

# SHIELD

Proactive Protection For Every Seed

Quality is a customer expectation and a Bayer promise. That's why we developed SHIELD—a comprehensive approach to deliver healthy seeds season after season. For over 10 years, SHIELD has focused on the prevention, detection and elimination of pathogens at Bayer production and processing sites, as well as third party production and processing sites for Seminis and De Ruiter. Microorganisms can cause plant disease or illness, and when introduced to a plant population under the right environmental conditions, disease leads to plant stunting, wilting, fruit deformation, yield loss or even plant death. SHIELD is Bayer's promise to take a proactive approach to supplying clean seeds so your confidence can flourish.



SEED · HEALTH · INNOVATION · EXCELLENCE · LEADERSHIP · DISCIPLINE

## OUR PROCESS

Our comprehensive process consists of three distinct disciplines: **Seed Production and Field Quality**, **Seed Sanitation** and **Seed Health Testing**.



Our global **Seed Production and Field Quality** specialists support our industry-leading approach around the world, offering valuable expertise and conducting timely field inspections in search of potentially harmful pathogens. They set strict growing guidelines to reduce the risk of harmful pest and disease.

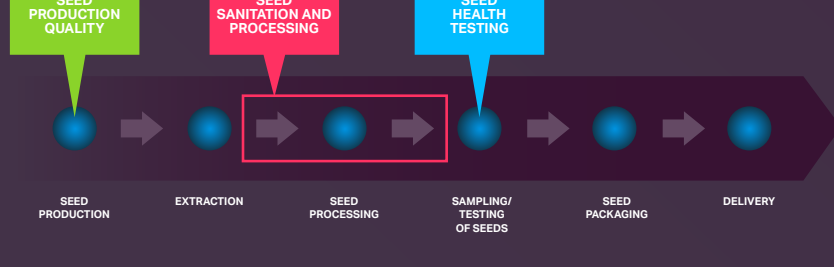


Our **Seed Sanitation** processes add another layer of seed protection. While we have established processes in place, we are also constantly searching for new sanitizing methodologies with increased efficacy.



**Seed Health Testing** ensures we ultimately provide best-in-class seed by collaborating with the industry to develop harmonized test methods.

Bayer uses a holistic systems approach to produce clean seed. Control points are placed at each critical step of the production process of pre-commercial and commercial seeds, and each batch must pass a final set of quality assurance tests before being delivered.

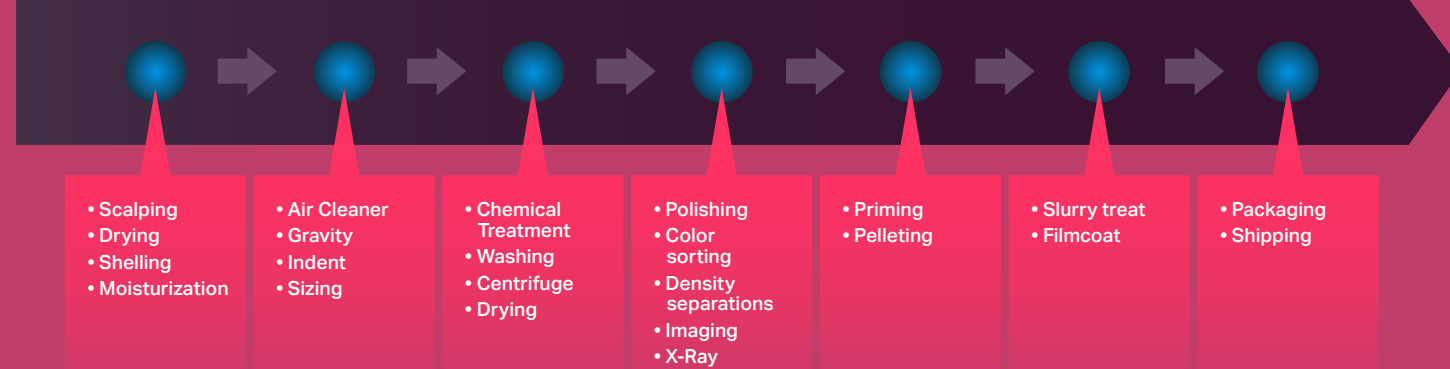


## SEED PRODUCTION QUALITY

*The First Step in Results*

SEED PRODUCTION GUIDELINES	INVEST IN OUR PEOPLE	INSPECTIONS	DIAGNOSTICS	INNOVATION AND DIGITALIZATION
Bayer sets high internal standards for seed production practices <ul style="list-style-type: none"><li>Focus on risk posed by water, people and materials</li><li>Disinfection measures before entering a production field and when handling plants</li><li>Advice on disinfectants use based on their performance and the pathogens risk</li><li>Crop protection guidelines for the different crop stages</li></ul>	Training on hygiene standards and Clean Seed Production Practices (CSP)  Training on diseases recognition	Detect pathogens/ abnormalities at field level  Ensure seed production guidelines are followed through internal audits  External inspections by country authorities	Internal diagnostic capabilities in each of the key countries where we are producing	Digital Field Scoring System to: <ul style="list-style-type: none"><li>Capture crop development records</li><li>Identify quality improvements needs</li><li>Industry co-creation</li></ul> Timely identification at the field level of diseases through the development and deployment of state of the art technology

## Seed Processing Overview



*\*Not all seeds will follow every step of this process*

## SEED SANITATION

*Clean Seeds Minimize Risk*

### WHAT IS IT?

HYGIENIC MEASURES THAT MAY INCLUDE ONE OR A COMBINATION OF PROCESSES

### WHY IS IT NECESSARY?

THESE HYGIENIC MEASURES PREPARE SEED FOR FURTHER PROCESSING BY CLEANING THE SEED AND, IF NECESSARY, MAY ALSO TARGET KEY PESTS OF INTEREST

### WHEN IS IT CONDUCTED?

DURING SEED EXTRACTION OR SEED RECEPTION AT PRODUCTION AND PROCESSING SITES

### INNOVATION

Research on specific microbial issues  
  
Establish standard specifications for sanitation equipment

Equipment design and improvements

### SUSTAINABILITY

Ensure safety and compliance of seed sanitation

Continuously develop innovative seed technologies that are efficacious and environmentally friendly while maintaining seed quality

### CUSTOMER FOCUS

Global consultancy for Production and Operations

On-site support at operation plants

## SEED HEALTH TESTING

*Confidence Backed by Technology*

WHETHER A PROTECTED CULTURE, A PROCESSING OR AN OPEN FIELD CROP, WE PRODUCE ALL OF OUR SEED USING THE SAME RIGOROUS STANDARDS.

- Product lines tested from breeder to commercial seeds
- Test plan focused on harmful pests and diseases

OUR INTERNAL SEED HEALTH LABORATORIES ARE ROUTINELY AUDITED FOR TRAINING AND PERFORMANCE.

- U.S. testing lab accredited through National Seed Health System managed by USDA
- US testing labs and in the Netherlands are Nakuibouw (the Netherlands Inspection Service for Horticulture) Authorized
- We follow the International Seed Federation ISHI-Veg industry standard test methods
- Bayer actively works internally and collaboratively externally to develop better technologies
- When we partner with third party testing labs, we expect that they are equivalent to our internal testing labs

## Customer Confidence Programs

Bayer's long-standing SHIELD program builds your confidence by using a holistic program approach.



CSP

ALL CROPS



GSPP

TOMATOES AND ROOTSTOCK

Clean Seed Program (CSP) is an internal Bayer Vegetables program that is committed to providing the best management guidelines for producing clean seed. For each crop family in our portfolio, we follow protocols focused on phytosanitary guidelines to prevent the introduction and spread of disease in our production fields. CSP results in better seed quality and more consistent supply.

Good Seed and Plant Practices (GSPP) is an accreditation program driven by seed companies and plant raisers that covers seeds and young plants. This hygiene and disease prevention system focuses on Cmm (bacterial canker) on tomatoes and tomato rootstock. We currently have four accredited Protected Culture sites.

Accessibility to information, technology and seed health education and training is important to supporting your knowledge of Bayer seed health standards, testing and field management.

Proactive Protection For Every Seed

THANK YOU!



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