Boll rind hardness tester

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An instrument to measure the thickness of the boll rind has been developed at CIRCOT, called Boll hardness tester. This has been operated successfully at the cotton farm, University of Agricultural Sciences, Dharwad and also exported to Uzbekistan.

Boll worm is a major pest of the cotton crop. The worms puncture the cotton bolls affecting the growth of the boll and reduce the yield considerably. To overcome this problem, genetically modified BT-cotton has been developed by the cotton scientist. BT-cotton is getting very good response from the cultivators. But the success of this BT-cotton depends on the consistent performance in the future. Since it is a genetically modified, the seeds for growing cotton crops are very costly. Before this, an attempt was made by the cotton breeder to grow a cotton variety which was having very thick rind of the cotton boll. To select such cotton variety, there was a need to measure the thickness of the boll rind. An instrument to measure this thickness of the rind of the boll was designed and developed by scientist at CIRCOT and named as Boll hardness tester.

This tester determines the penetration resistance of cotton bolls. This is defined for the purpose of design ***"as the force in grams needed to push 16 no. standard sewing needle to a given depth".*** A schematic diagram of the instrument is given here.

METHOD OF MEASUREMENT

The cotton boll is placed suitable between the clamps on the frame of the boll holding clamp (BHS), then work the boll support screw knob so that the screw (BS) is in firm contact with the cotton boll (C). The job carrier (F) is advanced by working the job (K) anticlockwise so that the needle (N) is in contact with the cotton boll (C). It is important to note that the tapered end of the pin-holder (P) is in contact with the leaf spring (L). The screw (s1) can be adjusted to make the contact with the dial gauge (G). Any further movement of the screw will show the reading other than zero in the dial gauge (G), this time it is essential to adjust it accurately to zero.

Advance the job-carrier (F) steadily with the aid of knob (K) and note the dial gauge (G) reading for various depths, in steps of 1mm, of penetration. Then bring the job-carrier (F) back to its original position by turning the knob (K). in the reverse direction. Then remove the needle from cotton boll. The cotton boll is ready for next test.

If "a" is the reading on the dial gauge (G) for a given depth "d" the deflection of the spring (L) is (a-d) and the force of penetration is $F=(a-d)\,k$

Where "k" is the spring constant, which is pre-determined and is 37.8 g/mm for the leaf spring attached in the instrument. Thus by observing the depth gauge reading, i.e. penetration "d" and dial gauge reading "a", the penetration resistance can be easily determined. This has helped the cotton breeder to select the cotton varieties having high depth of penetration that can resist the boll worm attack.

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