus crispatus* against *E. coli*.

## KEY-MESSAGE

The use of antibiotics to treat vaginal infections in pregnant women remains the method of choice, but it is still too often ineffective. Thus, *Lactobacillus* probiotic can be an alternative to maintaining healthy vaginal microbiome that can help control preterm birth.

## REFERENCE

Kumar S, Kumari N, Talukdar D, Kothidar A, Sarkar M, Mehta O, Kshetrapal P, Wadhwa N, Thiruvengadam R, Desiraju BK, Nair GB, Bhatnagar S, Mukherjee S, Das B and GARBH-Ini Study Group (2021) The Vaginal Microbial Signatures of Preterm Birth Delivery in Indian Women. *Front. Cell. Infect. Microbiol.* 11:622474. doi: 10.3389/fcimb.2021.622474

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