

## RESEARCH ARTICLE

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**Influence of Induced Mutation in Beans ( *Phaseolus vulgaris* )**

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**Abstract**

Beans ( *Phaseolus vulgaris* ) in our country is considered as one of the main leguminous plants, and represent a high genetic variability and important for agricultural production. The use of induced mutagenesis techniques is one of the most important methods for the creation of new varieties. Besides the economic benefits, induced mutagenesis techniques also play an important role in the study of genetics and plant development. Numerous climatic changes that have occurred in recent years, its production has undergone a significant reduction. The aim of this study is to evaluate the response of bean plants from Shijak variety after treatment of bean materials with physical and chemical mutagens to shorten the time of flowering and green bean connection. Evidence of reduced production of beans has initiated studies to make possible the elimination of these losses in productivity. One of the problems identified is the abortion of flowers of the beans, so the legumes do not survive due to high temperatures and droughts in this period. Bean seeds are irradiated with gamma radiation of Cs-137, with three doses, and are treated with chemical mutagen dES in three different doses and control, and EMS also in three three different doses and control. Results obtained in the first generation of mutant M1 indicate changes compared to control for the both treatments. There were changes in the maturity period for the two gamma rays doses (100 Gy and 150 Gy). On the other hand, the third dose of dES has provided a diversity of legumes, with bigger seeds and large number of seeds. Changes have been noted in the amount of Chlorophyll pigments related to the acceleration of flowering, where the first doses of dES has given more and fast flowers compared to the control.

**Keywords:** Chemical mutagen; Chlorophyll pigments, Gamma irradiation *Phaseolus vulgaris* , Mutation.

**1. Introduction**

Mutagenic induction technology was recently recognized as a valuable additional tool for the creation of improved cultivars in agriculture [2,3]. The use of induced mutagenesis techniques is one of the most important methods for the creation of new varieties [1]. Initial materials genotype plays an important role in the realization of mutations. Achievements in the induction of mutations are closely linked genetic fund. Materials can be seeds, buds, stems, embryos, pollen grains, etc. depending on specific needs. Beans (*Phaseolus vulgaris*) is a high genetic variability and the importance for agricultural production. Numerous climatic changes that have occurred in recent years, its production has undergone a significant reduction. Identification of bean production reduction has led to the realization of studies to make it possible to eliminate these losses in productivity. One of the problems identified is abortion bean flowers, so do not link pod due to high temperatures and drought during this period. Through mutagenic techniques induced to bean seeds is trying

to shorten the time of flowering to eliminate abortion of flowers in this period.

**2. Material and methods**

The material was “Shijak variety” beans, from samples collected in (2014). The field test realized in experimental parcel in Fier (Albania) and in the greenhouse of the Department of Biotechnology the Faculty of Natural Sciences, University of Tirana. Seed treatment before planting became a natural mutagenic and mutagenic chemicals according to the methods given in the Manual of the IAEA [4].

- Physical mutagenes treatment in 2013 consisted in irradiating Cs-137 gamma radiation in three doses using 1000 seeds for each dose, 50 Grey, 100 Grey, 150 Grey.
- Chemical mutagenes: dES (diethylsulphat) with 0.010 M dose, 0.015 M, 0.020 M, and
- EMS (etylmetansulphonat) in doses of 0.050%; 0.075%; 0.100%; 0.150% respectively.

All treatment was done according the methods and using the IAEA Manual about the ways of treating plant materials [4].

### 3. Results and discussion

Establishment of research work has consisted in the experimental data given in different works and positive results [6,10]. The purpose of the work is bean plants: to shorten the time that their blooming flowers due to high temperatures not to have an abortion, but to connect the pod to create disease-resistant materials that affect specific varieties, to achieve resistant lines during prolonged droughts, to shorten the baking time of string, to increase the number of grains in the green as well as their weight. Observation in the first generation mutant to assess the phenotypic characteristics and possible mutations in this generation and the possibility of comparing the adjustment in some areas of the country [8,9].

After planting in the field is made continuous assessment for the identification of species or specific herbs with improved properties under the influence of mutagenic substances by comparing them with untreated parental materials. In M1 generation we accumulated all plants by the literature and made recommendations and their assessment in the laboratory, for all doses used, including control [6,7]. During the period of vegetation, data on phenological phases (sprouting, braching, blooming and maturing) have been recorded. The assessment and measurement is done in a laboratory for the pod and the grain.

Evaluation of all physiologic indicators is realized based on IPGR descriptions.

Changes in the content of photosynthetic pigments particularly in their relations, allow to assess modification / reduction of themselves [1,9]. Changes in the organization of the photosynthetic unit in response to the action of different mutagens used and operation of a defense mechanism in species more tolerant and resistant after treatment with physical and chemical mutagenic [5,8]. While in M2 generation, we gathered different mutant lines for each used dose (physical and chemical mutagens), with the best features. The data obtained from the field and those from laboratory were processed statistically to acquire DUS, based on UPOVIT criteria. Besides identifying positive attributes, it is aimed for mutant lines with improved features to be acquired and identified.



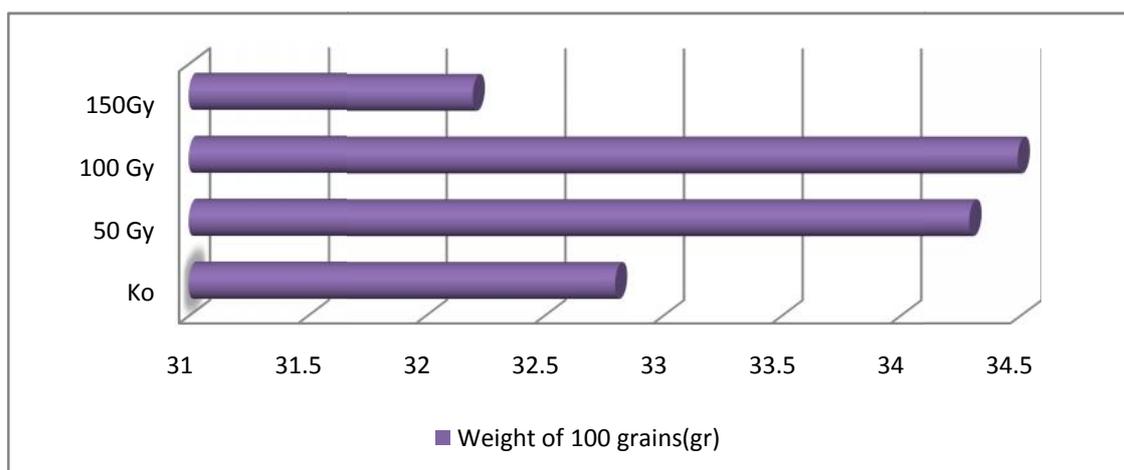
**Figure 1:** Bean plants in field in Fier ( Albania)



**Figure 2:** Bean plants in flowering



**Figure 3 :** Green beans treated with irradiation



**Figure 4:** The weight of grains per pod for three doses compared with untreated control.

Measurements are done according to the above described protocol for all material taken from the experimental parcel in Fier (Albania). All in all, we have analyzed 100 pods for each treatment and the same amount for their control [3]. The mutagenesis in the treated plants of M2 to M3 generation has resulted in a changed number of grains per pod. In addition, a change in the length of the pod is noticed. This change shows that the length of the pod does not necessarily reflected in an increased number of grains, on the contrary in some cases a decreased number of grains is notices. However, in most cases, there is an increase of the grain's weight per pod for materials treated with physical and chemical mutagens [11]. Especially for quantitative characteristics such as pod length, number of grains in pod and weight of the grain, the environmental effect is powerful.

#### 4. Conclusions

The studied varieties exhibit differences, but the selection work should continue and after assessment it will be possible to identify the individuals that fullfill the requirements of our objective. Preliminary results obtained found M1 generation plants that have shown chlorophyll

pigments revealed, so changes in their photosynthetic apparat.

Regarding pod characteristics, the best results were obtained by 50 Gy dose because it increased the performance for the measured features in the pod. As for the treatment with 100 Gy dose, it is recommended for issued related to flower abortion because it is not only increased the number of flowers per plant but flowers also bloomed earlier. Therefore we can say that according to purpose of the study or the feature intended to improve we had to choose the right dose for the treatment.

#### 5. References

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