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DENSITY OF HONEY BEES (*Apis mellifera* L.) ON ROWS OF THE SELF-POLLINATED SUNFLOWER LINE 2607 IN SEED PRODUCTION OF ALBENA HYBRID

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SUMMARY

In different planting designs of parent lines for hybrid seed production, pollen is provided by the fertility restoring line. *Apis mellifera* L. is the most important insect in pollen transfer from the inflorescences of the male line to these of the female. In 1989-1991 in Dobroudja region, Bulgaria, studies were conducted to determine the row spacing effect of the female line rows of Albena hybrid from the male line row on the density of *Apis mellifera* L. on the rows of the female line.

The results of the investigation show that on an average day, when the density of *Apis mellifera* is from 6 to 40 bees per 100 heads, there is no correlation between the traits studied, i.e., the row spacing between the sunflower self-pollinated line 2607 and the male line, in a planting design 5:1 of hybrid seed production, does not effect substantially the density of *Apis mellifera* L. on these rows.

Key words: *Apis mellifera*, bees, bee pollination, sunflower, sunflower hybrid seed production.

INTRODUCTION

In different planting designs for sunflower hybrid seed production, pollen for pollination of the hybrid female line is provided by the fertility restoring line. The pollen transfer is performed by different agents among which *Apis mellifera* L. is most important. This biological feature in sunflower pollination arouses a question regarding the effect of row spacing between the female line and the male one on the density of *Apis mellifera* L. in the female line rows.

In Russia, observations had shown that the distribution of bees on the plants of the female line was uneven. The bees recorded on the heads of the central rows in the band were on the average by 19-21% more than the bees on the marginal rows (Dimchya, 1988). According to the same author, the increase of bee number per sunflower head makes the bee distribution more even.

In India, an opposite relationship had been found. The visits of bees decreased as the female line row receded from that of the male line (Satyanarayana & Seetharam, 1982).

The aim of the present study is to determine the effect of the distance of female line rows from male rows on the density of *Apis mellifera L.* in the rows of the female line.

MATERIALS AND METHODS

The investigations on bee visits on the rows of the sunflower self-pollinated line 2607 (female line of Albena hybrid) were carried out in hybrid seed production plots, in a planting design 5:1, during 1989-1991 in Dobroudja region, Bulgaria. During a mass flowering of the line 2607, a site long 40m was marked comprising the first, second, third, fourth and fifth rows at a distance of 100m from the beginning of the sunflower field, where the colonies were located. Two workers moving parallelly to the rows at the speed of 100m for 15 min counted and recorded the bee number on the flowers of each head. Records were taken on alternate hours from 7 a.m. to 5 p.m.

RESULTS AND DISCUSSION

The results of the investigation of the population density of *Apis mellifera* L. in the rows of the sunflower self-pollinated line 2607, in hybrid sowings for seed production with the planting design 5:1, are listed in Table 1. The average density of *Apis mellifera* L.varies from 6 to 40 bees per 100 heads.

Table 1. Effect of distance of the sunflower self-pollinating line 2607 from the male line of Albene hybrid on the density of *Apis mellifera* L. on the female lines in seed production plots in the planting pattern of 5:1 during 1989-1991 in Dobroudja region, Bulgaria

Date, place of observ.	Average bee number per 100 heads						r	Sr	GD		
	First row	Second row	Third row	Fourth row	Fifth row	For a day			5,0%	1,0%	0,1%
1989.,Dropla site											
10.VII.	38	37	27	32	44	36	0.172	0.560	1.782	3.271	7.247
11.VII.	37	42	35	40	48	40	0.629	0.349	1.111	2.039	4.516
12.VII.	31	37	30	31	38	33	0.334	0.513	1.632	2.996	6.639
13.VII.	22	25	26	24	25	24	0.521	0.421	1.340	2.459	5.448
Total							0.199	0.226	0.475	0.650	0.886
1990.,Obrochiste site											
9.VII.	36	30	27	31	32	31	-0.338	0.511	1.626	2.985	6.613
10.VII.	29	22	17	24	28	24	0				
11.VII.	27	24	11	18	23	21	-0.353	0.505	1.607	2.950	6.535
12.VII.	16	9	6	9	7	9	-0.728	0.271	0.862	1.583	3.507
Total							-0.155	0.230	0.483	0.662	0.902
1991.,Balchik site											
16.VII.	7	6	7	8	3	6	-0.493	0.437	1.391	2.553	5.655
17.VII.	5	8	8	8	6	7	0.224	0.548	1.744	3.201	7.092
18.VII.	7	6	4	5	8	6	0.100	0.572	1.820	3.341	7.402
19.VII.	5	7	7	6	5	6	-0.158	0.563	1.791	3.288	7.286
Total							-0.100	0.233	0.490	0.671	0.914

In test years, the density variation is related mainly to the different numbers of colonies located for crop pollination. In days of observation, the differences in the bee density are mostly due to the different combinations and effects of abiotic factors. During 1989, a tendency was observed in 100% of the cases for increasing the average density of *Apis mellifera* L. per 100 heads on the rows of the female line by receding from the male line (preliminary communication by Dimitrov et al., 1992). In the conditions in 1990, in

75% of the days, there was a tendency of decrease of the average density of *Apis mellifera* L. per 100 heads on the rows of the female by receding from the male one. In 25% of the cases there was no correlation (r=0). In 1991, a tendency was observed in 50% of the cases for a decrease of the average density of *Apis mellifera* per 100 heads on the female rows by receding from the male line, and in the other 50% there was an opposite tendency. The obtained correlation coefficients for days of observations and for years were not confirmed.

The experimental data and the calculated correlation coefficients allow us to make a conclusion that there is no correlation between the traits studied and an average daily density of *Apis mellifera* L. from 6 to 40 bees per 100 heads, i.e., the row spacing between the male line and line 2607 (female line of Albena hybrid), in hybrid seed production plots with the planting design 5:1 does not effect substantially the density of *Apis mellifera* L. on the female rows.

REFERENCES

Dimitrov P., Z. Dimitrova, A. Piskov, 1992. Studies of bee-pollinators (*Hymenoptera, Apoidea*) in sunflower hybrid seed production. Selskostopanska nauka, 1.3:22-26.

Dimchya G.G., 1988. Opailenie podsolnechnika na uchaskah gibridizatzii. Pchelovodstvo (in Russian), 1:16-17.

Satyanarayana A., and A. Seetharam, 1982. Studies of the method of hybrid seed production in oilseed sunflower (*Helianthus annuus*). 3. Role and activity of insect visitors in pollination and seed set. Seed Sc. Technol. 10, 1:13-17.

DENSIDAD DE ABEJAS (*Apis mellifera* L.) EN HILERAS DE LA LINEA PURA 2607 EN LA PRODUCCION DEL HIBRIDO ALBENA

RESUMEN:

En diferentes diseños de plantación de líneas parentales para producción de semilla hibrida de girasol, el polen proviene de la línea fertil restauradora. *Apis mellifera* L., el insecto mas importante en la transferencia de polen de las inflorescencias de la línea macho a las de la hembra. Entre 1989 a 1991 se llevaron a cabo estudios en la región de Dobroudja, Bulgaria, para determinar el efecto de la distancia entre líneas parentales macho y hembra del híbrido Albena, sobre la población de *A. mellifera* en la línea hembra.

Los resultados de la investigación mustran que en un día medio, cuando la densidad de A. mellifera varia desde 6 a 40 abejas por 100 capítulos, no existe correlación entre los caracteres estudiados, es decir la distancia entre hileras de la línea pura 2607 la línea macho en un diseño de plantación de producción de híbrido de 5:1 no efecta sustancialmente la densidad de *A. mellifera* en esas hileras.

DENSITÉ D'ABEILLES (*Apis mellifera* L.) PRÉSENTES SUR LA LIGNÉES FEMELLE 2607 AU SEIN D'UNE PARCELLE DE PRODUCTION DE SEMENCES DE L'HYBRIDE ALBENA

RÉSUMÉ:

Quel que soit le dispositif cultural employé pour la production de semences hybride, le pollen est apporté par la lignée fertile (restaureur). *Apis mellifera* L. est l'insecte le pius important pour le transfert de pollen des inflorescences males vers celles des lignées femelles. Entre 1989 et 1991, dans la région de Dobroudja - Bulgarie - des études ont été conduites afin de déterminer les conséquences du rapport "espace entre rang de la lignée femelle / espace entre rang du restaureur" sur la densité d'abeilles présentes sur les rangs femelles.

Les résultats de cette étude montrent que sur un jour moyen, quand la densité d'*A. mellifera* se situe entre 6 et 40 abeilles pour 100 capitules, il n'y a aucune corrélation entre les caractéres étudiés. Pour un ratio 5 rangs femelles 2607:1 rang male, l'espace entre rang entre la lignée femelle 2607 et le restaureur n'a pas d'effets sur la densité d'abeilles présentes sur les plantes femelles.