

THE FORMATION OF MAIZE GRAIN YIELD DEPENDING ON SOWING DATES IN THE NORTHERN STEPPE OF UKRAINE

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Topicality. The productivity potential of maize determines the prospects of this crop in the grain balance of Ukraine. In the context of the crisis caused by the war and global climate change, which has a significant effect on crop production in the Steppe zone, the productivity of grain crops, including maize, is becoming increasingly unstable over the years, leading to a decline in the gross harvest of the crop. Given the changing weather conditions, in particular climate warming, substantiation, development and implementation of agrotechnical practices to mitigate the negative effects of drought, heat and soil moisture deficit is relevant. In the complex of zonal agrotechnical practices, the sowing dates of crops play an important role. Seed germination, timely emergence of seedlings, and optimal plant density depend on the sowing date. Early sowing in insufficiently warmed soil prolongs the sowing – germination period, or late sowing in excessively dry soil results in sparseness of seedlings and low grain productivity. Therefore, there is a requirement to create the most favourable conditions for the growth of maize plants, considering the biological characteristics and environmental requirements of hybrids, soil, climate and weather conditions. **Purpose.** Identification of the peculiarities of growth and development of maize plants and formation of maize grain yield depending on the sowing date of biotypes belonging to different maturity groups in the Northern Steppe of Ukraine. **Materials and Methods.** New maize hybrids of different ripeness groups DN Pulsatsiia, DN Atlant, DN Drah, DN Nazar were sown on the experimental plot of the Laboratory of Agricultural Resources of Maize and Sorghum at the SE Institute of Grain Crops of NAAS in three dates. The following research methods were used: laboratory and field methods for determining plant height, number of leaves per plant, individual plant productivity, grain moisture content; statistical method for performing correlation, analysis of variance and statistical evaluation of research results. **Results.** It was found that the highest grain yields were formed by the early ripening hybrid DN Pulsatsiia (10.27 t/ha), the mid-early hybrid DN Atlant (10.96 t/ha), the mid-ripening hybrid DN Drah (11.61 t/ha) and the mid-late hybrid DN Nazar (11.49 t/ha) at the early sowing date. **Conclusions.** In the growing season of 2021–2023, the highest grain yield was formed by maize hybrids of all maturity groups at early sowing date. Sowing maize both at the optimal and late time resulted in a decrease in grain yield in corn hybrids by an average of 4.5 and 13.1%, respectively, compared to the early time. Based on the experimental data, it was found that new maize hybrids DN Pulsatsiia, DN Atlant, DN Drah, DN Nazar form the highest grain yield in the Northern Steppe of Ukraine when they are sown on 14–25 April.

Key words: maize, hybrid, sowing date, yield attributes, individual productivity of plants, grain yield

Introduction. Accelerated and sustainable grain production is the most important task for the country's agricultural sector. As one of the most productive crops for multiple uses, maize plays an important role in the successful achievement of this goal [1, 2]. The strategy for the effective development of the grain sector in Ukraine envisages a sustainable gross yield of 28–

30 million tonnes of maize grain, which will help to develop and fully meet the needs of the food, feed, processing and other domestic industries for high-quality raw materials and the growing volume of grain exports.

In the context of the crisis caused by the war and global climate change, which has a significant effect on crop production in the Steppe

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zone, the productivity of grain crops, including maize, is becoming increasingly unstable over the years, leading to a decline in the gross harvest of the crop.

In the face of global warming and climate change, an important issue is the substantiation, development and implementation of agrotechnical practices to mitigate the negative effects of drought, heat and soil moisture deficit. Solving these problems requires finding ways to optimise maize growing conditions, use adaptive properties and agrocenotic resistance of modern hybrids to adverse environmental stressors, and ensure rational use of the growing season and agroclimatic resources of soil and environmental zones. An important place in the complex of zonal agrotechnical measures is occupied by the sowing dates of crops [3–5].

Maize (*Zea mays* L.) as a plant of southern origin has specific characteristics and requirements to the cultivation system. According to generalised data, the seeds of most maize hybrids germinate at a soil temperature of 8–10 °C, seedlings appear at a soil temperature of 10–12 °C, the most favourable average daily air temperatures for growth and development during the period of seedling emergence – tasseling are 20–23 °C, and for the second half of the growing season from tasseling to grain ripening are 22–23 °C.

However, the temperature factor has a significant impact on the growth, development and productivity of maize plants. Thus, plants stop to form new leaves at air temperatures below 6.6°C, and the minimum temperatures for the development of vegetative organs in maize are limited to 10–11 °C. During the growing season (before the emergence of reproductive organs), the rise in air temperature to 25 °C does not harm the growth and development of maize plants. The accumulation of organic matter in the maize plants slows down at an air temperature of 25–27 °C, and completely stops at 33–35 °C [1–3, 6].

Maize plants are also susceptible to low temperatures and frosts. In the spring, frosts of -2–3 °C can completely damage maize seedlings, but if the impact of low temperatures occurs before the 5–6 leaf stage, seedlings can recover within a week. Autumn frosts can also be a prerequisite for a decrease in maize yields. Temperatures close to 0 °C damage the green leaves of maize plants, and a temperature drop

to -2–3 °C causes damage of mature grain with moisture content exceeding 20 % [7].

Maize hybrids of different maturity groups represent a diverse range of ecological biotypes of the crop. Maize hybrids are characterised by different growth and development rates, variability of morphological traits, duration and intensity of photosynthetic activity, root system development and other characteristics that are also formed under the impact of technological methods, in particular, sowing dates. Sowing in time affects the uniformity and completeness of seedlings, the growth and development rates of plants, and crop yields [1].

Soil and climatic conditions in the cultivation area should be considered to determine the optimal date for sowing maize, including the rate of rise in air and soil temperature, the time and frequency of spring frosts, and the moisture availability of the seedbed. Seeds are sown in insufficiently wet soil at late sowing dates, which negatively affects their germination [3, 8].

At early sowing (steady soil warming up to 8–10 °C), tasseling of maize plants occurs earlier, which allows early crops to rationally utilise soil moisture reserves and reduce the risk of negative effects of drought on crop plants during the critical development stages of the growing season.

Materials and Methods. The research was carried out at the experimental plot of the Laboratory of Agrobiological Resources of Maize and Sorghum of the SE IGC NAAS in 2021–2023. The soil was ordinary low-humus full-profile chernozem. The maize cultivation technology was generally accepted for the Steppe zone. The predecessor was spring barley for grain. Primary tillage included ploughing to a depth of 25–27 cm. Plant nutrition background was N₆₀P₄₅K₄₅. Harness herbicide (2.5 l/ha) was applied before sowing. Maize was sown in three dates: early sowing was carried out at soil temperature at a seeding depth of 8–10 °C, optimal and late sowing was carried out 10 and 20 days after the early sowing, respectively. The plant density of maize hybrids depended on FAO biotypes and was as follows: DN Pulsatsiia (FAO190) – 60,000 plants/ha, DN Atlant (FAO 290) – 50,000 plants/ha, DN Drah (FAO 340) – 40,000 plants/ha and DN Nazar (FAO 430) – 30,000 plants/ha. According to the Dnipropetrovsk Regional Centre for Hydrometeorology,

the main meteorological elements of the study Steppe subzone of Ukraine (Table 1).

years (2021–2023) were typical for the Northern

In 2021, the moisture conditions of the

Table 1. Meteorological conditions of the growing season of maize hybrids, (according to the Dnipropetrovsk Regional Centre for Hydrometeorology)

Year	Average daily air temperature, °C	Total precipitation per month, mm	Average daily relative humidity, %	Monthly HTC
May				
2021	15.8	27.0	65.7	0.55
2022	15.2	20.0	52.0	0.42
2023	16.1	33.8	59.0	0.68
Long-term average	16.5	49.0	62.0	0.96
June				
2021	19.5	202.3	80.0	3.46
2022	22.2	29.0	57.3	0.44
2023	20.2	29.4	61.3	0.48
Long-term average	20.5	61.0	65.0	0.99
July				
2021	23.6	70.0	72.0	0.96
2022	22.4	36.6	59.7	0.53
2023	23.1	41.1	62.7	0.57
Long-term average	22.7	50.0	64.0	0.71
August				
2021	22.8	51.0	70.3	0.72
2022	24.5	46.0	59.7	0.61
2023	24.3	29.0	59.7	0.38
Long-term average	22.0	45.0	63.0	0.66
September				
2021	13.9	24.0	54.0	0.58
2022	15.0	34.0	71.0	0.76
2023	19.3	13.4	56.0	0.23
Long-term average	16.2	43.0	68.0	0.88
Growing season (May – September)				
2021	19.1	374.3	71.8	1.28
2022	19.9	165.6	59.9	0.55
2023	20.6	149.0	83.3	0.47
Long-term average	19.6	248.0	64.4	0.83

maize growing season (from May to September) were characterised as well-moistened, with the hydrothermal coefficient (HTC) according to G. T. Selyaninov equal to 1.28 (normal value is 0.83). According to the moisture conditions, May was dry, June was ultra-humid, July was moderately humid, and August was dry. The weather conditions of the maize growing season in 2022 were characterised by a higher average air temperature (by 0.3 °C) with precipitation 82.4 mm lower than in the long-term data. The growing season was dry with HTC of 0.55. In terms of moisture availability, May, June and July were very dry, resulting in a deterioration of maize growth processes due to a lack of precipitation, and plants were supplied with water

only through soil moisture.

The average air temperature of the growing season in 2023 exceeded the long-term average by 1 °C at a precipitation deficit of 99.0 mm, while the moisture conditions of the period were characterised as very dry (HTC = 0.47) and were more stressful for plants than in 2022. Monthly, May was dry, July and August were moderately dry, and June, August and September were very dry.

Thus, the meteorological conditions of the three years of research demonstrated the agroecological and climatic resources of the northern part of the steppe zone of Ukraine. The diverse hydrothermal conditions and different sowing dates allow us to comprehensively assess the ef-

fect of both the weather factor and the sowing date on the growth, development and formation of grain productivity of newly developed maize hybrids of different maturity groups.

The research was conducted according to the 'Methodological recommendations for field experiments with maize' (Dnepropetrovsk, All-Union Scientific Research Institute of maize, 1980) and 'Methodology for field experiments with maize' (Dnipropetrovsk, 2008) [9, 10].

Results and Discussion. In the spring of 2021–2023, the optimal temperature regime for sowing occurred at different times, so the field experiments were sown in early, optimal and late dates: in 2021 – on 14, 24 April and 5 May, in 2022 – on 25 April, 5 and 15 May, in 2023 – on 19, 29 April and 8 May, respectively.

The productive moisture reserves in the 0-100 cm soil layer at the time of sowing of maize hybrids were: at early sowing date in 2021 – 141.2 mm, in 2022 – 122.0 mm, in 2023 – 132.0 mm, at optimal sowing – 139.3 mm, 119.4 and 130.6 mm, and at late sowing date – 134.4 mm, 111.3 and 126.1 mm, respectively (according to the average long-term data, the moisture reserves in the one-metre layer were 136, 133 and 128 mm, respectively). It should be noted that it is a common phenomenon in the Northern Steppe of Ukraine that spring reserves of productive moisture in the one-metre soil layer decrease from early to late sowing dates.

In 2021–2023, full seedlings of the maize were recorded on 17–19 days (early sowing date), 12–14 days (optimal sowing date) and 9–10 days (late sowing date) after sowing, depending on the temperature regime of the spring period and biological characteristics of the hybrids. With an increase in air temperature at early to late sowing dates, the duration of the sowing – seedling period was reduced by 8 days on average by biotypes.

The highest average field germination (87.6 %) in maize hybrids was observed at late sowing date due to sufficient soil moisture after precipitation and increasing air temperature. In our opinion, this indicator tended to decrease at early sowing due to a prolonged decrease in day and night air temperature.

Depending on the genetic characteristics of the maize biotype and sowing date, the duration of the growing season (sowing – full ripeness of grain) was 119–132 days in the early

ripening DN Pulsatsiia hybrid, 122–134 days in the mid-early DN Atlant hybrid, 126–139 days in the mid-ripening DN Drah hybrid, and 130–144 days in the mid-late DN Nazar hybrid. Depending on the sowing date of the maize hybrids, the duration of the sowing – full grain ripeness period between early and late sowing (20 days difference) is reduced by 14 days.

Plant height is an important indicator that characterises the response of the crop to growing conditions and agronomic practices. The tallest plants (238–315 cm) were formed by maize hybrids in the conditions of wet 2021, with excess moisture in June contributing to an increase in the average plant height by 7 cm (optimal sowing date) and 16 cm (late sowing date). Under dry growing conditions in 2022 and 2023, taller plants (235–267 and 211–247 cm, respectively) of maize hybrids were formed at an early sowing date (Table 2).

Average plant height of maize hybrids varied within 232–271 cm in 2021–2023. The tallest plants (228–271 cm) of maize hybrids were at the early sowing date. On average, the biometric index of maize hybrids decreased by 3 cm (optimal sowing date) and 2 cm (late sowing date).

It should be noted that the number of economically viable ears formed on the plant is a genetically determined trait that can vary under the influence of growing conditions [11, 12]. During the research, maize hybrids formed on average from 103 ears (DN Pulsatsiia, late sowing date, 2022) to 194 ears of economically viable ears (DN Nazar, optimal sowing date, 2021) per 100 plants.

In 2021–2023, all maize biotypes formed a greater number of ears per 100 plants at the optimal sowing date, with the highest number of ears in DN Drah (150 ears) and DN Nazar (156 ears), and the lowest in DN Pulsatsiia (120 ears) and DN Atlant (127 ears). Shifting the sowing date of maize by 10 days towards early or late date caused a decrease in individual plant productivity depending on the biotype by 0.01–0.03 and 0.01–0.04 ears per plant, respectively.

Maize hybrids of domestic breeding were also distinguished by a high grain yield per ear, which varied from 82.6 % (hybrid DN Nazar, late sowing date) to 86.4 % (hybrid DN Atlant, optimal sowing date), depending on the genetic characteristics of the biotype and sowing date (Table 3).

Table 2. Plant height and individual productivity in maize hybrids of different maturity groups depending on the sowing date

Hybrid (factor B)	Plant height, cm				Number of ears per 100 plants			
	2021	2022	2023	average	2021	2022	2023	average
Early sowing date (factor A)								
DN Pulsatsiia	238	235	211	228	136	109	113	119
DN Atlant	254	234	214	234	140	115	123	126
DN Drah	299	267	247	271	175	123	149	149
DN Nazar	269	242	245	252	190	119	151	153
Average	265	245	229	246	160	117	134	137
Optimal sowing date (factor A)								
DN Pulsatsiia	247	230	206	228	139	105	115	120
DN Atlant	259	227	210	232	144	111	126	127
DN Drah	306	244	235	262	181	118	152	150
DN Nazar	281	236	240	252	194	116	158	156
Average	273	234	223	243	165	113	138	139
Late sowing date (factor A)								
DN Pulsatsiia	254	227	203	228	128	103	117	116
DN Atlant	268	221	208	232	135	106	130	124
DN Drah	315	235	231	260	170	113	159	147
DN Nazar	295	230	236	254	186	114	164	155
Average	283	228	220	244	155	109	143	136

Table 3. Grain yield per ear and harvesting moisture content depending on the sowing date

Hybrid (factor B)	Grain yield per ear, %				Grain moisture content, %			
	2021	2022	2023	average	2021	2022	2023	average
Early sowing date (factor A)								
DN Pulsatsiia	84.9	84.6	84.0	84.5	17.6	16.3	15.0	16.3
DN Atlant	86.1	87.2	85.1	86.1	17.8	17.3	15.6	16.9
DN Drah	85.6	85.9	86.0	85.8	18.5	18.4	17.9	18.3
DN Nazar	84.4	82.5	83.4	83.4	25.4	22.8	23.3	23.8
Average	85.3	85.1	84.6	85.0	19.8	18.7	18.0	18.8
Optimal sowing date (factor A)								
DN Pulsatsiia	85.4	84.0	83.5	84.3	18.9	17.7	18.3	18.3
DN Atlant	87.5	86.8	85.0	86.4	19.5	19.4	18.6	19.2
DN Drah	86.5	85.0	86.1	85.9	20.8	20.5	21.2	20.8
DN Nazar	84.7	81.8	82.9	83.1	26.7	26.5	29.9	27.7
Average	86.0	84.4	84.4	84.9	21.5	21.0	22.0	21.5
Late sowing date (factor A)								
DN Pulsatsiia	84.5	83.6	83.0	83.7	20.2	18.5	20.1	19.6
DN Atlant	86.7	85.9	85.3	86.0	21.1	20.7	20.8	20.9
DN Drah	85.7	84.5	84.9	85.0	23.2	22.8	23.4	23.1
DN Nazar	84.6	80.8	82.5	82.6	28.1	31.2	33.0	30.8
Average	85.4	83.7	83.9	84.3	23.2	23.3	24.3	23.6

During the grain ripening stage, maize grain dries at different rates depending on the maturity group of the hybrids, their morphological characteristics and grain moisture content. The efficiency of grain moisture release depends significantly on the length and number of ear husks and cob diameter. Late-ripening maize

hybrids have a thicker layer of ear husks, resulting in their slower moisture release and a longer grain ripening period.

The moisture content of grain significantly affects its drying rate. The average daily moisture release was also taken into account to determine the harvesting time, which is about

0.8–1.2 %, 0.5–0.7 and 0.3–0.4 % at grain moisture content of 35–40, 30–35 and 25–30 %, respectively, according to the data of the SE IGC NAAS. Intensive moisture release from maize grain practically stops when the average daily air temperature drops to 5–6 °C and its relative humidity increases to 80–90 % [1, 2].

In 2021–2023, the grain moisture content of maize hybrids at harvesting in the experiment depended on both the genetic characteristics of the hybrids and the sowing date: it was 16.3 % at early sowing date (DN Pulsatsiia), 23.8 % (DN Nazar), and 18.3–27.7 % and 19.6–30.8 % at optimal and late sowing dates, respectively.

The grain content of the ear in the maize hybrids varied from 494 kernels (DN Pulsatsiia hybrid, late sowing date) to 728 kernels (DN Nazar hybrid, early sowing date) on average over the years of research, and maize hybrids formed 14–18 grain rows per ear. Hybrids sown in the early dates were characterised by the highest grain content of the ear (Table 4).

Maize hybrids of different maturity groups

had 1000 grain weight from 246 g (DN Pulsatsiia hybrid, late sowing date, 2023) to 378 g (DN Drah hybrid, optimal sowing date, 2021). The highest indicator (378 g) was in the mid-ripening DN Drah hybrid in wet 2021. In 2021–2023, on average, 1000 grain weight of hybrids in all maturity groups varied from 270 g (DN Pulsatsiia hybrid, late sowing date) to 349 g (DN Nazar hybrid, early sowing date) and was reduced due to drought conditions during the second half of the growing season. On average over three years, we have found a decrease in the 1000 grain weight on crops of all maize biotypes when the sowing date was moved from early to optimal or late ones.

The most important criterion for the effectiveness of the proposed agricultural practice in crop cultivation is the level of grain yield. Hybrids of different maturity groups of domestic breeding provided an average grain yield from 9.36 to 11.61 t/ha at standard (14 %) moisture content, depending on the sowing date in 2021–2023 (Table 5).

Table 4. Grain content of the ear and 1000 grain weight in maize hybrids of different maturity groups depending on the sowing date

Hybrid (factor B)	Grain content per ear, pcs				1000 grain weight, g			
	2021	2022	2023	average	2021	2022	2023	average
Early sowing date (factor A)								
DN Pulsatsiia	519	475	518	504	287	280	284	284
DN Atlant	579	468	608	552	328	329	286	314
DN Drah	530	662	582	591	364	325	309	333
DN Nazar	636	789	759	728	368	350	328	349
Average	568	599	617	594	337	321	302	320
Optimal sowing date (factor A)								
DN Pulsatsiia	523	464	505	497	298	278	261	279
DN Atlant	539	461	552	517	349	327	279	318
DN Drah	548	608	523	560	378	316	298	331
DN Nazar	639	698	648	662	371	348	304	341
Average	562	558	557	559	349	317	286	317
Late sowing date (factor A)								
DN Pulsatsiia	549	440	492	494	288	277	246	270
DN Atlant	572	455	491	506	334	318	275	309
DN Drah	541	592	482	538	355	309	282	315
DN Nazar	647	633	556	612	351	338	295	328
Average	577	530	505	538	332	311	275	306

Depending on the hydrothermal conditions of the year and the sowing date, the early ripening DN Pulsatsiia hybrid (FAO 190) formed a grain yield of 7.51–12.98 t/ha, mid-early DN Atlant hybrid (FAO 290) – 7.70–13.51 t/ha, mid-ripening DN Drah hybrid (FAO 340) – 8.28–15.0 t/ha, mid-late DN Nazar hybrid

(FAO 430) – 7.32–13.82 t/ha.

The highest yields were obtained in maize hybrids of all maturity groups (FAO 190–430) at early sowing date. Over the years of research, the highest yields among the biotypes were achieved by DN Nazar (11.49 t/ha) and DN Drah (11.61 t/ha) hybrids at early sowing date.

Table 5. Grain yield of maize hybrids of different maturity groups at standard moisture content (14%) depending on the sowing date

Hybrid (factor B)	Grain yield, t/ha			Average (factor B)
	2021	2022	2023	
Early sowing date (factor A)				
DN Pulsatsiia	12.13	8.68	10.00	10.27
DN Atlant	13.29	8.88	10.71	10.96
DN Drah	13.52	10.59	10.72	11.61
DN Nazar	13.32	9.86	11.30	11.49
Average	13.07	9.50	10.68	11.08
Optimal sowing date (factor A)				
DN Pulsatsiia	12.98	8.13	9.09	10.07
DN Atlant	13.51	8.39	9.71	10.54
DN Drah	15.00	9.04	9.47	11.17
DN Nazar	13.82	8.47	9.34	10.54
Average	13.83	8.51	9.40	10.58
Late sowing date (factor A)				
DN Pulsatsiia	12.12	7.51	8.47	9.37
DN Atlant	12.87	7.70	8.76	9.78
DN Drah	13.06	8.28	8.66	10.0
DN Nazar	12.68	7.32	8.09	9.36
Average	12.68	7.70	8.50	9.63
LSD ₀₅ , t/ha	2021: A 0.08, B 0.12, AB 0.27; 2022: A 0.09, B 0.10, AB 0.17; 2023: A 0.09, B 0.11, AB 0.20.			

Compared to the early sowing date, grain yield reduction in maize hybrids by 4.5 and 13.1 % occurred both at the optimal and late sowing dates, respectively.

Thus, the research results show that in the growing season of 2021–2023, the highest level of grain yield was formed by maize hybrids of all maturity groups (FAO 190-430) of domestic selection at early sowing dates. Among the presented biotypes at all sowing dates, the DN Drah hybrid formed the highest average grain yield (10.71 t/ha).

Conclusions. The sowing date is one of the most important elements of cultivation technology, which significantly affects the maize growth, development and formation of its grain productivity. In 2021–2023, maize hybrids of different maturity groups, depending on the sowing date, averaged grain yields of 9.36 to 11.61 t/ha. Hybrids (FAO 190-430) formed the

highest yield level at early sowing dates. The grain yield of maize hybrids decreased by 4.5% and 13.1% at both the optimal and late sowing dates, respectively, compared to the early sowing date. Among the yield attributes, the highest values of ear grain content and 1000 grain weight were observed at early sowing date. Sowing 10 days later than the early date led to a decrease in these indicators by 5.9 and 1.0 %, and by 20 days – by 9.5 and 4.4 %, respectively. The individual productivity of maize plants at the optimal sowing date had a tendency to increase the number of formed ears per plant (by 1.5 %), and at the late sowing date – to decrease (by 0.7 %) compared to the early sowing date.

Experimental data show that new corn hybrids DN Pulsatsiia, DN Atlant, DN Drah and DN Nazar form the highest grain yield when sown on 14–25 April in conditions of the Northern Steppe of Ukraine.

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Актуальність. За своїм потенціалом продуктивності кукурудза є найбільш перспективною культурою в зерновому балансі України. За кризових явищ, зумовлених війною та глобальними змінами клімату, продуктивність зернових культур, в тому числі і кукурудзи, стає все більш нестабільною за роками, особливо великий вплив на формування урожаю спостерігається в степовій зоні, що призводить до зниження валового збору зерна культури. Останнім часом простежується стійка тенденція до зміни погодних умов, зокрема, потепління клімату. В таких умовах актуальним є обґрунтування, розробка і впровадження у виробництво агротехнічних заходів послаблення негативних явищ посухи, жари і дефіциту ґрунтової вологи. У комплексі зональних агротехнічних заходів важливе місце займають строки сівби культури. Від строку сівби залежить польова схожість насіння, своєчасність сходів, формування оптимальної густоти рослин. За ранньої сівби при недостатньо прогрітому ґрунті подовжується період сівба – сходи, при запізненні з сівбою насіння може потрапити у надто сухий ґрунт, що спричиняє в обох випадках зрідженість сходів культури і низьку зернову продуктивність. Тому виникає необхідність у врахуванні біологічних особливостей і екологічних вимог гібридів, ґрунтово-кліматичних та погодних умов, створення для росту рослин кукурудзи найбільш сприятливих умов навколишнього середовища. **Мета** – виявлення особливостей розвитку рослин кукурудзи і формування врожайності її зерна залежно від строків сівби біотипів різних груп стиглості в Північному Степу України. **Матеріали і методи.** Матеріалом були нові гібриди кукурудзи різних груп стиглості ДН Пульсація, ДН Атлант, ДН Драг, ДН Назар, сівбу яких проводили на дослідній ділянці лабораторії агробіологічних ресурсів кукурудзи і сорго ДУ ІЗК НААН в три строки. Використовували: лабораторно-польові методи для визначення висоти рослин, кількості листків на рослині, індивідуальної продуктивності, вологості зерна; статистичний для виконання кореляційного, дисперсійного аналізу та статистичної оцінки результатів досліджень. **Результати.** Встановлено, що вищу урожайність зерна гібриди ранньостиглий ДН Пульсація (10,27 т/га), середньоранній ДН Атлант (10,96 т/га), середньостиглий ДН Драг (11,61 т/га) та середньопізній ДН Назар (11,49 т/га) фор-

мували за раннього строку сівби. **Висновки.** В умовах вегетації 2021–2023 рр. найвищий рівень врожайності зерна гібриди кукурудзи всіх груп стиглості (ФАО 190–430) формували за раннього строку сівби. Перенесення сівби кукурудзи як на оптимальний, так і на пізній строки зумовлювало, зниження урожайності зерна на 4,5 і 13,1 % відповідно, порівняно з раннім строком. Таким чином, на основі експериментальних даних можна стверджувати, що в умовах північної частини Степу України вищу врожайність зерна нові гібриди кукурудзи ДН Пульсація, ДН Атлант, ДН Драг, ДН Назар формують за сівби 14–25 квітня.

Ключові слова: кукурудза, гібрид, строк сівби, елементи структури врожаю, індивідуальна продуктивність рослин, врожайність зерна