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A novel and low-cost instrument for color identification of natural fibres

Gautam Roy[a] & S C Saha

National Institute of Research on Jute and Allied Fibre Technology, 12 Regent Park, Kolkata 700 040, India

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A new instrument has been developed to find out the color of natural fibres like jute and mesta using the light reflectance method and electronic light sensors. The system has been used to measure the color range of natural fibres very effectively and is also found very economical.

Keywords: Jute, Light reflectance, Mesta

Color of fibre means the property of fibre, which distinguishes its appearance as redness, yellowness, greyness, etc[1,2]. It is largely dependent on retting conditions, water quality and washing.

Colour is considered a fundamental physical property of agriculture products. In fact, colour plays a major role in the assessment of the quality of fibre in industries and in research.

The extent to which color is involved for assessing the quality of agricultural products is extremely wide[3,4]. Luster is the amount of reflected light for an incident light upon a medium to measure the light intensity. In jute and allied fibres, it is measured in the term of the grey scale index value.

A low cost instrument for measuring the colour and luster of jute and allied fibres has been designed and developed by NIRJAFT almost two decades ago[5] using the principle of reflectance photometer, which can measure the brightness and luster of the fibre sample in terms of diffused and specular reflectance using photo electric cell. But this method is not sufficiently accurate as here the illumination of light source and parameters of the output from the light sensor are manually adjustable, and thus the method provides a probable source of error.

To combat the problem, types of instrument has now been developed. The present one is basically a low cost colour range indicator, especially designed and developed for the use of marginal farmers to access the range of the colour of their product.

Experimental

A torch like body has been prepared fitted with four LEDs. There is a press switch. When the switch is pressed, a light emission will take place, if the sufficient amount of voltage is available in the primary storage cell kept inside the torch. The fibre sample is to be placed in the close contact with the light so that light from other environmental sources cannot come into effect. The fibre is to be tested, preferably on a black background. If the voltage level is sufficient, the voltage indicator LED will glow which means that the measurement of colour using that instrument will be correct. In this instrument, only 3 LEDs has been used for the indication of range of colour, and 1 LED has been used to indicate the battery voltage level. The use of this voltage indicator LED has got an important role because if the voltage reduces to less than a threshold value, the measurement system may not give the correct result.

The other 3 LEDs, red, yellow and green indicate the range of the colour of the fibre under test.

To start the test, the fibre is placed at the glass side preferably on a black background. Then by pressing the push switch, proper amount of white light will fall on the fibre on the fibre sample and the reflected part of the same will be received by the light sensor. From that received light, the percentage of the colour will be computed with respect to the whiteness value and the corresponding LED will be illuminated to indicate the colour range where the fibre belongs. So, if the green LED glows, it will indicate very good colour, if yellow light glows, it will indicate the fairly good and if the red light glows, it will indicate the average colour of the fibre under test.

Results and Discussion

The low cost handy type unit has been developed and completed in all respect. Its characteristics are:

- It is a completely automatic type and will work on light reflectance technique.
- No expertise is required to operate the new proposed instrument.

[a] Corresponding author.
E-mail: gautamroy1234@yahoo.com

Table 1—Results of the low cost colour indicator

Class of colour arranged in instrument	Indication	Remarks
Good	Green	Covers total range of very good and good colour
Average	Yellow	Covers total range of faily good to fair average colour
Poor	Red	Covers average to poor range of colour

- It is a very low cost device.
- It is completely portable & can work with rechargeable cells/solar cells/ primary cell.

Moreover, provision is kept to run the instrument by using rechargeable mobile phone battery and even using the solar cell.

The colour percentage with respect to standard white surface[6] has been used in this instrument and is given below:

Class	Range of colour
Good	65 Õ 56
Average	55 Õ 31
Poor	<31

In this new instrument when the switch, kept on the cabinet, is pressed, a parallel white light beam is fallen on the fibre sample under test (Fig. 1). The reflection of that light from the fibre surface is accessed by a suitable sensor and thenconverted to its equivalent whiteness value. The output of this sensor is converted to its equivalent voltage levels and then compared with the defined reference voltages. As per the colour range shown (Table 1), the grade is computed and the corresponding LED is illuminated. From this instrument (Fig. 2), anyone can access the colour of the fibre, whether it is good, average or poor, and not the colour percentage with respect to white surface. The proposed low cost colour meter is found good for farmers.

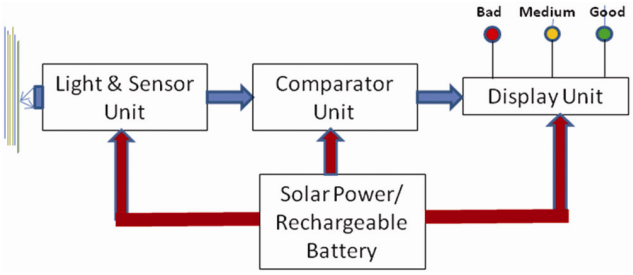

Fig. 1 — Block diagram of the system

Fig. 2 —Photograph of device

References

1 Boyle Cailin, *Color Harmony for the Web* (Rockport Publishers, Inc. Massachusetts), 2001.

2 Osgood C E, May W H & Miron M S, *Cross-Cultural Universals of Affective Meaning* (University of Illinois Press., Chicago), 1975.

3 Gerard R, *Differential effects of colored lights on psychophysiological functions*, Doctorial dissertation, University of California, Los Angeles, California, 1976.

4 Khouw Natalia, *The Meaning of Color for Gender*, www.colormatters.com/color-symbolism/gender-differences (accessed on 15 March 2003).

5 Chakravarty A C, A photoelectric meter to measure brightness, colour and lusture of flat surfaces, *Invention Intelligence*, July 1973.

6 Physical method of test for uncut Indian jute, mesta and Bimli, *BIS No. 7032* (Bureau of Indian Standards),1986.