BioDiagnostics, Inc.

BioDiagnostics' 25,000 square foot facility, River Falls, WI.

BioDiagnostics, Inc.
River Falls, WI

715-426-0246 • www.biodiagnostics.net

Key Personnel
- Quentin Schultz, CEO/President
- Craig Nelson, Vice President
- Denise Thiede, Ph.D., Vice President
- Venkatramana Pegadaraju, Ph.D., Manager Molecular Breeding & Genomics Technology
- Ryan Johnson, Manager DNA QA Laboratory

Company Profile
- Seed quality testing lab.
- Molecular breeding analysis.
- Genomic and genetic analysis.
- SNP discovery and analysis.
- 32 full-time employees.

When Quentin Schultz established BioDiagnostics (BDI) in 1996, he was inspired by a vision to provide smaller seed companies access to the same array of germination seed tests and genetic analytical services available to the larger, well-financed international seed producers.

"My goal was to make high-technology services available to the masses," he recalls. "To that end, my vision was to have a business staffed by highly-trained employees working together in a collegial environment with the best, most up-to-date tools to provide the kind of customer service and support I would expect. That vision remains one of our key guiding values."

In its early years, BioDiagnostics, Inc. relied on isozyme electrophoresis genetic

BDI owners (l to r) Denise Thiede, Quentin Schultz, Craig Nelson, and Marilyn Schultz.

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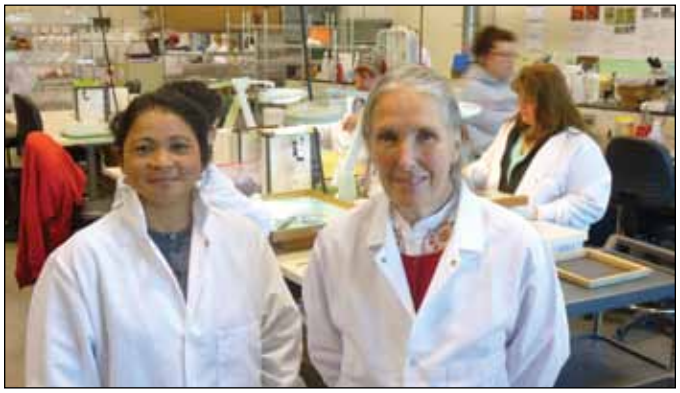
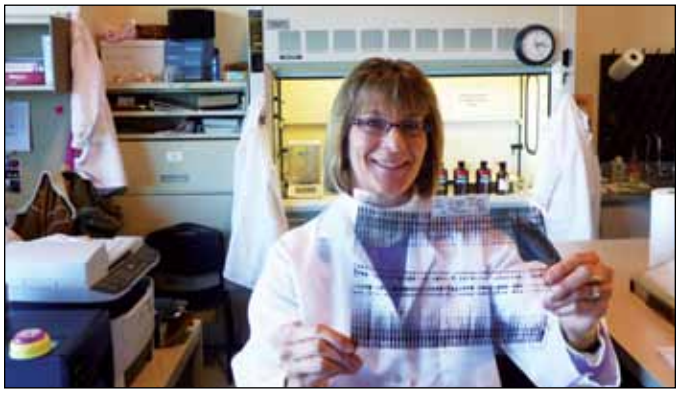


Sunita Young and Elizabeth Heywood two of the five RST's in the SST Lab at BioDiagnostics



Wendy Zillgitt, (RGT) Supervisor I, Isoelectric Focusing lab, holds a 100-lane gel. This test for genetic purity identifies selfs and off-types.

purity testing services to support the company as it expanded its capabilities to provide a wide array of genetic purity testing and analytical services.

In 2001, the company moved into half of a new 25,000 sq. ft. facility at its present location.

"With the rapid adoption of transgenic technology in the seed industry and the continued growth in demand for our genetic purity testing services, we knew it was time to expand," Schultz says.

Two years later, in 2003, the company expanded its laboratory space to add isoelectric focusing and expand high throughput DNA testing capabilities.

BioDiagnostics in 2005 became the first U.S. seed lab to earn approval in the Accredited Seed Lab (ASL) program, administered by the United States Department of Agriculture (USDA).

The BDI analytical chemistry lab in 2006 added high pressure liquid chromatography (HPLC) analytical services for its clients and industry partners.

"As an entrepreneur, I understand the need to be forward looking and make the investments necessary to meet emerging customer needs," Schultz explains.

Last year, BDI added the Douglas Scientific Array Tape™ platform for SNP genotyping with a smaller panel of SNP markers. In addition to enabling BDI to triple its testing capacity, the Array Tape system reduces the cost of each data point by more than half compared to previous testing methods.

The platform allows BDI to generate more than 81,000 data points a day. BDI also purchased an Illumina iScan to enable analsys of larger SNP marker sets. This portfolio of genotyping technologies offers tremendous testing flexibility for molecular breeding programs across a wide range of crops species employing a variety of breeding schemes from trait introgression to genomic selection.

Corporate Culture

As an entrepreneur leading a service company, Schultz also understands the critical importance of service-oriented employees. His relaxed management style has imprinted his passion for serving people onto his employees.

"It begins by bringing in people who have their own internal commitment to using their skills to serve others, i.e. their colleagues and our customers," Vice President Craig Nelson says. "We have been fortunate to be able to find people who are both highly qualified technically and driven to serve our customers."

Seed samples coming into the lab for routine germination testing, for example, are entered into BDI's ▶

Ryan Johnson, (RGT), is Manager of the BDI DNA Quality Assurance Laboratory. Validation tests are all run according to biotech trait providers protocols.

Chondra Carlson with an Illumina iScan instrument that has the dual capability of performing golden gate and infinium genotyping to support wide range of molecular breeding projects.

online *myBDI.biodiagnostics.net* system. Entries are proofed to assure sample data and customer requests are accurate.

"Each customer is a unique opportunity for us to be exceptional in how we handle their request for our services," says Darcey Rodeweld, administration supervisor and the first BDI employee to receive incoming samples.

"We all feel involved – this is more than a job," Rodewald says. "Even though we have never met some of them, these customers become our friends. We feel that what we are doing is important for them."

If employee turnover provides any indication of employee satisfaction, BDI employees are a satisfied group. Carol Betzel, the first employee Schultz hired in 1996 is still on the job.

"I think I paid her for at least six months before I was able to pay myself!" Schultz quips.

Services

"BDI provides a comprehensive set of seed quality, genetic, trait and analytical quality assurance tests to meet the specific needs of seed producers, seed retailers, plant breeders, and those assessing the quality of seed, grain and oil," says Vice President Denise Thiede, Ph.D.

Joe Zalusky, Supervisor I, Analytical Chemistry; AOCS Approved Chemist.

"But more than providing tests and analysis, we provide consultation to help customers understand the implication of test results. When an electrophoresis test, for example, indicates a high level of selfs or out-crosses, we have expertise in multiple disciplines to trace the cause of the problem. We can then explain the problem to our customer and prescribe procedures to prevent future occurrences."

BDI procedures are validated by ISO/IEC 17025:2005 certification. BDI's quality management systems for both seed testing and genetic/genomic analysis include calibration, validation, refereed testing, internal control samples, and third-party accreditation.

Seed testing procedures are routinely performed in accordance with Association of Official Seed Analysts (AOSA) rules. When requested, tests can also be performed according to Canadian or ISTA rules.

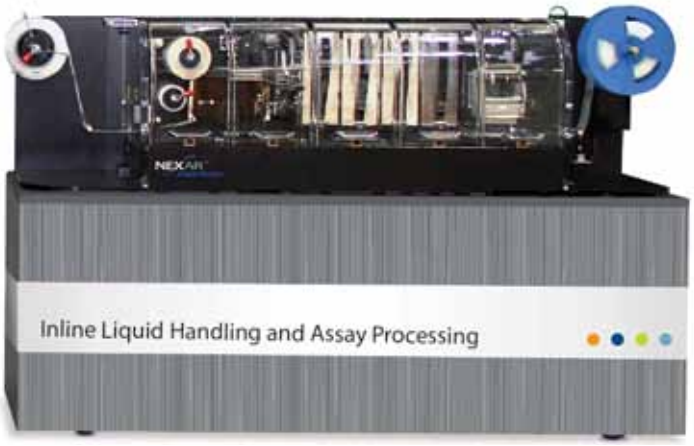
BDI labs are staffed by registered genetic technologists (RGTs) and registered seed technologists (RSTs) certified by the Society of Commercial Seed Technologists (SCST).

Labs are managed by RGTs and RSTs, who also run the tests, analyze the results, and help customers to interpret those results.

"The applications for genomic and DNA testing are evolving as new technologies become available, " says Thiede. "We are actively developing procedures to bring novel high-technology solutions to seed industry challenges."

Joe Funk, editor

SNP Genotyping on Array Tape™



Nexar® inline liquid handling and assay processing system.

Perhaps the most technically impressive machine in BDI's arsenal of genetic testing equipment is its Douglas Scientific Array Tape platform for high throughput SNP genotyping system installed in March, 2012.

Instead of using individual 96 or 384-well plates, samples are moved through the process on Array Tape™, a continuous polymer strip serially embossed with reaction wells.

A single Array Tape reel 3.5 inches wide and 22 inches in diameter contains capacity for 200 microplate equivalents (76,800 reaction wells).

To process the arrays, the system uses three automated instruments:

• The Nexar® modular, inline liquid handling and assay processing system. This instrument dispenses samples and reagents into each Array Tape well at sub-microliter volumes for processing.

A pressure-sensitive film is automatically applied to seal the filled Array Tape wells as the tape is wound onto the out-feed reel.

• The Soellex® high throughput PCR thermal cycler, three-chamber water bath. The loaded reel is automatically cycled through the water baths set at different temperatures to facilitate amplification.

When loaded with three Array Tape reels, this machine has the potential to thermal cycle 230,400 reaction wells in a single process run.

• The Araya® inline fluorescence scanning instrument includes a fully automated bar code reader and fluorescence detection.

An entire reel with 200 arrays can be scanned in less than 100 minutes.