

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

By:

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Abstract:

The length of the Usher fibres is affected by many factors particularly fibre maturity, the green ball size and the area of the picked fibres. The maturity of the fibres is determined by the colour of the seeds. When the colour is dark brown, experiences show that this is the time of picking matured fibres. In this research three methods of measuring the length of Usher fibres have been used:

- a- Individual fibre method.
- b- Comb-sorter method.
- c- The digital fibrograph method.

The results show that Usher staple fibres are much more uniform in length than cotton fibres. The calculated coefficient of variation of 15% indicated the degree of this uniformity.

ملخص:

نبات العشر من النباتات التي تحتوى على شعيرات بذرية وقد اجريت هذه الدراسة لتحديد الطول الفعال للشعيرة الذي يتاثر بنضوجة الشعيرات والتي يمكن الحصول عليها عن طريق لون البذور المتدرج من الأبيض حتى البنى الغامض الذى يدل على نضج الشعيرات . فى هذه الدراسة استخدمت ثلاث طرق لقياس طول الشعيرات وهى :

1. طريقة الشعيرات الفردية

2. طريقة الأمشاط

3. طريقة الفايبوروقراف

وقد اثبتت النتائج أن طول الشعيرات له درجة انتظامية عالية مقارنة بالقطن تصل الي 85%

كما وجد ان طول الشعيرات يتأثر بحجم الكرة الخضراء واماكن اخذ العينات من داخل الكرة الخضراء.

1- Introduction:

Testing can be of a valuable aid provided that the instruments and techniques are used effectively. 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-section. This unit is a complex structure built from atoms and molecules. This 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 length of the fibre is one of the main critical physical properties.

Measuring the Usher fibre length is not an easy task. Knowing that the variations exist not only at the different areas of the extracted fibre, but exist also within the fibres obtained from the same shrub.

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 in strength, then testing the whole bulk is quite impracticable. Therefore samples are selected and tested ⁽²⁾.

How far the results obtained from a sample may be relied upon to represent the bulk, the population from which it is drawn depends on two things:

1. The size of the sample:
2. The manner in which it is taken.

To take a truly representative sample, the technique should be such that every individual in the parent population should have the same chance of being chosen in the sample ⁽¹⁾.

1-1 Objectives:

The objectives of this work are to study the effects of three factors on the length of Usher fiber, these factors:

- 1- Size of the ball.
- 2- The location of the fibers with respect to the starting point of growing.
- 3- The maturity of the fibre.

2- Materials and Methods.

2-1 Sampling and determination of fibre length.

For fibre length test a sample of three groups had been collected from various areas of Sudan. The three samples were:

- **Sample (1)** the ball is opened manually while the seed colour is dark green.
- **Sample (2)** the ball is opened manually while the seed colour is light brown.
- **Sample (3)** the ball is left to open naturally while the seed colour is dark brown. When the seeds are dark brown, the Usher ball is considered fully matured.

2-2 Maturity of the Usher fibre and the length:

The Usher fibers were picked from the three samples of balls at the three stages of maturity. The fibres had been tested for measuring their length. The results show that there is no effect of the maturity on the length of the fibres. However, the maturity of natural fibres has a significant effect on the fibre length. For usher fibres, this work found that, maturity has no effect on the length.

2-2-1 Individual fibre method:

In this method Usher fibres are straightened one by one over a suitable scale, and their length is read directly. The results yielded are comprehensive. It is a good method especially for short fibres. This 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 would be read without stretching the fibre. This method gives a mean length of 34 mm.

2-2-2 Comb-sorter method:

To measure Usher fibre length by a comb-sorter, a sample weighing approximately 0.01 grams is firstly prepared by repeated drawing and doubling actions. It is formed into a narrow bundle of fibres which is a straight and parallel.

From the results obtained from this test the effective length and the ratio of short fibres were calculated and found to be:

- The effective length is 30 mm.
- The ratio of short fiber is 15%.
- The Uniformity is 85%.

Three balls of different sizes have been selected, big size, middle size and small size. All balls are matured. Fibres from each ball are picked from three different locations:

- a- Fibres are picked from an area close to the starting point of growing.
- b- Fibres are picked from the middle area.
- c- Fibres are picked from an area far from the starting point of growing.

2-2-3 Digital fibrograph method ⁽³⁾:

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

$$U.R = \frac{S_{50} \times 100}{S_{2.5}} = \frac{29 \times 100}{33} = 85\%$$

$$\text{Floating fibres percentage} = \frac{(S_{2.5} - 0.975) \times 100}{L} = \frac{(33 - 0.975)}{30} \times 100 = 12.5\%$$

3- Results and Discussions:

Table (I) 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 not significantly affected the length of the fibre. Table (II) 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 big size ball has the longest fibres (36 mm) while the small size ball has the

shortest fibres (32 mm). It could be said that the length of the Usher fibre is directly proportional to the size of the green ball. Table (II) is plotted in Figure (1) for the small size ball. From this figure it could be stated that the closer the area to the starting point of growing the longer the length of the Usher fibre. As well it could be said that the length of the Usher fibres decreases with the increase of the distance of the fibre from the starting point of growing as shown in Figure (2). It is of great value to mention here that these results are original and it is the first time to obtain these results for usher fibres in Sudan by this work.

Table (I): the results of testing the three samples

Sample No.	Length
Sample (1)	31mm
Sample (2)	32mm
Sample (3)	32mm

Table (II): the test results of the length of fibres picked from different sizes and locations of the ball

	First area	Middle	Last
Big size	36mm	36mm	34mm
Middle size	33mm	33mm	31mm
Small size	32mm	31mm	30mm

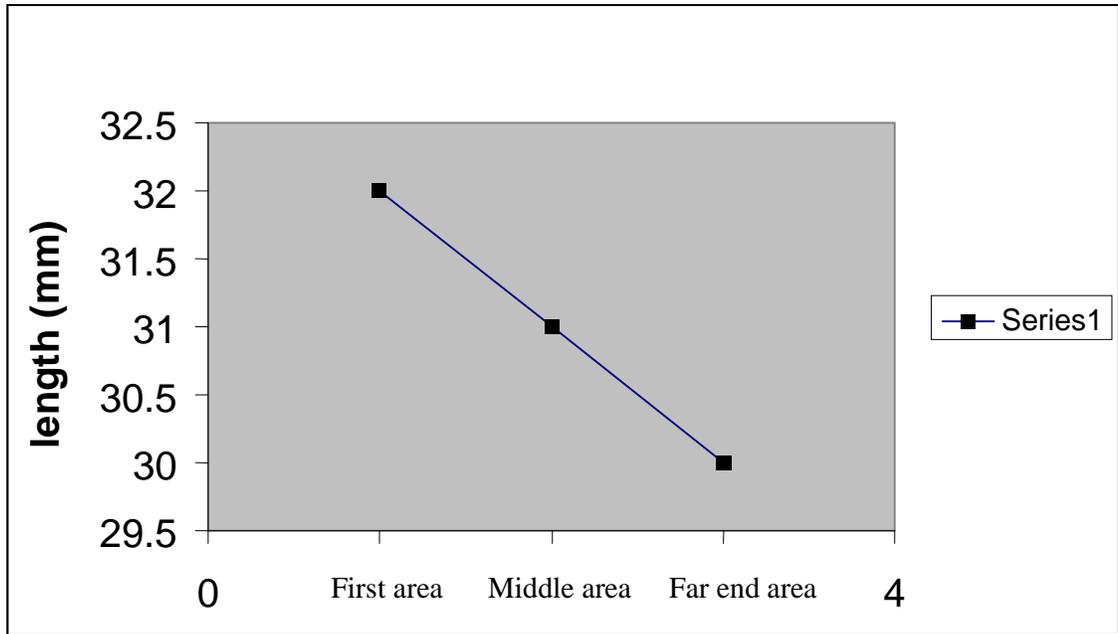


Fig. (1): Test Results of Fibre Length of small Ball

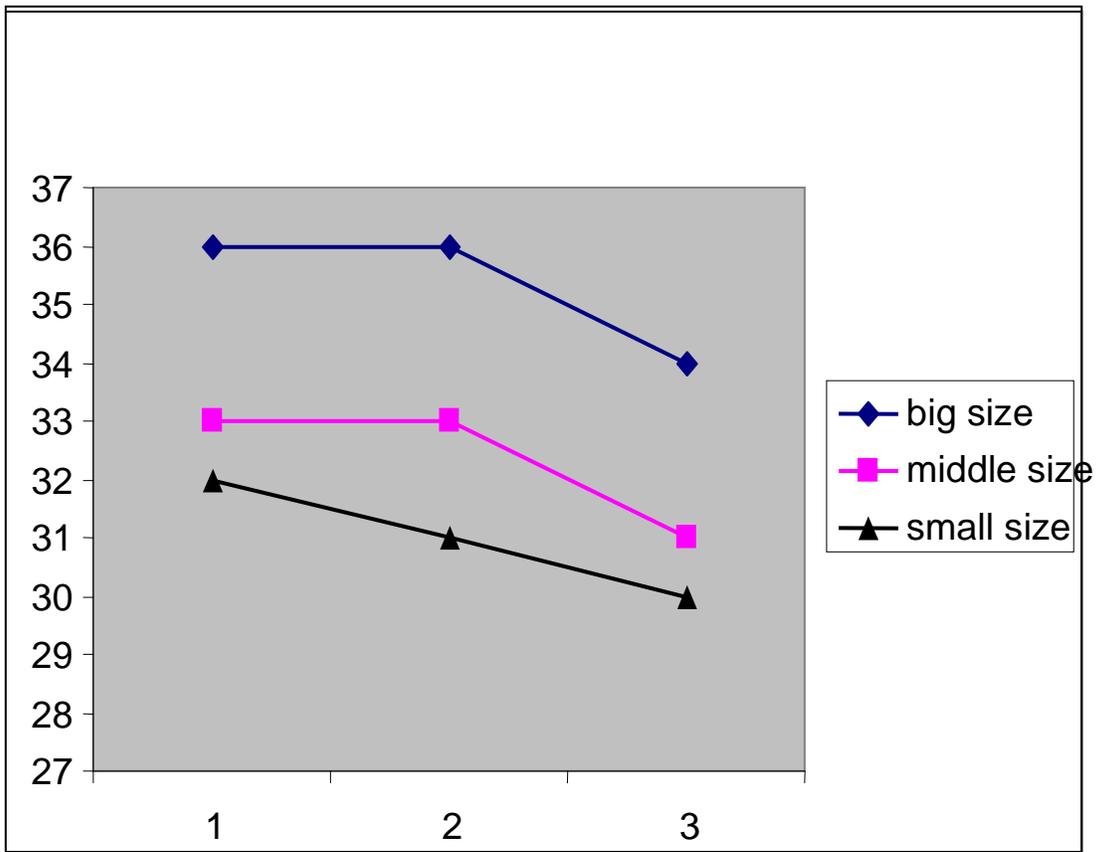


Fig. (2): Test Results of Fibre Length (mm) and Area

4- Conclusion:

The results show that there is no significant effect of the maturity on the length of the Usher fibre. The length of the Usher fibre was found to increase with the increase of the size of the green ball. It was found that the location of the usher fibre with respect to the starting point of growing has a big role in the length of the fibres. The length of the Usher fibre tends to decrease with the increase of the distance of the fibre from the starting point of growing. These obvious results have been verified for the first time by this work for usher fibres. The results obtained althrough this work would be a valuable reference for other researchers to pursue for future work. Usher fibres in Sudan are completely ignored by Sudanese textile industry. This work should attract the attention of the Sudanese industry to these valuable fibres.

5-References:-

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