

EXPERIMENTS UPON MUTAGENIC EFFICIENCY OF SOME X RAYS DOSES TO GROUNDNUT CROP

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ABSTRACT

This research paper aims to investigate the mutagenic efficiency of Tambure ti and Venus groundnut varieties treated with X rays.

Mutagenic efficiency is a measure of how often mutations result from the report between the number of punctual mutations and mutagenic dose applied. It is used to assess the effectiveness of each treatment with mutagenic factors used in breeding programmes. The assessing of mutagenic efficiency in the mutagenesis works allows breeders to identify useful treatments for obtaining the highest possible hereditary variations.

The frequency of morphological changes was higher in Tamburesti variety in smaller doses (5.9% in 6000r and 4.1% in 5000r), while Venus variety presented same type of frequency in bigger doses (8.7% in 9000r and 7.5% in 10000r).

Mutagenic efficiency was observed to both varieties, in different doses, thereby ensuring the highest percentage of survival and pods formation.

INTRODUCTION

The discovery of the role of radiation mutagenic opened a vast new perspective on the way to achieve new forms of plants, having a great practical interest. Many researches proved that groundnut is predominantly a self-pollinated crop with limited genetic variation for qualitative and quantitative traits. Mutagenesis offers an excellent scope for increasing the spectrum of variation (Mouli et al., 1989).

Long time ago, the mutagenic effectiveness was considered a measure of the frequency of mutations induced by unit dose of mutagen, while mutagenic efficiency give an idea of the proportions of mutations in relation to other associated undesirable biological effect like lethality induced by mutagen in questions.

P. Raja Ramesh Kumar and S. Venkat Ratnam, 2010 concluded that to sun-flower, mutagenic efficiency decreased gradually with the increase of gamma rays dose in their experimented varieties.

MATERIALS AND METHODS

Tested varieties were Tambure ti and Venus, which were irradiated with X-rays, using doses between 5000-10000r. The research was conducted in S.D. Tamburesti in 2012-2013. During vegetation period it was establish the frequency and spectrum of morphological and chlorophyll changes, sterility and lethality of the irradiated material.

For the calculation of the mutagenic efficiency it were used the proposed indications of Konzak et al., (1964) in barley, which have been used also by Pipie Ada (1969) at pea and Valeria Marghitu et al., (1975) at bean, being necessary the following indicators:

MCP/L = frequency of chlorophyll mutants / lethality;

MTP/L = total frequency of the mutants (chlorophyll and morphological) / lethality;

MCP/S = frequency of chlorophyll mutants / sterility;

MTP/S = total frequency of mutants (chlorophyll and morphological) / sterility.

RESULTS AND DISCUSSIONS

The possibility of obtaining a larger number of plants with heritable changes in a high percentage of survival it can be measured in prognostic way, using mutagenic efficiency calculation.

Research has shown that the ratio between the frequency of mutations and reduction in the survival of plants, if proven viable mutations are most effective at low doses of X-rays, in both varieties.

The data presented in Figure 1, as concern the changes to Tamburesti variety, can highlight the following aspects:

- between the frequency of chlorophyll and morphological mutations and applied doses was found a strong correlation and most effective dose proved the 6000r;
- reduced values of chlorophyll mutations compared with morphological ones in 6000, 7000 and 10000r variants.

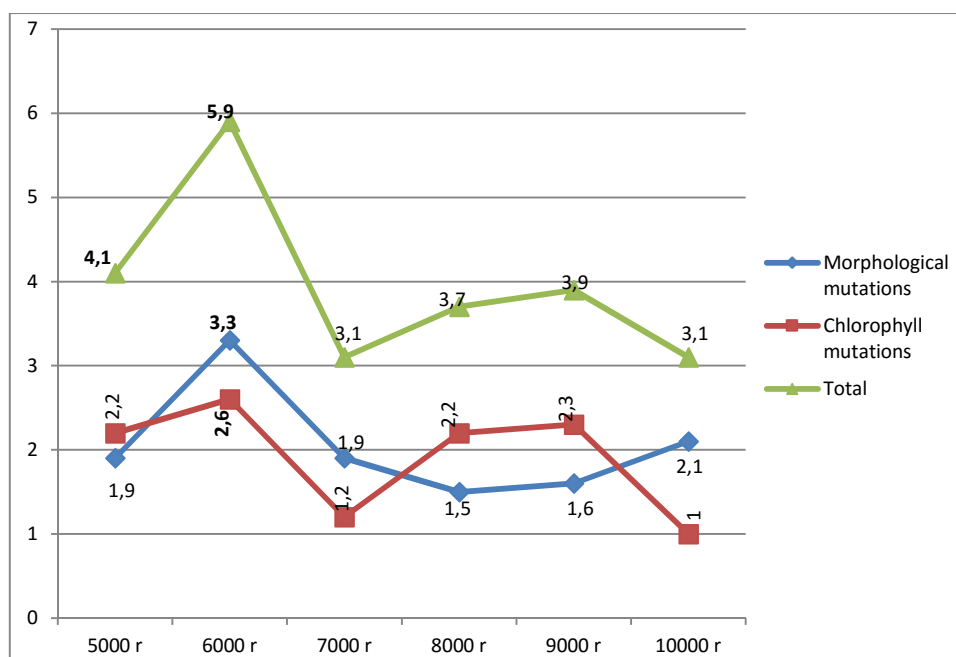


Figure 1. Changes in Tamburesti variety

In Venus variety was found the same positive correlation between the frequency of morphological and chlorophyll change (Figure 2), but in maximal doses of 9000-10000r.

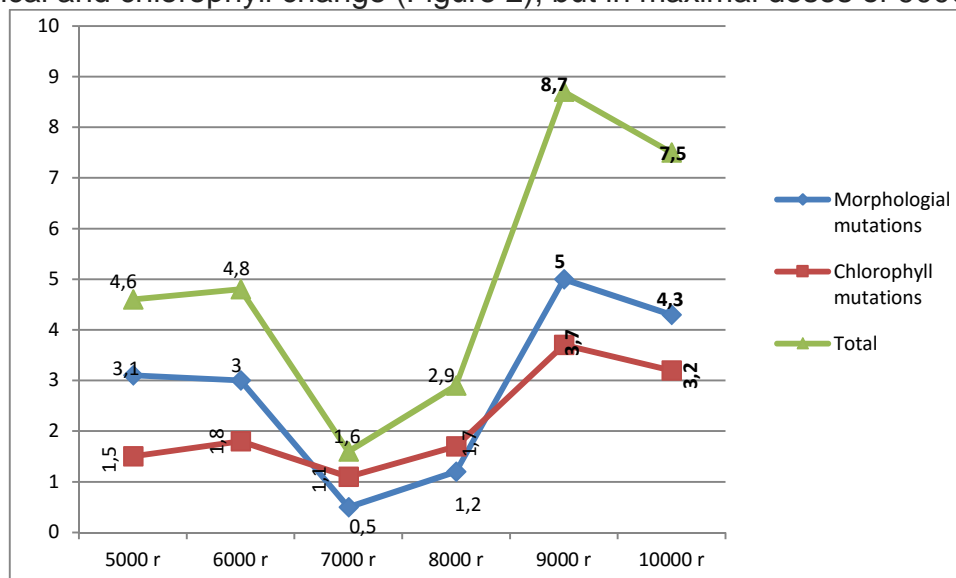


Figure 2. Changes in Venus variety

As concern mutagenic efficiency in Tamburesti variety, from the six experimented doses of X rays, best result were obtained in 8000r (MTP/L) and 7000r (MTP/S) (fig. 3). MCP/L and MCP/S presented the smallest values in 10000r variant and the biggest values in 9000r variant.

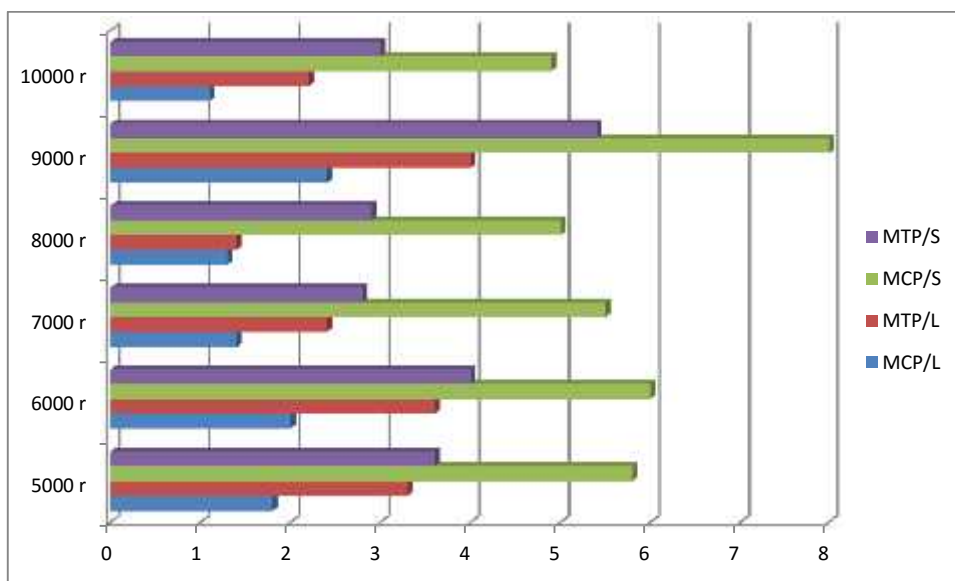


Figure 3. Mutagenic efficiency to Tamburesti variety

To Venus variety, maximum mutagenic efficiency was observed in 5000r (MTP/L) and 7000r (MTP/S) (fig. 4).

MCP/L presented the smallest values in 8000r variant and MCP/S in 7000r while the biggest values were found in 10000r variant.

Burghate, S.K. and co., 2013 founded maximum mutagenic efficiency in combined treatments of gamma rays with ethyl-methane sulphonate, followed by single treatment of gamma rays and ethyl-methane sulphonate. Same author recorded highest efficiency to a combined treatment of 200 Gy gamma rays + 0.2% EMS while, the maximum effectiveness was found at lower concentration of 0.1% EMS single.

X-rays have shown mutagenic efficiency inversely proportional to the size of seeds of the two tested varieties.

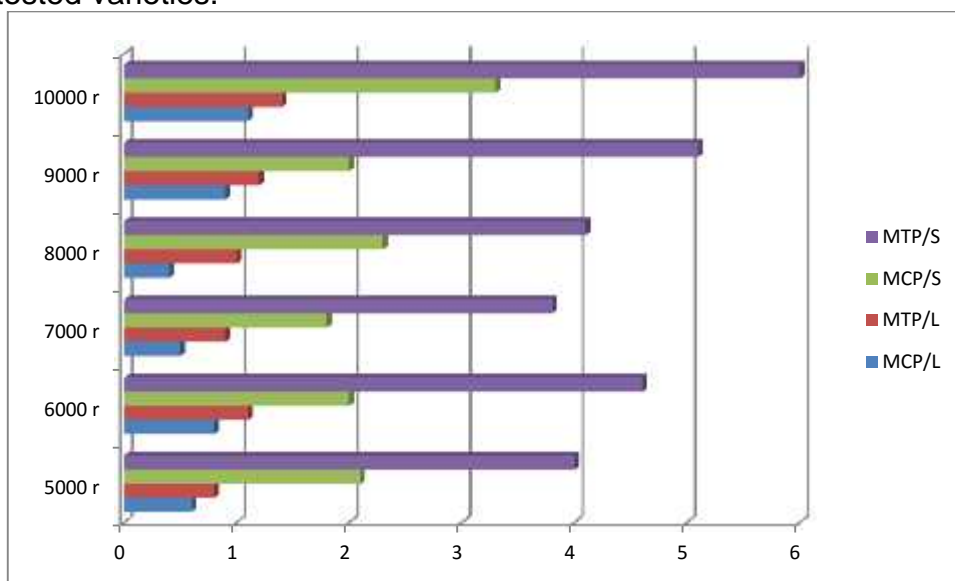


Figure 4. Mutagenic efficiency to Venus variety

Sonone, N.G. and al., (2008), concluded in a similar type of experiment that increased mutagenic effectiveness correspond with an increase unit dose of EMS and gamma rays. They also said that maximum mutagenic effectiveness was recorded in 60 nM EMS, while 40 kR gamma rays treatment showed minimum effect.

CONCLUSIONS

Experiments with multiple doses of X-ray irradiation for 2 successive generations and setting their mutagenic efficiency was carried out by calculating the frequency of occurrence of mutations and percent survival of the plant.

Hereditary characteristics of the material subjected to different doses of X-rays, reacted differently. It was found that Tamburesti variety, which is middle late and smaller seed size, mutagenic efficiency occurs at higher doses comparative with Venus variety, which is late and has larger seeds, where mutagenic efficiency occurs at smaller doses.

Maximum mutagenic efficiency of X radiation in Tamburesti variety was met in dose of 8000r and in Venus Variety in the dose of 5000r.

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