

The
PEANUT GROWER

INOCULANT GUIDE

November 2011



Sponsored by VAULT® Peanut Inoculants from Becker Underwood
with exclusive BioStacked® Technology

The Root Of The Matter

Most producers would say the reason for making farming their occupation was to be able to work outdoors, make their own schedule or have more time to spend with the family. The typical answer is often some type of immeasurable quality, but the reality is that if you cannot make a profit in farming, then you are not going to be able to continue for long.

Profitability involves putting all the pieces together, from the inputs with a fixed cost to those variables that are truly key components such as timing but have no actual cost, to bring about a quality product that yields above what is needed to cover those costs. For peanuts, a potential profit begins in the root zone.

Get In The Zone

What happens in those several inches of soil known as the root zone makes all the difference in the world in peanut production. Waiting on the proper soil temperature, placing the seed in close proximity to the inoculant product, closing the row properly for protection and good seed-to-soil contact, plus providing enough moisture for complete germination are important factors at planting. Together, these practices help the peanut plant get off to a vigorous start.

Glen Harris, University of Georgia Extension soil scientist, says peanuts are great scavengers of potassium and phosphorus. These elements, plus others micronutrients, are best supplied through fertilization of rotational crops.

One element that needs to be supplied directly to peanuts is calcium. Soon after emergence of the peanut crop, Harris says, soil samples should be taken from the pegging zone, or the top three to four inches of soil, so that calcium needs can be determined.

“Placing soluble calcium in the pegging zone or the top three or four inches is the critical point,” Harris says. “More



calcium is needed on the larger-seeded runner varieties that are popular today.”

An Input Worth Putting Out

While calcium must be applied, as a legume, peanuts can supply their own nitrogen, but only if *rhizobia* bacterium is as follows: available in the root zone; in close proximity to the emerging seedling; in sufficient quantity to be useful; alive and in vigorous condition to move into the root and begin actively fixing atmospheric nitrogen.

Scott Tubbs, University of Georgia cropping system agronomist, says there are many weather conditions faced by producers that could affect the viability and quantity of *rhizobia*.

“High soil temperatures can kill off *rhizobia* in the soil. Also, soil moisture status, if conditions are extremely dry or extremely wet, can affect inoculation of the root,” he says.

“When in doubt, put it out,” is the mantra he offers. “Inoculants are a relatively inexpensive input for peanuts, and you get pretty good bang for the buck for putting out an inoculant.”

Need proof of the value of inoculants? Read on in this Inoculant Guide to hear from producers and experts in the field.

Placing an inoculant in the root zone leads to:

- A vigorously growing crop with a better yield potential.
- A greater ability to withstand disease pressure than peanuts under stress.
- A good start with the use of fresh *rhizobia* versus potentially sluggish indigenous *rhizobia*.
- A low-cost way to ensure the proper strain of bacteria is present.
- Savings from using the peanuts' natural nitrogen-fixing ability.

Reaching Your Profit Potential



What does it take to reach profitability in peanut production? Several producers and industry experts share their tips and go-to resources for a successful crop.

Hugh Hunter, Jasper, Florida

I would tell you the key to peanut profitability is all about timing. From the day you plant all the way through to harvest, there is a set schedule of management steps that need to be taken. If you do that, you're going to make peanuts.

Clemson University has a peanut production guide that, in my opinion, is one of the best, and the crop specialists there say to use a liquid in-furrow inoculant. You want peanuts to come out of the ground quickly and get off to a good start;

and if they're not making their own nitrogen, you're just going to be behind.

Why wouldn't you want to use an inoculant to make sure your peanuts get off to a good start? Nothing does very good when it gets stunted.

I like to experiment a little every year to see if a new practice or product can really make a yield difference. We marked the fence this year, and you could see right to the row where the VAULT® inoculant started and the other inoculant stopped. You could look down the row and the peanuts inoculated with VAULT were wider. The plants were growing faster and lapped over quicker.

Kelly Philman, Bell, Florida

Anybody can grow peanuts, but it's the

small things that keep you in business. The more years you plant peanuts back to back, the more everything is about timing, from gypsum application to fertilizer application to planting to spraying, all those things need to be done on time all the way to harvest.

I've always used an inoculant, and I'm not going to plant an acre without it. On our farm, we've seen that the use of VAULT inoculant can add a half-ton more yield. Using an inoculant seems to make the plants healthier and grow quicker. If an inoculant hasn't been used, it's almost like the plants are lagging as much as three weeks behind those in fields that were treated with an inoculant. When you plant as many acres of peanuts as we do, everything has to be on a timeline, and you just can't take the chance of not using an inoculant.



Justin Clark - Becker Underwood Field Development Specialist

The first key to getting the most from every peanut acre is to make sure all liq-

uid application equipment is properly calibrated to deliver the correct rate of chemical and/or inoculant.

Second is to use a quality inoculant product every year. Due to the extremely hot and dry weather across the peanut growing areas this year, native *rhizobia* populations for the 2012 growing season are sure to be affected. By applying fresh *rhizobia* directly to the seed or in the soil during planting, you can help maximize your yield potential.

Third, limit the potential early season disease pressure. VAULT liquid peanut inoculant features advanced *rhizobia* plus INTEGRAL® biofungicide for enhanced root vigor, nutrient uptake and suppression of yield-robbing *Rhizoctonia* and *Fusarium* root rot.

Fourth, be sure to stay current on local university data and information generated through on-farm research.

Kevin Shaw, Lakeland, Georgia

There are several keys to successful peanut production such as having the land in good shape. I'm also a firm believer that using an inoculant pays off. I feel an inoculant gives the plant a good boost and if you've got a healthy plant, it's going to set a lot of peanuts. That's just logical.

Even when used in fields where peanuts have been planted in the last three years, you can see to the row where an inoculant was applied and where it wasn't. There's a visual difference. You can see the plants are making more nitrogen.

One of the most important things is a great spray program, and it's also important not to harvest too early. Our own on-farm tests show that the last week of growth can make 500 pounds or more of difference in yield.

Charles Smith, Jr., Wadley, Georgia

We still believe there's value in deep-turning the soil. We've tried some strip-till and it's done pretty well, but overall, year after year, we think we're better off turning the land.

Timing is everything. You need to get the peanuts in on time and start the fungicide program on time. We're typically

Drought Management For 2012



Most drought conditions create long-lasting impact, as will the drought of 2011 on 2012 peanut production.

"Drought conditions, as well as extremely wet conditions, negatively affect *rhizobia* in the soil," says Phil Shelley, Becker Underwood territory manager. "It's important for peanut growers to know that dry, hot temperatures are detrimental to the native *rhizobia* in the soil. Growers need to strongly consider the use of an inoculant on all their peanut acres next spring.

"And if it's still extremely dry next spring, we recommend growers irrigate before putting down an inoculant," Shelley says. "Once the inoculant is exposed to a dry, hot soil environment, it only takes two or three hours before those conditions start affecting the number of viable *rhizobia*."

"If a grower irrigates first and then applies the inoculant as an in-furrow application while planting, it works a whole lot better," Shelley continues. "The soil moisture in that 3- to 4-hour period can make a tremendous difference in the viability of the *rhizobia*."

Complete The Moisture Profile

John Beasley says not enough moisture at planting may cause incomplete germination.

"The University of Georgia does not recommend planting peanut seed in dry soil. Our recommended planting depth is two to two and a half inches. If there is no moisture in the soil from the surface to that depth, the seed should be left in the bag," he says.

"One of the risks associated with planting into a dry soil and waiting for a rain event is that if you have seed placed two to two and a half inches deep and you receive a rain that soaks the soil just to the seed but not enough to cover the seed, it may imbibe just enough moisture to initiate the germination process, but not enough to complete the germination process. In that case, there is a risk that the seed will begin to swell, not complete germination, then rot.

"Growers with irrigation have the advantage of being able to apply water in order to plant," Beasley says. "In spring 2011, it remained dry well past the end of the recommended planting window for peanut."

Being patient, especially at planting and then again at harvest, is a big part of proper timing.

spraying every two weeks but, depending on conditions, we may be out there every 10 days to stay on top of things.

We've always used an inoculant. It's like an insurance policy to ensure that

whatever we plant comes up and produces nitrogen like it should. We saw right away what a difference it makes. For the most part, we use an inoculant on every peanut acre.

Inoculant Insights

The peanut plant may be thousands of years old, but researchers continue to unlock the complexities of this amazing crop. More and more is also learned about the unique relationship this legume has with the *rhizobia* that inhabit the roots, forming nodules that allow the plant to collect nitrogen from the air and convert it into a usable compound for the plant.

Because today's producers must also know if information or practices will contribute to their profitability or not, researchers study the economics of an input.

More Yield, More Profit

Scott Tubbs, University of Georgia cropping systems agronomist, recently looked at the profitability of inoculant products. He found that the application of inoculants increased profitability, and that liquid inoculant products increased profitability by \$164 per acre.

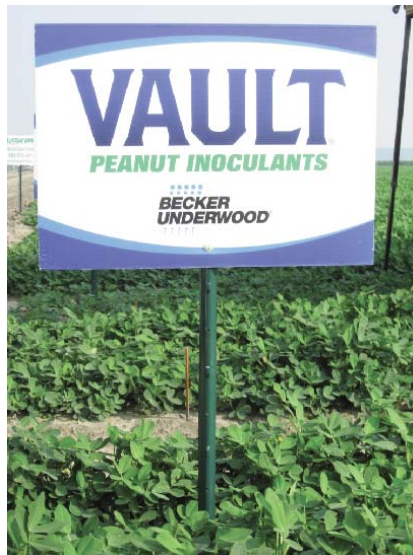
In a test on new ground with liquid inoculants applied in-furrow at planting, Tubbs says, "The inoculated products out yielded the uninoculated products, and whereas the difference may not have been a statistical difference as far as data analysis, it would have been an economical difference to the producer; enough of a difference to have paid for the use of the product."

Tubbs also found that the use of starter fertilizer decreased profitability.

"In 2008, starter fertilizer decreased profitability by \$24 to \$29 per acre, and in 2009, profit was decreased from \$15 to \$54 per acre, except at the rate of 15 pounds of N per acre."

Costly Failures

The cost of an inoculant failure has been looked at also. Jay Chapin, Clemson University production Extension specialist, now retired, studied the cost of an inoculant failure on new ground.



His research showed the cost of a complete inoculant failure on new land. His research also showed that that an application of nitrogen can mitigate some of the loss, but not to the point had an inoculant been applied and successful inoculation achieved.

With no inoculant and no additional nitrogen application, a producer could lose as much as \$390 per acre. However, with no inoculant applied and 180 units of nitrogen applied as a rescue, the producer could still lose \$236 per acre.

It pays to apply an inoculant.

More Nodules

Recent research has also shown that foliage color is not the best indicator of an inoculant failure. Tubbs found that foliage color may differ to a greater extent based on genetics than it does based on inoculated versus uninoculated peanuts.

"A grower should not depend solely on foliage color to determine an inoculant failure," he says. "You have to get below the surface, see that the nodules are there and that they are active."

Finally, in another aspect of getting to the root of the matter, Tubbs studied the nodulation achieved through inoculation of peanut plants.

"We conducted an experiment where the roots of the peanut were carefully cut off of the plant, and then the nodules were slowly and carefully pulled off of the root cuttings. We then weighed the nodules from the different plants.

"As expected, the plants that had an inoculant applied had much more nodulation than the untreated check plants."

Tubbs found that the inoculated peanuts did better than the untreated check on all variables.

Evidence supporting the use of inoculants and barriers to effective use of inoculants continues to mount, and new research projects are being planned for the coming year.

At Planting:

- Use a fresh, high quality inoculant specific to peanuts.
- Read and follow product label instructions.
- Know compatibility of product prior to tankmixing.
- Calibrate equipment to ensure proper delivery at the recommended rate.
- Plant into moist soil at a depth to protect the seed and inoculant from harsh weather.
- Set planting speed and equipment so furrow is recovered to prevent it from drying out.
- Do not use chlorinated water to apply liquid inoculants.

Top Inoculant Questions

Q. Why and when is inoculation necessary?

A. An inoculant product should be used when there is reason to believe that soil populations of *rhizobia* are low or the native *rhizobia* are ineffective.

Examples of expected *rhizobia* deficiencies are as follows: soil that has not hosted the specific legume for more than three years; soil pH of less than 5.8, or more than 8.5, which should be adjusted before planting; soil organic matter is less than one percent; the field has been under recent drought or flood conditions; surface soil temperatures have exceeded 80 degrees F; soil erosion has occurred; a soil sterilant has been applied.

As technology and selection of *rhizobia* strains improve, new, more efficient strains of *rhizobia* should be used to replace native strains residing in the soil. Because soil-residual *rhizobia* become less effective over a period of one to three years, there is a benefit of adding high levels of newer strains of *rhizobia* each time peanut is planted using a commercial inoculant product. Also, the presence of nodules does not assure nitrogen fixation. Evaluate nodules by examining the inside color of the nodules. A pink to red center means it is actively fixing nitrogen.

Q. Do legumes always nodulate?

A. Large amounts of excess nitrogen in the soil, either from an applied fertilizer, manure or residual left from previous years, can reduce nodule formation of legume plants even though there are plenty of the appropriate *rhizobia* available in the soil.

Plants will look green and healthy until the soil nitrogen is used.

A developing plant will choose the readily available nitrogen over that produced by *rhizobia* bacteria; however, when soil nitrogen is used up, the plant will languish from the lack of nitrogen and yield will be affected. Because of this, it is better to apply an inoculant and to not use N fertilizer.

Q. Do inoculants require special storage or handling?

A. Inoculants are live bacteria and require special care. To maximize the effectiveness of *rhizobia*-containing inoculants, follow the recommended handling, storage and application directions for each inoculant product in addition to these general handling practices:

- Apply only an inoculant product specific to peanuts.
- Store between 40° and 70° F and out of direct sunlight — avoid overheating.
- Avoid storing outside or unprotected from the elements for long periods.
- Prevent from freezing.
- Avoid exposure to fumigants during storage and use.
- Know compatibility with fungicide and insecticide products to be applied.
- Use and mix only with non-chlorinated water.
- Regularly check calibration of application equipment.

