



# Nationwide Premier Agricultural Testing



*A Network of Company-Owned North American R&D Facilities and Professional Staff Dedicated to Agricultural Product Development*



**Pacific Ag  
Research**



**Florida Ag  
Research**



**Michigan Ag  
Research**

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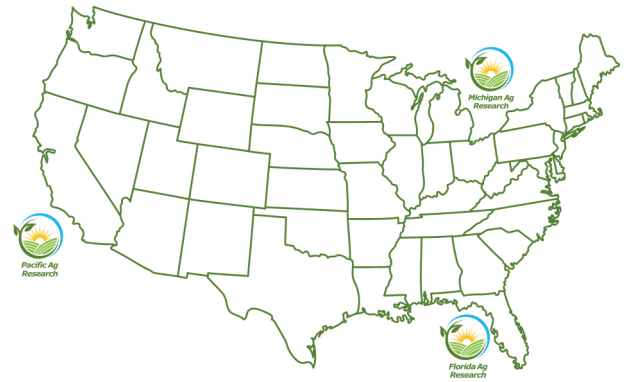


## The Ag Metrics Group Advantage — Combining Science & Farming

Over the past 40+ years, Ag Metrics Group (formerly Pacific Ag Group) has developed a national program to provide high confidence efficacy and regulatory data for product development and registration.

### National Network of Scientific Campuses

Ag Metrics Group provides a unique model of a wholly-owned network of research campuses with best in class science laboratory facilities. We own and manage literally hundreds of acres of prime farm land across 10 facilities in five top U.S. growing regions. Our advanced-degree scientists, trained technicians, experienced growers, laboratories, greenhouses, and field testing facilities are available to help your research team achieve meaningful progress in new product development. We bring science and farming together with our on-site laboratories surrounded by expertly grown field plantings of American crops.



### Local Crop Knowledge

Our station managers understand local growing methods and ag-product usage, and reliably grow and manage commercial quality plantings for experimentation.



### Custom-Built Test Protocols

We build complete test systems and protocols to fit your research goals, for single or multiple locations, from discovery to product launch. We live and work in the farming regions we serve and therefore have valuable inputs into experimental conditions, protocol development, and current industry practices.

### Controlled Experimental Conditions

On site disease, nematode inoculum, and reared insect pests, can be introduced into the field plantings to assure tests are adequately challenged. Insect and disease forecasting are also used to schedule application timings and simulate commercial conditions where new products will ultimately be used.

### Top Quality Laboratories & Farms

Ag Metrics Group's network of multiple laboratories have a diversified and highly qualified staff supported with specialized diagnostic equipment. Company-owned farms maintain a large fleet of tractors, farm and off-site vehicles, allowing each facility to cover a wide radius of regional trial locations.

### Centralized Data Management & Reporting

Centralized reporting assures consistency in data communication across multiple sites and disciplines. All reports contain summaries of experimental methods, statistical comparisons of variables, and graphical representations that assist in the interpretation of otherwise complex results. Statistical Software includes Agricultural Research Manager (ARM), SAS, FieldPro, and specific programming allowing multifactorial analysis, regression/ correlation and dose response analysis.



### Regulatory Compliance

Our regulatory team helps avoid hold-ups in launching and managing your research program to help get your product to market faster. This compliance is managed by a full-time regulations and permits manager with regional support staff that function as a liaison and client advocate with regulatory agencies for test substance transport, use, storage, and disposal. These services include: Research Authorizations (RAs), Notices of Intent (NOIs) to apply, advanced notice of crop disposal following completion of the field research, and guidance with required paperwork through federal and state agencies.



# Comprehensive Array of Contract Research Offerings

Ag Metrics Group provides a wide variety of agricultural and biological testing services.

## Soil Management

Soil Health, Soil Borne Disease Management, Post Fumigation Remediation/ Food Web Regeneration, Nutrient Movement/ Retention, Water Movement/ Retention, Nutrient Leaching, Nitrification Processes

## Crop Response

Crop Safety, Physiology, Gene Response/ Signaling, Fruit/ Flower Retention, Root Architecture, Nursery Products & Seed Performance, Reduced Fertility, Salt & Drought Tolerance, Fruit Quality, Shelf-Life

## Crop Rotation & Weed Science

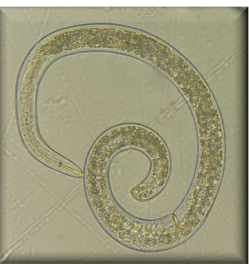
Cover Cropping & Rotations, Compaction/ Soil Stability, Herbicide Efficacy & Selectivity

## Product / Equipment

Chemical Compatibility, Application Technologies, Cultural Practices, Plastic Mulch/ Ground Covers, New Equipment Prototypes

## Biostimulants

Efficacy, Demonstration Trials, Compatibility, Microbe Profiles, Plant Growth Effects, Harvest Metrics



## Nematology

Naturally occurring and inoculated nematode population trials in Greenhouse, Microplots, Large Scale Field Studies. A dozen pure-cultures of American pest nematode species.

## Controlled Studies

Pest Inoculated Studies, Irrigated Chemigated Studies, Controlled Climate Studies

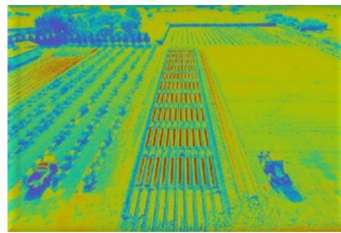


## GLP Studies

Residue Trials, Crop Rotation, Operator Exposure, Dust/ Drift Studies, Soil Dissipation & Accumulation, Field Leaching, Run-off, Drip/ Drench Irrigation Studies, Shadehouse/ Greenhouse Studies, Seed Dressing & Drilling, Import Tolerance Studies, Dislodgeable Foliar Residue

## Specialty Studies

- Pest Resistance Monitoring
- Soil Fumigation Research
- Aerosol & Fumigant (Off-gassing) Flux Studies
- Soil-Borne Plant Pathology
- Multi-year/ Multi-Regional Product Testing
- Worker Exposure Studies
- Rainfastness, Spray Adjuvants, Droplet Metrics, Deposition on Plants
- Application Equipment Engineering & Optimization
- Third-party Demonstrations, Crop Sequencing Trials
- Honeybee Bioassays, Outdoor Hoop-house Flight & Pollination Studies



## Specialized Farm Equipment

- **8 XP Research Combine with Kincaid Corn Head, HarvestMaster H2 GrainGuage** - Allows significantly more accurate collection and processing of harvest metrics
- **Precision vSet Planters** - 99% seeding accuracy
- **Trimble Guidance Systems** - Precise hands-free tractor guidance systems
- **Almaco Cone Drill Planter** - Consistent planting of small grains
- **Irrigation Injection Equipment** - Accurate application of test materials through drip and overhead chemigation
- **Backpack, Tractor Mounted, Air Blast & High Clearance Sprayers** - Allows precise application of test material for a wide variety of crop types

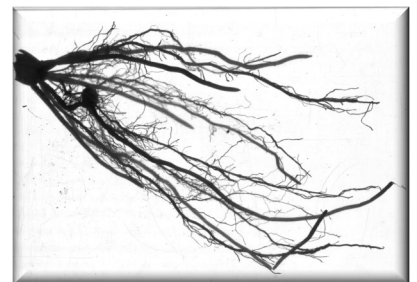


## Specialized Research Equipment

- Drones with 6 lens multispectral camera sensors and image stitching and interpretation software for plot vegetation analysis



- Precision controlled environmental chambers for in-lab experiments and incubation of biologicals
- Ultra-Low Freezers and sample-specific storage for biologics
- Large cold storage capacity for stable harvest samples
- qPCR quantification of pest DNA in plant tissues, soil, and water
- Electropenetrography – Advanced technique that measures effects of a test substance on feeding behavior of piercing sucking insects
- Potter Spray Tower - Precise application of test substances to various substrates for lab bioassays
- Multiple hand held spectral imaging technologies to measure physiological crop responses
- Imaging and time lapse technologies to document plant disease progress, insect feeding damage, and leaf surface area development
- Scanning devices to document metrics of root system architecture



- Fruit quality assessment tools - colorimeter, penetrometer, refractometer, field calipers/scales
- Fruit and vegetable packinghouses with sorting lines for large plot harvest metrics
- Comprehensive weather data for all Ag Metrics Group field stations



## Pacific Ag Research

1840 Biddle Ranch Road  
San Luis Obispo, CA 93401  
Office: (805) 594-1800



## Agriculture Research in the West

Pacific Ag Research is headquartered in San Luis Obispo, and maintains seven California stations in different microclimates for studies in pest management, fertility and crop yield, greenhouse research, and consultations with agribusiness and grower cooperatives. This western research program represents U.S. EPA Region 9.

Pacific Ag Research performs a wide variety of research focusing on fruiting vegetables, leafy greens, cucurbits, strawberries, brassicas, and wine grapes in lab, greenhouse, and field settings. Owing to its location in the heart of California's Central Coast viticulture industry, an experimental winery tests grape harvests from research trials to identify potential effects of test substances on important enology variables such as momentum of fermentation, taste, shelf life, and many specific sensory attributes of the finished wine.



One hundred and fifty miles north of the San Luis Obispo headquarters are the Pacific Ag Salinas Valley research stations. Here, two different farm sites study soil and foliar pathogens, coastal insect pests, weed management, and new genetics with a particular emphasis on leafy greens. Fruiting vegetables, strawberries, wine grapes, and artichokes also play a key role in this region.

A 65-acre Central Valley location near Five Points provides a third specialized climate of California agricultural production. Here, a multidiscipline field research team conducts trials in tree nuts, citrus, wine and table grapes, watermelon, winter leafy greens, processing tomatoes, corn, and cotton.

It is well known that California closely regulates the testing of experimental products. In order to manage governmental compliance, our West Coast team has a full-time regulations and permits manager that functions as a legal liaison and client advocate with regulatory requirements of test substance transport, use, storage, and disposal. In testing of experimental products, these services include: Research Authorizations (RAs), Notices of Intent (NOIs) to apply, advanced notice of crop disposal following completion of the field research, and regulatory guidance with required paperwork.

All reports contain summaries of experimental methods, statistical comparisons of variables, and graphical representations that assist in the interpretation of otherwise complex results.

### Stations: 7

Central Coast, Salinas & Central Valley

### EPA Zone: 9

Greenhouse: 15,000 Sq. Ft.

Labs: Pathology, Entomology, Agronomy

Specialty: Molecular Pathology, Post-Harvest Facility, Winery, Hydroponics, Turf & Ornamental

## Commonly Researched Crops

- **Fruiting Vegetables:** Eggplant, Pepper, Tomato
- **Tree & Vines Fruits:** Apple, Cherry, Citrus, Grape, Olive, Peach
- **Tree Nuts:** Almond, Pistachio, Walnut
- **Cucurbits & Melons:** Cantaloupe, Cucumber, Pumpkin, Watermelon, Squash, Zucchini
- **Cole Crops:** Bok Choy, Broccoli, Cauliflower, Chinese Cabbage, Cabbage, Kale, Mustard Greens
- **Leafy Vegetables:** Basil, Celery, Lettuce, Spinach
- **Berries:** Blackberry, Blueberry, Raspberry, Strawberry
- **Ornamentals:** Annual & Perennial Crops, Cut Flowers
- **Edible Legumes:** Chickpeas, Dry Beans, Peas
- **Field Crops:** Canola, Corn, Cotton, Wheat
- **Other:** Alfalfa, Artichoke, Cannabis, Carrot, Onion, Potato, Sweet Corn





## Florida Ag Research

3001 N. Kingsway Road  
Thonotosassa, FL 33592  
Office: (813) 986-5599

## Agriculture Research in the Southeast

Florida Ag Research is located in Thonotosassa, FL, near beautiful Tampa Bay. This facility is in the midst of America's valuable Southeast growing region (EPA Zone 4), producing almost half of the U.S. tomato and legume crops and more than a quarter of several other vegetable, cucurbit and citrus crops. It is home to American winter strawberry and tomato production. The region is subject to severe disease and nematode infestations due to the tropical weather patterns and characteristic sandy soil. These conditions contribute to an excellent environment to study pests of tropical and sub-tropical crops.



Florida Ag facilities include 70 acres of intensively managed plantings, nematology, plant pathology, and entomology laboratories, and several acres of experimental greenhouses and shade-houses. The frequent, heavy Florida precipitation creates an ideal environment for establishment and growth of foliar plant pathogens, which allows for reliable efficacy testing of new plant protection products. In addition, the warm annual temperatures without significant frost events, also ensures dependable insect and nematode populations from season to season.

With a continued need for an answer to the devastating Citrus Greening Disease, Florida Ag's Citrus Working Group tests potential solutions in the lab, greenhouse, and field plantings, focusing on vector control, bacterium suppression, symptom remediation, and genetic resistance.



**Stations:** 2

**EPA Zone:** 3

**Greenhouse:** 50,000 Sq. Ft.

**Shadehouse:** 20,000 Sq. Ft.

**Labs:** Pathology, Entomology, Nematology

**Specialty:** Nematode Biology, Tropical Crop Pests, USDA-APHIS Approved Quarantine Facility, Turf & Ornamentals



### Commonly Researched Crops

- **Fruiting Vegetables:** Eggplant, Pepper, Tomato
- **Tree & Vines Fruits:** Banana, Citrus
- **Tree Nuts:** Pecan
- **Cucurbits & Melons:** Cantaloupe, Cucumber, Squash, Watermelon, Zucchini
- **Cole Crops:** Broccoli, Cabbage, Cauliflower, Collards
- **Leafy Vegetables:** Celery, Lettuce, Spinach
- **Berries:** Blueberry, Strawberry
- **Ornamentals:** Annual & Perennial Crops, Cut Flowers
- **Edible Legumes:** Chickpeas, Dry Beans, Peas, Peanut
- **Field Crops:** Corn, Cotton, Millets, Sorghum (Sudangrass), Soybean, Sunflower
- **Other:** Carrot, Okra, Onion, Potato, Sweet Corn, Turnip, Sugar Cane, Tropicals, Turf





## Michigan Ag Research

21602 27 1/2 Mile Road  
Albion, MI 49224  
Office: (517) 857-2676



**Stations:** 2

**EPA Zone:** 5

**Growing Zones (US & Canada):** 5, 5A, 5B

**Greenhouse:** 3,000 Sq. Ft.

**Labs:** Pathology, Entomology, Nematology

**Specialty:** Crop Diseases & Nematology, IPM Systems, Germplasm Performance, Weed Science, GLP

## Agriculture Research in the Midwest

Michigan Ag Research conducts field trials throughout the Great Lakes region. This research facility covers Growing Zones 5, 5A and 5B for both the U.S. and Canada, as well as U.S. EPA Region 5. Trials conducted at our Albion farm focus on field crops, tree and vine fruit crops, vegetables, and ornamentals (Winter and Spring). This research site has high disease, insect, and weed pressure, and maintains colonies of common nematode pest species of the Midwest. The station has over 200 acres with deer and security fencing to protect high value research. A separate field crop location with different soil types located 45 miles away is used for disease and insect field trials on corn and soybean.



The Michigan Ag Research facility has reliable planting, application, and harvest equipment for all Midwest crops including corn, soybean, and cereal grains. The station also has established grape vineyards and plantings of tart cherries and apples. Michigan Ag conducts a robust field trial program each year in plant pathology, entomology, and weed science.



Several computer software programs analyze and interpret foliar disease and root biomass metrics, NDVI, and many drone-based aerial measurements. In addition to plant pathology, an on-site professional entomologist allows for in-depth research on worms, aphids, beetles, and other insect pests and beneficials. An on-site nematologist extracts and quantifies nematodes from field and greenhouse experiments. Our team at this facility is well known and respected in Michigan agriculture across several scientific disciplines.



### GLP Programs

Michigan Ag Research is the new hub of Ag Metrics Group's GLP programs. Given its large size, it can provide the necessary buffers to allow for specialized requirements and quarantine.



### Common GLP Studies

- Residue Trials
- Crop Rotation
- Soil Dissipation & Accumulation
- Drip / Drench Irrigation Studies
- Greenhouse Studies
- Seed Treatment

## Commonly Researched Crops

- **Fruiting Vegetables:** Eggplant, Pepper, Tomato
- **Tree & Vines Fruits:** Apple, Grape, Peach, Tart Cherry
- **Cucurbits & Melons:** Cucumber, Pumpkin, Squash
- **Cole Crops:** Broccoli, Cabbage, Cauliflower, Collards
- **Leafy Vegetables:** Basil, Celery, Lettuce, Spinach
- **Berries:** Blueberry, Caneberry
- **Ornamentals:** Annual & Perennial Crops, Christmas Trees
- **Edible Legumes:** Chickpeas, Dry Beans, Peas
- **Field Crops:** Barley, Canola, Corn, Oats, Rye, Soybean, Sorghum (Sudangrass), Sugar Beet, Sunflower, Wheat
- **Other:** Alfalfa, Asparagus, Carrot, Hemp, Onion, Potato, Sweet Corn

# Ag Metrics Group Test Systems

## Plant Pathology

- **Almonds:** Blossom Blight, Brown Rot, Shot Hole
- **Apples:** Apple Scab, Powdery Mildew
- **Banana:** T4 *Fusarium* "Panama Disease", Sigatoka Leaf Spot
- **Basil:** Downy Mildew, *Botrytis*
- **Carrot:** *Alternaria* Blight, *Pythium* Cavity Spot, Powdery Mildew, *Rhizoctonia*
- **Celery:** *Septoria* Blight, *Cercospora* and *Pseudomonas* Leaf Spot, *Fusarium* Wilt
- **Cherry:** Cherry Leaf Spot
- **Cole Crops:** *Alternaria* Leaf Spot, Downy Mildew
- **Corn:** Smut, Tar Spot, *Exserohilum* Root Rot, *Fusarium* Ear/Stalk Rots, *Macrophomina*, Damping Off, Northern Corn Leaf Blight, Gray Spot
- **Eggplant:** Powdery Mildew, *Verticillium* Wilt, *Phytophthora* Root & Crown Rot
- **Grape:** Downy & Powdery Mildews, *Botrytis* Bunch Rot
- **Legumes:** *Pythium* & *Rhizoctonia* Damping Off Diseases, *Ascochyta* Leaf Blight
- **Lettuce:** *Botrytis* Basal Rot, Powdery & Downy Mildews, *Sclerotinia* spp., *Fusarium*, *Pythium*, *Verticillium* Soil Borne Diseases
- **Onion:** Downy Mildew, Purple Blotch, *Botrytis* Neck Rot, Pink Root
- **Pepper:** Powdery Mildew, *Fusarium*, Nematodes, *Phytophthora* Root Rot
- **Potato:** Early Blight, *Fusarium* Dry Rot, Late Blight, *Rhizoctonia*
- **Pumpkin:** *Phytophthora* Crown & Root Rot
- **Raspberry:** *Botrytis*, *Phytophthora* Root Rot, Rust
- **Spinach:** Downy Mildew, *Verticillium* Wilt
- **Squash:** Powdery Mildew *Phytophthora* Crown & Root Rot
- **Stone Fruit:** Blossom Blight, Brown Rot
- **Strawberry:** Anthracnose, *Botrytis*, *Macrophomina*, *Verticillium* Wilt
- **Tomato:** Bacterial Speck/Spot, *Botrytis*, Early/Late Blights, *Fusarium/Verticillium* Wilts, Powdery Mildew, Stem Rots, Misc. Plant Viruses



## Agronomy

Many basic agronomic experiments are conducted by our field scientists and support staff in several regional microclimates and soil types. Some examples include studies with conventional and bio-fertilizers, soil amendments, nutrient cycling, plant growth regulators, crop water relations/drought management, field performance of conventional and regulated germplasm, and seed increases. In addition, ag engineering protocols test prototypes of crop sprayers, subsoil injection devices, irrigation technologies, crop robotics, and several drone-based imaging systems related to Precision Agriculture.



## Biostimulants

Our company focus on farming excellence and a well-established network of regional cooperator growers provides Biostimulant scientists with test systems that include detailed plant growth and harvest metrics, earliness, disease, drought, and salt tolerance, enhanced nutrient utilization, crop safety, mode of action, and proof of concept for label claims and advertising.

## Weed / Herbicide Science

Common weed species found in the American West, Midwest, and Southeast, are grown on our regional research stations for testing new chemical and alternative weed control technologies. Testing protocols involve pre- and post-emergence efficacy, crop safety, surfactant potentiation, and environmental fate of herbicidal compounds in soil and plants. Our Florida station began a weed nursery in 2022.

## Beneficial Microbes Research

Soil food web diversity, root colonization by beneficial microbes, and even microflora associated with Honeybees, are studied in Ag Metrics Group microbiology laboratories. Bioassays using established testing protocols characterize microflora population dynamics in response to various test stimuli and define important metrics such as Mycorrhizal Inoculation Potential (MIP), percent root colonization, and specific effects of the test organism to the target plant species.

## Specialized Investigations

In addition to routine experiments described above, Ag Metrics Group operates a post-harvest packing and refrigerated storage facility, and a fully functional on-site, award-winning winery. This allows follow-up metrics from field and vineyard applications of test products into the market-basket for shelf life studies of fruits and vegetables, or to identify effects on fermentation processes or sensory attributes of the finished wine.



## Insect & Nematode Studies

- **Almonds:** Navel Orange Worm, Peach Twig Borer, Oriental Fruit Moth, Spider Mites, Ants, Root Knot, Ring Nematodes
- **Carrot:** Aster Yellow Leafhopper, Root Knot Nematodes
- **Celery:** Aphids, Dipterous Leafminer, *Lygus*
- **Chinese Cabbage:** Cucumber Beetle, Flea Beetle
- **Citrus:** Asian Citrus Psyllid, Citrus Nematode, Citrus Leafminer, Thrips, Rust Mites, Spider Mites
- **Cole Crops:** Cucumber & Flea Beetles, *Bagrada* Bug, Cabbage Aphid, Cabbage Looper, Cabbage Maggot, Diamondback Moth
- **Corn:** Black Cut Worm, Corn Ear Worm, Spider Mites, Sting & Lesion Nematode
- **Cucurbit:** Aphids, Dipterous Leafminer, Spider Mites, Thrips, Flea Beetles, Whiteflies, Root Knot Nematode
- **Eggplant:** Two-Spotted Spider Mite, Whiteflies
- **Grape:** Leaf Hopper, Mealybug, Spider Mites, Root Knot & Ring Nematodes
- **Lettuce:** Green Peach & Foxglove Aphids, Dipterous Leafminer, Armyworm & Loopers, Springtails, Thrips
- **Onion:** Leafminer, Onion Maggot, Onion Thrips, Bulb Nematode
- **Pepper:** Pepper Weevil, Aphids, Lepidoptera, Potato Psyllid, Thrips, Nematodes
- **Potato:** Aphids, Colorado Potato Beetle, Leafhopper, Potato Aphid, Potato Tuber Moth, Nematodes
- **Raspberry:** Spotted Wing *Drosophila*
- **Spinach:** Leafminer, Thrips, Aphids
- **Stone Fruit:** Aphids, Oriental Fruit Moth, Thrips, Mites
- **Strawberry:** Aphids, *Lygus*, Spider Mites, Thrips, Two-Spotted Spider Mite, Spotted Wing *Drosophila*, Sting Nematode
- **Tomato:** Aphids, Beet Armyworm, Fruitworm /Earworm, Root Knot Nematodes, Potato Psyllid, Thrips
- **Walnut:** Codling Moth, Walnut Husk Fly, Root Knot & Ring Nematodes







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