GROWTH KINETICS OF SOIL BACTERIA IN PRESENCE OF PESTICIDES APPLIED FOR RICE CROP PRODUCTION.

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The expansion of agricultural activity promoted the use of agrochemicals, whose permanence in the soil can cause serious contamination problems. Its infiltration into groundwater or runoff into surface watercourses, as well as their deposition in trophic chains, imply a latent risk to the balance of ecosystems. The present work objective is to analyze the growth kinetics of bacteria isolated from soils destined for rice cultivation in Las Palmas, Chaco, Argentina, in the presence of glyphosate, imazapic-imazapyr and clomazone, pesticides of current application. Two of 24 isolated bacteria named H5 and I2 were specially selected for this study because of their resistant to high agrochemical concentrations. Growth kinetics tests were carried out applying two methods to monitor biomass increase. One of these methods was based on biomass determination by dry weight (BPS) and the other by colony forming units/ml (CFU/ml) count using the drop technique (RMG). Initial inoculums were prepared in minimal saline medium (M9) with glucose 0,5%p/V and incubated at 30°C at 200 or 300 rpm for 24 h. Then, 5 ml of each were transferred to 50 ml of M9 with 1% V/V of the mixture of agrochemicals as the only carbon source to evaluate growth kinetics under these restrictive conditions. The formation of bacterial aggregates at the lowest agitation level was observed, interfering with biomass determinations. For this reason, the subsequent tests were carried out at 300 rpm to prevent the floc formation. To apply the BPS method, 1 ml culture samples were centrifuged 30 minutes, and the pellet obtained was dried for 10 h at 60°C to be subsequently weighed. For the RMG method, culture samples were taken and 10 µl drops of serial dilutions in NaCl 150 mM, were seeded in triplicates in Plate Count Agar (PCA). The growth kinetics was also analyzed by RMG with glucose as sole carbon source. The emulsification of clomazone formulation derived in turbidity in culture medium, generating interferences in the biomass estimation by the BPS method. Therefore, the only way to evaluate kinetic parameters was by the CFU/ml counting method by RMG at 300 rpm. In this way, growth curves for the two tested bacteria revealed generation times (t_g) of 1.48 h and 7.46 h with division rates (ν) of 0.68 h^{-1} and 0.15 h^{-1} for I2 and H5 respectively. Results obtained with glucose showed higher division rates and shorter generation times (ν_{I2}=1,4 h^{-1},ν_{H5}= 0,48 h^{-1}, t_{gI2}=0,73 h, t_{gH5}=2.34 h) demonstrating a slowdown in bacterial growth by pesticide formulation consume. Further studies will be focused on the identification of degradation products to proceed with the application of mixed cultures in rice crop soil bioremediation microcosms experiments.

Keywords: native soil bacteria- bacterial growth kinetics – herbicide resistance