

## THE INFLUENCE OF MAGNETIC FLUIDS ON THE GERMINATION AND GROWTH OF THE WHEAT SEEDLINGS

VOICA Constantin\*, POLESCU Lucia\*, LAZĂR Daniela Anca\*

**Abstract:** The influence of the magnetic fluid relayed on water on germinating force and germinating ability, number of roots and length of the radicles and stems were determined for wheat caryopsis from cultivar 'Iulia'. The wheat caryopses were treated 12 and 24h with magnetic fluid relayed on water (50G) in different concentrations (0.25 ‰; 0.5 ‰; 0.75 ‰ and 1.0 ‰). The germinating force of the wheat caryopsis treated for 12 and respectively 24h with magnetic fluid presented only a small variation in comparative with the control, meantime, in the case of the germinating ability the obtained values were larger in almost all used concentrations than in control. In the case of the 12h treatment, the growth of the radicles and stems was stimulated by all used concentrations of magnetic fluid. Also, a stimulation of the growth of the radicles was observed in case of the 24h treatment. Data regarding the influence of magnetic fluid on average number of radicles showed a positive influence of the 0.25‰ and 0.50‰ both in the case of 12 and 24h treatments.

**Keywords:** Wheat, 'Iulia' cultivar, magnetic fluids, germinating force, germinating ability, growth

### Introduction

A special interest is presented by the plant behaviour in biocompatible magnetic fluids.

Audus (1960) studied the root development in several plants like *Lepidium sativum*, *Phleum pratense* and *Poa nemoralis*, in magnetic fields. Roots were oriented to form 90 angle with the surface of Earth and the magnetic poles were parallel with this surface. The roots, initially vertically oriented, changed their direction towards the zone without magnetic field so as to escape from the zone with high magnetic flux.

Van Dyke and Halpern (1965) pointed out that plants respond to the magnitude and direction of the magnetic field. It was observed that root degeneration and growth inhibition occurred in the presence of a strong magnetic field. This is suggesting that there is a threshold above that the stimulator effect of the magnetic field disappears leading to growth inhibition.

Also, Corneanu et al. (1995), in experiences carried out on *Mammillaria duwei* observed a stimulation of the growth after adding of the magnetic fluids in the culture medium.

In this paper it was followed the influence of the magnetic fluid relayed on water on germinating force and germinating ability, number of radicles, stem and radicles lengths of the wheat caryopsis from cultivar 'Iulia'.

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\*Universitatea din București, Facultatea de Biologie, Aleea Portocalelor nr. 1-3, RO-060101-București

### Material and methods

The experiment was carried over on caryopsis of wheat from cultivar 'Iulia', which were treated 12 and 24h with magnetic fluid relayed on water (50G) of different concentrations (0.25 ‰; 0.5 ‰; 0.75 ‰ and 1 ‰).

After 12 and respectively 24h, time in which the caryopsis were kept in different concentrations of magnetic fluid relayed on water, they were transferred into Petri dishes on filter paper wetted with distilled water.

In each Petri dish, 50 caryopses were introduced, for each variant were used 4 replications. Also, a control variant was prepared (caryopsis non treated with magnetic fluid).

For these caryopsis, the germinating force and germinating ability were determined, the average number of radicles, lengths of radicles (measuring the longest radicle) and stems.

The growth of the radicle and stem were determined on seedlings of 10 days.

### Results and discussions

From the analysis of the data regarding the influence of different concentrations of magnetic fluid on germinating force and germinating ability (Table 1) resulted that the germinating force of the wheat caryopsis treated for 12 and respectively 24 h varied very little in comparison with the control, a small stimulation was obtained in the case of the treatment with concentration of 0.50‰ for 12h, for which the germinating force was 96%, meantime the value of the control variant was 93%. For both treatment durations (12 and 24h) the lowest germinating force was noticed in the case of the caryopsis treated with the 1‰ concentration.

Regarding the germinating ability, the influence of the treatment with magnetic fluid of different concentrations was more obvious. So, in the case of the treatment of the caryopsis for 12h, the values were larger than control for all used concentrations, meantime for the caryopsis treated for 24h, the germinating ability exceeded the control only in the case of the 0.25‰, 0.50‰ and 1‰ concentrations.

The data regarding the influence of magnetic fluid on the growth of stems and radicles (Table 2) shown that in the case of 12h treatment all tested concentrations stimulated the growth of both organs, a larger stimulations being noticed in the case of the radicles. The largest values were obtained for 0.25‰ and 1‰ concentrations. In the case of 24h treatment was noticed a stimulation only for the growth of radicles.

The data for the influence of the magnetic fluid on the average number of radicles (Table 3) indicated a positive influence of the 0.25‰ and 0.50‰ concentrations both for the case of 12h and 24h treatments.

### Conclusions

The germinating force of wheat caryopsis treated 12 and 24h with magnetic fluids varied very little in comparison with the control, meantime in the case of germinating ability the obtained values for all tested concentrations were larger than values of the control.

The growth of the radicles and stems was stimulated by all used concentrations of magnetic fluids without the case of the 24h treatments in which was noticed stimulation only for radicular growth.

The average number of radicles was positively influenced by the 0.25‰ and 0.50‰ concentrations both for the case of 12h and 24h treatments.

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Table 1 The influence of magnetic fluids on germination of the wheat caryopsis from cultivar Iulia (average values)

TREATMENT	Treated 12 hours		Treated 24 hours	
	Germinating force	Germinating ability	Germinating force	Germinating ability
Control	93%	95%	92%	93%
0.25‰	93%	97%	91%	96%
0.50‰	96%	99%	91%	94%
0.75‰	93%	98%	92%	93%
1‰	91%	99%	90%	96%

Table 2 The influence of magnetic fluids on growth of the wheat seedlings from cultivar Iulia (average values expressed in cm)

TREATMENT	Treated 12 hours		Treated 24 hours	
	Root	Stem	Root	Stem
Control	17.27	9.56	15.12	10.49
0.25‰	20.94	10.58	18.10	9.84
0.50‰	19.59	9.95	19.01	9.41
0.75‰	20.16	10.32	19.19	10.17
1‰	21.29	10.41	19.71	9.71

Table 3 The influence of magnetic fluids on the average number of roots

TREATMENT	Treated 12 hours	Treated 24 hours
Control	2.95	2.92
0.25‰	3.02	2.94
0.50‰	3.02	2.94
0.75‰	2.93	2.89
1‰	2.94	2.87

## INFLUENȚA FLUIDELOR MAGNETICE ASUPRA GERMINAȚIEI ȘI CREȘTERII PLANTULELOR DE GRÂU

**Rezumat:** s-a determinat influența fluidului magnetic pe bază de apă asupra energiei și facultății germinative, asupra numărului de rădăcini, precum și asupra lungimii radicelelor și tulpinițelor de la cariopsele de grâu din soiul Iulia.

Cariopsele de grâu au fost tratate 12 și 24 de ore cu fluid magnetic pe bază de apă (50 G) în diferite concentrații (0,25‰; 0,5‰; 0,75‰ și 1‰).

Energia germinativă a cariopselor de grâu tratate 12 și respectiv 24 de ore cu fluid magnetic a variat foarte puțin față de martor, în timp ce în cazul facultății germinative valorile obținute au fost mai mari la aproape toate concentrațiile cu care s-a experimentat, în comparație cu martorul.

În cazul tratamentului de 12 ore, creșterea rădăcinițelor și a tulpinițelor a fost stimulată de toate concentrațiile de fluid magnetic utilizate. O stimulare a creșterii rădăcinițelor s-a observat și în cazul tratamentului de 24 de ore.

Datele privind influența fluidului magnetic asupra numărului mediu de rădăcinițe a arătat o influență pozitivă a concentrațiilor de 0,25‰ și 0,50‰ atât în cazul tratamentului de 12 ore, cât și a celui de 24 de ore.

**Cuvinte cheie:** cariopse de grâu soiul Iulia, fluide magnetice, energie și facultate germinativă, creștere