

Components related to higher head diameter, heterosis and type of inheritance in oil seed sunflower (*Helianthus annuus* L.)

Dobrudzha Agricultural Institute – General Toshevo, Bulgaria

Georgi Georgiev

Corresponding author: georgi_d4@abv.bg

ers number of seeds per plant, kernel weight per plant and most important influencing directly the yield per plant and ion of the head coincided with the months of vegetative with regard to the climatic conditions and the plants were head diameter is an important structural element with direct he number of seeds in a head. During this investigation, the to the parameter head diameter under changeable ation of large inflorescences with a large number of embryo e favorable conditions for the development of the young ass flowering stage.

beginning of head formation to mass flowering depended imatic conditions. The head diameter was also significantly ng to Miller and Fick (1997), the head diameter and its size ype, the soil moisture and the soil fertility. According to eter is influenced to the highest degree by the size and area ybrid power (heterosis) in F_1 , it is necessary to find the h are ecologically and geographically distant, with valuable ters, since this phenomenon does not always occur (Hladni ra et al., 2005) A peculiarity of the qualitative parameters is factors – the large number of genes determining it and the enchev et al, 1975).

investigate sunflower, head diameter, type of inheritance,

ut in the trial field of Dobrudzha Agricultural Institute – 2015 according to a conventional technology for growing The study included 5 sterile lines, 11 fertility restorer lines investigated lines were sown in three replications, the plot size analysis (ANOVA – analysis of variances) was applied, the generation F_1 through the coefficient of Mather and Jinks as estimated according to Omarov (1975).

according to the genotype and the environment, remaining ations. This allows the conclusion that hybrid combinations 08A x 84R possess good ecological stability to the changeable eter. A significant correlation was found in the fertility the percent of protein and 1000 kernel weight. Such a direct lines according to the number of leaves per plant.

eter in the hybrid combinations varied from incomplete per dominance and depended on the accumulation and in the parental forms. Concerning heterosis (best parent and s observed, which was conditioned by the high values of one l combination.

parameter head diameter in hybrid combinations

MS	F	P-value	F crit
19.0686	2.85846	8.28E-13	1.30273
452.627	67.8506	5.53E-38	2.61918
22.6177	3.39048	1.63E-33	1.19144
6.67094			

Table 1 shows that the experiment was properly conducted specifically. The parameter head diameter in all hybrid lines in 2015 due to the lower precipitation from emergence to hybrid combinations, high variation was not determined for the in comparison to the parental lines, which was an important ecological stress.

ow that averaged for the four years of investigation in some of the same female sterile line to different male fertile lines 98R, 2003Ax 99R, 2008A x 100R и 2008A x 85R), the mean most the same. This indicated that the two fertility restorers t head diameter was obtained in the hybrid combinations 008A as female components. The average values showed that rgest head diameter were 217A x 100R (21.4 cm), 2003A x (cm). The lowest values of this parameter were registered in 017A x 87R (18.6 cm).



Figure 1. 2008A x 100R



Figure 3. 2003A x 100R



Figure 3. 2008A x 99R

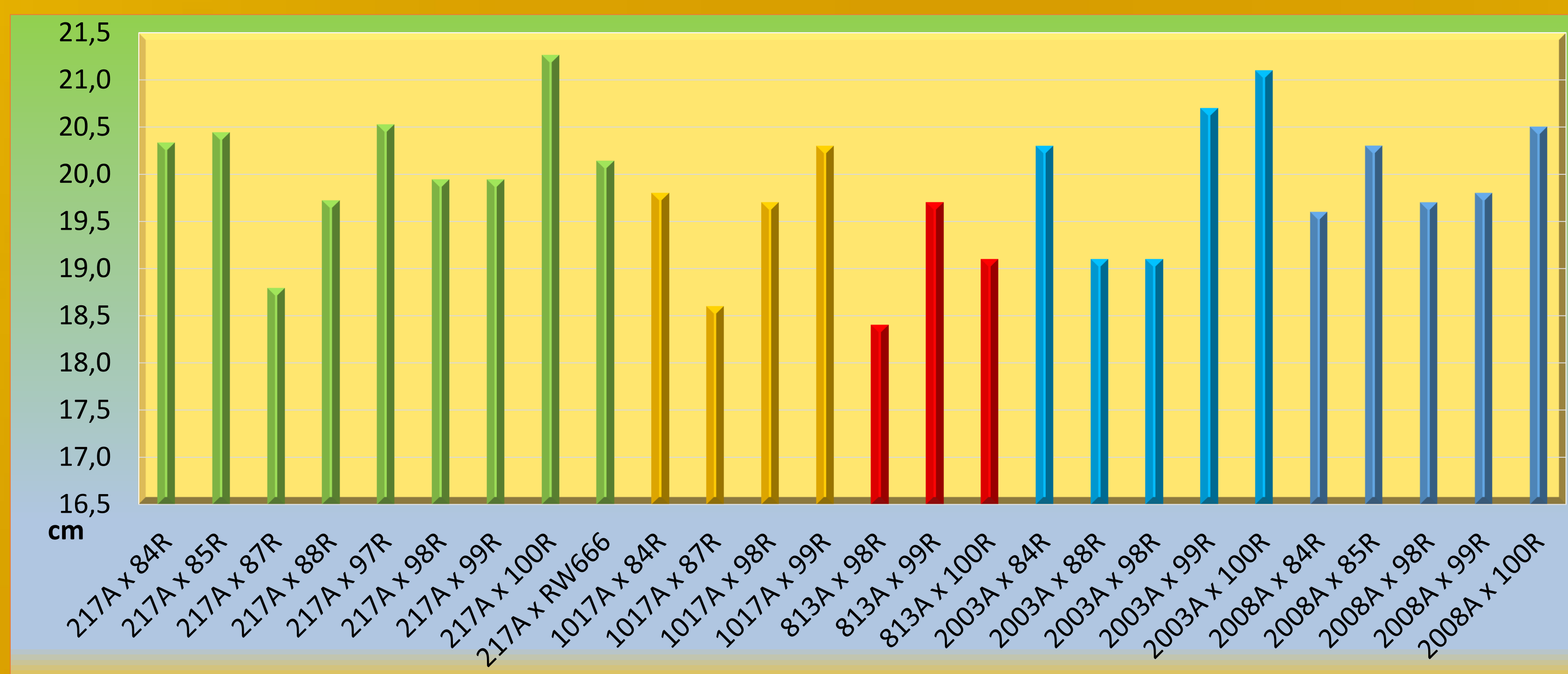


Figure 4. Mean values of parameter head diameter in hybrid combinations during 2012-2015

	PH	HD	DBS	NS/H	MSIP	M1000S	YIELD	LP	NLP
PH	1								
HD	0,467*	1							
DBS	0,261	-0,357	1						
NS/H	-0,692	-0,329	-0,311	1					
MSIP	0,645**	0,501**	0,209	-0,73	1				
M1000S	0,329*	-0,219	-0,315	-0,226	0,141	1			
YIELD	0,012	0,157	0,386*	-0,097	0,314*	0,505**	1		
LP	-0,408	0,197	-0,179	0,376*	0,047	-0,529	0,432*	1	
NLP	0,842***	0,482*	0,131	-0,886	0,78	0,339*	-0,02	-0,196	1

Table 2. Phenotype correlations between 9 traits of 23 hybrid combinations

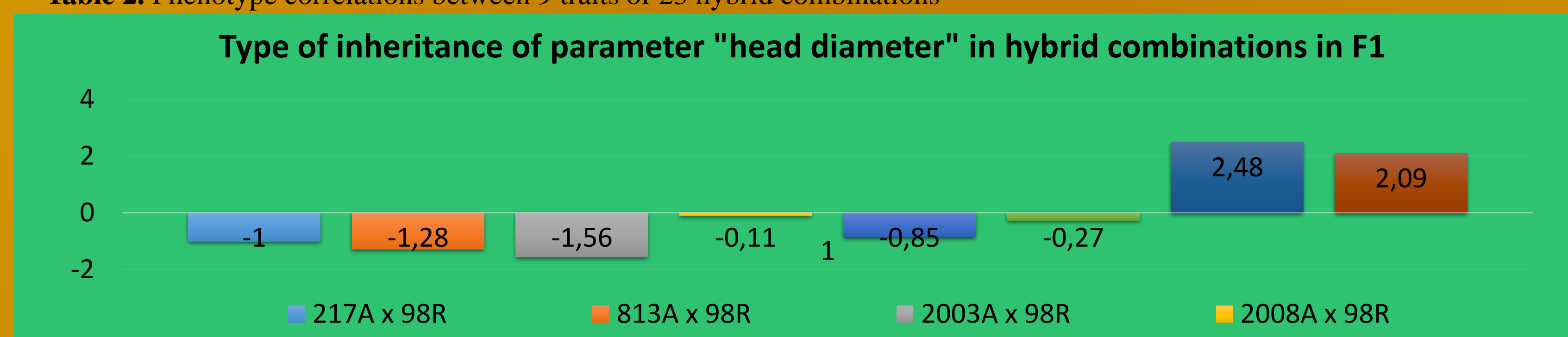


Figure 5. Type of inheritance of the parameter „head diameter“ in hybrid combinations (F_1)

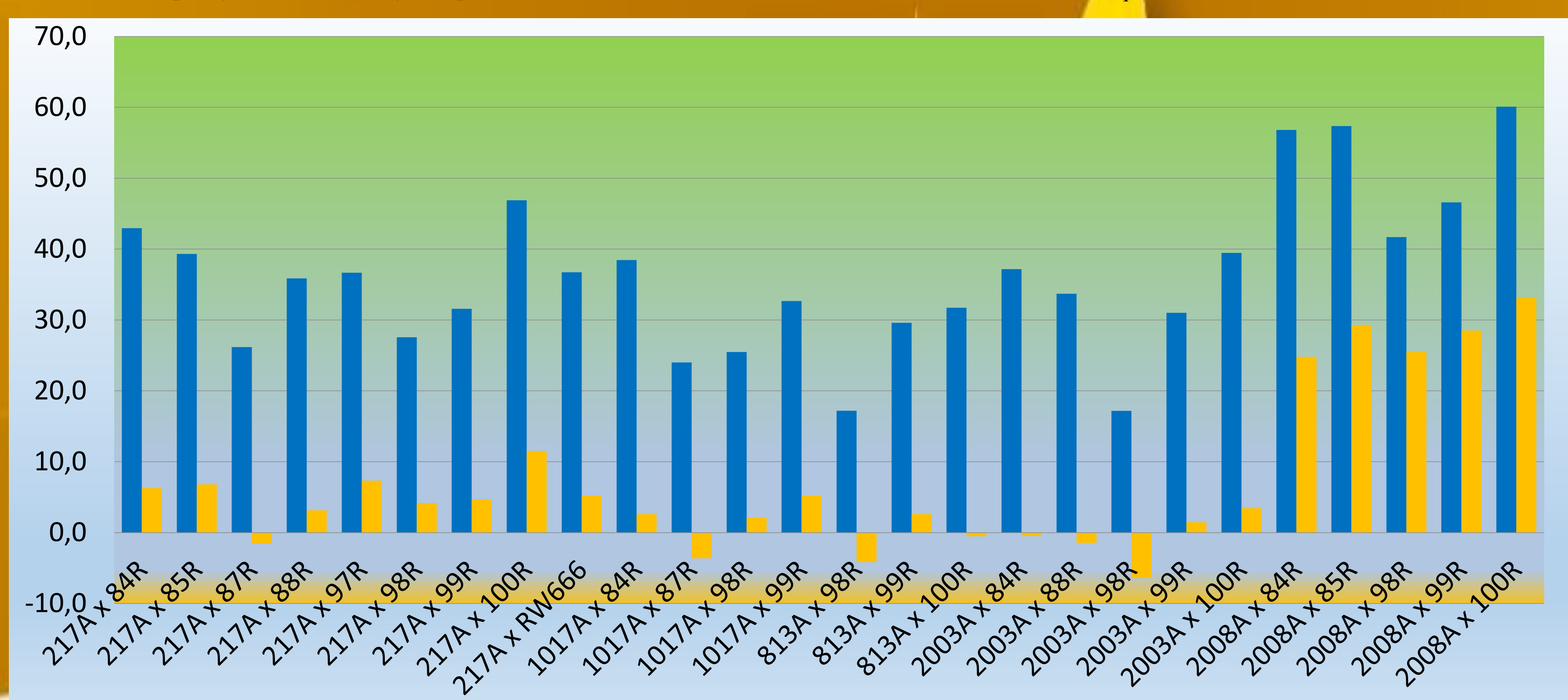


Figure 6. Mid-parent and best parent heterosis for parameter head diameter in F_1 hybrid combinations

The parameter head diameter in the parental lines changed according to the genotype and the conditions of the environment, remaining constant in the obtained hybrid combinations. This allows the conclusion that hybrid combinations 2008A x 100R, 2008A x 85R and 2008A x 84R possess good ecological stability to changeable conditions of the environment according to the parameter.

Significant correlation in the fertility restorers was obtained between head diameter, percent of protein and 1000 kernel weight. Such direct effect was also obtained in the sterile lines according to the parameter number of leaves per plant.

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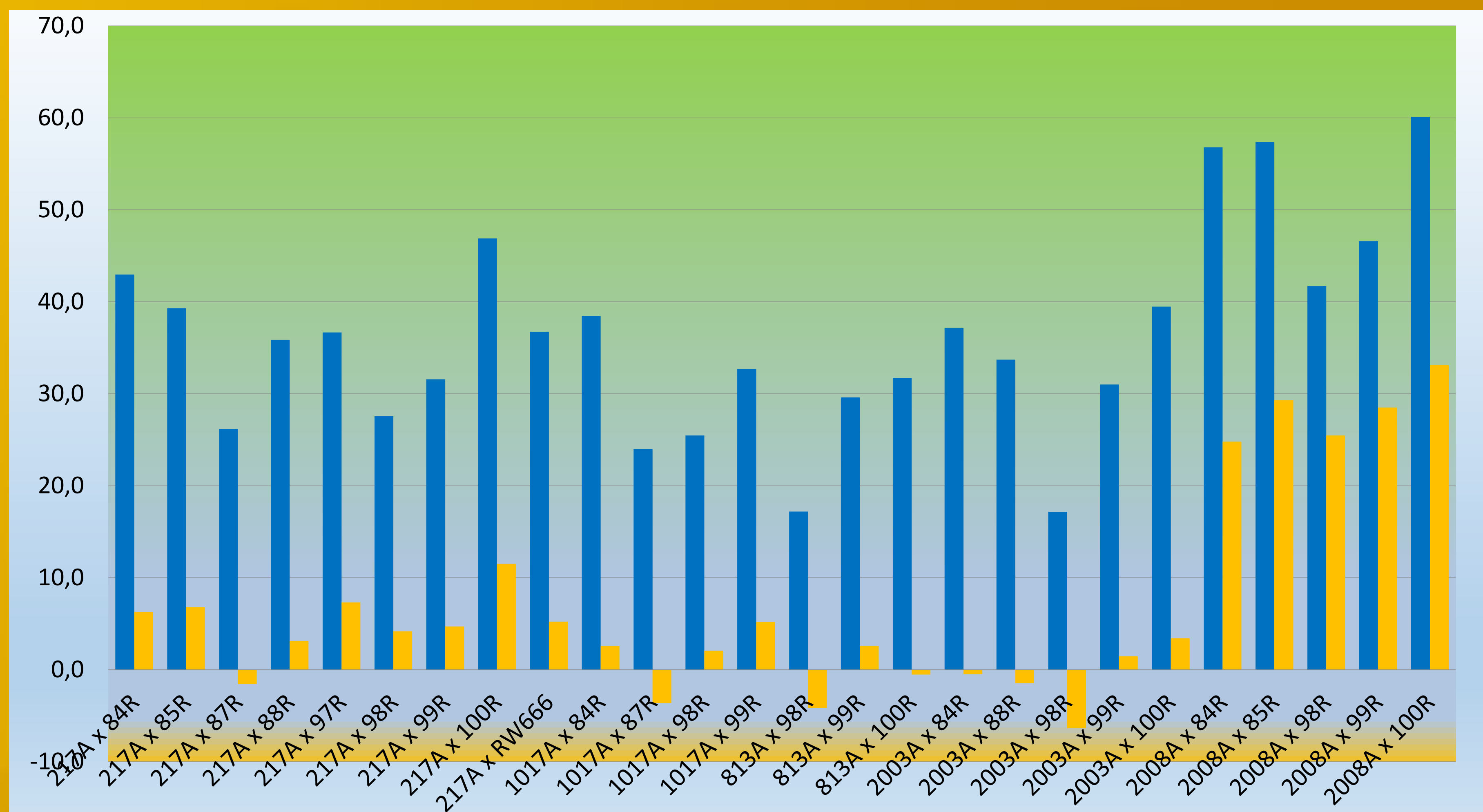
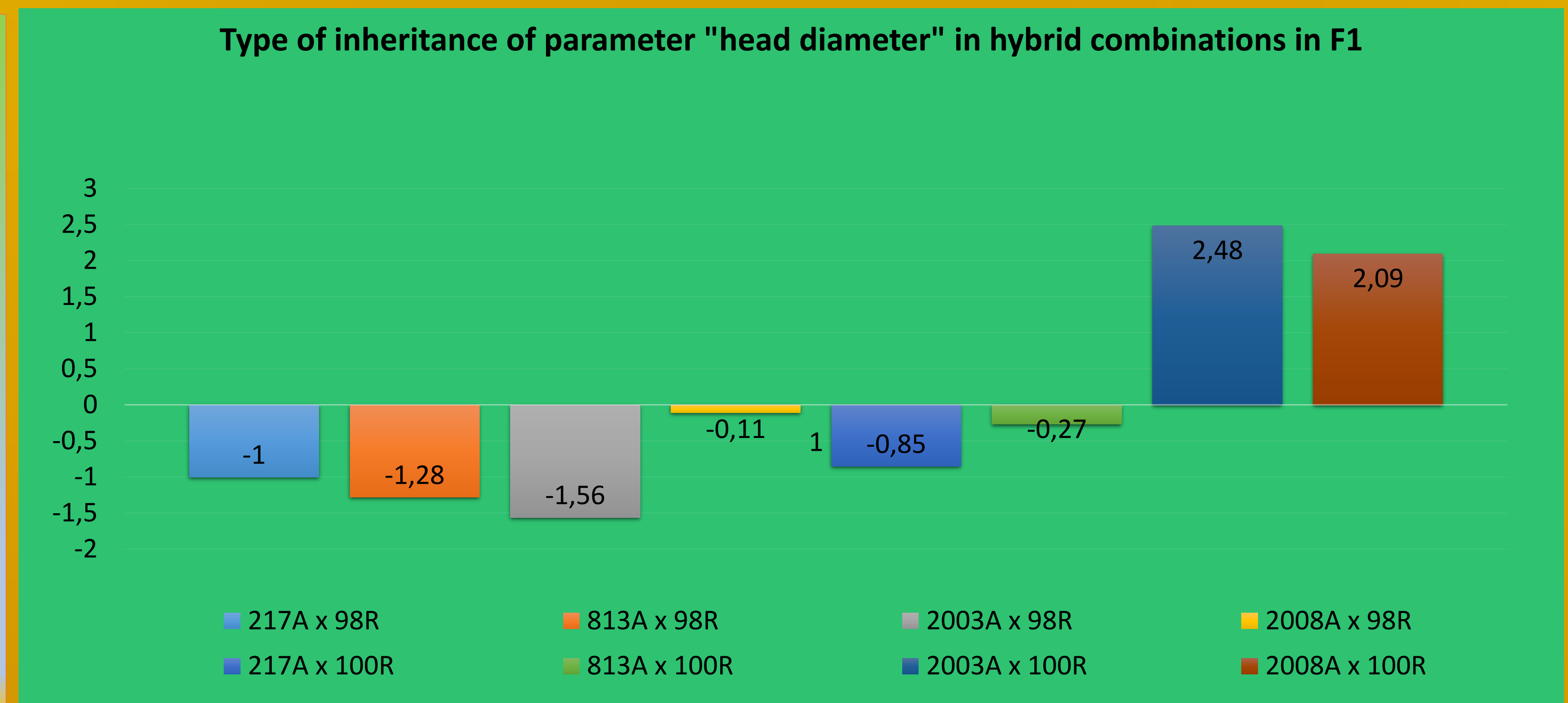
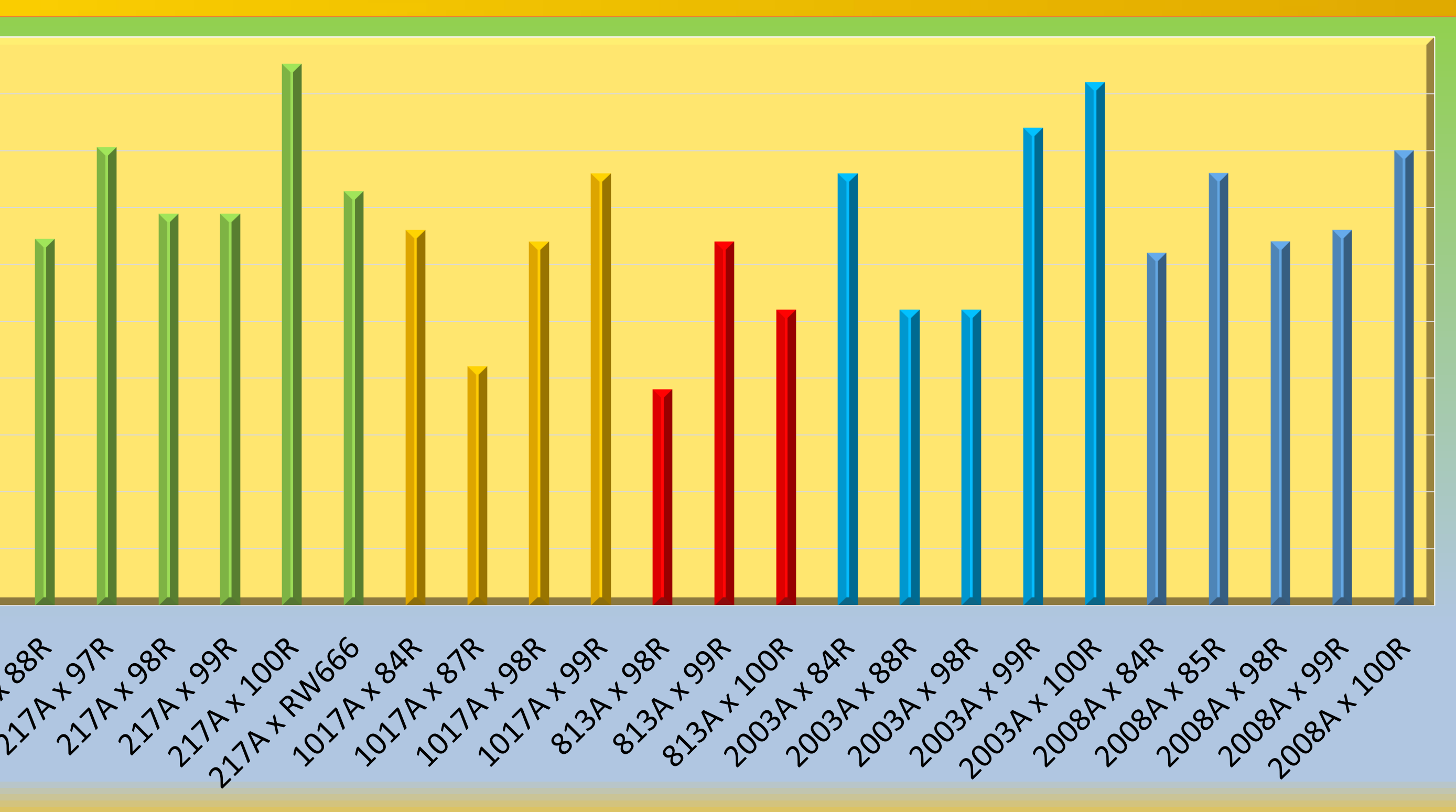
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Corresponding author: georgi_d4@abv.bg

Materials and Methods

Field experiment was carried out in the trial field of Dobrudzha Agricultural Institute – General Toshevo (DAI) during 2012 – 2015 according to a conventional technology for growing of sunflower (Georgiev et al., 1997). The study included 5 parental lines, 11 fertility restorer lines and 23 hybrid combinations.



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Head diameter in the parental lines changed according to the genotype and conditions of the environment, remaining constant in the obtained hybrid combinations. This allows the conclusion that hybrid combinations 2008A x 100R, 2008A x 84R and 2008A x 85R possess good ecological stability to changeable conditions of the environment according to the parameter.

A positive correlation in the fertility restorers was obtained between head diameter, protein content and 1000 kernel weight. Such direct effect was also obtained in the parental lines according to the parameter number of leaves per plant.