GERMINAL CAPACITY TO DIFFERENT LOCAL POPULATIONS OF *CALENDULA* IN HUNEDOARA DISTRICT

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Abstract: *Marigolds (Calendula officinalis L.), were medical plants with a true source of Vitamin C, protean substances, bitterness substances, having an agreeable balmy smell. The profound knowledge of medical plants, inclusively marigolds, it sphere of usage was developed, especially in the middle of last century, of its cropping being very much people interested, because of exceptional therapeutic qualities which possessed and had to base the complex of active biological substances.Calendula officinalis L. was great in treatments of a lot of illnesses, and its administration was very well accepted by the organism, being nontoxic. All these features of marigolds made that the purpose of that paper to be the index identification of laboratory germination to 16 local populations from Hunedoara district. The knowledge of germinal capacity was very important to be assured the necessary number of plants at the emergence. Investigation made offered knew perspectives in direction of germinal capacity testing of those local populations and filling the scientific data base through foundation of identification's methods of germinal capacity in laboratory. Taking in view that the tests of germination of spontaneous flora were very complex, it could consider that a part of seeds couldn't be, anyway, carried out of germinal break. The results obtained through testing and monitoring the germinal capacity of Calendula officinalis L. seeds permitted the identification of some germination indicators of biological material. Investigation brought a data base of valorous reference about germinal capacity of local populations in Western Romania, as Hunedoara district. The present paper belongs to a big work which had like study "Resistance testing of some species of Calendula officinalis L. to Thysanoptera pest attack through different methods/techniques of analysis concerning the improvement of raw material quality", that represented the theme of postdoctoral- dissertation.*

Key words: *Calendula officinalis L., germinal energy, germinal faculty*

INTRODUCTION

Agricultural production depended in a big part by germinal capacity of seeds, it was very important the development of that domain be progressive to all the cropped species at global level. All in all, investigation concentrated on important crops from the economical point of view with the development of tests for germinal capacity evaluation of seeds of cropped plants on a smaller scale and which gradually begun to win importance; that was also the case of medical plants.

Calendula officinalis L. was yearly plant, which usually cropped from seeds, very adaptable to the weather conditions (it needed a lot of sun, but also could resist without it), it were plants that germinated both to darkness and light.

Germinal capacity of seeds expressed through germinal energy and faculty.

Germinal energy expressed through percentage of pure seeds normally germinated in best conditions and in a period of time between 1/3 to ½ from established time for germinal faculty determination. In case of marigolds germinal energy determined to 3-4 days.

The germinal faculty expressed through numerical percentage of pure seeds normally

germinated in best conditions and in certain time, established in case of *Calendula officinalis* L. to 10-12 days.

Seeds of *Calendula officinalis* L. possessed some distinct particularities about germination, it might be of minimum 70-85% to be possible seeding in the field and to assure the necessary number of plants at emergence (POSSO P., 1996; MARTINEZ A., BERNAL H. AND CACERES A.,, 2000).

In labor analysis, germination meant the development from seeds embryo, of those essential structures, that showed the embryo capacity to develop itself in a normal plant in best conditions in the field.

Investigations concerning that domain were made by: POSSO P., (1996); MING L.C., DIAS M.C., VENTRELLA M.C., (1999); NAKAGAWA J. (1999); GREGGAINS V., FINCH-SAVAGE W. E., QUICK W. P., ATHERTON N. M., (2000); MARTINEZ A., BERNAL H. AND CACERES A., (2000); BUDVYTYTE A. (2001); JEVDJOVIĆ R. AND MALETIĆ RADOJKA (2004); BRÂNZILĂ I., (2002; 2004; 2005); CARVALHO PATRICIA REINERS; MACHADO NETO NELSON BARBOSA AND CUSTODIO CECI CASTILHO, (2007).

MATERIAL AND METHODS

Germinal faculty was influenced by the way of feeding and attendance of mother-plant, of conditions of seeds formation, its oldness, seeds blanket (the thickness, texture, the hardness and chemicals constitution).

In quality of biological material was used the seed of marigolds collected from 16 localities of Hunedoara district as it followed: Batiz, Clopotiva, Galati, Hateg, Orastie, Paclisa, Plopi, Pui, Rau Alb, Rau de Mori, Rusi, Santamarie Orlea, Sarmizegetusa, Simeria, Subcetate, Totesti.

Study was realized to Teritorial Inspectorate for Seeds Quality and Seeding Material Timis.

Calendula officinalis L. had heterocarpia as characteristic, it meant seeds formation of different forms and shapes- long big seeds, curved medium seeds and curved ringed small seeds; in present investigations were taken in study all the three categories of seeds (figure 1).

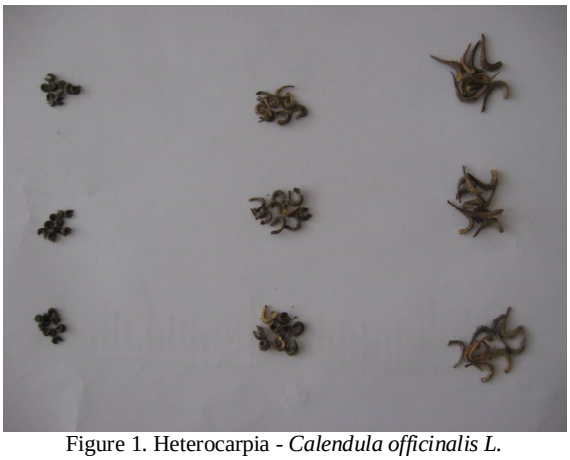

Figure 1. Heterocarpia - *Calendula officinalis L.*

Germinal faculty and energy were determined after normal embryo number, seeds in course of germination and dead seeds.

To determine germinal faculty and energy it was used method BP (the roller). The seeds were put among paper bands of filter roller (germination bed), with pH- of 6.0-7.5 wet filter with free water of organic and inorganic impurities, after that it were covered with another paper for maintaining humidity and introduced them in plastic bags (figure 2.).

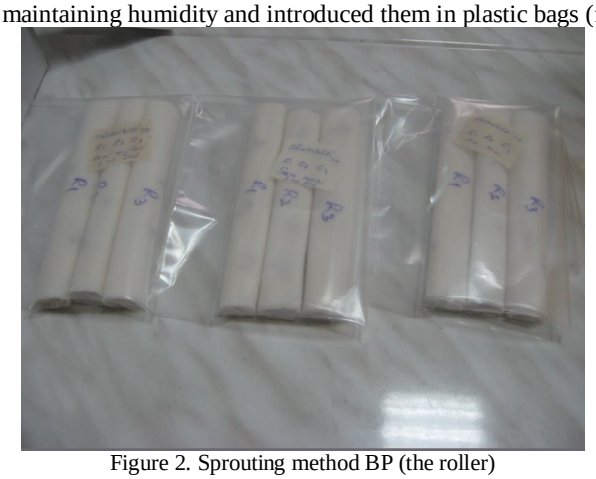

Figure 2. Sprouting method BP (the roller)

Seeds were supposed during 4 days of a treatment for germination interruption, as ante-cooling – to a temperature of 10°C.

After ante- cooling, plastic bags with samples were put in BINDER germinator in vertical position to a temperature of 20°C-16h - 30°C-8h using thermorecorders for automatic reading and displaying of diagram's temperatures.

Marigolds' seed stayed in germinate apparatus during 3-10 days with an embryos intermediate appreciation to 6 days.

The embryos that had a special stage of development had individually been evaluate following the essential parts and classifying the embryo as normal (radicle well developed coleoptil same as the seed length, etc), or abnormal (radicle or stalk deformed, broken cotyledons or detached from the ax, etc).

To the first numbering determined the germinal energy which showed the uniformity and rapidity of germination, and at the end of germination anlysis had determined the germinal faculty; because of a long germination it was made an intermediate reading.

RESULTS AND DISCUSSIONS

Analyzing evolution of *Calendula officinalis L.* seeds met for germination, it observed that in the same experimental conditions, its behavior about parameters taken in study (germinal energy- E% and germinal faculty- G%) was different.

Value of germinal energy in case of collected samples of Hateg locality was of 86.6% for medium and small seeds, respectively 90.0% for big seeds.

The collected seeds from Totesti locality had a germinal energy's value of 0.0% for all the three categories of seed.

The sample of *Calendula officinalis* L. seed collected in Hateg locality possessed a germinal faculty of 96.3% to big seeds, 93.6% to medium seeds and 90.0% to small seeds.

Value of germinal faculty to seeds of local populations of Totesti and Plopi, was the lowest, 0.0% in case of medium and small seeds and 3.3% to big seeds (Totesti), respective

3.3% in case of small seeds, 10.0% to medium seeds and 23.3% to big seeds collected from Plopi locality (table 2).

Table 2

Germinal capacity of *Calendula officinalis* L. seeds collected in Hunedoara district

Local population	Category of seeds	Ist reading (after 3 days) (EG%)	IIIrd reading (after 10 days) (FG%)	Local population	Category of seeds	Ist reading (after 3 days) (EG%)	IIIrd reading (after 10 days) (FG%)
Batiz	Small seeds	10.0	30.0	Clopotiva	Small seeds	33.3	66.6
	Medium seeds	26.6	46.6		Medium seeds	40.0	70.0
	Big seeds	40.0	60.0		Big seeds	56.6	76.6
Galati	Small seeds	63.3	70.0	Hateg	Small seeds	86.6	90.0
	Medium seeds	73.3	80.0		Medium seeds	86.6	93.6
	Big seeds	73.3	83.3		Big seeds	90.0	96.3
Orastie	Small seeds	16.6	63.3	Paclisa	Small seeds	63.3	70.0
	Medium seeds	30.0	76.6		Medium seeds	66.6	76.6
	Big seeds	30.0	80.0		Big seeds	70.0	80.0
Plopi	Small seeds	3.3	3.3	Pui	Small seeds	6.6	10.0
	Medium seeds	3.3	10.0		Medium seeds	23.3	36.6
	Big seeds	10.0	23.3		Big seeds	30.0	36.6
Rau Alb	Small seeds	40.0	73.3	Rau de Mori	Small seeds	10.0	56.6
	Medium seeds	46.6	76.6		Medium seeds	20.0	56.6
	Big seeds	73.3	76.6		Big seeds	26.6	60.0
Rusi	Small seeds	60.0	63.3	Santamarie Orlea	Small seeds	53.3	56.6
	Medium seeds	73.3	80.0		Medium seeds	56.6	66.6
	Big seeds	73.3	86.6		Big seeds	60.0	80.0
Sarmizegetusa	Small seeds	33.3	73.3	Simeria	Small seeds	43.3	46.6
	Medium seeds	43.3	86.6		Medium seeds	50.0	70.0
	Big seeds	60.0	86.6		Big seeds	56.6	90.0
Subcetate	Small seeds	20.0	40.0	Totesti	Small seeds	0.0	0.0
	Medium seeds	26.6	56.6		Medium seeds	0.0	0.0
	Big seeds	30.0	63.3		Big seeds	0.0	3.3

Germinal energy of laboratory, reported to number of germinal seeds, significant varied between localities and bordered in limits of 0.0- 90.0%. To medium and small seeds were between 0.0- 86.6%, and to big seeds between 0.0- 90.0%. (figure 3).

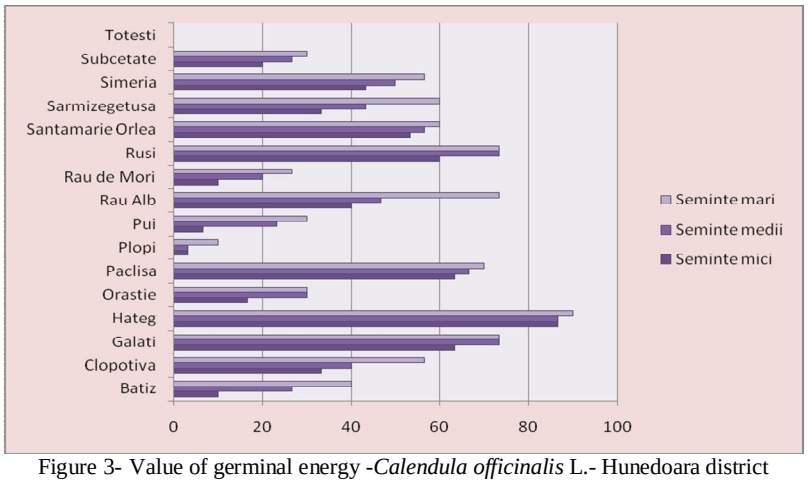

Figure 3- Value of germinal energy -*Calendula officinalis* L.- Hunedoara district

In average of investigation period, germinal faculty of marigolds seeds, reported to number of germinal seeds, varied between 0.0- 96.3%. It had tentative of increasing from small seeds to big seeds (figure 4).

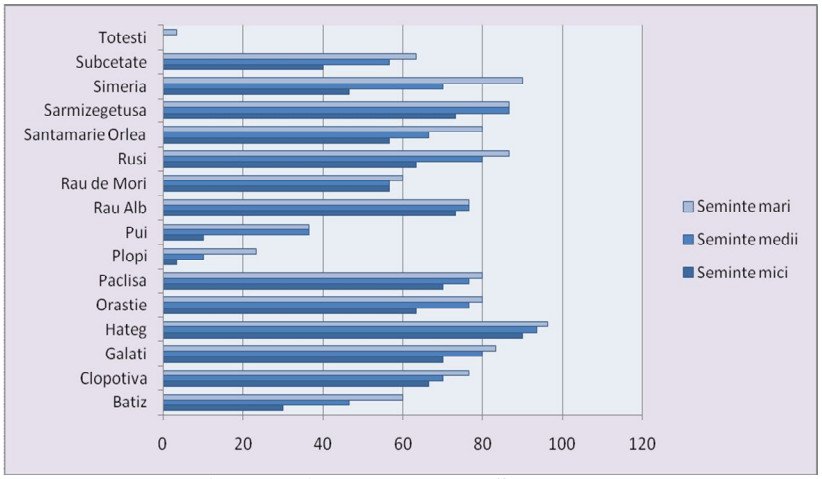

Figure 4- Value of germinal faculty -*Calendula officinalis* L.- Hunedoara district

Seeds of small category had a germinal faculty between 0.0- 90.0%, those of medium category between 0.0- 93.6%, and to big seeds that index was 3.3- 96.3%.

CONCLUSIONS

After investigation made, it observed that germinal energy had a value between 0.0 - 86.6% for medium and small seeds and 0.0- 90.0% for big seeds.

Value of germinal energy to local populations seeds taken in study reported to category of seed varied between 0.0- 86.6% to medium and small seeds and 0.0 - 90.0% to big seeds.

Big seeds of *Calendula officinalis* L. of Hateg locality had the biggest germinal faculty (96.3%), face to medium and small seeds from Totesti locality which hadn't germinate.

Seeds of big category had the germinal capacity higher than medium and small seeds.

Seeds of *Calendula officinalis* L. possessed a germination of minimum of 70-85% could be seeded in the field assuring the necessary number of plants at emergence (Galati, Orastie, Rau Alb, Rusi, Sarmizegetusa, Clopotiva, Hateg, Paclisa, Simeria, Santamarie Orlea), and seeds that had a germinal capacity under that limit hadn't be seeded in the field (Batiz, Plopi, Subcetate, Pui, Totesti, Rau de Mori).

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