



# **CONTRACT RESEARCH SERVICES** **GET EFFICIENTLY TO MARKET**

# FROM SOURCE TO SUPPLY

Sustainable and productive agriculture needs a continuously innovative approach for improved management of crop production. With the growing demand for efficiency and with environmental concerns at the forefront, the ability to provide expertise for seed development, research, Plant Protection Product development, Biocide, soil fertility management and other specialty analytical data are crucial for success.



## CAPABILITIES

The following service categories highlight some of our activities:

### REGISTRATION SERVICES

Study management/Project management in the field of:

- Active substance/Product/Formulation properties
- Biology/Efficacy
- Environmental fate
- Ecotoxicology
- Residues
- Dietary and operator safety
- Product stewardship

### ANALYSIS

- Method development/Validation
- Crop protection residue level(s) in all kinds of matrices
- Food processing
- Contaminants (e.g. Mycotoxins, GMO)
- Microbial analysis
- Seed and grain analysis

### COMMERCIAL DEVELOPMENT

- Market survey and analysis
- Product labelling (regulatory requirements)
- Product packaging
- Product demonstration
- Safety data sheet

### WORKING PRACTICES

- GLP Accreditation
- GEP Accreditation
- EPPO/CEB
- WHO-FAO
- OECD
- EU/EPA GUIDELINES

## BENEFITS

- Standardised operating procedures
- Quality approach and state-of-the-art equipment prevent bias in the studies performed
- Expertise throughout the network in Agronomy, Plant Pathology and Biology
- Access to a European/Global network offering a fully international service
- Rigorous training with continuous improvement
- Many in-house services under one management structure
- Customer focused approach

## SGS VALUES

- Passion
- Integrity
- Entrepreneurialism
- Innovative spirit

## SGS BENEFITS

- Achieve consistent quality
- Develop strong focus on safety
- Effectively manage risk
- Operate efficiently
- Drive productivity forward
- Excel in speed to market
- Meet stakeholder sustainability expectations

# REGISTRATION SERVICES

SGS provides expert support in the development, design, management, coordination, analysis, compilation and submission of data to relevant authorities across the European Union and globally for new and existing Plant Protection Product Registration.

## REQUIREMENTS

- Annex II/dRR (active substance related)
- Annex III/dRR (product related) a.s.
- Risk assessment
- Dossiers
- Labels
- SDS
- CADDY

## A MORE COMPLETE PACKAGE

- Physical chemical properties
- Validated methods of analysis
- Human risk assessment
- Residues in food
- Ecotoxicology studies and environmental risk assessment
- Efficacy
- Classification and labelling

## CATEGORIES

Our team offer expert consultancy, analysis and registration services on the following categories

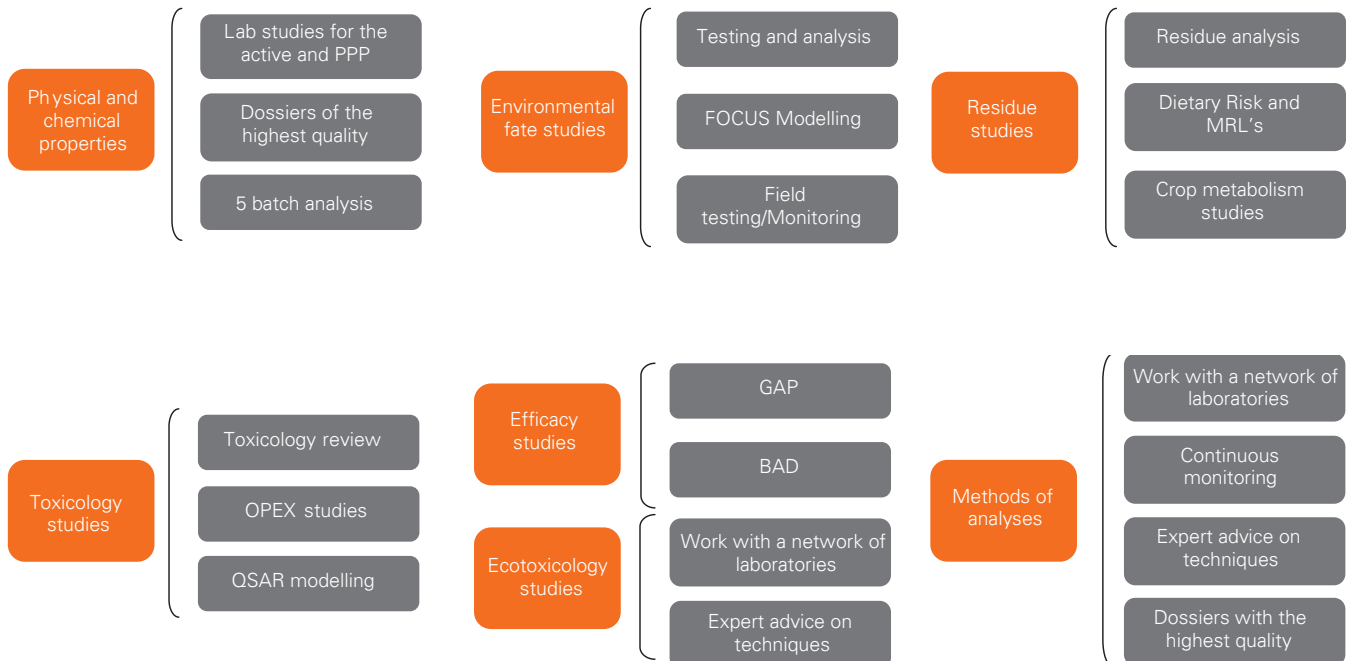
- Pesticides
- Fertilisers
- Biocides
- Bio-pesticides
- Bio-stimulants
- Plant Growth Regulators
- Soil enhancers

## OUR SERVICES

- Preparation and submission of registration dossiers
  - OECD format, dRR, JMPR, CADDY, BADs, Country Addenda
- Local/European/Global approach



- Data gap analysis
- Labels and SDS
- Study planning
- Study management
- Modelling
- Specific national registration



# GEP FIELD STUDIES

SGS offers a flexible and impartial resource for your product development, supporting your needs throughout the research process.



Our experienced staff can conduct field trials to support the screening, development and registration of agricultural and horticultural chemicals, biopesticides, biocides, fertilisers and new plant varieties (including Genetically Modified Organism). The trials are conducted from our field stations located across Europe, North and South Americas, Africa and Asia offering a

complete competitive service from one source. All our testing facilities comply with the relevant, industry specific Quality Management Systems for conducting regulatory efficacy studies for local and international submissions.

## OUR SERVICES

- Product efficacy testing for local, international and global submissions
- Local, European and Global study management
- Selectivity trials to determine the effects to crops
- Protocols drawn up to EPPO guidelines
- Drip, drench irrigation studies
- Tank mix compatibility testing
- Electronic Data Exchange in ARM and company defined versions
- Full trial/Project reports
- Secure internal data management system (Intranet)

## CATEGORIES

- Fungicides
- Herbicides
- Insecticides
- Biopesticides
- Fertilisers
- Acaricides
- Nematicides
- Molluscicides
- Biocides
- Soil/Crop enhancement
- Plant Growth Regulators (PGRs)
- Adjuvants
- Seed treatments
- Stored crops

Applications in all countries are aimed to comply with Good Agricultural Practice.

SGS offers efficacy testing on any crop or uncropped situation in all regions of the world.

# DEMONSTRATION FIELD TRIALS

SGS provides additional marketing solutions for your Plant Protection Products in terms of tailor made comparative performances trials, which may be used to educate the potential customers to the added value from your products.



SGS offers services for development and demonstration for both product comparisons to demonstrate the capabilities of agrochemical compounds or the management of large scale demonstration centres, where a choice of crops

and varieties can be planted and used in conjunction with a range of spray programmes, compounds and mixtures to provide a diverse situation, ideal for education, demonstration, development, sales and marketing purposes.

## EQUIPMENT

At SGS, we have a wide range of specialised equipment to enable us to conduct all types of trials. We are constantly reviewing and renewing our systems and tools to bring better technology systems to the field, to laboratories and into our offices.

## LAND

In many regions around the world SGS rents and manages their own land,

allowing tailored solutions to complex layouts and introduction of targets into conditions for best demonstration. With land linked or close to our offices this also provides an ideal location for groups to meet, view and discuss the trials on show in a convenient atmosphere.

## OUR SERVICES

- Market/Sales support trials
- Product comparison trials
- Sequence comparison
- Timing comparison
- Variety demonstration
- Seed rate demonstration
- Field demonstration centres
- Variety pest interaction
- Irrigated, enhanced conditions

# POLYTUNNEL/GLASSHOUSE

SGS has a great deal of experience in testing plant protection products for efficacy and selectivity within glasshouses/polytunnels on wide range of crops including vegetables and ornamentals.

New chemicals and formulations are screened in controlled conditions unrelated to seasons under natural or artificial infestation to provide early information on their biological activity prior to progressing with Field Studies.

Testing involves crop safety investigation and dose rate studies using small pots and cages.

In our extensive network, we have a high number of different ornamental and vegetable glasshouse producers which gives us the possibility to cover most aspects of crop protection and Plant Growth Regulator (PGR) in glasshouses.

## OUR SERVICES

- Crop safety screening
- Efficacy testing
- Dose rate definition
- Succeeding crop studies
- Ornamentals evaluation
- Screening of new formulations
- Seed germination and propagation tests
- Artificial pest infestation
- Protected soil/Cage/Pot/Tray trials
- Biocide/Biopesticide testing



# SPECIALITY STUDIES

SGS has a number of talented, innovative personnel who can design, manage and conduct a range of speciality studies in both the field and laboratory.

New products may require special testing methods to demonstrate the potential of the product to the best advantage. These studies can be based on existing standard methods with small variations for a given product type, or totally bespoke studies designed in conjunction with the client to meet their particular needs.

## RESISTANCE ANALYSIS

- Testing against standard or requested products
- Herbicide resistance

## FIELD SCREENS

- Small plot, unreplicated or replicated
- Herbicide, fungicide, crop/variety type
- Rate and formulation comparisons
- Drilled target species
- Tank mixes

## PRODUCT PROPERTIES

- Rainfastness (field and controlled environment)
- Pattern testing
- Nozzle effectiveness

## NEMATODE STUDIES

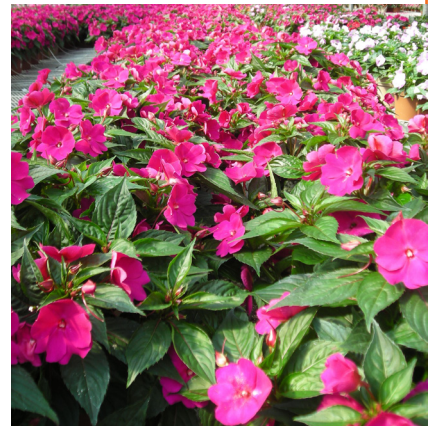
- Glasshouse/Field crops
- Irrigated, spray, granule application

## CROP SEQUENCING

- Single and multiple following crop effects

## SPECIFIED USES

- Forestry
- Amenity grass
- Fertiliser
- Horticultural
- Ornamental
- Soil enhancement



## CONTROLLED STUDIES

- Inoculated studies
- Irrigated studies
- Climatic controlled studies

# ECOTOXICOLOGY AND BIODEGRADABILITY

SGS has a number of dedicated ecotox testing laboratories based in SGS laboratory sites throughout Europe and can provide tier 1 testing for Plant Protection Products, biocides, etc.



Ecotoxicological studies deal with potential influences of chemicals, crop protection agents, biocides, animal and human drugs on target areas of flora, fauna and the environment, combined with non target plants and animals.

The results of these studies are used in environmental and ecotoxicological risk assessments within the scope of the

registration process for substances and products. These tests are conducted according to the principles of Good Laboratory Practice (GLP).

SGS is accredited according to DIN EN ISO/EC 17025 and is GLP certified for a wide range of corresponding test procedures. We have particular experience in the area of problem substances that are poorly soluble in water, highly volatile and/or coloured.

Test methods according to OECD, DIN, ISO, EPPO, CEC, EPA, OPSS and ECETOC guidelines.

## ECOTOXICOLOGY

- Bacteria toxicity tests (acute, chronic, aerobic, anaerobic, mono-species tests, tests on complex associations)
- Algae growth inhibition test (various species)

- Crustacean toxicity (e.g. daphnia)
- Fish toxicity, acute (static, semi-static)
- Worm toxicity, acute
- Plant growth inhibition tests
- Soil microflora test

## BIODEGRADABILITY

- "Rapid" biodegradability
- "Basic" biodegradability
- Simulation tests (sewage treatment plant simulation)
- Biodegradability in an anaerobic environment
- Compost ability/Rotting ability
- Biodegradability of mineral oil products
- Primary degradability of surface-active substances

# BENEFICIAL/NON TARGET STUDIES

SGS has set up services in the higher tier testing for non target animals and plants. SGS can place, conduct, manage and report the full range of studies required to register a Plant Protection Product, including refinement of bird and mammal risk assessments.



In recent years, there has been an increased interest within the regulatory authorities in the protection of beneficial species with a specific focus on pollinators and non target plants and

animals. Together with the focus on sustainability and protecting the environment, SGS has recognised the need for quality services in this area and has expanded its resources to meet these challenges.

## OUR SERVICES

- Residue studies including residue analysis of all matrices
- Method development and validation in arthropods, nectar, pollen
- Residue verification in all routes of exposure:
  - via spray, drift, contact, crop residues, soil and sediment

Active substances and metabolites in laboratory, semi-field and field studies.

## RESIDUE ANALYSIS

All kind of semi field to field test require analysis of the exposure level by residues.

Possible residue samples are water from guttation fluid, surface water and puddles, from inside the hives, pollen, honey/nectar, pollen, wax and royal-jelly.

Residues in specific flora and fauna groups, non target field trials in animals and plants as well as bee, bumble bee and solitary bee studies are performed with partner companies.

# GLP FIELD STUDIES

SGS's global network of experienced field trialists is fully equipped to meet all the challenges of conducting GLP studies in all crop types and regions of the world.

The SGS philosophy of providing a single, high quality service has resulted in our use of standardised operating procedures, based on the most exacting GLP requirements, and designing an in-house data management system for monitoring the studies.

We have many years of experience in the planning and coordination of Good Laboratory Practice (GLP) residue programmes throughout Europe providing a complete, competitive service from one source.

Our laboratories provide residue analysis including method development and validation, environmental fate in the field in soil, surface water and ground water and import intolerance studies.

## OUR SERVICES

- Project management/Study directorship
- Crop residue trials
- Crop rotation
- Operator exposure
- Dust drift studies
- Animal feeding studies
- Soil dissipation
- Soil accumulation
- Field leaching
- Run-off
- Drip/Drench irrigation studies
- Polyunnel/Glasshouse studies
- Seed dressing and drilling
- Import tolerance studies

SGS can offer trials in the field, polyunnel or in glasshouses under controlled conditions with all trials carried out by our experienced staff.



Study Management is run through our laboratories or regulatory team, with all field stations being GLP compliant and audited regularly. Samples are monitored and transferred on a regular basis in suitable conditions with a carrier to our analytical laboratories or a facility of your choice.

# OPERATOR EXPOSURE SERVICES

SGS can provide in-house expertise in all aspects of operator exposure assessment and determinations. One of the main aspects of human risk assessment is the exposure to the operators.

During pest control operations, the use of agrochemicals can have adverse impacts on the health of operators, bystanders, workers and residents. A thorough understanding of the health risks and legal implications associated with the use of PPP will reduce the prospect of serious consequences.

The exposure to a PPP is initially estimated using a computer model and extracted data from toxicological studies. When applying these models, for some PPPs, the estimated exposure levels can appear to be unacceptably high; under these circumstances the conduct of a controlled field study might be required in order to establish the precise level of exposure.

## OUR SERVICES

- Exposure risk assessment
- Method development and validation on all materials derived in the OPEX study.

- Conduct of field studies
- Plant protection and biocide products
- All kinds of application including seed treatment, fumigation
- In crop, glasshouse, livestock, home and garden
- Monitoring of operator, bystander, worker, residents
- Residue analysis in all relevant matrices and samples (e.g. washing solutions)
- Reporting of field and analytical phase
- Assessment of data
- Exposure assessment on standard scenarios
- Proposed mitigation measures

Human risk assessment requires a multidisciplinary approach, whether supporting Acceptable Operator Exposure Levels (AOELs) from toxicological studies, modelling exposure scenarios, generating higher

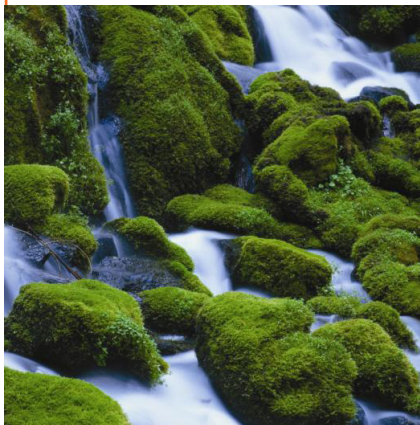


tier data (e.g. dermal absorption, or conducting complex field studies).

Working with field-based agronomists within the SGS network ensures SGS regulatory experts can locate sites and co-operators for studies at short notice.

# ENVIRONMENTAL STUDIES

SGS has a vastly experienced team of environmental experts fully conversant with the ever changing demands of protecting the environment. Knowledge about the biotic and abiotic conversion of substances is an important prerequisite for assessing the risks of chemicals in the environment.



In addition to the conversion of substances, their translocation and the associated discharge into neighbouring environmental compartments also play an important role in a complementary environmental risk assessment. Tests which help describe the behaviour of substances in the environment are required for pesticides, biocides,

chemicals and increasingly also for drugs under standardised, internationally recognised test conditions and in compliance with the principles of Good Laboratory Practice (GLP).

Our services with regard to testing of the environmental behaviour of crop protection agents and other substances include various methods and study types.

## CONSULTING/EVALUATION

- Checking existing data as a basis for environmental risk assessments
- Developing a test strategy

## BIOTIC DEGRADATION/METABOLISM

- Degradation in soils and water/ sediment systems under aerobic and anaerobic conditions
- Determining the degradation kinetics in the soil and water/ sediment systems

## ABIOTIC DEGRADATION

- Hydrolysis in relation to pH

## DISPLACEMENT

- Leaching into the soil
- Adsorption/Desorption on soils and sediments

## EXPOSURE ESTIMATES

- Calculation of the predicted environmental concentration (PEC) in soils, water, sediment, and air
- Determination of the degradation kinetics

## OUR SERVICES

- Advice in study conception
- Project and study management
- Analytics in all environmental matrices
- Modelling/PEC value calculation
- Expert opinions/Reports

# DISSIPATION AND ACCUMULATION STUDIES

SGS has a dedicated team of scientists devoted to the planning, design and conduct of dissipation and accumulation studies. Substances that degrade slowly can enrich with repeated application and can represent an increased danger for soil life and other environmental compartments such as groundwater.



Degradation behaviour and studies to calculate the concentration in the soil form a basis for an extended risk assessment within the scope of a registration process.

SGS has experience in the widespread use of crop protection agents and also in special application techniques (e.g. granular applications, seed treatment, drip application) and unusual sampling requirements (e.g. soil depths up to 2m, rice paddy soil sampling).

## OUR SERVICES

- Advice in study planning
- Coordination with authorities and farmers
- Selecting study locations and sites
- Drafting study plans
- Determining all relevant site parameters
- Equipping the location with measuring technology

- Online weather stations with data gap alarms
- Selecting and deploying validated dose verification
- Techniques to exclude surface processes
- Standard 1m depth sampling
- Sample transport, storage, validation of sample homogenisation
- Residue analysis in the soil and plant growth
- Standardisation of data/Modelling
- Determining the dissipation kinetics
- Estimating the environmental concentration in the soil/water
- Compilation of reports



# GROUND AND SURFACE WATER MONITORING

SGS has specialists monitoring the potential impact of chemicals reaching the water bodies. In case of post registration regulation in individual countries specific requirements can be raised based on surface or more often groundwater protection.

The aim of field studies is to measure transport and propagation behaviour in the environmental compartments in order to evaluate the environmental risk especially for ground and surface water. These studies requires a tailored approach taking into consideration the crop/pesticide, soil, climate and hydrogeological conditions to select representative and vulnerable sites to achieve full regulatory acceptance.

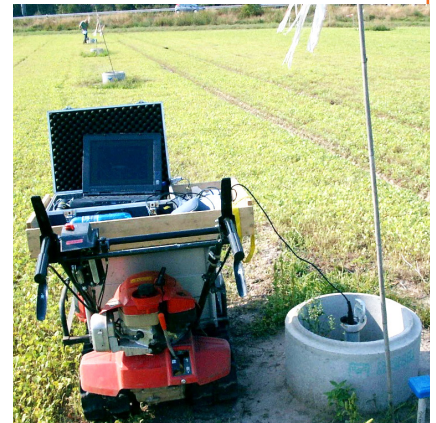
## STUDY TYPES

- Monitoring
- Studies in surface and groundwater
  - Field leaching, catchment based
  - Regional groundwater monitoring (prospective and retrospective)
  - Test site scale (field leaching) groundwater monitoring
  - Drainage studies

- Catchment and test site scale runoff studies
- Catchment scale surface water monitoring
- Elucidation of PPP findings
- Hydrogeological expert services such as catchment delineation, etc.

## OUR SERVICES

- Advice in protocol proposals to the authorities
- Coordination with authorities
- Study design and study plan
- Site selection and characterisation
- Negotiations with water authorities and farmers
- Organise site/Catchment history and manage catchment application for prospective studies
- Installation of monitoring sites including drilling of boreholes and monitoring equipment
- Selecting and deploying validated sampling technology



- Event triggered automated sampling of runoff, surface and drainage water as well as sediment sampling
- Sample transport and storage
- Residue analysis
- Compilation of reports
- Standardising the data
- Determining leaching behaviour
- Predicting environmental concentrations in ground and surface water

# SEED STUDIES

Our experts have access to a wide range of growers and consultants and can provide flexible solutions for global and local needs on all crop types.

A wide range of field crops are tested such as wheat, durum wheat, barley, triticale, oats, rye, maize grain and fodder, oilseed rape, sunflower, soybean, beans, peas, potatoes, grass, field vegetables, and flowers.

We investigate the efficacy of new seed treatments for the control of different pests and diseases.

## A FLEET OF QUALITY TESTING EQUIPMENT

- Plot drills
- Conventional box drills
- Plot harvesters

- Precision drills
- Vegetable planters
- Potato planters
- Grass drills
- Range of cultivation equipment

## OUR SERVICES

- Variety studies
- Screening of varieties
- Testing of densities
- Tolerance to diseases
- Evaluation of traits
- Crop sensitivity
- Seed treatment (GLP/GEP studies)
- Physical and mechanical seed analysis



- Seed loading analysis
- Storage stability
- Germination

# SEED ANALYSIS

SGS has a number of bespoke seed testing facilities throughout the world, which can carry out a large variety of different seed tests based on specified requirements.



SGS can offer advice on seed quality which will complement its wide range of analysis. This experience also extends to grain, incorporating expertise in grain quality, analysis and other associated topics.

## DISEASE ANALYSIS

- *Fusarium*
- Bunt
- Loose smut
- Leaf stripe
- *Ascochyta*
- Pea bacterial blight

## ADVISORY SEED ANALYSIS

- Purity
- Other species content
- Screenings
- Seed identification
- Moisture
- Thousand seed weight
- Germination
- Rapid tetrazolium viability
- Vigour testing
- Stem nematode

## GRAIN QUALITY ANALYSIS

- Protein
- Hagberg
- Gluten
- Admixture
- Moisture
- Natural weight
- Oil content
- Nitrogen
- Infestation
- Stem nematode
- Mycotoxin analysis

# PHYSICAL AND CHEMICAL PROPERTIES

SGS specialists in the physical/chemical properties testing laboratories carry out tests ranging from the physical state of the active substance/product to the detailed determination of key characteristics.



## OUR SERVICES

- Melting, freezing, solidification, boiling points
- Relative density

- Vapour pressure, volatility (Henry's law constant)
- Spectra (UV/VIS,IR,NMR,MS) and molecular extinction
- Solubility in water
- Solubility in organic solvents
- Partition coefficient (n-octanol, water partition)
- Stability in water:
  - Hydrolysis rate (DT50)
  - Phototransformation
  - Identity of breakdown products
  - Dissociation constants (pKa values)
- Flash point, flammability, auto-flammability
- pH, acidity or alkalinity
- Viscosity, surface tension
- Relative density, bulk density
- Storage stability shelf-life
- Suspensibility
- Spontaneity of dispersion
- Dilution stability
- Emulsifiability
- Stability of emulsions
- Sieve test
- Size distribution of particles
- Dust content
- Friability, attrition characteristics
- Flowability, dustability
- Compatibility in tank mixes

All physical and chemical analysis studies are carried out according to the OECD/EU guidelines and in compliance with GLP. With the exception of the explosivity/oxidation studies (carried out a partner organisations) all studies are conducted in SGS laboratories by highly experienced staff.

# ANALYSIS OF PESTICIDE DURING DEVELOPMENT

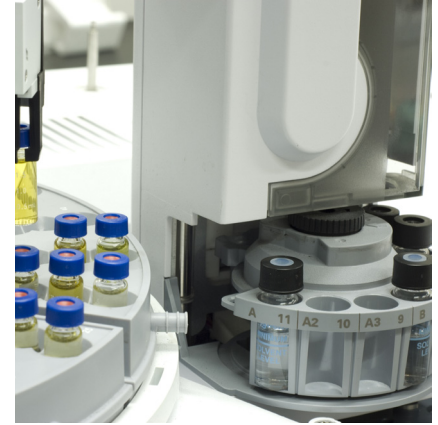
During the development of new plant protection products, analytical methods are developed and validated for the determination of residues and product chemistry. For Residue Assessment the methods are based on the residue definition which may include the active substance and/or the major metabolites. For the product chemistry the methods are based on the active substance and the product properties.

SGS has experience in performing pesticide analysis from metabolism studies to residue determination and independent method validation in dedicated GLP compliant laboratories.

We are able to provide analytical solutions for organic and in-organic pesticides, biocides, fertilisers, biologicals, and product components such as surfactants and other additives.

## OUR SERVICES

- GLP Study directorship/PI
- Extraction efficiency comparison
- Method development in all kind of matrices
- Method validation according to SANCO guidance documents
- Independent laboratory validation
- Residue storage stability
- Assessment of pesticide method suitability for monitoring
- Residue level determination in all matrices include soil, sediment, water, air, crops, processed crops and products, consumables, animal food and feed, blood, etc.
- Experience in non target animals and plants residue testing
- Dose verification in environmental fate and ecotox studies
- Impurity profiling/Quantification
- 5-batch analysis
- Physicochemical and safety parameter for active ingredient and product
- Further analysis available upon request



SGS has specific competence to run sample homogenisation under deep frozen conditions, sample preparation and analysis with most state of the art instruments (e.g. LC/MS/MS and GC/MSD).

# FOOD PROCESSING STUDIES

SGS has many years of experience in the fields of food technology, content and residue analysis of raw materials, intermediates and end products, SGS is able to offer a complete service in almost all areas of the food industry.

A large number of conventional techniques such as bottling and canning, milling, fermentation, refining, brewing and sterilisation can be used under industrial production conditions as required.


## OUR SERVICES

- Analysis of processed fractions
  - Conducting and monitoring processing studies.
- Our experiences with industrial processing cover a broad spectrum. All food processing processes are carried out according to the OECD guidelines and in compliance with GLP. In addition to processing and analysing food, animal feed (e.g. silage) and taint testing can also be performed (without GLP). SGS carries out the processing studies as balance or follow-up studies and, on the basis of the results of the processing and residue analysis, calculates the transfer factors for the residues.



## CONTACT

E-mail: [seed.crop@sgs.com](mailto:seed.crop@sgs.com)

Follow us on 

[WWW.SGS.COM](http://WWW.SGS.COM)

WHEN YOU NEED TO BE SURE

