

# UNIBEST Resin Capsules for Soil and Environmental Testing



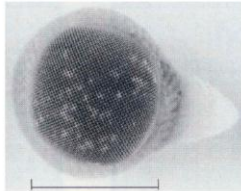
U.S. Patent 5,355,736  
Canadian Patent 2,087,153

## Ag Manager™ and Soil Savvy™

A technology providing a simple and accurate measure of elemental bioavailability.....

Potassium	Sodium
Sulfur	Manganese
Phosphorus	Iron
NO <sub>3</sub> -N	Zinc
NH <sub>4</sub> -N	Copper
Calcium	Lead
Magnesium	Mercury

## Resin Capsule



2 cm (0.75 inches)

Made in the U.S.A.

## Terra Tracker™

Targets organic chemicals  
In Situ Solid Phase Extraction (ISSPE)  
to detect, monitor, and quantify

- Chlorinated industrial solvents
- Hydrocarbons
  - Gasoline
  - Other petroleum compounds
- Pesticides
- Organic – heavy metal complexes
- Soil humics
- Gases (aliphatics and aromatics)

Ag Manager™  
Soil Savvy™

## Benefits

Terra Tracker™

### Reduces lab cost dramatically

Eliminates lab testing steps (drying, grinding, weighing, and multiple extractions).

### Simultaneous, “universal” adsorption

All available elements accumulated by a single capsule. Nutrients and contaminant levels revealed.

### Reduces testing costs by 30 – 50%

Passive *in situ* test for natural conditions. Improves detection by concentrating over time. Sensitive to liquid, dissolved, or gas phases.

### Monitor or quantify simply

No need for elaborate equipment for chemical accumulation. Simple extraction techniques for sample analysis.

Ag Manager™  
Soil Savvy™

## Applications

Terra Tracker™

### Use in the laboratory

Simple, straightforward protocols. Use of “field fresh” samples.

### Use in the field

Continuous *in situ* monitoring.

### Contaminant testing in soil, vadose zone, water and gas

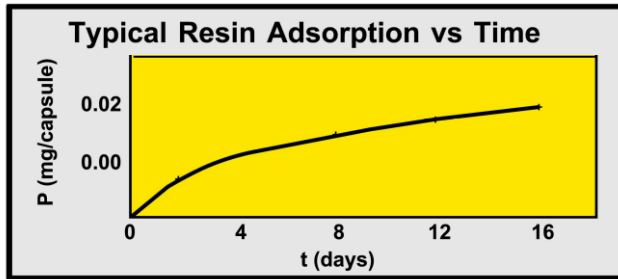
Excellent detection of hydrocarbon vapors in soils. Monitor *in situ* remediation progress. Easily determine types and relative amounts of organics.

## Physical Characteristics and Specifications

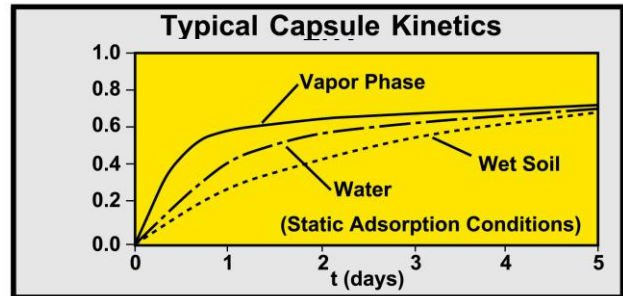
**Size:** 2 cm (0.75 inch), 10 grams  
**Shelf Life:** Indefinite, may be rejuvenated if dry  
**Construction:** Spherical ball of resin encapsulated in mesh fabric

**Materials:** Chemically stable in most media  
**Storage Conditions:** Cool, but not below freezing  
**Sensitivity:** Mostly in the microgram range

## Ag Manager™ and Soil Savvy™



## Terra Tracker™



### Abbreviated Testing Protocol

1. Place capsule in soil at root zone
2. Remove after 7 days
3. Remove all foreign residue
4. Transport to lab in inert, sealed container
5. Extract capsule with 50 mL 2 M HCl
6. Analyze for all target elements
7. Correlate test results to database

### Abbreviated Testing Protocol

1. Place capsule in testing media *in situ*
2. Remove capsule after prescribed time
3. Remove all foreign residue
4. Transport to lab in inert, sealed container
5. Desorb: solvent or thermal
6. Conduct gas chromatography or other analysis
7. Correlate test results to user database

### Features

#### Ag Manager™ and Soil Savvy™

1. Simultaneously adsorbs all ions
2. Measures rate of bioavailability
3. Sensitive to soil properties
4. Works in all kinds of soils
5. Laboratory or *in situ* use

### Advantages

Measures the availability of elements to a plant  
 Calibrate to specific plant and soil – identify appropriate plantings  
 Know process rates  
 Universal test for all regions – easily transfer database to new sites  
 Simple protocols for moist or dry soils – observe natural conditions

### Benefits

#### Terra Tracker™

1. All organics adsorbed simultaneously
2. *In situ*, direct evaluation
3. Follow remediation progress
4. Vapor-phase application
5. Simple, reproducible protocol
6. Testing under natural influences

Determine chemicals present – know range to manage  
 Test wells, flowing water, or moist soil  
 Repeated, “point” sampling – know what happens at one point  
 Results reflect vapor transfer conditions – no elaborate equipment  
 Use for intensive or extensive surveys – compatible methods  
 Environment influence – permits practical remediation

#### In Situ Monitoring

1. Non-destructive sampling
2. Evaluate natural environment
3. Simple installation
4. Very easy to use

Repeat sampling at same point – eliminate site variability effects  
 Respond to varying conditions – see soil as a plant does  
 Maintain a natural sampling point – data not compromised  
 Quickly changed – minimizes drudgery of collecting samples