



Analysis of the JRC report on pesticide mirror measures

Key findings and advocacy implications

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It seeks to transform the current, deeply unsustainable economic model with a commitment to social justice and respect for planetary boundaries.

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Background

Following political commitments at the highest level of the Commission to adopt mirror measures on pesticides, a concrete proposal is currently under discussion as part of the Feed and Food Omnibus package.

The Joint Research Centre (JRC), the European Commission's science and knowledge service, published an in-depth report on mirror measures concerning pesticides this summer. The JRC report primarily approaches the issue from the perspective of regulatory reciprocity and a level playing field for European farmers. It therefore focuses mainly on the economic feasibility of strengthening import requirements for residues of banned pesticides and on the consequences for trade, prices, and competitiveness.

This framing (which echoes that of the Commission) tends to present the recent political momentum as a response to farmers' concerns, even though the issue of maximum residue levels (MRLs) for authorised and banned pesticides has long been raised by civil society organisations on environmental and public-health grounds, as well as to improve the consistency of EU policies. It is therefore important to reassert these challenges in this debate now that the JRC has provided key evidence showing that stronger requirements can be economically manageable. Mirror measures should not be reduced to a mere instrument of agricultural protection or competitiveness: their environmental and public-health objectives—which fall outside the scope of the JRC's economic assessment—must be brought back to the centre of the debate. All the more so since, under WTO law, only environmental and public-health grounds can be invoked as justification — concerns about a level playing field in production conditions are not accepted.

As regards the economic study, the assumptions, scenarios, and results provide valuable insights for advancing implementation of the proposal included in the Feed and Food Omnibus. Mechanically, if import flows decline and exporters face additional adaptation costs, consumer prices in the EU will rise to some extent. The key question is the magnitude of this increase. According to its authors, the JRC study provides orders of magnitude rather than forecasts¹. Understanding this work is important in order to know how best to use it and to respond to attempts by stakeholders who might highlight the estimated largest price increases to challenge this mirror measure. A discussion grounded in precise data is all the more necessary given the strong pressure being exerted against this proposal, including from third countries².

To begin with, the impact assessment only examines the proposal to lower residue limits to the limit of quantification—LOQ, or “technical zero”—for the 18 most hazardous active substances. This level of ambition is considerably lower than measures advocated by our organisations (see annex 1) or even by the current Irish EU presidency³.

The assumption of an abrupt halt in exports to the EU, resulting in a major inflationary economic shock—as modelled in the JRC's first scenario (S1)—is not only unrealistic: legitimising excessively high impact assumptions (S1 and S2) also undermines the prospects for more ambitious policy action (see annex 1). **This note therefore examines and challenges some assumptions and findings of the JRC report to provide evidence and arguments for adopting more ambitious import requirements.**

¹ “This study is not an impact assessment, as it does not cover environmental or social dimensions, and its results should be considered as a range bounding plausible outcomes rather than predicting them”. p 3.

² 19 agricultural exporters (Brazil, Canada, India, Japan, the US, Argentina, Australia, Colombia, Costa Rica, Ecuador, Egypt, Guatemala, Indonesia, Panama, Paraguay, Peru, South Africa, South Korea, Uruguay) sent a joint letter on 18 September 2026 to Commissioners Šefčovič and his agriculture/health counterparts hinting at possible legal action if Brussels doesn't amend this proposal.

³ The Irish presidency's compromise on the food safety omnibus once again proposes, as the final version prepared under the Cypriot presidency did (a suggestion later dropped from subsequent versions), to go further than the list of the 18 most hazardous substances and to also lower to zero the maximum residue levels (MRLs) for pesticides that are toxic to honeybees or pose a risk to groundwater quality. (Contexte 09/09/2026)

Main messages

- **Scenario 1 should not be used as a central forecast, but only as an upper bound.** For country–commodity pairs involving a targeted substance with an EU MRL above the LOQ and evidence of authorisation or residue detection, it applies the shock to the entire trade flow, without scaling exposure to actual use or detection rates. It also assumes that exporters do not adapt at all, which is unrealistic in light of historical examples⁴.
- **The assumptions underpinning S3—which produces a limited inflationary impact—appear more relevant than those used in S2 and more consistent with the initial request to assess the effects of lowering MRLs to the limit of quantification for a small list of substances.** S2 appears to overestimate both the share of trade flows potentially affected and the associated adaptation costs.
- **The significant impacts on the European livestock sector cannot be considered a robust finding.** They occur mainly under S1, while becoming negligible in the two scenarios that allow exporters to adapt.
- Additional historical case studies documenting how exporters have adapted, including potential spillover effects, would help provide a stronger evidence base on adaptation in exporting countries.

Analysis of the report and key questions

→ **The JRC report is highly informative and comprehensive.** It identifies exposure for relevant agricultural products and exporting countries (235 commodities from 86 countries), quantifies associated trade flows, develops impact scenarios, and assesses macroeconomic and trade effects.

→ **The study covers 18 active substances** classified among the most hazardous according to the EU criteria used in the Omnibus proposal and the impact of MRLs set at the limit of quantification. It therefore assesses the least ambitious demand level presented in Annex 1, and it does not examine the effects of the broader measure proposed in the latest compromise.

→ One of the main limitations of the study highlighted by the authors is the **lack of data on the actual use of the identified substances at commodity-country level and on the substitution costs**⁵.

→ **The differences between the results of the JRC scenarios are extremely large.** This applies to both trade flows—EU imports fall by 41% under the no-adaptation scenario (S1), by 8% under the costly-adaptation scenario (S2), and by 0.4% under the easier-adaptation scenario (S3)—and to price impacts, where the differences are of a similar magnitude. Under S1, for example, the reduced availability of certain products would lead to a dramatic 332% increase in consumer coffee prices, meaning that prices would be more than four times their initial level.

Unfortunately, these extreme estimates are sometimes the figures highlighted in the media or in certain analyses. Yet the results depend heavily on what happens inside the model's “black box”, particularly the assumptions made about exporters' ability and willingness to adapt.

4 E.g.: chlorpyrifos (2020), tricyclazole in rice exported from India and Pakistan (2018), or the neonicotinoids clothianidin and thiamethoxam (2026)

5 See “However, it faces limitations notable from the lack of available evidence at active substance-commodity-country level on use and substitution cost. This points to the need for further assessment”. p3.

Analysis of the assumptions underpinning scenarios S1, S2, S3

The methodology used to construct the scenarios is not straightforward, and the assumptions selected can significantly affect the results. Initial comments have mainly focused on the different degrees of exporter adaptation assumed under each scenario, particularly in S1. The adaptation-cost assumptions used in S2 are also open to question.

However, another important variable is the share of exposed trade flows included in each scenario. Because data on the national-level use of these active substances by crop type are lacking, assumptions had to be made. These assumptions also vary across the scenarios and may significantly influence the results⁶. Consequently, the differences between the scenarios do not measure adaptation alone, since the scale of the shock is also changed simultaneously.

The 3 scenarios are therefore built on two simultaneous sets of assumptions: (1) exposure of trade flows and (2) exporter adaptation.

Scenario 1: No-adaptation scenario (346 country-commodity pairs impacted)

1. A country × commodity pair is considered affected where at least one targeted substance has an EU MRL above the LOQ for that commodity and is either authorised for use on that crop in the exporting country or detected in EU imports of that commodity from that country.
2. No adaptation occurs: 100% of the trade flow to the EU stops.

→ **This scenario therefore combines two very strong assumptions:**

1. The assumption concerning the first variable does not correspond precisely to the issue being assessed. Trade flows are identified as 100% exposed based on whether the substance is authorised for use on the crop. The authorisation of an active substance for a crop does not necessarily mean that it is actually used; and its use on a crop does not necessarily result in residues in the final product. In many cases, use of the active substance may leave no residues for various reasons (Annex 1).
2. Exporters will almost always adapt, particularly when the EU represents a large, profitable, solvent and stable market for the exporting country—which is very often the case. This can be shown through concrete examples; see the micro-level analysis below.

→ Could this scenario give an overly pessimistic picture of the likely impacts? The entire trade flow is considered exposed even without residue detections, and exporters are assumed not to adapt. Taken together, these two assumptions seem unrealistic.

⁶ We lack precise data on the extent to which active substances are used for specific country-commodity pairs which would provide a more precise measurement of the share of producers that would be affected by the reduction of MRL to the LOQ". p 31

Scenario 2: SWITCH / EFSA+ / 20% (346 country-commodity pairs impacted)

1. A country × commodity pair remains affected even without recorded residue detections (MRL>LOQ), because the JRC supplements residue-detection data with information on authorisations and imputes an exposure factor. When a substance is authorised for use on a crop but is not detected above the LOQ in residue controls, the JRC assigns the median detection rate for the same type of pesticide in the same broad world region, subject to a minimum exposure rate of 20%. This is a deliberately cautious proxy designed to avoid assuming zero exposure in the absence of detections.
2. Adaptation cost is set at 20%. In both S2 and S3, adaptation is not universal: the model assigns each country–commodity pair either an adaptation or a non-adaptation response, depending on which option is more economically advantageous for the exporting country.

→ This also appears to be a high estimate:

1. The imputed share of affected trade flows is probably overestimated, since a minimum rate of 20% is applied even when the observed detection rate is lower or zero. Moreover, the imputation is made by a broad pesticide category.
2. Applying a systematic adaptation cost of 20% to the affected products appears very high, although costs may vary considerably across active substance × agricultural commodity combinations (see the specific analysis in annex 2).

→ S2 therefore combines two separate cautious assumptions: a 20% floor for the share of trade flows presumed to be affected if substances are approved in the country and a 20% adaptation cost applied to that share. Their combination helps explain why the estimated impacts are substantially greater than under S3.

Scenario 3: SWITCH / EFSA / 5% (87 country-commodity pairs impacted)

1. Exposure is estimated solely based on residues actually detected through EU controls. For each country × commodity pair, the share of trade considered affected corresponds to the detection frequency of the substances concerned. Authorisations for use in the exporting country are not taken into account, and no minimum exposure floor is applied.
2. Adaptation cost is set at 5%.

→ Broadly reasonable

1. The affected trade flows may be somewhat underestimated. A substance that is used may leave residues but remain absent from the detection data because too few samples were analysed or because testing was not specifically targeted at that substance, country, or commodity.
2. The assumption appears broadly consistent as an average. The 5% cost is a lower-bound assumption rather than a precise estimate. The JRC considers that it may represent medium-term adaptation costs once the initial difficulties have been partly overcome.

At this stage, the most consistent assumption appears to lie between S2 and S3, but probably closer to S3. The resulting inflationary impacts of the envisaged import requirement on pesticides would therefore remain limited.

Analysis of the impacts on European production

One chapter of the JRC study examines the impacts on European agricultural production. The results indicate adverse effects on the livestock sector, which could become a powerful argument for dividing the agricultural community between livestock and crop producers.

However, the most pessimistic outcomes are primarily driven by difficulties in sourcing plant proteins and occur under S1—which we already consider unrealistic. This also makes the most pessimistic projections for the livestock sector relatively implausible.

For example: “EU imports of Brazilian soybean meal decrease by 100% under S1—equivalent to 9.525 million tonnes—by 25% under S2 and by 0.1% under S3, depending on the intensity of the shock and the assumed cost of substituting active substances in soybean production.”

The most concerning results for the livestock sector cannot be considered a robust effect of the measure, as they arise mainly from the S1 no-adaptation scenario.

Historical examples of exporter adaptation

The JRC report seeks to answer a forward-looking question: how might exporters respond? Historical precedents can help by showing how exporters responded under similar circumstances.

JRC approach: macro-level, prospective and model-based.

Proposed additional studies: historical case studies, micro-level and qualitative.

In its “Related and future work” section, the JRC explicitly states that ex post analyses of previous reductions of MRLs to the LOQ would help explain how producers and exporters respond, the costs they incur, and the effects on trade and production.

The JRC already conducts such an analysis for chlorpyrifos in apples and citrus fruit. It compares the market shares in which chlorpyrifos was authorised before and after the MRLs were lowered. It finds that countries where the substance was not authorised gained market share in relative terms, while explicitly acknowledging that a causal relationship cannot be established.

Spillover effects: The model essentially assumes that producers change their practices to maintain access to the EU market. However, if an EU requirement subsequently leads the exporting country to amend its own pesticide rules, restrictions or recommendations, the initial cost of complying with EU requirements may gradually develop into a systemic change in agricultural practices. The model does not appear to capture this dynamic.

What can real-world precedents involving MRL reductions tell us about the mechanisms through which third countries adapt? Can these cases provide useful evidence and arguments for advocacy?

The tricyclazole–rice precedent. An initial shock, a shift towards Pakistan, followed by adaptation in India.

The tricyclazole case provides a particularly relevant precedent for testing the JRC’s assumptions about how exporters respond. In 2017, the European Union lowered the MRL for this fungicide in rice from 1 to 0.01 mg/kg—a hundredfold reduction. A transitional period, lasting until 30 December 2017, was granted for basmati rice produced before the regulation entered into force. From that date on, consignments placed on the EU market had to comply with the limit of quantification of 0.01 mg/kg under Regulation (EU) 2017/983.

This case provides concrete evidence of how producers and exporters respond when an MRL is lowered to the LOQ and illustrates an adaptation pathway:

- Short term: a decline in Indian trade flows and a shift towards Pakistan;
- Medium term: controls, producer specialisation, segregation and learning;
- Longer term: changes in recommendations, local restrictions and potential regulatory alignment

The EU requirement contributed to changes not only in the controls applied to final products, but also in pesticide recommendations and the availability of certain pesticides in major producing regions.

Annex 1: Levels of ambition for pesticide mirror measures (from highest to lowest)

Level 1: Full process-based mirror measures covering all substances banned in the EU

This would be the most effective measure from a health and environmental perspective, as it would require the active substance not to be used. However, implementation and enforcement would be more complex, as they would require documenting production practices in third countries.

Outcome: Agricultural products produced using active substances banned in the EU would be prohibited from entering the EU market. This would be comparable to the French safeguard measure concerning dimethoate residues in cherries, or to existing EU mirror measures applying to growth hormones and antibiotic growth promoters in livestock production.

Level 1a: Full process-based mirror measures applying only to the most hazardous substances

Level 2: Lowering MRLs to the limit of quantification for all substances banned in the EU

This measure would be less effective in protecting pesticide users' health and the environment because an active substance may be used on a crop without leaving residues in the final product. This may occur for several reasons: the agricultural product may be protected by a shell, as with hazelnuts; processing may result in no detectable residues, as with sugar; or the active substance may be applied early in the crop cycle, as with pre-emergence herbicides. Residues are more likely to be found from fungicides or insecticides applied late in the crop cycle or during storage, highly systemic substances, or herbicides used at the end of the crop cycle, particularly as desiccants.

This approach is easier to enforce because compliance can be checked by testing the final marketed product, using procedures and control networks that are already in place within the EU.

PAN Europe has identified 88 active substances as not authorised in the EU while still having at least one MRL above the LOQ⁷.

For the first time, MRLs have been lowered to the LOQ for environmental reasons rather than to protect consumer health for two neonicotinoids; the decision was adopted in 2023 and implemented in March 2026. Regulation (EU) 2023/334 concerning clothianidin and thiamethoxam is particularly significant. The Commission explicitly states that it aims to prevent the adverse effects on pollinators associated with EU production from being transferred to production in third countries. It therefore lowered the MRLs to take account of a global environmental concern, even though the previous MRLs had been considered safe for European consumers.

Level 3: Lowering MRLs to the LOQ for only a selection of the most hazardous substances banned in the EU (Omnibus)

→ This is the option assessed in the JRC report.

It covers 18 active substances that are not approved in the European Union and are classified among the most hazardous according to the criteria applied by the JRC. For each substance, at least one MRL remains above the limit of quantification, and its use in a third country is evidenced either by an authorisation or by the detection of residues in imports into the EU.

7 See PAN Europe, List based on banned and restricted active substances included in the Prior Consent Inform (PIC) Regulation, with at least one MRL set on a food item above Limit of Detection/determination (LOD) (88 Active Substances), April 2026. <https://www.pan-europe.info/sites/pan-europe.info/files/public/resources/other/List%20-%20Briefing%20MRLs%20%281%29.pdf>

Annex 2: Analysis of the JRC report's adaptation-cost assumptions

The JRC report assesses the economic effects of lowering the maximum residue levels (MRLs) of 18 active substances banned in the European Union to the limit of quantification (LOQ). The scenarios are based primarily on two assumptions regarding exporters' adaptation costs: 20% in Scenario S2, representing a short-term upper bound, and 5% in Scenario S3, intended to represent easier adaptation over the medium term. In CAPRI, these additional costs are applied to the share of trade flows considered exposed, in the form of additional bilateral trade costs.

Adaptation costs may include more expensive crop-protection alternatives, potential yield or quality losses, additional treatments, and the costs of residue testing, traceability, and segregating compliant production. However, the empirical justification for the 20% upper bound draws on only a limited number of references, primarily a Californian study on alternatives to chlorpyrifos and the JRC's own cyproconazole case study. These examples are used to support a uniform 20% adaptation-cost assumption, which is then applied to the trade flows considered exposed across the affected country–commodity–active substance combinations.

Two methodological issues result in an overestimation of production-cost increases. First, the additional cost of an alternative replacing one specific active substance is treated as an increase in the entire crop-protection cost item, even though the substance concerned generally represents only one component of the overall crop-protection programme. Second, the JRC uses approximately 20% as the share of crop-protection expenditure in total production costs. However, this ratio refers to crop-protection expenditure as a share of crop-specific costs, rather than total production costs. The denominator excludes several major cost components, including depreciation, wages, rent and interest paid. According to footnote 19 and the FADN data, crop-protection expenditure represents only 5.4% of intermediate consumption on average, while intermediate consumption itself accounts for only part of total production costs. The 5.4% average does not, on its own, provide a representative estimate for all the crops and exporting countries concerned.

The authors have acknowledged the validity of both criticisms. They confirm that applying the chlorpyrifos cost multiplier to total crop-protection expenditure overestimates the increase in total costs and that using the 20% ratio tends to amplify the estimate. The same sources of overestimation are applied to the cyproconazole case, despite the availability of numerous chemical alternatives and the very low additional cost in absolute terms. Illustrative calculations using the report's substitution-cost multipliers and alternative assumptions⁸ that appear plausible for arable crops would instead result in an increase in total production costs of approximately 4% for chlorpyrifos and 2% for cyproconazole. These illustrative estimates concern direct substitution costs and are substantially below the increases suggested by the examples used to justify the 20% adaptation-cost assumption.

The estimated 20% difference between organic and conventional production mentioned in the report also appears to point in the same direction, providing a useful order-of-magnitude comparison. Converting to organic production involves a much more fundamental transformation than replacing a single active substance, since it entails discontinuing all synthetic pesticides and fertilisers and therefore represents a major systemic change.

Other adaptation costs may nevertheless arise, including residue testing, certification, traceability, segregation of trade flows, technical support, additional treatments and potential yield losses. Their significance, however, depends heavily on context. Some testing procedures and segregated supply chains are already in place to comply with existing EU MRLs (some stricter than Codex, others already at LOQ).

⁸ If we assume that the treatment involving chlorpyrifos or cyproconazole represents 20% of total plant-protection expenditure, and that plant-protection expenditure accounts for 10% of total production costs

The costs linked to yield or quality losses from less effective pest control may be very important in some cases. Still, they depend heavily on the agronomic role of the substance concerned and on the availability and effectiveness of alternatives in exporting countries. Since the analysis covers a limited set of 18 active substances, we can assume that other active substances with comparable uses may remain available in many exporting countries. Moreover, non-chemical alternatives may also be introduced, including resistant varieties, crop rotation or other agronomic practices, although their feasibility and costs will clearly vary across triads.

A uniform 20% cost increase applied irrespective of the active substance therefore appears high and unlikely to reflect a representative average adaptation cost across the affected trade flows.

Where several active substances affect the same country–commodity pair, S2 does not apply the 20% adaptation cost several times. Instead, the exposure factor is increased by five percentage points for each additional active substance. This rule avoids mechanical cost accumulation, but remains arbitrary and does not account for differences in the agronomic importance of the substances concerned. No comparable increase is applied in S3.

Finally, the JRC clarifies that the 5% and 20% adaptation cost values are a sensitivity analysis, not precise empirical estimates. It acknowledges that actual costs could only be assessed at the level of each country–commodity–active substance triad. Under these conditions, S3 appears broadly more consistent with the adaptations observed over the medium term, whereas S2 combines several conservative assumptions that may amplify the estimated impacts. A discussion with the authors would be particularly useful to clarify these assumptions, how they are translated into CAPRI, and the policy interpretation of the results.