

THE EFFECT OF CHEMICAL MUTAGEN AGENTS ON SOME MORPHOLOGICAL CHARACTERS AT *SILYBUM MARIANUM*

EFFECTUL AGENȚILOR MUTAGENI CHIMICI ASUPRA CARACTERELOR MORFOLOGICE LA ARMURARIU (*SILYBUM MARIANUM*)

BLAJ Valeria¹, C. LEONTE², Gh. ȚÎRDEA²,
Ana-Maria POPA²

¹Sanitary Veterinary Authority, Bacau

²University of Agricultural Sciences and Veterinary Medicine, Iassy

Abstract: *Silybum marianum* is an annual, herbaceous medicinal herb of Mediterranean origine, belongs to the Compositae family, and has genom $2n = 34$ chromosomes. Our study emphasises the modification upon the germination capacity, length of the root, rhythm of growing of the stem at *Silybum marianum*, our purpose being to determine the effects of some chemical mutagen agents with different concentrations (colchicines, methyl ester of sulphonic methane acid and hydroxylamine) upon the morphological characters. These mutagen agents determine a certain variability to the initial biological material, which leads by repeated selections to the identification of valuable mutant genotypes.

Rezumat: *Silybum marianum* este o plantă medicinală erbacee, anuală, din familia Compositae, originară din zona mediteraneană ($2n=34$). Scopul cercetărilor a fost determinarea efectelor unor agenți mutageni chimici (colchicina, esterul metilic al acidului metan sulfonic și hidroxilamina), asupra caracterelor morfologice la *Silybum marianum*. Tratamentele cu diferite concentrații ale agenților mutageni s-au făcut la semințe. Aceste caractere vor fi urmărite în continuare și în generația M2 când preconizăm identificarea unor genotipuri mutante valoroase.

MATERIAL AND METHODS

The biological material used in our experiments was *Silybum marianum* seeds treated with chemical mutagen substances. The treatments were made with mutagen agents: colchicines (C), methyl ester of sulphonic methane acid (EMAM) and hydroxylamine (HA). Colchicines were used in five concentrations: 0,01%, 0,05%, 0,10%, 0,15% și 0,20%, methyl ester of sulphonic methane acid (EMAM) : 0,0125%, 0,025%, 0,050% hydroxylamine (HA) : 0,005%, 0,010% și 0,10%. The treatments with different concentrations of mutagen agents were made to *Silybum marianum* seeds, for 6, 12 and 24 hours.

All the analyses were made in the laboratory the germination of seeds was made in Petri vases at room temperature (20°C-24°C).

The data/results obtained were processed by the statistical method that is the analysis of the variables and the determination of the limit differences.

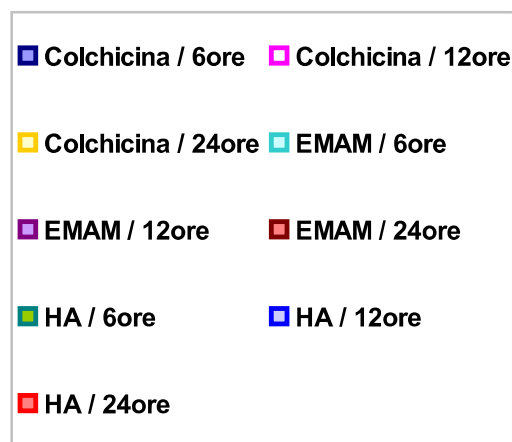
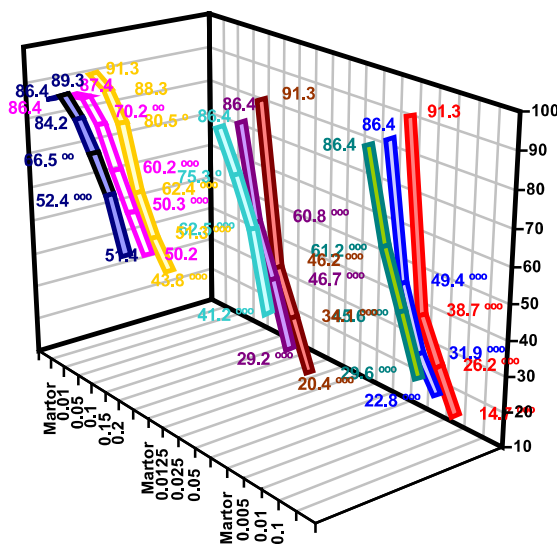
RESULTS AND DISCUSSIONS

The analysis of the germination capacity at control variant shows values between 86,4% and 91,3%. Treatments with colchicines at low concentration, 0,01%, on seeds for 6 and 12 hours influenced positively the germination capacity of seeds with values between 89,3% and respectively 87,4%, but the differences at control variants were insignificant.

Germination capacity diminished with the bigger colchicines concentration and for a longer duration, 0,20% and exposure time, 24 hours, recording 43,8% germinated seeds (fig. 1). The treatments made with EMAM diminished the germination capacity of seeds much more compared to the colchicines treatments.

The analysis of the milk thistle germination capacity after HA treatments (fig. 1) in all used concentrations, differences at the control variants were very significant.

Germination capacity



(%)

Fig. 1. The effect of chemical mutagen agents upon germination capacity (%)

Another analyzed character was the length of the root which had at control variants values between 42,61 mm and 44,62 mm.

The colchines treatments, at low concentrations, 0,01% and 0,05%, had stimulatory effects upon the rhythm of growing of the roots at *S. marianum* meristem (fig. 2). Thus, the colchines treatments in concentration 0,01% had 41,34 mm for 6 hours and 42,66 mm for 12 hours; but the colchines treatments in concentration 0,05% had 42,11 mm for 24 hours and 43,60 mm for 12 hours.

Length of the root

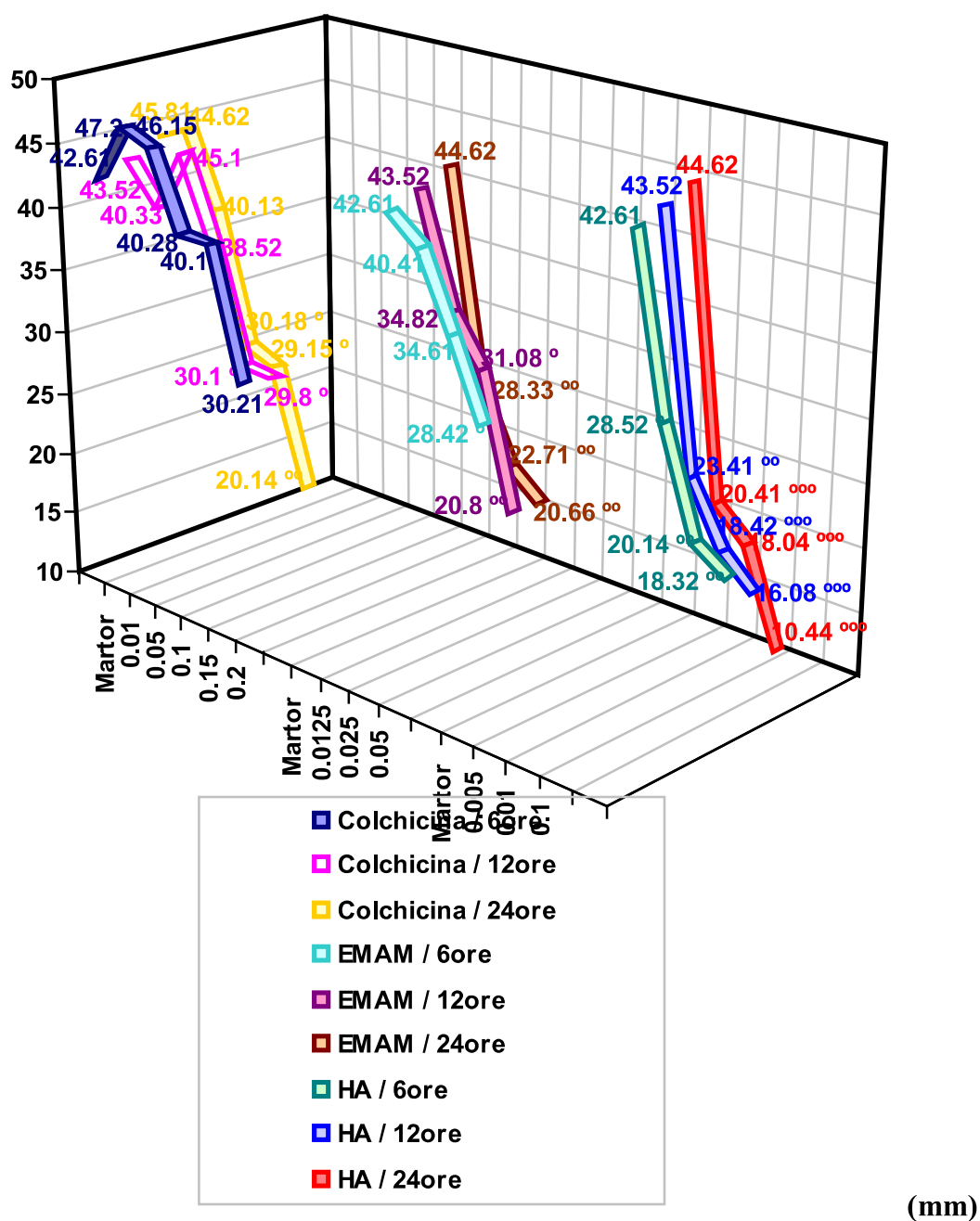


Fig. 2. The effect of chemical mutagen agents upon length of the root

The methylic ester of sulphonic methane acid treatments had an inhibitory effect on the rhythm of growing the root in all three concentrations and especially for maximum time exposures of 24 hours.

Hydroxylamine had the greatest effect upon the rhythm of growing of the root, even at 0,005% concentration, recording 20,41 mm for 24 hours exposure and 28,5 mm for 6 hours exposure. At the maximum concentration of 0,10%, this character had 10,44 mm for 24 hours exposure and 18,32 mm for 6 hours exposure at mutagen agents. In all variants the differences at the control variants were very significant. In control variants, the average length of the stem had 28,42 mm for 6 hours exposure and 40,11 mm for longer time exposure in distilled water, but the differences were not significant (fig. 3).

The colchines treatments, at low concentrations, 0,01% and 0,05%, had stimulatory effects upon rhythm of growing of the stem with values between 41,34 mm and 43,60 mm, but differences at the control variants were insignificant.

The methylic ester of the sulphonic methane acid treatments determined inhibitory effects upon rhythm of growing of the stem, for all variants concentrations and for the three times of exposure.

The rhythm of growing stem was more influenced by the hydroxylamine treatments in 0,010% and 0,10%.

The differences at control variants had different degrees of significance in all variants of treatment.

The rhythm of growing the stem (mm)

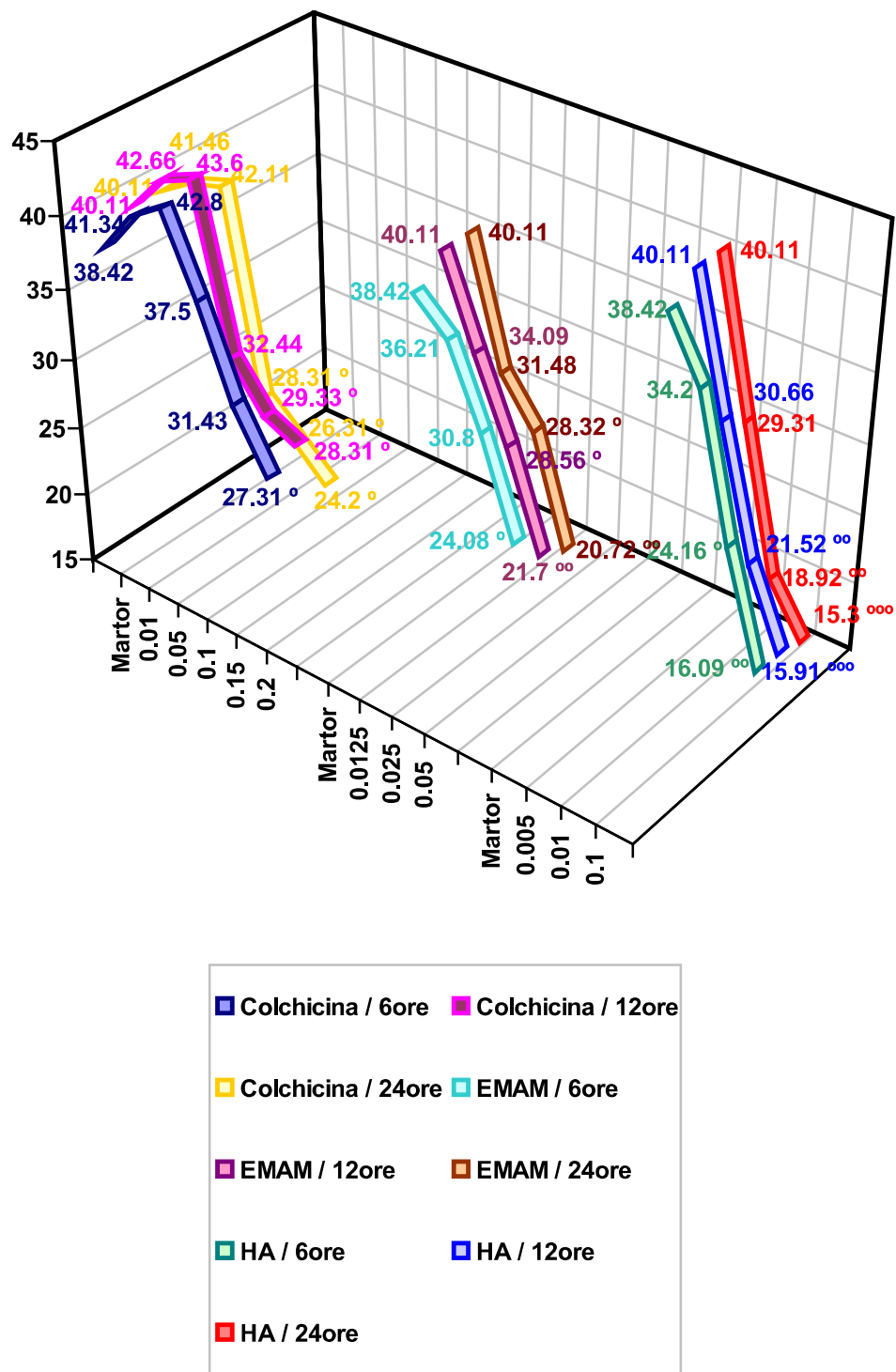


Fig. 3. The effect of chemical mutagen agents upon rhythm of growing the stem

CONCLUSIONS

In order to obtain some lines with valuable characters, we increased the variability by using chemical mutagen agents: colchicines(C), hydroxylamine (HA) and methylic ester of sulphonic methane acid (EMAM).

The germination capacity of seeds is one of the first tests that reflect with certainty the effect of mutagen chemical substances used, comparing average values of the character for each experimental variant with DL 50 value. From the comparison of the results obtained we noticed that HA had the strongest mutagen effect, followed by the methylic ester of sulphonic methane acid(EMAM) and colchicines(C).

The rhythm of growing of the root and stem at *S. marianum* decreased when the concentration of three mutagen agents increased, and also with the increasing time of exposure of 6 hours and 24 hours .

These correlations allow us to appreciate correctly the mutagen efficiency of the three chemical substances used, with the help of the two characters.

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