

Diagnostic Services and Test Kits for Plant Pathogens and Transgenic (GMO) Traits in Detecting Viruses, Bacteria and Fungi that Cause Plant Disease



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CEOCFO Magazine

CEOCFO: Mr. Vrient, what is the idea behind Agdia, Inc®?

Mr. Vrient: It is a diagnostic company to improve the quality of agricultural products worldwide.

CEOCFO: How do you do that?

Mr. Vrient: Basically, we have adopted common clinical processes, ELISA (Enzyme-Linked Immunosorbent Assay) and ImmunoStrip® which are antibody based tests as well as molecular diagnostics, PCR, Isothermal and nucleic acid hybridizations for the detection of plant pathogens.

“Grow Profits Not Problems” By hopefully, helping growers, keep disease in check it is hoped that in the end, products (plants and or the product from the plants) can be available to the consumer at an affordable price. Additionally, with the world population increasing it will be necessary that maximum yield be achieved to continue to meet the needs in a sustainable food chain. This can only be achieved by improved breeding techniques along with a well-designed and properly executed disease management program in all growing stages.- Baziel Vrient

CEOCFO: What are the challenges in detecting pathogens? How are your products able to do so?

Mr. Vrient: We basically use these technologies, ELISA, isothermal and PCR for our everyday work. A major challenge that exists in this industry is the adaption or the adopting of new technologies that are developed at an economical price, “trying to acquire the technology”. Many new technologies are developed. The tendency is to look at the human clinical aspect where there are a lot more dollars being funded for the work and paid for assays verses the agricultural market where it is a really tight budget for the diagnostic companies and even more so for the grower. Example, if we have an A1C test performed it may cost \$40.00. Whereas a Grower of ornamentals or vegetables may submit say 78 samples, one plant line, for 11 different test and receive a result with an expected cost of less than \$2.75 per sample for a total of \$214.50. They may do this multiple times per growing cycle.

The biggest challenges that are present in this industry is that nature is constantly changing the pathogens, modifying it structure wise so that you get different strains or even a brand new pathogen. Some are reactive, some may not be reactive. A good example would have been TSWV which is Tomato Spotted Wilt Virus and is transmitted by a Thrip (insect). However, about three or four years after bringing the test to market we saw similar symptoms on plants, but negative reaction on the antibody based assay. We eventually found, with the assistance of collaborators, that it was

actually a new Tospo virus called Impatiens Necrotic Spot Virus or INSV, which required a test being developed. Remember that only three or four years lapsed between the TSWV kit introduction and the discovery of INSV. Currently there are probably about twenty plus different Tospovirus viruses that are still in the same family, but uniquely different. Therefore, trying to stay up with them requires a great deal of work. There are about four hundred economically important plant viruses around; not counting any different strains or isolets that may appear. It is a lot of work and that is the big challenge within this industry.

CEOCFO: *Are plants routinely tested? Who is testing their plants? How do they know when? Are they able to see one little tiny segment of something and know it is time for a test or is it often when plants are full of spots?*

Mr. Vrient: Keep this in the context that I am telling you. There are people that are very proactive in preventing a disease problem. Then there are people that are reactive. Growers that are proactive are going to continually do screening on their stock plants or mother plants as they are called as well as their progeny. They will test before every propagation cycle and numerous times during the propagation. What I mean by that is I have one mother plant and I may be doing tissue cultures, so one will go to ten and ten will go to one hundred and one hundred will go to one thousand and so forth in propagation. Therefore, those people that are conscious of the quality of plant in the market will do continual monitoring throughout the growing cycle. You then have people that are reactive that may not do a lot of testing or may do no testing until they see a symptom or sign of problem in the plants. Then they may test. Therefore, it just varies depending upon the consciousness of the grower, which may be one way of saying it.

CEOCFO: *Is there a measurable value in testing early? Can you detect enough to really make a difference?*

Mr. Vrient: Yes, it is definitely worth the benefit of testing early. A good example is the following. A large propagator about two and a half to three years ago developed a problem that ultimately end up costing millions of dollars. Additionally, in certain areas of the world if you are found with a certain pathogen Governmental agencies could restrict growing a particular crops on your farm for five years, basically shutting down your farm. Therefore, you literally cannot grow on that farm that crop that is your primary money maker. I am aware of an instance right now that we are trying to work on that is going to be a huge problem. Propagators of certain trees are going to have to test all the way through the propagation of trees because of a bacterium that has been found in trees and basically causes the nut or the fruit to abort. Therefore, there is a constant need to check as some of these pathogens are also mechanically transmitted. The pathogen could be transmitted my trimming (pruning) or by an infected plant touching a non-infected plant moving the pathogen. They are insect transmitted or vector transmitted I should say. You could have aphids, thrips, white flies, nematodes and other insects moving pathogens around. Additionally, fungal and bacterial can be transmitted just by mother nature wind and rain Seed transmitted pathogens are another large problem that must be dealt with

CEOCFO: *What is involved in shipping a sample to you? How do you get in the samples both in the US and internationally? What is involved at your end to make sure everything is safe?*

Mr. Vrient: First of all, we are a USDA approved lab, so we hold permits that allow us to bring in plant tissue from around the world. The permits are very broad ranging but pathogens specific, based upon the pathogens we want to look at. Therefore, we have outlined major pathogens that we want to test for. If there are new pathogens that are appearing then we have to go and modify the permit to receive that suspected pathogens. Therefore, we are permitted by the USDA and we hold all the regulatory permits to do this. Those permits then have designed guidelines that tell us how we have to handle the sample from the beginning of it arriving at Agdia to the disposal of the sample. Therefore, there are a set of guidelines and we are subject to inspection randomly, usually at least once a year for our permits and all of the documented work that is done with them.

CEOCFO: *You get a sample, you test it - then what happens?*

Mr. Vrient: Of course, we will test the sample and if we find a positive or a negative we report that back to the individual, so that he has to make a management decision, what he wants to do based on that result. In some instances depending upon the pathogen he may he may destroy the crop, decide to continue with the crop (do nothing) or in some case the problem may come under government guidelines and then he must follow government guidelines which may include eradication of the problem.

CEOCFO: *Are there different levels? Might the same pathogen register as a one or a ten and perhaps there would be different solutions or either you have it or you do not?*

Mr. Vrient: It is pretty cut and dried; yes or no, I have it. Depending on the pathogen and the crop they have to make that management decision. Therefore, if they by example, Tobacco Mosaic Virus (TMV) infection in an ornamental greenhouse is found I am sure that a responsible propagator would go and check almost every plant they could, economically if possible, in that greenhouse or range. Tobacco Mosaic Virus is a pathogen that will spread very rapidly, it

is a mechanically transmitted so plant to plant transmission is possible. Many of these people will actually, I hate to say this, but pitch the crop based on the pathogen that they have and the infection rate or some growers may not", but will try to sell of the crop and get rid of it, which becomes a whole different problem at that point.

CEOFCO: *How do you divide up between the testing you do and the products you have available so that people can test on their own? What is the business side?*

Mr. Vrient: The business where we actually have product is about seventy percent of the business. Thirty percent of our business will be associated to the testing services. Some of the people will actually, even though they may be using our services, have their own testing program where they buy our product for their use. Therefore, it is a combination of both. It is a checks and balance system, so we are actually checking their work to see if it is coming out properly as we would say it.

CEOFCO: *What is the competitive landscape? Are there many companies available to growers?*

Mr. Vrient: I guess I would define what the company is. First of all, in the US, all of the land grant universities have an extension or a service, diagnostic lab, where they can actually test the plant or the product. That is offered by Purdue, Michigan State and the land grant universities. Government, USDA – APHIS, comes into play and there are several companies that offer testing services and product also. The big picture, the product suppliers may be about ten to twelve companies worldwide. Then at the same time we still compete with our own government who has our USDA APHIS, Animal, Plant Health Inspection Service. Therefore, even governments end up being a competitor to Agdia at some point.

CEOFCO: *Why are growers choosing Agdia?*

Mr. Vrient: Based on thirty five years of service to the industry and the quality of our product and our services. Agdia is both 9001 and 17025 ISO certified company, so our testing services are certified under 17025.

CEOFCO: *Are you competitive price wise or are people paying a bit more for the better service? Where does cost come into play for the growers weighing against the potential horrors that can develop?*

Mr. Vrient: I feel we are more than competitive in the industry for the quality of work that we are doing and results that we give. Growers are all basically particular about testing. Therefore yes, they are going to be very conscious of the cost versus the value of the crop. However, at the same time with the potential of catastrophe looming out there they will basically decide to do the testing, especially if it is a large commodity crop. A good example of that would be potatoes. Let us just take those as an example. There is a problem right now in the potato industry with a bacteria called dickeya. It produces a soft rot of potato. Therefore, if you are getting potatoes from grocery stores that are not holding up and they become very soft and mushy and may be oozing a bacterial flow out of them, it is probably because of soft rot. This is a big problem in the industry right now that is going to take some time to flush out throughout the entire industry. Therefore, there is a lot of testing being done right now for soft rot, dickey, of potatoes at the seed end but not much if any at the commercial (retail) end. Ornamentals are a constant challenge for growers due to how the market is. When you figure you may have starting material that may be generated in Europe or Africa that goes to Central and South America and then back into the United States or North America or wherever, that all happens on about a thirty nine week cycle. They are very conscious of testing and when they need to test. They should be, let me put it that way.

CEOFCO: *How do you keep up with everything that is going on? Is it a big challenge?*

Mr. Vrient: It is a big challenge! As I said, we have been doing this for thirty five years and we are known around the world for product and services. At the same time we are also known around the world as collaborators. We have a far reaching group of people that we work with or they work with us on different problems, different tests and different ideas while trying to make sure that the food stays on the table and the flowers stay in the garden. It is based on just a long history of Agdia's commitment to the agricultural community.

CEOFCO: *How is business these days?*

Mr. Vrient: Business has been good, basically because Mother Nature keeps dealing the cards and you do not know whether you are going to have aces in the hole or a wild card in the hole. Business has been relatively good for us. We moved into a new facility in 2014. It is approximately a fifty two thousand square foot laboratory where we house all of our production, R&D, testing, biomaterials, marketing and administration. Prior to the move we occupied 3 different sites.

CEOFCO: *Is it a challenge to find qualified people interested in what you do to come on board?*

Mr. Vrient: I am going to tell you, "not really". We have been able to garner very good people without a lot of problems. Basically, we are known within the industry between academia, commercial, as well as governmental agencies. We really do not run into a big problem of finding people who want to make a commitment to agriculture (Agdia). Agdia also makes

a large commitment to them. We have relatively little turn over and with the current staff we have an average of almost 15 years of service time.

CEOCFO: *What is next for Agdia?*

Mr. Vrient: What is next? Just continued growth with the new facility; that is the way I look at it. We were founded thirty five years ago. I am the second generation and a third generation is already in place to take over when I decide I do not want to do this anymore. We have a long term commitment, otherwise we would not have invested in the facility that we did. We have commitment to the grower, whether it be the ornamental, vegetable, field crop, fruit crop, or the tree industry. Whatever can be commercially grown, we have a dedication that we are going to be here to serve the grower, and more importantly, the people at the end of the line, the consumer. What many people do not realize is that the problems with agriculture resulting from disease problems basically affects the dollar amount that we are putting out every day for your groceries you buy or your ornamentals that you want to plant in your yard. We try to make sure that products are available for the market and hopefully at an affordable price.

