

ASSESSMENT OF THE CARDENOLIDE CONTENTS IN SOME MEDICINAL PLANTS FROM MOLDOVIANS SPONTANEOUS FLORA

EVALUAREA CONȚINUTULUI CARDENOLIDELOR ÎN UNELE PLANTE MEDICINALE DIN FLORA SPONTANĂ A MOLDOVEI

DUCA Maria¹, BUDEANU O.¹, GROSU C.¹

e-mail: mduca2000@yahoo.com

Abstract. Research carried out the potential of Moldavian plant. The various contents of cardenolide compounds in different medicinal plants were established. Phylogenetic distribution of cardenolide area has been expanded.

Key words. cardenolide, filogenetic, medicinal plants.

Rezumat. Cercetările scot în evidență potențialul farmaceutic al unor specii de plante medicinale din flora spontană a R.Moldova. S-a studiat conținutul cardenolidelor în diferite specii de plante. A fost lărgită aria filogenetică de răspândire a cardenolidelor.

Cuvinte cheie. cardenolide, filogenie, plante medicinale.

INTRODUCTION

Medicinal plants represent one of the most active essential bioactive substances from medicines which are the base of fitotherapy. The use in medicine of local plants, especially the one from spontaneous flora, represent a perspective direction which has great economic importance for Republic of Moldova, a such flora that contains an important diversity of species which can be use in control of diseases like cardiovascular disease, infections disease, oncologic etc.

Cardenolides are secondary metabolites, sterolic nature whit cardio toxic effects, known from antiquities (Ziskind et. al., 2004; Wade, 1986). They display a large set of action including excitability, contractibility and tonicity on the heart (Balthazart et. al., 2006; Losel et. al., 2003; Wehling et. al., 2006). They are used in heart failure in shape of pharmaceutical products and only under medical observation. Olso they perform cardiotonic and diuretic actions.

Recent studies showed their effect in cancer treatment (Prassas, Diamandis, 2008; Newman, Yang, 2008). According to scientific data (Luckner, Wich 2000) this type of substances are find in plants like: *Adonis vernalis*, *Convallaria majalis*, *Digitalis purpurea*, *Digitalis lanata*, *Erysimum* sp., *Euonymus europaeus*, *Nerium oleander*, *Periploca graeca*, *Strophanthus* sp., *Thevetia neriifolia*. Depending on associated glycosidic residue and the presence of some free radicals in different position there are a wide range of compounds that differ in structure and physiologic effect on human body

¹ University of Academy of Sciences of Moldova, Republic of Moldova

Cardenolides have been found in approximately 60 genders of angiosperm angiosperms (Singh and Rastogi, 1970; Melero et al., 2000; Kreis and Müller-Uri, 2010). Until currently has been reported the presence of such compounds in order Poales, Asparagales, Liliales, Ranunculales, Crossosomatales, Myrtales, Celastrales, Malpighiales, Fabales, Rosales, Brassicales, Malvales, Gentianales, Lamiales, Solanales, Asterales. Roughly half of the investigated gender until today belongs to Gentianales. It seems that cardenolides have a greater prevalence in younger phylogenetic angiosperm. Barely recently, cardenolides have been reported in Asterales (Wang et al., 2007) and Crossosomatales (Klausmeyer et al., 2009). Consequently, these compounds can have a greater distribution than previously estimated.

MATERIAL AND METHOD

Extraction of cardenolides had been made from dry plants whit 70% methanol from 50 mg of dry material. Hydrolyzed extract whit mixture of acetone and HCL (100:1) kept in dark for 12 hours have been run trough HPTLC chromatography on Kieselgel 60 F254 (10X10cm) glass plates, using methanol: chloroform: water (60:39:1) as mobile phase. Standards from Merck (RFG) have been used. Chromatograms have been visualized in UV (254nm) (fig.1.)



Fig. 1 – HPTLC of cardenolide standard

RESULTS AND DISCUSSIONS

16 species of plants have been researched: *Adonis vernalis*, *Aesculus hippocastanum*, *Artemisia vulgaris*, *Atriplex tatarica*, *Calendula officinalis*, *Chenopodium album*, *Clematis integriflora*, *Convallaria majalis*, *Crataegus monogina*, *Euonymus verrucosa*, *Inula helenium*, *Plantago major*, *Sambucus ebulus*, *Trifolium fragiferum*, *Veronica canaedruss*, *Vibrium opulus*. On the exposed one it was interested to study the presence of cardenolides compounds in medicinal plants from Moldavia which belong to different taxonomic groups

After the end of investigation it has been assessed the presence of cardenolides in the following species of plants: *Crataegus monogina* (Rosaceae), *Euonymus verrucosa* (Celastraceae), *Trifolium fragiferum* (Fabaceae), *Aesculus hippocastanum* (Sapindaceae), *Sambucus ebulus* (Adoxaceae), *Inula helenium*

(Asteraceae), *Artemisia vulgaris* (Asteraceae), *Convallaria majalis* (Ruscaceae) (fig.2).

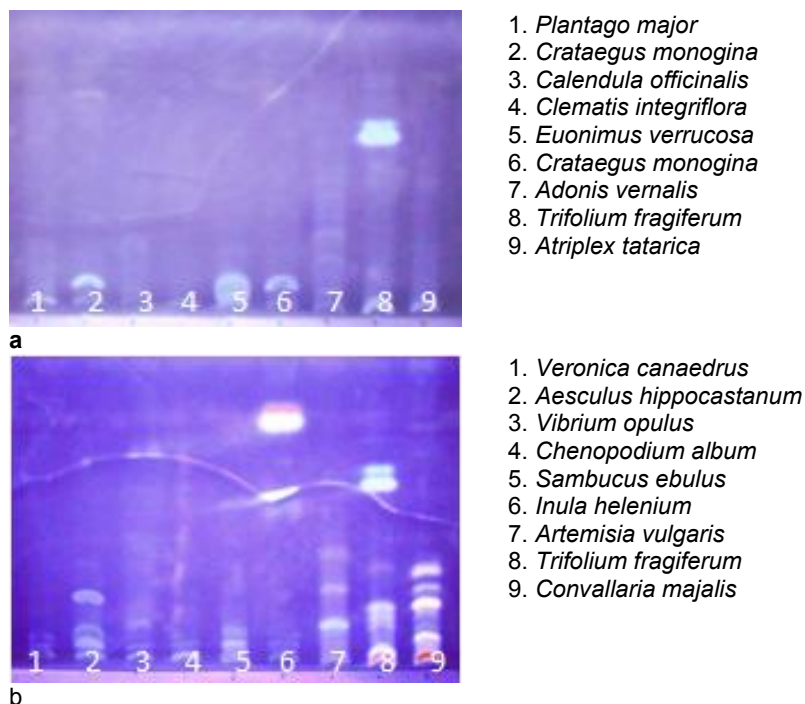


Fig. 2 – HPTLC of cardenolide extract

CONCLUSIONS

It has been detected the presence of cardenolides compound in eight species of plants from 16 species collected from Moldavia flora.

Cardenolides have been detected in medicinal plants from spontaneous flora of Moldavian Republic which belong to different taxonomic groups

Researching the filogenetic distribution on these secondary metabolites has been determined in Rosaceae, Fabaceae, Sapindaceae, Adoxaceae, Asteraceae, and Ruscaceae. This confirms in most part the data collected from literature.

The presence of this compound in, Adoxaceae and Ruscaceae extends the filogenetic area of spreading the cardenolides.

REFERENCES

1. Balthazart J., Cornil C.A., Taziaux M., Charlier T.D., Baillien M., Ball G.F., 2006 – *Rapid changes in production and behavioral action of estrogens*. Neuroscience.
2. Klausmeyer P., Zhou Q., Scudiero D.A., Uranchimeg B., Melillo G., Cardellina II, J.H., Shoemaker R.H., Chang C., McCloud T.G., 2009 - *Cytotoxic and HIV-1 inhibitory compounds from Crossosoma bigelovii*. J. Nat. Prod.
3. Kreis W., Muller-Uri F., 2010 - *Biochemistry of sterols, cardiac glycosides, brassinosteroids, phytoecdysteroids and steroid saponins, second ed.* In: Wink, M.

- (Ed.), *Biochemistry of Plant Secondary Metabolism*, vol. 40 CRC Press, Sheffield.
4. Losel R.M., Falkenstein E., Feuring M., Schultz A., Tillmann H.C., Rossol-Haseroth K., Wehling M., 2003 – *Nongenomic steroid action: controversies, questions, and answers*. *Physiol. Rev.*
 5. Luckner M., Wichtl M., 2000 – *Digitalis: Geschichte, Biologie, Chemie, Physiologie, Molekularbiologie, Pharmakologie, medizinische Anwendung*. Stuttgart: Wiss.Verl.-Ges.
 6. Melero C.P., Medarde M., San Feliciano A., 2000 - *A short review on cardiotonic steroids and their aminoguanidine analogues*. *Molecules*.
 7. Newman R.A., Yang P., Pawlus A.D., Block K.I., 2008 – *Cardiac glycosides as novel cancer therapeutic agents*. *Mol Interv.*
 8. Prassas I., Diamandis E.P., 2008 – *Novel therapeutic applications of cardiac glycosides*. *Nat Rev Drug Discov.*
 9. Singh B., Rastogi R.P., 1970 - *Cardenolides—glycosides and genins*. *Phytochemistry*
 10. Wang T.M., Hojo T., Ran F.X., Wang R.F., Wang R.Q., Chen H.B., Cui J.R., Shang M.Y., Cai S.Q., 2007 - *Cardenolides from Saussurea stella with cytotoxicity towards cancer cells*. *J. Nat. Prod.*
 11. Wehling M., Losel R., 2006 – *Non-genomic steroid hormone effects: membrane or intracellular receptors*. *J. Steroid Biochem. Mol. Biol.*
 12. Ziskind B., Halioua B., 2004 – *Contribution of Ancient Egypt to cardiovascular medicine*. *Arch Mal Coeur Vaiss.*