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Complex biological investigations on Hungarian *Lotus*-taxa

by

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I have been studying the subject of *Lotus corniculatus agg.* in Hungary for about 16 years. In my research work I tried to investigate this complex-species from the aspects of different branches of science, like

microtaxonomy,
phytogeography /distribution and presence in phytocenoses of Lotus taxa/,
morphology,
phytotomy,
cytotaxonomy, cytogenetica

as well as by the examination of macroelements, protein- and HCA-contents.

In Hungary the most frequent wild growing *Lotus* taxa belong to the complex-species of *Lotus corniculatus agg.* /with many microtaxa and so called ecotypes, all of them tetraploid/. Another species is the diploid *Lotus tenuis* W.et K. There are three other diploid species, too: *Lotus angustissimus* L.) *Lotus Borbasii* Ujh. and *Lotus uliginosus* Schkuhr.

Lotus corniculatus and *tenuis* occours generally everywhere in our country. *Lotus borbasii* grows in the Hungarian Middle-Mountains on limestone. *L.angustissimus* has a very little area on the alkalic soil of the Great Hungarian Plain, and *L.uligonosus* grows subspontaneously only in a habitat.

For our experiments we used many wild growing plant of the Lotus corniculatus group and cultivars and we applied L.tenuis and borbasii species, too.

The greatest variety can be found in the L.corniculatus complex-species, especially in its morphological appearance. This morphological structure is connected - partly - with the enviroment, in which these taxa grow. The typical group of L.corniculatus has hairless stems and leaves, but we found in the group of var.hirsutus a wide scale of transition from the scarcely hairy type to the very powefull hairy one. Likewise the morphology of stem and leaves show great differences between the infraspecific taxa of L.tenuis, especially characteristic of them is: var.salina with pigmy stems, which lies down on the extreme arid alkalic soil of the Great Hungarian Plain.

Another important difference can be observed in the anatomical stucture of these taxa, in particular regarding leaves and stems. In the appearance of the leaf's epidermis tissue there is a significant difference between the species and the infraspecific taxa: for example, the difference in the number, size and shape of the epidermis cells and stomata.

In the stem anatomy of L.corniculatus agg. we regard the secondary thickening of tissues very important. The appearance and number of sclerenchym-bundles, the qualitative distribution and proportion of the xylem and phloem tissues, the various developmental types between the vasculare-bundes and inter-vasciculare tissues show significant differences in the various Lotus taxa.

In our observation we found a very interesting connection

between the pollen size and the number of chromosomes of Hungarian Lotus taxa. Diploid taxa /for example L.tenuis, borbasii, angustissimus/ have smaller pollens than tetraploid ones /e.g.L.corniculatus group/. This observation agrees with Prof.Grant's investigations.

The problem of hard-seed of bird'sfoot trefoil is very difficult and complicated. We had no intention to carry out intensive experiments with it, but some years ago we completed a simple examination using the method of mechanical rubbing. We obtained positive results with it. The germination of the treated seeds showed - in general - higher values, than the control seeds.

Our cytotaxonomical investigations comprised on the one hand, the determination of chromosome numbers, and caryotypes, on the other the qualitative determination of the DNA-content of various Hungarian Lotus taxa /the latter with cytophotometric method/.

In collaboration with the Plantphysiological Department of the Veterinary University in Budapest for many years I have been dealing with the investigation of the macro- and microelements of Lotus taxa, as well as with the determination of their protein- and HCA-contents. The problem of cyanogenesis has been examined by many researcher, because it is very important both theoretically and for practical life, too.

The determination of the cyanoglycoside of Hungarian Lotus taxa was made by using quantitative and semiquantitative methods. We found that in Hungary the tetraploid taxa of corniculatus group are of cyanogen type - in general - with a great cyanoglycoside content, with the except of one local ecotype: var.dabasensis, which is of acyanogen type, therefore HCA$^-$ negative.

The diploide Hungarian taxa are HCA^+ positives, but they have an average, or small quantity of cyanoglycoside content.

Our experiments on the cyanoglycoside content extended to the observation of the change in the HCA-content at various phases of the plant's growth and development. We found that the higher cyanoglycoside-level is conneced both with the phase of active groth and of blossoming.

The crude protein content of leaves and stems of various Lotus taxa /partly from cvar./ was determined by using the Kjeldahl-method. The mean value of protein content was for g/kg fresh material: between 60-75, for g/kg dry material : between 270-350. In the protein content no significant difference could be seen between the various cultivars. Among the wild growing taxa the var. dabasensis showed the greatest value of protein content.

Beside we made many other investigations to determine the carrotine content and various macroelements, namely Na, Ca, Mg.

We are planing to make further investigations, especially on the polymorphism of cyanogenesis and the protein content, too.