

# NEW TOMATO HYBRIDS DEVELOPED AT THE S.C.D.L. BUZĂU

## HIBRIZI NOI DE TOMATE OBȚINUȚI LA S.C.D.L. BUZĂU

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**Abstract.** *Between 2003–2008 there were studied in glasshouse, solarium and field conditions at S.C.D.L. Buzau, four early tomato hybrids  $F_1$  (*Lycopersicon esculentum* – Mill.) comparing to  $IH_{50}F_1$ . To all four hybrids, created at S.C.D.L. Buzau,  $H_1Bz$ ,  $H_2Bz$ ,  $H_3Bz$ ,  $H_4Bz$ , we can observe that the heterosis had noticeable manifested to the main studied characters  $H_1Bz$ ,  $H_2Bz$ ,  $H_3Bz$ ,  $H_4Bz$  were dignified, because of their productivity and high quality fruits, exceeding to the parents and the control variant. According to the results obtained, it can be observed that the hybrids obtained, cultivated in glasshouse, solarium and open field, had different yields pertained to the control variants and yearly yields. From the earliness point of view, any analyzed hybrid did not surpassed  $H_3Bz$  hybrid in all three crop systems. According to the results obtained,  $H_1Bz$  was homologated in 2006, finally called SIRIANA  $F_1$ . Nowadays  $H_2Bz$  hybrid is in homologation process.*

**Key words:** tomato, hybrid  $F_1$ , heterosis

**Rezumat.** *În perioada 2003 – 2008 s-au studiat, în condiții de seră, solar și câmp, la S.C.D.L. Buzău, patru hibrizi  $F_1$  de tomate timpurii (*Lycopersicon esculentum* – Mill) cu creștere nedeterminată ( $SP^+$ ) comparativ cu  $IH_{50}F_1$ . La toți cei patru hibrizi creați la S.C.D.L. Buzău,  $H_1Bz$ ,  $H_2Bz$ ,  $H_3Bz$ ,  $H_4Bz$ , se observă manifestat vizibil fenomenul heterozis la principalele caractere studiate. Din rezultatele obținute reiese că hibrizii obținuți, cultivați în seră, solar și câmp, au avut producții diferite atât față de martor, cât și de la un an la altul. S-au evidențiat prin productivitate și fructe de calitate față de genitori și martor  $H_1Bz$ ,  $H_2Bz$ ,  $H_4Bz$ . Din punct de vedere al timpurietății, nici un hibrid analizat nu a depășit hibridul  $H_3Bz$  în toate cele trei sisteme de cultură. În urma rezultatelor obținute, hibridul  $H_1Bz$  a fost omologat în anul 2006 sub denumirea definitivă de SIRIANA  $F_1$ . În prezent se află în curs de omologare hibridul  $H_2Bz$ .*

**Cuvinte cheie:** tomate, hibrid  $F_1$ , heterozis.

## INTRODUCTION

For higher valorization of the biological material sources that exists in the tomato amelioration program, there is necessary studying the genetic potential of this material in order to find the most efficient valorization methods to achieve new varieties and hybrids with superior qualities (Crăciun, T., 1981). Obtaining hybrid combination of tomatoes with a high productivity level is very important these days in tomato amelioration (Leonte, C., 1996). Until now, in our country there were made relatively little researches concerning variability and heredity of the quantitative aspects in tomatoes. Most knowledge about variability and

heredity of the quantitative aspects are inferences from the amelioration studies or researches made many years ago.

Lately, the surfaces cultivated with tomato hybrids have extended in all regions of our country, but over 95% of these are importation, the hybrid seeds being commercialized at very big prices. Even if these hybrids that are cultivated now in our country have indubitable qualities in what it concerns earliness, productivity, transport and keeping resistance, qualities that the varieties used until now lack, there has been observed that besides the high commercialization price of the seeds, the hybrids also have some inconveniences.

## MATERIALS AND METHODS

During 1996 – 2005, at the S.C.D.L. Buzău, there were purchased and studied over 200 tomato genotypes. Each provenance introduced in the collection field had been first subjected to a preliminary study, in order to stocktake the helpful aspects and valorize it.

Nowadays, the collection field has over 200 derivatives, having as main objective their conservation, and the working field has 30 genitors SP<sup>+</sup> (indetermined increase) and 30 genitors Sp (determined increase), many of these can be recommended as valuable varieties because of their advanced stage of amelioration.

In order to establish some productive and high quality hybrid combination, in selecting the lines in the working field there were followed up the principles of ensuring a genotype, ecological and geographical diversity, morphological diversity and also their economic value. There was pursued that the partners be averted from the genetic and geographic point of view, and also to be characterized by valuable biological properties in order to transmit them to the descendents.

The hybrids obtained, H<sub>1</sub>Bz, H<sub>2</sub>Bz, H<sub>3</sub>Bz și H<sub>4</sub>Bz, have been studied for six years in comparative cultures for orientation and competition, organized in field, solarium and glasshouse, using as a control variant the Romanian hybrid IH – 50. Also, the four hybrids had been compared with each ones genitors, considering the hybridizing formula: H<sub>1</sub>Bz = L<sub>10</sub> × L<sub>23</sub>; H<sub>2</sub>Bz = L<sub>66</sub> × L<sub>165</sub>; H<sub>3</sub>Bz = L<sub>19</sub> × L<sub>64</sub>; H<sub>4</sub>Bz = L<sub>22</sub> × L<sub>15</sub>. The researches were been made during the period 2003 - 2008, in the experimental field from S.C.D.L. Buzău.

The variants were organized in randomized blocks with four repetitions. The number of cropping plants from each holding was 60 in glasshouse and 120 in field.

Through successive harvests, there were obtained data concerning the early production and total production of hybrids.

The technology applied was generally the one specific to the early tomato crop from protected spaces and field.

Knowing the morphological and physiological characteristics of the tomato genitors is an essential condition in amelioration and especially in obtaining performing F<sub>1</sub> hybrids.

The researches were made considering the experimental technique norms for the number of plants, surface, number of holdings, varieties, placement etc.

Because of the absence of some hybrids produced in our country, the foreign firms are commercializing tomato seeds F<sub>1</sub> at high prices. The experiment had in view obtaining F<sub>1</sub> hybrids to correspond to the Romanian market demands and to favorably comport to the environmental conditions existent.

## RESULTS AND DISCUSSIONS

The results obtained mark out that the hybrids obtained, cultivated in glasshouse, had different yields comparing to the control variant, but also comparing to the yields obtained in the last years. The IH 50 control variant reached the maximum yield of 57,7 t/ha in 2006, and the average yield during the six years of study was 55,2 t/ha (table 1).

H<sub>1</sub>Bz reached the maximum yield of 88,9t/ha in 2006, the yield average being 84t/ha, 28,8t/ha more than the control variant.

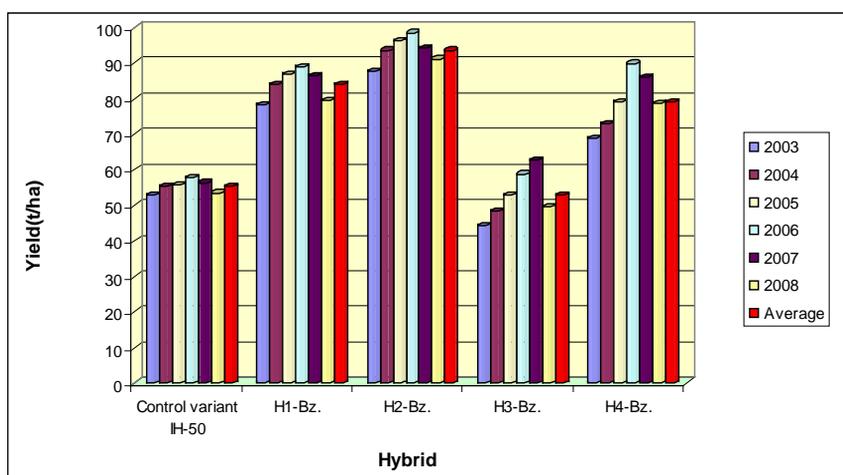
Table 1

Means yields(t/ha) of tomatoes obtained in glasshouse							
HYBRID	2003	2004	2005	2006	2007	2008	Average
Control variant IH-50	52,8	55,2	55,6	57,7	56,4	53,5	55,2
H <sub>1</sub> -Bz.	78,2	84	86,8	88,9	86,5	79,6	84
H <sub>2</sub> -Bz.	87,8	93,6	96,4	98,5	94,1	91,2	93,6
H <sub>3</sub> -Bz.	44,4	48,5	52,8	58,8	62,7	49,6	52,8
H <sub>4</sub> -Bz.	68,7	72,9	79,2	89,9	85,9	78,6	79,2

H<sub>2</sub>Bz reached the maximum yield of 98,5 t/ha in 2006, the yield average being 93,6t/ha, 38,4t/ha more than the control variant.

H<sub>3</sub>Bz reached the maximum yield of 62,7 t/ha, in 2007, the yield average being 52,8 t/ha, 2,4 t/ha less than the control variant.

H<sub>4</sub>Bz reached the maximum yield of 89,9 t/ha in 2006, the yield average being 79,2 t/ha, 24 t/ha more than the control variant (figure 1).



**Fig. 1.** Mean yields obtained in glasshouse at the tomatoes hybrids

The hybrids created, except H<sub>3</sub>Bz, were superior in the yields obtained comparing to the control variant, reaching maximum yields in 2006. Thus, at the 2006 year level, the yield differences between the control variant and the other hybrids (H<sub>1</sub>Bz, H<sub>2</sub>Bz and H<sub>4</sub>Bz) were very significant positive.

H<sub>3</sub>Bz hybrid obtained smaller yield results than the control variant IH<sub>50</sub>, surpassing this one only in 2006 and 2007, being remarked through other characteristics.

Considering the results obtained during 2003 – 2008 period, there can be observe the hybrids obtained had a different comportment in what it concerns the solarium yield (table2).

Table 2

**Means yields(t/ha) of tomatoes obtained in solarium**

<b>HYBRID</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>Average</b>
Control variant IH-50	59,4	62,4	62,9	64,7	64,2	60,8	62,4
H <sub>1</sub> -Bz.	69,9	77,8	78,6	79,8	76,8	77,9	76,8
H <sub>2</sub> -Bz.	78,6	84	85,3	87,2	88,6	80,3	84
H <sub>3</sub> -Bz.	52,7	61,8	62,6	67,2	67,7	58,8	61,8
H <sub>4</sub> -Bz.	69,7	72,3	74,4	76,9	78,6	74,5	74,4

The IH<sub>50</sub> control variant reached the maximum yield of 64,7t/ha in 2006 and the mean yield was 62,4 t/ha.

H<sub>1</sub>Bz reached the maximum yield of 79,8t/ha in 2006, the yield average being 76,8t/ha, 14,4t/ha more than the control variant.

H<sub>2</sub>Bz reached the maximum yield of 88,6 t/ha in 2007, the yield average being 84 t/ha, 21,6t/ha more than the control variant.

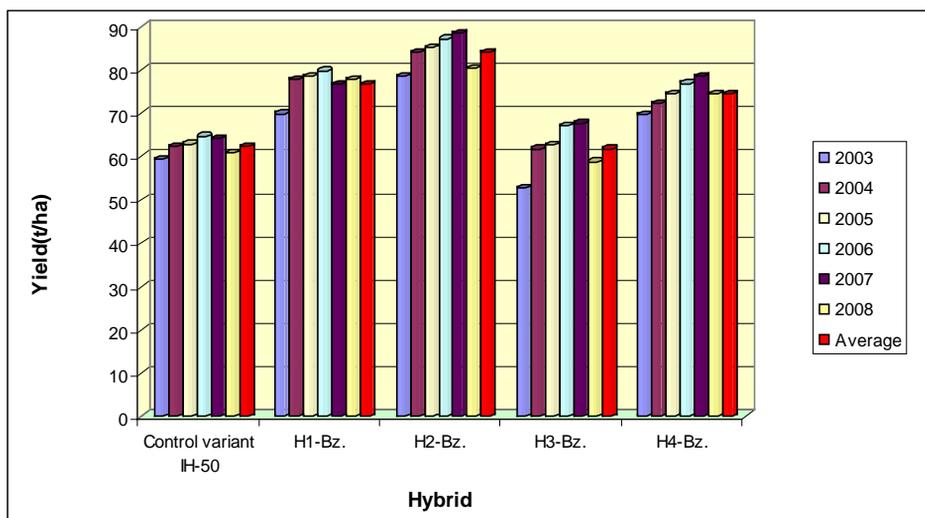
H<sub>3</sub>Bz reached the maximum yield of 67,7t/ha in 2007 the yield average being 61,8t/ha, cu 0,6 t/ha less than the control variant. H<sub>4</sub>Bz reached the maximum yield of 78,6 t/ha in 2007, the yield average being 74,4t/ha, 12 t/ha more than the control variant, IH<sub>50</sub>.

In this culture system, except H<sub>3</sub>Bz, all studied hybrids obtained significant yield increase comparing to the control variant, especially during 2003 – 2008 (figure 2).

In field, the hybrids obtained had a different comportment in what it concerns productivity, comparing to the control variant, but also they had a different comportment from one year to another.

The IH<sub>50</sub> control variant reached the maximum yield of 58,5t/ha in 2006 and the mean yield during the six years of study was 52,2t/ha.

H<sub>1</sub>Bz reached the maximum yield of 68,2t/ha in 2006, the yield mean being 65,2t/ha, 10 t/ha more than the control variant.



**Fig. 2.** Mean yields obtained in solarium at the tomatoes hybrids

H<sub>2</sub>Bz reached the maximum yield of 70,5t/ha in 2007, the yield mean being 67,3t/ha, 12,1t/ha more than the control variant.

H<sub>3</sub>Bz reached the maximum yield of 54,8 t/ha in 2006 the yield mean being 52,7t/ha, 2,5t/ha less than the control variant.

H<sub>4</sub>Bz reached the maximum yield of 64,6t/ha in 2006, the yield mean being 62,8t/ha, 7,6t/ha more than the control variant (table 3).

*Table 3*

**Means yields(t/ha) of tomatoes obtained in field**

HYBRID	2003	2004	2005	2006	2007	2008	Average
Control variant IH-50	55,2	53,8	55,2	58,5	57,5	51	55,2
H <sub>1</sub> -Bz.	62,8	65,2	64	68,2	67,1	63,9	65,2
H <sub>2</sub> -Bz.	61,2	65,9	67,3	70,1	70,5	68,8	67,3
H <sub>3</sub> -Bz.	49,3	52,7	53,3	54,8	54,6	51,5	52,7
H <sub>4</sub> -Bz.	48,5	62,8	63,8	64,6	64,3	62,8	62,8

Except H<sub>3</sub>Bz, that obtained yields smaller than 2,5t/ha comparing to the control variant in this culture environment, the other hybrids obtained significant bigger yields.

The result obtained during 2003 – 2008 period concerning the hybrids mean yield obtained at the S.C.D.L. Buzău clearly demonstrates that in all three culture systems(glasshouse, solarium and field) the mean yield obtained it is bigger in F<sub>1</sub> than the yield of the most valuable parent and it is also bigger than the mean values registered by genitors (table 4).

Table 4

## Means yields(t/ha) of tomatoes obtained during 2003 – 2008 period

Culture system	Control variant IH50	P <sub>1</sub>	P <sub>2</sub>	H <sub>1</sub> Bz	P <sub>1</sub>	P <sub>2</sub>	H <sub>2</sub> Bz	P <sub>1</sub>	P <sub>2</sub>	H <sub>3</sub> Bz	P <sub>1</sub>	P <sub>2</sub>	H <sub>4</sub> Bz
		L10 ♀	L23 ♂		L66 ♀	L165 ♂		L19 ♀	L64 ♂		L22 ♀	L15 ♂	
Glasshouse	55,2	52,8	67,2	84	52,8	57,6	93,6	45,6	36	52,8	57,6	45,6	79,2
Solarium	62,4	48	62,4	76,8	55,2	62,4	84	48	38,4	60	55,2	48	74,4
Open field	55,2	50,4	60	65,2	55,2	45,6	67,2	38,6	50,4	52,8	40,8	50,4	62,8

H<sub>1</sub>Bz surpassed the most valuable genitor with 16,8t/ha in glasshouse, 21,6t/ha in solarium and 5,2t/ha in open field. H<sub>2</sub>Bz surpassed the most valuable genitor with 36t/ha in glasshouse, 22t/ha in solarium and 12t/ha in open field. H<sub>3</sub>Bz surpassed the most valuable genitor with 17,8 t/ha in glasshouse, 12t/ha in solarium and 2,4t/ha in open field. H<sub>4</sub>Bz surpassed the most valuable genitor with 22,6t/ha in glasshouse, 19,2t/ha in solarium and 12,4t/ha in open field.

## CONCLUSIONS

To all four hybrid combinations, there visibly manifests the heterozis phenomena reproductive and adaptable in all three culture systems. The hybrid that highly manifests the heterozis phenomena is H<sub>2</sub>Bz.

The hybrids obtained had demonstrated superiority to the control variant hybrid in what it concerns yield and environmental conditions adapting in all three culture systems where they were experimented (glasshouse, solarium and open field).

In concerns productivity, all hybrids demonstrated superiority, except H<sub>3</sub>Bz. On the top there is H<sub>2</sub>Bz hybrid that highly surpassed the hybrid control variant IH<sub>50</sub> obtaining a productivity increase of 38,3t/ha in glasshouse, 21,6t/ha in solarium and 12,1t/ha in open field.

## REFERENCES

1. Ciofu R. și colab., 2003 – *Tratat de legumicultură*. Editura Ceres, București
2. Crăciun, T., 1981 – *Genetica plantelor horticole*. Editura Ceres, București;
3. Drăcea I., 1972 – *Genetica*. Editura Didactică și Pedagogică, București;
4. Dumitrescu I. și colab., 1998 – *Producerea legumelor*. București
5. Leonte C.; 1996 – *Ameliorarea plantelor horticole* București.