



SEED AND CROP SERVICES

SOLUTIONS FOR LIFE SCIENCE COMPANIES, PLANT BREEDERS, SEED PRODUCERS,
FERTILIZER PRODUCERS, DISTRIBUTORS, GROWERS AND CONSUMERS.

www.seedservices.sgs.com
www.cropservices.sgs.com





CONTINUOUSLY
INNOVATIVE

Production agriculture needs continuous innovation to improve the management and sustainability of our natural resources. With demands for efficiency and increasing environmental concerns, expertise in germplasm development, research activities, product development, fertility management, and other speciality analytical techniques are crucial for success. To provide solutions for this highly specialised sector, SGS has developed a unique package of added value services. Life Science Companies, Plant Breeders, Seed Producers, Agro Chemical Companies, Distributors, Fertilizer Suppliers and ultimately Farmers can now benefit from efficient registration, safe application and optimum usage of these products.

- **Seed Services**
- **Laboratory Research Services**
- **Fertility Management**
- **Speciality Testing Services**

SGS is the world's leading inspection, testing, verification and certification company. Serving the agricultural sector for more than 130 years and with more than 50,000 employees in over 140 countries, SGS is recognised as the global benchmark for quality and integrity.



SEED SERVICES

SEED QUALITY ASSURANCE SERVICES

SEED GERMLASM SERVICES

Seed genetics are vital to the success of our clients. Information concerning the purity and identification of germplasm allows effective decisions to be made in the marketing and production of the seed.

In the area of transgenically modified (GMO) seed, event, trait identification and purity analysis is conducted. Methods include polymerase chain reaction (PCR) which detects transgenic DNA and Enzyme-Linked Immunosorbant Assay (ELISA) which detects proteins expressed from the inserted DNA. PCR and ELISA testing begins at the breeding level to confirm event/traits and continues with seed production to confirm required trait purity level. End users also use PCR and ELISA to detect GMO's in whole grains, processed grains and food products. Analysis for GMO's determines the presence of GM events, either on a qualitative, semi-quantitative, or quantitative basis.

PCR SERVICES

- Event identification on leaf, seed, or processed materials
- Quantification of GMO level on seed or processed materials

ELISA SERVICES

- Purity level for single seed analysis of 90, 180, or client requested number of seed analysis

Confirmation of event present for field and production troubleshooting. Electrophoresis is utilised to determine genetic characterisation and purity of

the seed. Varieties may be distinguished from others through unique banding patterns. Purity on 100 to 200 individual seeds is used in some crops. For open pollinated crops, a sample of the population is compared to a sample from a foundation population. Electrophoretic methods utilised are starch gel and isoelectric focusing (separates proteins by pH) electrophoresis.

SEED VIABILITY

Accredited by the International Seed Testing Association (ISTA), and ISO certified the SGS seed laboratory adheres to the highest possible standards for seed testing.

Specie Types

- Agricultural crops
 - Grasses
 - Legumes
 - Flowers
 - Shrubs
 - Trees
- Native and non-native species

Our germination laboratories utilise modern scientific and proprietary equipment to ensure repeatability of science based test results. Our experienced staff has demonstrated expertise in virtually all main crops that are grown.

A critical point in the marketing of seed is the determination of the germination quality. The germination of the seed lot provides the seed marketers with a basis to determine market value.

TETRAZOLIUM TESTS

Much of the seed industry requires fast turn-around time to meet shipping deadlines, place bids on seeding projects, and to manage emergency seed needs that can occur in natural disasters. In these cases, a quick evaluation of the viability of the seed is needed. The Tetrazolium Test or Rapid Viability Test is a biochemical assay of the embryonic regions of the seed. This test measures respiration of the living cells and allows a determination of the viability and vigour of the seed. It is critical to have experienced seed analysts conducting this microscopic examination. SGS offers these tests to the seed industry to assist them in meeting these unexpected demands.

SEED VIGOUR

Measurements of seed vigour are primarily germination based tests that subject the seed to a variety of simulated environmental stresses for different lengths of time. vigour tests methods are highly researched and utilise both ISTA Rules and methods published in the Association of Official Seed Analysts (AOSA) Vigour Test Handbook. Some of our vigour tests have been developed and researched internally to address specific quality issues for certain segments of the seed industry.

- Cool Germination
- Cold Germination
- Saturated Cold
- Accelerated Aging
- Electrical Conductivity

AGRONOMICALLY ACCURATE?





GENETIC PURITY

The genetic purity of the seed is important to the consumer because they are basing management decisions on the various agronomic characteristics of that particular variety of seed.

Some seed varieties have visual characteristics that are either on the dry seed or that are exhibited when the seedling is grown out. SGS conducts routine visual examinations to detect contamination by other varieties of the same kind of seed.

- Hilum colour examinations
- Hypocotyl colour examinations
- Phenol Testing
- Peroxidase Activity Testing
- Florescence Testing

Electrophoresis is utilized to determine genetic characterization and purity of the seed. Varieties may be distinguished from others through unique banding patterns of proteins. Purity on 100 to 200 individual seeds is used in some crops. For open pollinated crops, a

sample of the population is compared to a sample from a foundation population. Electrophoretic methods utilized are starch gel and isoelectric focusing (separates proteins by pH) electrophoresis.

PHYSICAL PURITY

The purity of the seed is determined by visual examinations of the bulk sample for the following contaminants:

- Pure seed
- Other species
- inert material

Samples for purity testing require 2500 seeds to be examined for the contaminants. Other seed determinations or noxious weed seed evaluations are based on a quantity of seed 10 times larger than the purity examination (25,000 seeds). Individual countries have specific contaminants that cannot be present in the seed.

The turf grass market requires specialized examinations to be done on even larger

quantities of seed to look for specific seed kinds that are not considered noxious weeds by State or Federal laws, but that cause management issues in turf situations. SGS conducts these examinations for “Undesirable Grass Seeds” in accordance to the specific standards that the turf industry requires.

SEED TECHNOLOGIST TRAINING WORKSHOPS

An essential part of a viable seed industry is to have capable analysts available to determine the physical attributes and quality levels of the seed. SGS offers comprehensive training workshops at various times of the year to current staff, and other external analysts so that they may further their skills. This assists in developing uniformity of testing across the industry and provides a resource pool for the future of the seed industry. The results of the tests that the seed analysts conduct is the basis for the information on the seed label, so it is critical that well-trained analysts be available to provide that information.

The workshops are focused into segments depending upon the needs of the analysts. SGS-MWSS offers ISTA Germination and Purity Testing workshops, AOSA/SCST Germination and Purity Testing workshops, Genetic Technologies Workshops, Tetrazolium Testing and Vigour Testing Workshops, and Workshops focused on a particular crop and quality measurements associated with that crop.

SEED EXPORT SERVICES

In the global seed market it is essential that quality testing is completed prior to shipment departure to prevent delays upon export. Importing countries use ISTA certificates to verify shipments are in compliance with their seed standards. SGS provides the required sampling and testing for seed exports.

SGS is accredited by both International Seed Testing Association (ISTA) and National Seed Health System (NSHS). ISTA certificates are recognized worldwide and required by many countries to ensure seed shipment acceptance. SGS train, accredit, and audit individuals that draw authorized samples for ISTA Orange International Certificates (OIC). SGS accreditation by NSHS allows us to conduct sampling, visual inspections and various seed health tests for phytosanitary certificates, therefore providing the knowledge and support to assist you in your global shipping needs.

ISTA AUTHORIZED SAMPLER TRAINING

- Authorized sampler workshops
- Audit seed samplers
- Support for samplers

ISTA ORANGE(OIC) AND BLUE INTERNATIONAL(BIC) CERTIFICATES

- Internationally recognized
- International requirement

SEED HEALTH TESTING

- Sampling for phytosanitary certificates
- Visual inspection
- Various seed pathogen tests

LABORATORY RESEARCH SERVICES

New innovations are continuously occurring within the seed industry. These innovations performed on the seed are both internal and external. To bring new seed amendments to market various product quality measurements must be determined including seed flow ability and germination effect.

SGS is on the forefront of test method development; not only for evaluating internal seed enhancements such as herbicide trait, but also for assessing seed quality and vigour. SGS has the experience and expertise to perform or develop the necessary tests to evaluate product performance and can assist your company by providing quality third party laboratory evaluation.

SGS LABORATORY RESEARCH SERVICES

- Seed Safety and Storage Trials for Seed Amendments
- Seed Quality Assurance Method Development
- Seed Treatment Dust Off Studies
- Seed Treatment Trail Study Preparation
- Seedling Growth Rate Studies
- Plantability Assessments
- Herbicide Trait Detection Method Development

ANALYTICAL SERVICES

From planting seed, to harvest, processing and marketing of the subsequent agricultural products SGS can provide the highest quality analytical testing utilizing validated methods and cutting edge technology.

SGS provides analysis of seed protectant loading rates ensuring your seed is protected without costly over application which can lead to decreased seed germination. SGS not only verifies loading rates, but also assist companies in implementing quality management of product application preventing problems before they occur. SGS Laboratories analyse a large spectrum of current products and works with seed protectant companies releasing new products.

Accurate measurement of out-put traits of crops are increasingly important as consumers demand verification of quality, and new technologies are utilized by feed, ethanol, and oilseed industries. SGS laboratories have multiple methods of analysing your products including official methods validated by AOAC and AOCS and non-destructive analysis utilizing NIR. SGS provides analysis of your seed, feed, and by-products (such as dried distillers grains with solubles-DDGS) for oil/fat, starch, protein, fibre etc.

Product safety is also an important issue affecting producers and processors. SGS provides individual and full screens of mycotoxins and antibiotics found in feed, DDGS, milk and other food products verifying safe levels for consumption. Human pathogens such as Escherichia Coli, Salmonella, and Listeria monocytogenes can also be tested for in feed, and food products. SGS laboratories utilize traditional FDA microbiological culturing methods along with rapid methods validated by FDA/AOAC that utilize ELISA and PCR technologies.

BENEFITS FOR YOU

- Extensive knowledge and experience
- Fast turnaround and unique online tracking of results
- One stop shop for all your requirements



CROP SERVICES

CROP SERVICES



LABORATORY RESEARCH SERVICES

FIELD TRIALS

Prior to commercialisation new pesticides, seed varieties and fertilizers have to be tested in supervised field trials. One of the obligations in the process of development is to carry out field trials on various crops in different regions.

SGS has created a Network of Field Trials Stations located in Europe, North America and South America to provide standardised services to the World's major Biotechnology, Agrochemical, and Fertilizer producing companies. These centres provide a comprehensive field trials service in accordance with the GLP and GEP accreditations. Our experienced staff can conduct field trials to support the screening, development and registration of agricultural and horticultural chemicals, bio-pesticides, fertilizers and also new plant varieties and seeds (including GMO). The purpose of these trials is to test the efficacy or effectiveness of the product, the crop tolerance and the pesticide residue situation.

The procedure consists of application of products at different levels of dilution on specially controlled crop areas. Agronomical observations are then performed along with the collection of samples. All kinds of crops and different cropping systems can be considered. Harmonised procedures, special protocols

and documentation systems specific to our clients are used to compile the required study data. Samples drawn by our experts for residue analysis are immediately deep frozen and dispatched to our laboratories in Germany, USA and Egypt or to those of our customers where the specialized residue analysis is performed:

GEP SERVICES

- Efficacy testing – protocols drawn up to EPPO guidelines
- Demonstration sites – management of large or small scale sites to demonstrate the capabilities of new agrochemical compounds
- Horticultural Trials
- Glasshouse / polytunnel work
- Compatibility testing
- Cultivation studies
- Biopesticides
- Specialised trials conducted on crop varieties, weed screens, forestry trials, amenity trials, grassland and amenity turf
- Evaluation of rain fastness of products

GLP SERVICES

- Project Management / Study Directorship
- Crop residue studies
- Crop rotation studies
- Soil dissipation studies
- Accumulation studies
- Operator exposure studies

BENEFITS FOR YOU

- Our standardised operating procedures
- Quality approach and state of the art equipment, prevent bias in the studies performed
- One single contact offering a fully international service



GETTING EFFICIENTLY TO MARKET?



FERTILITY MANAGEMENT

For precision farming it is essential to balance the crop nutrient requirements. It is possible through the application of precise sampling and high technology testing to map accurately the soil. SGS provides a high technology approach to soil sampling and testing. Parent material, geological events and environmental conditions over long periods have created an earth surface which has significant nutrient variability. Both large and small crop areas, testing for soil macro and micronutrients, soil acidity or alkalinity or other soil parameters can be performed. By determining the current nutrient levels in the soil, fertilizer application requirements can be mapped to optimise crop productivity potential.

Because of the spatial variability of soil nutrient values at the field level, new technologies involving GPS and site specific applications, known as variable rate technology (VRT), have been developed to place the right amount and type of fertilizer where it is most needed.

This may mean, for example that 2-5 different rates of phosphorus fertilizer are applied in the field instead of one single broadcast rate. Efficiency, reduction of cost and environmental protection can result.

If the grower charts his nutrient needs over time, he will establish fertilizer trends. These trends further advance knowledge of the productivity of the fields, which allows more precise applications of VRT developed over time. SGS is a leader in GPS site specific agriculture which can bring cost reduction through more efficient application of fertilizers.

CUSTOMISED SAMPLE COLLECTION

- Highly trained professional field staff available at your location
- Standardised sampling procedures for accurate results
- Grid or zone sampling techniques tailored to your operation
- GPS location sampling techniques
- Solves your limited manpower issues during labour intensive seasons.

GRAPHIC INFORMATION SYSTEMS MAPPING

- Complete GIS mapping services
- Yield, Soil Nutrient, Variable Rate, etc.
- Multiple software platforms
- Export to any file type
- Parameters adjustable to clients needs or local specifications
- Data and visual reporting delivered

SOIL ANALYSIS

- Multiple methods of nutrient analysis for pH, N, P, K, Ca, Mg, S, Zn, Mn, B, Fe, Cu, Na, soluble salts, organic matter, base saturation, and calcium carbonate equivalent (CCE).
- Engineering properties: texture and water holding capacities
- Fertility recommendations based on client supplied parameters and sample analysis.
- Standardised or client specified testing packages available

SPECIALITY TESTING

When growing crops sometimes nutrient problems arise in the areas of the field. The use of plant tissue analysis can point to specific nutrient problems. Plant analysis is a snapshot of nutrient uptake in the growing plant. This tells how well a plant is feeding from the soil supply of available nutrients. Sometimes the current crop can be amended for a response this year, other times it is gained knowledge of the field for the next crop.

Plant analysis is a tool that can be used in Integrated Pest Management (IPM). IPM is scouting a field several times throughout the crop cycle from emergence to harvest. The scout looks for signs of uncontrolled weeds, insects or plant diseases that can reduce yield.

PLANT ISSUE TESTING

- Plant available nutrients
- Packages from single nutrient to full spectrum

Many of the grains and forages that are produced are used as animal feeds. SGS can determine the feed values by both NIR and wet chemistry assays. These values can be used to formulate a feed ration for livestock by an animal nutrient specialist.

FEED AND FORAGE

- NIR/Wet Chemistry
- Nutrients, aflatoxin, protein, moisture, ADF, NDF, etc.

Chemical Fertilizers are effective, but can have a very high cost. For this reason, animal manure is being increasingly used as a nutrient resource. Much of the nutrient content that an animal consumes but does not actually digest is valuable available nutrient. SGS can analyse the manure for fertility content which can eventually contribute towards crop nutrient requirements.

When growers use livestock manure, a Nutrient Management Plan (NMP) can be developed. The NMP utilises site specific soil analysis in conjunction with manure analysis to determine the best rates of manure to be spread per land unit to reduce commercial fertilizer cost and prevent environmental pollution.

MANURE/SLUDGE ANALYSIS

- pH, % moisture, nutrients, heavy metals, volatile solids, calcium carbonate equivalent (CCE)

WATER ANALYSIS

- Livestock suitability, Fecal Coliform, Drinking Water

SOIL NEMATODES

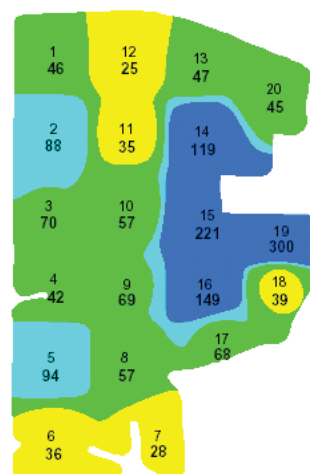
- Quantitative and qualitative analysis for Corn/Soybean variety.

FERTILIZER/LIMESTONE ANALYSIS

- N, P, K, S, Zn, specific gravity

BENEFITS FOR YOU

- Increase of precision brings the possibility of reduced fertilizer cost
- Increase in yield through accurate soil fertility determination
- Increased environmental protection through accurate application of products



MAKING **GAINS** THROUGH TECHNOLOGY?

WWW.SGS.COM