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Methods for On-Farm Testing of Peanut Varieties in Florida with Results from 2005–2009[1]

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Evaluating the performance of peanut varieties is traditionally done in small plots on research stations by University personnel. Such tests are very valuable and the data is reliable and accurate. In the southeastern United States, variety performance tests are conducted in Alabama http://www.ag.auburn.edu/aaes/communications/peanuts/, Florida http://edis.ifas.ufl.edu/topic_peanut_varieties, and Georgia http://www.swvt.uga.edu/pct-tests.html. All of the peanut varieties that we grow today and those that were grown in the past were developed and selected based on "small plot" tests similar to these. Thus, the reliability of the method to identify superior varieties is very good. However, adoption of new varieties often hinges on the experience of growers with the new variety during the first years of seed availability. When a grower tries a new variety, the first impression is important in the future perception of the variety. Mostly, this perception relies on comparisons of the new variety to those varieties commonly grown, so the method of comparison is critical for an accurate perception. If the method of comparison is flawed, then the wrong impression can result. This publication is intended to present ideas for comparing the performance of varieties on a "farm scale" that will give peanut growers tools to accurately evaluate peanut varieties on their own farm.

In comparison to small plot research methods, the methods for testing varieties on a farm scale are different, but the objectives are the same. The primary objective of variety testing is to compare each variety grown in a similar environment using common management practices. The goal is to eliminate differences in soil type, disease pressure, irrigation, planting date, or any other factor, so that all varieties in the test are treated equally. Since all varieties are treated equally, the results primarily indicate differences in the varieties, not differences that could be caused by other factors as mentioned above.

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On-Farm Test Pitfalls

Constraints of time, land, and labor hinder proper on-farm variety evaluation. Often, new varieties are "tested" by planting an entire field, or part of a field, and comparing the results to varieties planted in other fields, or other parts of a field. Comparing the performance of varieties from different fields, or even different parts of the same field, can be very misleading. Other factors, besides the variety, can heavily influence the ultimate performance measures of pod yield and grade. The question is, then, '*What differences, other than the variety, exist between the test fields?*'. Some major differences could include soil type, irrigation/rainfall, diseases (especially soil-borne diseases and pests such as white mold, CBR, and nematodes), previous crop, date of planting, weed pressure, and so on. Since there are always differences among fields, the only way to compare varieties with accuracy is to plant them in the same field, at the same time, manage them in the same fashion, and replicate them over a portion of the field to minimize differences that could occur in soil type and/or soil-borne diseases. There are at least two distinct methods that can be used to test varieties. Two of those methods are exemplified below in Figures 1 and 2. An on-farm experiment in Columbia County, Florida in 2009 is presented in Figure 1.

In the test conducted in Columbia County (Figure 1), 36 rows of six different peanut varieties were planted side-by-side. At harvest, twelve rows are harvested together to form three within-variety replications, with each group of twelve rows being weighed separately. This method can best be described as a demonstration test—each variety planted in long strips that are not repeated or replicated. This method has the advantage of being relatively simple to plant and harvest, but the disadvantage of requiring at least two years of data for replication purposes. At this test site, the soil variability is minimal, and the crop rotation is excellent, so field variability due to soil type and disease pressure has minimal impact on pod yield and grade even in a single year. This particular test has been conducted since 2005 with various varieties on the I.C. Terry Farms near Lake City, Florida in Columbia County. Results are presented in Figures 3 and 4 and are discussed below.

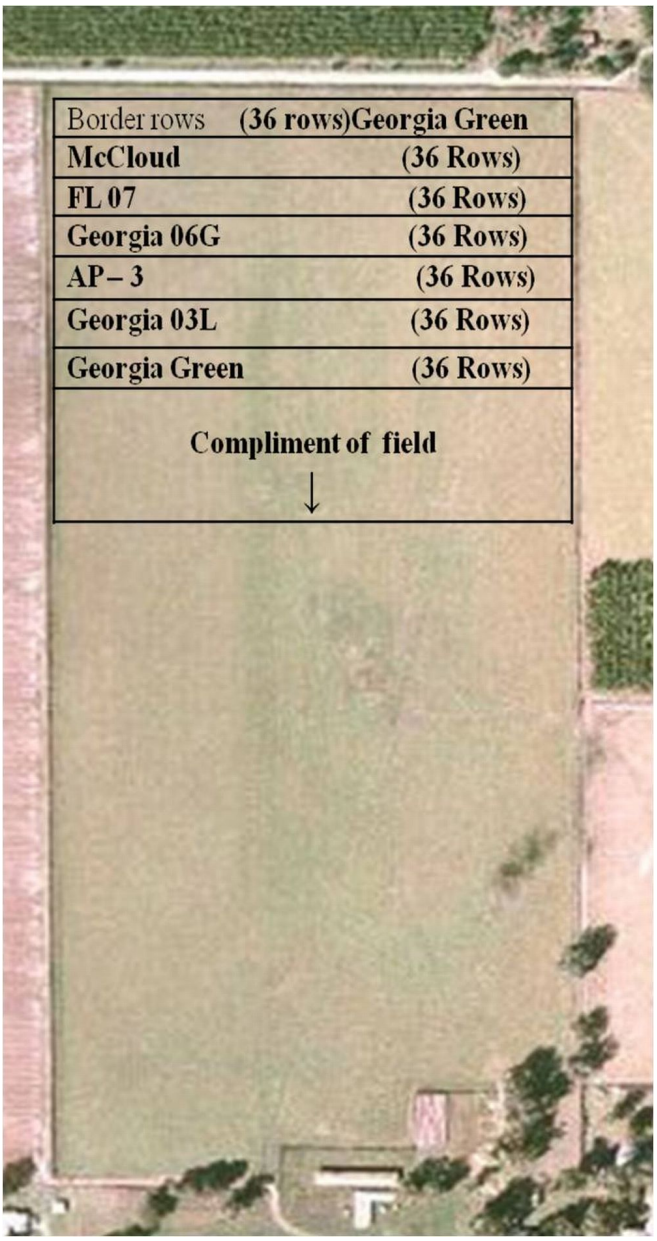

Figure 1. Map of an on-farm variety demonstration test in Columbia County, Florida in 2009.

Figure 2 presents a field map of a replicated on-farm field test. This test was conducted in Jackson County, Florida in 2009. There were four varieties and each was planted in eight, 6-row strips throughout the field. At harvest, two strips were combined together to form four replicates of each variety. This method of planting was made possible by automatic steering powered by GPS (Global Positioning System). A twelve-row planter was used, half filled with one variety, and half filled with another. The

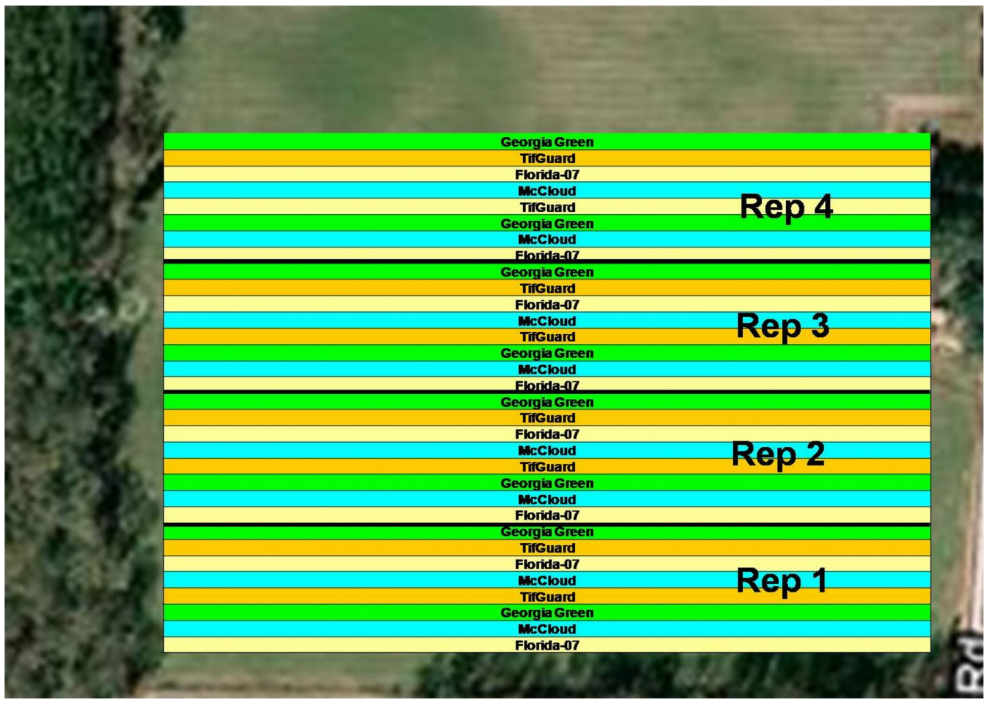

Figure 2. Map of an on-farm variety test in Jackson County, Florida in 2009.

GPS-autosteer system allowed the operator to plant two of the four varieties throughout the field by skipping the 12-row pass for the other two. After planting the first two varieties (Florida-07 and McCloud), Georgia Green and Tifguard were then planted in the same manner. Two strips of each variety were harvested together within each replication and weighed. Since the varieties were replicated across the field, data from a single year can be analyzed and interpreted. However, it is still preferable that decisions on variety performance tests be made after at least two years of data has been collected.

Both of these methods are acceptable for on-farm testing of peanut varieties. As mentioned before, the method illustrated in Figure 1 is not replicated throughout the field. However, if GPS-autosteer is not available, replication can be achieved by using only two varieties and dividing the planter in half (or 4/2 for a 6-row planter) and planting alternating strips of the two varieties. Of course, it is imperative that the digging and harvesting equipment properly match the planting pattern.

On-farm Test Results

Pod yield results from the Columbia County test during the five-year period of 2005–2009 are presented in Figures 3 and 4. Management included a full-season fungicide program. The typical rotation on this farm is two to three years of peanut, followed by four to five years or more of Bahia grass. Soil-borne disease pressure is usually low, but leaf spot disease pressure can be intense. Notice that each variety is compared to others only if they have been tested during the same period. Comparison of varieties tested in different years can be misleading as varieties can perform differently in different years. For example, consider the performance of 'McCloud' in Figure 4. In 2008, McCloud yielded about 900 lbs/A less than 'Georgia-06G', but in 2009, McCloud yielded 400 lbs/A more than Georgia-06G. On average however, there was no difference in the yield of Georgia Green, Georgia-06G, 'Florida-07', and McCloud during 2008–2009. Similarly, there was no difference in the average yield of 'AP-3' and 'Georgia Green' during 2005–2008. While the results from Columbia County indicate little difference in yield among common peanut varieties, they do show the potential for year-to-year

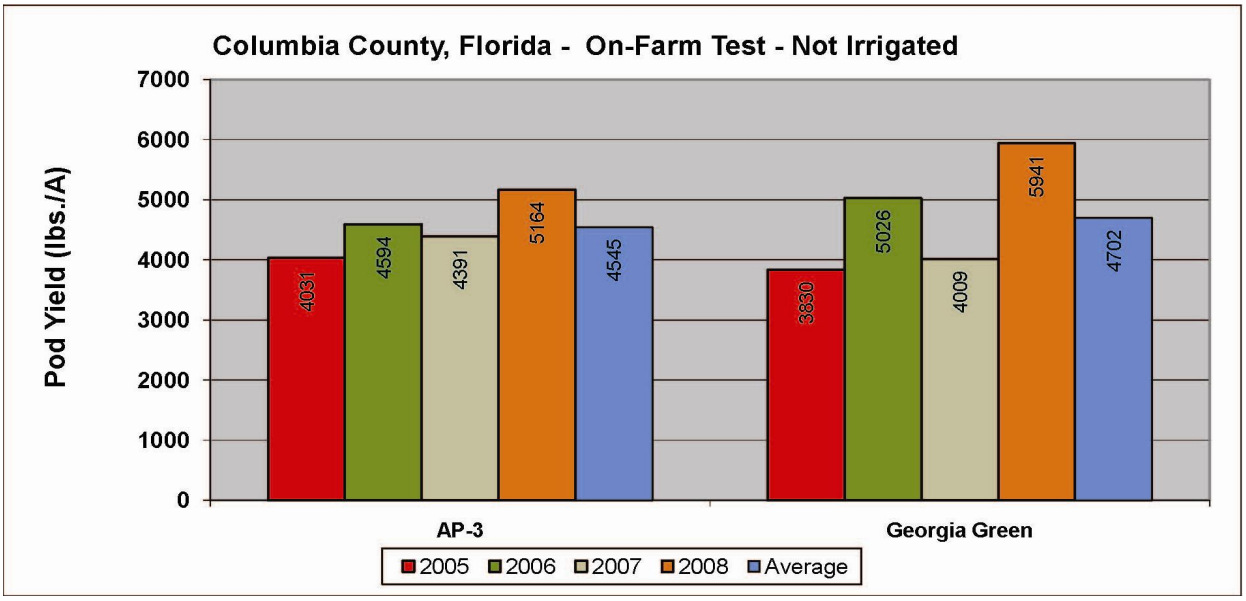

Figure 3. On-farm comparison of Georgia Green and AP-3 in Columbia County, Florida, 2005-2009.

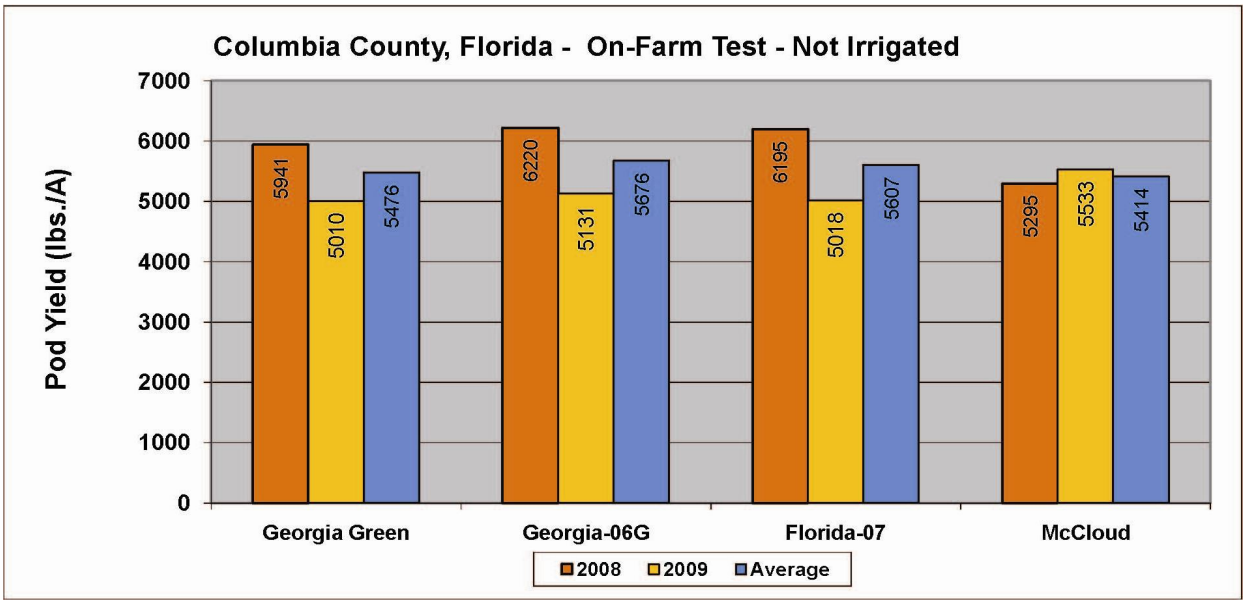

Figure 4. On-farm comparison of four peanut varieties in Columbia County, Florida, 2008-2009.

fluctuation in performance thus highlighting the need for testing varieties for more than one year.

Pod yield results from an on-farm test in Jackson County, Florida comparing McCloud, 'Tifguard', Florida-07, and Georgia Green are shown in Figure 5. On average, McCloud, Tifguard, and Florida-07 had similar pod yield, and all three yielded more than Georgia Green. Disease, especially white mold, was more prevalent in this test as compared to the tests in Columbia County. It is common for Georgia Green to perform exceptionally well in tests where disease is minimal (as in Figures 3–4), but its yield can drop dramatically when disease is a factor. Although a second year of testing is needed in Jackson County, taken together with results from research tests, results from on-farm tests suggest that new varieties (such as McCloud, Tifguard, and Florida-07) have better disease resistance than Georgia Green. Therefore, the new varieties will likely perform better in the presence of diseases.

Summary

New peanut varieties are being released every year and it is important for farmers to evaluate them on their farm to determine if adopting a new variety would be beneficial. Utilizing methods as described in this paper can significantly improve the accuracy of on-farm variety evaluation and growers are encouraged to evaluate new varieties on their farm. By evaluating variety performance on the farm in a manner that insures that comparisons are made within a very similar soil type and similar environmental and disease conditions, farmers can accurately determine which varieties perform best under their farm conditions and management programs. Similarly, as new varieties are developed and released, proper on-farm testing can prove valuable in determining their regional adaptation.

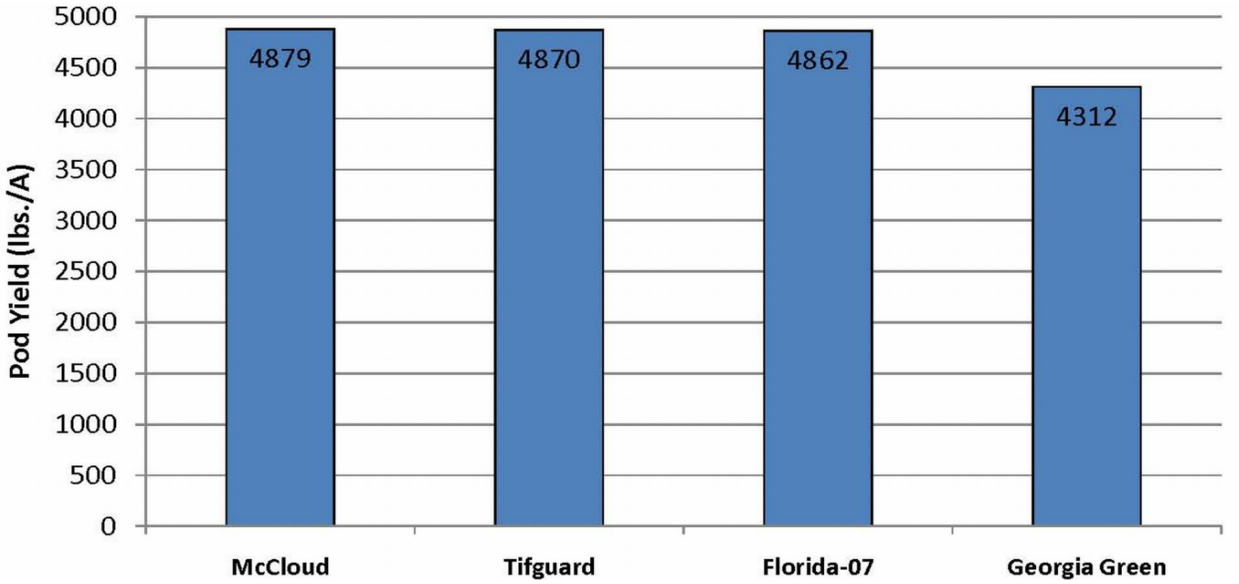

Figure 5. On-farm comparison of four peanut varieties in Jackson County, Florida during 2009