

Mgr inż. Diana Rogacz

Synteza i wstępna ocena ekotoksykologiczna wybranych C-tienylowych pochodnych fosfonoglicyny
oraz C-arylowych pochodnych N-fosfonometylo-glicyny

SUMMARY

The growth of the world's population, changing food preferences and the need to increase agricultural productivity are challenging agriculture to meet the demand for quality food. While the use of agrochemicals to achieve this goal, has its benefits, it also comes with some challenges and negative impacts.

It is well known that aminophosphonic derivatives exhibit strong herbicidal activity against higher plants. Phosphonate analogues of phenylglycine show interesting herbicidal activity and are used, either as plant growth regulators or fungicides, and therefore, methods for their production are still being intensively developed. Also herbicides, which have a sulphur atom in their structure, are an effective tool against common weeds. Therefore, the aim of this dissertation was to synthesise C- thienyl substituted derivatives of phosphonoglycine and selected C-aryl derivatives of N- phosphonomethylglycine (glyphosate), as well as dialkyl and diaryl esters, derivatives of aminophosphonic acids, which contain in their structure a heteroaromatic thiophene system, and a preliminary ecotoxicological assessment of all compounds obtained.

Following this approach, a group of dimethyl and diphenyl thiophene-2- carboxaldehyde derivatives containing various N-methyl or methoxyphenyl substituents, in which the methyl and methoxy groups were substituted to the benzene ring in the *ortho*-, *meta*- or *para*- position. Group of dimethyl thiophene-2- carboxaldehyde derivatives substituted with: benzyl, *tert*-butyl and benzhydryl (diphenylmethyl), as well as a dibenzyl derivative with a furfuryl substituent. Their ecotoxicological impact and already synthesised N- phosphonomethylglycine aminophosphonates on organisms from various levels of trophic chain was evaluated.

The literature part of the dissertation demonstrated the most important biology an environmental aspects the essence of aminophosphonic substances, methods of their synthesis, application possibilities, as plant protection agents. Sulphur based herbicides are also described as an effective substances for weed control.

Experimental part, contains the aim, scope and concept of the dissertation, as well as description of all materials and chemicals used in the research work, methods of synthesis and techniques used for the characterisation of the obtained compounds. Further experimental part describe effects of aminophosphonate derivatives on crop plants using phytotoxicity tests, an evaluation of their herbicidal properties against common weeds, and an ecotoxicological assessment on aquatic organisms from different trophic levels using bioassays test. The bacterium *Allivibrio fischeri* was choosed representative of marine waters, and the crustacean *Heterocypris incongruens*, as a representative of fresh waters.

Mgr inż. Diana Rogacz

Synteza i wstępna ocena ekotoksykologiczna wybranych C-tienylowych pochodnych fosfonoglicyny
oraz C-arylowych pochodnych N-fosfonometylo-glicyny

On the basis of obtained, it was found that some of the synthesized aminophosphonium derivatives demonstrate low phytotoxicity against crop plants (radish and oat), with simultaneously effective herbicidal properties, pointing out them as potential active agents in herbicidal formulations. Their selective activity, gives potential for the use of such compounds as herbicides in the cultivation of monocotyledonous crops. Among the tested aminophosphonates, some of them demonstrated low harmfulness on aquatic organisms and plants, keeping at the same time relatively high efficiency, create them for the potential application possibilities in the field of agrochemistry.

Diane Rogacz

06.06.23r.