

Impact of Roller Gin Type and Seed-Cotton Level on Ginning Efficiency and Fiber Properties

Ibrahim, I. A.

Plant Production Department, Faculty of Agriculture (Saba Basha), Alexandria University, Egypt.

Received on: 6/3/2010

Accepted: 12/4/2010

ABSTRACT

This study was carried out at Plant Production Department, Faculty of Agriculture (Saba Basha), Alexandria University, Egypt, during 2008/2009 season to compare three different roller ginning stands with five seed-cotton levels and investigate their effect on ginning efficiency, lint grade and fiber properties. Five seed-cotton levels; namely, Good to Fully Good (G/FG), G + ¼, Good (G), G - ¼ and Fully Good Fair to Good (FGF/G) were used, belonged to one commercial Egyptian extra long staple cotton variety; namely, Giza 88. Three roller ginning stands were used in this study; i.e., McCarthy, Turkey single roller and Indian double roller. The obtained results clarified that the Indian double roller gin stand surpassed the other two gin stands and gave the highest gin stand capacity (kg/inch/hr), ginning out-turn (%) and lint grade. Concerning fiber properties, Indian double roller gin stand produced the lowest values of fiber elongation, maturity, reflectance degree percentages, degree of yellowness, uniformity index and the shortest mean length fibers.

Likewise, the highest mean values of gin stand capacity, ginning out-turn, lint grade, micronaire value, fiber elongation (%) and reflectance degree (Rd %) were obtained from the highest seed-cotton level, Good to Fully Good (G/FG).

Key words: seed-cotton level; double and single roller gin; fiber properties.

INTRODUCTION

Cotton is a natural fiber used primarily as a raw material for textiles. Cotton's strength, absorbency and capability to wash and dye make it the fiber king adaptable to a considerable variety of textile products. Egyptian cotton, despite of the up and down of the cultivated area, will continue its leadership role as the best natural fiber of choice around the world.

Ginning is the first important process, to which cotton is subjected on its way from the field to the textile mill, before it is spun into yarn and converted into fabrics. The gin stand is the heart of the ginning plant (Wright and Moore, 1977).

In Egypt, cultivated cotton varieties are long (LS) Giza 86 and Giza 90 and extra long staple (ELS) Giza 45 and Giza 88 cottons, so that it must be ginned by the roller gin stands.

Ginning in Egypt is 100% roller. The average age of the gin plants is 100 years. Most were installed in 1905. There are 64 gins in Egypt. In the early sixties, these gins were nationalized by the government, which consolidated the 64 gins into five national companies; namely, Arabia, Misr, Delta, Nile and Al Wadi Ginning companies.

The main objective of the ginning processes is separating fibers from seeds, and the perfect ginning operation would be performed with or without the slightest injury to either seed fiber.

Roller ginning produces a superior fiber with fewer raw-fiber neps and less fiber breakage (Hughes and Lalor, 1989). Roller ginned fiber, also, has

excellent spinning potential. Roller gins are used primarily for ginning extra long staple cotton (Baker and Griffin, 1984). The roller gin uses a laminated canvas/rubber roller with a fixed and a reciprocating knife, to pinch and pull fibers from the seed (Albersson and Stredonsky, 1964). Roller ginned cotton, generally, has more dust, longer mean length, less short fiber and fewer neps than saw ginned cotton Cocke *et al.*, (1977a and b). Saw ginning is a more efficient method for short staple, fuzzy seed cultivars than roller ginning. The increased opening action of saw ginning allows less trash to be retained, but increases short fiber content and neps (Kveton, 1986).

The cotton roller ginning process is defined as the mechanical separation of cotton fibers from their seeds by means of one or more rollers, to which fibers adhere, while, the seeds are impeded and struck off or pulled loose. The roller is the major component of Double Roller (DR) gin. The gin roller length varies from 1025 to 1148 mm with a diameter varying from 178 to 180 mm suitable for operation. The roller consists of 78 to 80 washer disks, each washer disk is 180 mm in diameter and 1 mm thick and has 18 Chrome Composite Leather-Clad (CCLC) flaps stitched and bonded together (Gurdeep and Lyer, 2004). HVI color grade, staple length, uniformity and fiber value were improved when using the roller gin stands. Roller ginning improved fiber length, length uniformity and nep count, when compared to saw ginning, (Hughes and Lalor, 1990). (Armijo and Gillum 2007) showed that roller ginning upland cotton, when compared to