

Crop Capacity of Various for Fast-Ripening Maize Hybrids Depending on Thickness of Plants

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Abstract: One of the questions for grain problem solving decisions is the increase of maize grain production. Comparative productivity of district and perspective maize hybrids of various group of ripeness by different density of cultivation was defined. It is established, that the best productivity is formed the hybrid of medium-late maize group of ripeness Dneprovsky 337 MB - 80,4 cwt/hectare by density of 50 thousand/hectare standing of plants. While the early-ripening hybrids Slavutich 162 CB and Luch 330 MB are necessary sowing with density 60 thousand/hectare and they form a crop on 20,0 and 11,6 cwt/ha less. Increase of crops and gross yield of the commodity and seed grain may be achieved on the basis of introduction of the new, more fruitful hybrids, the advanced intensive technologies which component is precise observance of the certain optimum normal seeding of seeds for each group of ripeness of hybrids that of duly and qualitative performance of all system of agrotechnical actions. The urgency of this question has defined the choice of a theme of researches which has caused necessity of a substantiation of practical decisions.

Key words: Maize • Various • Hybrids • Capacity • Crop

INTRODUCTION

According to the researches, carried out by scientific USA [1] in state North Dacota, it is established, that increase of stalk density from 24 to 72 thousand of plants on one hectare was accompanied by increase of a grain yield from 41 to 61 cwt/ha, amounts of lines of grains from 16,2 to 16,7. Thus early-ripening hybrids exceeded late-ripening hybrids almost on all elements of a crop. At early-ripening high-efficiency forms which it was raised with the increased of stalk density, the stability of drowning was decreased, humidity of a grain was increased at harvesting. By the Mexican scientists [2] it is established, that optimum density of maize changes from 45000 to 75000 plants on one hectare depending on group of ripeness of hybrids. In the researches which have been carried out in Holland, the control crop (10 plants on 1m²) was accepted for 100 %. With increase of density up to 12 plants on m², contents of dry substance it was increased by 4 %, but it did not compensate the

equivalent control of gathering of dry substance through low productivity of green mass [3]. Experiences with the maize, carried out by scientists of India, have shown, that the top yield of a grain (72,2 cwt/ha) was received at density of standing of 90 thousand plants on hectare and N₁₈₀. Without nitric fertilizer - the density influenced on a grain yield a little. By N₆₀ - the optimum density of standing was 65 thousand plants on hectare, by N₁₂₀ - 90 thousand plants on hectare; productivity accordingly 51,6 and 66,0 cwt/ha. The numerous researches which have been carried out in Germany, it is established, that the weight of 1000 grains in the greatest measure is reduced at increase of density from 64 to 80 thousand plants on hectare. At the same time the number of lines of grains in maize-cob in a smaller measure depend on density of crops (gradually decreased from 13.2-13.9 at 64 thousand/ha to 13.1-13.6 at 118 thousand plants on hectare [4]. On the basis of the series experiences which have been carried out in Bulgaria [5], the conclusion is made, that density of plants without an

irrigation at early-ripening hybrids (Knezha 180) should make 75-80 thousand/hectare, medium-early (Knezha 255, Knezha 260A, Knezha 290) - 65-70 thousand/hectare; medium-late (Knezha 510, Knezha 530, Knezha 557) - 55060 thousand/hectare, late-ripening (Knezha 611, Knezha 641, H-708) 40-50 thousand plants on hectare. By experience of other scientists it is established, that the best crop - 10,75 thousand/hectare hybrids $\hat{A}\tilde{N}$ 66-25 can be received under condition of an irrigation and at density of 89 thousand plants on hectare and nitric fertilizer of 349 kg/hectare. During the test of two maize hybrids in Yugoslavia on a background of three densities (52907, 59250, on 64931 plants on 1 hectare) it is established, that at a density of 52907 plants on 1 hectare the best crop of both hybrids which allows to recommend for hybrids of group of ripeness of FAO 600-700 the optimum density of cultivation in 50-55 thousand plants/hectare [6]. Other researchers found a decrease in the production when the stalk density was increased from 41 to 143 thousand plants / hectare. General productivity thus has made 6,56 t/hectare and 10,86 t/hectare respectively, [7]. Apparently from the made review of original sources, common scientific idea about use of hybrids of maize of different groups of ripeness, for realization of genetic potential does not exist. Therefore the question of studying of reaction of plants of maize hybrids on climatic and agrotechnical conditions of cultivation in Northern steppe remains open and it became the purpose of our researches.

MATERIALS AND METHODS

In 1998 - 2000 years at the Kirovograd State Agricultural Research Station the short-term experiences on studying of reaction of different behind on ripeness maize hybrids on density of standing of plants were incorporated. The soil of a research plot - chernozem usual medium-humus hard-loamy. The contents of humus in an arable layer (0-30 cm) makes 5,8-6,0 %, hydrolyzing nitrogen - 5,5-6 mg/kg, accessible phosphorus and potassium accordingly 11-14 and 14-15 mg/100 g of soil, pH of salt extract - 6,7-7,0, hydrolytic acidity - 2,2-1,8 mg on 100 g of soil. Research were carried out according to the standard methods. In experience was sowed the early-ripened hybrid Slavutich 162 CB and the medium-ripened Luch 330 MB and Dneprovski 337 MB with density of standing of plants before harvesting 40, 50 and 60 thousand/hectare.

The predecessor was a winter wheat. Sowing carried out in optimum terms. The size of an experimental plot was 50,4 m² at triple repetition.

Weather conditions in one year of realization of researches differed. So, on the humidifying, year of 2001 was average, 2002 - droughty, the insufficient amount of precipitation was in 2003.

RESULTS AND DISCUSSION

Results of researches testify, that on the average for years 2000 - 2003 the period of young growth-burst out foreign currency of early-ripened hybrid Slavutich 162 CB has made 59 days and in medium-ripened Luch 330 and Dneprovski 337 accordingly 63 and 67 days. The length of the vegetative period of the given hybrids made accordingly 99, 105 and 106 days. The analysis of dynamics of growth and development of plants shows, that the best were plants of hybrid Dneprovski 337MB which height on density varied in borders 202 - 218 cm, that it is more in comparison with hybrids Slavutich 162 CB and Luch 330 MB accordingly on 13,4-20,6 and 3,0-10,0 %. It is necessary to note, that at hybrid Dneprovski 337 MB with increase of normal seeding increase of height of plants whereas in other two hybrids it remained almost at one level, accordingly 175 - 197 cm was observed. The amount of leaves on plants of the given hybrids, on density of standing, practically did not change and made 10-11 piece. The weight of a grain of one maize-cob was the best also at hybrid Dneprovski 337 MB and changed from 176 g by density 40 thousand/hectare to 183 and 162 g accordingly at density 50 and at 60 thousand/hectare. The weight of 1000 grains of hybrid Dneprovski 337 MB made accordingly for researched density 292, 297 and 288 g. The best productivity of this hybrid marked at density of plants 50 thousand/hectare, hybrids Slavutich 162 CB and Luch 330 MB formed the highest productivity at density of standing of plants 60 thousand/hectare. The direct correlation dependence of crop capacity of hybrids with parameters of elements of their productivity (Table 1) is observed. So, on the average for years 2001-2003 the best crop capacity of a maize grain was provided with hybrid Dneprovski 337 MB - 80,4 cwt/hectare at density of plants 50 thousand/hectare, that it is more in comparison with hybrids Slavutich 162 CB and Luch 330 MB (at density 60 thousand/hectare) accordingly on 20,0 and 11,6 cwt/ha by $HCP_{05} = \pm 15,3$ cwt/ha.

Table 1: Crop capacity of maize grain, cwt/hectare

Hybrids	Density of standing, thousand/hectare	2001	2002	2003	Average for 3 years
Slavutich 162CB	40	52,2	44,2	45,6	47,3
Slavutich 162CB	50	67,6	56,3	50,6	58,2
Slavutich 162CB	60	68,8	57,1	55,2	60,4
Luch 330MB	40	57,3	55,9	53,8	56,7
Luch 330MB	50	67,1	63,5	60,9	63,8
Luch 330MB	60	97,9	59,8	48,7	68,8
Dneprovski 337MB	40	80,5	76,2	63,6	73,4
Dneprovski 337MB	50	95,0	80,4	65,7	80,4
Dneprovski 337MB	60	93,0	68,6	64,2	75,3
LCD. (005) Cwt/ha For hybrids	9,04	3,01	3,24	12,83	
For density	5,99	6,00	1,94	15,31	

CONCLUSION

Thus in conditions of Northern steppe of Ukraine on chernozem usual medium-humus hard-loamy the best maize crop capacity forms the medium-late maize hybrid Dneprovski 337 MB - 80,4 cwt/ha by density of plants 50 thousand/ha while the early-ripened hybrids Slavutich 162 CB and Luch 330 MB form accordingly 60,4 and 68,8 cwt/ha by density of plants - 60 thousand/ha, or it is less on 20,0 and 11,6 cwt/ha.

The best economic return received from hybrid Dneprovski 337 MB at sowing with norm of seeding 50 thousand pieces/ha, a hybrid Luch 330 MB at norm of seeding 60 thousand pieces/ha, hybrid Slavutich 162 CB at norm of seeding 60 thousand pieces/ha.

With the purpose of the increase of grain production in conditions of Northern Steppe of Ukraine it is recommended to raise the maize hybrids which provide the maximal crop capacity. For medium-ripened the hybrids Luch 330 MB and Dneprovski 337 MB the recommended and economically justified normal seeding is 50 thousand pieces/ha (net profit - 3044 and 2530 UAH/ha accordingly), the early-ripened hybrid Slavutich 162 CB - 60 thousand pieces/ha (net profit is 2228 UAH/ha).

REFERENCES

1. Russell, W.A., 1974. Comparative performance for maize hybrids representing different eras of maize breeding. Ann. Corn and Sorghum Res. Conf., 29: 81-101.
2. Sangoi, L. and R.J. Salvador, 1998. Influence of plant height and leaf number on maize production at high plant densities. Pesquisa Agropecuária Brasileira, 33: 297-306.
3. Sihgh, K.P., 1988. Effect of plant density and level and proportion of nitrogen fertilization on growth, yield and yield components//Indian J. Agr. Sci., 58(11): 854-856.
4. Valiev, G.Z., 1988. Cultivation of maize at various density of standing plants//Scientific and technical bulletin VNII of Plant Growing, 183: 13-14.
5. Elejovska, M., K. Shopova and E.G. Jordan, 1989. The effect of density for seeding and terms on flowers in the seeds // Plant Growing Sci., 26(3): 26-29.
6. Matei, I., 1988. Influenta desimii de samanat asupra productiei, La citiva hibrizi de porumb de mare producti vitata, pe nisipurile irigate de la Timburesti // An. Univ. Craiova Ser. Biol. Agron. Horti., 19: 12-26.
7. Pinter, L., V. Schmidt, S. Jozza, J. Szabo and G. Kelemen, 1990. Effects of plant density on the feed value of forage maize //Maydica, 35(1): 73-79.