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Influence of Weather Conditions on the Spread of Fires in the Forest Fund of Zhytomyr Polesia

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Abstract. Fires are one of the critical factors in the weakening of forests. Given the high share of pine forests in the Zhytomyr Oblast, the conditions for fires are very favourable. Especially intense fires occurred in 2020, when rapid warming occurred in the spring, which in the absence of snow cover and the presence of intense winds in the February-March 2020 increased the fire danger in forests. The purpose of this study is to identify the features of the dynamics of the spread of fires in the forest stands of the Zhytomyr Oblast Department of Forestry and Hunting and assess the meteorological indicators that may affect their spread. Research methods: statistical – when analysing data on meteorological indicators and materials for accounting for forest fires. The study identified the specific features of the dynamics of fire spread in forest stands of Zhytomyr Oblast in 2014-2021. According to the analysis, there was a considerable increase in the number and area of fires in 2020 compared to the average figures for 2014-2019 and 2021 combined. During 2014-2021, 951 fires occurred on a forested area of 43,807.65 hectares. It was revealed that only 448 fires occurred in 2014-2019 and 2021, and 503 fires were recorded in 2020 on an area of 43,229 hectares. Among others, crown fires were recorded on an area of 6,389 hectares in the same 2020 year and on an area of 35.7 hectares in 2019 alone. The largest areas of crown fires were recorded on the territory of the State Enterprise "Ovrutske SF", State Enterprise "Luhynske forestry", State Enterprise "Ovrutske forestry" and State Enterprise "Slovechanske forestry". The indicators of temperature, precipitation, and hydrothermal coefficient for 2014-2021 are analysed. The values of air temperature and precipitation were determined during the growing season, and the hydrothermal coefficient was calculated according to G.T. Selyaninov. The study established that the sum of air temperatures during the growing season was 3,127.6°C on average for 2014-2021. The highest temperature values were recorded during the growing season of 2018. According to the analysis of the amount of precipitation for the growing season 2014-2021, the indicators were set at 323.8 mm. The lowest precipitation rates were recorded in 2015. According to the ratio of temperature and precipitation indicators, the value of G.T. Selyaninov's hydrothermal coefficient for the growing seasons of 2014-2021 was obtained, the average value of which was 1.04 units

Keywords: forest fire, hydrothermal coefficient, dynamics of fire spread, crown fires, growing season, sum of air temperatures, sum of precipitation



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INTRODUCTION

Forest fires occur periodically in different regions of the world (Boer *et al.*, 2020; Usenya, 2020). The spread of forest fires is facilitated by dry weather conditions, which have become more frequent recently (Shvydenko *et al.*, 2018), as well as an increase in the proportion of coniferous forests weakened by various biotic and anthropogenic factors (Hurzhii *et al.*, 2021). Trees weakened by fire worsen their sanitary condition, sometimes perishing (Chornogor *et al.*, 2021; Voron *et al.*, 2019), and become susceptible to pest infestation and pathogen damage (Davydenko *et al.*, 2021; Meshkova, 2021a; Meshkova, 2021b).

Every year, tens of thousands of cases of wildfires are registered in Ukraine on an area of about 20 thousand hectares. Therewith, in the 1980s, 1,673 cases of fires were registered on an area of 1.2 thousand hectares, in the 1990s – 3,917 cases of fires on an area of 3,962 hectares, in 2000–2010–4,743 cases of fires on an area of 4.4 thousand hectares (Zbitsev *et al.*, 2019a). Major fires were recorded in 1993 in the Autonomous Republic of Crimea (600 hectares), in 1995 – in the Luhansk, Kharkiv, and Kherson Oblasts, in 1996 – in the Donetsk, Luhansk, Kyiv, and Chernihiv Oblasts (0.5–8.5 thousand hectares), in 1998 – in the Luhansk Oblast (over 1.7 thousand hectares), in 1999 – in the Kherson and Luhansk Oblast (1–2 thousand hectares), in 2007 – in the Autonomous Republic of Crimea (on an area of more than 1,000 hectares of forests). In August 2007, large forest fires occurred in the Kherson Oblast (8.7 thousand hectares), and in August 2008 – in the Kharkiv region (1.2 thousand hectares) (Voron *et al.*, 2021). In 2015, fires covered 14.8 thousand hectares in the Chernobyl Exclusion Zone, 600 hectares – on the territory of the Polesia Nature Reserve, in 2018 – 580 hectares in the forest fund of the State Enterprise “Oleshkivske forest hunting range” (Zbitsev *et al.*, 2019b).

Given the high share of pine forest area in Zhytomyr Oblast (Buzum *et al.*, 2018), the conditions for the occurrence of fires are very favourable. The fire danger also increased due to the presence of many areas where pine forests dried up because of bark beetle outbreaks (Borisenko & Meshkova, 2021). Especially intense fires occurred in 2020, when rapid warming occurred in the spring, which in the absence of snow cover and the presence of intense winds in the February–March 2020 increased the fire danger in forests (Kornienko, 2021).

The spread and intensity of fires are characterised by indicators of the average factual burn rate, which are calculated by the number of fire cases per 1 million hectares (average absolute burn rate) and by the area covered by the fire in hectares per thousand hectares (relative burn rate). These indicators are used to assess the regions with the highest risk of fires, which allows determining the strategy for placing monitoring and extinguishing equipment. Thus, it is determined that in the steppe zone of Ukraine the mountain content reaches 27.2–36.9 ha per 1,000 ha of area, and in the Forest-steppe and Polesia this indicator ranges from 1.0 to 4.6 ha/1,000 ha (Voron *et al.*, 2021).

In 2007–2017, Polesia identified 763.9 cases of

fires per year, an average area of 1,952 ha/year, a relative burn rate of 179 cases of fires per 1,000 ha of area and 4.7 ha per 1,000 ha of area. In particular, in the Zhytomyr Oblast, these figures are 128.5 cases of fires, 204 ha, 128.3 cases per 1,000 ha of area and 2.3 ha per 1,000 ha of area (Zbitsev *et al.*, 2019b; Andreieva *et al.*, 2018; Andreieva & Goychuk, 2020).

These features of varying forest burn rates largely depend on climatic conditions, in particular temperature, precipitation, and its combination, wind strength and direction, as well as on factors that cause a fire (Voron *et al.*, 2016; Sydorenko *et al.*, 2021). The latter include the population, in particular recreants and individuals who set fire to stubble or other plant remains in fields and vegetable gardens (Voron *et al.*, 2021).

Global temperatures have increased by 0.8°C in recent decades (Jain *et al.*, 2022). An increase in air temperature, start and end dates of seasons, an increase in the duration of vegetation and fire-hazardous periods, a decrease in precipitation, and an increase in the frequency and intensity of natural weather events are predicted (Shvydenko *et al.*, 2018), which will lead to an increase in the level of fire hazard (Voron *et al.*, 2021).

The purpose of this study was to identify the features of the dynamics of the spread of fires in the forest stands of the Zhytomyr Oblast Department of Forestry and Hunting and assess the meteorological indicators that may affect their spread.

Although each oblast and natural area is described by certain average values of temperature and precipitation, they vary over the years. Therefore, in some years, the fire danger may increase even in areas where it is not high in terms of long-term average indicators. In this regard, it is important to investigate the dynamics of the spread of fires in the forest stands of the Zhytomyr Oblast Department of Forestry and Hunting and assess the meteorological indicators that may affect the spread of fires.

MATERIALS AND METHODS

The study used materials of statistical reporting of the Zhytomyr Oblast Department of Forestry and Hunting (ODFH) for the last eight years (2014–2021), by implementing analysis and statistical processing of materials on the dynamics of the spread of fires that occurred during the study period in the forest fund of forestry enterprises subordinate to Zhytomyr ODFH.

Based on the results of the data obtained, the average annual number of cases and the average annual area of forest fires for 2014–2019, 2021 were established and compared with the indicators of 2020.

The composition of forest rocks, to determine the class of fire danger, was established using the database of the State Enterprise “UkrDerzhlisProekt” regarding the forest fund of enterprises subordinate to the Zhytomyr ODFH.

Weather conditions for 2014–2021 are analysed. In particular, the dynamics of the sum of air temperatures and the dynamics of the sum of precipitation for the growing seasons of 2014–2021 are determined. Since large-scale fires occurred in April 2020, an analysis

of the dynamics of precipitation in April for 2014-2021 was carried out.

In the occurrence of fires, not only elevated temperature and insufficient precipitation are important, but also their correlation, which was calculated using the G.T. Selyaninov's hydrothermal coefficient (HTC) according to the following formula (1):

$$HTC = \frac{10 \sum P}{\sum t} \quad (1)$$

where $\sum P$ is the sum of precipitation in millimetres for a period with an average monthly temperature of more than +10°C; $\sum t$ is the sum of the average daily temperatures for the same period, °C [21].

The fire maximum was defined as the months during which the number of fires exceeded their average monthly number, and the fire peak was defined as the months when the highest number of fires was recorded (Voron *et al.*, 2021).

Statistical data analysis and charting were performed using the MS Excel software package.

RESULTS AND DISCUSSION

In the forests of the Zhytomyr Oblast, there is a high fire danger (middle class 2.5), which is mainly associated with a high proportion (about 60%) of coniferous plantations. A considerable part of plantings with a high fire hazard is located in a region with a high level of radiation pollution, where economic activities have been limited for over 30 years, and shrunken plantings have accumulated.

Analysis of the dynamics of the spread of fires in the forests of the Zhytomyr Oblast in recent years shows that in 2014-2019, 2021, the average annual number of fires was 64.0 – from 14 (2014) to 220 (2015), and 503 fires in 2020, i.e., 7.9 times higher than the average value. Therewith, a fairly substantial number of fires (220 cases) were also recorded in 2015 (Table 1).

Table 1. Dynamics of forest fire spread indicators in Zhytomyr Oblast for 2014-2021

Indicators	Years								Average for 2014-2019, 2021
	2014	2015	2016	2017	2018	2019	2020	2021	
Number of fires	14	220	36	17	16	94	503	51	64.0
Fire area, ha	2.8	102.4	12.5	237.2	7.4	174.62	43229	41.73	82.67
Crown fires, ha	0	0	0	4	0	35.7	6389	0	5.67
Average area of 1 fire, ha	0.20	0.47	0.35	13.96	0.46	1.86	85.94	0.82	2.60

The average annual area of forest fires in 2014-2019, 2021 was 82.67 hectares – from 2.8 hectares in 2014 to 102.4 hectares in 2015, and in 2020 it reached 43,229 hectares, i.e., 522.9 times higher than the average value.

In 2014-2019, 2021, crown fires were detected only on 4 hectares in 2017 and 35.7 hectares in 2019, while in 2020 they were registered on an area of 6,389 hectares,

which accounted for 14.8% of the total area of fires in 2020 (Table 1).

Fires occurred in 2014-2019 in the forest fund of all forestry enterprises of the Zhytomyr Oblast excluding the State Enterprise "Berdychivske forestry" and the State Enterprise "Novohrad-Volynske SFHR", where deciduous stands predominate (Table 2). At the same time, in 2020, forest fires were registered in all forestry enterprises of the oblast.

Table 2. Dynamics of the number of cases of forest fires in the forest fund of forestry enterprises of Zhytomyr Oblast in 2014-2021

Forestry Enterprise	Years								Average for 2014-2019, 2021
	2014	2015	2016	2017	2018	2019	2020	2021	
Baranivske FHR	0	3	1	0	1	5	38	1	1.6
Bilokorovytske FHR	3	88	2	2	0	6	39	3	14.9
Berdychivske FHR	0	0	0	0	0	0	7	0	0
Horodnytske FHR	0	2	0	0	0	1	5	4	1
Yemilchynske FHR	0	3	0	0	0	1	1	0	0.6
Zhytomyrske FHR	0	1	1	0	0	5	26	4	1.6
Korostenske FHR	3	11	0	0	7	0	9	0	3
Korostyshivske FHR	0	4	0	1	1	0	21	1	1
Luhynske FHR	2	15	0	0	0	4	19	0	3
Malynske FHR	0	3	1	0	2	0	4	1	1
Narodytske SF	3	19	0	0	0	18	38	12	7.4
N-Volynske SFHR	0	0	0	0	0	0	14	2	0.29

Table 2, Continued

Forestry Enterprise	Years								Average for 2014-2019, 2021
	2014	2015	2016	2017	2018	2019	2020	2021	
Ovrutske forestry	0	3	3	0	0	5	69	5	2.29
Ovrutske SF	0	2	0	0	0	1	19	1	0.60
Olevske forestry	2	15	0	2	0	24	25	3	6.60
Popilnianske forestry	0	0	1	2	0	6	7	0	1.30
Radomyshlske FHR	0	14	9	6	3	3	26	4	5.60
Slovechanske forestry	0	12	3	0	1	0	64	9	3.60
Poliskyi nature reserve	1	14	10	4	0	2	6	0	4.43
Luhynskyi forestry agro-industrial complex (Luhynske specialised forestry)	0	5	4	0	1	13	48	1	3.43
Zhytomyrskyi MFR (Zarichanske forestry)	0	6	1	0	0	0	18	0	1.0
Total	14	220	36	17	16	94	503	51	64.24

The largest number of cases of fires in 2015 was registered in the State Enterprise “Bilokorovytske forestry” (88 cases). More than 10 cases were reported in state enterprises “Korostenske FHR”, “Luhynske forestry”, “Narodytske SFR”, “Olevske forestry”, “Radomyshlske FHR”, “Slovechanske forestry” and in Polisia Reserve.

In 2016, fires occurred in 11 forestry enterprises, with the largest number of fires occurring in SEs “Radomyshlske FHR” and in the Polisia nature reserve (9 and 10 cases, respectively).

In 2017, fires occurred in six forestry enterprises, among which the maximum number of cases was also recorded in the State Enterprise “Radomyshlske LMG” and in the Polisia nature reserve (6 and 4 cases, respectively).

In 2018, fires occurred in seven forestry enterprises, among which 7 cases occurred at the State Enterprise “Korostenske FHR” and 3 cases – at the State Enterprise “Radomyshlske FHR” (Table 2).

In 2019, fires were registered on the territory of 14 enterprises, the maximum number of which was recorded in the State Enterprise “Naroditskoe SHR” and State Enterprise “Olevske forestry” (18 and 24 cases).

In 2020, forest fires were registered in all forestry enterprises; in the SE “Ovrutske forestry” and the SE “Slovechanske forestry” – 69 and 64 cases, respectively, in the SE “Baranivske FHR”, SE “Bilokorovytske forestry”, SE “Narodytske SFR” and SE “Luhynske forestry

agro-industrial complex” the number of cases ranged between 38-48. In general, in the Zhytomyr Oblast, the number of fires in 2020 exceeded the average of previous years by 7 times (Table 2).

In 2021, the largest number of fires was recorded in the State Enterprise “Narodytske SFR” – 12 cases.

At the beginning of April 2020, the area of fires amounted to over 8.7 thousand hectares and covered the territory of Naroditske Davydkivske and Klishchivske, Kotovske, and Denysovetske forest districts of the exclusion zone and unconditional (mandatory) resettlement. In April, the entire northern part of the region was also engulfed in fires (SE “Bilokorovytskyi forest farm”, SE “Luhynskyi forest farm”, SE “Narodytskyi special forest farm”, SE “Ovrutskyi forest farm”, SE “Ovrutskyi special forest farm”, SE “Olevskyi forest farm”, SE “Slovechanskyi forest farm”). As of April 21, 2020, the area of fires exceeded 20 thousand hectares. As of January 1, 2021, the forest area of Zhytomyr ODFH covered by fires reached 43,229 hectares in 503 fire centres (Table 3). The largest area of fires was registered in the SE “Ovrutske SHR”, SE Enterprise “Narodytske SHR”, SE “Slovechanske forestry”, SE “Luhynske forestry”, SE “Ovrutske forestry”, SE “Olevske forestry” and SE “Bilokorovytske forestry”, which together accounted for 97.3% of the area of all plantings covered by fire.

Table 3. Area of forest fires in the forest fund of forestry enterprises of Zhytomyr Oblast in 2014-2021

Forestry Enterprise	Years								Average for 2014-2019, 2021
	2014	2015	2016	2017	2018	2019	2020	2021	
Baranivske FHR	0	3	1	0	1	5	38	1	1.6
Bilokorovytske FHR	3	88	2	2	0	6	39	3	14.9
Berdychivske FHR	0	0	0	0	0	0	7	0	0
Horodnytske FHR	0	2	0	0	0	1	5	4	1
Yemilchynske FHR	0	3	0	0	0	1	1	0	0.6

Table 3, Continued

Forestry Enterprise	Years								Average for 2014–2019, 2021
	2014	2015	2016	2017	2018	2019	2020	2021	
Zhytomyrske FHR	0	1	1	0	0	5	26	4	1.6
Korostenske FHR	3	11	0	0	7	0	9	0	3
Korostyshivske FHR	0	4	0	1	1	0	21	1	1
Luhynske FHR	2	15	0	0	0	4	19	0	3
Malynske FHR	0	3	1	0	2	0	4	1	1
Narodytske SF	3	19	0	0	0	18	38	12	7.4
N-Volynske SFHR	0	0	0	0	0	0	14	2	0.29
Ovrutske forestry	0	3	3	0	0	5	69	5	2.29
Ovrutske SF	0	2	0	0	0	1	19	1	0.60
Olevske forestry	2	15	0	2	0	24	25	3	6.60
Popilnianske forestry	0	0	1	2	0	6	7	0	1.30
Radomyshlske FHR	0	14	9	6	3	3	26	4	5.60
Slovechanske forestry	0	12	3	0	1	0	64	9	3.60
Poliskyi nature reserve	1	14	10	4	0	2	6	0	4.43
Luhynskyi forestry agro-industrial complex (Luhynske specialised forestry)	0	5	4	0	1	13	48	1	3.43
Zhytomyrskyi MFR (Zarichanske forestry)	0	6	1	0	0	0	18	0	1.0
Total	14	220	36	17	16	94	503	51	64.24

If in previous years only grassroots fires were registered in the forests of the Zhytomyr Oblast, then in 2020, crown fires broke out in the forest background of 10 forestry enterprises, which accounted for a total area of 6,389.3 hectares, or 14.8% of the total area covered by fires.

Crown fires are the most dangerous because sparks from burning needles and branches spread in space, and heat flows damage both coniferous and deciduous trees in the thin bark area. The increase in the area of crown fires could be associated with both strong winds and the spread of plantings with low-lying crowns, since tending cutting was not carried out everywhere on time due to

the location of plantings in radiation-hazardous areas and insufficient funding for these activities. In terms of the area of crown fires, the leading place belongs to the SE "Ovrutske SFR" (5,000 ha), large areas of crown fires were recorded in the SE "Luhynske forestry" (404 ha), "Ovrutske forestry" (402 ha), the SE "Slovechanske forestry" (275 ha), the Polisia nature reserve (150 ha) and the SE "Bilokorovytske forestry" (99 ha). The area of crown fires exceeded a third of the total area of forest fires in the SE "Ovrutske SFR" and SE "Popilnianske forestry", approached a third in the Polisia nature reserve and amounted to about 10% in the forests of the SE "Ovrutske forestry", SE "Luhynske forestry" and SE "N-Volynske SFHR" (Fig. 1).

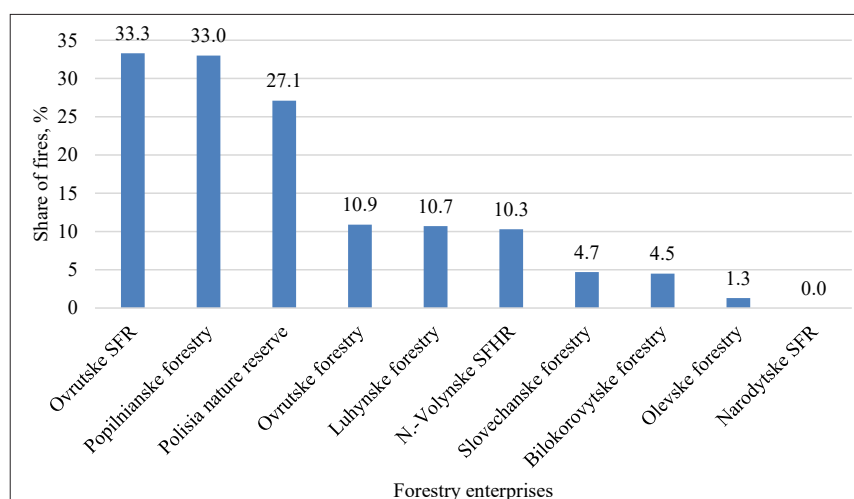


Figure 1. Share of the area of crown fires from the total area of forest fires in forestry enterprises of Zhytomyr ODFH

Analysis of weather conditions according to the Zhytomyr weather station revealed that the sum of air temperatures during the growing season was 3,127.6°C on average for 2014-2021. This indicator exceeded the indicated average data in 2015-2016 and 2018-2020, to the greatest extent – in 2018 – by 211.3°C, or by 6.8% (Fig. 2).

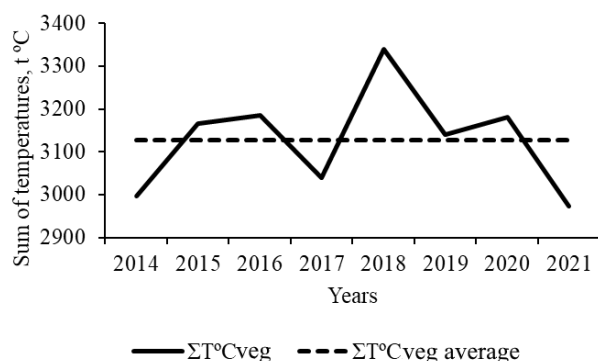


Figure 2. Dynamics of the sum of air temperatures for the growing seasons 2014-2021

The amount of precipitation during the growing season averaged 323.8 mm for 2014-2021, and was the lowest in 2015 (118.4 mm, or 36.6% less than the average value) (Fig. 3). In 2016 and 2017, the amount of precipitation during the growing season was lower than the average data for the period by 67.4 and 74.8 mm (i.e., by 20.85 and 23.1%). In 2020, this indicator was lower than the average data by 9.2 mm, or 2.8% (Fig. 3).

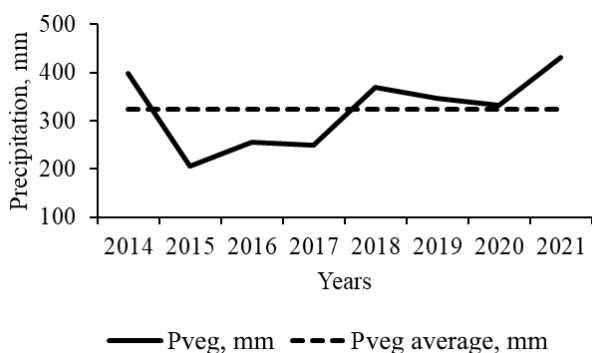


Figure 3. Dynamics of the amount of precipitation for the growing seasons 2014-2021

Since major fires occurred in April 2020, the dynamics of precipitation in April 2014-2021 was analysed (Fig. 4).

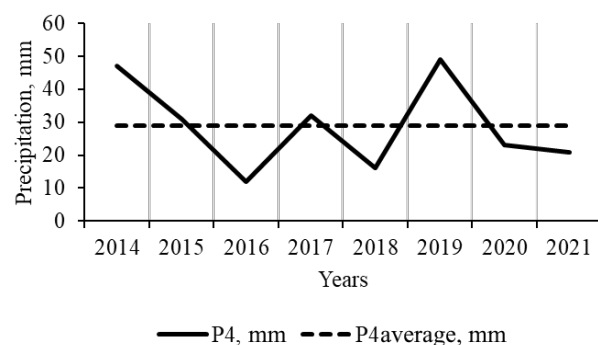


Figure 4. Precipitation dynamics for April 2014-2021

In 2014-2021, the average amount of precipitation in April was 28.9 mm. This indicator was lower than the long-term average in 2016, 2018, 2020, and 2021, with the difference in 2016 and 2018 being 16.9 and 12.9 mm, or 58.5 and 44.6%, respectively, and in 2020 and 2021 – 5.9 and 7.9 mm, or 20.4 and 27.3%, respectively (Fig. 4).

Not only high temperature and insufficient precipitation play a role in the occurrence of a fire hazard, but also their correlation, which is estimated using the hydrothermal coefficient of G.T.Selyaninov (Selyaninov, 1937).

Analysis of the values of G.T.Selyaninov's hydrothermal coefficient for the growing seasons of 2014-2021 shows that the average value of the indicator for this period was 1.04 units (Fig. 5). This indicator was lower than the average values in 2015-2017 by 0.2-0.4 units, or by 21.2-37.6%. It was in those years that foci of stem pests spread in the pine plantations of the region (Shvydenko et al., 2018; Andrieieva et al., 2018; Meshkova, 2021b).

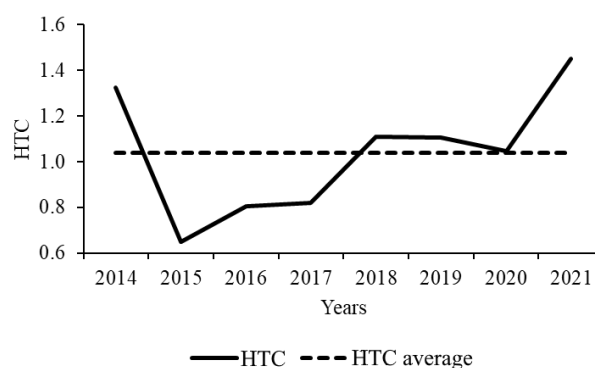


Figure 5. Dynamics of the hydrothermal coefficient for the growing seasons 2014-2021

In 2020, the hydrothermal coefficient of G.T.Selyaninov during the growing season did not considerably exceed the average values (by 0.01 units, or 0.7%) (Fig. 5).

Thus, weather conditions themselves were not the main causes of large forest fires.

CONCLUSIONS

1. In the forests of Zhytomyr Oblast Department of Forestry and Hunting, forest fires were registered in the forest fund of all forestry enterprises of the oblast (in total, on an area of more than 20 thousand hectares). The average annual number of fires is 7.9 times higher, and the average annual area of forest fires is 522.9 times higher than the average values in 2020. The area of crown fires in 2020 was 14.8% of the total area of fires.

2. The sum of air temperatures during the growing season exceeded the average data by 6.8%. The amount of precipitation in April 2020 was lower than the long-term average of 5.9 mm, or 20.4%. G.T.Selyaninov's hydrothermal coefficient was 21.2-37.6% lower than the average values in 2015-2017, and in 2020 it exceeded them by 0.7%.

3. According to reports on forest fires and their consequences in Zhytomyr Oblast Department of Forestry and Hunting, it is established that the causes of fires are the activity of the population. At the same time, the fire spread under favourable weather and climatic conditions (high air temperature, low precipitation, etc.).

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Вплив погодних умов на поширення пожеж у лісовому фонді Житомирського Полісся

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Анотація. Пожежі є одним із важливих чинників ослаблення лісів. Зважаючи на високу частку площі соснових лісів у Житомирській області, умови для виникнення пожеж є дуже сприятливими. Особливо інтенсивні пожежі відбулися у 2020 році, коли навесні відбулося швидке потепління, що за відсутності снігового покриву та наявності сильних вітрів у лютому-березні 2020 року підвищило пожежну небезпеку в лісах. Мета дослідження — виявити особливості динаміки поширення пожеж у лісових насадженнях Житомирського ОУЛМГ та оцінити метеорологічні показники, що можуть вплинути на їх поширення. Методи дослідження: статистичні — під час аналізу даних метеорологічних показників і матеріалів щодо обліку лісових пожеж. Визначено особливості динаміки поширення пожеж у лісових насадженнях Житомирської області у 2014—2021 рр. Згідно проведеного аналізу встановлено значне збільшення кількості та площ пожеж у 2020 році порівняно з середніми показниками за 2014—2019 та 2021 роки разом. За період 2014—2021 років виникла 951 пожежа на вкритій лісом площі 43807,65 га. Виявлено, що лише 448 пожеж виникли за 2014—2019 та 2021 роки, а у 2020 році зафіксовано 503 пожежі на площі 43229 га. У тому числі верхові пожежі було зафіксовано на площі 6389 га у тому ж 2020 році та на площі 35,7 га лише у 2019 році. Найбільші площі верхових пожеж зафіксовано на території ДП «Овруцьке СЛГ», ДП «Лугинське ЛГ», ДП «Овруцьке ЛГ» та ДП «Словечанське ЛГ». Проаналізовано показники температури, опадів і гідротермічного коефіцієнта за 2014—2021 роки. Було визначено за вегетаційний період значення температури повітря, кількості опадів, та розраховано гідротермічний коефіцієнт за Г.Т. Селяніновим. Встановлено, що сума температур повітря протягом вегетаційного періоду становила 3127,6 °С в середньому за 2014—2021 рр. Найвищі температурні показники були зафіксовані протягом вегетаційного періоду 2018 року. Згідно аналізу суми атмосферних опадів за вегетаційний період 2014—2021 рр. встановлено показники на рівні 323,8 мм. Найнижчі показники атмосферних опадів було зафіксовано у 2015 році. За співвідношенням показників температури та опадів отримано значення гідротермічного коефіцієнта Г.Т. Селянінова за вегетаційні періоди 2014—2021 рр., середнє значення якого становило 1,04 одиниці

Ключові слова: лісова пожежа, гідротермічний коефіцієнт, динаміка поширення пожеж, верхова пожежа, вегетаційний період, сума температур повітря, сума опадів