

Effect of Balls Size and Fiber Location inside the Ball on Usher Fibers Length

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ABSTRACT: The length of the Usher fibres is affected by many factors particularly the fibre maturity, green ball size and the location inside the ball where the fibre was picked. The maturity of the fibres is determined by the colour of the seeds. Dark brown colour indicates that the fibre is fully mature and it's ready to be picked. In this research, three methods for measuring Usher fibres length were used; Individual fibre method, Comb-sorter method and The digital fibrograph method. The results obtained showed that Usher fibres are more uniform in length than cotton fibres. The calculated coefficient of variation was 15% and this clearly indicates the degree of its uniformity.

KEYWORDS: *comb – sorter, ball, Fiber location , Usher*

INTRODUCTION

Testing can be a valuable aid provided that the instruments and techniques were used affectively. The fact that a material has been tested, no matter how accurately, does not enhance its technical quality.

The unit from which many complicated textile structures are assembled is the single fibre. It is similar to a small beam characterized by great length relative to its cross-sectional area. This unit is a complex structure built from atoms and molecules⁽¹⁾. The present research deals with the length measurements of Usher fibres and the assessment of this property which is of great importance to the evaluation of the whole Usher plant.

The fibre length is regarded as one of the important physical properties of textile fibres.. Measuring the Usher fibre length is not an easy task. This is because the variations exist not only at the different areas of the extracted fibre, but also within fibres picked from the same shrub.

The objectives of the present work were to study the effects of three factors on the length characteristics of Usher fiber. These factors were; ball size, the location of fibers with respect to the ball growing point and fibre maturity.

MATERIALS and METHODS

Sampling and determination of fibre length: Practically every measurement made to a textile material must be restricted to only a small fraction of the bulk. When the test is a destructive one, as when measuring the fibre strength, then testing the whole bulk is quite impracticable. Therefore samples are selected randomly and tested⁽²⁾. How far the results obtained from a sample represent the whole bulk and the population from which the sample is drawn depend on; the sample size and the manner in which it is taken.

To take a truly representative sample, the technique should be such that every individual in the population should have the same chance of being chosen in the sample⁽¹⁾. To measure the fibre length, three groups of samples were collected from various regions in Sudan. The three samples groups were: i) ball opened manually while the seed colour was dark green, ii) ball opened manually while the seed colour was light brown and iii) ball left to open naturally while the seed colour was dark brown.

When the seeds are dark brown, the Usher ball is considered fully matured.

Usher fibre length measurements:

The Usher fibers were picked from the three samples of balls at the three stages of maturity and fibre length was measured for each sample.

Individual fibre method:

In this method Usher fibres were straightened one by one over a suitable scale, and their length was read directly. The method is good especially for short fibres. The method is useful for measuring the length of Usher fibre because Usher fibers have no convolutions; therefore, no loads are needed to remove the crimp so the length can be read without stretching the fibre.

Comb-sorter method:

Three balls of different sizes were selected, big size, middle size and small size, All balls were mature. Fibres from each ball were picked from three different locations: i) fibres picked from an area close to the starting growing point, ii) fibres picked from the middle area and iii) fibres picked from an area far from the starting growing point.

For measuring Usher fibre length using the Comb-sorter, a sample weighing approximately 0.01 grams was firstly prepared by repeated drawing and doubling actions by hand. It was then formed into a narrow bundle of fibres which were straight and parallel. The bundle of the fibres was then inserted into the sorter and the effective fiber length and the ratio of short fibres were determined.

Digital fibrograph method⁽³⁾:

The digital fibrograph gives the tests results in digits or numerical form. In the 2.5% span the length is 33 mm while in the 50 percent span the length is 29 mm. The uniformity ratio is 85%.

$$U.R = \frac{S50 \times 100}{S2.5} = \frac{29 \times 100}{33} = 85\%$$

Floating fibres percentage =

$$\frac{(S2.5 - 0.975) \times 100}{L} =$$

$$\frac{(33 - 0.975)}{30} \times 100 = 12.5\%$$

Results and Discussions:

Table 1 shows that the length of the Usher fibre is 32 mm. It could be stated that the degree of maturity of the Usher fibre has no significant effect on fibre length Table 2 shows the fibre lengths at the first, middle and last region of the accumulated bundle of fibres inside the ball. It was found that the large size ball had the longest fibres (36 mm) while the small size balls had the shortest fibres (32 mm). It could be concluded that the length of the Usher fibre is directly proportional to the size of the green ball. As shown in table 2 and Figure 1, for small ball size, could be concluded that the closer the area to the growing points the longer the length of the Usher fibre. As well it could be inferred that the length of the Usher fibres decreased with the increase of the distance from the growing point (Figure 2).

Table 1. the results of testing the three samples

Sample number	Length (mm)
1	31
2	32
3	32

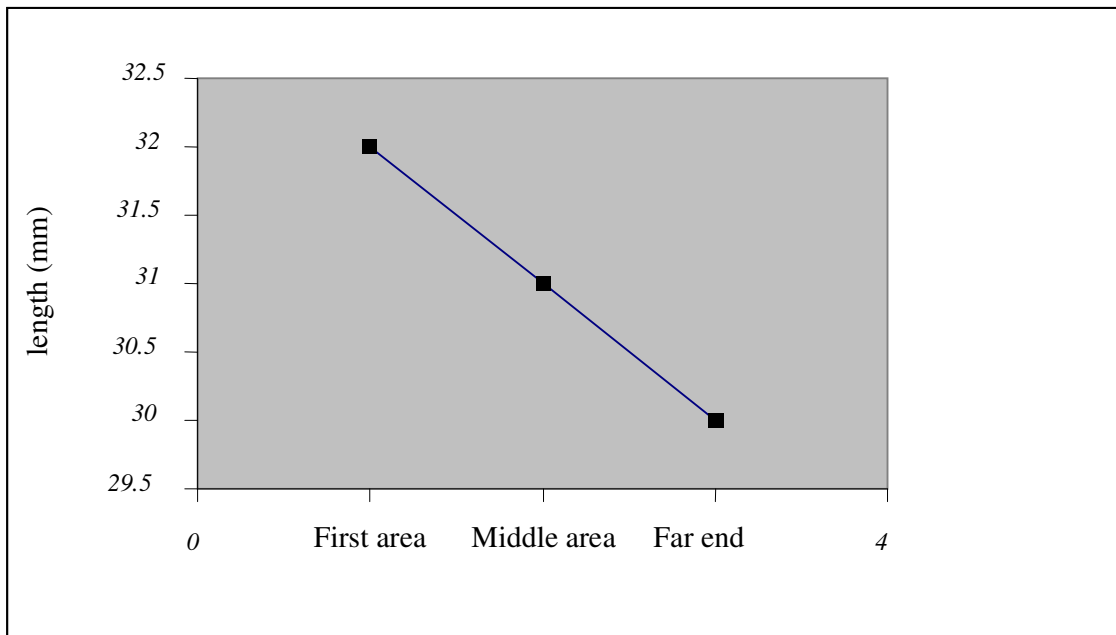


Table 2. Usher fibre length as influenced by ball size and locations within ball

Ball size	First area	Middle	For end
Large size	36mm	36mm	34mm
Middle size	33mm	33mm	31mm
Small size	32mm	31mm	30mm

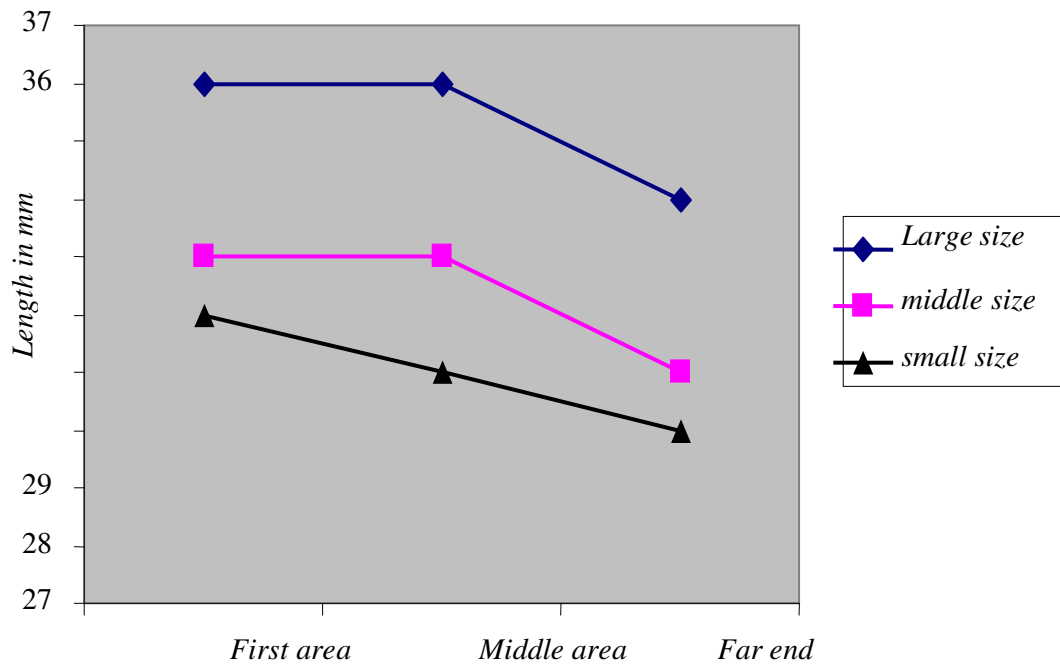


Figure 2. Usher fibre length as influenced by ball size and location within ball

CONCLUSION

The results showed that fiber maturity had no significant effect on length of Usher fibre. The length of the fibre increased with size of the green ball. The location of the usher fibre with respect to the growing point has a significant effect on fibre length. The length of the Usher fibre decreased with the increase of distance from the growing point.

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