UDC 575.222.7; 636.85
Original scientific paper

HETEROSIS FOR SEED YIELD AND YIELD COMPONENTS IN SUNFLOWER

Nada HLADNI[1], Dragan ŠKORIĆ[1], and Marija KRALJEVIĆ-BALALIĆ[2]

[1] Institute of Field and Vegetable Crops, 21000 Novi Sad,
[2] Faculty of Agriculture, 21000 Novi Sad, Serbia and Montenegro

Hladni N., D. Škorić, and M. Kraljević-Balalić (2005): *Heterosis for seed yield and yield components in sunflower*. – Genetika, Vol. 37, No. 3, 253-260.

The development of new high-yielding and stable sunflower hybrids based on interspecific hybridization requires information on the heterotic effects for agronomically important traits in the F_1 generation. Heterotic effects for seed yield, plant height and head diameter were studied in interspecific sunflower hybrids developed by the line x tester method. The female inbred lines were developed by interspecific hybridization, while the male restorer inbreds with good combining abilities were used as testers in the form of fertility restorers. F_1 hybrids were obtained by crossing each tester with each female inbred. The inbred lines and their F_1 hybrids differed significantly in their mean values of the traits under study. Heterosis values for seed yield per plant were positive and highly significant relative to both the parental mean (98.4-274.1%) and the better parent (54.8-223.2%). Significantly less heterosis was recorded in the case of plant height relative to parental mean (19.0-66.0%) and better parent (-3.9-51.6%). With head diameter, the heterotic effect ranged from 19.0 to 55.6% (parental mean) and from 7.8 to 36.6% (better parent). The results of this study may be used for the development of new high-yielding and stable sunflower hybrids based on interspecific hybridization.

Key words: sunflower, heterosis, seed yield, seed yield components

Corresponding author: Nada Hladni, Institute of Field and Vegetable Crops, Maksima Gorkog 30, 21000 Novi Sad, Serbia and Montenegro,
tel: 381 21 48-98-411, faks; 381 21 413 833; e-mail nadah@ifvcns.ns.ac.yu

INTRODUCTION

Intense competition existing in the domestic and global sunflower markets makes it necessary to constantly develop new hybrids with a higher genetic potential for seed and oil yields per unit area, a wider range of disease resistance, and greater adaptability than can be found in the existing hybrids (ŠKORIĆ *et al*., 2004). One of the primary tasks of sunflower breeding is the development of new inbred lines by interspecific hybridization that will subsequently be used for obtaining new high-yielding and stable hybrids of this crop. Plant height, head size, form and position on the stem, and leaf number, size, duration and distribution on the plant all play important roles in defining optimal plant architecture in sunflower hybrids (ŠKORIĆ, 2002).

There are single-cross sunflower hybrids grown in intensive agriculture in which use is made of heterosis (or luxuriance) in the F_1 generation. The phenomenon of heterosisis not present in all hybrid combinations of the F_1 generation, however, and heterotic effects differ from trait to trait. The manifestation of heterosis for agronomically important traits is a prerequisite for obtaining productive hybrids (ŠKORIĆ, 2002). Because of this, heterotic effects for yield and yield components in the F_1 generation are the subject of study of many geneticists and sunflower breeders.

The effects of seed yield heterosis relative to parental mean or better parent are in the 25-60% range, as reported by MARINKOVIĆ (1989), who based this conclusion on the work of a number of researchers (MOROZOV, 1947; HABURA, 1958; SCHUSTER, 1964; PUTT, 1966; VRANCEANU and STOENESCU, 1969; ŠKORIĆ, 1975; MARINKOVIĆ, 1984), as well as by KUMAR *et al*. (1999).

According to HLADNI *et al*. (2003), heterosis for seed yield relative to parental mean ranged between 43.3 and 92.3%, while that relative to better parent was 22.0-118.4% according to JOKSIMOVIĆ *et al*. (2001) and 35.0-85.7% according to HLADNI *et al*. (2003).

Great many researchers have studied heterosis of plant height. Values of positive heterosis relative to parental mean some of them reported are as follows: MARINKOVIĆ (1981), 15.7-31.5%, MARINKOVIĆ *et al*. (2002), 85.4%, and HLADNI *et al*. (2003), 18.0-40.8%. Positive heterosis for plant height relative to better parent has been reported by VOLF and DUMANČEVA, 1973 (23%), DOZET, 1990 (53.0%), MARINKOVIĆ *et al*., 2002 (84.2%), and HLADNI *et al*., 2003 (-7.4-34.0%).

Heterosis for head diameter relative to parental mean or better parent has also been investigated by a large number of researchers, such as MOROZOV (1947), HABURA (1958), SCHUSTER (1964), PUTT (1966), VRANCEANU and STOENESCU (1969), ŠKORIĆ (1975), and MARINKOVIĆ (1984).

The objective of this paper was to determine the presence and extent of heterosis for seed yield per plant, plant height and head diameter in sunflower hybrids obtained by crosses between seven CMS inbred lines developed by interspecific hybridization and three restorer testers.

MATERIALS AND METHODS

Used to determine heterosis for seed yield per plant and sunflower yield components in the F_1 generation were seven new divergent (A) CMS inbred lines, three Rf restorer lines used as testers, and 21 F_1 hybrids developed at the Institute of Field and Vegetable Crops in Novi Sad. The female inbreds (NS-GS-1, NS-GS-2, NS-GS-3, NS-GS-4, NS-GS-5, NS-GS-6, and NS-GS-7) had been developed by interspecific hybridization, while the male restorer inbreds (RHA-R-PL-2/1, RHA-N-49, RUS-RF-OL-168) with good combining abilities were used as testers in the form of fertility restorers. The F_1 hybrids were obtained by crossing each tester with each female inbred line. A trial with three replicates was set up at the Rimski Šančevi Experiment Field of the Institute of Field and Vegetable Crops in Novi Sad using the experimental design required by the line x tester method (SINGH and CHOUDHARY, 1976). The basic sample for plant trait analysis consisted of 30 plants (ten per replicate) taken from the middle rows of each block of inbreds and hybrids.

The trait analyses were performed in the field and laboratory. Plant height (distance from the ground to the center of the head) and head diameter were measured in the field at physiological maturity. Seed yield per plant (expressed as grams per plant) was measured in the laboratory after harvesting, removing all impurities and reducing moisture to 11%.

Mean values, standard errors, arithmetic means and variability coefficients were calculated for all the traits according to HADŽIVUKOVIĆ (1991). Heterosis was evaluated according to JINKS (1983).

RESULTS AND DISCUSSION

Significant differences in the mean values of seed yield per plant, plant height and head diameter were found between the A lines and Rf testers and their F_1 hybrids. The variability of seed yield per plant, plant height and head diameter observed in the lines and hybrids was low (Table 1).

Heterosis values for seed yield per plant were highly significant in all of the hybrid combinations both relative to the parental mean (98.4-274.3%) and relative to the better parent (54.8-223.2%). These results are in agreement with those of LIMBORE *et al*., 1998 (114.8%), SINGH *et al*., 2002 (278.0%), and JOCIĆ, 2003 (129.3-412.0%).

A high positive heterotic effect (H_1=273.3%. H_2=223.2%) was found in the hybrid combination NS-GS-6xRHA-N-49. which was the inbred x restorer tester cross with the lowest mean value of seed yield per plant (Table 2).

Highly significant positive heterotic effects for plant height relative to parental mean (H_1) were recorded in all the hybrid combinations. They ranged from 19.0 to 66.0% and are in agreement with the values reported by GIRIRAJ and VIRUPAKSHAPPA, 1992 (45.5%) and LIANGING, 1996 (25.4-31.5%). The plant height heterosis values relative to better parent differed considerably from those relative to parental average. Highly significant positive heterosis was found in 19 hybrid combinations, and the values ranged bettween 6.1 and 51.6%. Similar results were reported by ŠKORIĆ, 1975 (60.2%) and LAY and KHAN, 1985 (59.0%).

Table 1. Mean values and variability of seed yield per plant, plant height and head diameter in sunflower

Parents and hybrids		SY		PH		HD	
		$0\pm s_0$	V	$0\pm s_0$	V	$0\pm s_0$	V
1	NS-GS-1	35.6±1.46	22.5	92.8 ± 0.50	3.0	20.1±0.64	5.2
1x8	NS-GS-1xRHA-R-PL-2/1	79.6±2.42	16.6	149.3±0.74	2.7	21.9±0.14	3.5
1x9	NS-GS-1xRHA-N-49	91.8±3.48	20.7	159.3±0.66	2.3	21.7±0.18	4.5
1x10	NS-GS-1xRUS-RF-OL-168	96.6±2.71	15.3	135.3±1.00	4.0	23.0±0.15	3.5
2	NS-GS-2	52.8±1.79	18.6	105.9±0.61	3.1	20.3±0.11	2.9
2x8	NS-GS-2xRHA-R-PL-2/1	82.2±2.65	17.7	154.2±0.95	3.4	22.8±0.17	4.0
2x9	NS-GS-2xRHA-N-49	96.9±2.54	14.4	154.8±0.69	2.4	23.0±0.15	3.5
2x10	NS-GS-2xRUS-RF-OL-168	81.7±2.49	16.7	138.5±0.79	3.1	23.1±0.12	2.9
3	NS-GS-3	50.5±1.25	13.6	117.4±0.93	3.3	19.6±0.10	2.7
3x8	NS-GS-3xRHA-R-PL-2/1	89.9±1.39	8.5	168.8±0.65	2.1	23.8±0.15	3.5
3x9	NS-GS-3xRHA-N-49	106.2±2.65	13.7	177.7±0.99	3.1	23.5±0.17	3.9
3x10	NS-GS-3xRUS-RF-OL-168	102.0±2.74	14.7	156.2±1.10	3.8	24.9±0.14	3.1
4	NS-GS-4	55.4±2.31	22.8	105.7±0.53	2.7	21.3±0.16	4.0
4x8	NS-GS-4xRHA-R-PL-2/1	111.1±2.67	13.2	161.3±0.66	2.3	23.8±0.19	4.4
4x9	NS-GS-4xRHA-N-49	94.4±2.68	15.6	164.0±0.64	2.1	23.0±0.19	4.4
4x10	NS-GS-4xRUS-RF-OL-168	103.3±1.81	9.6	159.0±0.72	2.5	24.0±0.22	5.0
5	NS-GS-5	57.0±1.50	14.4	85.8±0.54	3.5	21.7±0.10	2.5
5x8	NS-GS-5xRHA-R-PL-2/1	162.9±3.28	11.0	149.8±1.69	6.2	29.2±0.31	5.7
5x9	NS-GS-5xRHA-N-49	117.0±3.71	17.4	163.7±1.29	4.3	24.6±0.22	4.9
5x10	NS-GS-5xRUS-RF-OL-168	112.4±2.40	11.7	149.0±1.14	4.2	24.8±0.13	2.8
6	NS-GS-6	32.4±1.65	27.9	68.0±0.49	3.9	21.6±0.14	3.6
6x8	NS-GS-6xRHA-R-PL-2/1	79.0±3.18	22.0	137.5±0.99	4.0	24.7±0.23	5.0
6x9	NS-GS-6xRHA-N-49	104.7±2.49	13.0	131.3±1.05	4.4	29.5±0.30	5.6
6x10	NS-GS-6xRUS-RF-OL-168	87.4±2.45	15.3	122.0±0.90	4.0	28.5±0.21	4.1
7	NS-GS-7	43.8±1.75	21.9	86.7±0.53	3.3	21.4±0.11	2.7
7x8	NS-GS-7xRHA-R-PL-2/1	93.0±2.09	12.3	138.5±0.79	3.1	26.9±0.24	4.9
7x9	NS-GS-7xRHA-N-49	100.4±2.23	12.2	139.3±0.81	3.2	29.1±0.23	4.3
7x10	NS-GS-7xRUS-RF-OL-168	94.9±1.65	9.5	134.7±0.70	2.9	25.9±0.18	3.7
8	RHA-R-PL-2/1	30.1±1.19	21.7	125.2±0.60	2.6	16.8±0.21	6.9
9	RHA-N-49	23.7±1.08	25.0	111.4±0.79	3.9	12.2±0.75	2.5
10	RUS-RF-OL-168	25.5±0.86	18.5	127.0±0.70	3.0	17.1±0.17	5.5

The combinations NS-GS-5xRHA-N-49 (H_1=66.0%. H_2=46.9%). NS-GS-1xRHA-N-49 (H_1=56.0%. H_2 =43.0%) and NS-GS-3xRHA-N-49 (H_1=55.4%. H_2 =51.6%) had the highest positive and highly significant heterosis values for plant height relative to parental mean and better parent (Table 2).

Heterosis for head diameter relative to parental mean ranged from 19.0 to 74.7%. which is in line with the findings of MARINKOVIĆ *et al*. (2002). where heterosis values varied from 4.8 to 55.1%. Heterosis values relative to better parent ranged from 11.6 to 36.6% and were similar to those reported by MARINKOVIĆ and ŠKORIĆ, 1990 (18.3-34.8%) and MARINKOVIĆ *et al*., 2002 (up to 22.6%).

Highly significant positive heterotic effects for head diameter relative to parental mean (H_1) were manifested in 20 of the hybrid combinations. The highest highly significant positive values of heterosis relative to better parent were recorded in NS-GS-6xRHA-N-49 (H_1=74.7%. H_2=36.6%), Table 2.

Table 2. Heterosis for seed yield per plant, plant height and head deameter relative to parental mean (H_1) and better parent (H_2)

Parents and hybrids		Heterosis percentage					
		SY		PH		HD	
		H_1	H_2	H_1	H_2	H_1	H_2
1	NS-GS-1						
1x8	NS-GS-1xRHA-R-PL-2/1	142.38**	123.66**	37.00**	19.31**	19.04**	9.12
1x9	NS-GS-1xRHA-N-49	209.61**	157.86**	56.01**	42.99**	31.45*	7.79
1x10	NS-GS-1xRUS-RF-OL-168	216.37**	171.49**	23.14**	6.59**	23.21**	14.43*
2	NS-GS-2						
2x8	NS-GS-2xRHA-R-PL-2/1	98.39**	55.74**	33.44**	23.17**	25.26**	12.15**
2x9	NS-GS-2xRHA-N-49	153.44**	83.60**	42.48**	38.95**	41.48**	13.14*
2x10	NS-GS-2xRUS-RF-OL-168	108.79**	54.81**	18.95**	9.08**	25.25**	13.63**
3	NS-GS-3						
3x8	NS-GS-3xRHA-R-PL-2/1	122.98**	77.94**	39.32**	34.89**	33.52**	21.43**
3x9	NS-GS-3xRHA-N-49	186.15**	110.22**	55.42**	51.59**	48.16**	20.07**
3x10	NS-GS-3xRUS-RF-OL-168	168.40**	101.97**	27.92**	23.00**	37.64**	26.87**
4	NS-GS-4						
4x8	NS-GS-4xRHA-R-PL-2/1	159.99**	100.62**	39.76**	28.89**	27.26**	11.58**
4x9	NS-GS-4xRHA-N-49	138.56**	70.31**	51.06**	47.17**	37.65**	8.14
4x10	NS-GS-4xRUS-RF-OL-168	155.37**	86.46**	36.68**	25.23**	26.87**	12.68**
5	NS-GS-5						
5x8	NS-GS-5xRHA-R-PL-2/1	274.10**	185.83**	42.04**	19.71**	54.53**	34.41**
5x9	NS-GS-5xRHA-N-49	189.98**	105.27**	65.96**	46.87**	45.28**	13.36*
5x10	NS-GS-5xRUS-RF-OL-168	172.42**	97.14**	40.06**	17.35**	29.73**	14.29**
6	NS-GS-6						
6x8	NS-GS-6xRHA-R-PL-2/1	152.87**	143.89**	42.34**	9.85**	31.21**	14.35**
6x9	NS-GS-6xRHA-N-49	273.29**	223.17**	46.36**	17.86**	74.73**	36.57**
6x10	NS-GS-6xRUS-RF-OL-168	202.04**	169.88**	25.13**	-3.91	49.30**	31.79**
7	NS-GS-7						
7x8	NS-GS-7xRHA-R-PL-2/1	151.65**	112.29**	30.76**	10.65**	43.48**	25.55**
7x9	NS-GS-7xRHA-N-49	171.82**	129.31**	31.55**	25.04**	55.59**	36.14**
7x10	NS-GS-7xRUS-RF-OL-168	181.29**	116.75**	35.96**	6.06*	54.52**	21.18**
8	RHA-R-PL-2/1						
9	RHA-N-49						
10	RUS-RF-OL-168						

*significant at 0.05; **significant at 0.01

The hybrid combinations NS-GS-1xRUS-RF-OL-168, NS-GS-2xRUS-RF-OL-168, NS-GS-6xRUS-RF-OL-168, and NS-GS-7xRUS-RF-OL-168 had considerably lower heterosis values for plant height compared with the values for the other two traits as well in comparison with the plant height values found in the rest of the combinations. Our study of the effects of heterosis of yield and yield components has shown that this phenomenon varies both by trait and by crossing combination. Heterosis of seed yield per plant was much greater than that of the other two traits. Heterosis values relative to better parent differed considerably fom those relative to parental mean in all three traits. The hybrid combinations NS-GS-

5xRHA-R-PL-2/1 and NS-GS-6xRHA-N-49 exhibited highly significant heterotic effects relative to parental mean for all three traits (Table 2).

CONCLUSION

The following conclusions were made based on the present study's results:

Significant differences existed among the genotypes (inbreds and hybrids) in their mean values of seed yield per plant. plant height and head diameter

Variability of the three traits was found to be low in the lines as well as hybrids.

The heterosis values for seed yield per plant and plant height were highly significant in almost all of the hybrid combinations both relative to parental mean and relative to better parent.

Seed yield per plant had a much more prounounced heterotic effect (54.8-223.2%) relative to better parent than either plant height (6.0-51.6%) or head diameter (11.6-36.6%).

Heterosis values relative to better parent (H_1) differed considerably from the parental mean (H_2) for all three traits.

This study may prove useful in the future development of high-yielding sunflower hybrids.

Received March 23rd, 2005
Accepted June 1st, 2005

REFERENCES

DOZET B. (1990): Način nasleđivanja nekih osobina u F_1 generaciji interspecijes hibrida suncokreta. Arhiv za poljoprivredne nauke, *51* (184), 361-369.

GIRIRAJ K. and K. VIRUPAKSHAPPA (1992): Heterotic effect for seed yield and component characters in sunflower over seasons. Proc. of the 13th Inter. Sunf. Conf.,. Pisa, Italy, 1043-1047.

HABURA E.C. (1958): Heterosis in Estragsmerkmalen bei der Sooneblume Britania, *8* (4), 284-295.

HADŽIVUKOVIĆ S. (1991): Statistički metodi. Drugo prošireno izdanje. Poljoprivredni fakultet. Novi Sad.

HLADNI N., D. ŠKORIĆ i M. KRALJEVIĆ-BALALIĆ (2003): Efekat heterozisa na komponente prinosa suncokreta (*Helianthus annuus* L.). Zbornik radova sa 44. Savetovanja industrije ulja. Budva, 35-41.

JINKS J.L. (1983): Biometrical genetic of heterosis. Monograph on theoretical and applied genetics. Vol. G: Heterosis. ed. By R. Frankel Springel –Verlag. Berlin. Heidelberg

JOCIĆ S. (2003): Nasleđivanje komponenti prinosa kod suncokreta (*Helianthus annuus* L.). Doktorska disertacija. Poljoprivredni fakultet, Novi Sad.

JOKSIMOVIĆ J. and J. ATLAGIĆ (2001): Pojava heterozisa za neke osobine suncokreta. Zbornik radova 42. Savetovanja industrije ulja. Herceg Novi, 59-63.

KUMAR A., M. GENESH, S. KUMAR, and A. REDDY (1999): Heterosis in sunflower (*Helianthus annuus* L.). Annals Agric. Res., *4* (20), 478-480.

LAY C.L. and S.R. KHAN (1985): Inheritance of plant height in six sunflower crosses. Proc. of the 11th Iner. Sunf. Conf.. Mar del Plata, Argentina, 721-725.

LIANGING S. (1996): Selection of ideal characters of oil-bearing sunflower self-line. Proc. of the 14th Inter. Sunf. Conf., Beijing/Shenyang, China, 721-725

LIMBORE A., D. WEGINWAR, S. LANDE, B. GIZTE, and K. GHODKE (1998): Heterosis in sunflower (*Helianthus annuus* L.). Annals Plant Physiol., *1* (12), 38-42.

MARINKOVIĆ R. i D. ŠKORIĆ (1990): Nasleđivanje prečnika glave I broja cvetova po glavi u ukrštanjima raznih inbred linija suncokreta (*Helianthus annuus* L.). Uljarstvo. *27* (1-2), 22-27.

MARINKOVIĆ R., D. ŠKORIĆ, T. VREBALOV, T. ĆUPINA, J. TURKULOV, R. MARINKOVIĆ, S. MAŠIREVIĆ, J. ATLAGIĆ, L. TADIĆ, R. SEKULIĆ, D. STANOJEVIĆ, M. KOVAČEVIĆ, V. JANČIĆ i Z. SAKAČ (1989): Suncokret (monografija). Nolit, 613str.

MARINKOVIĆ R. (1981): Nasleđivanje veličine lisne površine, broja listova i visine biljaka u dialelnim ukrštanjima inbred linija suncokreta. Magistarska teza, Univerzitet u Novom Sadu, Poljoprivredni fakultet.

MARINKOVIĆ R. (1984): Način nasleđivanja prinosa semena i nekih komponenti prinosa ukrštanjem raznih inbred linija. Doktorska disertacija, Univerzitet u Novom Sadu, Poljoprivredni fakultet.

MARINKOVIĆ R., D. ŠKORIĆ i D. JOVANOVIĆ (2002) Efekat heterozisa za visinu biljke i prečnik glave kod suncokreta (*Helianthus annuus* L.). Zbornik radova Naučnog instituta za ratarstvo i povrtarstvo. *36*, 169-177.

MOROZOV VK (1947): Selekcija podsolnečnika v SSSR (knjiga). Moskva.

PUTT E. (1966): Heterosis, combininig ability. and predicted synthetics from a diallel cross in sunflowers (*Helianthus annuus* L.). Can. J. Plant. Sci., *46*, 59-67.

SCHUSTER W. (1964): Inzucht und Heterosis bei der Sonnenblume (*H. annuus* L.). Giessen.

SINGH R. S.B. SING, and R.K. RAHAEJA (2002): Heterosis for fatty acid composition over enviromnents in sunflower (*Helianthus annuus* L.). Journal of Research. Punjab Agricultural University, *39* (1), 1-5.

ŠKORIĆ D. (1975): Mogućnost korišćenja heterozisa na bazi muške sterilnosti kod suncokreta. Doktorska disertacija, Univerzitet u Novom Sadu, Poljoprivredni fakultet.

ŠKORIĆ D., R. MARINKOVIĆ, S. JOCIĆ, D. JOVANOVIĆ i N. HLADNI (2002): Dostignuća i dalji pravci u oplemenjivanju suncokreta i izbor hibrida za setvu u 2002 godini. Zbornik radova Naučnog instituta za ratarsvo i povrtarstvo, *36*, 147-160.

ŠKORIĆ D., R. MARINKOVIĆ, S. JOCIĆ, D. JOVANOVIĆ i N. HLADNI (2002): Glavni pravci i ciljevi u oplemenjivanju suncokreta. Zbornik radova 43. Savetovanja industrije ulja. Budva, Jugoslavija, 11-19.

ŠKORIĆ D., S. JOCIĆ i G. MALIDŽA (2004): Novi hibridi suncokreta Pobednik i RIMI. Zbornik radova sa 45. Savetovanja industrije ulja. Petrovac na Moru, 21-31.

ŠKORIĆ D., R. MARINKOVIĆ, S. JOCIĆ, D. JOVANOVIĆ i N. HLADNI (2002): Glavni pravci i ciljevi u oplemenjivanju suncokreta. Zbornik radova 43. Savetovanja industrije ulja. Budva, Jugoslavija, 11-19.

VOLJF V. i P. DUMANČEVA (1973): Pojavlenije geterozisa u gibridov pervogo pokolenija podsolnečnika. Meždunarodni simpozijum Geterozis kulturnih rastenij- rezjume dokladov. Varna, 40.

VRANCEANU V. F. STOENESCU (1969): Hibrizii simpli de floreasporelui o perspecitiva apropiata pentru producties. Probleme agricole. *10*, 21-32.

EFEKAT HETEROZISA ZA PRINOS SEMENA I KOMPONENTE PRINOSA SUNCOKRETA

Nada HLADNI[1], Dragan ŠKORIĆ[1] i Marija KRALJEVIĆ-BALALIĆ[2]

[1] Naučni institut za ratarstvo i povrtarstvo, 21000 Novi Sad,
[2] Poljoprivredni fakultet, 21000 Novi Sad, Srbija i Crna Gora

Izvod

Stvaranje visoko prinosnih i stabilnih hibrida suncokreta na bazi interspecijes hibridizacije zahteva posedovanje informacije o efektu heterozisa za agronomski važna svojstva u F_1 generaciji. Efekat heterozisa za prinos semena. visinu biljke i prečnik glave proučavan je kod interspecijes hibrida nastalih ukrštanjem primenom linija x tester metoda. Inbred linije majke nastale su interspecijes hibridizacijom, a restorer inbred linije oca dobrih kombinacionih sposobnosti korišćene su kao testeri u formi restauratora fertilnosti. Hibridi F_1 generacije nastali su ukrštanjem svakog testera sa svakom inbred linijom majke. Vrednosti heterozisa za prinos semena po biljci bile su pozitivne i visoko značajne u odnosu na roditeljski prosek (98.4-274.1%) i u odnosu na boljeg roditelja (54.8-223.2%). Znatno niži efekat heterozisa ustanovljen je za visinu biljke (19.0-66.0%) u odnosu na roditeljski prosek i u odnosu na boljeg roditelja (6.1-51.6%). Kod prečnika glave vrednosti heterozisa su se kretale od 19.0% do 74.7% u odnosu na roditeljski prosek i od 11.6-36.6% u odnosu na boljeg roditelja.

Primljeno 23. III 2005.
Odobreno 1. VI 2005.