Food and Agriculture Organization of the United Nations

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1st SGE for PPR and SPGP in Europe

PPR emergence in Europe: insights from viral genetic investigations

CIRAD
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GF-TADs
GLOBAL FRAMEWORK FOR THE PROGRESSIVE CONTROL OF TRANSBOUNDARY ANIMAL DISEASES

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PPR emergence in Europe

- First notifications in July 2024 in Greece and Romania
- Emergence in Bulgaria in December 2024
- Emergence in Hungary in January 2025 and new outbreak in Romania in Feb 2025

Situation since 08/07/2024

PPR emergence in Europe

Since June 2025

- First notification in Albania in June 2025, and in Kosovo* in July 2025
- First notification in Croatia in December 2025

Situation since 01/01/2025

(*) This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ opinion on the Kosovo declaration of independence.

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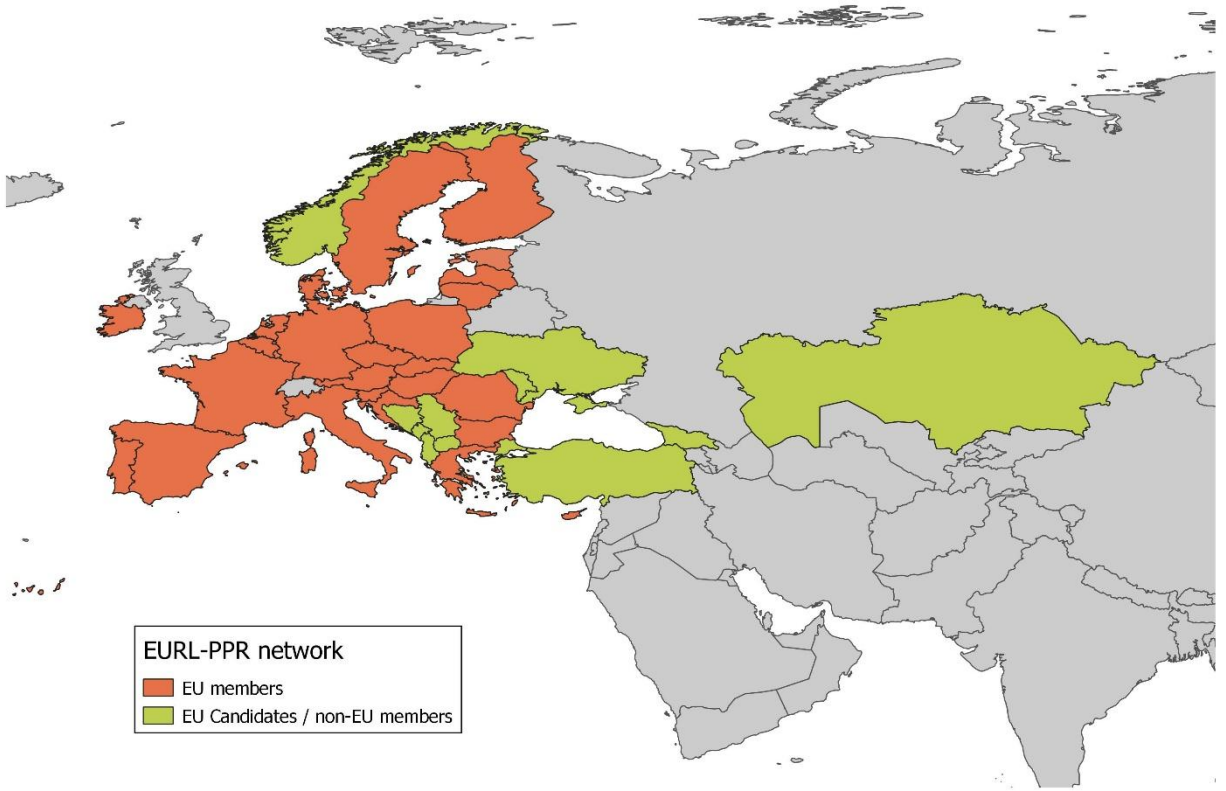
Support from EURL-PPR

Network of NRLs from 27 EU member states and 14 non-EU states

Activities in support of countries facing PPR emergence:

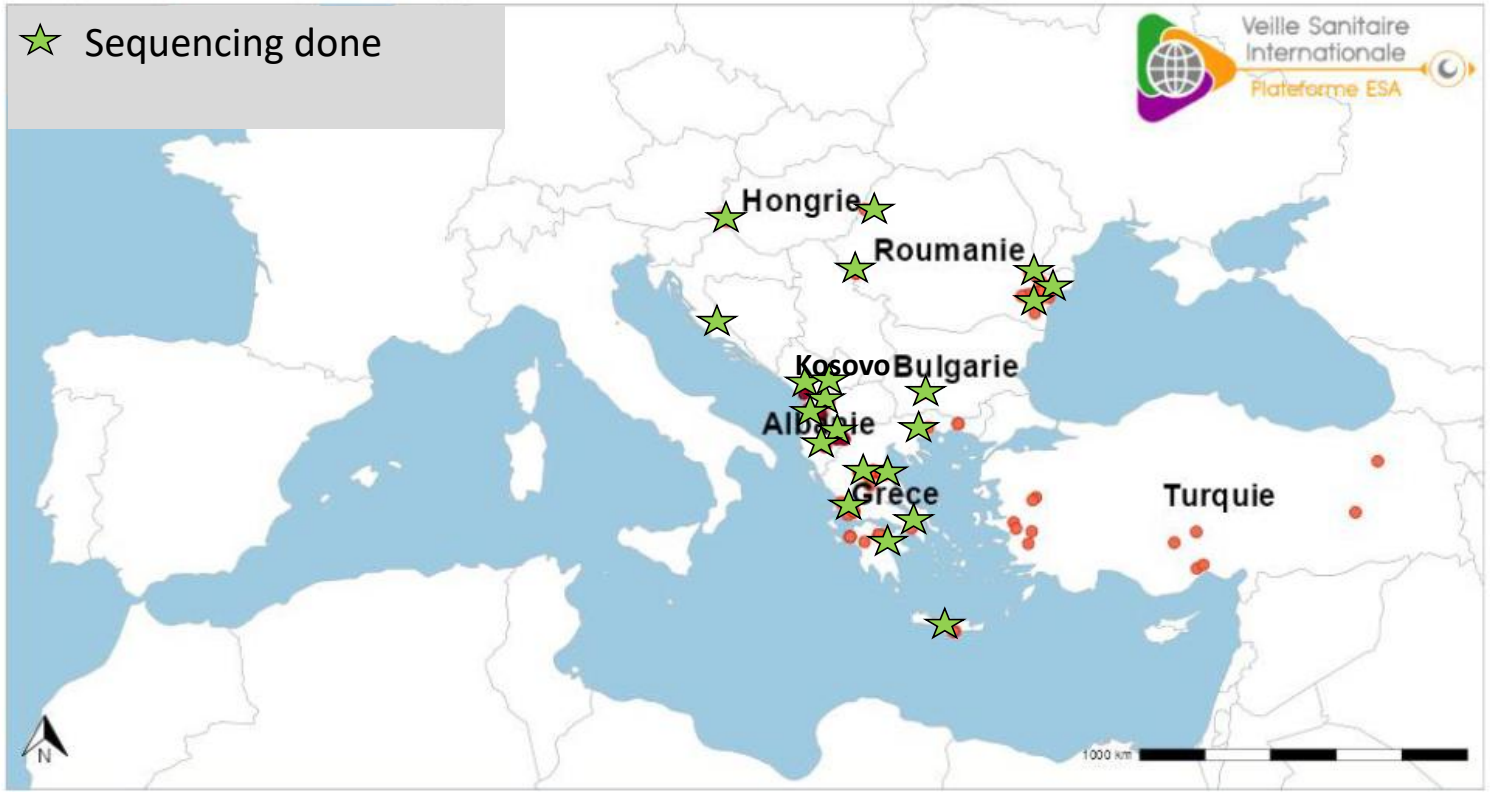
- Participation in field mission
- Confirmatory diagnosis on sera and molecular biology samples received from NRLs
- Supports to NRLs with technical advice and reference material when requested
- Partial genome sequencing (portion of N gene) on all samples tested positive
- **Full genome sequencing on some positive samples**
- **Phylogenetic analyses and genome comparisons**



Website: https://eurl-ppr.cirad.fr/

Complete sequencing effort

- Total of 47 full genome sequences obtained so far from Romania (28), Greece (11), Bulgaria (1), Hungary (1), Albania (3), Kosovo (2), and Croatia (1) in collaboration with National Reference Laboratories and veterinary authorities of each country
- Includes a sequence obtained by NRL of Austria from Romanian sheep



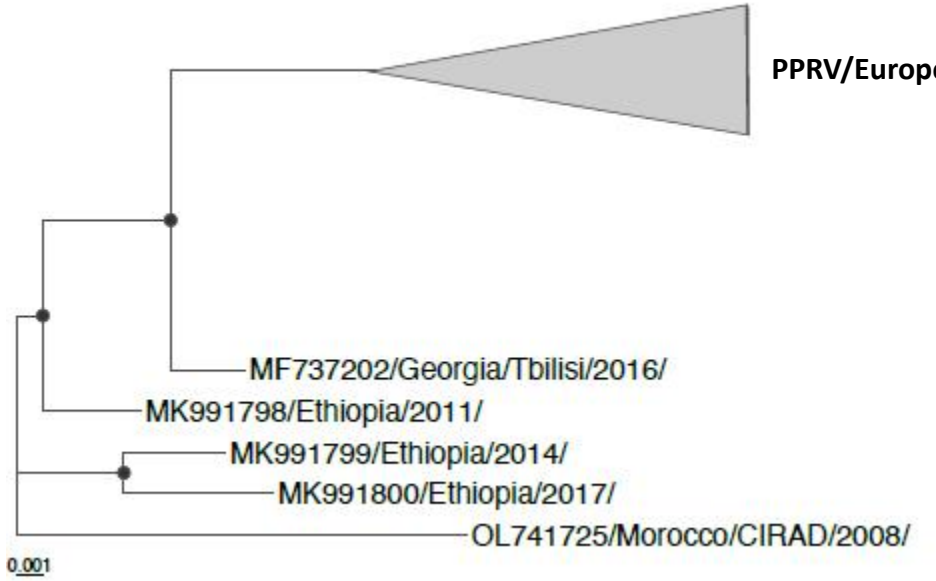
Insights into PPR transmission pathway in Europe

Common origin for emergence of PPR in Europe confirmed for all countries infected

Associated with PPRV strains circulating in North/East Africa, but not with sequences from Turkey. Missing data to identify likely origin of the introduction

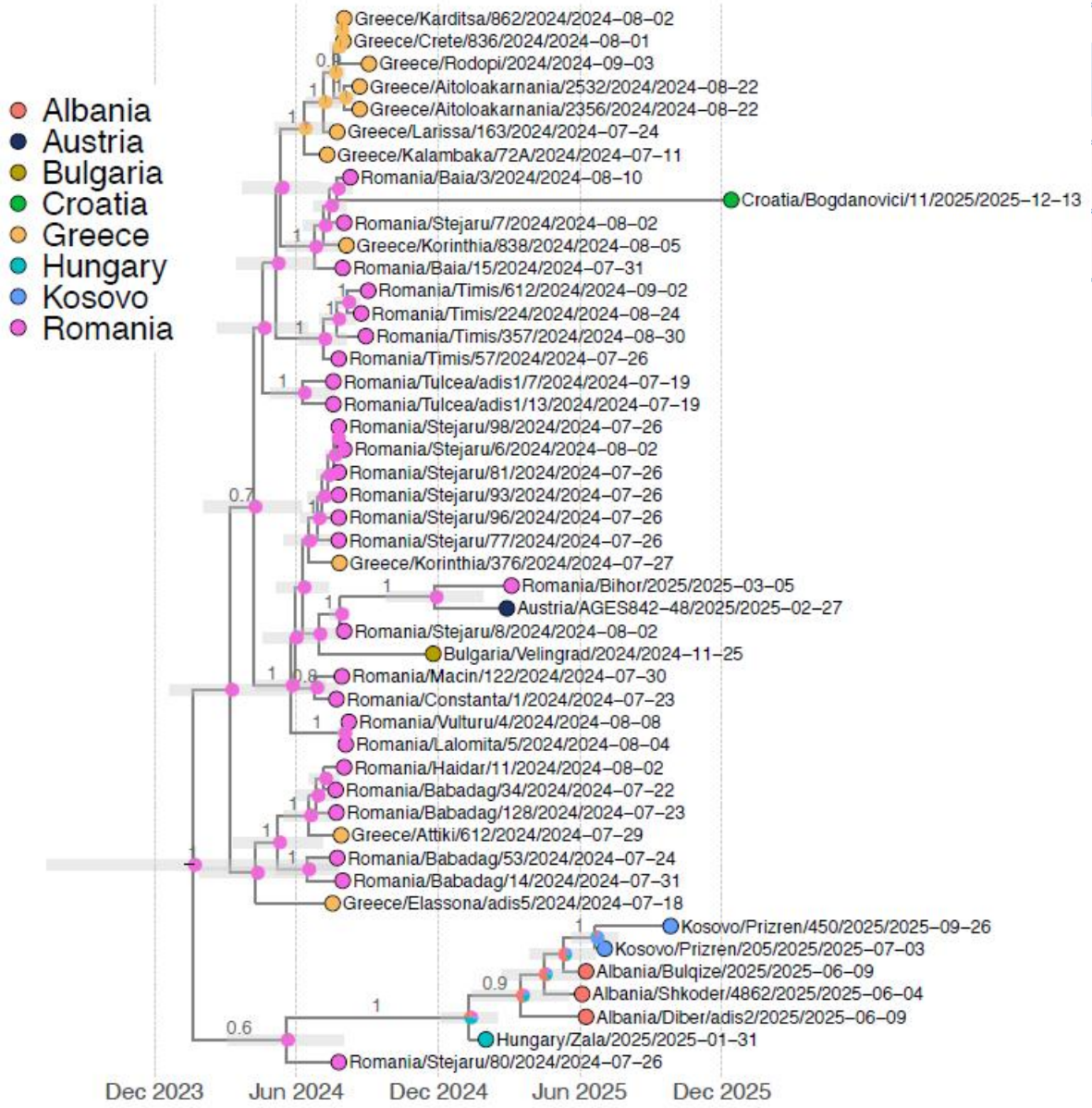
Introduction of PPR in Europe:

97-99% probability that Romania was the first country infected (Ancestal Character Reconstruction)



Insights into PPR circulation in Europe

Time-dependent phylogeny



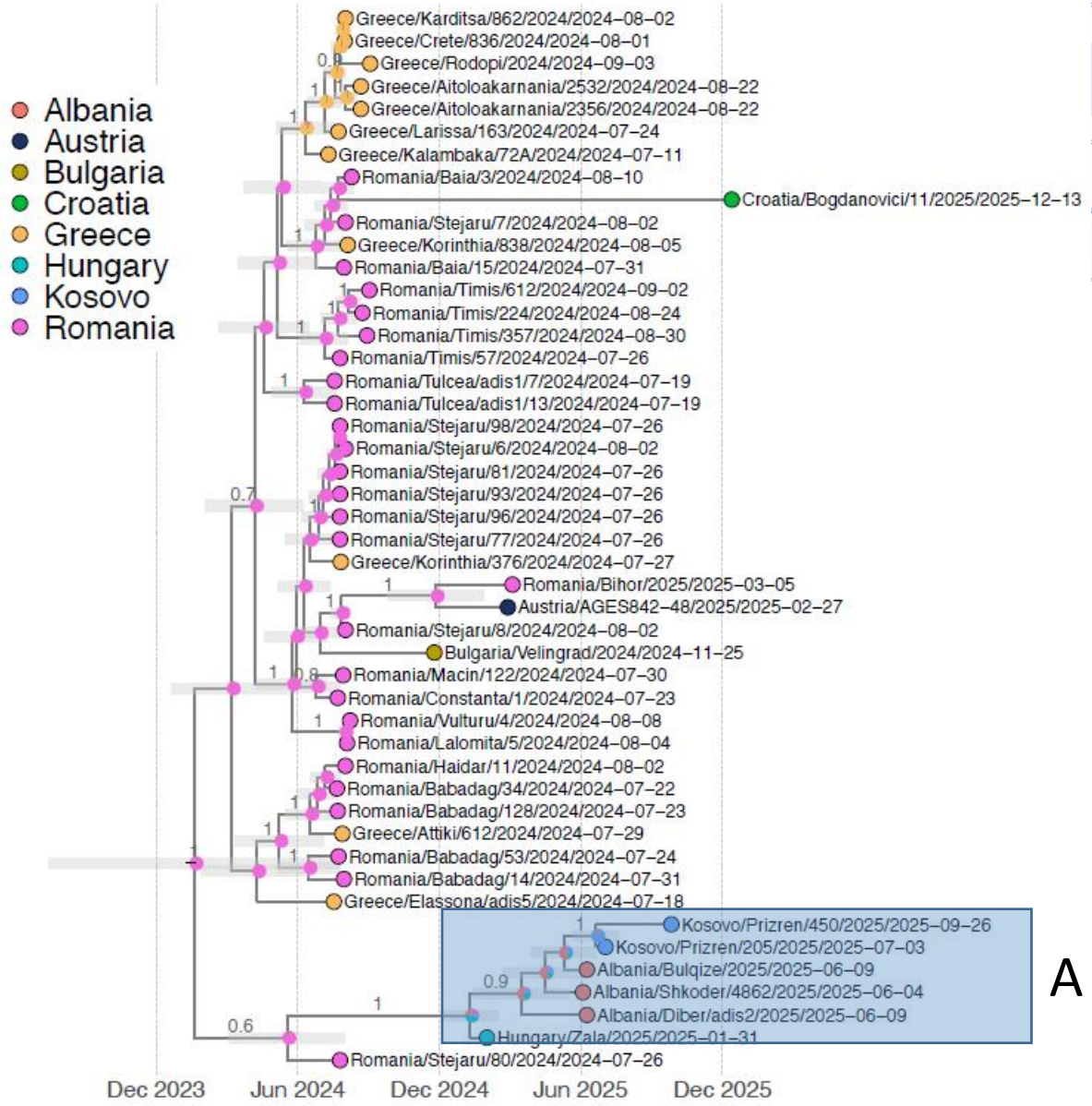
Insights into PPR circulation in Europe

Outbreaks of 2025 in 3 different clusters:

A) Hungary (Jan 25), Albania (Jun 25), Kosovo (July 25)

Most closely related seq: East Romania (Jul 24)

Time-dependent phylogeny



A

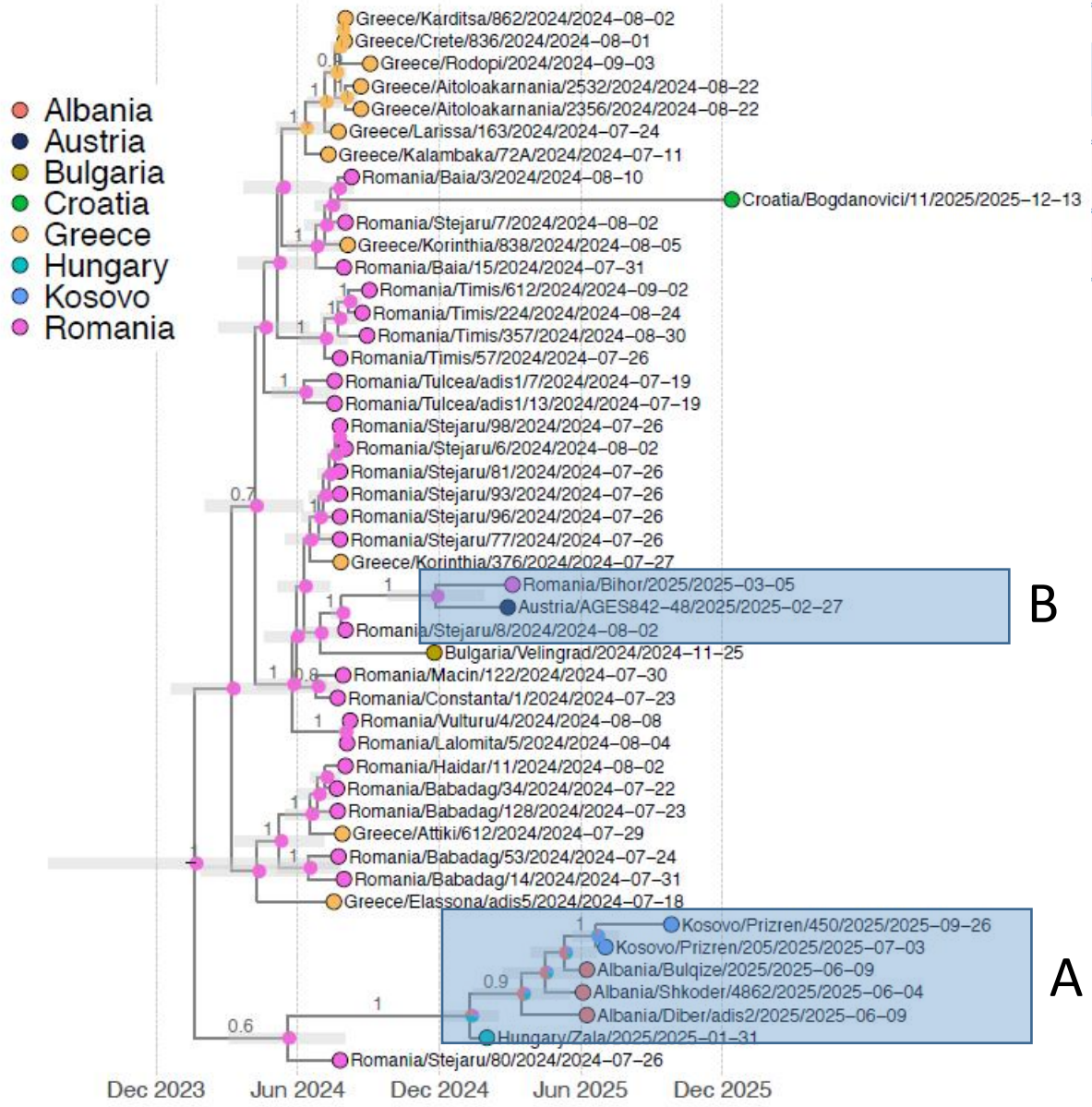
Insights into PPR circulation in Europe

Outbreaks of 2025 in 3 different clusters:

A) Hungary (Jan 25), Albania (Jun 25), Kosovo (July 25)
Most closely related seq: East Romania (Jul 24)

B) Western Romania (Mar 25)
Most closely related seq: East Romania (Aug 24)

Time-dependent phylogeny



Insights into PPR circulation in Europe

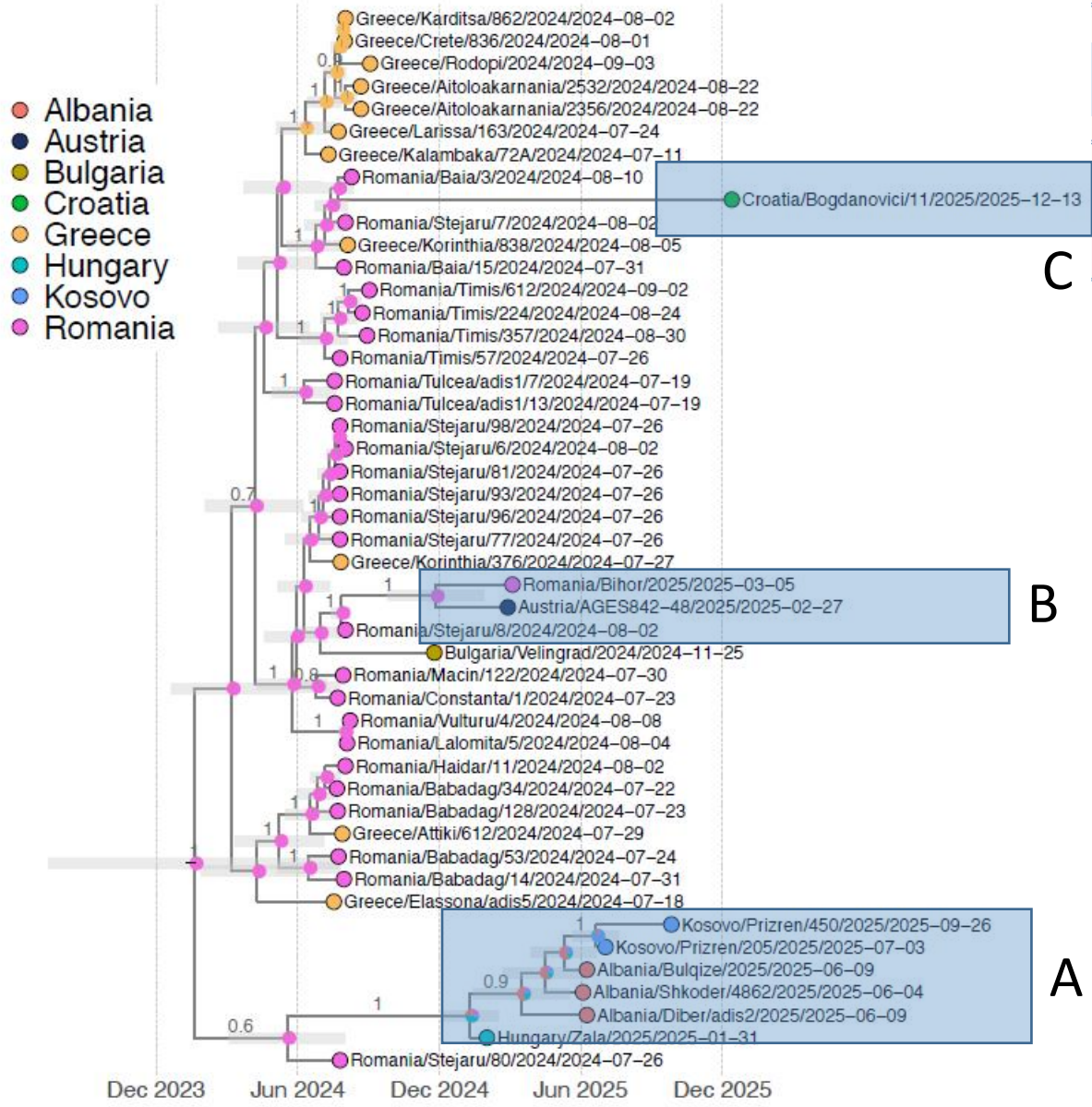
Outbreaks of 2025 in 3 different clusters:

A) Hungary (Jan 25), Albania (Jun 25), Kosovo (July 25)
Most closely related seq: East Romania (Jul 24)

B) Western Romania (Mar 25)
Most closely related seq: East Romania (Aug 24)

C) Croatia (Dec 25)
Most closely related seq: East Romania (Jul 24)

Time-dependent phylogeny



Insights into PPR circulation in Europe

Outbreaks of 2025 in 3 different clusters

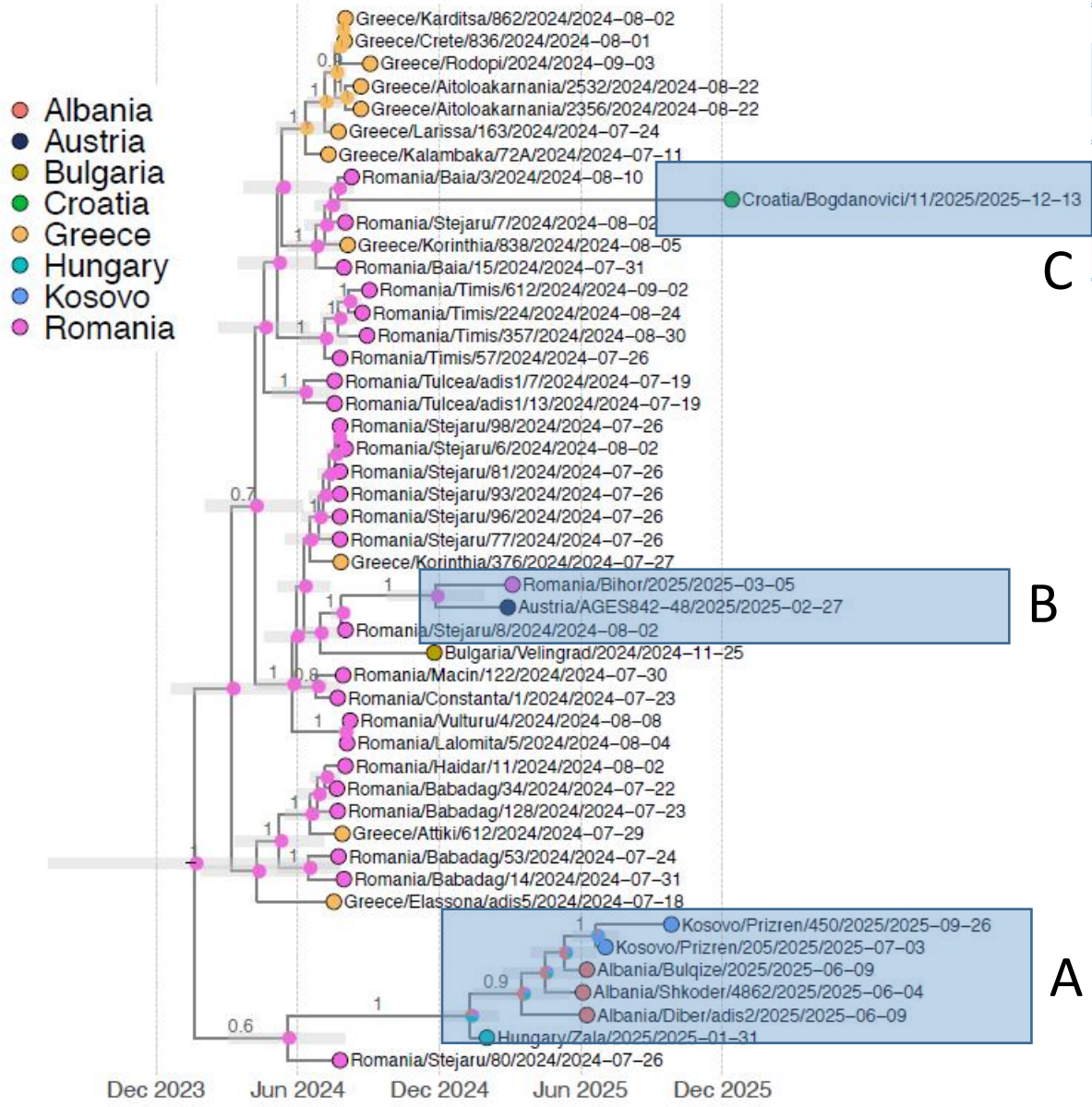
+ big time period separating outbreaks

PPR currently circulating in multiple areas of South Eastern Europe undetected

Possibly Romania still infected and B&H infected

All countries in the region at risk of being infected

Time-dependent phylogeny

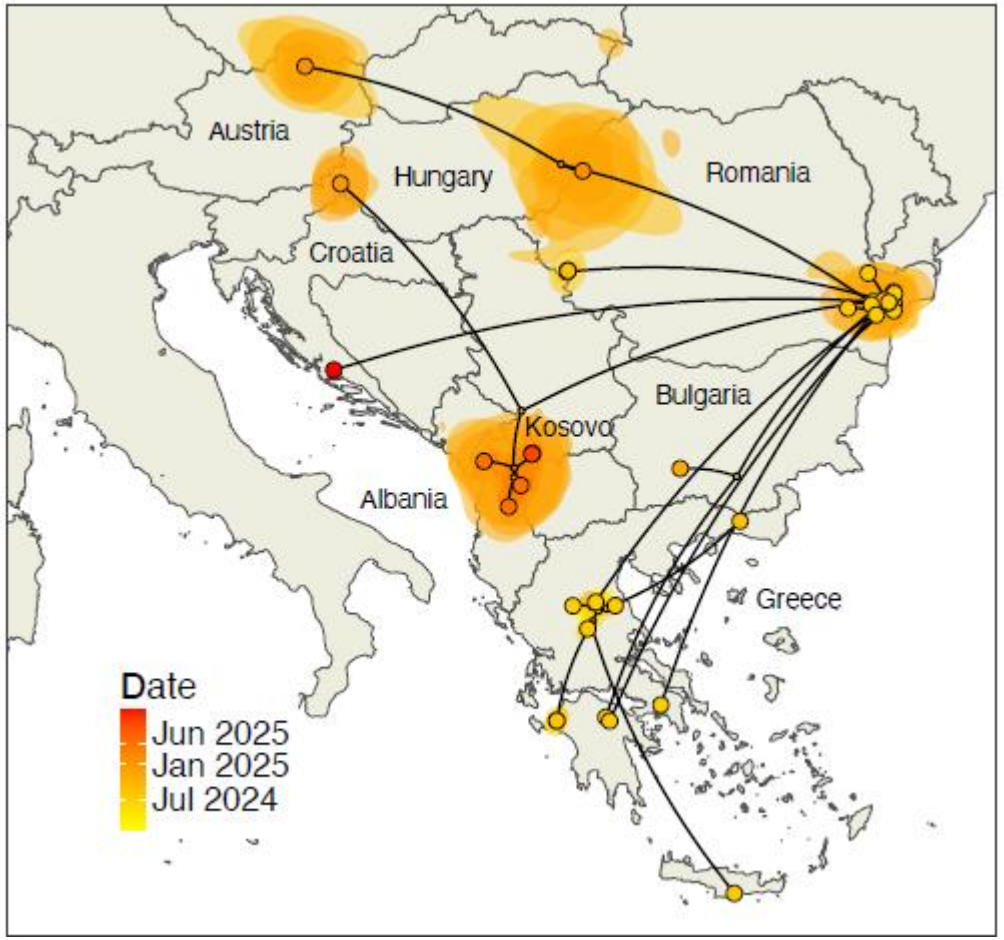


Insights into PPR transmission pathways in Europe

Field and genetic investigations strongly suggest:

- **Animal movement** is the main route of spread of PPR in Europe
- Strong suggestion of a role of **non-compliant movements** in some cases
- Clear cases of **indirect transmission** with vehicles, material, persons carrying virus particles
- The more the delay in detection and restriction, the higher the risk of spread through movement
- Limited or non-specific clinical signs reduced sensitivity of clinical surveillance, increasing risk of missing oubreaks

Spatio-temporal diffusion



Improving surveillance of PPR in Europe

Clinical surveillance is not enough!

Symptoms may be difficult to detect or absent

- Subclinical transmission proven in Croatia and Romania at least
- Symptoms vary across species and breeds, and depending on health condition and environmental context

Improving surveillance of PPR in Europe

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Proposed means of detection to be implemented :

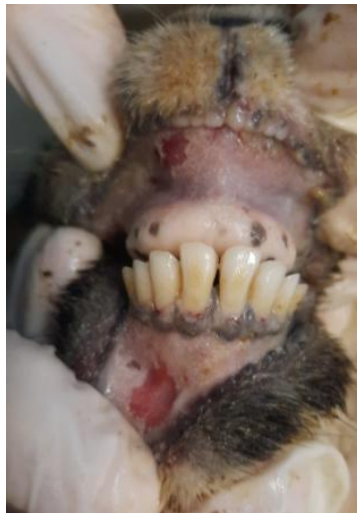
- ➢ Planned active surveillance with systematic sampling across South Eastern Europe (and beyond)
- ➢ Focusing on areas at risk due to animal movement, and on results of epidemiological investigations
- ➢ Take advantage of sampling done for other diseases (e.g. BTV) and test for PPR
- ➢ Increase awareness of field vets of the difficulty to detect the disease, with sampling in any report of abortions, unexplained mortality, any signs remotely related to PPR

Information sharing and coordination among countries important

Improving surveillance of PPR in Europe

Symptoms may be difficult to detect and can include

- Loss of appetite, loss of weight, apathy, nasal/ocular excretions, coughing, sudden death, diarrhea, lesions in the mouth, abortion
- Varies across species and breeds, and depending on health condition

Pictures: General Direction Animal Health and Welfare, Romania

Improving surveillance of PPR in Europe

Risks of delays in reporting PPR suspicion by farmers/ veterinary officers

- Limited number of symptoms, low mortality with recovery of many infected animals
- Suspicion of other, better-known disease (e.g. BT) leading to analysis without testing for PPR
- Symptoms observed thought to be due to heat (notably loss of appetite, apathy)
- Only symptoms associated with secondary bacterial infections (e.g. pasteurellosis) are identified leading to antibiotic treatment
- Poor communication between veterinary services and communities

Need to increase awarness in Europe

Importance of biosecurity measures

Indirect transmission

- Investigation in the field suggest that some farms may have been infected without direct contact with infected animals
- Possible routes of indirect transmission:
  - Trucks visiting multiple farms (milk collection, transport of feed)
  - Persons visiting multiple farms

Clear guidelines for biosecurity measures for disinfection of equipment and personal protective equipment to be provided in areas at risk

Pictures: T. Aleksandrov

Laboratory surveillance for PPR

For sensitive diagnosis of PPR virus genetic material

Status of animal	Type of test	Aim of test	Types of samples
Alive	Real-time PCR	Detection of virus	Priority: Nasal, rectal, throat, ocular swab Vaginal swab in acse of abortion AVOID whole blood
Dead/ euthanized	Real-time PCR	Detection of virus	Priority: Nasal, rectal, throat, ocular swab Lymph node, Lung Optional: Spleen AVOID whole blood

Real-time PCR highly specific and sensitive, although can be affected by inhibitors

Laboratory surveillance for PPR

Serological surveillance

- cELISA test (detection of antibodies) on serum samples, with seropositivity starting 8-9 days after infection
- During 2-3 weeks, animals may be both PCR and ELISA positive
- Useful to find evidence of past PPR circulation (>10 days), especially if subclinical infection
- Main tool to prove PPR freedom of a region/ country based on random or targeted sampling strategy

For active surveillance in Europe: samples for both molecular biology and serology should be collected

Laboratory surveillance for PPR

Serological surveillance – false positives

- Highly sensitive but validated kit (IDvet) with ~1% of false positive
- **Expect 1-2 positive results / 100 sera**
- Possible investigations on suspected false positive results
  - Favored: seroneutralisation test (gold standard)
    - To be put in place by NRLs when possible
  - Re-test on new sample from the same + more animals in the farm
  - Confirmatory test by EURL-PPR

EURL-PPR available to support in all cases

Conclusions

- Genetic and field evidence that PPR is circulating undetected in multiple areas of South Eastern Europe
- Multiple cases of asymptomatic infections complicate surveillance
- New surveillance measures should be implemented across Europe to identify infected zones and control the disease
- Should include planned risk-based surveillance with systematic sampling for PCR and ELISA
- Information on the difficulty to detecting PPR and the sampling procedure should be disseminated largely within the veterinarian community
- EURL-PPR can support for field and lab preparedness and genetic sequencing effort.
- Collaboration and information sharing with NRLs and veterinary authorities across Europe is key to success

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Acknowledgements

- NRLs and Vet Authorities of Romania, Greece, Bulgaria, Hungary, Austria, Albania, Kosovo, Croatia
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- European Commission

EU Reference laboratory for Peste des Petits Ruminants

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THANK YOU

To receive information on the disease, on appropriate sampling, on laboratory methods, and available supports:

EU and WOAH/FAO reference laboratory for PPR

CIRAD, Montpellier, France

email: contact-eurl-ppr@cirad.fr ; arnaud.bataille@cirad.fr

website: https://eurl-ppr.cirad.fr/

https://www.ppr-labs-oie-network.org/

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