

Report on the outcomes of a Virtual Mobility¹

Action number: CA21134

Grantee name: Firdevs GODUC SAHAN

Virtual Mobility Details

Title: National Synthesis on Crop Protection Status, Traceability Reforms, and Agroecological Transition in Türkiye

Description of the work carried out during the VM

During the Virtual Mobility (VM) grant period, the grantee conducted a comprehensive national synthesis on the status, governance, and ecological transition of crop protection in Türkiye. The primary objective was to deliver a structured, evidence-based review supporting the working goals of COST Action CA21134 (TOP-AGRI Network) regarding pesticide reduction and agroecological cropping systems.

The methodology integrated systematic documentary analysis with targeted professional exchanges:

1. **Regulatory and Policy Review:** A detailed synthesis was undertaken evaluating national legislative frameworks (predominantly Law No. 5996), official ministerial publications, technical guidelines from TAGEM, and recent policy directions outlined in national agricultural councils. Particular focus was placed on the digital governance of plant protection products (PPPs), examining the implementation of the Plant Protection Products Tracking System (BKÜTS) and the electronic B-Prescription initiative designed to enhance traceability and reduce chemical misuse.
2. **Technical and Agronomic Assessment:** The grantee reviewed integrated pest management (IPM) practices, monitoring networks, early-warning and forecasting infrastructure, and the operational application of biological and biotechnical control across Türkiye's major agroecological zones (Mediterranean, Aegean, Central/Eastern Anatolia, and Black Sea regions).
3. **Virtual Professional Consultations:** To supplement the documentary analysis with applied, on-the-ground context, the grantee organized and led a virtual consultation meeting in September 2026 with agricultural researchers, alongside a focused exchange with regional plant protection experts in Adana. These exploratory discussions provided critical contextual insights regarding field-level IPM adoption, grower constraints, and biological control scalability.
4. **Report Drafting and Synthesis:** The grantee compiled, structured, and finalized the national report entitled "*Crop Protection in Türkiye: Current Status and Pathways Towards Low-Pesticide Agriculture*",

¹ This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the Grant Holder Manager to verify the grant documents compliance and proceed with the payment.

identifying core pathways for non-chemical interventions, precision application technologies (including agricultural UAVs), and cross-border research synergies.

The work was executed in full accordance with the approved work plan without any deviations.

Description of the VM main achievements and planned follow-up activities

Main Achievements:

The VM grant fully achieved its planned objectives and delivered all expected outcomes:

- **Final Deliverable Produced:** Delivery of a comprehensive, 7-section national synthesis report detailing the institutional architecture, regulatory instruments, pesticide governance systems, and IPM implementation status in Türkiye.
- **Direct Contribution to Action Objectives:** The deliverable directly enriches the CA21134 repository by providing an in-depth assessment of a climatically diverse non-EU Mediterranean/Near East partner country. It bridges national agronomic realities with the broader European Green Deal and zero-pesticide transition frameworks, fulfilling the Action's core task of mapping low-pesticide strategies across contrasting agroecosystems.
- **Traceability and Policy Mapping:** The work highlights Türkiye's unique digital traceability mechanisms (BKÜTS and B-Prescription), offering practical case-study insights for the network on how centralized digital tracking can support pesticide reduction policies and residue compliance in export/domestic value chains.
- **Identification of Collaborative R&D Hubs:** The synthesis defined specific areas where Türkiye's diverse cropping systems (e.g., protected cultivation, viticulture, and extensive field crops) can serve as testing grounds for shared protocols on biocontrol agents, entomopathogenic organisms, and pest forecasting models.

Planned Follow-up Activities:

- **Integration into Working Group Deliverables:** The grantee will collaborate with Working Group leaders within CA21134 to integrate these national findings into overarching comparative policy briefs, cross-country synthesis papers, and joint publications initiated by the TOP-AGRI Network.
- **Joint Research Development:** Building upon the identified R&D priorities (such as climate-responsive pest monitoring and alternative biopesticide evaluation), the grantee plans to engage with network partners in future consortia proposals under Horizon Europe and transnational research initiatives.
- **Knowledge Dissemination:** Insights gathered from the synthesis and professional consultations will be shared through national technical workshops and institutional seminars to foster local alignment with zero-pesticide innovations promoted by the COST Action.

Author's note

This report was prepared using publicly available legislation, institutional publications and policy documents, supplemented by brief professional consultations. It represents the author's synthesis and does not constitute an official institutional position.

Executive summary

Türkiye has a diverse agricultural production structure, ranging from extensive field crops to intensive greenhouse production, orchards and vineyards. Crop protection contributes to food security, agricultural livelihoods, product quality and export competitiveness. Differences in climate, cropping systems and pest occurrence require approaches adapted to regional production conditions.

The Ministry of Agriculture and Forestry coordinates the national crop-protection framework through regulatory authorities, research institutes and provincial and district services. Existing instruments include integrated pest management guidance, pest surveillance, forecasting and early-warning services, residue controls, digital traceability and support for biological and biotechnical control.

Recent policy developments address sustainable production, biological control, food safety and agricultural digitalisation. The Plant Protection Products Tracking System and B-Prescription initiative are relevant components of pesticide governance, while research and extension activities support the practical application of integrated management.

This synthesis reviews the national framework and identifies opportunities for further development through preventive practices, locally adapted monitoring, alternative control methods and application technologies. Türkiye's varied production environments also provide opportunities for international cooperation on agronomically effective and economically viable low-pesticide systems.

1. Introduction and methodology

1.1. Purpose and scope

This national synthesis was prepared within COST Action CA21134 TOP AGRI Network to describe the current status of crop protection in Türkiye and outline pathways towards lower dependency on chemical pesticides.

The report covers the agricultural context, institutional and regulatory arrangements, pesticide traceability, integrated pest management, biological and biotechnical control, and relevant research priorities. It considers insect pests, plant diseases and weeds across major production systems.

The transition towards low-pesticide agriculture involves combining prevention, monitoring and appropriate intervention. Cultural practices, resistant or tolerant varieties, natural enemies, biological products and biotechnical tools contribute to this process. Selective chemical treatments, where necessary, are integrated with these measures according to crop requirements and pest conditions.

1.2. Information sources and professional exchanges

The report draws primarily on publicly accessible national and international documents available up to September 2026. Sources considered include Ministry publications, the Plant Protection Products Database, TAGEM technical materials, national policy documents and international agricultural reports.

A brief virtual meeting was held in September 2026 with three participants, including the author. A separate professional exchange was conducted with a contact based in Adana. These exchanges provided supplementary context relating to crop protection.

Descriptions of national programmes and regulatory arrangements are based on documentary sources. The consultations were informal and exploratory; they are not presented as a representative national survey or as an institutional consensus. Participant identities and institution-specific comments are not included.

2. Agricultural and crop-protection context

2.1. Diversity of production systems

Türkiye's agricultural production reflects substantial variation in climate, altitude, soils and water availability. Cereals, pulses, industrial crops, fruits and vegetables are cultivated under rainfed, irrigated and protected conditions. This diversity shapes the distribution of pests, diseases and weeds and the choice of management practices.

Central, Eastern and Southeastern Anatolia include extensive areas of field-crop production. Wheat, barley, pulses, maize and sugar beet are among the crops grown in these regions. Crop rotation, seed health, weed management and seasonal surveillance are relevant components of their protection programmes.

The Mediterranean and Aegean regions contain important areas of citrus, grapes, olives, vegetables and greenhouse production. Marmara also supports diverse horticultural and field-crop systems. Management decisions in these regions are linked to crop phenology, irrigation, local pest populations and harvested-product quality.

The Black Sea region includes production under relatively humid conditions, with crop-protection programmes adapted to its perennial crops and locally important pests and diseases.

National technical guidance provides a common reference for these systems. Local observations and monitoring support its application to individual crops, locations and growing seasons.

2.2. Product quality and agricultural trade

Türkiye supplies domestic and international markets with fresh fruit and vegetables, grapes, dried fruit, nuts and processed agricultural products. Plant health and residue management are therefore relevant to both production and marketing.

Export-oriented production takes account of national product authorisations and the residue requirements of destination markets. Additional customer specifications may apply within particular supply chains.

Correct product selection, compliance with authorised doses and observance of pre-harvest intervals contribute to residue management. Application records provide a reference for growers, advisers and other supply-chain participants.

The integration of non-chemical methods can support these quality objectives. Monitoring, biological and biotechnical control, and appropriate harvest planning can be incorporated into production programmes according to the crop and intended market.

3. Institutional and policy framework

3.1. National institutional structure

The Ministry of Agriculture and Forestry coordinates plant-health and crop-protection activities. The General Directorate of Food and Control has responsibilities relating to plant health, quarantine, plant protection products and official controls.

The General Directorate of Agricultural Research and Policies, TAGEM, coordinates public agricultural research through its institutes. Research subjects include pest identification, population dynamics, plant diseases, weeds, pesticide efficacy, effects on beneficial organisms and integrated management.

Commodity-focused research institutes contribute specialised knowledge for particular production systems. Viticulture research, for example, connects vineyard pest and disease management with grape production practices and product quality.

Provincial and district directorates undertake surveillance, inspection, grower information and implementation of national programmes. Their field activities support communication between public services and producers.

Universities, cooperatives, producer organisations, professional advisers and private-sector organisations also contribute through scientific studies, training, technical services and the provision of crop-protection tools.

3.2. Legislative foundations

Law No. 5996 on Veterinary Services, Plant Health, Food and Feed provides the principal legal foundation for plant-health activities. Secondary legislation addresses the authorisation, sale, storage, application and control of plant protection products, together with quarantine and residue-related requirements.

Plant protection products are authorised for specified crops, target organisms, doses and application conditions. The Ministry's public Plant Protection Products Database provides information on authorised products and recommendations.

Official notices also communicate restrictions, withdrawals and changes to authorised uses. As product status can change, current database entries and dated Ministry publications provide the reference for product-specific information.

Crop-protection planning brings these regulatory requirements together with information on pest biology, available modes of action, resistance management and non-chemical options.

3.3. Policy direction

The Fourth Agriculture and Forestry Council, held in 2025, addressed several subjects relevant to sustainable crop protection. These included plant protection product production and licensing, the promotion of biological and biotechnical methods, integrated pest management and biological-control laboratory capacity.

Related policy themes included pesticide residues within a One Health approach, alignment with the European Green Deal, early-warning systems and agricultural digitalisation.

These themes connect crop protection with food safety, environmental management, climate adaptation and agricultural research. They provide areas of common interest for regulatory authorities, researchers, extension services and producers.

4. Pesticide governance and digital traceability

4.1. Plant Protection Products Tracking System

The Plant Protection Products Tracking System, known as BKÜTS, supports the traceability of products within the authorised supply chain. Product identification and electronic recording allow commercial movements to be documented through relevant distribution stages.

Records involving manufacturers or importers, distributors and authorised retailers contribute to official control activities. The system also supports the identification and tracking of products circulating in the market.

Supply-chain records form part of the wider information available for pesticide governance. Together with authorisation details and producer records, they contribute to the documentation of crop-protection activities.

4.2. B-Prescription initiative

The B-Prescription initiative introduces electronic processes linking plant protection product sales and prescriptions with registered producer and production information.

Its intended functions include associating purchases with registered crops and production areas, taking account of authorised doses and recording information relevant to product supply and use. Prescription requirements for designated products are part of this framework.

These processes support responsible product selection, traceability and residue prevention. They also provide a structured means of recording information shared among producers, authorised professionals and administrative services.

Practical guidance and training help users incorporate electronic procedures into their routine activities. Consistent records can subsequently support the review of crop-protection programmes.

Where suitable data are available, aggregated records may also provide opportunities for research on product-use patterns across crops and regions, subject to the applicable conditions governing data access and use.

4.3. Farm records and residue management

Farm-level application records generally document the product, dose, treatment date and crop. This information supports the observance of pre-harvest intervals and provides a reference when planning subsequent interventions.

Records can also assist discussions between producers and advisers about treatment timing and seasonal management. In documented supply chains, they contribute to the communication of production practices.

Digital recording therefore complements field diagnosis, monitoring and the selection of authorised measures within an integrated management programme.

5. Integrated pest management and alternative control

5.1. Monitoring and prevention

Türkiye's crop-specific technical instructions provide guidance on integrated management of pests, diseases and weeds. Depending on the crop and target organism, they include sampling procedures, monitoring methods, intervention thresholds and control measures.

Monitoring may involve visual inspection, trap catches, examination of plant material and assessment of symptoms. Where established, economic thresholds help relate observations to the need for intervention.

Preventive practices include healthy planting material, sanitation, crop rotation, resistant or tolerant varieties, balanced fertilisation and appropriate irrigation. In perennial crops, pruning and canopy management can also contribute to plant health.

The conservation of natural enemies is another component of integrated management. Information on product selectivity and compatibility helps incorporate chemical treatments, when required, into programmes using beneficial organisms.

Treatment decisions take account of the target's developmental stage, crop condition and local observations. Resistance-management principles guide the selection and sequencing of authorised modes of action.

5.2. Forecasting and early-warning services

Forecasting and early-warning services support management of selected pests and diseases. Weather observations and biological models provide information on conditions associated with infection, pest development or adult activity.

Relevant variables may include temperature, rainfall, relative humidity and leaf wetness. These observations are interpreted alongside crop phenology and field monitoring.

Weather variation between seasons gives continuing relevance to local model evaluation. Comparing alerts with observed pest and disease development can help describe their practical application in different production environments.

Timely communication enables growers and advisers to incorporate warnings into field decisions. Extension activities and accessible messages support the interpretation of this information throughout the growing season.

5.3. Biological and biotechnical control

Biological control includes the use and conservation of predators, parasitoids and microbial agents. Biotechnical methods include mating disruption, mass trapping and other approaches that use pest behaviour to support management.

Their application varies according to the crop and target organism. Protected cultivation provides opportunities for planned releases of beneficial arthropods. Orchards and vineyards offer settings for pheromone-based methods and coordinated management across neighbouring holdings.

Türkiye provides financial support for biological and biotechnical control in specified production systems. The relevant official arrangements define eligible crops, practices and application conditions.

Implementation involves appropriate timing, correct installation or release, and follow-up monitoring. Environmental conditions, product storage and compatibility with other treatments are relevant to method selection.

For mobile pests, cooperation among neighbouring growers can contribute to coordinated implementation. Producer organisations, field demonstrations and technical visits offer opportunities to exchange practical experience.

5.4. Economic suitability

The farm-level suitability of a method depends on its technical performance and economic implications. Relevant considerations include product costs, labour, monitoring requirements, application frequency and the value of the marketable crop.

Demonstration activities allow producers to observe methods under local conditions. Recording inputs and crop outcomes provides information for comparing complete management programmes.

Multi-season evaluation can capture variation in weather and pest pressure. These observations help identify the circumstances in which particular combinations of measures are suitable for continued adoption.

6. Research and development opportunities

6.1. Climate-responsive crop protection

Variation in temperature, rainfall and humidity influences pest development, disease occurrence and the timing of crop-protection activities. Locally adapted monitoring provides information for responding to these seasonal conditions.

Research can examine relationships between weather, crop phenology and target-organism development. In perennial systems, observations over successive years are particularly useful for describing seasonal patterns.

These studies can contribute to forecasting tools, sampling schedules and the evaluation of management practices. They also provide a basis for comparing crop-protection approaches across Türkiye's different agroecological regions.

6.2. Evaluation of alternative methods

Field studies of microbial agents, beneficial arthropods, semiochemicals and botanical products can assess efficacy, timing and compatibility within integrated programmes.

Recording environmental and application conditions helps explain variation in performance. For biological agents, temperature and humidity may be relevant; for pheromone-based methods, treated-area characteristics and pest movement may influence results.

Research on cultural measures, resistant varieties and physical or mechanical methods complements product-based studies. Evaluating combinations of practices throughout the season provides information on their contribution to crop health and production.

Useful assessment variables include pest abundance, disease development, crop damage, marketable yield, effects on beneficial organisms and management costs.

6.3. Application technology

Equipment calibration, nozzle selection, spray volume and adaptation to crop structure are relevant to treatment delivery. Research and training in these areas support the appropriate use of application equipment.

Agricultural unmanned aerial vehicles provide a further subject for technical evaluation. Crop-specific studies can investigate deposition, canopy penetration, coverage, drift and biological efficacy under defined operating conditions.

Comparisons with conventional equipment can describe operational characteristics, labour requirements and suitability for particular field conditions. Assessment alongside product properties and crop architecture provides a fuller understanding of application performance.

6.4. Knowledge exchange and professional training

Training can connect pest diagnosis, monitoring, economic thresholds, biological control and application practices. Field visits and demonstrations provide opportunities to relate technical guidance to commercial production.

The interpretation of early-warning information and the use of digital records are additional subjects for professional development. Cooperative activities involving researchers, extension staff and producer organisations can support the exchange of experience and identify questions for further investigation.

7. Contribution to COST Action CA21134

Türkiye's Mediterranean, continental and humid production environments provide opportunities for collaborative studies on low-pesticide agriculture. Its combination of field crops, protected cultivation, orchards and vineyards allows management approaches to be examined under contrasting conditions.

Relevant areas of cooperation include common protocols for evaluating alternative methods, locally adapted forecasting models, surveillance of invasive pests and disease vectors, pesticide-resistance monitoring and application technology.

Shared assessment methods can improve comparison between studies while retaining information on local weather, cropping practices and pest pressure. Recording economic

outcomes alongside biological results also supports the interpretation of methods from a producer perspective.

Researcher and adviser exchanges offer opportunities to share experience in sampling, demonstrations and grower training. Digital traceability provides a further topic for discussion concerning the appropriate use of aggregated crop-protection information.

These activities are consistent with the network's objective of strengthening interaction among countries and disciplines. They can contribute practical knowledge for the development of preventive and low-pesticide production systems.

Conclusion

Türkiye's crop-protection framework includes public regulation, agricultural research, technical guidance, field services and producer support. Integrated pest management, biological and biotechnical methods, residue controls and digital traceability provide complementary components within this framework.

Locally adapted research, demonstrations and professional exchange can support their continued development. Considering crop performance, environmental conditions and farm economics together provides a practical basis for selecting suitable management approaches.

Through its diverse production systems and scientific experience, Türkiye can contribute to international cooperation on maintaining effective crop protection while gradually reducing pesticide dependency.