Executive summary of activities carried out

During this stage, biochar was obtained from apple waste. The biochar was activated by specific methods and then 63 new materials were obtained by synthesis. These new materials were prepared by: i) modifying the components (activated and non-activated biochar, different metal oxides, in different ratios, encapsulated and non-encapsulated materials in compatible biopolymers); ii) modifying the reaction conditions (using different reagents, preparation in the presence/absence of plant extracts, reaction medium); iii) modifying the encapsulation conditions in alginate ($CaCl_2$ concentration, alginate concentration, temperature and drying method of the obtained materials). All materials were characterized by FTIR spectroscopy, X-ray diffraction, Brunauer-Emmett-Teller (BET) and electron microscopy (TEM, SEM, EDX).

Also, preliminary tests of pollutants adsorption from synthetic waters and preliminary tests on the behavior (degree) of water retention were carried out. For ciprofloxacin, tetracycline and trimethoprim, degrees of removal from water up to 100% were obtained for some materials. A material was obtained which, after 144 h of maintenance in double-distilled water, showed a water retention degree of 8457.36 %.

The results obtained were the basis for the first tests on the resistance of common beans to drought-induced stress (activities carried out by the project partners). These activities will be continued in the next stages of the project, being evaluated the adsorption properties of these materials for a larger number of antibiotics. Also, the degree of water retention will be determined for other types of materials (e.g. A-ac-Fe_3O_4-ext, A-ac-NiO-ext etc.) encapsulated in alginate.