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Preliminary estimate of the main agricultural and horticultural¹ crops in 2023

 **4%**

It is estimated that the harvest of basic cereals with cereal mixtures will be around 4% less than last year's and will amount to around 25.9 million tonnes

The results of the preliminary production estimate for the main agricultural and horticultural crops in 2023 are as follows:

- production of basic cereals with cereal mixtures is provisionally estimated at 25.9 million tonnes, i.e. about 4% less than last year's harvest;
- rape and turnip rape production is estimated at about 3.6 million tons, i.e. about 1% less than last year's harvest;
- the production of field vegetables is estimated at approximately 3.9 million tonnes which is 3% lower than in the previous year;
- it is estimated that the harvest of fruit from trees will be about 9% lower than last year and will amount to over 4.3 million tonnes;
- fruit production from fruit bushes and berry plantations is estimated at 592 thousand tonnes, which is 1% less than the harvest in 2022.

The unfavourable impact on the development of crop production in the current year was mainly due to:

- cold days in April and the first half of May with falls in air temperature at ground level (in April even below -9°C in some areas), inhibiting plant growth and development;
- a shortage of rainfall in May and June, causing excessive soil drying in some areas and limiting the production capacity of many crops, especially cereals;
- locally occurring extreme climatic phenomena in June and July, i.e. thunderstorms, hailstorms and storms accompanied by strong winds.

On the other hand, the following had a favourable impact:

- the sowing of cereals and rape at optimal agrotechnical dates;
- good growth and bushiness of winter crops in autumn 2022;
- good overwintering of crops (only 0.1% of the sown area of winter cereals was ploughed).

Agrometeorological conditions

The course of agrometeorological conditions from autumn 2022 to summer 2023.

Sowing of winter cereals in autumn 2022 was generally carried out at optimal agrotechnical dates and by the end of the second decade of October, sowing was completed. Air and soil

Recorded rainfall deficits in May and June had a negative impact on the production capacity of many crops, especially cereals

¹ The information contains the results of a preliminary estimate of yields and harvests of cereals, rape and turnip rape, ground vegetables and fruit, as well as of the first swath of meadow grasses and an assessment of the condition of potato and sugar beet plantations, developed on the basis of expert opinions carried out in early July.
- expert opinions of Statistics Poland's (from the municipal level) developed on the basis of inspections of fields, meadows and orchards.

temperatures in November supported vegetation and created good conditions for the emergence, growth and development of late-sown winter cereals. Winter cereals sown at optimum agrotechnical dates in November were tillering, and daily air temperature fluctuations favoured plant hardening. Plants entered winter dormancy well grown and bushy. The large drops in air temperature recorded mainly in the first and second decade of December, reaching as low as -17°C and below in places, did not cause excessive cooling of the soil at the depth of the tillering node, thanks to the snow cover. In the third decade of December, as a result of warming up (in places the air temperature rose to as much as 18°C), melting snow combined with rainfall caused water-logging in the fields in some places. The high air temperature in January and February, which is high for the winter months, disrupted the winter dormancy of plants, while melting snow and rain and snow showers ensured good soil moisture. As a result of diurnal air temperature fluctuations, repeated freezing and thawing of the topsoil could weaken the plant root system.

Table 1. Air temperature and precipitation from autumn 2022 to spring 2023

Specification	National average air temperature		National average rainfall totals	
	°C	deviation from the norm ^{a)}	mm	% norm ^{a)}
AUTUMN ^{b)} 2022				
September	12.4	-1.4	69.3	117.6
October	11.2	2.5	26.6	57.1
November	4.3	0.3	19.7	51.5
WINTER ^{b)} 2022/2023				
December	0.5	0.4	45.3	123.9
January	2.9	4.1	51.7	146.2
February	1.5	1.7	40.7	129.0
SPRING ^{b)} 2023				
March	4.6	1.5	38.9	103.1
April	7.7	-1.0	41.8	110.9
May	12.9	-0.6	40.2	57.4
SUMMER ^{b)} 2023				
June	17.6	0.8	54.0	75.7

a) From 2021 IMiGW adopts as the average norm from years 1991-2020.

b) Monthly averages /Statistics Poland calculations based on IMiGW data/.

The weather in March was varied. The beginning of the month saw the start of the vegetation of winter crops. The cool days with frosts recorded during the month were not conducive to intensive plant growth. The rainfall in March contributed to good and, in places, even excessive soil moisture, which made field work difficult or impossible. Locally, at the end of the month, sowing of oats, spring wheat and spring barley began on evenly moistened fields. Agro-meteorological conditions in April were generally unfavourable for agriculture. Cool

days with rainfall and air temperature drops at ground level even below -8°C in places slowed down plant growth and development, occurring mainly in the first half of the month. Moisture in the topsoil throughout the country secured the water needs of plants, while in places where precipitation was intense, there was an excess of water in the fields, which made field work much more difficult. The cool days at the beginning of May adversely affected the rate of plant growth and development. The rainfall recorded mainly in the second decade of the month, locally intensive and torrential, caused excessive soil moisture and waterlogging in many areas of the country (mainly in the southern and south-eastern parts). Field work was hampered. The rainfall deficit observed in the northern part of the country led to soil dryness. Agro-meteorological conditions in June varied. Significant soil water deficits were observed in many parts of the country, causing soil dryness. This adversely affected the condition of many crops (especially spring cereals), causing disturbances in normal plant growth and development, mainly on weaker soils. The greatest intensity of soil drying occurred in the north-western and central-northern parts of Poland. At the same time, locally heavy rains, combined with thunderstorms and strong winds, caused temporary excessive soil moisture. In the first half of July, the ripening of rape and turnip rape as well as winter and spring cereals continued throughout the country. Locally, the harvest of winter barley began. In the second half of the month, the cutting of rape and turnip rape locally commenced. The course of weather conditions during the harvest period will have a decisive impact on the size and quality of the harvest.

Cereals

It is provisionally estimated that the area under cultivation of basic cereals with cereal mixtures in 2023 is about 2% less than last year's and amounts to about 5.7 million ha², of which:

- wheat more than 2.4 million ha;
- rye about 0.7 million ha;
- barley more than 0.6 million ha;
- oats about 0.5 million ha;
- triticale about 1.2 million ha;
- cereal mixtures about 0.3 million ha.

The yield of basic cereals with cereal mixtures is provisionally estimated at 45.0 dt/ha, i.e. 0.9 dt/ha (by 2%) less than last year's yield.

The yield of winter cereals including winter cereal mixtures is provisionally estimated at 47.8 dt/ha, i.e. 1.0 dt/ha (by 2%) less than last year's yield.

The yield of spring cereals including spring cereal mixtures was provisionally estimated at 35.0 dt/ha, i.e. 1.2 dt/ha (by 3%) less than last year's yield.

The harvest of basic cereals with cereal mixtures is estimated at 25.9 million tonnes, i.e. 1.0 million tonnes (by 4%) less than last year's crop.

The winter cereal harvest is provisionally estimated at 21.5 million tonnes, i.e. 0.5 million tonnes (2%) less than last year's harvest.

The spring cereals harvest, including spring mixtures, has been provisionally estimated at 4.4 million tonnes, i.e. 0.5 million tonnes (11%) less than last year's harvest.

The winter cereal harvest including winter cereal mixtures was provisionally estimated at 21.5 million tonnes, 2% less than last year

The harvest of spring cereals including spring cereal mixtures was provisionally estimated at 4.4 million tonnes, 11% lower than last year

² The sown area of agricultural and horticultural crops was determined on the basis of data from the Agency for Restructuring and Modernisation of Agriculture and estimates by field experts of Statistics Poland.

Table 2. Cereal yields and total rape and turnip rape from 2010-2023

Specification	2010	2015	2018	2019	2020	2021	2022	2023 ^{a)}	2022 =100
	in decitons per 1 hectare								
basic cereals with cereal mixtures	35.1	36.7	32.3	35.2	44.8	42.6	45.9	45.0	98
winter wheat	45.7	47.6	43.0	46.4	54.2	51.8	54.4	53.4	98
spring wheat	34.3	33.5	31.5	32.6	41.7	39.6	42.4	41.2	97
rye	26.9	27.8	24.2	27.2	35.1	33.1	36.0	35.4	98
winter barley	40.7	41.3	37.8	43.0	51.1	47.7	49.6	48.6	98
spring barley	33.0	33.0	29.5	32.1	40.0	37.8	39.5	38.7	98
oats	26.4	26.5	23.5	24.9	33.2	31.4	32.8	31.8	97
winter triticale	35.2	36.3	32.8	35.9	45.0	43.1	45.5	44.7	98
spring triticale	28.4	28.4	25.1	27.5	36.4	33.7	35.6	34.5	97
winter cereal mixtures	30.9	30.9	28.2	30.6	38.1	36.6	37.5	37.8	101
spring cereal mixtures	30.5	27.2	25.0	26.2	34.5	33.7	33.8	32.6	96
rape and turnip rape	23.6	28.5	26.1	27.1	31.9	32.1	33.8	33.2	98

a) Preliminary yield estimate in 2023

Table 3. Cereal production and total rape and turnip rape from 2010-2023

Specification	2010	2015	2018	2019	2020	2021	2022	2023 ^{a)}	2022 =100
	In million of tonnes								
basic cereals with cereal mixtures	25.1	24.7	22.8	25.1	28.6	27.0	26.9	25.9	96
winter wheat	8.5	9.9	8.3	9.5	12.0	11.3	12.6	12.1	96
spring wheat	0.9	1.1	1.5	1.5	0.6	0.9	0.9	0.7	79
rye	2.9	2.0	2.2	2.5	3.0	2.5	2.4	2.5	105
winter barley	1.0	1.0	0.8	1.0	1.4	1.4	1.5	1.7	110
spring barley	2.4	2.0	2.3	2.4	1.6	1.6	1.3	1.1	88
oats	1.5	1.2	1.2	1.2	1.7	1.7	1.5	1.6	102
winter triticale	4.2	4.7	3.6	4.1	5.9	5.2	5.3	5.1	96
spring triticale	0.4	0.6	0.4	0.5	0.3	0.2	0.2	0.2	87
winter cereal mixtures	0.3	0.3	0.2	0.2	0.4	0.4	0.2	0.2	80
spring cereal mixtures	3.0	1.9	2.3	2.3	1.7	1.9	1.0	0.8	82
rape and turnip rape	2.2	2.7	2.2	2.4	3.1	3.2	3.6	3.6	99

a) Preliminary production estimate in 2023

Rape and turnip rape

Sowing of winter rape, which started in the second decade of August 2022, was completed in the second decade of September. The course of weather conditions during autumn was favourable for seed germination and rape plant emergence. The positive air temperature in November supported vegetation and created good conditions for plant growth and development. Plants were well grown, bushy and hardened off before entering winter dormancy. The winter did not cause major losses to rape crops. In total, only about 0.1% (in 2022 - about 0.1%) of the area sown in autumn was qualified for ploughing throughout the country, and the condition of winter rape plantations left for this year's harvest was assessed better than last year. Vegetation of rape in spring was generally undisturbed, but the amount of precipitation in May and June was insufficient in most parts of the country. Despite the late spring rainfall deficit, the filling of the canes is satisfactory. It is estimated that rape yields will be lower than last year's.

It is estimated that the area under rape and turnip rape this year has increased by around 1% compared to last year and amounts to around 1.1 million hectares. The rape and turnip rape harvest is provisionally estimated at 3.6 million t, about 1% less than last year.

Potatoes

This year, planting of potatoes intended for early harvesting by regions began in March. Most of the plantations (intended for later harvesting) were planted in the second half of April. Cool weather with frosts in April and May caused plant emergence to be uneven and prolonged in time. The shortage of rainfall in May and June, as well as its uneven distribution, had an adverse effect on plant growth and development, limiting their yield potential. Rainfall occurring in July improved the condition of potato plantations, especially of later varieties. However, it varies regionally. It is estimated that this year the potato planting area will be slightly lower than last year's and will be close to 0.2 million hectares. Taking into account the course of meteorological conditions and factors affecting the yield potential of potatoes so far, it can be concluded that the yield and harvest of potatoes in the current year will be lower than last year's, but they will ultimately depend on the further course of the weather.

Sugar beets

The area under sugar beets is tentatively estimated at around 0.3 million hectares, higher than last year's figure. Sowing of sugar beets, which began in mid-March, was commonly carried out in the second half of April and was completed in early May. Due to spring cold weather, crop emergence was delayed, slow and uneven. The deficit of rainfall in May and the first half of June clearly slowed the rate of plant growth and development. However, the condition of sugar beet plantations in mid-July was good, with an estimated plant density of about 95,000 plants per hectare. However, the amount of sugar beet yields will depend on the further course of weather conditions.

Meadow hay

The condition of permanent grasslands after winter was good. Spring vegetation of plants, began in permanent grasslands at the end of the first decade of March and generally proceeded without disturbance, but not dynamically. The slow growth and development of meadow sward was conditioned by meteorological factors. April's cold weather, as well as May's shortage of rainfall, slowed the growth of the meadow sward, delaying the harvest date of the first swath of meadow hay and deteriorating its quality. The first swath was harvested in the third decade of May. Yields of the first swath of meadow grasses in terms of hay were estimated at about 27.4 dt/ha, while yields from permanent meadows (in terms of hay) amounted to about 6.3 million tonnes.

The rape and turnip rape harvest was provisionally estimated at 3.6 million tonnes, about 1% less than last year's

The first-cut permanent meadow crop (converted into hay) amounted to about 6.3 million tonnes, i.e. less than last year's figure by around 6%

Field vegetables

The beginning of the growing season in 2023 was characterized by low air temperatures and significant soil moisture, which in many regions of the country disabled to carry out field works on time and resulted in a slight delay in the sowing of ground vegetables. The weather conditions in the following weeks, however, enabled sowing of later varieties and the planting of seedlings on time. Drops in air temperature at the beginning of May, especially noticeable at night, made it necessary to cover the plantations and caused uneven emergence and development of plants. However, no major frost losses were recorded. The increase in air temperature in the second half of May enabled the acceleration of vegetation and influenced the increase in the biological mass of plants. Drought in June and the first decade of July, occurring especially in the Wielkopolskie, Łódzkie and Kujawsko-Pomorskie voivodeships, again inhibited the development of plants. Only on plantations where additional irrigation is used, the problem of insufficient rainfall is less noticeable. The current weather conditions are the least favorable for the cultivation of brassica vegetables, as well as cauliflower and broccoli. Root vegetables, on the other hand, are in better shape. Unfavorable meteorological conditions in the prevailing period of the current vegetation caused the infection of numerous plantations with fungal and bacterial diseases. Pest pressure is also strong. As a consequence, it is estimated that the harvest of vegetables of early varieties in many regions of the country will be smaller than in the previous year, and the final volume of production of vegetables of late varieties depends on the weather conditions (especially rainfall) in the later growing season.

It is estimated that this year's harvest of cabbage will not exceed 630 thousand tonnes., but the final value will be determined by the production results of late varieties. Due to drought and high air temperatures, the cauliflower harvest is currently estimated at 124 thousand tonnes, and onions at the level of 630 thousand tonnes. Carrot production may amount to approx. 590 thousand tonnes., root parsley 150 thousand tonnes, while beetroot will increase to approx. 247 thousand tonnes. In relation to the previous year, the harvest of field tomatoes will decrease to approx. 168 thousand tonnes, and cucumbers to 131 thousand tons. The production of root celery will also be lower and will amount to approx. 106 thousand tonnes. The harvest of sweet corn is currently estimated at approx. 154 thousand tonnes, and the total production of pumpkin, squash and zucchini at approx. 414 thousand tonnes. The harvest of other vegetable species was estimated at 506 thousand tonnes.

Fruits

Thanks to favorable weather conditions and rainfall, which supplied the groundwater, fruit trees entered the rest period in 2022 in good condition. Relatively high air temperatures, despite the lack of snow cover in the majority of the country, allowed the plants to survive the winter dormancy without significant frost damage. Vegetation in 2023 was slightly delayed due to the decrease in air temperatures in March and April, which at the same time favored the protection of flower buds against frost. However, damage to the flowers occurred in the first half of May. Low temperatures and frequent rainfall handicapped conducting protection treatments, which led to the development of fungal diseases. Unfavorable weather conditions reduced the activity of pollinators, and consequently, the number of set fruits was lower than in the previous year. Due to the rainfall deficit that persisted in the following weeks, a strong fall of buds was recorded on many plantations. The pressure from plant pests has also intensified. In some regions of the country, weather conditions improved slightly at the turn of June and July. Still, the amount of water accumulated in the soil remained below the optimal level.

This year's total harvest of fruit from trees is currently estimated at over 4.3 million tonnes which is 9% less compared to the previous year. The final result will depend on the amount and intensity of rainfall in the second part of the growing season.

The production of field vegetables is currently estimated at less than 3.9 million tons, which is 3% lower compared to the previous year

The harvest of fruit from trees in orchards is currently estimated at over 4.3 million tonnes, i.e. about 9% less than the previous year's production

The harvest from apple orchards was initially estimated at less than 3.9 million tons which is about 9% less than in the previous year. A significant decrease in yield is caused by the effort of trees in the previous season and unfavorable weather conditions in the current one. It is estimated that the production volume of pears in orchards is similar to the level from the previous year and will amount to approx. 80 thousand tonnes. The persistent drought contributed to a decrease in the plum harvest by approx. 4% to less than 128 thousand tonnes. Cherry production in 2023 will be 8% lower than a year ago and will amount to approx. 168 thousand tonnes, and cherries will decrease by 4% to 73.3 thousand tonnes. It is expected that the total harvest of peaches, apricots and walnuts will be lower than last year by almost 8% and will amount to approx. 20 thousand tonnes. Harvest from other fruit trees (including, among others: amelanchier, dogwood, mountain ash, medlar and quince) will amount to less than 3 thousand tonnes.

Fruit production from fruit bushes in orchards and berry plantations was initially estimated at 592 thousand tonnes, i.e. approx. 1% less than in the previous year. Because of the mild winter and rainfall at the end of 2022, no frost damage was recorded on most plantations of fruit bushes in the country, and the plantations survived the winter dormancy in good condition. Due to the low air temperatures at the beginning of the growing season in 2023, the blooming of the plants was delayed, and the drought persisting in the following weeks led to a significant fall of the set fruit. The course of weather conditions in the first half of the year was unfavorable for plants, but it favored the development of bacterial and fungal diseases, which affected the reduction of plant yields. In 2023, a reduction in the area of strawberry cultivation was observed, and in consequence a decrease in the production volume by over 2% to approx. 180 thousand tonnes. This was due to the persistent problem of the lack of people willing to work on the harvest, as well as the low profitability of fruit production for processing. The weather conditions at the beginning of the year were not conducive to the cultivation of raspberries, so the harvest of this species was estimated at less than 102 thousand tonnes, i.e. 3% less than in the previous year. Due to the poor condition of the shoots of repeat-blooming cultivars, it is currently difficult to expect an improvement in the production result in autumn. The total production of currants (black and coloured together) was estimated at 143.7 thousand tonnes, i.e. over 1% lower than in the previous year. The black currant harvest was estimated at less than 100 thousand tonnes, i.e. about 2% less than in the previous year, while colored currants, as in 2022, amounted to just over 44 thousand tonnes. The decrease in blackcurrant production was caused by a significant fall of fruit buds observed on many plantations throughout the country, which was caused both by frost during flowering and by persistent water shortage in the soil. Highbush blueberry harvest was estimated at 67.5 thousand tonnes, which is 5% more than the year before. Gooseberry production decreased by 6% to 9.2 thousand tonnes, and the harvest of other fruit from fruit bushes and berry plantations in orchards was estimated at almost 89 thousand tonnes, i.e. about 1% less than in 2022. A decrease in harvest was recorded especially in the case of chokeberry, the dominant species in this group of fruits. On the other hand, the production of Kamchatka berry, vine and hazelnuts increased slightly.

The harvest of fruit from fruit bushes in orchards and berry plantations was initially estimated at 592 thousand tonnes, which is over 1% less than in the previous year

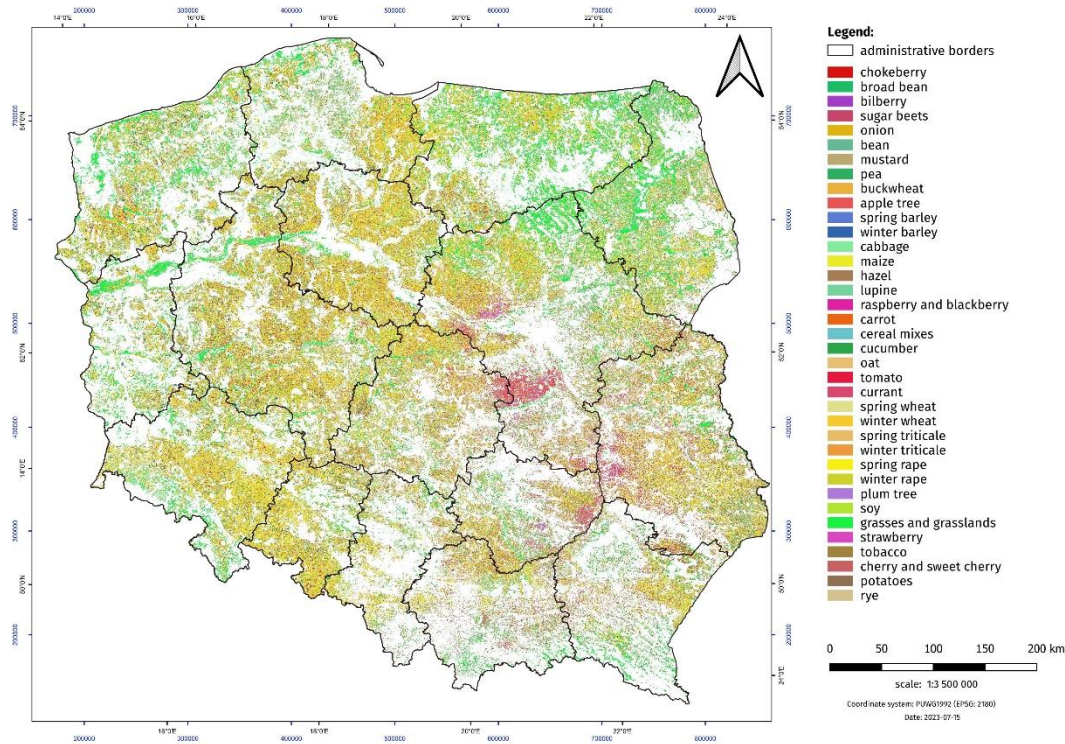
Forecasting the area of agricultural and horticultural crops using satellite remote sensing

In terms of work on agricultural and horticultural crop estimates, efforts have been underway for many years to use satellite imagery to forecast agricultural and horticultural crop acreage. The new system for obtaining agricultural crop data, combined with the possibility of making greater use of crop data from ARMA, forms the basis of a new methodology for agricultural surveys.

The estimate of agricultural and horticultural crops was made using satellite remote sensing methods. It was based on Sentinel-1A radar images with a resolution of 13.9x13.9m and Sentinel-2 with a resolution of 10x10m. Satellite data recording covered the period from 15.10.2022 to 15.07.2023. Due to the failure of one Sentinel-1 satellite, radar data were available every 12 days. The range of crops identified included 37 species. A total of 430 satellite scenes (3.5 TB of data) of 250 km wide SLC (Single Look Complex) radar data and Sentinel-2 optical data

(2496 satellite scenes, 2.5 TB of data) were used. The estimation was developed on the basis of segmentation and classification of the object-based T2 coherence matrix and H/α polarimetric de-composition parameters using machine learning algorithms (Random Forest). To teach the system and validate the classification results, data from a vector database of payment applications obtained by the Department of Agriculture and Environment of the Statistics Poland from the Agency for Restructuring and Modernisation of Agriculture were used. In order to increase the precision of crop area mapping, a mask of agricultural parcels was used. An overall classification accuracy of 71% was obtained.

Map 1. Preliminary estimate of the main agricultural and horticultural crops



The estimation of agricultural and horticultural crops for Poland was developed on the basis of satellite images with a resolution of more than 100 m². The current use of images from Sentinel-type satellites results in inaccurate identification of small plots (usually less than 10 acres) and adversely affects the quality of the results. The problem concerns a part of agricultural plots in south-eastern Poland. Estimates obtained from the satellite crop identification system using higher-resolution images for this area are the future of the system.

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Data available in databases

[BDL: Sown area](#)

Terms used in official statistics

[Crop area](#)