THE MORPHOLOGICAL CHARACTERISTICS OF MERLOT PLANTLETS TREATED LASER

CARACTERISTICI MORFOLOGICE ALE PLANTULELOR DE MERLOT OBȚINUTE DIN MERISTEME TRATATE LASER

GIOSANU DANIELA
University of Pitești

Abstract*: The using of laser radiation as a mutagen physical factor allowed obtaining new genotypes, with morpho-physiological modifications. These mutations could lead to the creation of new forms, with valuable features: high productivity, resistant to many diseases or to environmental unfavorable conditions.*

The research was made on "Merlot" grapevine variety, known as a sensitive one to drought and especially to frost. The meristems culture is preferred as an initial material for in vitro method due to its high ability of cell division. Besides, the use of meristems guarantees genetic stability to the descendants. The explants were laser irradiated evenly, for 30 sec, 180 sec, 300 sec and 600 sec. The purpose of this work is to achieve a study concerning the action of laser radiation on the evolution of grapevine meristems, having in view the morpho-physiological variations of plantlets regenerated from these radiated meristems.

Widespread laser utilization- as mutagen physical agents –is especially conditioned by its own emission of radiation characteristics (pronounced mono-chromaticity, coherence and orientation). Explants of "Merlot" have been radiated using a Ne-He laser (power source P=6mW and λ = 632,8 nm), for 30 sec, 180 sec, 300 sec, 600 sec. The meristems reaction was compared with a standard group of plantlets not radiated.

One can see that radiation bring phenotypic changes: asymmetrical disposition of leaves on the sprouts, unequal knot junctions, double sprouts, forked sprouts and dwarf-ness. It also has been observed the apparition of albino plantlets. The behavior of this modified plants cultivated "in situ" remained stable.

INTRODUCTION

The laser radiation is one of the very used mutagen physical factors, because they have a good mono-chromaticity and are coherent. Due to its mono-chromaticity, the laser radiation action with a specific wavelength is absorbed by certain cellular tissues (Corneanu C.G. şi Stoicescu C.G., 1987).

The obtained mutations by using laser treatment could lead to the creation of new forms, with valuable features: high productivity, resistant to many diseases or to environmental unfavorable conditions (Budagovsky A.V., Evseyeva R.P , 1993 , Svetlana D., Aladjadjian A, 1996).

The purpose of this work is to achieve a study concerning the action of laser radiation on the evolution of grapevine meristems, having in view the morpho-

physiological variations of plantlets regenerated from these irrradiated meristems

MATERIAL AND METHOD

The research was made on "Merlot" grapevine variety, known as a sensitive one to drought and especially to frost. The meristems culture is preferred as an initial material for in vitro method due to its high ability of cell division. Besides, the use of meristems guarantees genetic stability to the descendants.(Raicu P., Badea Marcela ,1983)

The explants were laser radiated evenly, for 30 sec, 180 sec, 300 sec and 600 sec with a He – Ne laser (P = 6 mW şi λ = 632,8 nm).

RESULTS AND DISCUSSIONS

The rhysogenesis: All the experimental variants had a rooting percentage of up to 90%, the maxim value – 96.75% - was noted for 600 sec. radiation (see fig.1)

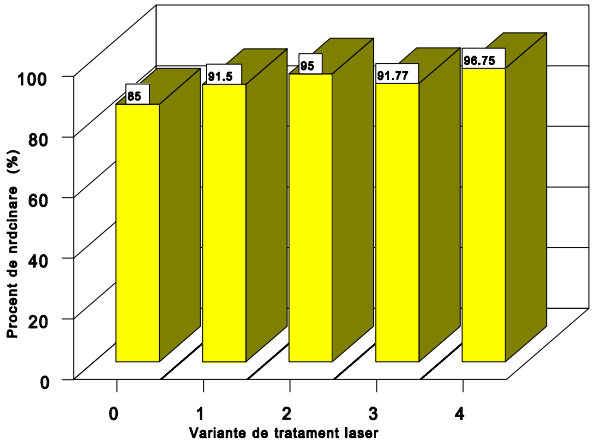

Fig.1 - The dependence of the rooting percentage by the laser treatment variant

The very high percent of rooting allowed the acclimatization of plants, with a good radicular system, under specific conditions of humidity (60-70 %) and temperature (24-25 %), over a period of 35 - 40 days.

Growth values during springtime are listed in the table 1:

Table1

Interdependence of some parameters (height and number of leaves/sprout) during the acclimatization and the variant of laser treatment.

Variant Time of exposure (sec)	Control	30	180	300	600
Average value Height (cm)	27,200	36,500*	30,650	30,587	24,350
Average value Leaves number/sprout	6,750	8,000	7,250	7,000	6,250

*Note: * -significant differences for DL > 5 %*

Similar to the gamma irradiation treatment, using the laser radiation left no significant differences between the experimental samples regarding the morphological characteristics of the plants (height and number of leaves/sprout). Nevertheless one can see a stimulation of the plant growth during the 30 sec. exposure compared with the 600 sec. (36,5 cm compared with 24,35 cm and 8 leaves/sprout against an average of only 6,25 leaves/sprout respectively).

Fig.2 - Laser radiated sprout (180 sec), during acclimatization

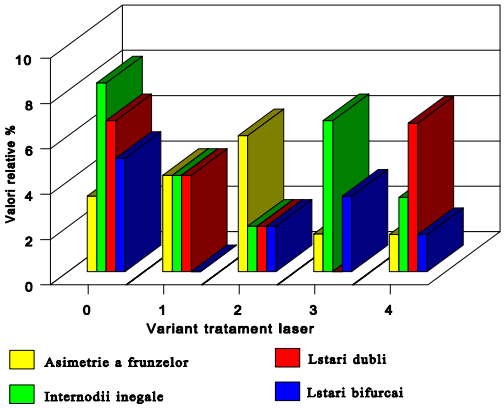

Fig.3 - Variation in the number of dwarf plants (relative values) laser tratment variant, for Merlot sort

During laser radiation of the "Merlot" grapevine plants have been observed changes in the plants morphology as: asymmetrical disposition of leaves on the sprouts, unequal knot junctions, double sprouts, forked sprouts and dwarf -ness.

Morphological changes are comprehensive during the "in vitro" cultivation for all the grapevine plants regardless of provenience, either standards or experimental variants.

Forked sprouts phenomenon is diminishing with the increment of time exposure at radiation, except the 30 sec exposure where forked sprouts are absent.

Double sprouts occure in maximum percentage (6,66 %) in the standard lot as well in the variant of the maximum raqdiation exposure of 600 sec. (6,55 %). Opposite ,the phenomenon is absent to the plants belonging to the experimental lot of 300 sec radiation exposure , but at this particular lot we observe a 1,66%

percentage of albino plants, a phenomenon that does not occurred during the experiments with gamma irradiation.

Fig. 4. Sprout with double knot, consequence of laser radiation for 600 sec; pronounced phenomenon of rhysogenesis

The analysis and experiments of the morphological changes in the regenerated plants from the meristems cultures in regards of the evaluation of genetically variability.

CONCLUSIONS

- In the treatment with laser radiation the rhysogenesis process is very pronounced over all the radiated variants with a rooting percentage above 90%.This allowed a better acclimatization of the regenerated plants.
- Laser radiation bring phenotypical changes: asymmetrical disposition of the leaves on the sprouts, unequal knot junctions, double sprouts, forked sprouts, as well as the occurrence of albino plants. Cultivating this regenerated plants „in situ" the modifications suffered were stable.
- Gamma irradiation and laser radiation of the explants produced a sort of dwarf grapevine plants of outstanding interest in practice.
- The experimental results shows evidence of the relevant action of the physical factors over the „in vitro" evolution in the grapevine cultures.

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