Early Season Crop Management

The approaches and techniques used to produce a cotton crop in Arizona can vary to some degree from county to county, or from farm to farm. However, one of the objectives that has become increasingly common across Arizona is that of achieving earliness with a crop. Earliness has been important at the higher elevations (over 2,000 ft. above sea level) for quite some time due to limitations in the length of the growing season for cotton. At the lower elevations, earliness has increased in importance due to a number of factors including: land/crop rotations (i.e. vegetable production), insect pest pressures (whitefly and pink bollworm), and difficulties in setting and maturing additional fruit in August due to high temperature (day and night) and high humidity conditions. Accordingly, achieving an early crop with a strong yield potential is important to all cotton producing systems across Arizona.

With early and optimum planting times, fields will commonly experience a transition from vegetative to reproductive status in a timely fashion. First fruiting branches (FFB) will ideally be set by nodes 5, 6, or 7 (about 700 heat units accumulated since planting, 86/55° F thresholds, HUAP). If these squares are retained, first blooms can be expected at about 1200 HUAP, which represents one of the first basic steps towards an early crop. It is also not uncommon to find some aborted squares in some fields, usually small squares that are dried-out and aborted at early stages of development. This type of fruit (square abortion) could be very important to recognize, if it is taking place in a given field, try to identify the cause, and correct it if at all possible.

Some important steps to take at this early and critical stage in the season would include: 1) identifying the average FFB for a field; and 2) making note of the overall fruit retention (FR) level. Identification of the FFB requires a careful inspection of a young plant using the following points: 1) the cotyledon nodes (parallel nodes at the base of the plant) = 0; 2) the FFB is usually not found before node number 5, but in some cases it can be as low as node number 4; 3) FFB occurrence on nodes 5,6, or 7 is a normal or optimal point of transition; and 4) FFB above node 7 is an early indication of a delay in fruiting, potential for vegetative

growth, and a potential for loss of crop earliness potential. Differentiating between a vegetative and fruiting branch can be done by looking at the first node (bump) on the branch in question. If the branch is a fruiting branch it will have either a viable fruit (square, bloom, or boll) or an abortion scar. If the branch is smooth at the first node (no fruit and no scar), it is a vegetative branch. Vegetative branches also have a tendency to have a straight growth pattern, whereas, fruiting branches have more of a zig-zag growth pattern with slight bends at each node. For example, the plant diagram shown in Figure 1 has the first fruiting branch at node 6.

Estimating FR levels can be done relatively easily this time of year. Once the FFB is identified, one can simply progress up the plant, one fruiting branch at a time, and identify the number of aborted or retained fruiting forms on each branch. In our program with the University of Arizona, we use only the first position on each fruiting branch before first bloom in a field. After a field has begun to bloom we then take into account both the first and second positions on each branch for estimating FR. For example, if a field was in a pre-bloom stage of growth, such as the one in Figure 1, we could evaluate the first position squares and calculate %FR in the following manner: 1) identify FFB at node 6

(therefore, there are 5 vegetative branches); 2) if the node in the terminal has an attached leaf that is 1 inch in diameter or greater, then we count it (i.e. 8 total nodes in Figure 1); we can then count aborted or retained sites from the FFB to the top node (suppose the first position had an abortion scar on branch 6, therefore 1 aborted and 2 retained sites); divide the number of retained sites by the total number of sites counted ([2 retained sites ¸ 3 total sites counted] X 100 = 66% fruit retention). The average %FR taken from a given field can then be compared to the baseline for FR developed here in Arizona to gauge crop condition at this time.

If FR is dropping in a field, management steps to consider should include: maintain good plant-water conditions (don't stress to try to encourage fruiting but don't over-water either); be cautious with N fertilization (check N fertilization records and petiole NO_3^--N concentrations); check for insect pest infestations; and watch for vegetative growth tendencies, which may require a plant growth regulator application.

It is important to evaluate crop condition early in the season. For example, we also don't want to go out into a field in August and realize we have a problem that may have begun back in May.
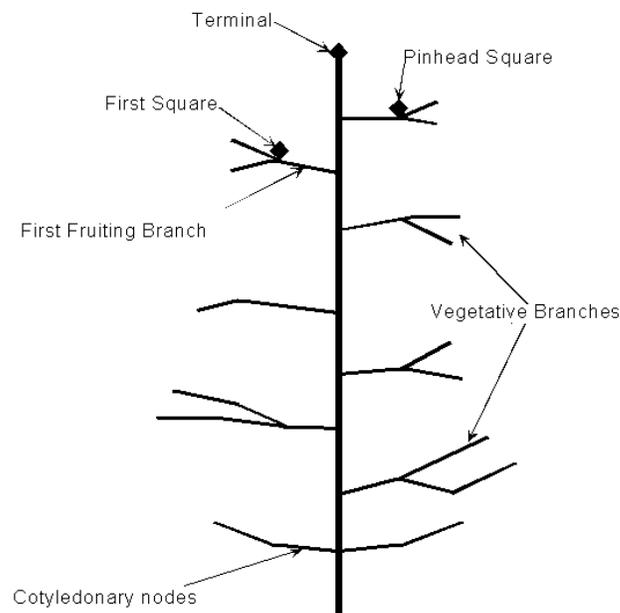
Figure 1. General early season cotton plant diagram.