



### Influence of heat treatment on the degradation of organophosphates in cooked beans (*Phaseolus vulgaris*)

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Organophosphates (OP) are compounds largely applied as agricultural insecticides, herbicides and plant growth regulators. In pharmacology are classified as anticholinesterase agents, and the acute intoxication is characterized by cholinergic symptoms as eye miosis, nausea, vomiting, diarrhoea, and others. Residues of OP can be present in substantial foods like beans. The common-bean (*Phaseolus vulgaris* L.) is an important part of the human diet in many parts of the world since is a rich source of proteins, carbohydrates, vitamin B-complex, and minerals, at relatively low cost to the consumer. Contain a relatively high intake of protein (22 % and 26 %), fibre, carbohydrates, vitamins and minerals (iron and zinc, mainly). The combination of bean and rice provides a meal with values compared to animal proteins. This study aimed to evaluate the influence of heat on some active ingredient belonging to OP chemical group. Quantification was performed by gas chromatography with a Flame Photometric Detector (FTD) and QuEChERS was utilized as extraction method (Lehotay et al., 2005). An analytical curve was prepared from the values of the areas of chromatograms obtained by successive injections of standards solutions (in acetate de etila) containing the following concentrations: 0.008 mg/kg, 0.016 mg/kg, 0.024 mg/kg, 0.032 mg/kg, 0.44 mg/kg and 0.55 mg/kg. In order to evaluate the heating effect on the analytes, an aliquot of beans samples was fortified at the level of 0.03 mg/kg. The aliquot was cooked for one hour at 120°C in a water-bath and the result was compared with uncooked samples. As results, was obtained from the analytical curves, values of correlation coefficient ( $r^2$ ) varied from 0.993 to 0.999 for each OP. After cooking were found the respective decay values: methamidophos (67.25 %); phorate (66.45 %); parathion (68.93 %); pirimiphos (68.63 %); malathion (78.78 %); terbuphos (47.04 %); chlorpyrifos (55.71%); phenthoate (63.07 %), etione (69.59 %); triazophos (66.81 %); pyrazophos (72.28 %). The detection limit (LD) obtained varied from 2-52 ng/kg, and the quantification limit (LQ) from 3-176 ng/kg. About recuperation studies, the majority of analytes had accuracy in the range of 80-120 %, with exception of phorate, parathion and triazophos, suggesting that a matrix effect can be occurred. According to this work, is possible to observe a thermal sensibility of organophosphates, since the degradation was significant, under the heating conditions applied, which was similar to the cooking conditions of beans dishes.

#### Reference

Lehotay, S. J.; Maštovská, K.; Lightfield, A. R.; J. AOAC Int., 2005, 88, 615.