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List of Abbreviations

A/A	Acid/acid
AAB	acetic acid bacteria
A/Ag	Acid/acid,gas
AFB	American foulbrood
^{o}C	Celsius
CCD	Colony collapse disorder
CFS	Cell Free Supernatant
CFU	Colony forming unit
cm	centimeters
DEHP	Di-(2-ethylhexyl) phthalate
DNA	Deoxyribonucleic acid
EA	Ethyl acetate
FAO	Food and Agriculture Organization
EFB	European foulbrood
EMB	Eosin-methylene blue agar
FLAB	Fructophilic lactic acid bacteria
GC	Gas chromatography
GC/MS	Gas chromatography/ mass spectroscopy
hr	Hour
Kg	Kilogram
Km	Kilometer
LAB	Lactic acid bacteria
LD_{50}	Lethal dose

L.S.D	Least Significant Difference
MAC	MacConkey`s medium
MBC	Minimum Bactericidal concentration
MIC	Minimum inhibitory concentration
mg	milligram
min	Minute
MR	Methyl red test
MRS	de Man, Rogosa and Sharpe medium
MYPGP	Muller Hinton, yeast, phosphate, glucose & pyruvic acid medium
NCBI	National Center for Biotechnology Information
ND	Not Detected
OIE	Office International des Epizooties
ONPG	O- Nitrophenyl- β- D- galactopyranoside
OTCR	OTC-resistant
P	Probability
PAA	Phenyl Acetic Acid
PBS	Phosphate buffer saline
PCR	Polymerase chain reaction
PDA	Potato Dextrose Agar medium

pH	potential of hydrogen
ppm	part per million
rDNA	ribosomal DNA
rRNA	ribosomal Ribonucleic acid
rpm	Round per minute
SD	Standard deviation
SE	Standard Error
Sp	Species
TCA	trichloroisocyanuric acid
TcR	tetracycline- resistant
TSI	Triple Sugar Iron Agar
UV	Ultra violet
µl	microliter
µm	micrometer
VOC	Volatile organic compound
VP	Vogas- Poskauer test
w/v	Weight / volume
YGPSA	yeast, glucose, phosphate, starch agar medium

ABSTRACT

The current study was investigating the variation in microbial loads of honey bee gut of 5th instar larvae and adult foragers in addition to documented the effect and correlation of different variables; type of microorganism, blooming season, and apiary location on these microbial loads. Different bacterial and fungal isolates were isolated and purified from samples.

Antibacterial and antifungal activities of all isolated microflora were screened against two honey bee pathogens; *Paenibacillus larvae* and *Ascosphaera apis* (pathogens of American foulbrood and chalkbrood diseases, respectively). Identification of isolated bacteria and fungi was carried out, also distribution of antagonisms among isolated and identified microflora was summarized.

Two new bacterial strains were identified as most potent isolates against *Paenibacillus larvae* and *Ascosphaera apis* using 16S rDNA and Blast analysis; *Fructobacillus fructosus* HI-1 and *Lactobacillus plantarum* HI-2, respectively. Also, isolation and identification of active metabolites of ethyl acetate extract of *Fructobacillus fructosus* HI-1 and *Lactobacillus plantarum* HI-2 CFSs were conducted. In addition, MICs and MBCs of *Fructobacillus fructosus* HI-1 CFS and *Lactobacillus plantarum* HI-2 CFS were determined.

The therapeutic effect of *Fructobacillus fructosus* HI-1 and *Lactobacillus plantarum* HI-2 was revealed in laboratory on honey bee larvae artificially infected with *Paenibacillus larvae* and *Ascosphaera apis*, respectively.