



ANTIBIOTIC SUSCEPTIBILITY AND SURVIVABILITY IN ORAL ENVIRONMENT OF NEWLY ISOLATED LACTIC ACID BACTERIA STRAINS

NIKOLA ATANASOV¹, RAMIZE HOXHA¹, YANA EVSTATIEVA¹, DILYANA NIKOLOVA¹

¹ *Department of Biotechnology, Faculty of Biology, Sofia University St. Kliment Ohridski, Sofia, Bulgaria*
Corresponding author e-mail: [nikolana@uni-sofia.bg](mailto:nicolana@uni-sofia.bg)

LAB express beneficial properties to the consumer and are widely used as probiotic substances to promote human gastrointestinal and oral healthcare.

This study's aim is to evaluate the susceptibility of newly isolated LAB strains to several commonly tested antibiotic agents and the survivability of these strains under simulated conditions of the oral cavity.

Seven LAB strains were used, previously identified as one strain of *Leuconostoc mesenteroides* and six strains of *Lactobacillus plantarum*. The main objective is to determine the potential of use of these LAB strains as probiotics for oral health.

With the oral cavity being the entrance point of the gastrointestinal tract, the taken probiotic substances are initially presented to the saliva. During this first contact the survivability and stability of the bacterial strains is of primary importance. The oral stress test was held under 37°C in an electrolyte saline solution with added lysozyme as the model for the oral saliva. It was found that 6 strains manifest very good survivability under simulated conditions of oral stress. These results determine the potential of tested strains to show their useful properties in this environment.

From the results is clear that *Leuconostoc mesenteroides* KpB 2-4 is losing its viability in oral environment by 1 log and so the saliva appears to be unfavourable environment for its survivability. No suppression from the saliva solution on the cell concentration of the *Lactobacillus plantarum* strains is observed which means that the saliva is very favourable environment and is a prerequisite for their survivability and to manifest their useful properties in the oral cavity. (Figure 1)

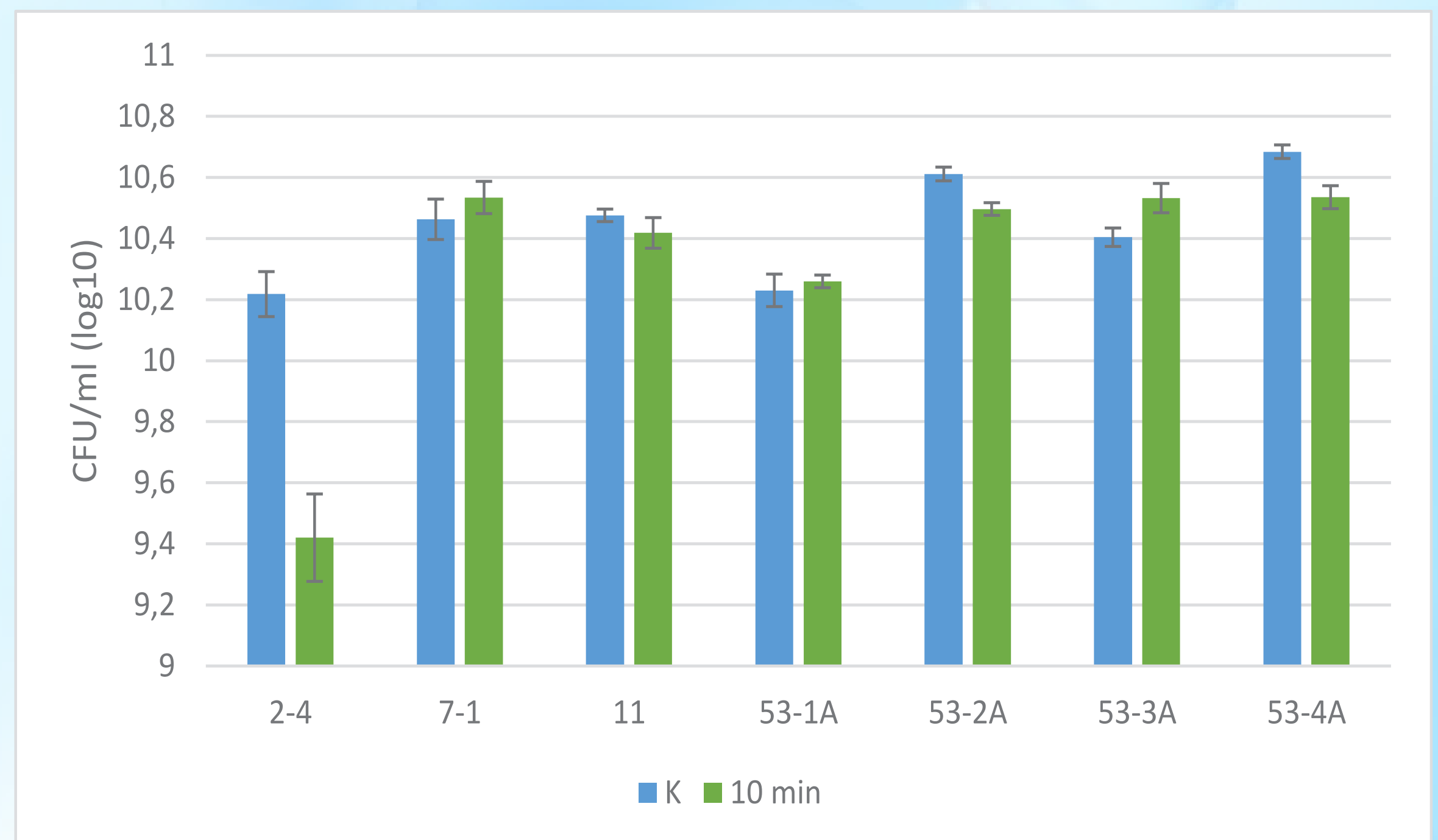


Figure 1. Oral stress of the tested strains.



Table 1. Used antibiotics and their effect over the tested strains.

Antibiotic	Concentration	KpB 2-4	KBB 7-1	KBB 11	KBB 53-1A	KBB 53-2A	KBB 53-3A	KBB 53-4A
Cloramphenicol (C)	30 mcg/disk	I	I	I	I	I	R	I
Clindamycin (CD)	2 mcg/disk	R	I	I	I	I	I	I
Gentamicin (GEN)	10 mcg/disk	R	R	R	R	R	R	R
Tetracycline (TE)	30 mcg/disk	I	I	I	I	I	I	I
Streptomycin (S)	10 mcg/disk	R	R	R	R	R	R	R
Kanamycin (K)	30 mcg/disk	R	R	R	R	R	R	R
Ampicillin (AMP)	10 mcg/disk	I	I	I	I	I	I	I
Vancomycin (VA)	5 mcg/disk	R	R	R	R	R	R	R
Nystatin (NS)	50 mcg/disk	R	R	R	R	R	R	R
Trimethoprim (TR)	5 mcg/disk	R	S	S	I	S	S	S

Legend: R - resistant; I - intermediate (7-16 mm zone); S - susceptible (>16 mm zone)

The evaluation of the antibiotic susceptibility is important for LAB with probiotic potential for selecting strains to be used as regulators of the gastrointestinal microbiota. Ten test antibiotics from three main groups Inhibitors of cell wall synthesis, Protein synthesis inhibitors, and Inhibitors of DNA synthesis were used. Resistance to a wider range of antibiotics has been established in some of the studied strains identified as *Lactobacillus planatarum*, which is a prerequisite for further study for establishment of the genetic determinants.

The results show that all tested strains are resistant to the antibiotics Gentamicin, Streptomycin, Kanamycin, Vancomycin, and Nystatin, even though they are all natural isolates. As most shown resistance to the selection of antibiotics is *Leuconostoc mesenteroides* KpB 2-4 (Table 1, Figure 2).

Acknowledgement: This work was supported by the Bulgarian Ministry of Education and Science under the National Research Programme "Healthy Foods for a Strong Bio-Economy and Quality of Life" approved by DCM # 577 /17.08.2018"

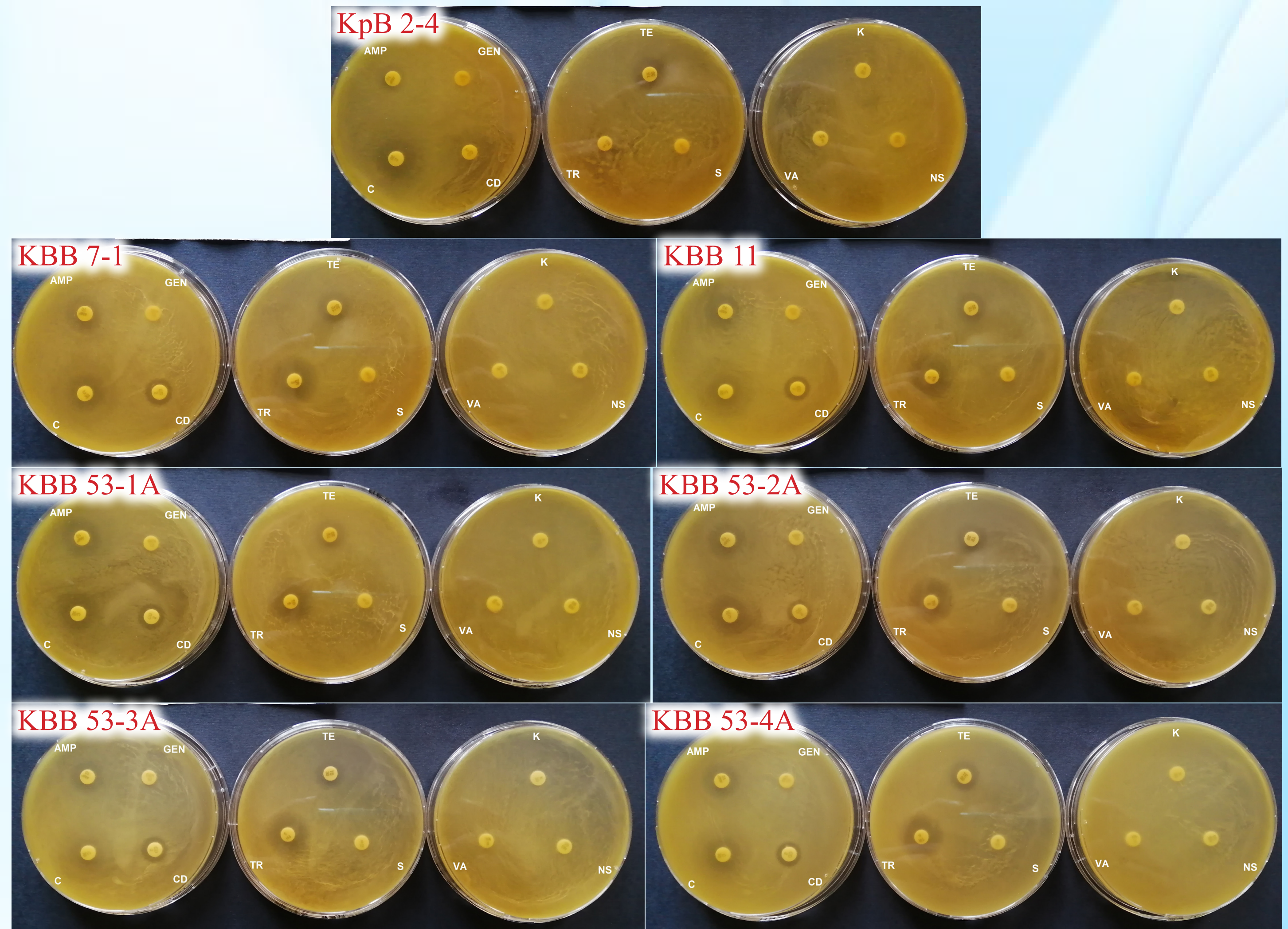


Figure 2. Antibiotic susceptibility of the tested strains.