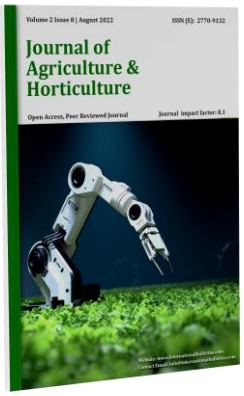

STUDYING BRANCHING AND ITS TYPES IN THE COTTON VARIETIES.

Xurramov Asilbek Abdusamat o'g'li
Independent researcher Tashkent State Agrar University
R.X.Muydinov
Independent researcher Tashkent State Agrar University
Anisa Barotova Razzakovna
Independent researcher Tashkent State Agrar University
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Abstract.
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The developing branches on a cotton plant can be schematically classified as either vegetative branches or fruiting branches (figure 1). Scientifically they explained as monopodia and sympodia. Thus wise, cotton plant varieties grown in the fields of farmers have two types of branches: monopodial and sympodial. Some genotype diversities may have both monopodial and sympodial branches, while others may have only sympodial branches arose directly from main stem which is called as zero type. Zero type of cotton varieties belong to fine staple cotton varieties (photo 8). Branches on the main stem are located in a spiral order, angled along the main stem.

The main stem is composed of nodes and internodes connecting each node to the other. On each node there is a leaf and an axial bud. The first node emitted on the main stem is the cotyledon node (Figure 1). For each of the first nodes above, there is either no branch or one vegetative branch (Figure 1). A vegetative branch does not carry any fruit but can emit secondary branches that carry fruits (Goldsworthy and Fisher, 1984). After a few nodes on the main stem, the first fruiting branch is emitted (Goldsworthy and Fisher, 1984); this node is called node of insertion of the first fruiting branch (N1FB). Above that node, all nodes contain a single fruiting branch (Figure 1). The main stem and the vegetative branches show a continuous (monopodial) development whereas the fruiting branches and the secondary fruiting branches on the vegetative branches show a discontinuous (sympodial) development in a zig zag manner (Figure 1). In addition, cotton shows a 3/8 phyllotaxy (every new branch develops on an axis rotated by 135° compared to the former). The stem compartment is characterized by its number of nodes on the main stem, its average length of the internodes on the main stem, its main stem height, its number of developed vegetative branches, its number of fruiting branches, its duration between the sequential emergence of nodes on the main stem (defined here as the phyllochron), and its biomass.[1]

Vegetative branches on the cotton plant bush, like the main stem, are referred to as monopodia (meaning ―single foot‖, named by the scientist Glen L. and others, 2007.) since they have only one meristem. It is commonly known that vegetative branches have only one meristem, they grow straight and erect, resembling the main stem (photo 1). The main stem begins from cotyledon node. This node characterizes with two parallel nodes on the both side of the main stem. They hereditarily have 3 nodes without branches and they are called aborted nodes.

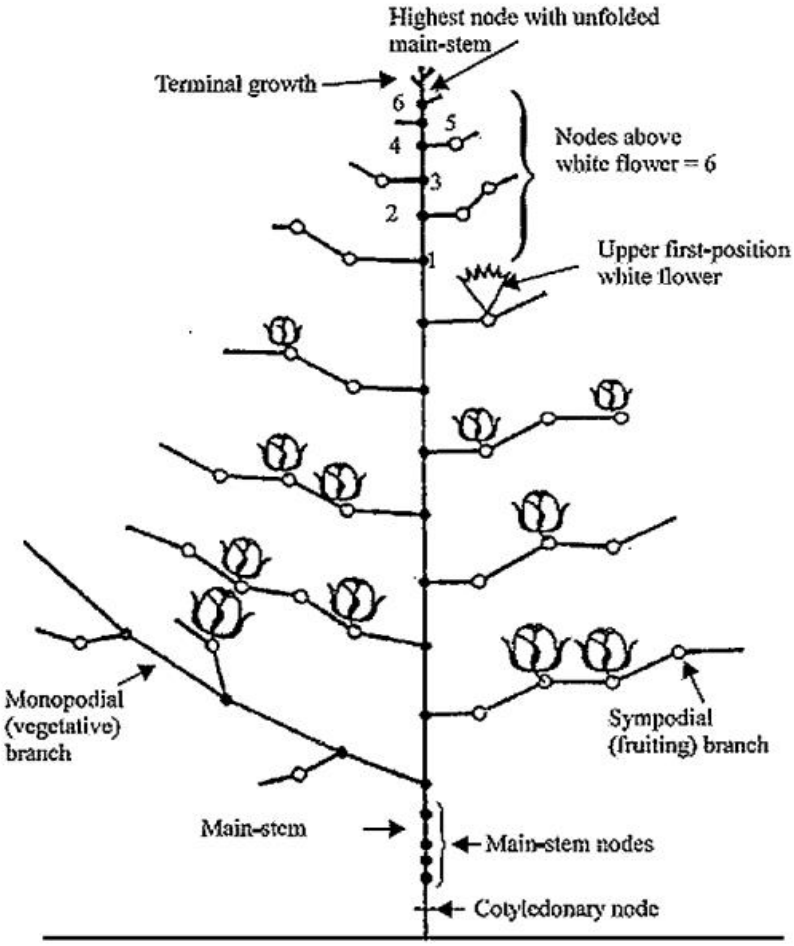

Figure 1. Typical cotton plant morphology

Vegetative branches can also produce fruiting branches in the second order (or secondary sympodial branches). In general, monopodial branches are larger and longer than sympodial branches. The distance between the last monopodial branch and the first sympodial branch is only one internodal length. The branches that do not bear fruit directly are the monopodial branches. Monopodial branches are also called vegetative branches and are always formed at the base of the cotton plant. Due to the enlarged size monopodial branches give the plant a bushy look and usually cause for slow rate of boll formation compared to a sympodial-type plant. In the result of this performance plant has less fruiting organs but leaves and woods. Plant spacing also has a great influence on the number of monopodial branches. Closer spacing of plant bushes per area reduces the appearance of monopodial branches.

Sympodial branches bear buds, flowers and bolls directly, for this reason they are called fruiting branches. The secondary branches on monopodial branches are also sympodial and bear the same fruit elements directly. Once a sympodial branch has formed on the main stem of the cotton plant, one or two branches are formed on every subsequent node until the plant is physiologically exhausted and growth stopped in the autumn. After a sympodial branch has form at the main stem node, the plant is no longer able to produce monopodial branches above that node. Term of this changing depends on the vegetative period of grown varieties. The node on which the first sympodial branch will appear is a varietal trait, but it is also affected by agronomic practices and treatments. Most sympodial branches are primary

branches and located in the base part just above the one or two monopodial branches of the main stem, but they may have secondary or tertiary branches and commonly depending on the earliness of the varieties. In the result of plant breeding, cultivated varieties have a higher number of genetic inheritable sympodial branches than monopodial branches. Zero type branching plants, mostly in the G.barbadense species varieties with only sympodial branches enter into the fruiting phase of growth earlier than plants of the varieties of G.hirsutum L, G.arboreum L. and G.herbaceum L. which have monopodial branches. Branches on which fruiting buds arise are called fruiting branches, or sympodia (meaning ―multiple feet‖), because each fruiting branch contains multiple meristems. Fruiting branches have a ―zig-zag‖ growth habit, as opposed to the straight growth habit of the vegetative branches. Branches on the main stem also show 3/8 alternate arrangement, since they grow adjacent to the leaves. Nodes are numbered in the same order the leaves are numbered where the cotyledon node is considered as zero node (Figure 8b). New fruiting branches of growing cotton varieties are generally believed to develop approximately every 3 days, although recent studies show that this developmental rate varies depend on the cotton genotypes. According to the reports of Uzbek breeder G.S. Zhaytsev (1928), who scientifically coined the principles of flowering order of cotton plant, the squares are produced at new positions on a fruiting branch approximately every 6 days. The age of fruiting structures on a cotton plant can be mapped according to the time sequences of different cotton species (figure 8b). Thus, every branch forms up to terminal node in three days and the next squares arose in six days an average.

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