

# DROUGHT AND HEAT EFFECT ON GROWTH RATE OF SOME MAIZE CONSANGUINE LINES AND HYBRIDS CREATED AT A.R.D.S. LOVRIN

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## Abstract

Recently, the climate conditions in the Banat area, in terms of thermal and hydric regime, underwent significant changes, even dramatic in 2017. The lack of rainfall and the very high temperatures this summer have significantly affected the growth, development and fructification of maize in this area.

When the atmospheric heat rises above the pedological drought, maize culture is almost compromised, reaching very high production losses, even over 40-50%.

This study relates to the ability to adapt parental forms and hybrids obtained from them. From the results it can be noticed that the thermal regime affects only the blooming and silk fenofase and the rainfall regime influences the first stages of growth affecting the parental forms more intensely, in some hybrids there is observed a uniformity of the height with that of one of the parental forms.

**Key words:** thermal regime, water regime, drought, heat, consanguine lines, semi-early hybrids, semi-late hybrids

Both the lack of precipitation and the very high temperatures, conditions encountered in 2017, have a significant impact on the growth, development and fructification of corn.

A direct method of assessing tolerance to drought and heat yielding safe results is to track the behavior of plants in the field by determining their reaction to these phenomena. (O. Cosmin et al, 1989)

When the atmospheric heat rises above the pedological drought, corn crops are almost compromised, reaching very high production losses of over 40-50%. (I. Coblea 2005)

The growth rate consanguine lines and hybrids obtained by crossing them is strongly influenced by phreatic intake, drought and heat periods and natural soil fertility, information needed for zoning hybrids (T. Sarca et al., 2000).

## MATERIAL AND METHOD

The study is part of an experience started several years ago in the maize improvement field

from ARDS Lovrin. The maize was sown on April 20, 2017 on a phreatic wet chernozem soil with a Ph of 6,9. The MHT (mother, hybrid, male) sowing scheme was used at a density of 29 cm between plants per row and 70 cm between rows. The length of the row was 5 m in three rehearsals. The plants rose on April 25, 2017.

Five consanguine lines were studied (Lv 92, Lv 86, C103, Lv 113 and Lv 102), with different vegetation periods (from early to late), and 5 simple hybrids (HSLv 1, HSLv 2, HSLv 3, HSLv 4 and HSLv 5), resulted from crossbreeding of the five consanguine lines. We made four measurements: three measurements until the blossom-silk period, and one near the technological maturity phase.

## RESULTS

The climatic conditions during the growing season where the observations were made are presented in the table below. (Table 1)

Table 1

Principalele elemente climatice înregistrate în perioada 1 aprilie – 31 august 2017

Elemente climatice		Aprilie 2017	Mai 2017	Iunie 2017	Iulie 2017	August 2017
Precipitații (mm)	Suma lunară	54	29	40	30	22,5
	Media lunară multianuală	42,7	56,8	67,8	55,8	32,5
	Abaterea	11,3	-27,8	-27,8	-25,8	-10
Temperatura (t°C)	Media lunară	10,9	16,9	22,1	28,9	24,1
	Media lunară	10,7	16,3	19,8	22,2	21,7

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	multianuală				
	Abaterea	0,2	0,3	2,3	6,7
					2,4

Analyzing Figure 1, it is observed that the lines with the fastest rhythm of growth are Lv 92 and C 103 and the lowest growth rate is the line Lv

86. It is observed from climatic data that the amount of rainfall and temperature did not influence considerably the growth rate of plants.

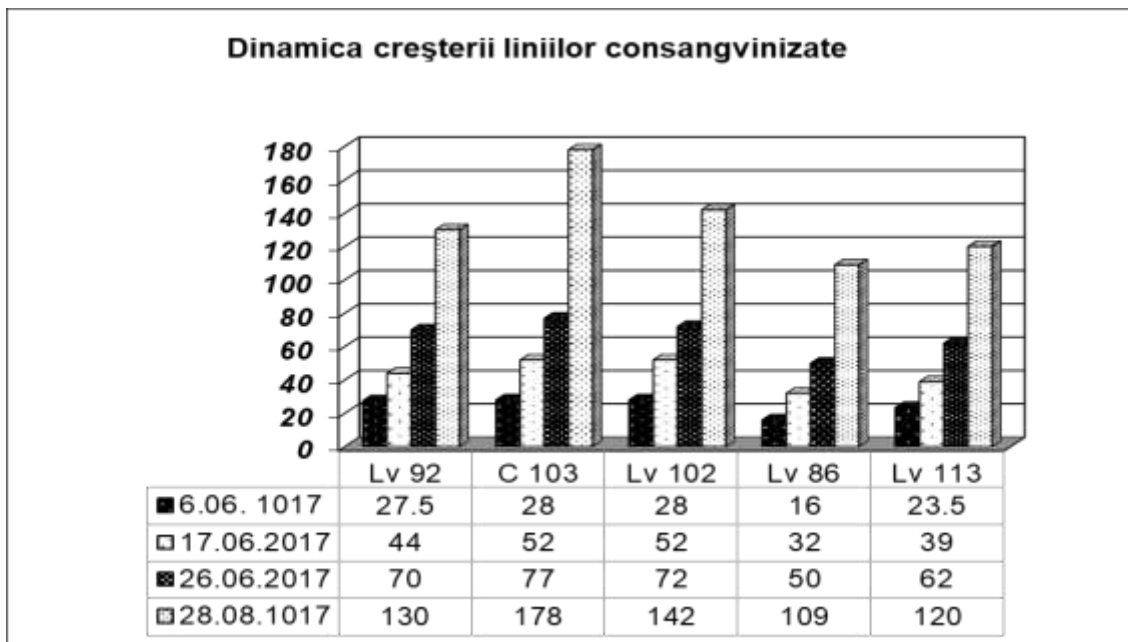


Figure 1. Growth dynamics of consanguine lines

The behavior of the five hybrids obtained from the crossing of the consanguine lines can be traced in Figure 2.

The 5 hybrids studied are:  
HSLv1 = Lv92 x Lv86,

HSLv2 = C103 x Lv113,  
HSLv3 = Lv102 x Lv92,  
HSLv4 = Lv113 x Lv92,  
HSLv5 = C103 x Lv102

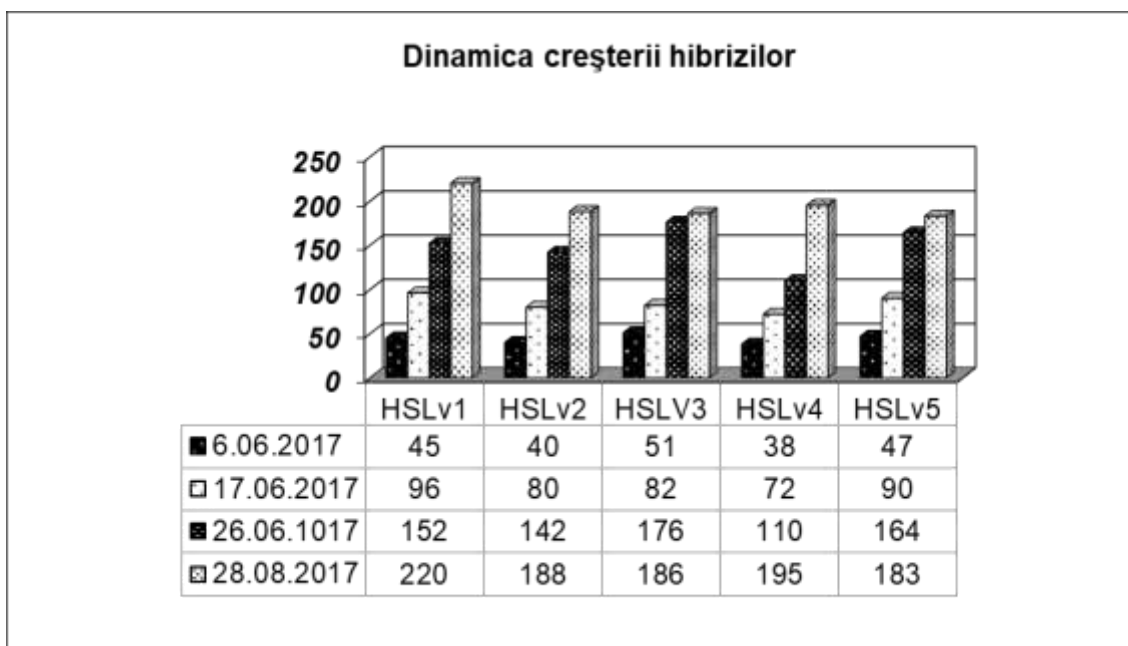


Figure 2. Growth dynamics of hybrids

From Figure 3 it can be seen that this year, hybrids that have as parental form a line with a

high size, not far exceed that height. For example, HSLv5.

Maize simple hybrid HSLv5 has parental forms the consanguine line Lv113, which in this year's condition behaved like an early line, and as a father form the consanguine line Lv92. This line is also the father of HSLv3 hybrid.

The hybrid growth rate obtained from the crossing of the consanguine lines Lv113 x Lv92

and HSLv5 (Figure 3) is influenced by the climatic conditions comparing to the parental forms, with almost a uniform leveling of the total height of the plant with that of one of the parental forms (Lv 92).

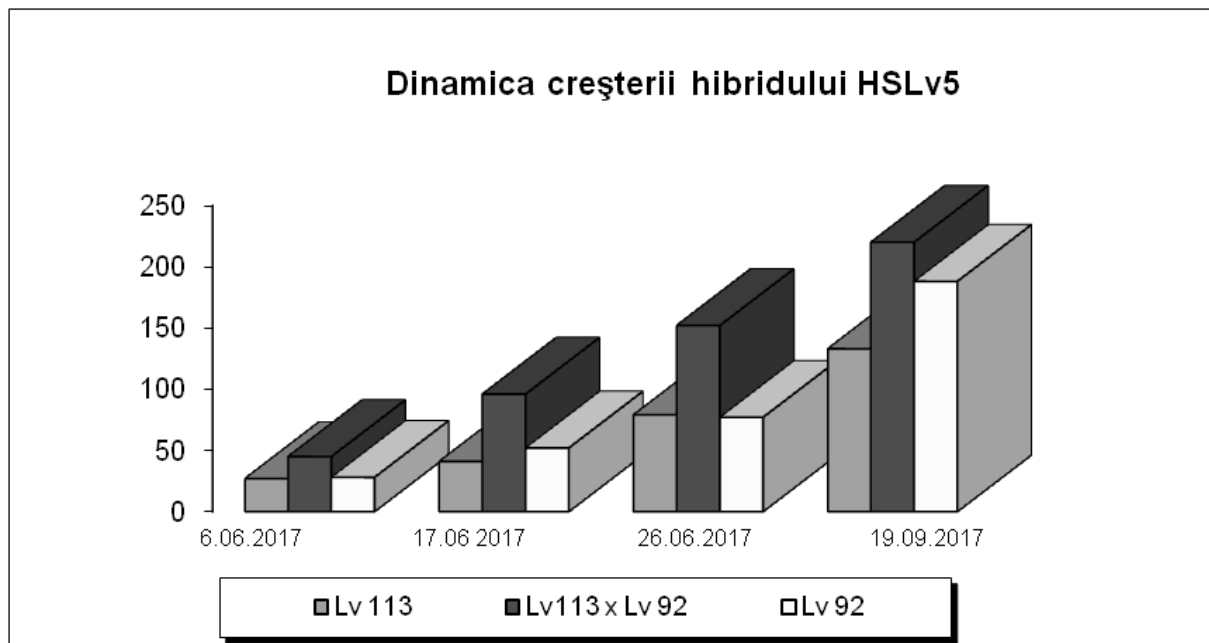


Figure 3. Growth dynamics of hybrid HSLv5

Maize simple hybrid HSLv3 (Fig. 4) is the result of the cross between the consanguine line Lv102, a line used as a mother form and the consanguine line Lv92, used as a father form.

Line Lv102 is a line with a higher, vigorous size, 6-7 days earlier than Lv92, which is a semi-late line of a lower height with a well developed

foliage with many branches and a lot of pollen, which recommends it as a father in crosses.

The climatic conditions of 2017, a year characterized by long periods of drought and heat, did not result in uniformity of the HSLv3 hybrid with either of the two parental forms.

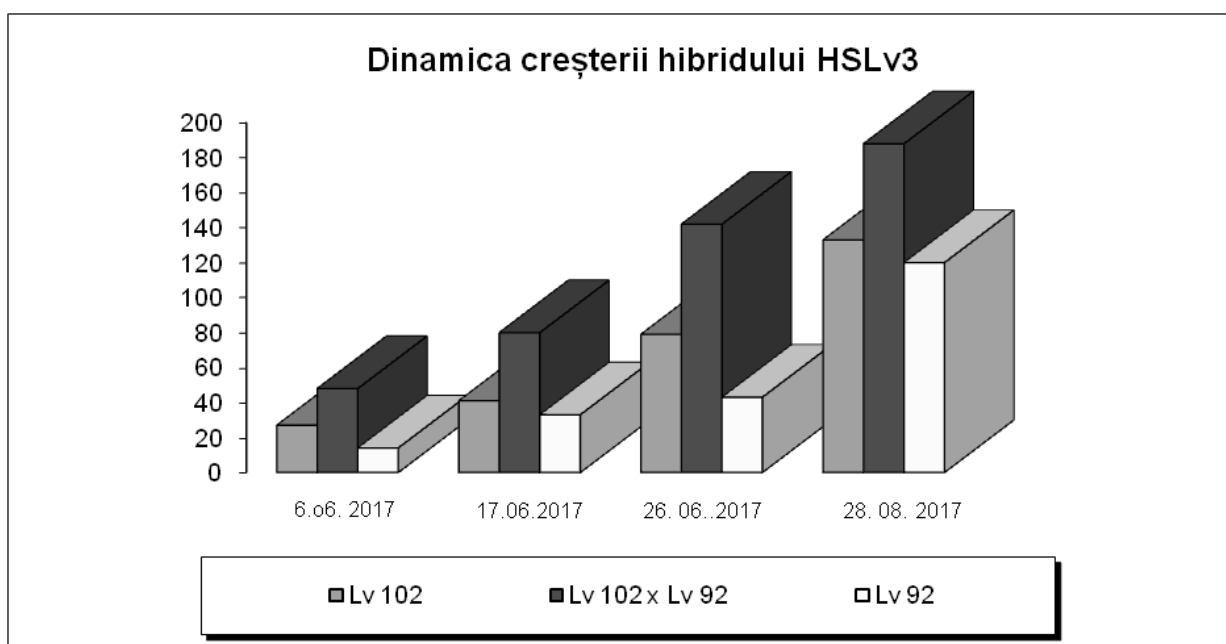


Figure 4. Growth dynamics of hybrid HSLv3

## CONCLUSIONS

The rhythm of growth of early lines is faster in the period between rising and silk phenophase. For example, lines Lv92 and Lv113, except line Lv86, whose growth rate is influenced by climatic conditions.

Line C103, being a tardive line, is not particularly influenced by climatic conditions, and continues to grow at a steady pace.

Referring to hybrids, the growth rate of the hybrid HSLv5 is influenced by climatic conditions compared to parental forms, noticing also a uniform level of plant height with that of one of his parental forms (C103).

In conclusion, this year with a special climatic regime determined a uniformity in height of the semi-early hybrids compared to the semi-late hybrids, which was not revealed in the past years, when the climatic conditions approached the normal ones.

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