

THE SEEDTIME AND THE MATURITY GROUPS INFLUENCING THE NUMBER OF PODS PER PLANT ON SOYBEAN

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Abstract: The experiments were arranged according to the method of random block system with three repetitions on basic field parcels of 12.5 m², within a three-year period (1998, 1999 and 2000).

The average number of the pods in the all seedtimes and for all varieties for the three year period (1998–2000) is 96, and it is 33.6% less than the average number of formed flowers. The average number of pods per plant for the three year period in the seedtime is 10% bigger (101) in the first seedtime (21 march), than the fourth seedtime (21 april). The variety with longer vegetation (II group of maturity) „111“ during the three year period formes, the biggest number of pods per plant (121), but the variety with shorter vegetation (I group of ageing) „015“ forms the smallest number of pods per plant (63).

Key words: soybean (*Glycine max. L. Merrill*), number of pods, seedtime, grain yield, varieties, climate conditions.

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ВЛИЯНИЕ НА СЕИТБЕНИТЕ СРОКОВЕ И ГРУПИТЕ НА ЗРЯЛОСТ ВЪРХУ БРОЯ НА БОБОВЕТЕ ОТ РАСТЕНИЕ ПРИ СОЯ

Резюме: Опитите са заложи по метода на рандомизираните блокове в три повторения в основни полски парцели от 12,5 м², по време на тригодишен период (1998, 1999 и 2000).

Средният брой бобове за всички сеитбени срокове и за всички сортове през тригодишния период (1998–2000) е 96 и той е 33,6 % по-малък от средния брой образувани цветове. Средният брой бобове (101) от растение през тригодишния период е 10% по-голям при първия сеитбен срок (21 март) в сравнение с четвъртия сеитбен срок (21 април). Сортът с по-дълга вегетация (II група на зрелост) „111“ образува най-голям брой бобове от растение (121) през тригодишния период, а сортът с по-кратка вегетация (I група на зрелост) „015“ образува най-малък брой бобове от растение (63).

Ключови думи: соя (*Glycine max. L. Merrill*), брой бобове, сеитбен срок, добив на зърно, сортове, климатични условия

According to the season, the optional seedtime is different for different agro ecological regions, and among the others it depends on the ripening of the variety that we want to cultivate, as well as from the purpose of the production expected.

The number of pods in one plant has a direct influence on the grain yield, but also influences indirectly through the total grain number of one plant. The heritability of the number of pods per plant is usually lower than 30%. This tells us that in the expression of this characteristic, the ecological variable has bigger influence than the genetic one (Annand and Torrie, 1963; Gupta et al., 1982; Belic et al., 1985).

The smaller number of pods is a result of the higher percent of flower abortativity at soybean.

According to the results of many researchers (Van Schaik and Probst, 1958; Hardman, 1970; Wiebold et al., 1981), in different varieties, soybean aborts from 20 to 94% of the flowers. Besides the flowers, the pods fall off as well, but it is not very significant.

The purpose of this work is to define the influence of different seedtimes and the maturity group over the number of pods and with that over the production potential, i.e on the grain yield of soybean cultivated in irrigational conditions.

MATERIALS AND WORK METHODS

Four varieties of soybean with different vegetation period have been analyzed: two from group I of maturity and two from group II (according to Hartwing's

classification, 1973). The experiments were made during a period of three years: 1998, 1999 and 2000 in Macedonia, in the region Ovce Pole (41°45' N latitude). The field on which the experiments were made is 230 m above sea level, on soil type – vertisol. The experiment is made in four repetitions with four different seedtime: 21st and 31st of March; 11th and 21st of April with three repetitions, according to the method of random block system.

The counting of pods is done in the (R7) stage from 15 randomly chosen plants from each repetition. The harvest of the plants is made in the (R8) stage of full maturity. Grain yield is determined from all plants in each plot separately and expressed in kg/ha.

The obtained data is statistically processed according to the analysis of variable method (ANOVA) and LSD test.

RESULTS

The average number of pods from all seedtime and for all varieties, for the three year period 1998–2000 year is 96 (table 1) which is 33.6% smaller then the average number of flowers formed.

Table 1/Таблица 1

Number of pods per plant 1998–2000
Брой бобове от растение 1998–2000 г.

Seedtime (A) Семтбен срок	Varieties (B)/Сортове				Average Средно (A)
	111	L-8	015	Balkan	
I	130	107	65	102	101
II	113	102	63	106	96
III	113	99	63	110	96
IV	127	82	59	98	91
Average (B) Средно	121	97	63	104	96
Level/Ниво	(A)	(B)	(AB)		
P < 0.05	2.35	19.06	5.59		
P < 0.01	4.32	34.99	8.03		

The average biggest number of pods (101), of all varieties for the three year period is registered for the first seedtime, and the smallest in the fourth which is 91.

The statistically determined differences ($P < 0.01$) are noted between the fourth and all the other seedtime. The differences between the first and the next two terms are not statistically significant and the second and the third are at the same level.

Table 2/Таблица 2

Average monthly relative air humidity, %
Средна месечна относителна влажност на въздуха, %

Years/Months Години/месци	III	IV	V	VI	VII	VIII	IX
1998	56	55	64	57	46	51	65
1999	64	64	65	61	57	51	62
2000	61	59	60	49	40	39	55
1970–2000	61	60	65	57	49	46	62

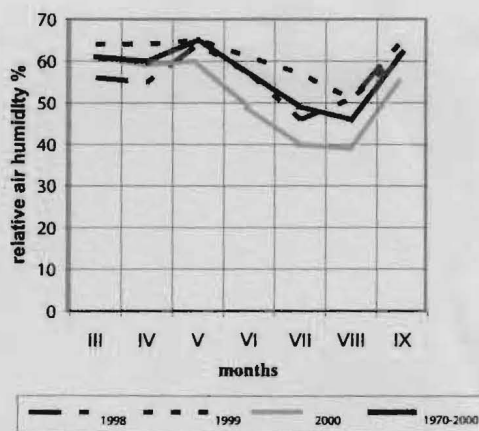


Fig. 1. Average monthly relative air humidity, %.

Фиг. 1. Средна месечна относителна влажност на въздуха, %

Variety „111“, for the three year period, forms the average biggest number of pods per plant (121), and the variety „015“ forms the smallest number of pods (63).

Over the three year period the statistical differences in the average number of pods in both analyzed levels of the varieties are established, except between the varieties „111“ and „Balkan“ at which the differences are not statistically important.

CONCLUSIONS

During the three year examination, the biggest number of pods per plant is registered in the first seedtime (21st of March), because the conditions for forming biggest number of flowers and their fertilization are most convenient at the end of May and at the beginning of June, when the plants from the first seedtime are in these stages. In later terms, with the coming of the drought, (second half of June), when the conditions for forming the pods are less convenient, especially when the plants from the fourth seedtime are in this stage, the smallest number of pods per plant is registered.

At different varieties the biggest number of pods that come from different variety is obtained in different seedtime. Nenadic (1976) and Board (1985) have concluded that the number of pods per plant in later seedtime is decreasing. Our results from these experiments are in accordance with the previous one with all varieties except with variety „111“, which points out the dependence of that characteristic from the variety.

The number of pods per plant in later seedtime is increasing, except the variety with longer vegetation „111“, which points out the dependence of that characteristic from the maturity group.

From everything that has been said, we can draw a conclusion that the number of pods per plant is in correlation with the seedtime and the maturity group of the varieties.

REFERENCES

- Annand, S. C. and H. J. Torrie (1963). Heritability of yield and other traits and interrelationships among traits in the F3 and F4 generations of three soybean crosses. *Crop Sci.*, 3, pp. 508–511.
- Belic, D., Jockovic D., and M. Hrustic (1985). Heritability in quantitative characters in soybean. *Archives agricultural science*, 46, 162, Beograd., pp. 97–113.
- Board, J. E. (1985). Yield components associated with soybean yield reductions at nonoptimal planting dates. *Agron. J.* 77, No 1, pp. 135–140.
- Carlson, J. B. and N. R. Lersten (1987). Reproductive Morphology. In Wilcox, J.R. (ed.) *Soybeans: improvement, production and uses*. Agron. Monogr. 16, ASA, Madison, WI, pp. 17–96.
- Fehr, W. R., Caviness, C. E. and D. T. Burmood (1971). Stage of development descriptions of soybeans (*Glycine max.* L. Merrill). *Crop Sci.* 11, pp. 929–931.
- Gupta, P. V., K. I. Garg and D. N. Rana (1982). Consistency of heritability estimates over environments and cropping systems for different groups of traits in soybean. *Soybean Genet. Newsl.* 9, pp. 66–68.
- Hardman, L. L. (1970). The effects of some environmental conditions on flower production and pod set in soybean *Glycine max.* (L) Merrill var. Hark. Diss. Abstr. 31, 5.
- Hartwig, E. E. (1973). Varietal development. In Caldwell, B.E. (ed.) *Soybeans: Improvement, production and uses*. Jour. Amer. Soc. of Agron., Madison, Wis., pp. 187–210.
- Nenadic, N. (1976). Influence of the seedtime dues on growth, development and yield in soybean. *Archives agricultural science* 29, 108, Beograd. pp. 149–154.
- Nenadic, N., M. Maric, V. Plazinic, R. Stikic, S. Dokic, D. Simova-Tosic, M. Tasic, D. Simic and Z. Vrbaski (1985). Soybean, production and remaking. Faculty of Agriculture Beograd. pp. 39–45.
- Van Schaik, P. H. and A. H. Probst (1958). Effects of some environmental factors on flower productive efficiency in soybeans. *Agron. J.*, 50, 192–197.
- Wiebold, W. J., D. A. Ashley and H. R. Boerma (1981). Reproductive abscission levels and patterns for eleven determinate soybean cultivars. *Agron. J.*, 73, pp. 43–46.

Статията е постъпила в редакцията на 10.02.2006 г. и е докладвана от ст. н. с. I ст г-р Тони К. Тонев