Fact-Checked Science

PAPER CHECK · CLIMATE

Estonia's growing season has lengthened by three to four weeks since 1965, mostly in spring

S0 News introduced a 2026 study of Estonia's growing season [1] with three remarks: that Estonians quietly care less than most people about global warming, that food production is surging, and that the season "has extended by an average of a week" in "just a century" [2 00:00:44–00:01:05]. The paper's abstract describes two ways of dating the season, applied at 15 weather stations over 1965–2025, and reports it lengthening by 4.3 days a decade on average, mostly because spring comes earlier: about four weeks in all, by our arithmetic. We could read only that abstract, as its publisher deposited it with Crossref [3], because Wiley's site met us with a bot check we did not try to get past; our own re-run of public station records finds about three weeks, and nothing in the abstract concerns food or attitudes.

By Fact-Checked Science · Published October 26, 2026

OUR ANALYSIS marks our own reasoning and calculations, including our re-run of 11 public station records and our checks of Estonia's crop statistics, and the verdicts are our assessment. Everything else comes from the numbered sources. For the paper [1] we could read only the abstract its publisher deposited with Crossref [3], so Abstract is the only locator into it; for the episode, times are positions in the video; elsewhere p. gives a page and Abstract the part of a source we quote.

The season really has grown by weeks since 1965; the episode shrank that to one week in a century and added claims the paper's abstract does not make

OUR ASSESSMENT

4.3 days

a decade: how fast the growing season lengthened across Estonia in 1965–2025, on the average the paper's abstract reports; about 26 days in all by our arithmetic [1 Abstract]

3.5 days

a decade in our re-run of 11 public station records over the same years, about three weeks in all, most of it from earlier springs [4]

0.7 days

a decade: the pace of a week "in just a century", as the episode put it, a sixth of the paper's [2 00:00:57–00:01:05]

THE CLAIMS

CONTEXT

"if you can't recall the last time the country of Estonia made a major stink about global warming, it's probably because they quietly care very less than most people seem to"

The presenter [2 00:00:44–00:00:53]

An aside that nothing in the paper's abstract touches [1 Abstract]. Polls back its gist: in the EU's 2025 climate survey, 60% of Estonians called climate change a serious problem, against 85% across the EU, and 46% supported the EU's goal of climate neutrality by 2050, against 81%, the lowest shares of any member state [5]. But the state has not been silent: the 2050 goal "was already established by a 2021 Riigikogu decision", and the government sent a climate act to parliament in May 2026 [6]. Meanwhile the country's carbon dioxide emissions more than halved from 2018 to 2024, as its electricity from fossil fuels fell by three-quarters [7]. See section 6.

MISLEADING

"Food production is surging like it is in northern Russia and Canada."

The presenter [2 00:00:53–00:00:57]

Estonia's cereal harvest has indeed roughly doubled, from 0.69 million tonnes a year in 2000–2009 to 1.32 million in 2016–2025, though by our analysis with no trend since 2015 [8]. But the paper's abstract mentions no crops or food [1 Abstract]. The rise followed the collapse of Soviet-era farming and EU accession: writing in 2009, Viira and colleagues tied the early post-accession rise to payments that let farmers use "more and better quality inputs" [9 p. 298], and we found no source for the later rise. Potato production fell by more than half, and in our check, years with longer seasons brought no bigger yields. In 1990–2009, cropland was abandoned on a vast scale across European Russia, Ukraine and Belarus [10 Abstract]; we did not check recent Russian or Canadian harvests. See section 5.

MISREAD

"there growing season has extended by an average of a week which may not sound like much but to see it in just a century is absolutely wild"

The presenter [2 00:00:57–00:01:05]

The paper covers 61 years, 1965–2025, not a century, and its abstract reports the season lengthening by 4.3 days a decade on average [1 Abstract]: by our arithmetic, about 26 days, nearly four weeks, in all. Our re-run of public station records finds about three weeks over the same years, and 16 to 23 days, two to three weeks, over the last century at seven stations with long records [4]. Similar changes are measured across Europe [11 Abstract][12 Abstract]. See section 3.

TRUE

The season has lengthened across Estonia, mostly because spring comes earlier

The paper's abstract [1 Abstract]

"Across Estonia, GSL increased by 4.3 days decade^{-1} on average, driven mainly by earlier SOS", with the largest increase among the maritime stations [1 Abstract] (GSL is the season's length, SOS its start). Our re-run of 11 public station records agrees on all three points, at a somewhat lower 3.3 to 3.5 days a decade: an earlier start at every station, and the biggest change on the western islands [4][13]. A study of central and northern Europe finds the same [14 Abstract]. See section 3.

TRUE

Two definitions agree on the trend's direction but differ by one to two weeks in single years

The paper's abstract [1 Abstract]

The traditional Estonian method and the international ETCCDI definition gave the same regions and the same direction of change, but "differed substantially in annual SOS, EOS, and GSL estimates", by 8.5 to 13.2 days RMS, above all in years when temperatures hovered around 5 °C [1 Abstract]. Earlier studies found the same [15 Abstract]; and in our test, two versions of the same stations' daily means that agree on average but differ by about 1 °C from day to day moved single seasons by about 11 days, while both stations' trends stayed upward. See section 4.

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1 · THE STUDY

A climate and methods paper from Estonia's rural research centre, which we could read only in its abstract

The paper is a peer-reviewed article in the *International Journal of Climatology*, published online on October 24, 2026, by Triin Saue of the Centre of Estonian Rural Research and Knowledge in Jõgeva [1][3]. Its full text was out of our reach.

What the records show

Received June 22, accepted October 12 and published October 24, 2026, as article e70638; one author; 43 references; funded by the Estonian Research Council (award PA1-KSV-KIPPER, RITA-AGROMET2); published under Wiley's standard terms of use, not an open licence [3].

OpenAlex lists it as free to read on the publisher's site, with no copy in any repository [16]. Its abstract, deposited by the publisher with Crossref, is quoted on this page [3].

OUR ANALYSIS

What that means for this check

Wiley's site met our tools, and a real browser, with a bot check; the site's rules do not let us try to get past one, so we stopped there, and we found no other copy. The page rests on the abstract, the Crossref and OpenAlex records, our re-run of public station data and the literature, and each verdict says which.

If the full text says what the abstract does not, the verdicts could move: claims 2 and 3 if it discusses crops or a change of about a week, claims 4 and 5 if its methods or tables disagree with its abstract. If you have the paper, tell us through the correction form below; with the text in hand we will revise the page.

What it measured

Daily mean air temperatures at 15 Estonian weather stations, 1965–2025, from which it dates the start (SOS) and end (EOS) of the thermal growing season, the warm part of the year above 5 °C, and its length (GSL), by two definitions; it then groups the stations into regimes and compares the definitions [1 Abstract].

The two definitions

The international one, from the ETCCDI, starts the season on the first of at least six days in a row above 5 °C, and ends it on the first of six days in a row below 5 °C after 1 July [17]. The traditional Estonian Raik–Tarand method "identifies a sustained seasonal transition using a cumulative thermal-balance criterion that is less sensitive to brief interruptions" [1 Abstract].

How it reached the episode

S0 News linked the paper in the episode's description as "Longer Growing Season" and gave it about 20 seconds, before its dark-energy item and its top story on a galactic magnetic reversal [2 00:00:44–00:01:05]. The abstract says nothing about a galactic cause or "the Earth disaster cycle", and the episode did not connect them [1 Abstract]. The same three sentences carry the same labels and verdicts in our review of the episode, S0 News, October 26, 2026.

What we could not read, and so do not rate

QUESTION	STATUS
Which 15 stations, where their records come from, and whether they were checked for changes in instruments or sites	Unverified; probably the Estonian Environment Agency's (our inference), whose raw station data, the author's other data sets of 2026 say, "may be requested directly from the agency" [18]
Whether the 4.3 days a decade comes from one definition or both, and how it was averaged and tested	Unverified; sections 3 and 4 give our re-run
The figures, tables and per-station results	Unverified; no figure is redrawn
Whether the discussion mentions crops, farming or food, and the author's stated limitations	Unverified; the abstract mentions none of them [1 Abstract]
Data availability and competing interests	Unverified
Journal, dates, licence, funding, affiliation, references	Known [3][16]

2 · WHAT IT FOUND

Earlier springs, a longer season, and two definitions that agree on the trend's direction but not on single years

The abstract reports three regional regimes, a national trend and a comparison of the two definitions [1 Abstract].

LENGTHENING, 1965–2025

4.3 days

a decade on average across Estonia, "driven mainly by earlier SOS" [1 Abstract]

IN ALL, 1965–2025

OUR ANALYSIS

≈26 days

4.3 days a decade over the 60 years from 1965 to 2025, nearly four weeks; the abstract gives no total

SINGLE YEARS, METHOD AGAINST METHOD

8.5–13.2 days

root-mean-square difference between the two definitions' yearly dates and lengths [1 Abstract]

The abstract's numbers

RESULT	IN THE ABSTRACT
Regimes	Three: maritime, transitional and southern inland
Maritime stations	The latest start (mean 25 April) and end (9 November), and the longest seasons
Southern inland stations	The earliest start (mean 16 April), with the season ending on 24 October
The trend	Season length up 4.3 days a decade on average, mainly from earlier starts; changes in the end "more spatially variable"; significant increases in all three regimes, the largest in the maritime one
Where the change comes from	In the southern inland regime, mainly from earlier spring onset; in the maritime regime, from both earlier starts and later ends
National means, Raik–Tarand	Start 21 April, end 28 October, 189.0 days
National means, ETCCDI	Start 23 April, end 29 October, 188.8 days
The definitions compared	Similar regimes, spatial patterns and directions of change; in single years, mean differences of +1.3 days in the start and +1.2 days in the end, near zero in the length, and RMSE 8.5–13.2 days, largest "during years with unstable temperatures around the 5°C threshold"

All from the abstract [1 Abstract]. RMSE is the root-mean-square difference.

In the author's words

From the abstract. GSL is the season's length, SOS its start and EOS its end.

> *"Across Estonia, GSL increased by 4.3 days decade^{-1} on average, driven mainly by earlier SOS, while EOS changes were more spatially variable."*
>
> Saue (2026) [1 Abstract]

> *"GSL increased significantly in all three regimes, with the strongest increase in the maritime regime."*
>
> Saue (2026) [1 Abstract]

> *"ETCCDI is therefore suitable for regional climate-change analyses and international comparisons, whereas the Raik–Tarand method may better represent sustained thermal transitions under Estonian conditions."*
>
> Saue (2026) [1 Abstract]

OUR ANALYSIS

The abstract hangs together

Its national means differ by about two days in the start and one in the end between the two definitions, which the stated mean differences of 1.3 and 1.2 days allow once dates are rounded to whole days, and its two season lengths, 189.0 and 188.8 days, differ by the near-zero amount it reports [1 Abstract]. Nothing in it is contradicted by the public data we re-ran (sections 3 and 4).

3 · A WEEK IN A CENTURY?

Not a week in a century: nearly four weeks in 61 years on the paper's figure, three in public data

The episode's figure understates the paper's rate twice over: too small a change, spread over too long a time [2 00:00:57–00:01:05][1 Abstract].

What the paper reports

Fifteen stations, 1965–2025, a period of 61 years, and an average lengthening of 4.3 days a decade [1 Abstract]. It says nothing, in its abstract, about a century or a week.

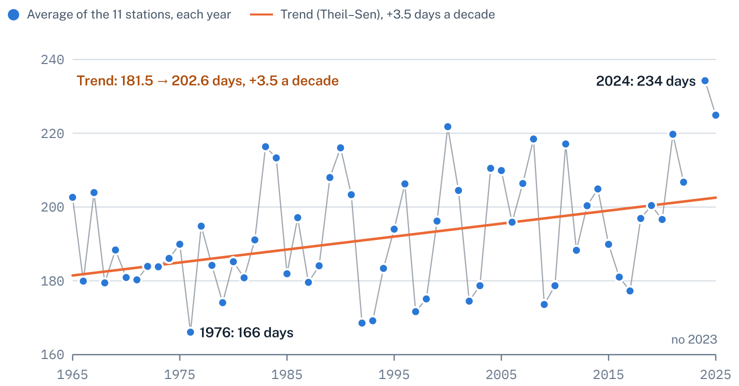
OUR ANALYSIS

The arithmetic

4.3 days a decade over the 60 years from 1965 to 2025 is about 26 days. A week in a century is 0.7 days a decade, a sixth of the paper's rate, and over 1965–2025 it would add up to about four days.

The growing season’s length at 11 Estonian stations, 1965–2025

OUR ANALYSIS



Days from the season’s start to its end, by the ETCCDI definition

Our re-run, not the paper’s data: daily maximum and minimum temperatures at 11 stations from NOAA’s GHCN-Daily [4], which carries them mostly from the European Climate Assessment & Dataset [13]; the daily mean is taken as their average, and the season dated by the ETCCDI definition [17]. Each dot is the average of the stations’ departures from their own 1965–2025 means, added to the stations’ mean of 193.3 days; 2023 is missing because most of the stations’ series have gaps that year. The paper’s station data are probably the Estonian Environment Agency’s, which the author’s other 2026 data sets say are available on request [18].

TREND, 1965–2025

OUR ANALYSIS

+3.5 days

a decade, about 21 days in 60 years (Mann–Kendall p = 0.009); the 11 stations’ own trends average +3.3 [4]

EARLIER STARTS

OUR ANALYSIS

11 of 11

stations, significantly at 9; the end moved later at 8, significantly only at Kuressaare [4]

THE WESTERN ISLANDS

OUR ANALYSIS

+5.8 days

a decade at Kuressaare and +5.2 at Vilsandi, the largest changes, with both earlier starts and later ends, as in the paper’s maritime regime [4][1 Abstract]

OUR ANALYSIS

Over a century

Seven of the stations have maximum and minimum temperatures from the 1920s or earlier. Over 1926–2025 their season lengthened by 2.3 days a decade (p = 0.0003), about 23 days in a century; their 30-year averages were 182 days in 1926–1955, 188 in 1956–1985 and 198 in 1996–2025, 16 days apart: two to three weeks longer in all [4]. NOAA warns that GHCN-Daily data “have not been homogenized” for changes in stations’ reporting practices, and the longest record joins sources: Tartu-Tõravere’s values until 1964 are flagged as government-supplied data, its later ones as ECA&D’s [4]. So this is a rough check.

OUR ANALYSIS

“Absolutely wild”?

Large, but typical of the region: the paper’s 4.3 days a decade sits beside about 5 a decade across Europe in 1965–2016 [12 Abstract] and 23 days over 1950–2019 in northern Europe [11 Abstract]. What stands out is the pace since the early 1990s: in our data, 7.2 days a decade in 1991–2025 (p = 0.012), against 1.2 in 1965–1994, after a shift in Estonia’s temperatures and snow cover “in the late 1980s, mostly since the winter of 1988/1989” [19 Abstract].

Other studies of the same change

STUDY	REGION AND YEARS	FINDING
Carter (1998)	Nine Nordic sites, 1890–1995	The season “lengthened considerably” between 1891–1925 and 1926–1960, then more slowly at the eight Fennoscandian sites [20 Abstract]
Walther and Linderholm (2006)	The Greater Baltic Area, the 20th century	On average a start about 12 days earlier and an end about 8 days later: about 20 days longer [15 Abstract]
Linderholm, Walther and Chen (2008)	49 stations in the Greater Baltic Area, the 20th century	“ca one week” longer since 1951, most of it in spring [21 Abstract]
Cornes, van der Schrier and Squintu (2019)	Europe, 1965–2016	About 5 days a decade, by the ETCCDI definition and a smoother index alike [12 Abstract]
Aalto and others (2022)	Northern Europe, 1950–2019	Starts about 15 days earlier and seasons 23 days longer [11 Abstract]
Miś and Tomczyk (2025)	Central and northern Europe, 1950–2022	Longer seasons across much of the region, “driven more by an earlier start than a later end” [14 Abstract]

From the studies’ abstracts. The “week” in Linderholm and colleagues’ abstract is for a shorter period and a wider region than the episode described.

4 · DOES THE DEFINITION MATTER?

Single years swing by one to two weeks with the definition; the long-term direction does not

The paper’s second finding, and the one in its title, is that the answer depends on how the season is defined [1 Abstract].

The paper’s explanation

“This reflects a structural difference between the definitions: ETCCDI requires six consecutive days above or below the threshold, whereas the Raik–Tarand method identifies a sustained seasonal transition using a cumulative thermal-balance criterion that is less sensitive to brief interruptions.” [1 Abstract]

Others found the same

Across Europe, the ETCCDI season’s start and end “are determined by temperature events operating within the synoptic timescale; this raises the inter-annual variance of the index”, while its long-term trends match a smoother index [12 Abstract]. Around the Baltic, “there was little difference in trends depending on the indices used” [15 Abstract].

OUR ANALYSIS

Same average, different days: eleven days apart

At Tallinn and Tartu-Tõravere, GHCN-Daily also holds true daily means from weather reports. From April to October they agree with the average of the day’s maximum and minimum to 0.1 °C on average, but differ by about 1 °C on a typical day (a standard deviation of 0.9 and 1.0 °C; a degree or more on a quarter to a third of days), and the ETCCDI seasons computed from the two differ by 10.7 and 10.8 days, root-mean-square, from year to year: the size of the difference the paper’s abstract reports between its two definitions [4]. It is the day-to-day differences that do it: shifting the true daily means by a uniform 0.1 °C moves the seasons by only 6.1 and 1.2 days RMS, changing 6 of 58 and 2 of 55 years.

Both versions give upward trends, but their size at one station can change two-or threefold (1.7 against 3.6 days a decade at Tallinn, 1.8 against 0.6 at Tartu-Tõravere), so single-station trends are fragile and averages over many stations steadier. One warm spell is enough: in our data for 2025, Tallinn’s season “started” on 28 March.

The trend depends on the years chosen

OUR ANALYSIS

YEARS	TREND, DAYS A DECADE	MANN–KENDALL P	YEARS WITH A VALUE
1965–2025	**+3.5**	**0.009**	**60**
1965–2024	+3.0	0.021	59
1971–2025	+4.3	0.008	54
1981–2025	+3.6	0.11	44
1991–2025	+7.2	0.012	34
1965–1994	+1.2	0.64	30
1995–2025	+5.8	0.077	30
1971–2000	+4.5	0.30	30
1991–2020	+3.5	0.29	30

The 11-station average of our re-run [4]. 2024 and 2025 were the two longest seasons since 1965, at 234 and 225 days; adding 2025 alone lifts the 1965–2024 trend from 3.0 to 3.5 days a decade.

The author’s own caution

In an earlier paper on spring’s onset at 21 Estonian stations, the same author found that the choice of reference period “can substantially affect both the magnitude and interpretation of phenological trends”: comparing 1971–2000 with 1991–2020, the trends were “generally weaker in the most recent period and, at some stations, near zero or positive” [22 Abstract].

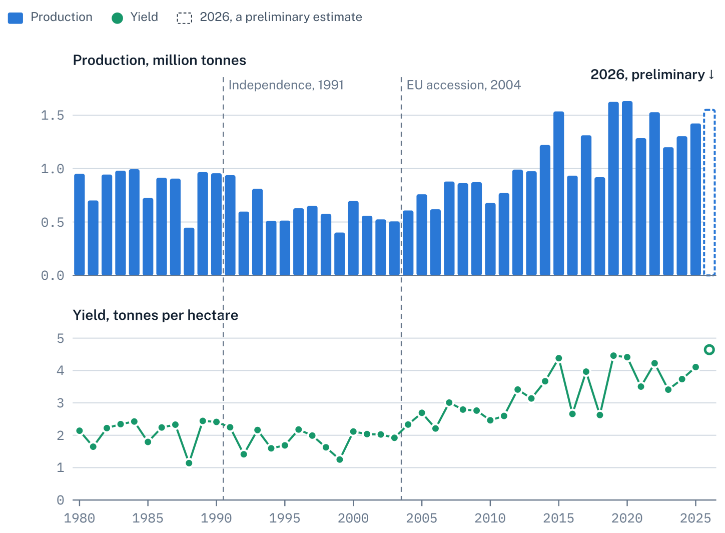
5 · IS FOOD PRODUCTION SURGING?

Cereal harvests have doubled since the 2000s,

but the paper's abstract says nothing about food, and yields do not follow the season year to year

The abstract says nothing about crops or food `[1 Abstract]`. Estonia's official statistics show a real rise in cereals, with its roots in farming and policy `[8]` `[9]`.

Estonia's cereal harvest, 1980–2026



Statistics Estonia, table PM0281, cereals for grain, whole country `[8]`; open data under CC BY-SA 4.0, so this chart, drawn by Fact-Checked Science, is CC BY-SA 4.0 too. "The data for 2026 are preliminary. The data on production in 2026 are preliminary estimates that are based on expert assessments." `[8]`

CEREAL PRODUCTION, A YEAR

OUR ANALYSIS

0.69 → 1.32 Mt

average of 2000–2009 against 2016–2025, million tonnes, from the yearly figures `[8]`

CEREAL YIELD, TONNES A HECTARE

OUR ANALYSIS

2.39 → 3.71

averages over the same years; 4.65 in 2026, a record, on the preliminary estimate `[8]`

POTATOES, A YEAR

OUR ANALYSIS

226 → 86 kt

averages over the same years, thousand tonnes: not all food rose `[8]`

What drove the rise

Writing in 2009, Viira and colleagues describe three phases after 1988: production "decreased rapidly" until 1995, "the decline stabilised" in 1995–2001, and "From 2001 onwards, the positive effects of the EU pre-accession period and EU membership can be observed" `[9 Abstract]`.

They tie the early post-accession rise, average yields up 27.6% in 2003–2007, to "higher direct payments, which have enabled farmers to use more and better quality inputs", and to investment aid in "up-to-date technology" `[9 p. 298]`. We found no source on what drove the later rise.

OUR ANALYSIS

A rise to the mid-2010s, then a plateau

Most of the doubling came after Viira and colleagues wrote. Five-year averages of production were 0.59 million tonnes in 2001–2005, 0.78 in 2006–2010, 1.10 in 2011–2015, 1.28 in 2016–2020 and 1.35 in 2021–2025 `[8]`.

Since 2015, neither production nor yield shows a trend (Theil–Sen +5,900 tonnes and −16.5 kg a hectare a year, Mann–Kendall $p = 1.00$ for both), so the rise belongs to the decade to the mid-2010s more than to the present; the 2026 harvest is the third largest, on the preliminary estimate `[8]`.

OUR ANALYSIS

Yields and the season, year to year

We set Estonia's cereal yield for 1992–2025, with its upward trend of 85 kg a hectare a year removed, against our 11-station season length. The correlation is −0.06 over 33 years; with the season's start it is +0.19 and with its end +0.04, none of them distinguishable from zero `[8]` `[4]`. Years with longer seasons did not bring better harvests.

This is a screening, not an attribution: it cannot rule out a slow contribution of the warming to the long-term rise in yields.

A longer season is not automatically more growth

Among the paper's 43 references `[3]` are two that make the point. In projections for Central and Southeast European forests, a longer season offsets summer drought only until "a tipping point in the 2040s–2050s", and at drier sites it cannot make up for slower summer growth, though humid coniferous forests grow faster under high emissions `[23 Abstract]`; and an earlier start "is often accompanied by false spring (FS) events", frosts after the season has begun `[24 Abstract]`. How the paper uses them, we could not read.

"Northern Russia and Canada"

After the Soviet collapse, 31 million hectares of cropland were abandoned in European Russia, Ukraine and Belarus by 2009, at the highest rates in European Russia `[10 Abstract]`. We did not check Canada or Russia's recent harvests. On October 22 the episode's "overall more food" from global greening was rated Overstated in our check of an Arctic greening study. That sentence claimed a consequence of greening, which had some basis but was overstated; this one states a trend that holds for Estonia's cereals but implies a link to the season that the evidence does not show.

6 · DOES ESTONIA CARE LESS?

Estonians are the EU's least worried about climate change, but their state has a 2050 goal and a climate act sent to parliament in May

The aside is about public opinion and politics, not about the paper, whose abstract says nothing on either `[2 00:00:44–00:00:53]` `[1 Abstract]`.

Estonia in the EU's climate surveys

SURVEY	QUESTION	ESTONIA	EU
2025, Special Eurobarometer 565	**Climate change a serious problem (very or fairly)**	**60% (15% very)**	**85% (37% very)**
2025, Special Eurobarometer 565	**Support the EU's goal of climate neutrality by 2050**	**46% (41% oppose)**	**81% (14% oppose)**
2023, Special Eurobarometer 538	Climate change "a very serious problem" (7–10 on a scale of 1–10)	45%, 18 points fewer than in 2021	77%
2023, Special Eurobarometer 538	Agree with a climate-neutral EU economy by 2050	71%	88%
2021, Special Eurobarometer 513	Climate change a very serious problem	63%	78%
2021, Special Eurobarometer 513	Agree with a climate-neutral EU economy by 2050	89%	90%

2025: from the survey's Estonia factsheet, whose figures are in its charts; in the survey report's country tables both Estonian shares are the lowest of the 27 member states `[5]`. 2023: face-to-face interviews `[25]`; 2021: online, and the questions and scales differ from survey to survey, so the waves are not strictly comparable `[26]`.

CARBON DIOXIDE, WITHOUT LAND USE

17.8 → 8.1 Mt

Estonia's emissions in 2018 and 2024 `[7]`

ELECTRICITY FROM FOSSIL FUELS

10.3 → 2.4 TWh

in 2018 and 2024 `[7]`

GREENHOUSE GASES PER PERSON

15.1 → 7.5 t

of carbon dioxide equivalent, without land use, in 2018 and 2024 `[7]`

The state's targets

On May 21, 2026, "The Estonian government approved the Climate Resilient Economy Act during its Thursday session, advancing the legislation to the Riigikogu to establish a roadmap for phasing out fossil fuels and ensuring national security." The act sets interim national targets for 2030, 2035 and 2040; "The goal of climate neutrality by 2050 was already established by a 2021 Riigikogu decision." `[6]`

OUR ANALYSIS

Why Context

It is an aside, and its core is borne out: Estonians are less worried about climate change than other Europeans, and fewer of them back the EU's goal. But "a major stink" is a matter of politics, and on that score the country has a 2050 goal set by its parliament and a climate act sent to parliament in May 2026; meanwhile its emissions more than halved in six years, as electricity from fossil fuels fell by three-quarters. Nothing in the paper's abstract touches any of it.

7 · REPEAT OUR RE-RUN

Three scripts and public data, in under a minute

Everything tagged "Our analysis" in sections 3 to 5 comes from these files. They use

Python's standard library only.

PY **gsl_rerun.py**
Downloads 12 station files from NOAA's GHCN-Daily (about 6 MB), dates the growing season at 11 stations for 1965–2025 and at seven for 1926–2025, and computes the trends, the dependence on the years chosen and the check against true daily means · 18 KB

JSON **gsl-rerun-numbers.json**
Its output from our run of October 26, 2026: every station's seasons and trends, the network series and the century check · 79 KB

PY **yield_vs_gsl.py**
The check of cereal yields against the season, year to year · 4 KB

PY **crops_summary.py**
Estonia's cereal statistics as given in section 5; with `--fetch` it first downloads a fresh copy from Statistics Estonia · 7 KB

CSV **estonia-crops.csv**
Statistics Estonia, PM0281, whole country, ten crops and land uses, 1980–2026; CC BY-SA 4.0 [8] · 79 KB

Run it

In an empty folder: `python3 gsl_rerun.py`, then, with `estonia-crops.csv` beside them, `python3 yield_vs_gsl.py` and `python3 crops_summary.py`. The first script prints each station file's SHA-256 and says whether it is the file we used; NOAA updates the files daily, but values for 1965–2025 change only if NOAA revises past data.

Credit and terms

Station data: NOAA's GHCN-Daily, which holds the maximum and minimum series mostly from ECA&D [4][13]. NOAA's documentation says some non-US data are exchanged under WMO Resolution 40, are meant for research, education and other non-commercial use, and that "the data or any derived product shall not be provided to other users or be used for the re-export of commercial services" [4]. Crop data: Statistics Estonia, CC BY-SA 4.0 [8].

8 · LIMITS

Where this check could be wrong

We read only the abstract

Everything the paper says beyond its abstract is unknown to us, including whether it discusses farming, which definition gives the 4.3 days a decade and how its trends were tested [3].

Single stations are fragile

Two versions of the same station's daily means, differing by about 1 °C from day to day, change single-station trends two-or threefold (section 4); averages over many stations are steadier, though we tested the approximation at two stations only.

Polls change, and so do their questions

The three surveys, of 2021 [26], 2023 [25] and 2025 [5], asked differently and, in Estonia, by different methods; the 2025 values come from the factsheet's charts.

Our re-run is not the paper's

Eleven stations rather than its 15; the average of maximum and minimum, from ECA&D via NOAA, rather than the daily means the paper used; and no homogenisation [4]. It checks the size and pattern of the paper's result, not its exact numbers.

Food: a screening, not an attribution

Yields not following the season from year to year does not exclude a slow climate effect on the long-term rise; we did not check Canada or Russia's recent harvests, and the 2026 harvest is a preliminary estimate [8].

What would change these verdicts

01
The full text discussing crops or food, or reporting a change of about a week: claims 2 and 3 could move.

02
The paper's methods or tables showing that the 4.3 days a decade rests on one definition, a few stations or an unusual choice of years: claims 4 and 5 could move.

03
A homogenised national record giving a much smaller lengthening than ours and the paper's: claim 4 could move.

If you have the paper, or see a mistake, tell us through the correction form below; with the full text in hand we will revise this page.

Sources

Bracketed numbers refer to this list. For the paper [1] we could read only the abstract its publisher deposited with Crossref [3], so Abstract is the only locator into it. For the episode [2], times are positions in the video (hours:minutes:seconds), from the first to the last transcript line of each quotation. For the other sources, p. gives a page and Abstract names the part of a source we quote; where only an abstract was read, the entry says so. Years are those of the printed issue where there is one, otherwise of online publication. Links checked October 26, 2026.

1 Saue, T. (2026). Changes in Thermal Growing-Season Characteristics in Estonia During 1965–2025: Regional Variability and Methodological Sensitivity. *International Journal of Climatology*, e70638. Published online October 24, 2026 (received June 22, accepted October 12). Peer reviewed; under Wiley's standard terms of use and, according to OpenAlex [16], free to read on the publisher's site but under no open licence, so no figure of it is redrawn. We could not read it: Wiley's site met our tools and a real browser with a bot check, which we did not try to get past, and we found no other copy. Abstract only, as the publisher deposited it with Crossref [3], quoted on this page.

2 SpaceWeatherNews (S0) (October 26, 2026). Galactic Magnetic Reversal Flipping Earth Field | S0 News Oct.26.2026. YouTube video, https://www.youtube.com/watch?v=n5rwUyx_AHA. Quoted from the automatically generated transcript; times are positions in the video. The label "Longer Growing Season" is the episode's own, on its link to the paper in the video's description.

3 Crossref. Metadata record for doi:10.1002/joc.70638. Retrieved October 26, 2026: the abstract deposited by the publisher, which we quote; received June 22, accepted October 12 and published October 24, 2026; article e70638; 43 references; funded by the Estonian Research Council (Eesti Teadusagentuur), award PA1-KSV-KIPPER (RITA-AGROMET2); Wiley's terms of use for the version of record.

4 Menne, M. J., Durre, I., Vose, R. S., Gleason, B. E., and Houston, T. G. (2012). An overview of the Global Historical Climatology Network-Daily database. *Journal of Atmospheric and Oceanic Technology* 29(7), 897–910. Cited as the data set's reference paper, not read. With the data: NOAA National Centers for Environmental Information, GHCN-Daily, version 3.35, station files for 12 Estonian stations fetched October 26, 2026, which we re-ran; their maximum and minimum temperatures come mostly from ECA&D (source flag E), while Tartu-Tõravere's until 1964 are flagged as government-supplied data (G). NOAA's dataset record warns that the data "have not been homogenized", and its documentation that some non-US data are exchanged under World Meteorological Organization Resolution 40, which lets countries restrict their use or re-export for commercial purposes, that they are meant for research, education and other non-commercial use, and that "For non-U.S. locations data, the data or any derived product shall not be provided to other users or be used for the re-export of commercial services."

5 European Commission (2025). Special Eurobarometer 565: Climate change. Fieldwork February 18–March 16, 2025 (in Estonia February 18–March 10, 1,006 interviews). We read Estonia's country factsheet, whose figures are in its charts, and the survey report's country tables for the questions on how serious climate change is and on climate neutrality by 2050.

6 ERR News (May 21, 2026). Estonian government approves Climate Resilient Economy Act. Read October 26, 2026.

7 Statistics Estonia. KK80: Environmental pressure indicators. Read through Statistics Estonia's open-data interface on October 26, 2026: carbon dioxide and greenhouse-gas emissions without land use, and electricity from fossil fuels, 2018 and 2024. Open data, CC BY-SA 4.0.

8 Statistics Estonia. PM0281: Agricultural land and crops by county. Latest update September 30, 2026; whole country, read through Statistics Estonia's open-data interface on October 26, 2026. "The data for 2026 are preliminary." Open data, CC BY-SA 4.0.

9 Viira, A.-H., Põder, A., and Värnik, R. (2009). 20 years of transition – institutional reforms and the adaptation of production in Estonian agriculture. *Agrarwirtschaft* 58(7), 294–303. We read the full text in AgEcon Search; p. gives its page.

10 Schierhorn, F., Müller, D., Beringer, T., Prishchepov, A. V., Kuemmerle, T., and Balmann, A. (2013). Post-Soviet cropland abandonment and carbon sequestration in European Russia, Ukraine, and Belarus. *Global Biogeochemical Cycles* 27(4), 1175–1185. Abstract only, as deposited with Crossref.

11 Aalto, J., Pirinen, P., Kauppi, P. E., Rantanen, M., Lussana, C., Lyytikäinen-Saarenmaa, P., and Gregow, H. (2022). High-resolution analysis of observed thermal growing season variability over northern Europe. *Climate Dynamics* 58(5–6), 1477–1493. CC BY 4.0. Abstract only, as deposited with Crossref.

12 Cornes, R. C., van der Schrier, G., and Squintu, A. A. (2019). A reappraisal of the thermal growing season length across Europe. *International Journal of Climatology* 39(3), 1787–1795. Abstract only, as deposited with Crossref.

13 Klein Tank, A. M. G., Wijngaard, J. B., Können, G. P., Böhm, R., Demarée, G., Gocheva, A., et al. (2002). Daily dataset of 20th-century surface air temperature and precipitation series for the European Climate Assessment. *International Journal of Climatology* 22(12), 1441–1453. The reference paper of the European Climate Assessment & Dataset (ECA&D), the source of the daily maximum and minimum temperatures in our re-run; cited, not read.

14 Miś, F., and Tomczyk, A. M. (2025). Spatial and temporal differentiation of the thermal growing season in central and northern Europe. *Theoretical and Applied Climatology* 156(2), 137. Abstract only, from the publisher's page.

15 Walther, A., and Linderholm, H. W. (2006). A comparison of growing season indices for the Greater Baltic Area.

16 OpenAlex. Work W7223463844. Retrieved October 26, 2026: free to read at the publisher ("bronze" open

International Journal of Biometeorology 51, 107–118. Abstract only, from the publisher's page.

access) with no licence, no copy in any repository, and the author's affiliation.

17 Expert Team on Climate Change Detection and Indices (ETCCDI). Climate change indices: definitions of the 27 core indices. Read October 26, 2026. The definition of growing season length (GSL) used by the paper and by our re-run.

18 Saue, T. (2026). Compound growing-season climate-event indices for Estonia, 1965–2024 (data set). Zenodo. CC BY 4.0. We read its description through DataCite, Zenodo having refused our requests, for its note on access to the Estonian Environment Agency's station data.

19 Jaagus, J., Sepp, M., Tamm, T., Järvet, A., and Mõisja, K. (2017). Trends and regime shifts in climatic conditions and river runoff in Estonia during 1951–2015. *Earth System Dynamics* 8(4), 963–976. CC BY 3.0. Abstract only, as deposited with Crossref.

20 Carter, T. R. (1998). Changes in the thermal growing season in Nordic countries during the past century and prospects for the future. *Agricultural and Food Science in Finland* 7(2), 161–179. Abstract only, as deposited with Crossref.

21 Linderholm, H. W., Walther, A., and Chen, D. (2008). Twentieth-century trends in the thermal growing season in the Greater Baltic Area. *Climatic Change* 87, 405–419. Abstract only, from the publisher's page.

22 Saue, T. (2026). Reference climate periods shape estimates of spring onset trends: evidence from Estonia. *International Journal of Biometeorology* 70(5), 162. The same author's earlier paper. Abstract only, from the publisher's page.

23 Tumajer, J., Kašpar, J., Altman, J., Altmanová, N., Camarero, J. J., Cienciala, E., Čada, V., Čihák, T., Doležal, J., Fibich, P., et al. (2025). Longer growing seasons will not offset growth loss in drought-prone temperate forests of Central-Southeast Europe. *Nature Communications* 16, 9535. CC BY 4.0. One of the paper's references. Abstract only, as deposited with Crossref.

24 Klimavičius, L., and Rimkus, E. (2025). Future projections of false spring events in the eastern part of the Baltic Sea region. *Baltica*, p. 160. One of the paper's references. Abstract only, as deposited with Crossref.

25 European Commission (2023). Special Eurobarometer 538: Climate change. Estonia, country factsheet. Fieldwork May 11–31, 2023, face to face, 1,005 interviews in Estonia. We read it in full.

26 European Commission (2021). Special Eurobarometer 513: Climate change. Estonia, country factsheet. Fieldwork March 16–31, 2021, online in Estonia, 1,019 interviews. We read it in full.

METHOD

How this was checked

On October 26, 2026, we tried every route the site allows to the paper's text: the episode's link, the DOI and the publisher's PDF links, through our tools and in a real browser; Crossref, OpenAlex, Europe PMC and Semantic Scholar; Zenodo and DataCite, where the author deposits data; ETIS, Estonia's research information system; and web searches. Wiley's site met our tools and our browser with a bot check, which we did not try to get past, and we found no other copy. So the page rests on the abstract the publisher deposited with Crossref and the Crossref and OpenAlex records [3][16]; the episode's automatically generated transcript; 12 papers on growing seasons, Estonia's climate and farming and post-Soviet land use (one read in full, 11 as abstracts), and the two reference papers of the station data, cited but not read; NOAA's record and documentation for those data; Statistics Estonia's crop and emissions tables; three Eurobarometer surveys; an ERR News report; the ETCCDI definitions; and our own re-run of public station records: about 200 numbers, quotations and statements in all. Every quotation was checked word for word against its saved source; the publishers' hyphen characters are printed as ordinary hyphens.

The verdicts and the items tagged "Our analysis" are our own assessment, built on the cited sources. They include every number from our re-run: the season's length, start and end at 11 stations in 1965–2025, its trends and how they depend on the years chosen, the check of the daily-mean approximation against true daily means, and the 1926–2025 check at seven stations; the correlation of Estonia's cereal yields with the season; the arithmetic that turns the paper's rate into a total; and our reading of what the abstract does and does not say.

We dated the season ourselves, by the ETCCDI definition, from NOAA's GHCN-Daily station files [4], with our own code, which is on this page with its output; it fetches its inputs from NOAA. The crop figures are Statistics Estonia's, summarised by a script also on this page with its input file. Nothing from the paper itself could be recomputed: its station list and methods are in the text we could not read (its station data are probably the Estonian Environment Agency's, which the author's other 2026 data sets say are available on request), and no figure of it is redrawn. A fresh reviewer then read the built page against its sources and re-ran our three scripts, which reproduced. The review led us to correct our account of the daily-mean test (the two series agree on average but differ by about 1 °C from day to day, which is what moves single seasons), to limit what the page says about the paper to what its abstract says, to mark the paper's data source as our inference, and to add that Estonia's cereal harvests have shown no trend since 2015, with smaller fixes to wording and citations; no verdict changed.

This page was researched and written with Claude, an AI assistant made by Anthropic, and then re-checked against its sources in a separate verification pass.

The verdicts on this page

MISLEADING	Contains something true but leaves a false impression, usually by leaving out key context.
MISREAD	Cites a real source but gets wrong what it says.
TRUE	The evidence supports the claim.
CONTEXT	A question or aside rather than a claim. We add the facts it leaves out.

All ten verdicts, and how we check

CORRECTIONS

Corrections and changes

If we get something wrong, we fix it and record the change below with the date. If a correction changes a verdict, the log says what the old verdict was.

Change log

Oct 26, 2026	Published on factchecked.science after a full check against the sources. Built from the paper's abstract and its bibliographic records, because its text sits behind the publisher's bot check, together with the episode's transcript, the literature on growing seasons, Statistics Estonia's data, three Eurobarometer surveys and our own re-run of public station records; nothing from the paper is reproduced beyond quotations from its abstract. Before publication, a fresh review against the sources corrected our account of the daily-mean test, limited what the page says about the paper to its abstract and added the plateau in cereal harvests since 2015; no verdict changed.