

Evaluation of yield component changes in Australian cotton cultivars

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Abstract

Cotton yield can be broken down into the components that make up the total lint yield. For cotton, these are bolls/m², seeds/boll and lint/seed. Whilst the cotton lint yields have been increasing, there has been little work done on whether yield components in Australian cultivars have changed over time. The aim of this experiment was to test the hypothesis that yield improvements in Australian cotton (*Gossypium hirsutum*) cultivars were primarily achieved through an increase in boll size (lint/boll). Six cultivars were used, two from the early 1970s (DP16 and Namcala), two from the mid 1990s (Sicala 40 and Sicot 189) and two current cultivars (Sicot 71 and Sicot 71B), the latter of which was a Bollgard II cultivar. These cultivars were grown in a replicated field experiment in three locations, selected to represent different cotton growing climates of NSW, Boggabilla (hot), ACRI (Australian Cotton Research Institute) at Narrabri (medium) and Carroll (cool). Throughout the fruiting period, plants were mapped at regular intervals to monitor fruit development. At maturity bolls were harvested and the various yield components and fibre quality traits were analysed. Yield components of two pima cotton (*Gossypium barbadense*) cultivars, SiPima and Pima S7 were also recorded. Throughout the growing season, all conventional cultivars set and retained similar numbers of fruit, while the Sicot 71B had significantly higher fruit retention rates. However, boll sizes (lint/boll) were smaller mainly due to reduced seeds/boll and hence, Sicot 71B did not yield any more lint than the other modern cultivars, including Sicot 71. Yield improvements over time were primarily due to an increase in boll size (lint/boll), which is generally due to an increase in lint/seed. There was a negative linear

relationship between boll retention and seeds/boll, and boll retention and fruiting sites/m². Lint/seed was a relatively stable component and was not negatively related to boll retention. Hence, to increase yields of future high yielding cotton cultivars, including Bollgard cultivars, it could be beneficial to select for high lint/seed in order to have larger boll sizes (lint/boll). Yields were quite similar in the three locations as there was compensation in yield components. This study will assist breeders to focus selection pressure on increasing lint/seed to continue the improvements in Australian cotton yields.

Keywords/phrases: cotton, yield components, yield, retention, fruit development, lint/seed