G & BM
Tome IV
Iaşi 2003

THE NICOTINIC ACID ACTION ON SOME LEGUMINOSAE SPECIES

ODETTA GRAMA, ION I. BĂRA, GHEORGHII CIOBOTARI

Key words: nicotinic acid, *Vicia sativa, Vicia villosa, Pisum sativum*.

Abstract: The treatment with nicotinic acid (0.1%, 0.25%, 0.5%, 0.75% and 1%) on *V. sativa, V. villosa and P. sativum* species decreased MI value. *V. sativa* and *P. sativum* are more sensible than *V. villosa* at nicotinic acid action.

INTRODUCTION

The Nicotinic acid is known under name of PP vitamine.

When PP vitamin is absent the human individual suffre of pellagra. For this the vitamin is named antipellagra. PP vitamin is a derivate of peridine. The nicotinic acid is piridin-β-carboxilic acid. It is a crystalline substance, uncoloured and odourless, with acid taste and melting point at 234^0C – 337^0C. It is soluble in water.

THE INVESTIGATIONS AIM

We aimed to establish the nicotinic acid influence on cell division in *Vicia sativa, Vicia villosa* and *Pisum sativum*, quantifiing mitotic index and aberrations frequency.

MATERIAL AND METHODS

It was investigated *V. sativa, V. villosa* and *P. sativum* individuals in early ontogeny. The seeds were obtained from Institut of Selection – Bălţi, Moldavia.

The germination was assured in darkness, in Petri dishes, at 20^0C. The treatment with nicotinic acid was assured for 2 and 6 hours with concentrations: 0.0025%, 0.005%, 0.01%, 0.25%, 0.5%, 0.75% and 1%. It was analyzed 15 roots from each species, coloured with CARR reactive. The slides for microscope were prepared by squash method.

RESULTS AND DISCUSSIONS

We observed (Fig 1) that the 0.0025% and 0.005% nicotinic acid, administered for 2 hours, has determined an increase of mitotic index (MI) at all investigated species. The lowest MI was registered under treatment with 1% nicotinic acid (MI=3.1% at *V. sativa,* 4.88% at *V. villosa*, and 3.94% at *P. sativum*, while the control values were 13.0%, 10.9% and 8.08%.

Under treatment applied 6 hours (Fig. 2), the MI values were lower than those from 2 hours, at all concentrations. At 0.0025% and 0.005% concentrations MI values were near control ones, for *V. sativa* individuals. In *V. villosa* the treatment with 0.005% nicotinic acid, administered for 6 hours, has had inhibitory effect on MI. On the other

hand, in *P. sativum* case, MI is lower than at control, for all concentrations

We may say that low concentrations of nicotinic acid, administered for short time, increases mitotique divisions process. The biggest stimulation was registered at *V. sativa* species and the smallest one at *P. sativum* species. When nicotinic acid acts on long time it has mutagenic effect. The same at high concentrations. At low concentrations (0.0025%, 0.01%) the relation dose-effect is not so evident because, for all investigated species, the aberrant A-T percentage is low (near control values), MI being enough high. The most frequent registered aberrances were simple and double bridges, retarded chromosomes, fragments a s o. Both, treated variants and controls, the percent of simple bridges was highest. When the treatment was administered 6 hours, the aberrant A-T percent registered higher values than the 2 hours one. Surprising, at *V. sativa* and *V. villosa* species treated 6 hours with 0.0025% nicotinic acid, the aberrant A-T frequency decreased. This situation was not repeated at 0.005% or others high concentrations. So we can conclude that, in low concentration, the nicotinic acid has a stimulant effect. *P. sativum* and *V. sativa* species are more sensible than *V. villosa*.

CONCLUSIONS

The treatment with nicotinic acid (0.1%, 0.25%, 0.5%, 0.75% and 1%) on *V. sativa, V. villosa* and *P. sativum* species decreased MI value. The smallest values of MI were registered at 0.75% and 1% nicotinic acid concentrations

The low concentrations of nicotinic acid (0.0025% and 0.005%) administered for 2 hours had stimulant effect on MI, at all investigated species.

V. sativa and *P. sativum* are more sensible than *V. villosa* at nicotinic acid action.

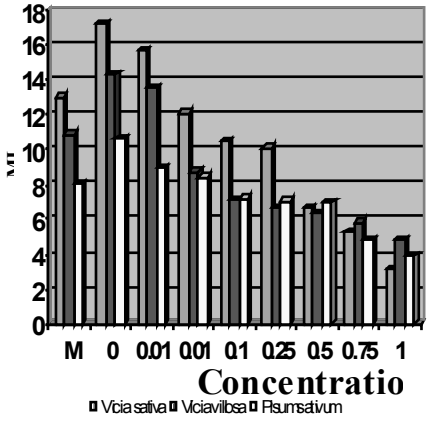

Fig.1. The mitotic index after 2 hours treatment with nicotinic acid.

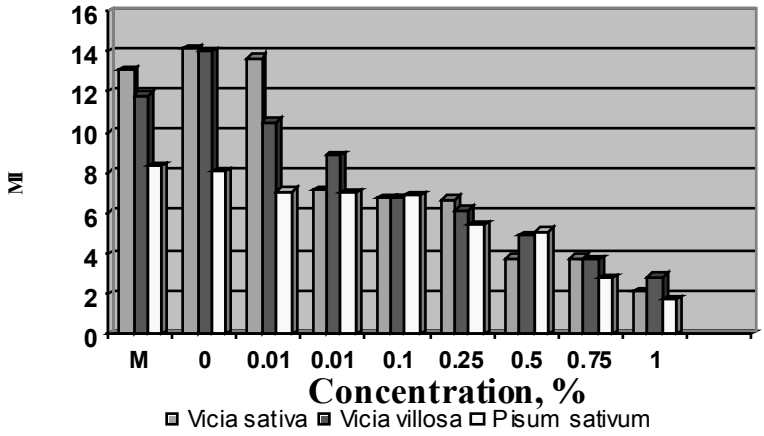

Fig.2. The mitotic index after 6 hours treatment with nicotinic acid.

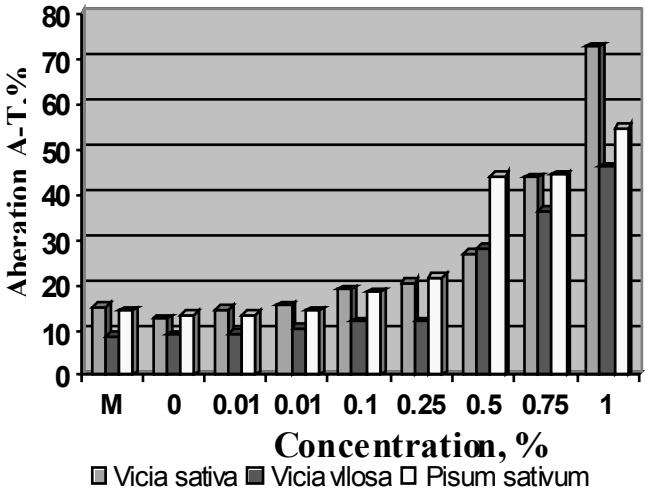

Fig.3 The aberants A-T frequency after 2 hours treatment with nicotinic acid.

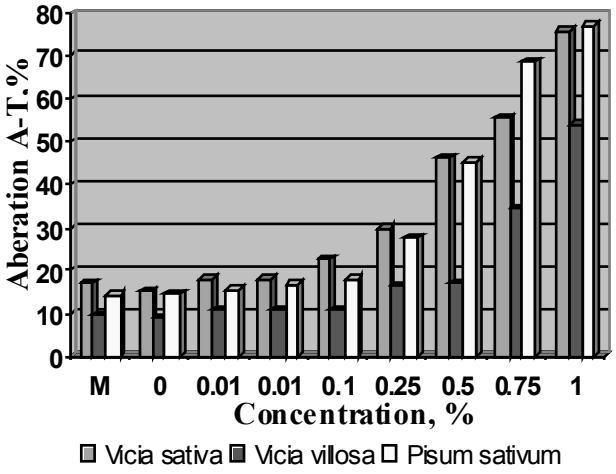

Fig.4 The aberants A-T frequency after 6 hours treatment with nicotinic acid

BIBLIOGRAPHY

Salinicova T., V., Grigorova N., V., 1993, *Povtornîe vozdeistvia na semena himiceschih mutaghenov kak sposob rasşirenia geneticeskogo raznoobrazia*, Genetika, N11, Nauka, Moskva, 1842.

Mitrofanov Iu., A., Titov Ă., K., 1968, K *mehanizmu obrozovania aberaţii hromosom*, Genetika, N7, Nauka, Moskva, 5.

Savel Ifrim, 1997, *Substanţe biologic active*, Editura Tehnică, Bucureşti, 57-61.

Artenie Vlad, 1991, *Biochimie*, Univ.. "Al.I. Cuza", 326-327.

Bedeleanu Dan, 1985, *Biochimie medicală şi farmaceutică*, Dacia, Cluj-Napoca, 404-417.

Tudose I, Pricop M., Tudose M., 1991, *Cytogenetic effects induced by nicotinic acid in Vicia faba L (2n=12) and Triticum aestivum (2n=42)*, Ann. Şt. Ale Univ. "Al.I.Cuza", Iaşi, Tom. XXXVII, s.II a, Biologie, p.129-136.