LABORATORY STUDY CONCERNING THE SENSIBILITY OF *BRADYRHIZOBIUM* AND *RHIZOBIUM* SPECIES FOR EDAFIC ACTINOMYCETES

STUDIU DE LABORATOR PRIVIND SENSIBILITATEA UNOR SPECII DE *BRADYRHIZOBIUM* ŞI *RHIZOBIUM* LA ANTIBIOTICE PRODUSE DE ACTINOMICETE EDAFICE

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***Abstract**: We have to know the competitive capacity of the Bradyrhizobium and Rhizobium strains, which are going to be used in the leguminous seed inoculations. This study consisted of the testing of four strains of Bradyrhizobium lupini and Rhizobium leguminosarum cicer variety, under the action of four antibiotics produced by edaphic actinomycetes. The method applied was the method of rounds imbued with antibiotic. The results achieved proved the general sensibility of these strains to kanamycin, while in the other cases their sensibility ranges from one strain to another.*

***Rezumat:** Capacitatea competitivă a tulpinilor de Bradyrhizobium şi Rhizobium care vor fi utilizate in inoculările semințelor de leguminoase trebuie să fie cunoscută. Prezentul studiu a constat în testarea a patru tulpini de Bradyrhizobium lupini şi Rhizobium leguminosarum var. cicer la acțiunea a 4 antibiotice produse de actinomicete edafice. Metoda de testare utilizată a fost metoda rondelelor impregnate cu antibiotic. Rezultatele obținute au arătat sensibilitatea generală a tulpinilor față de kanamicină în timp ce pentru restul antibioticelor mărimea sensibilității variază de la tulpină la tulpină*

***Key world:** symbiotic nitrogen inoculants, antibiotics sensibility, edaphic actinomycetes*
***Cuvinte cheie:** inoculanți simbiotici de azot, sensibilitate la antibiotice, actinomicete edafice*

INTRODUCTION

The symbiotic nitrogen inoculants are edaphic bacteria which provide the necessary nitrogen to leguminous species, for the processes of vegetal protein biosynthesis. Beside their high capacity of fixing the nitrogen in various symbiotic strains, they must also prove a high competition capacity within the microbial antagonism (HERA C, 1984). It is well known that the edaphic actinomycetes are great producers of antibiotic substances and this makes them very advantageous within the soil microbiota (PAUL E. A.1989) . The tests upon the strains of *Rhizobium* and *Bradyrhizobium* represent a necessity for strain characterization from this point of view (GHINEA L., 2002).

MATERIAL AND METHOD

The species taken into study were *Rhizobium leguminosarum* var *cicer*, with the following strains NT 1, NT 3, NT 7, NT9 and *Bradyrhizobium lupini* with the strains LP 53, LP 73, LP 78, and LP 83, taken from the Laboratory for Soil Biology, National Institute for Research-Development in Agriculture Fundulea. The „in vitro" tests aimed at the establishing of the sensibility to antibiotics produced by edaphic actinomycetes, respectively to: tetracycline – (T) produced by *Streptomyces rimosus*, chloramphenicol – (C) *Str. venezulae*, erythromycin - (E) *Str. erythreus* and kanamycin – (K) produced by *Str. kanamyceticus*. We have applied the method of rounds with cultivation on YMA and the „turf" inoculation technique (ZARNEA GH., 1996). After 20-24 hours of incubation at 23-25^{0}C, we have read the results. This reading

consisted of measurements of the diameters of the bacterial-inhibition area, with the help of a rule.

RESULTS AND DISCUSSION

The reaction to antibiotics of the strains of *Rhizobium leguminosarum* var *cicer* and *Bradyrhizobium* may be observed in figure 1 and 2, so we may remark a high sensibility of these strains to kanamycin. In this case, we have determined the highest values of the inhibition area.

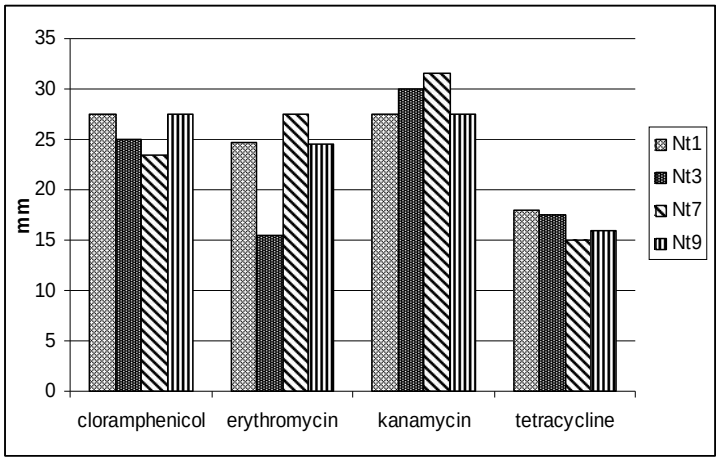

Figure 1. The sensibility to antibiotics of the *Rhizobium leguminosarum cicer* strains

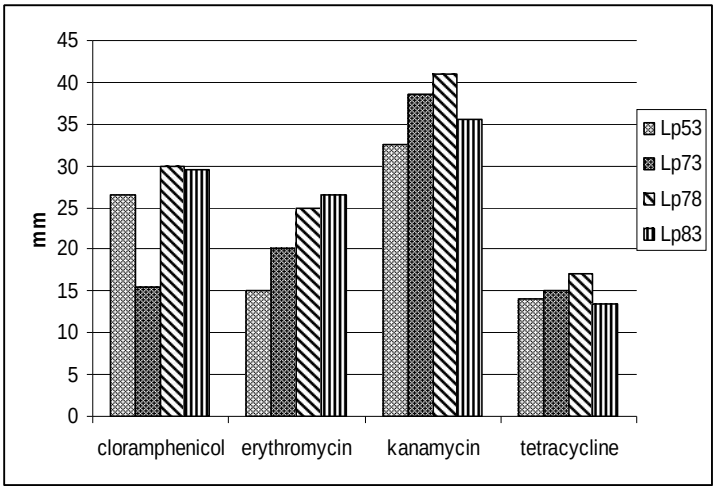

Figure 2. The sensibility to antibiotics of the *Bradyrhizobium lupini* strains

The highest sensibility may be noticed at Lp 78 with 41 mm, while the inhibition area is a bit lower at Nt7, namely 32.5 mm. Another general conclusion may be drawn in the case of reaction to tetracycline, where both strains prove the lowest resistance, with values ranging between 15-17 mm. About erythromycin, the strain Nt 3 proves to be more resistant compared to the other strains. The strain Lp 83 has a higher resistance to tetracycline than the other strains tested.

Comparatively with the experience average the Lp 73 and Lp78 strains have a sensibility superior significant at 5% level to kanamycin (see table 1.). The strain Lp53 does not have sensibility to any antibiotics.

Table 1

The signification of the results obtained for *Bradyrhizobium lupini* strains

Strains	antibiotic	Diameter of area (mm)	%	Differences	Signification
control	average	**24.68**	100	0	
LP53	C	26.5	107.37	1.82	-
	E	15	60.77	-9.68	0
	K	32.5	131.68	7.82	-
	T	14	56.72	-10.68	0
LP73	C	15.5	62.80	-9.18	-
	E	20	81.03	-4.68	-
	K	38.5	155.99	13.82	**
	T	15	60.77	-9.68	0
LP78	C	30	121.55	5.32	-
	E	25	101.29	0.32	-
	K	41	166.12	16.32	***
	T	17	68.88	-7.68	-
LP83	C	29.5	119.53	4.82	-
	E	26.5	107.37	1.82	-
	K	35.5	143.84	10.82	*
	T	13.5	54.70	-11.18	0

$DL_{5\%}$=9.52 $DL_{1\%}$=12.32 $DL_{0.1\%}$=16.3

From the data's table 2 we remarked that the all strains studied don’ts not present sensibility to any antibiotics in comparative with the experience's average.

Table 2

The signification of the results obtained for variety *Rhizobium leguminosarum cicer* strains

Strains	antibiotic	Diameter of area (mm)	%	Differences	Signification
control	average	**23.72**	100	0	
NT1	C	27.5	115.93	3.78	-
	E	24.56	103.54	0.84	-
	K	27.5	115.93	3.78	-
	T	18	75.88	-5.72	-
NT3	C	25	105.39	1.28	-
	E	15.5	65.34	-8.22	-
	K	30.66	129.25	6.94	-
	T	17.5	73.77	-6.22	-
NT7	C	23.5	99.07	-0.22	-
	E	27.5	115.93	3.78	-
	K	31.5	132.79	7.78	-
	T	15	63.23	-8.72	-
NT9	C	27.5	115.93	3.78	-
	E	24.5	103.28	0.78	-
	K	27.5	115.93	3.78	-
	T	16	67.45	-7.72	-

$DL_{5\%}$=9.12 $DL_{1\%}$=12.29 $DL_{0.1\%=}$16.32

CONCLUSIONS

- The strains of *Bradyrhizobium lupini* proved more sensible, compared to the strains of *Rhizobium leguminosarum cicer*, to the action exerted by antibiotics, meaning a more reduced capacity of surviving within soil, because of the microbial antagonism.
- The *Rhizobium leguminosarum cicer* strains show a similar sensibility to erythromycin and chloramphenicol, however we may remark the strain Nt3 with a lower sensibility compared to the other strains tested.
- The highest sensibility of the symbiotic inoculants may be remarked in the case of kanamycin, proving a reduced competition capacity compared to *Streptomyces kanamyceticus*.

LITERATURE

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