MAIN PERIODS OF GROWTH AND DEVELOPMENT OF F1 CUCUMBER HYBRIDS AND THEIR YIELDS DEPENDING ON WEATHER

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Purpose. To evaluate effects of weather on growth and development of cucumber plants, lengths of the main interphase periods, and cucumber yield the Left-Bank Forest-Steppe of Ukraine; to select breeding-valuable genotypes for heterosis breeding under climatic changes. Methods. Field, analytical, measuring, statistical. Results. The study was conducted outdoors at the Institute of Vegetable and Melon Growing of NAAS in 2019–2020. The weather in the study years varied significantly, allowing us to assess its influence on phenological processes of growth and development of cucumber plants. Summarizing the results, we established that sufficiently high average daily air temperature (25.3–25.8 °C), a large amount of unevenly distributed precipitation (0–104 mm), with little or no precipitation during certain phases of cucumber development, significantly affected the growing period length and yield of the cucumber hybrids under investigation. We found that the onset of mass anthesis of female flowers did not vary significantly across the years, averaging 33–36 days. (35 days in the check accession). Fructification started on day 37–40 in 2019 and on day 42–45 in 2020, which was 4–6 days later. Fructification lasted 32–40 days in 2019 and 20–24 days in 2020, which was 12–16 days longer. Analysis of the cucumber yield dynamics over the study years showed that the weather in 2019 was more favorable for the growth and development of cucumber plants. Thus, in 2019, the total yields of hybrids ranged 20.8 t/ha to 64.9 t/ha. In 2020, at high temperatures and low air humidity, the total yield was 12.7–26.9 t/ha, which was significantly lower (by 41.4–61.0 %). Conclusions. The weather in the study years reflected the climate instability in the Forest-Steppe of Ukraine. The lengths the main periods of the growth and development of cucumber hybrid plants and their yields were revealed to vary significantly under variable growing conditions. We selected hybrids with annual parameters that would be valuable for further breeding: by early ripeness – F1 ‘BD 96-18’/ ’Tsezar’, F1 ‘RD 96 2-95’/ ‘Dzherelo’, F1 ‘RD 96 2-95’/ ‘Heim’ and F1 ‘Mah-62’/ ‘Toma-18’ (42 days); by fructification length – F1 ‘RD 96 2-95’/ ‘Dzherelo’ (35 days), F1 ‘Mah-62’/ ‘Toma-18’, F1 ‘BD 96-18’/ ‘Heim’ and F1 ‘RD 96 2-95’/ ‘Heim’ (32 days); by yield capacity – F1 ‘Mah-62’/ ‘Toma-18’ (45.9 t/ha), F1 ‘BD 96-18’/ ‘Toma-18’ (39.3 t/ha), F1 ‘Krack’/ ‘RD 96 2-95’ (36.8 t/ha), F1 ‘RD 96 2-95’/ ‘Heim’ (35.8 t/ha), F1 ‘BD 96-18’/ ‘Heim’ (34.6 t/ha), and F1 ‘RD 96 2-95’/ ‘Dzherelo’ (34.2 t/ha). The selected hybrids yielded significantly more than the check F1 hybrid ‘Ajax’ (by 80-142 % or by 19.0 t/ha).

Key words: F1 hybrid, cucumber, temperature, precipitation, anthesis, fructification, yield.

Introduction. Today, the agricultural production problem has been significantly aggravated because of intense pace of global and regional climatic changes, which are manifested as an increase in average annual air temperatures, frequent droughts, which cover up to 50–70 % of the territory of Ukraine (Basok B.I. & Bazieiev Ye.T., 2020). Global changes in the climate in recent years have made an important objective – creation of new genotypes with powerful genetic potentials of high performance and adaptability – more urgent in order to harvest stable yields.

Review of Resent Studies and Publications. Cucumber is one of the most common vegetables. It has been very popular among the population for a long time. Both fresh and canned cucumbers are eaten. Cucumber fruits are rich in biologically active substances; contain aromatic substances, enzymes that facilitate assimilation of proteins and vitamins B and C, carbohydrates, Ca and P ions (Deepa S.K. et al., 2018; Murri I.K., 1961).

Today, drastic climatic changes pose a big challenge for agricultural production. It was documented that the average annual air temperature in the territory of Ukraine started rising by 1.5 times fast-
er than in the world as a whole. The difference between the initial and final temperatures for the period of 1991–2020 increased from 0.5 °C to 1.2 °C (Basok B.I. & Bazieiev Ye.T., 2020). A rapid increase in the sum of temperatures in March and a considerable increase in the average daily temperatures in July-August are inherent in these changes. In addition, water supply is getting worse due to insufficient precipitation; its seasonal distribution has become irregular: May, September and October amounts are similar to or higher than the multi-year averages, but there is a great precipitation deficit in other months. Reduced precipitation in July-August, when anthesis and fructification occur, is especially negative (Vdovenko S.A. & Palamarchuk L.I., 2021). There are very high risks that intense droughts could increase in number. Water deficit and high temperatures disrupt most of metabolic processes in plants, impairing hormonal balance and causing alterations in subcellular structures. The degree of damage largely depends on plants’ resistance to heat and drought as well as on hydrothermal stress duration and intensity (Parakash V. et al., 2021).

Studying peculiarities of yield formation and developing special technology models in order to prevent risks and predict possible losses of yields are the main ways to overcome the negative impact of climatic changes on yield (Surhan O.V., 2020). Successful breeding of hybrids for resistance to biotic and abiotic stressors depends on the availability of starting materials with high levels of valuable morphological and biological characteristics, including heat and drought resistance. Creation of such genotypes (lines, varieties and hybrids) requires the improvement of existing methods of evaluation and selection of valuable cucumber starting materials, development of new methods and their effective application, which will allow for significant acceleration of breeding and synthesis of genotypes with high adaptive potentials (Serhienko O.V. et al., 2022).

Onset dates of some phases of growth and development and lengths of both the growing period as a whole and its parts are informative breeding traits, which determine the adaptability of a genotype to growing conditions (Serhienko O.V., 2016). Growing period length is determined by genotype. However, both the entire vegetation period of cucumber plants and interphase periods depend on weather and technological factors (Kharkina T.G. & Morkovskaya Ye.F., 1999). Soil and climatic conditions of cucumber cultivation were also demonstrated to have a significant impact on yield (Polovyj A.M. et al., 2021).

Cucumber is a temperature and water-demanding crop. Growth stops when temperature drops below 14.5 °C or rises above 42 °C. Extended periods at temperature of below 10 °C are harmful for plants. Short frosts (below 1.5 °C) kill cucumber plants. The most intensive growth is observed at 28–32 °C (Kuperman F.M., 1982; Singh M.C. et al., 2017). Cucumber does not tolerate soil or air droughts. The highest yields are harvested at a relative air humidity of >90 % and a water content of 85–95 % related to the full moisture content of the soil. It was shown that insufficient air humidity could be to some extent compensated by moistening the soil (Rahil M.H. & Qanadillo A., 2015).

A drastic rise in temperature, large fluctuations in daily temperature maxima and minima, prolonged high temperature without sufficient soil moisture are extremely unfavorable for cucumber. A drop in temperature below 20 °C leads to a sharp reduction in the ability of plants to absorb nutrients. Even average daily air temperatures, slight daily temperature fluctuations, a slow decrease in temperature at the end of the growing period are most favorable for cucumbers (Vashchenko S.F., 1956; Bolotskykh A.S., 2001, 2002).

Environmental requirements of cucumber are closely associated with its origin. Its homeland is tropical regions of Southeast Asia, which are characterized by high temperatures, frequent precipitations and high sunlight intensity. However, the cultivation of cucumber for thousands of years in different climatic zones has left its mark and to a certain extent changed the ecological nature of the crop. This made it possible to create varieties and hybrids adapted to cultivation in areas with a temperate climate.

Nevertheless, an upward trend in the average daily air temperatures and uneven distribution of precipitation in the last decades are the main causes of deterioration of conditions during cucumber plants’ growth and development phases, including key ones. Many scientists reported that the same variety grown under different weather conditions differed both in the entire growing period length and in its parts. Given the need of the population for sufficient amounts of vitamin-rich vegetables, the creation of new, more productive F₁ cucumber hybrids is a priority line to increase the efficiency of agricultural production and is of great social, scientific and practical importance.
Hence, the purpose of our study was to describe weather effects on the growth and development of cucumber plants of different breeding genotypes, lengths the main interphase periods, and yield in the eastern Forest-Steppe of Ukraine and to select breeding-valuable genotypes for heterosis breeding under of sharp climatic changes.

Material and Methods. The influence of agrometeorological conditions on the cucumber growth, development and yield was studies outdoors at the experimental base of the Institute of Vegetable and Melon Growing of NAAS located in the Left-Bank Forest-Steppe of Ukraine (central mid-humid area of the Kharkivska Oblast; the climate of the zone is temperate-continental) in 2019-2020.

The soil is a typical low-humus heavy loamy chernozem. The humus content in the arable layer was 4.0–4.5 %; the P_2O_5 content was 11–15 mg/100 g of soil; the K_2O content was 8–10 mg/100 g of soil; pH of salt extract was 7.0–7.5.

In 2019–2020, the weather was characterized by insufficient rainfall; air temperatures during the cucumber growing period were higher than the multi-year averages. Figures 1–3 illustrate the agrometeorological parameters (precipitation, air temperature) during the growing period in the study years.

**Figure 1.** Precipitation (mm) profile during the cucumber growing period, 2019–2020 (MYA = multi-year average)

**Figure 2.** Air temperature profile during the cucumber growing period in 2019 (AD AT = average daily air temperature; Max AT = maximum air temperature; Min AT = minimum air temperature; MY DA AT = multi-year daily average air temperature; MYA Max AT = multi-year average maximum air temperature; MYA Min AT = multi-year average minimum air temperature)
Breeding material in the amount of 10 F₁ hybrids obtained by synthetic selection was studied. F₁ hybrid ‘Ajax’ (Netherlands) was taken as the check hybrid. Phenological observations of the main periods of the growth and development of cucumber plants were done: “emergence – anthesis of female flowers”, “emergence – fructification” and fructification length (CMEA’s extended harmonized classifier, 1980; Methods of state trials of agricultural crop varieties, 2001). Fruits were harvested in accordance with the requirements of the state standard (DSTU 3247-95, 1996). Mathematical and statistical methods were used to process experimental data and test significance of differences (Dospekhov B.A., 1985). The farming techniques were conventional for the Forest-Steppe of Ukraine (Yakovenko K.I., 2001).

Results. The weather variability during plant growing has a considerable impact on quantitative and qualitative parameters of agricultural plant products, which significantly depend on water availability and temperature, i.e. on precipitation amount and frequency and air temperature (Serhiienko O.V., 2016). Different genotypes differently respond to environmental changes; therefore studies were focused on identifying cucumber hybrid combinations with high resistance to adverse environmental conditions, mainly to fluctuations in daily temperatures and soil moisture.

The temperature profile is known to have the greatest effect on the cucumber growth, development and performance. It is known that 12–13 °C is the most favorable temperature for cucumber seed germination; 22–24 °C is optimal for plant growth; at 40–45 °C physiological processes stop, so such temperatures are detrimental. The optimal temperature for cucumber plant growth is closely associated with sunlight intensity and carbon dioxide concentration (Kuperman F.M., 1982; Singh M.C. et al., 2017; Bolotskykh. A.S., 2002).

In 2019, the weather was favorable for the growth and development of cucumbers. Giving plants a chance to fulfill their potentials (Fig. 2). Analyzing the temperature profile, we noted that cucumber plants were exposed to significant temperature fluctuations during the growing period. In the hot summer months, plants were exposed to high temperatures (higher than 33.0 °C), which had a negative impact on the cucumber growth, development and yield. In June-August, the minimum temperature (6.0–9.0 °C) exceeded the multi-year average by 1–6.5 °C. The strongest deviations towards increasing daytime temperatures were observed starting from the 10th of June to the end of the month. On some days, the temperature reached 33–34 °C or even higher. The peak of the maximum daily air temperature was recorded at 37 °C (within the third 10 days of June). During the growing period, precipitation was not abundant, but wetting was sufficient during the crucial periods of the plant growth and development, contributing to high yields of the cucumber hybrids. The highest amount of precipitation was recorded during the third 10 days of May, which was 5.1 mm more than the multi-year average and contributed to the intensive development of plants. At the fructification onset (the first 10 days of July; a crucial period), the precipitation amount was 38 mm with the multi-year average of 25.4 mm, which ensured even fructification.

Figure. 3 Air temperature profile during the cucumber growing period in 2020 (AD AT = average daily air temperature; Max AT = maximum air temperature; Min AT = minimum air temperature; MY DA AT = multi-year daily average air temperature; MYA Max AT = multi-year average maximum air temperature; MYA Min AT = multi-year average minimum air temperature)
However, the weather in 2020 was less favorable for cucumber. During the cucumber emergence within the second 10 days and third 10 days of May, there were big fluctuations in the average daily (15.0–14.7 °C) and minimum (0.0–2.0 °C) air temperatures, significantly delaying the emergence. The traditional inflow of cold air masses during the second 10 days and third 10 days of May combined with a large amount of precipitation, which was almost five-fold compared to the multi-year average, negatively affected the emergence of seedlings, delaying (on average by 14 days) further growth and development of plants as well as harvest of marketable young cucumbers.

Reproductive organs were formed during the second-third 10 days of June at high air temperature (32–34 °C) and water deficit (2.5–8.0 mm. with the multi-year average for this period of 21.2–25.9 mm). These factors slowed down the growth and development of plants, considerably reducing the vegetative mass, which is known to impair the outflow of macronutrients, to raise energy costs for evaporation, to reduce plants’ resistance to diseases, and to disrupt fructification. Abundant precipitation during the third 10 days of May (104 mm. which is 77.1 mm more than the multi-year average) and the first 10 days of June (20 mm vs. the multi-year average of 17.9 mm) contributed to the intensive growth of the vegetative mass, which was ensured by the optimal temperature mode (20.2–25.8 °C). At the same time, the second 10 days and third 10 days of June were characterized by low air humidity and soil moisture because of a small amount of precipitation (2.5 and 8.0 mm. respectively, with its irregular distribution) and high average daily air temperature (24.4–25.8 °C, with the maximum of 32.0–34.0 °C). There was no precipitation at all (0.0 mm) during the first 10 days of July. At the same time, the second 10 days of July had a big (55 mm) amount of precipitation, which, combined with low average daily temperatures (22.2 °C, with the minimum of 10°C), caused intensive development of *Peronospora brassicae* and damage to cucumber plants, decreasing young cucumber yields and marketability.

We noted that the weather during the cucumber growing period significantly influenced the growth period lengths and development of promising F₁ hybrids. Lengths of phenological phases outdoors are an integrated indicator of hybrids’ responses to environmental changes (Table 1).

All hybrids under investigation were grown under identical weather conditions and we found that growth and development phases did not differ significantly between genotypes within a year unlike year-to-year variations.

Data show that the “emergence – anthesis of female flowers” lasted on average 33–36 days (35 days in the check hybrid), with weather-induced 2- to 3-day differences: 30-35 days in 2019 and 33–37 days in 2020. Hybrids with the shortest mean periods (33 days) were selected: F₁ ‘SD 96-18’ / ‘RD 96 2-95’, F₁ ‘BD 96-18’ / ‘Tsezar’, F₁ ‘Mah-62’ / ‘Toma-18’, F₁ ‘RD 96 2-95’ / ‘Heim’ and F₁ ‘SD 96-18’ / ‘RD 96 2-95’ (Am = 1); F₁ ‘Mah-62’ / ‘Toma-18’ and F₁ ‘BD 96-18’ / ‘Tsezar’ (Am = 0) were most stable cross the years.

F₁ hybrids under investigation are classed as early-ripening or mid-early; their the “emergence – fructification onset” periods lasted on average 40–43 days, with weather-induced 4- to 5-day differences: 37–41 days in 2019 and 42–45 days in 2020. Hybrids that began to bear fruits earlier than the others were selected: in 2019 – F₁ ‘RD 96 2-95’ / ‘Heim’ (37 days); in 2020 – F₁ ‘SD 96-18’ / ‘RD 96 2-95’, F₁ ‘BD 96-18’ / ‘Tsezar’ and F₁ ‘Mah-62’ / ‘Toma-18’ (42 days). Analysis of the averaged data distinguished the following early-ripening F₁ hybrids: F₁ ‘BD 96-18’ / ‘Tsezar’ (40 days); F₁ ‘Ivol D 96’ / ‘RD 96 2-95’, F₁ ‘SD 96-18’ / ‘RD 96 2-95’, F₁ ‘Mah-62’ / ‘Toma-18’, and F₁ ‘RD 96 2-95’ / ‘Heim’ (41 days). F₁ ‘SD 96-18’ / ‘RD 96 2-95’ (Am = 2 days) and F₁ ‘Mah-62’ / ‘Toma-18’ (Am = 3 days) were most stable cross the years.

Fructification in hybrids lasted on average 26–35 days, with significant (12–16 days) weather-induced differences: 32–40 days in 2019 and 20–24 days in 2020. Long fructification (32–35 days) was intrinsic to F₁ ‘Mah-62’ / ‘Toma-18’, F₁ ‘RD 96 2-95’ / ‘Dzerelo’, F₁ ‘BD 96-18’ / ‘Heim’ and F₁ ‘RD 96 2-95’ / ‘Heim’. The longest fructification was recorded for F₁ ‘RD 96 2-95’ / ‘Dzerelo’ (35 days), with a variation amplitude of 16 days between the years with variation limits of 24–40 days, which was 8 days longer than in the check hybrid (27 days) or 4.5-fold compared to the sample mean. Besides the check hybrid, the smallest variation amplitude of this trait between the years was observed in F₁ ‘Ivol D 96’ / ‘RD 96 2-95’ (Am = 13 days) and F₁ ‘SD 96-18’ / ‘RD 96 2-95’ (Am = 12 days), with the sample mean of 16.1 days.
So, our study demonstrated that the weather in the study years had different effects on the hybrids, that is, the genotypes differently responded to changes in the environment. Three hybrids were most stable in terms of the onsets and lengths of growth and development phases: F₁ ‘SD 96-18’ / ‘RD 96 2-95’, F₁ ‘BD 96-18’ / ‘Tsezar’, and F₁ ‘Mah-62’ / ‘Toma-18’; their averaged data were vary similar to yearly data, with the smallest variation amplitude of the “emergence – onset of anthesis of female flowers” (Am = 0-1 day) and “emergence – fructification onset” (Am = 2-4 days) periods. F₁ ‘SD 96-18’ / ‘RD 96 2-95’ should also be highlighted, as its variation amplitude for the “fructification length” trait was the smallest (12 days).

Genetic improvement to increase and maximize the performance of varieties as the ultimate indicator characterizing their economic value is a mainstream in cucumber breeding. Cucumber yield stability and amount are determined by values and ratios of quantitative traits that are formed during certain stages of organogenesis and, in turn, depend on how optimal or intensive factors that support the plant life are.

During the growing period, cucumber plants absorb water unevenly. Cucumber plants require the largest amounts of water in the phase of 2–4 true leaves, during anthesis and fructification (Botlotskykh A.S., 2002). Water deficit during these periods has a negative effect on the development of plants, leading to a significant decrease in the yield, especially at elevated temperature of the air.

Yield is a complex characteristic that significantly depends on growing conditions: the more favorable growing conditions are, the higher chances for genotypes to fulfill their potentials are. The yields of the hybrids under variable growing conditions, along with averaged data, are summarized in Table 2.
Characterization of F₁ cucumber hybrids in terms of the “total yield” trait. 2019-2020

<table>
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<th>Hybrid</th>
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<td>F₁ ‘Ajax’ (check hybrid)</td>
<td>208</td>
<td>100</td>
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<tr>
<td>F₁ ‘Ivol D 96’ / ‘RD 96 2-95’</td>
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<td>146</td>
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<td>F₁ ‘SD 96-18’ / ‘RD 96 2-95’</td>
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<td>160</td>
<td>140</td>
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<td>40.2</td>
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<tr>
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<td>F₁ ‘Mah-62’ / ‘Toma-18’</td>
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<td>F₁ ‘RD 96 2-95’ / ‘Dzherelo’</td>
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Analysis of the obtained data made it possible to distinguish a number of F₁ hybrids by mean yield. Thus, the highest yield (45.9 t/ha) was harvested from F₁ ‘Mah-62’ / ‘Toma-18’. It should be noted that this hybrid yielded the most by years: 64.9 t/ha under the favorable weather conditions in 2019 and 26.9 t/ha in the unfavorable year of 2020, which by 2.4-fold or by 58.5 % less; it was superior to the check hybrid by 212 % or by 57 %, respectively. F₁ ‘BD 96-18’ / ‘Toma-18’ was also noticeable for its high yield (the mean yield was 39.3 t/ha; 57.2 t/ha under the favorable weather conditions in 2019 and 21.4 t/ha in the unfavorable year of 2020, which is by 2.7-fold or by 63 % less; it yielded by 175 % and 25 % more than the check hybrid, respectively.

In general, all studied hybrids tended to decrease their yields in 2020 by 1.2–3.6 times or by 19.1–71.9 %, with the sample mean of 2.1 times or 47.8 %, respectively, which again confirmed the dependence of this characteristic on weather conditions. The smallest variation amplitude of this characteristic was recorded for the check hybrid, F₁ ‘Ajax’ (Am = 3.7 t/ha), and F₁ ‘Ivol D 96’ / ‘RD 96 2-95’ (Am = 5.8 t/ha), which gave low mean yields: 19.0 t/ha, 27.4 t/ha, respectively. Of the hybrids that significantly exceeded the check hybrid and yielded a lot, the following hybrids should be noted, as they were the most stable combinations with smaller variation amplitudes of this parameter: F₁ ‘Mah-62’ / ‘Fora-18’ (Am = 19.1 t/ha), F₁ ‘RD 96 2-95’ / ‘Dzherelo’ (Am = 19.7 t/ha), F₁ ‘BD 96-18’ / ‘Heim’ (Am = 18.8 t/ha), and F₁ ‘RD 96 2-95’ / ‘Heim’ (Am = 21.4 t/ha), which corresponded to a decrease in this indicator by 1.7–1.9 times or by 42.7–48.0 %. The largest variation amplitude of this parameter was observed in F₁ ‘BD 96-18’ / ‘Tsezar’ (32.5 t/ha, which corresponds to a decrease in this parameter by 72 % or by 3.6-fold). F₁ ‘SD 96-18’ / ‘RD 96 2-95’, F₁ ‘Krak’ / ‘RD-96 2-95’, F₁ ‘BD 96-18’ / ‘Toma-18’ and F₁ ‘Mah-62’ / ‘Toma-18’ also had wide variation amplitudes of this parameter, depending on growing conditions (Am=19.3-38.0 t/ha), which corresponded to a decrease in yield by 2.3–2.7 times or by 58.0–63.0 % and characterizes the these hybrids as intensive genotypes.
Conclusions. The weather in the study years reflected the climatic instability of the Forest-Steppe of Ukraine. The variability of the lengths of the main periods of the growth and development of hybrid cucumber plants and their significant variability in terms of yield under variable growing conditions were demonstrated for the genotypes under investigation. The hybrids that are valuable for further breeding were selected by average annual parameters: F₁ ‘BD 96-18’ / ‘Tsezar’, F₁ ‘RD 96 2-95’ / ‘Dzherelo’, F₁ ‘RD 96 2-95’ / ‘Heim’ and F₁ ‘Mah-62’ / ‘Toma-18’ by early ripeness (42 days); F₁ ‘RD 96 2-95’ / ‘Dzherelo’ (35 days); F₁ ‘Mah-62’ / ‘Toma-18’, F₁ ‘BD 96-18’ / ‘Heim’ and F₁ ‘RD 96 2-95’ / ‘Heim’ (33 days) by fruitification length; and F₁ ‘Mah-62’ / ‘Toma-18’ (45.9 t/ha), F₁ ‘BD 96-18’ / ‘Toma-18’ (39.3 t/ha), F₁ ‘Krak’ / ‘RD 96 2-95’ (36.8 t/ha), F₁ ‘RD 96 2-95’ / ‘Heim’ (35.8 t/ha), F₁ ‘BD 96-18’ / ‘Heim’ (34.6 t/ha) and F₁ ‘RD 96 2-95’ / ‘Dzherelo’ (34.2 t/ha) by yield, as they yielded significantly more (by 80–142 % or by 19.0 t/ha) than the check hybrid, F₁ ‘Ajax’.

References


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ТРИВАЛІСТЬ ОСНОВНИХ ПЕРІОДІВ РОСТУ І РОЗВИТКУ ГІБРИДІВ F₁ ОГІРКА ТА РІВЕНЬ УРОЖАЙНОСТІ В ЗАЛЕЖНОСТІ ВІД ДІЇ ПОГОДНИХ УМОВ

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Мета досліджень – виявлення впливу погодних умов на темпи росту і розвитку рослин огірка, тривалості основних міжфазних періодів, формування врожаю огірка в Лівобережному Лісостепу України та виділення селекційно-цінних генотипів для гетерозисної селекції в умовах змін клімату. Методи. Польові, аналітично-вимірювальні, статистичні. Результати. Дослідження проводилось впродовж 2019-2020 рр. в Інституті овочівництва і баштанництва НААН в умовах відкритого грунту. Погодні умови в роки проведення досліджень значно різнились, що дозволило нам оцінити їх вплив на фенологічні процеси росту і розвитку рослин огірка. Узагальнюючи результати спостережень досліджень встановлено, що достатньо високі показники середньодобової температури повітря (25,3–25,8°С), велика кількість опадів з нерівномірним їх розподілом (від 0 до 104 мм) та значним їх дефіцитом у окремі фази розвитку огірка мали істотний вплив на тривалість вегетаційного періоду та формування урожайності огірка.

Мета досліджень – виявлення впливу погодних умов на темпи росту і розвитку рослин огірка, тривалості основних міжфазних періодів, формування врожаю огірка в Лівобережному Лісостепу України та виділення селекційно-цінних генотипів для гетерозисної селекції в умовах змін клімату. Методи. Польові, аналітично-вимірювальні, статистичні. Результати. Дослідження проводилось впродовж 2019-2020 рр. в Інституті овочівництва і баштанництва НААН в умовах відкритого грунту. Погодні умови в роки проведення досліджень значно різнились, що дозволило нам оцінити їх вплив на фенологічні процеси росту і розвитку рослин огірка. Узагальнюючи результати спостережень досліджень встановлено, що достатньо високі показники середньодобової температури повітря (25,3–25,8°С), велика кількість опадів з нерівномірним їх розподілом (від 0 до 104 мм) та значним їх дефіцитом у окремі фази розвитку огірка мали істотний вплив на тривалість вегетаційного періоду та формування урожайності огірка.

Встановлено, що настання масового цвітіння жіночих квіток за роками різнилося не істотно і, в середньому, спостерігалось на 33-36 добу, у стандарту на 35 добу. Покаток плодоношения у 2019 р. відбувся на 37-40 добу, у 2020 р. на 42-45 добу, що на 4-6 діб пізніше. Период плодоношения у 2019 р. тривав 32-40 діб, у 2020 р. – 20-24 доби, що на 12-16 діб довше. Аналіз динаміки формування урожайності огірка за роки досліджень показав, що погодні умови 2019 були більш сприятливі для росту і розвитку рослин огірка. Так у 2019 р. загальна урожайність гібридів знаходилася в межах 20,8-64,9 т/га. У 2020 р. на тлі високих температур і низької вологості повітря загальна врожайність становила 12,7-26,9 т/га, що на 41,4-61,0 % істотно менше.

Висновки. Погодні умови в роки досліджень відобразили кліматичну нестабільність Лісостепу України. Виявлено мінливість рівня прояву основних періодів росту і розмноження гібридних комбінацій огірка, що значною мірою залежить від змін у погодних умовах нижніх шарів атмосфери. У цілому урожайність огірка значно залежала від температури і вологості повітря.

Ключові слова: гібрид, огірок, температура, опади, цвітіння, плодоношення, урожайність