

## THE CUMULATIVE EFFECT OF KINETIN AND AIA ON SOYBEAN ORGANOGENESIS

Marele Daniela \*

\*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea; Romania, e mail: [marele\\_dana@yahoo.com](mailto:marele_dana@yahoo.com)

**Abstract:** *In our study kinetin and AIA were used for making the culture medium more effective. The nature of the phytohormones used, and also their concentration, the differences of the hormonal balances have an important role in the organogenesis processes.*

**Key words:** soybean,, organogenesis, cytokinins, phytohormones,auxines,hormonal balance ;

### INTRODUCTION

Literature outlines the physiological cumulative effect of auxin and cytokinins , effect called hormonal balance(CACHIȚA-COSMA și colab., 2004; CACHIȚA-COSMA și Camelia SAND, 2000; RAICU și colab., 2000) .

SKOOG și MILLER (1957), founded the concept of plant hormones control of organogenesis, demonstrating experimental the fact that his roots and stems differentiation in vitro plantlets are, for dependence ratio is auxin / cytochinin, in the environment.

Auxins intervenening in numerous physiological processes and interact with various endogenous substances, particularly with other phytohormones, especially with cytokines, gibberellins and ethylene (BOXUS et al., 1995).

The neogenesis of an organism is a phenomenon that calls the non-operation of numerous physiological processes leading to the mitotic activity by which a meristematic cell acquires the ability to divide again (BIGOT, 1980). This activation precedes the phase of organogenesis, which is characterized either by its direct function of a 'model' organ that want to share a timetable; or by forming a mass of cells unorganized (callus) the ability of organogenesis materialize later.

### MATERIAL AND METHODS

In our study we used cultivars of soybean: Diamond, Pearl and Agate introduced into the culture medium Murashige-Skoog (1962).

Auxins used to induce cell division and rootedness process were acid indolilacetic (AIA) in a concentration of 0.5-2.0 mg / l. Used cytokinins were kinetin (K) (6-furfuryl-aminopurine) .

MILLER and colab., have identified the first cytokinins - kinetin (6-furfurilaminopurina), which was proven by showing that stimulates

caulogenesis or neoformation of buds, to the inoculants, of these strains is generating.

(SÖDING ) mentioned the fact that the increases in length of plant cells, AIA loosen the connections of cellulose microfibrils in the pectocelluloses cellular wall.

Four experimental variants were made in terms of germplasm used source of explant culture media and the combination of growth regulators.

During the experiments were carried out observations at 15, 30 and 60 days of culture, the number of shoots on meristem height and rooting shoots (number of main roots).

Tabel 1

*Layout of the experiments carried out to optimize a protocol for direct organogenesis of soybean meristems*

<i>Experiment</i>	<i>Explant source</i>	<i>Cultivars</i>	<i>Medium and plant growth regulators</i>
I	<i>Stem and crown meristems</i>	Diamant Perla Agat	B5 (0,2 mg/l ANA) B5 (0,2 mg/l AIA +0,2 mg/l 2iP); <i>at 30 days transferred to the same medium</i> LS (0.004 mg/l PIC+1 mg/l K <i>at 30 days transferred to RL(0.2 mg/l AIA)</i>
II	<i>Stem meristems</i>	Diamant Perla Agat	MS ( <i>plant growth regulator free</i> ); <i>at 15 days transferred to the same medium</i> LS (0.004 mg/l PIC+1 mg/l K <i>at 15 days transferred to RL(0.2 mg/l AIA)</i>
III	<i>Stem meristems</i>	Diamant Perla Agat	MS (0.004 mg/l PIC+1 mg/l K; <i>at 15 days transferred to MS (0.2 mg/l AIA)</i> LS (0.004 mg/l PIC+1 mg/l K) <i>at 15 days transferred to RL(0.2 mg/l AIA)</i>
IV	<i>Meristeme tulpinale Stem meristems</i>	Diamant Perla Agat	LS (0.003; 0.004; 0.005 mg/l PIC și 0.5; 1.0 mg/l K) <i>at 15 days transferred to RL(0.2 mg/l AIA)</i>

## RESULTS AND DISCUSSION

The best results on the behavior of genotypes were observed at 60 days of culture when grown on 25% of meristems developed LS environment suitable for transplanting plants, compared with 10% in the medium B5. It also notes that both coronary meristems and stems formed the seedling with normal growth, noting that coronary meristems develops a large number of explants.

Tabel 2

*Comparison of media MS (plant growth regulators free) and LS  
(0.004 mg/l PIC+ 1,0 mg/l K, for 15 days, RL+0.2 mg/l IAA afterward)  
after 60 days of culture (Experiment II)*

<i>Cultivar</i>	<i>Number of shoots/meristem</i>	<i>Number of roots/meristem</i>	<i>Height (mm)</i>
Diamant	5,6	1,7	2,6
Perla	5,0	1,1	1,8
Agat	5,8	2,3	2,6
<i>Average MS</i>	5,5	1,7	2,3
<i>Average LS</i>	6,6	3,7	3,2
<i>General average</i>	6,0	2,7	2,5
<i>Signification</i>			
<i>Cultivar</i>	*	*	Ns
<i>Medium</i>	*	ns	Ns
<i>Cult.×Medium</i>	ns	ns	Ns
<i>LSD 5%</i>			
<i>Cultivar</i>	0,82	1,00	-
<i>Medium</i>	0,53	-	-

Reported differences are due entirely surplus growth regulators which benefited LS culture medium, referring to the presence of kinetin (K) and indolilacetic acid (AIA).

Table 3 shows the influence indolilacetic acid (AIA) in mg/l on callus and rootedness process in three cultivars of soybean.

The data presented highlights the differences in behavior genotypes influence AIA introduced into the culture medium. If all three caulogenesis growing phenomenon does not show any trend, if rootedness process and callus are some important aspects. It is noticed, at the level of both phenomena that the AIA favourable dose is ranging from 1.0 to 1.5 mg/l. in the culture environment, an aspect and phenomenon already noted in the dedicated literature, namely that AIA has a noticeable effect in generating the risogenesis process (CHIRILEI et al., 1970, BANDICI, 2001).

Under this issue, one may notice that, in the case of the three cultivars used in the experiment, the risogenesis occurs at a level of 27.4%, one may notice a difference amongst genotypes behaviours, in the sense that, while in the case of Diamond and Pearl varieties the response at risogenesis is only 2.4%, for the Agate variety, the differences are striking, with 8-10% above the previous two varieties mentioned. However, the same remark does not go for calusogenesis process, which, per genotypes, is of 10.2%, while the differences between genotypes are less striking. Analyzing the results it appears the level of in vitro cultures exist, at least in

soybean ,the negative correlation between risogenesis and callusgenesis, on the one hand and the caulogenesis on the other hand.

Tabel 3

*Cumulative effect of K and AIA on soybean organogenesis*

Cultivar	K+AIA (mg/l)	Evolution of organogenesis %			
		No development	Caluso- genesis	Rizo- genesis	Caulo- genesis
Diamant	0,0	100,0	0	0	0
	0,5	68	40	18	48
	1,0	53	45	23	53
	1,5	54	50	38	62
	2,0	45	38	36	57
	3,0	63	26	20	40
	%	56,6	39,8	27,	52,0
Perla	0,0	100,0	0	0	0
	0,5	63	33	23	50
	1,0	60	46	29	52
	1,5	58	52	34	63
	2,0	60	41	26	50
	3,0	46	32	16	38
	%	57,4	40,8	25,6	50,6
Agat	0,0	100,0	0	0	0
	0,5	48	48	29	57
	1,0	43	53	36	66
	1,5	51	58	42	66
	2,0	60	50	31	52
	3,0	66	31	18	38
	%	35,4	48,0	31,2	55,8
$\bar{X}$ /genotip		<b>49,8</b>	<b>42,9</b>	<b>27,9</b>	<b>52,8</b>

Establishing different hormonal balances and prove at organogenous differences (caulogenesis-rootedness) leads to the conclusion that the most efficiency formula is the combination K + AIA .

Agat cultivation of three varieties had the best results in combination K + AIA: if caulogenesis (48%) and rootedness process (31.2%).

The response hormonal balance highlights a negative correlation between caulogenesis and risogenesis, if visualize percentage reports highlighted the combination K+ AIA.

## CONCLUSIONS

The data presented show the favorable effect of combinations of

kinetin and auxin in the sense of favoring the process of organogenesis.

However highlights that the emergence of differences in response based on genotype variety Agat having the most favorable combinations mentioned in response to hormonal balance.

Analyzing the influence of auxin and cytokinins in the process of organogenesis soybeans, it appears unquestionably need their presence Murashige-Skoog nutrient environment. In all cases it has been found that the passage of the culture medium of the explant on the base without the involvement of growth hormone are not activated organogenesis

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