

A UNIFOLIOLATE MUTANT IN COMMON BEAN

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The life cycle of living organisms goes through a series of developmental stages, each of which is characterized by specific organs or cell types. "Normal" development results in the characteristic appearance of a given organism. Mutations that alter this normal developmental pattern can potentially shed light on the gene(s) involved in one way or the other in the differentiation of new cell and organ types in the course of the life cycle.

In its normal development, the common bean plant, after producing two opposite cotyledons and two opposite unifoliolate primary leaves, produces alternate trifoliolate true leaves. These trifoliolate leaves consist of a basal (i.e. close to the stem node) pulvinus, petiole, two lateral leaflets each with its own pulvinus, a rachis, and a terminal leaflet also with its pulvinus. A mutant with unifoliolate true leaves was identified by Dr. D. Debouck; seeds of the original trifoliolate genotype (NI1031) and the derived unifoliolate mutant (NI1032) were provided by Dr. R. Maréchal of the Faculte des Sciences Agronomiques, Gembloux, Belgium. True leaves of this unifoliolate mutant consist of a basal pulvinus, a short petiole, and a single (terminal) leaflet with its pulvinus. Compared with the terminal leaflet of the trifoliolate "wild-type", the single terminal leaflet of the unifoliolate mutant exhibits a larger size; this suggests that the gene(s) involved in this mutation cause the subdivision of the entire leaf lamina into the two lateral leaflets and the terminal leaflet.

We are in the process of studying the genetic control of this mutation. The F_1 of the cross between NI1031 and NI1032 exhibited unifoliolate leaves, indicating dominant gene action. Segregation data for the F_2 were as follows:

	Unifoliolate	Trifoliolate	Ratio tested	Khi ²	P
F_2	51	14	3:1	0.25	>0.5

Our results so far indicate that this mutation is under the control of a single dominant allele. We are verifying this result by analyzing F_3 progenies and a cross between NI1032 and the standard (trifoliolate) bean genotype ICA-Pijao. A phenotypically similar mutation was described by Lamprecht (1935); that mutation, however, was under the control of a single recessive allele.

We are also backcrossing this trait into a series of commercial cultivars to determine its effect on productivity and adaptation. Observation in the greenhouse indicate no sterility associated with this mutation.

Lamprecht, H. 1935. Zur Genetik von *Phaseolus vulgaris*. XI. Eine Mutante mit einfachen Blättern und ihre Vererbungsweise. Hereditas 20: 238-250