2004 BELTWIDE COTTON CONFERENCES, SAN ANTONIO, TX – JANUARY 5-9

FIELD GUIDE TO COTMAN DATA COLLECTION

Diana M. Danforth
University of Arkansas
Fayetteville, AR
Tina Gray Teague
Arkansas State University and
University of Arkansas Agricultural Experiment Station
Jonesboro, AR
Ray Benson and William Robertson
University of Arkansas
Little Rock, AR

Abstract

COTMAN data collection procedures are described and illustrated. Once per season, the user enters farm and field information, takes stand counts and records the number of the first sympodium. Weekly, from first square to first flower, retention of first-position squares is recorded. After first flower, nodes-above-white-flower (NAWF) is recorded until the field reaches cutout (NAWF=5).

Introduction

COTMAN is divided into 2 components (Figure 1). SQUAREMAN is used to monitor crop development up to time of first flowers. It is used to monitor square retention and plant stress. BOLLMAN is used when the crop is flowering to monitor boll loading and plant stress and to help with end-of-season crop termination decisions. BOLLMAN utilizes NAWF data.

For a cotton crop to follow the COTMAN target development curve, the crop should begin squaring 35 days after planting, and first flowers should appear about 25 days later, around 60 days after planting. Physiological cutout is expected approximately 80 days after planting when the crop averages NAWF = 5.

Plant monitoring is key to the COTMAN system. The following information is intended to provide a step-by-step guide to data collection in the field. A water and tear resistant pocket-sized field guide to data collection is distributed with the COTMAN software.

Once per Season Data Collection

Once per season you enter these data into the COTMAN program.

1. Farm information – total acres, harvest capacity, weather risk…
2. Field information – field acreage, variety, planting date, row spacing…
3. Stand count – the number of plants in 3 row feet across 24 consecutive rows at 4 locations per field. To facilitate counting plants, construct a “T” shaped sampling stick using a 3-foot PVC pipe attached to a 4-foot piece of 1-inch PVC pipe. This T-stick can be used to push plants over to allow rapid counts in the 3-foot section across the rows (Figure 2).
4. First fruiting node (FN) – the average first fruiting node (1st sympodial branch) on 10 plants at four locations in the field. Make determination of FN when squares consistently can be found across the field. Count from the cotyledons (node=“0”) up to the first sympodial branch to determine FN (Figure 3).

Where to Sample

- Choose the 4 sample sites where plant growth is typical for the field.
- Try to sample the same general areas in the same order every week.
- If the field is irrigated, always stay inside the irrigated area.
- It is a good idea to ask the grower where to make your counts in the fields because he will know the fields best.

Weekly Data Collection

SQUAREMAN Data Collection

Begin collecting SQUAREMAN data when the crop starts squaring (you may wish to collect FN data at the same time you start collecting SQUAREMAN data). Repeat the following procedure in four different locations in each field:

1. Measure the average plant height. Plant height is measured in inches from the soil to the terminal. Take one measurement on both rows at each site.
2. From 5 consecutive plants, start at the 1st fully expanded true leaf in the terminal and continue down the plant checking for the presence or absence of 1st position squares. A fully expanded leaf will be unfurled so that its leaf tips are not touching. Record a "1" if a square is present and enter a "0" if the square has shed (Figure 4).
3. Repeat steps 1 and 2 on the adjacent row.

SQUAREMAN Mapper Tips

1. Start at the top of the plant at the first fully expanded true leaf – its tips should not be touching.
3. Don't damage the terminal area digging around for small squares.
4. If the first square is dark or obviously damaged, record a "0". If the square looks normal, record a "1".
5. Check the remaining first position squares down the plant until you reach a monopodial branch.
6. Move to the next plant and begin again.

To locate a square, follow the stipule rule. Stipules are small leaves on each side of a square (Figure 5). It will save time looking for the square if you train your eye to look precisely between the stipules. The stipules are pointing where you need to look. A pair of stipules on a sympodial branch will have between them either (1) a square or boll or (2) a scar where a square or boll has been shed.

BOLLMAN Data Collection

When first flowers appear, start collecting NAWF data. Repeat the following procedure at 4 locations per field:

1. Count the number of nodes **above** the uppermost first position white flower (NAWF) from 5 plants in one row and 5 plants from an adjacent row. Figure 6 depicts a plant where NAWF = 5.
2. Select only plants with a WHITE flower on the FIRST fruiting position. In Figure 7 there is a pink flower on the 2nd position so it would not be selected. When the crop is just starting to flower, you may have to "swim" down the row to find 5 plants with white flowers.
3. When counting, stop at the uppermost unfurled leaf in the terminal. **Do not count a leaf that is not yet unfurled** (Figure 8).
4. Stop collecting BOLLMAN data when the field averages a NAWF value of 5.

Plant Structure

Plant mappers must understand plant structure.

1. Cotyledons are the first leaves to emerge. They are bean-shaped and are the only leaves that lie side-by-side on the main-stem.
2. A monopodial branch (vegetative branch) is a continuous limb. Monopodial branches look like individual plants growing from the main-stem and they can eventually set fruit, but only after re-branching.
3. A sympodial branch (fruiting branch) grows at an acute angle from the main-stem. After a sympodial branch produces a square it will begin to grow again and will appear to zig-zag.

Figure 9 provides an overview of the cotton plant structure as it relates to COTMAN plant monitoring. Concepts and terminology associated with the COTMAN system are summarized in Oosterhuis et al, 1996.

Acknowledgement

The COTMAN system was developed by the University of Arkansas Division of Agriculture with support from Cotton Incorporated.

References

Oosterhuis, D.M., F.M. Bourland, N.P. Tugwell and M.J. Cochran. 1996. Terminology and concepts related to the COTMAN crop monitoring system. Special Report 174, Arkansas Agricultural Experiment Station, Fayetteville.

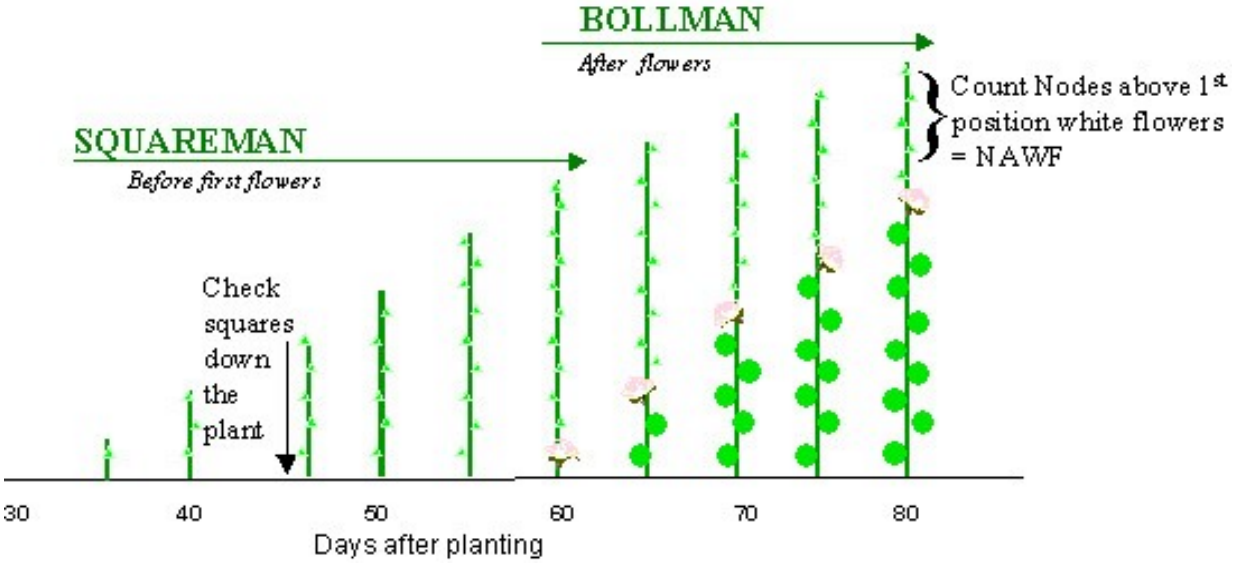

Figure 1. Seasonal Use of SQUAREMAN and BOLLMAN Components.

Figure 2. A T-Stick Simplifies Taking Stand Counts.

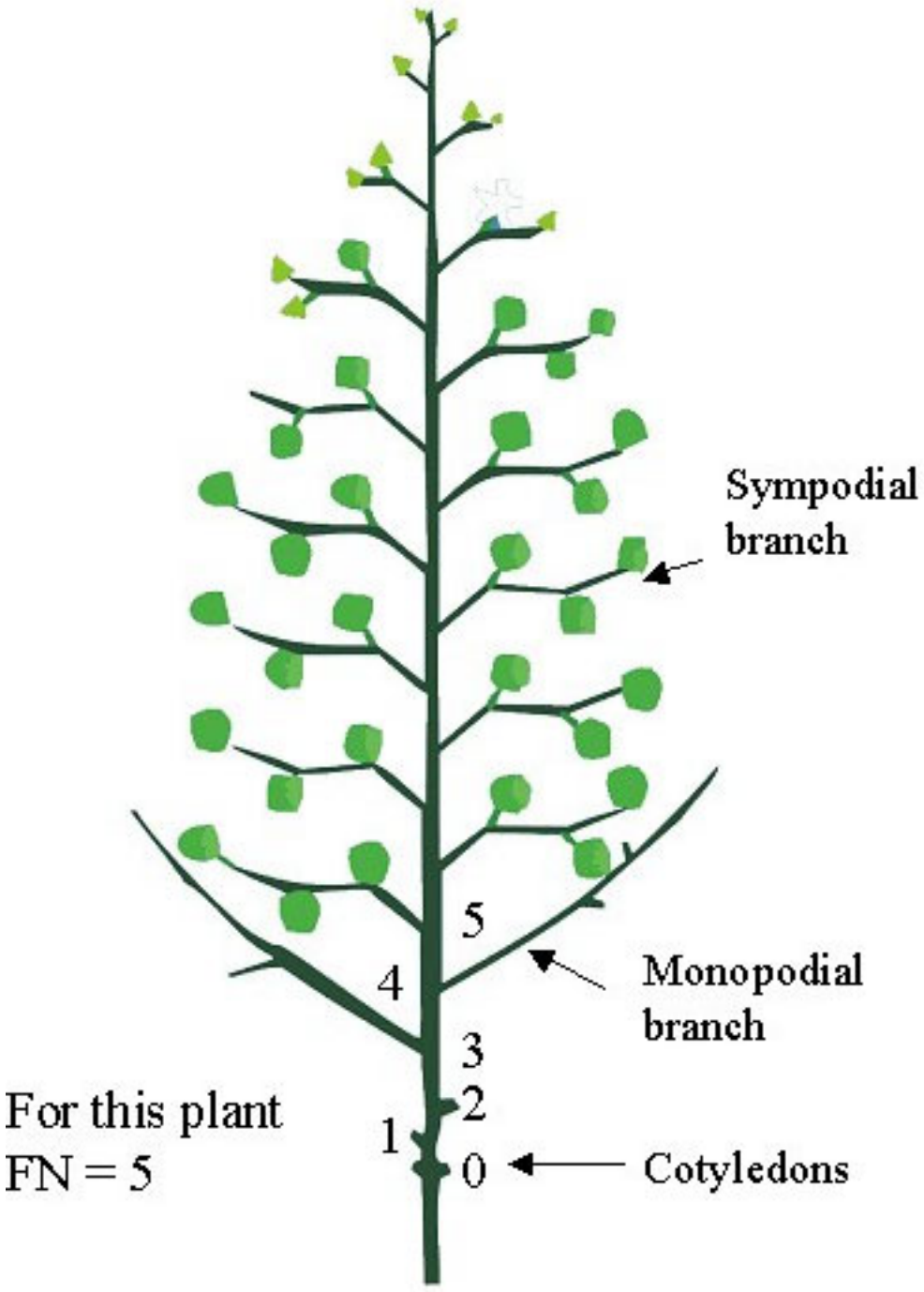

Figure 3. Determining the First Fruiting Node (FN).

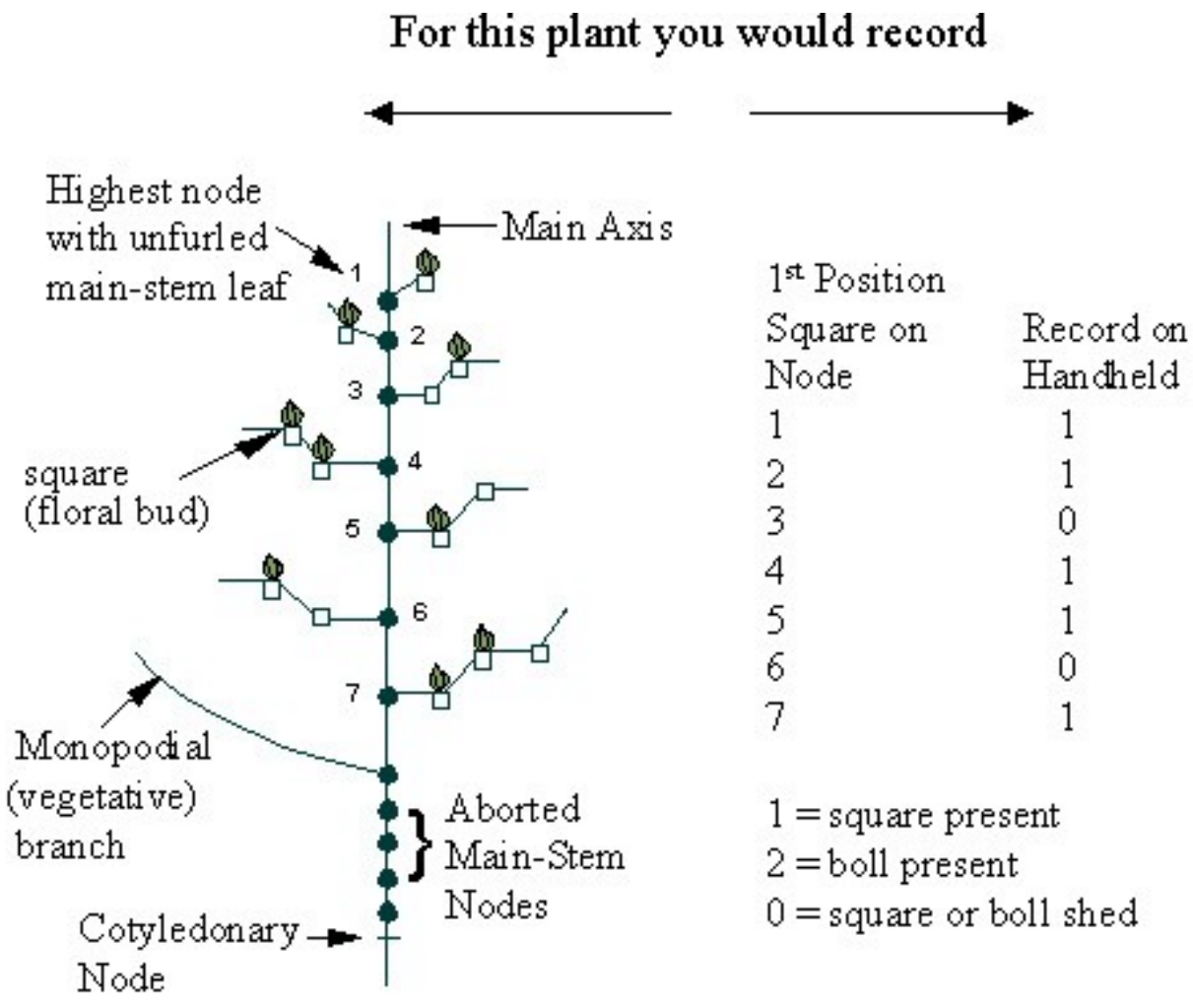

Figure 4. Recording Retention of First-Position Squares.

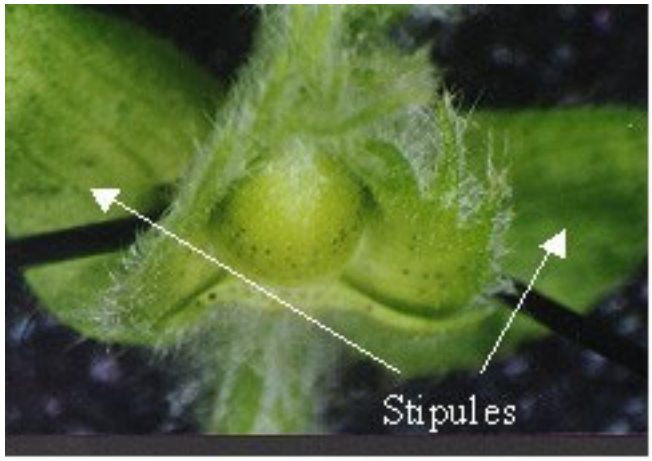

Figure 5. Tiny Square with Bract Cut Away to Show Stipules on Either Side.

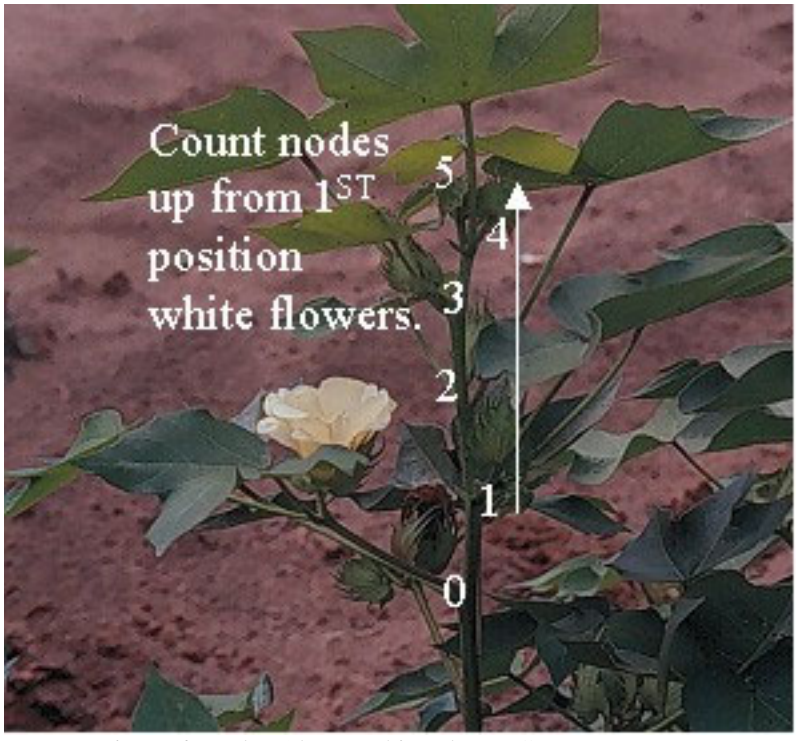

Figure 6. Nodes-Above-White-Flower Counts (NAWF).

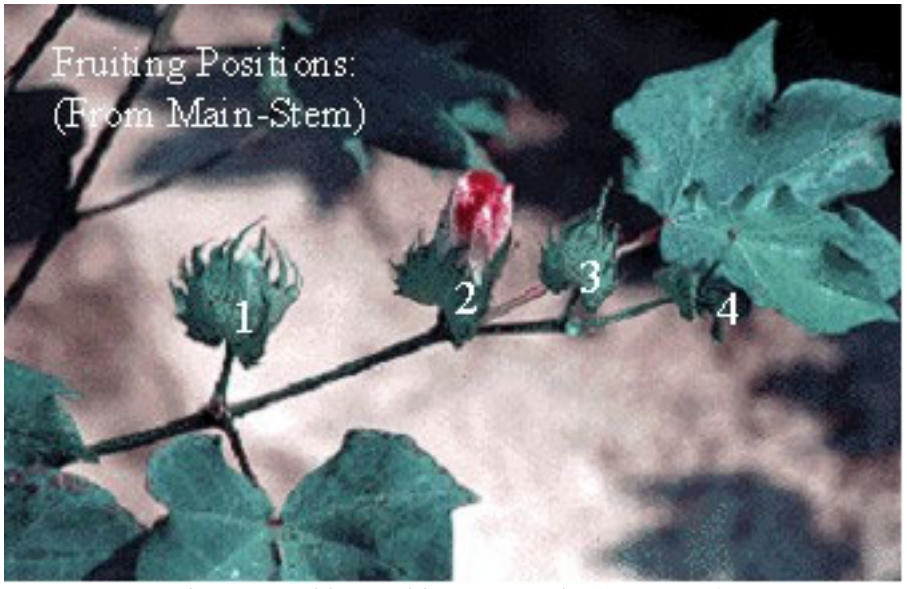

Figure 7. Fruiting Positions on a Main-Stem Branch.

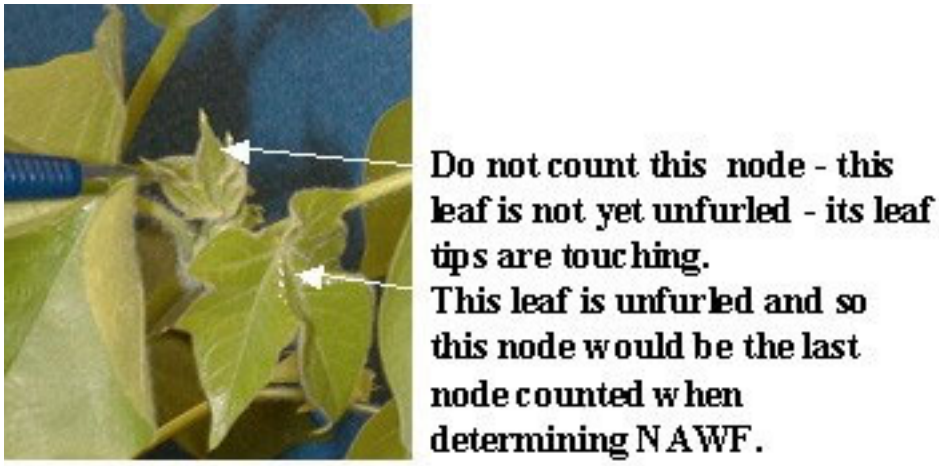

Figure 8. Identification of the Uppermost Node for Plant Monitoring.

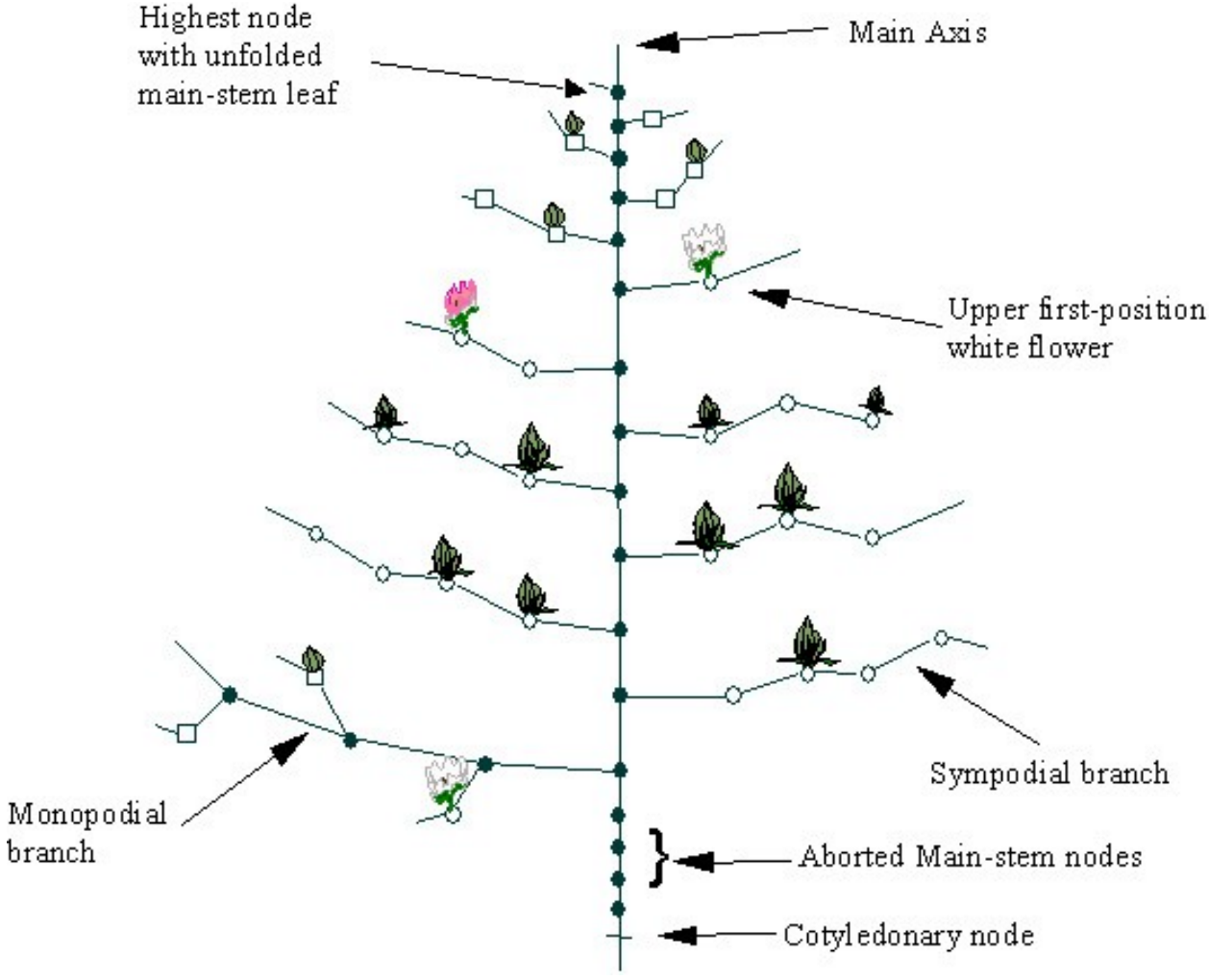

Figure 9. Cotton Plant Structure as it Relates to COTMAN Plant Monitoring.