

# Portable Analytical Solutions for Food Safety & Agriculture



- Nutrient diagnostics and heavy metal screening
- Identification of contaminant objects found in food
- Fast, non-destructive measurements
- Ideal for solids, powders, plant tissue and liquids
- Interactive touchscreen with Wi-Fi connectivity
- Light-weight and battery or AC powered



## Healthy soil, crops and food maximize farm-to-table safety, quality & profitability



Safe and nutritious food is of primary concern to everyone, from the farm to the table. The recent prevalence of contaminants and adulterated, counterfeit or fraudulent food has led to an increase in public awareness and government regulations.

Simple, routine and sophisticated science-based methods enable a reliable, precise, accurate, transparent and harmonious decision making process for safe and nutritious food the world over.

Bruker's portable XRF solutions offer multi-element analysis with off-the-shelf or customized methods to provide actionable results at any stage of the food production process – from the presence of required elemental nutrients to threats from elemental and metal contaminants.

**Bruker provides science-based portable XRF solutions for rapid, routine testing and in-depth research analysis for food and agriculture applications in the lab, factory or in the field**





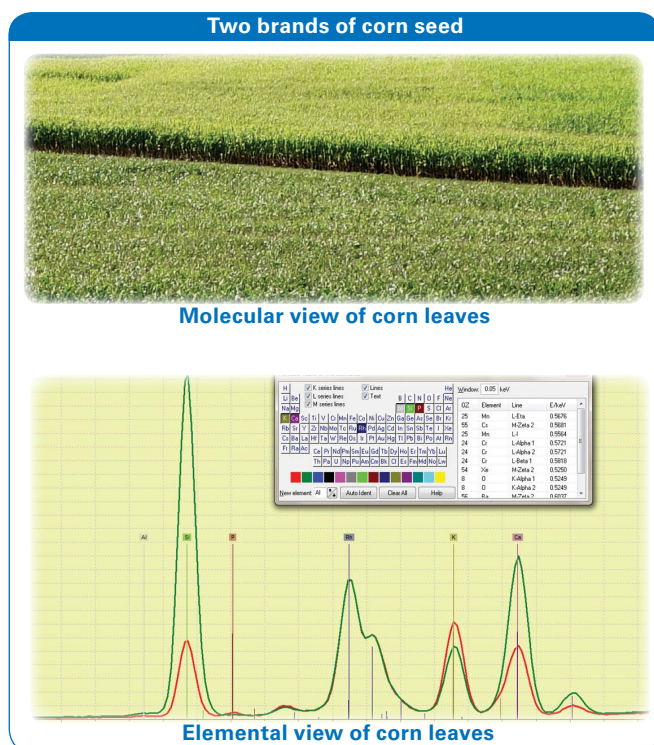
## Portable elemental analysis solutions for farm-to-table safety, quality & profitability

### Sustainable and healthy soil, crops & food

- Elemental content, characterization & profiling

### Food control management & inspection

- Quality analysis at critical control points for raw materials, during process and finished products
- Hazardous analysis at critical control points for intentional & incidental adulterants and metallic contaminants
- Expedited Foreign Body Investigations (FBI) at food processing plants when contaminant objects are found



## Characterize fields quickly and non-destructively for optimized cultivation

- Analyze elemental composition of soil to confirm healthy and sustainable fields
- Perform nutrient diagnostics and heavy metal screening of area soil, irrigation source and fertilizer for optimized crop quality and yield
- Compare quality and yield of various seed brands or fertilizer mixes
- Analyze elemental nutrient content in plant tissue
- Enhance sustainable farming practices with field composition characterizations

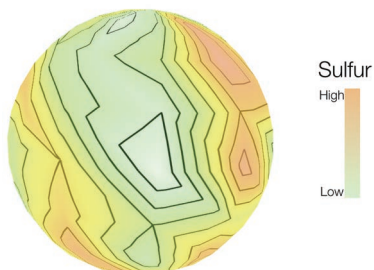




### Generate elemental maps in 2D or 3D with portable XRF data



#### 2D relative abundance plot of sulfur on a tomato



### Examine fertilizer and treatment effectiveness

- Research elemental properties of soil and fertilizer placement to determine maximum yield mixes in support of regional farming
- Optimize surface treatments such as Ca, Cl, S on produce for preservation of product from farm to market to minimize financial loss
- Analyze elemental nutrient content of solid, powdered or liquid organic and manufactured fertilizers for effectiveness before use
- Integrate elemental analysis data into healthy soil and crop Smart Farming programs

### Screen for toxic metals in water, soil & plants

- Monitor heavy metals (Pb, As, Hg and more) in-situ and in real time
- Determine toxic metal concentrations in water, soil, sediments and crops with matrix-matched standards
- Profile phytoremediation effectiveness by characterizing toxic metal uptake in soil remediation plants such as Indian Mustard (for Cd, Pb, Se, Zn, Hg, Cu, 137Cs), White Willow (for Cd, Ni, Pb), Sunflower (for Pb, Zn), Hemp (Cd, Pb, Ni 137Cs) or Ladder Brake (for As)
- Integrate elemental analysis data with GPS coordinates in the field for elemental mapping of farming areas







### QC/QA incoming material as well as in-process and finished products

- Determine elemental nutrient content in products such as Se or Mo in dietary supplements or Fe in animal feed
- Analyze elemental food content for fortificants such as Fe and Ca in milk liquid and powder or I in salt
- Screen raw materials and finished products for metals such as Pb, Hg or As
- Identify intentional or incidental adulterants such as Pb or Cr colorants or As and Br from pesticides



### Pass/Fail results for incoming, in-process or end products

48 Test PASS  
Time 73.0

EI	PASS	PPM	FAIL	+/-
Pb	700	27	1300	16
Cl	700	0	1300	31
Ba	700	0	1300	43
Sb	700	0	1300	33
Cd	70	0	130	16
Se	700	0	1300	4
Hg	700	0	1300	3

Spectrum

36 Test FAIL  
Time 58.0

EI	PASS	PPM	FAIL	+/-
Cl	700	460K	1300	3533
Pb	700	8658	1300	104
Hg	700	26	1300	23
Se	700	19	1300	9
Ba	700	0	1300	147
Sb	700	0	1300	104
Cd	70	0	130	45

Spectrum



### Screen all Food Contact Materials (FCMs)



### Audit metals and alloys of incoming stock, in-process materials and finished products

- Check for hazardous elements in food packaging such as plastics, polymer films, tins, cans, and cardboard packs
- Confirm metal and alloy grades of incoming and in-service piping, tubing, components, parts and welds
- Monitor blending, grinding and mixing operations for metal contamination
- Check heavy planting, harvesting and transportation equipment & machinery components to ensure safe and durable alloy grades



## Portable elemental analysis for food & its cultivation

Micronutrients				
Mn <sup>25</sup>	Fe <sup>26</sup>	Cu <sup>29</sup>	Zn <sup>30</sup>	Mo <sup>42</sup>
Critical Nutrients				
P <sup>15</sup>	S <sup>16</sup>	K <sup>19</sup>	Ca <sup>20</sup>	
Toxic Metals				
As <sup>33</sup>	Hg <sup>80</sup>	Pb <sup>82</sup>	U <sup>92</sup>	

Elemental analysis provides key information to help assure the presence of essential and beneficial nutrients & treatments as well as the absence of toxic metals in food, plants, soil and water. When you can't bring samples to the analyzer, you can take Bruker's portable XRF (pXRF) analyzers to them.

These multi-element analyzers are ideal for nutrient diagnostics, treatment effectiveness, heavy metal screening, or fast ID of alloys & metals in parts & processing equipment. They can even be used to QC incoming feed stock for on-site generation of renewable energy.

## Portable elemental analysis



Our portable Counter Top XRF, the CTX, is configured for measuring elements from magnesium to uranium in liquids, samples which require preparation, and those best analyzed in a sample cup. The convenient form factor of the CTX is ideal for food QA/QC at critical control points of raw materials, during process, and for finished products. The CTX is also ideal for agriculture related scientists who study plant tissue, root stock, fertilizer mixes, fertigants, oils and soils.





## Bruker portable XRF analyzer benefits

- Non-destructive measurement of sample material as-is or with minimal sample preparation
- Battery operated and ruggedized analyzers, ideal for remote locations, at-line and in-situ tests
- Off-the-shelf pre-installed calibrations for out-of-the-box testing with no user adjustments necessary
- Advanced data analysis software for qualitative and custom or user generated quantitative analysis
- Low operation and maintenance costs with no hazardous waste disposal requirements
- Powerful, green alternative to traditional ICP and AAS atomic spectroscopy methods

## Handheld elemental analysis



Our Hand Held XRF (HHXRF) TRACER 5 Analyzer with air, helium or vacuum beam paths and customizable filters provides lab-like qualitative and quantitative analysis of elements from sodium to uranium. The advanced Tracer XRF enables detection limits of the lightest elements at detection limits lower than standard pXRFs. Its versatility enables in-situ or laboratory research and methods development for multi-element analyses with custom SRMs for soil, fertilizers, seeds, plants, crops & treatments, liquids and more.

# Point-and-shoot handheld XRF



Our S1 TITAN point-and-shoot HHXRF provides fast results in composition, pass/fail or Y/N for Mg to U in soil, dry plant matter, incoming biomaterial and final food products for well-defined and standard materials and methods. Options for off-the-shelf or custom calibrations are available. The S1 TITAN is a workhorse for fast metal and alloy ID of incoming and in-service piping, tubing, components, parts and welds. It's the go-to HHXRF tool for identifying contaminant foreign bodies found in food products.

## Health & safety, quality & yield, profitability & sustainability

**Bruker portable XRF analyzers can help reach your objectives**

### **Farming**

Soil  
Seeds  
Irrigation  
Fertilizers  
Treatments  
Plants & feed

### **Processing**

Raw materials  
Mixes/blends  
Stored goods  
Equipment  
Waste

### **End products**

Beverages  
Snacks & condiments  
Grains  
Supplements  
Packaging

### **Materials**

Liquids, slurries & powders  
Soil, sediment & sludge  
Cellulose, polymers & paper  
Solids, metals & alloys

### **Measurements**

Nutrient content  
Nutrient profiling  
Elemental composition  
Elemental mapping  
Fortificant content  
Adulterant content  
Heavy metal content  
Metallic contaminants  
Alloy grade ID

### **Time to measure**

Minimal to no sample prep  
Screen content in seconds  
Measure content in minutes  
Analyze for actionable results

### **Nutrients & fortificants**

Manganese (Mn)  
Iron (Fe)  
Copper (Cu)  
Zinc (Zn)  
Selenium (Se)  
Molybdenum (Mo) & more

### **Fertilizers & treatments**

Sodium (Na)  
Phosphorus (P)  
Sulfur (S)  
Potassium (K)  
Calcium (Ca) & more

### **Heavy & toxic metals**

Arsenic (As)  
Mercury (Hg)  
Thallium (Tl)  
Lead (Pb)  
Uranium (U) & more

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