

Study on Physiological Characteristics of lower 'Boll-Leaf System' with the Changes of Source/Sink Ratios in Cotton at the Early Flowering

SUN Hong-chun, LI Cun-dong, WANG Wen-xin, XIE Zhi-xia, ZHU Ji-jie

(Department of Agronomy, Agricultural University of Hebei, Baoding 071001, China)

Abstract: With the treatments of cutting off some buds or leaves on the lower fruit branches at the early flowering, the effects of changing source/sink ratios on boll-leaf system physiological characteristics were studied in 2002-2003. But the data used in this article was mostly gained in 2003. Utilizing Bt-transgenic hybrid cotton variety CCRI 29 as material, the experiment divided into three treatments: first, picking off leaves of other nodes on the same fruit branch (one leaf support two bolls) in 8 d after anthesis; second, taking off buds of other nodes on the same fruit branch (two or three leaves support one boll) in 8 d after anthesis; third, general training management. The results of experiment indicated that the changes of source/sink ratios obviously effected the content of dissoluble protein and dissolvable sugar and starch of leaf and boll, but the trends of the changes of the content of dissoluble protein, dissolvable sugar and starch were different. Compared with the treatments of picking off leaves and CK, picking off buds can enhance the content of dis-

soluble protein (during July 20 - August 9), dissolvable sugar (during July 20 - August 9) and starch (during July 9 - August 1) of leaves on the lower fruit branches, and is beneficial to starch synthesis in seed. All of these contributed to the increase of boll weight. But picking off buds didn't benefit the protein synthesis in cotton seed, the content of protein was $4.2 \text{ mg} \cdot \text{g}^{-1}$ and $4.3 \text{ mg} \cdot \text{g}^{-1}$ less than that of the treatments of picking leaves and CK. The analysis of variance showed that the difference between treatments of picking off leaf and picking off buds is significant. In leaf growth prophase (before Aug. 1), the content of chlorophyll by picking off leaves was the highest. In leaves growth anaphase (after Aug. 1), picking off buds boosted the chlorophyll accumulating in leaf and extended leaf function period, however, picking off leaves made the content of chlorophyll decrease rapidly that showed the sign of early aging, and reduced the content of dissoluble protein. In addition, the changes of source/sink ratios influenced dry matter accumulation of boll evidently. Picking off buds increased dry weight of cotton shell and seed cotton, and picking off leaves decreased the dry matter of seed cotton. By picking off leaves, the dry matter of shell dropped more rapidly than that of other treatments, reducing source/sink ratios accelerated the transportation of carbohydrate from shell to seed cotton.

Key words: source/sink ratios; boll-leaf system; physiological characteristic; cotton