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A Farm Demonstrations Method for Estimating Cotton Yield in the Field for Use by Extension Agents and Specialists

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Abstract

This article describes a programming possibility for Extension agricultural agents working in cotton production. It describes methods by which scientific estimates of cotton yields may be performed by agents in the field and educational opportunities that may arise as a result of the estimation process. These programs have been very popular and successful in Alabama.

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Background

As cotton bolls start to open and talk in workshops and on farm tours centers around late season crop management and defoliation, farmers often are very interested in yield estimates. Often Extension agricultural agents in the Cotton Belt are asked to estimate cotton yields "in the field," before the cotton is picked. Usually, agents just look out over the field and develop an estimate based on the "look" of the field and their prior experience. The problem with such estimates is that they are almost invariably wrong, and agents making estimates based on such unscientific methods risk loss of credibility among their clientele.

Several "rules of thumb" exist for estimating such yields, for example "100 bolls per 10 feet of row equals one bale per acre" or "each individual lock per 10 row-feet equals 1 pound per acre lint". While these "rules of thumb" offer some improvement in accuracy, the interest in yield offer an excellent teaching opportunity for the agent.

While there is often a good bit of variation in any field, an agent who is willing to spend a few minutes sampling bolls can make a more accurate estimate and can use the opportunity to illustrate several important farm and cotton management principles. The accuracy of the resulting estimate depends on the agent's willingness to take the time to count and weigh a representative sample of bolls. The accuracy of the estimate directly depends on how much time is taken to develop the sample.

Factors Affecting Estimate Accuracy

It must be noted that the accuracy of yield estimates also depends, to a lesser extent, on assumptions regarding cotton picker efficiency and gin turnout. Efficiency of harvesting equipment may vary significantly, depending on age and condition of the pickers as well as field and environmental conditions. The proportion of the crop that ends up in the picker basket may vary between 75 95%. Under good conditions, pickers will be able to gather roughly 95% of the seed cotton, containing both lint and cottonseed, into the machine.

However, many common factors may significantly reduce that efficiency. Some cotton may be "strung out" of the bolls and fall to the ground. Some bolls may be "hard locked," a condition where the cotton lint fails to "fluff" so it is missed by the picker. Some bolls may not open in time to be picked. However, in the absence of extreme conditions 85 to 90% of the cotton will be

5.5	441	551	661	771	881	992	1102	1212
6	481	601	721	841	962	1082	1202	1322
Bolls per Foot of Row, 30-Inch Rows								
Grams per boll	8	10	12	14	16	18	20	22
2	203	254	305	355	406	457	508	558
2.5	254	317	381	444	508	571	634	698
3	305	381	457	533	609	685	761	837
3.5	355	444	533	622	711	799	888	977
4	406	508	609	711	812	914	1015	1117
4.5	457	571	685	799	914	1028	1142	1256
5	508	634	761	888	1015	1142	1269	1396
5.5	558	698	837	977	1117	1256	1396	1535
6	609	761	914	1066	1218	1370	1523	1675

Bolls must be weighed to make an accurate estimate. Again, there are many ways to scientifically estimate average boll weight. Any systematic sampling of boll weight and number will work. The choice depends on the scales available.

Postal-type scales that weigh in ounces will require samples that weigh several ounces, about 100 grams. This means you will need a sample of at least about 25-30 bolls. One may randomly select a sample of two or three plants and count and weigh every boll on those plants to get the average boll weight. There are about 28 grams in an ounce, so if you weighed a sample of 24 bolls and it weighed 3 ounces, it would convert to 3.5 grams per boll (Three ounces = 84 grams, $84\text{grams}/24\text{bolls}=3.5\text{grams/boll}$). The only important principle is to sample bolls from many different areas in the field and from all parts of the cotton plants.

Additional Educational Opportunities

An interesting demonstration to perform while the agent is measuring these bolls is to show the value (and weight) of bolls from different parts of the plant. It is interesting for farmers to see the difference in value of a large first position boll near the middle of the plant and a small boll on the end of one of the upper fruiting branches. To calculate boll value, simply divide weight in grams by 454 grams per pound, and multiply by a current cotton lint price per pound, about \$.55.

Another interesting demonstration while in the process of estimating yields is to show the wide variation between different areas of the field and between different plants. The farmers can see how the whole field might perform if the weaker areas of the field performed as well as the stronger areas.

Finally, doing these calculations gives farmers an idea of the value of a relatively small number of bolls per 10 row-feet. They can see that a late season insect control application or a boll-ripening treatment that opens just a few bolls every 10 feet will cover the cost of the material and application.

For example, it would require the chemical to open just 4.5 4-gram bolls per 10 row-feet to pay for a \$10 per acre boll-ripening treatment. This represents less than half a boll per foot of row. With a normal plant population, that's about one boll on every sixth or eighth plant. One boll per row-foot on 38-inch rows equals 13,756 bolls per acre. While one 4-gram boll at \$.55 per pound is worth

less than two tenths of a cent, one 4-gram boll per foot of row is worth over \$22 per acre.

In summary, demonstrations like these can be an interesting and important part of late-season cotton tours and field days and can provide the Extension agent ample opportunity to demonstrate area competence while providing farmers with useful cotton management information.

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