



EVALUATION OF A BIOFERTILIZER FORMULATED WITH THE EFFLUENT FROM THE ANAEROBIC DIGESTION OF COW MANURE IN OAT PLANTS (*Avena sativa*).

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Key words: Biofertilizer, *Azospirillum brasilense*, digestate.

Introduction. Anaerobic digestion is a process which carried out the degradation of residual biomass at axenic conditions. This process is able to produce biogas and a liquid residue called digestate. The digestate is a mixture of partially degraded organic material whose properties may be utilized for the cultivation of microorganisms of agricultural interest and generate biofertilizers [1]. The growing of agricultural interest microorganisms at micro and macro level is based on media containing the necessary elements for the development of the metabolic functions of bacteria [2]. Some common bacteria for the preparation of biofertilizer are plant growth promoting rhizobacteria (PGPR), because they exert beneficial effects on plant growth. *Azospirillum brasilense*, one PGPR extensively studied, is commonly propagated in NFb medium, the main effect of this bacteria is the plant's root development and consequently the increase in the absorption rate of water and nutrients in addition to N₂ fixation.

In this study the effect of the biofertilizer obtained from the propagation of *Azospirillum brasilense* in the digestate, was evaluated in oat plants (*Avena sativa*).

Methods. Oat (*Avena sativa*) disinfected seeds were previously inoculated [3], with *A. brasilense* (UFC 10⁶) [2, 4] over a comercial media NFb and a media formulated from the digestate generated from cow manure. As controls were used non inoculated media and water. Five seeds were planted in sterile soil per pot. The oat root growth was measured with respect to the dry weight of the root. Statistical analysis of experimental data was performed by ANNOVA by Tukey test (P <0.05), using a normal distribution.

Results. It is observed that the seeds inoculated with *Azospirillum* + NFb had the highest dry weight level. The biofertilizer developed with *Azospirillum* + effluent had a minor effect than the *Azospirillum* + NFb, however *Azospirillum* + effluent show higher values compared to the control. Non inoculated media show lower growth levels than control.

Table 1. Root dry weight of oat plants (*Avena sativa*).

Tratamientos	Media (g)
<i>Azospirillum</i> + NFb	0.10 ^a ± 0.04
<i>Azospirillum</i> + Efluente	0.09 ^{ab} ± 0.03
Control	0.08 ^{bc} ± 0.02
NFb	0.07 ^{bc} ± 0.03
Efluente	0.06 ^c ± 0.02

Average of n=33. Equal letters represent no significant statistical difference. Tukey test (P<0.05).

The presence of *Azospirillum brasilense* generates a statistically significant increase in the dry weight of the seedlings from oat (*Avena sativa*).

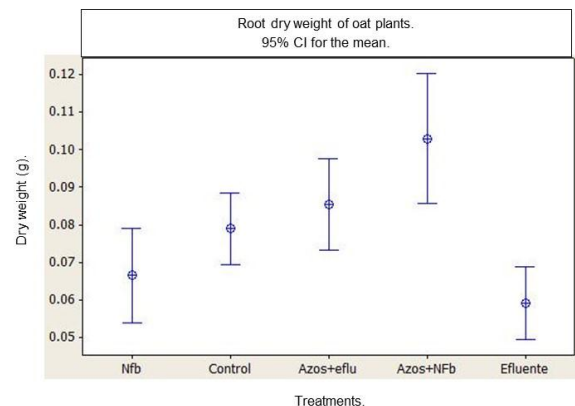


Figure 1. Root dry weight of oat plants (*Avena sativa*).

Conclusions.

The biofertilizer developed application from digestate of cow manure with *Azospirillum brasilense* in oat (*Avena sativa*) seeds, generates a positive effect on their root growth, at similar level as comercial culture media with an economic advantage due its residual origin.

References.

1. Alburquerque J, De la Fuente C, Ferrer A, Carrasco L, Cegarra J, Abad M, Bernal M. (2012). *Biomass & Bioenergy*. Vol (40):181-189
2. Okon Y, Itzigsohn R, (1995). *Biotech Advances*. Vol (13): 415-424
3. Pereyra M, Ballesteros F, Creus C, Sueldo R Barassi C. (2009). *European Journal of Soil Biology*. Vol (45): 20-27
4. Bashan Y, Trejo A, De- Bashan L. (2011). *Biol Fertil Soils*. Vol (47): 963-969.