



— CROP ROTATION ANALYSIS · ROMANIA · 2017-2025

Winter Oilseed Rape Rotation & Failed Establishment

Where and when Romania sows winter rape, what it grows immediately before and after, and what replaces autumn-drilled rape that fails to establish — from annual 10 m field-level crop maps.

VERSION 2026.06

DATE 22 June 2026

COVERAGE 42 counties · 9.16 M fields · 9 years

MODEL my_ecrop_50M_mlp_v2 (R0 acc 0.86 · rape F1 0.92)

CLASSIFICATION Internal — DigiFarm

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Executive summary

Where/when. Romania grows winter oilseed rape (WOSR) mainly across the southern Danube plain and the western counties. Mapped WOSR area tracks official Eurostat area at $r = 0.964$ across 2017–2025 — reproducing the autumn-2018 collapse (2019 harvest), the 2023 peak, and the 2024 dip.

Rotation. WOSR sits in a classic cereal break-crop slot: **91% of the area before it is winter cereal** (Wheat 77%, Barley 14%); **60% of the area after it returns to wheat** (then maize 17%, barley 11%, sunflower 6%). Continuous rape is rare (**2.87%**). The dominant sequence is **Wheat → WOSR → Wheat** (2.78 M ha).

Failed establishment. **2019 is the clear #1 failure year** — on rape-prone fields the spring-crop share rose +0.11 above its multi-year median (~0.25 M ha upper bound) while WOSR dipped, matching the autumn-2018 drought that forced re-sowing to **maize and sunflower**. 2024 shows an area drop *without* a spring spike — farmers planting less rape pre-emptively, a distinct mode the proxy separates.

01 What this is built on

Annual 10 m crop-type maps (`my_ecrop_50M_mlp_v2`) classified per field for Romania, harvest years **2017–2025**. The unit is the field: one fixed boundary set is reused every year, so each field keeps its identity and its 9-year crop sequence is a clean per-field record. Of 15.31 M bounding-box polygons, **9.16 M fall within Romanian NUTS3 territory** and are used here; **6.15 M (40%) are cross-border leakage** (parcels in the RO bbox but physically in Bulgaria/Serbia/Hungary/Moldova) and are excluded by point-in-polygon.

WOSR = Rapeseed = HCAT 1430 (Romanian rapeseed is ~96–99.7% winter rape). **Timing:** a field mapped Rapeseed in harvest-year Y was drilled in **autumn $Y-1$** , so "before" = $Y-1$ and "after" = $Y+1$. All nine years were regenerated against one v7 boundary set before analysis (the raw inputs were vintage-split across two non-overlapping field-ID spaces).

02 Where & when Romania grows winter rape

Harvest yr	2017	2018	2019	2020	2021	2022	2023	2024	2025
Mapped WOSR (kha)	1001	1056	430	562	819	825	1209	785	1330
Mapped share of arable (%)	10.6	11.0	4.5	5.6	8.0	8.1	11.8	7.9	13.8
Eurostat area (kha)	598	633	353	363	446	469	641	522	788

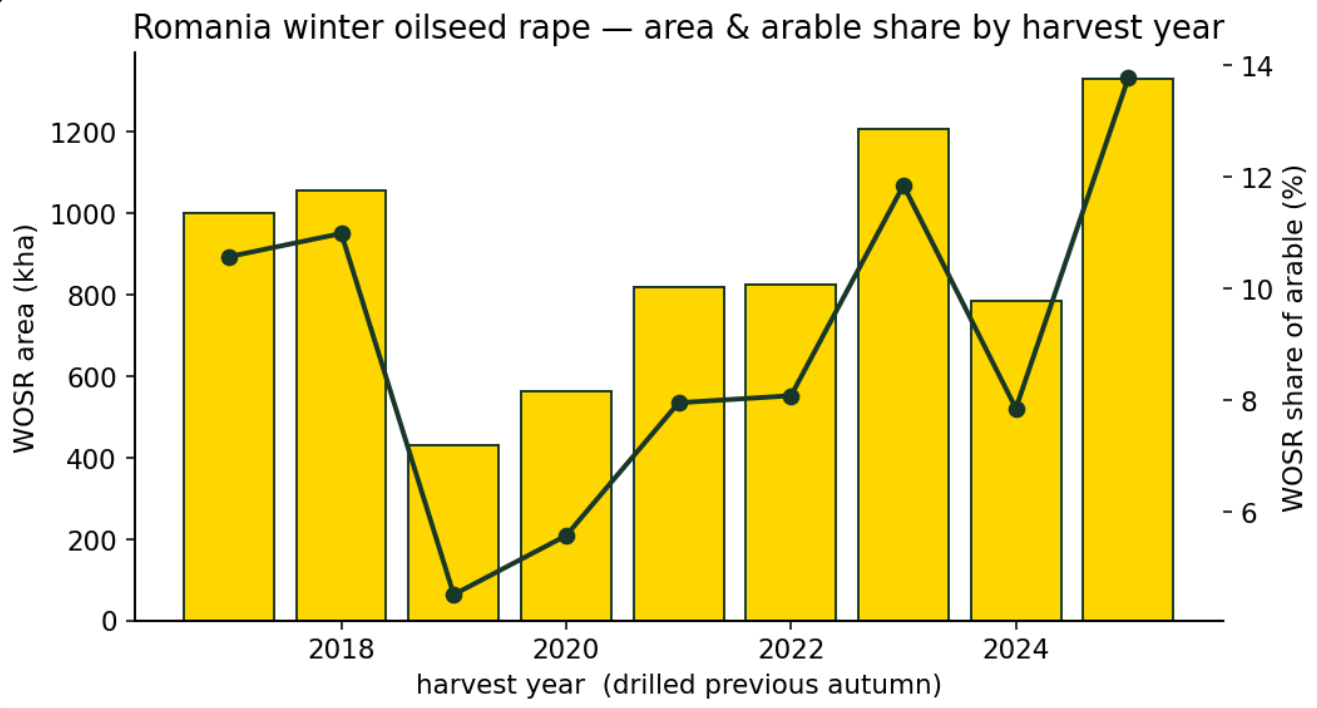


Figure 1 — National WOSR area (bars) and share of arable (line) by harvest year. Mapped-vs-Eurostat correlation $r = 0.964$; the 2019 collapse and 2023/2025 peaks are reproduced. Absolute mapped area runs $\sim 1.7\text{--}2\times$ the official survey (commission error + per-field area proxy) — read levels as indicative, shape as reliable.

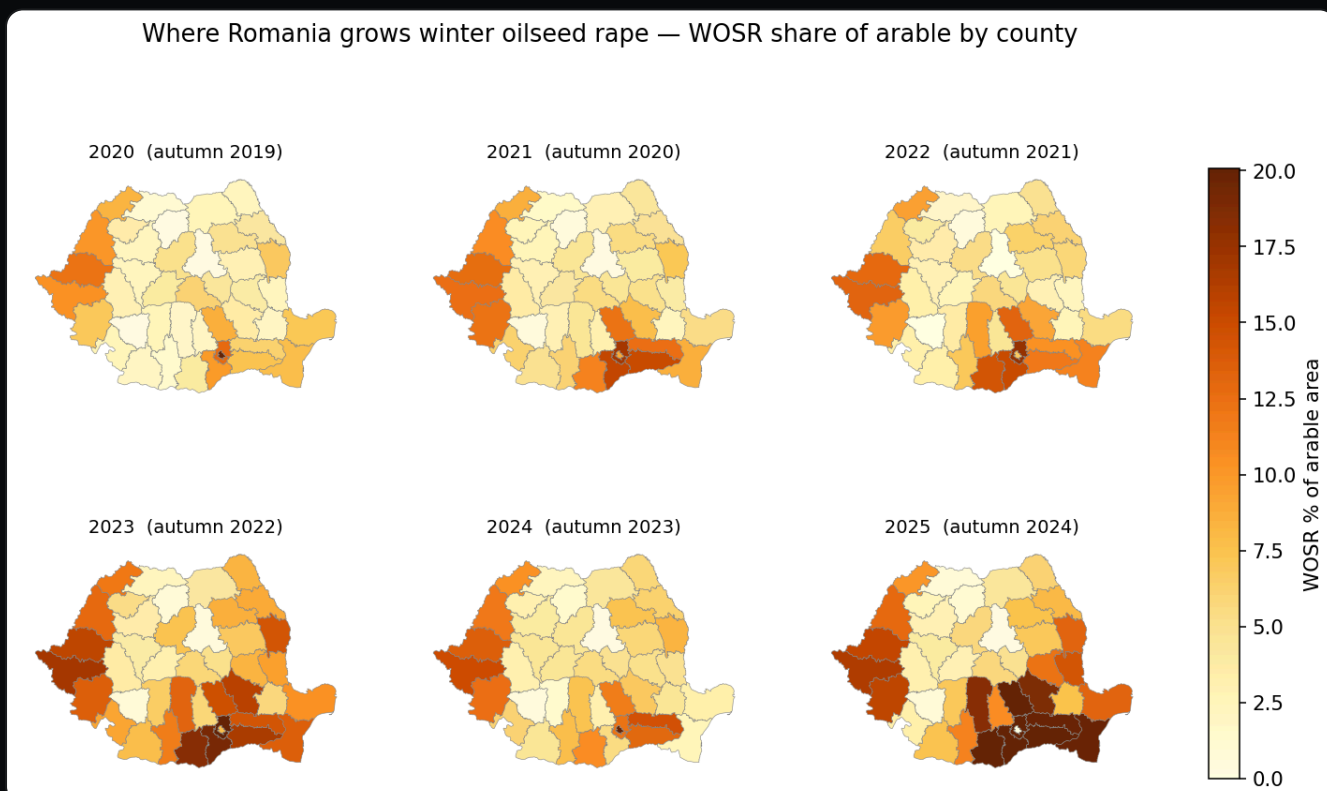


Figure 5 — WOSR share of arable by county (NUTS3), 2020–2025. Rape concentrates in the southern Danube plain and the west; the Carpathian belt grows little. The 2024 panel (autumn 2023) is visibly lighter — the area reduction after the dry 2023 sowing.

03 What comes before and after winter rape

WOSR must be drilled in August–September, so it follows an early-harvested winter cereal; it is itself harvested early and is a textbook break crop before winter wheat. The data show exactly this.

Before WOSR (share of WOSR-field area): Wheat **77%**, Barley **14%** (→ 91% cereal), Maize 3%. **After WOSR**: Wheat **60%**, Maize **17%**, Barley **11%**, Sunflower **6%**. **Continuous rape (WOSR→WOSR)**: **2.87%** — rare, consistent with clubroot/sclerotinia avoidance.

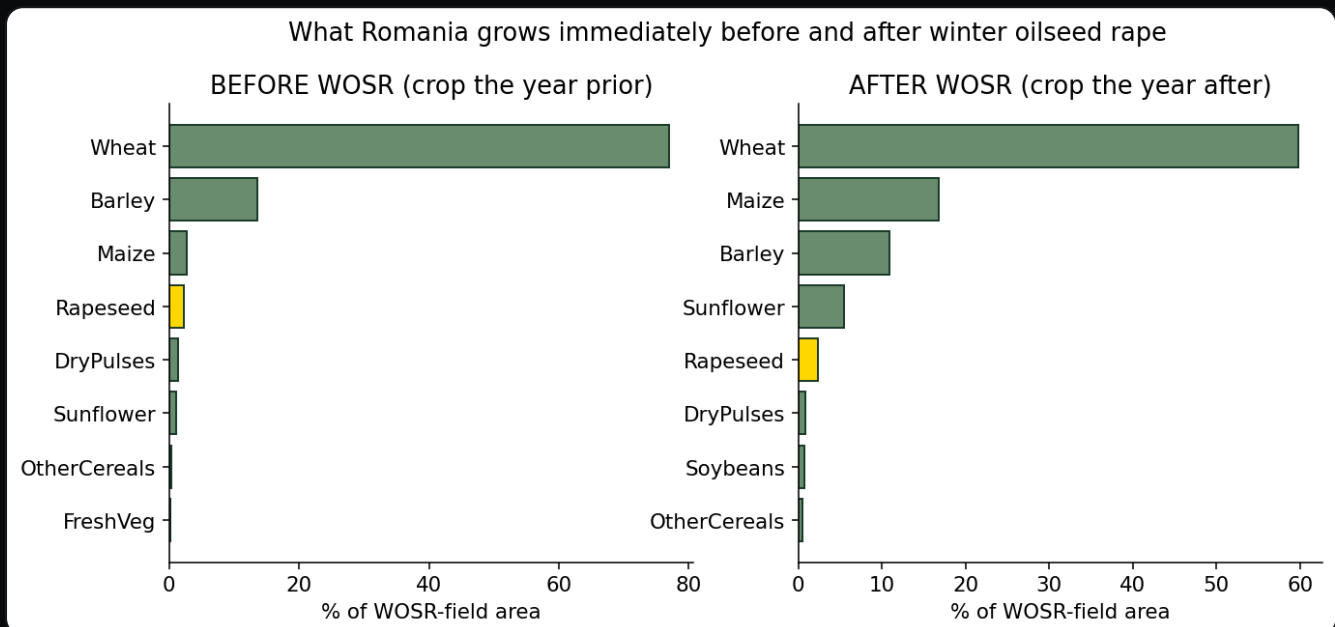


Figure 2 — Crop the year before (left) vs the year after (right) winter rape. Before is dominated by winter cereals; after returns mostly to wheat, with maize/barley/sunflower making up the rest.

The single dominant three-year sequence is **Wheat → WOSR → Wheat (2.78 M ha)**, followed by Wheat→WOSR→Maize (0.78 M ha), Wheat→WOSR→Barley (0.40 M ha) and Barley→WOSR→Wheat (0.38 M ha).

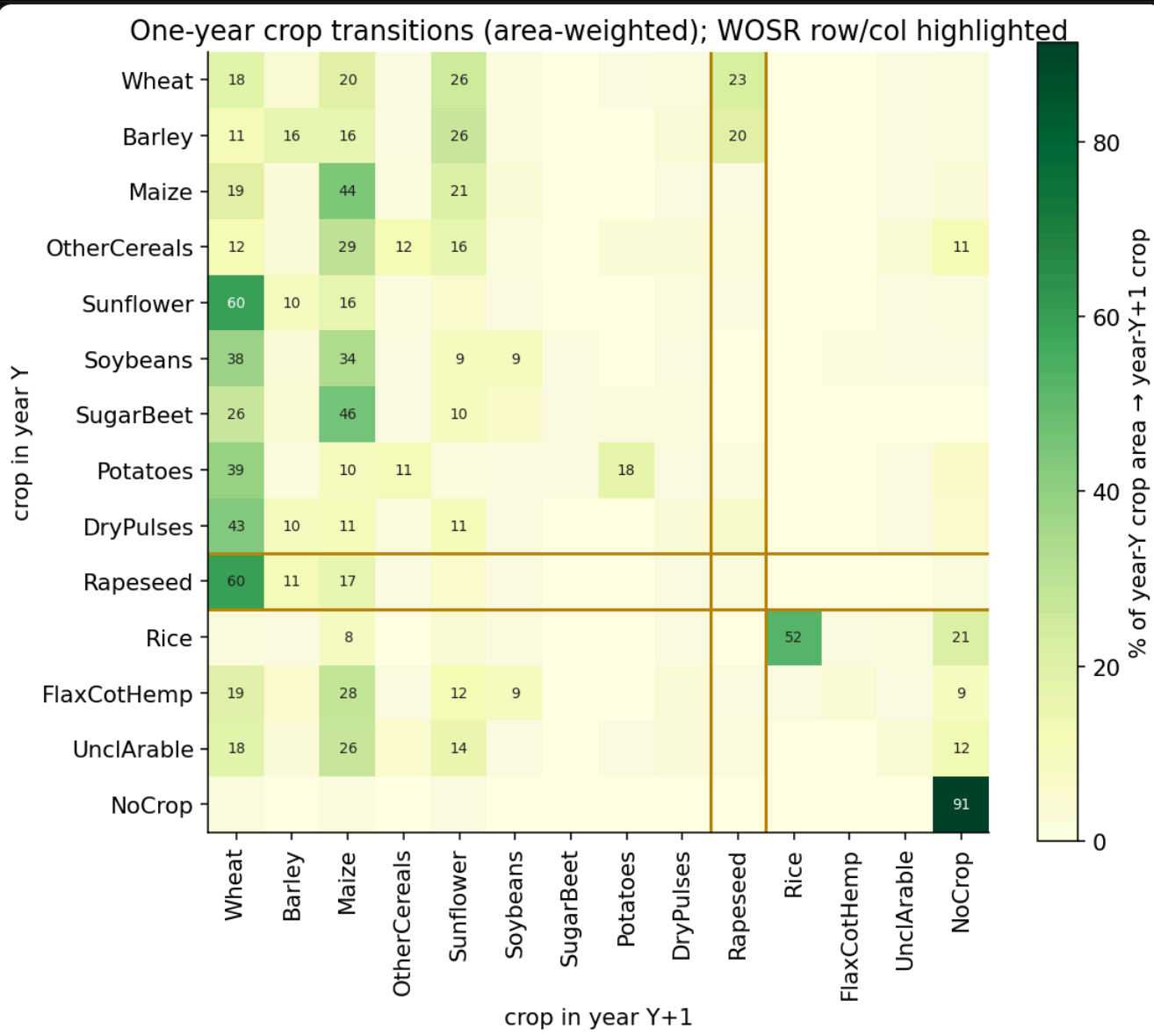


Figure 3 — One-year crop transition matrix (area-weighted, % of each year-Y crop going to each year-Y+1 crop). The WOSR row and column are highlighted; the strong WOSR→Wheat cell and Wheat/Barley→WOSR cells are the break-crop signature.

04 Autumn rape that failed to establish

The annual map shows the crop that **actually grew and was harvested**. If winter rape is drilled, fails (winterkill/drought), and is re-sown in spring, the map shows the **replacement crop**, not rape — so failed rape is only visible *indirectly*, as a spring crop where rape was expected. (Re-sowing to *spring* rape still scores as Rapeseed and is invisible.) The results below are **upper bounds**, not per-field confirmation.

Method. On WOSR-prone fields (rape in ≥ 2 of 9 years; 174k fields, 2.27 M ha) we track the spring/summer-crop share each year against the field-set's multi-year median. A year where spring share rises above median while WOSR dips is a candidate failed-establishment year.

Harvest yr	WOSR on prone fields	Spring-crop share	Spring excess vs median	Failed-area (ha, upper bound)
2019	16.3%	37.3%	+0.111	252,485
2020	20.0%	33.3%	+0.071	161,436
2017	26.7%	33.0%	+0.068	154,170
2021	28.7%	30.0%	+0.038	86,054
2022–2025	—	≤24%	≤0	0

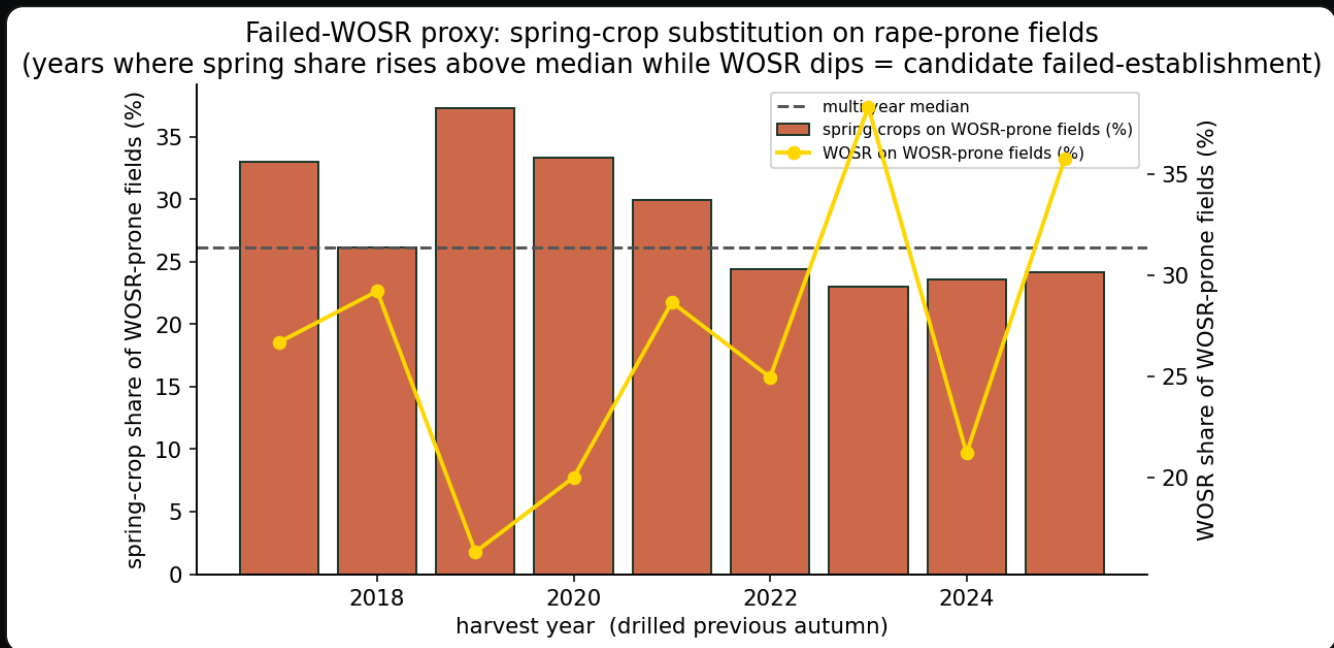


Figure 4 — Spring-crop share (bars) vs WOSR share (line) on rape-prone fields, by harvest year. 2019 shows the failed-establishment signature: spring share above the multi-year median while WOSR dips. 2024's WOSR dips with no spring rise — a different mode (reduced planting, not drill-then-fail).

Cross-reference. Independent records (USDA FAS GAIN, JRC MARS, Eurostat, Argus) put the failure years at **autumn 2018 (→2019)** — exceptional drought, "replanted with barley, corn, and sunflower" — and **autumn 2023 (→2024)**, the most extreme, ~70% un-emerged by late October, area ~30%. Our proxy nails **2019 as #1**. 2024 does *not* spike, but its WOSR area *did* drop (§2): the absence of a spring-substitution signal means the 2024 reduction was farmers **drilling less rape / switching to winter wheat pre-emptively**, not drill-then-fail-then-respring. The proxy thus distinguishes *establishment failure with spring re-sow* (2019) from *pre-emptive area reduction* (2024). A sub-annual Sentinel-2 autumn-canopy detector (phase 2) would resolve this per-field.



05 Caveats

Labels are model predictions. Absolute WOSR area is ~2× the official survey (commission error + area proxy); year-to-year **shape** is validated ($r = 0.964$), **levels** are indicative. The class does not split winter vs spring rape, so spring-rape re-sow of a failed winter crop is invisible. Spring barley is not separable from winter barley, so barley is excluded from the unambiguous spring set in §4 (conservative). 40% of bbox polygons are cross-border and excluded — all figures are within-RO territory. The §4 proxy reports upper bounds and cannot confirm failure on any individual field.

Evidence sources: 59 attributed citations in the companion evidence brief (Eurostat, FAOSTAT, USDA FAS GAIN, JRC MARS, Argus). Phase-2 Sentinel-2 autumn-establishment detector specified separately.