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A comparitive study on bamboo and modal woven fabrics and garmentation of kurthi with fragorance finish

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Abstract
The present study focus on the development of kurthi with bamboo/modal 30's and 40's count blended woven fabric. Fragrance was given to the fabric by using rose extract and essential oil by applying microencapsulation technique and pad dry-cure method. Various parameters of the fabric like abrasion, wick ability, bursting strength, water drop absorption, Water Vapor Permeability, Air- permeability and water drop absorption tests were evaluated. Moreover the fabric quality was tested for washing property up to 50 washes and the quality of the fabric was also assessed. Results revealed that the blending property of Bamboo/modal 30's count and 40's count was good when compared to any other fibres. Further as an application part woven fabric was also designed for girls, which showed a good compatibility and dermally safe product. This study pays a way for the usage of eco-friendly and dermatologically safe woven fabrics from Bamboo/modal 30's and bamboo /modal 40's count.

Keywords: bamboo/modal, 30's, 40's count, rose extract, microencapsulation, woven fabric

Introduction

Bamboo fibre is a kind of regenerated cellulosic fibre which is produced from raw material of bamboo pulp. Starchy pulp is produced through a process of alkaline hydrolysis and multi-phase bleaching; further chemical processes produce bamboo fibre. Bamboo can be spun purely or blended with other materials such as cotton, hemp, silk, lyocell and modal. Cotton has been one of the most human friendly plant with its soft, luxury and hygienic touch to the skin. Our knowledge of the early development in textiles is very large as they are not evident through proper records. Textiles were first developed as a means for carrying food and as mats in shelter. Only in later stages, it is used as clothing.

The word "textile" was originally used to define a woven fabric and the processes invo1ved in weaving. Over the years the term has ta ken on broad connotations, including the following:

(1) Staple filaments and fibers for use in yarns or preparation of woven, knitted, tufted or nonwoven fabrics, (2) yarns made from natural or man-made fibers, (3) fabrics and other products made from fibers or from yarns, and (4) apparel or other articles fabricated from the above which retain the flexibility and drape of the original fabrics. This broad definition will generally cover all of the products produced by the textile industry intended for intermediate structures or final products. Textile fabrics are planar structures produced by interlacing or entangling yarns or fibers in some manner.

In turn, textile yarns are continuous strands made up of textile fibers, the basic physical structures or elements which make up textile products. Each individual fiber is made up of millions of individual long molecular chains of discrete chemical structure. The arrangement and orientation of these molecules within the individual fiber, as well as the gross cross section and shape of the fiber (morphology), will affect fiber properties, but by far the molecular structure of the long molecular chains which make up the fiber will determine its basic physical and chemical nature.

Usually, the polymeric molecular chains found in fibers have a definite chemical sequence which repeats itself along the length of the molecule. The total number of units which repeat themselves in a chain (n) varies from a few units to several hundred and is referred to as the degree of polymerization (DP) for molecules within that fiber. Textile fibers have been used to make cloth for several thousand years. Until 1888, when the first manufacture fiber was produced commercially, fibers were produced by plants and animals. The fibers most commonly used were wool, flax, cotton, and silk. These four natural fibers continued to be used and value today, although their economic importance related to all fiber has decreased.

History of Bamboo

Technically a type of grass, bamboo grows faster than any other woody plant in the world. In just five years, most species of bamboo reach maturity, and certain types are known to double in size in a single day. Other popular hard woods barely grow an inch in a week, and several, such as oak, can take up to 120 years to reach maturity. This woody grass currently grows throughout the world, but the origin of bamboo is believed to be ancient China. Bamboo is finally being utilized in all walks of life. From dishware to clothing, you can find a bamboo alternative in almost every industry. In today's environmentally conscious society, we have finally

begun to utilize bamboo across the board. Bamboo was first found and used in China more than 5000 years ago, which is why the woody plant conjures up images of pandas eating shoots and leaves in the Orient. Even though its many uses are only just becoming widely known, the bamboo plant as an alternative material began long before "going green" became a trend. Believe it or not, the history of bamboo is historically significant for many Asian countries.

Bamboo is fastest growing woody plant on this planet. It grows one third faster than the fastest growing tree. Sometimes the growth of Bamboo is approximately three feet over a night. Bamboos are plants of global interest because of their distinctive life form, their ecological importance and the wide range of uses and values they have for humans. Bamboo has tremendous economic potential. Bamboo use in India has a long and wide history. Millions of people in India depends on bamboo for housing, food, fuel, paper and even cloth.

Objectives

- To select natural and regenerated cellulosic fibers.
- To blend the selected yarns (Bamboo and modal) through weaving process.
- To study the difference between the different counts 30's and 40's.
- To evaluate the physical properties of selected fabrics.

Modal

The demands on the textile products and textile materials have steadily increased by growing of population. The requirement of more quality and more various textile products are enhanced. In additional of slow growing of cotton fibers supplied in fast consumption by market, many researchers developed new fibers comparable to cotton in term of chemical and physical structure.

Modal is a regenerated cellulose fiber and it made out of wood chips form the beech tree. Through the complex chemical process, the fiber is extracted by wood pulp, reconstituting and spun into fine yarn. Modal was developed by Austria based Lenzing AG who registered in trademark fabrics name but many manufacturers make their own version nowadays.

It is a wood pulp based cellulosic fiber, made out of pure wooden chips from the beech tree, technically as the European Schneider Zelkova tree. While viscose rayon can be obtained from the wood pulp from a number of different trees, Modal uses only beech wood, thus it is essentially a variety of viscose rayon; a generic name for modified viscose rayon fiber that has high tenacity and high wet modulus.

Modal is a processed bio-based textile made from reconstituted cellulose from the beech tree. It is very soft and popular for both clothing and household textiles such as bedding, upholstery, and towels. Modal may be used on its own or in a blend with cotton, spandex, or other textiles. In many ways, modal acts like cotton, but it also has some significant advantages over cotton. Modal fibers are defined in International Standard ISO 206: 999 (E) as high wet modulus, high breaking strength regenerated cellulose fibers produced by using particular viscose rayon, and regeneration bath compositions which allows greater molecular orientation during stretch and coagulation of the fibers.

Again, Modal as defined by the International Bureau for Standardization of Manmade Fibres (BISFA) is a distinct viscose rayon fibre genre, which has a higher wet modulus and satisfies a minimum value of tenacity in the wet stage at 5% elongation. Modal is a cellulose fiber made by spinning reconstituted cellulose from beech trees. It is about 50% more hygroscopic (water-absorbent) per unit volume than cotton. It takes dye like cotton, and is color-fast when washed in warm water. Modal is essentially a variety of rayon.

Origin of the Fibre

Modal is considered a type of rayon. While rayon may be made of the wood pulp of a number of different trees, modal uses only beech wood. Modal is considered bio-based rather than natural because, though the raw materials used to make it are natural, they are heavily processed using a number of chemicals.

Modal fibers are defined in International Standard ISO 206: 999 (E) as high wet modulus, high breaking strength regenerated cellulose fibers produced by using particular viscose rayon, and regeneration bath compositions which allows greater molecular orientation during stretch and coagulation of the fibers.Again, Modal as defined by the International Bureau for Standardization of Manmade Fibres (BISFA) is a distinct viscose rayon fibre genre, which has a higher wet modulus and satisfies a minimum value of tenacity in the wet stage at 5% elongation.

Lenzing Modal is a registered trademark of Lenzing AG, an Austrian company specializing in textiles and fibers, particularly natural fibers made from cellulose. Modal has been used alone or with other fibers in household linens such as towels, bathrobes, and bed sheets, and the fabric has increased in popularity in the early 21st century. Modal was first developed by Austria based Lenzing AG Company who trademarked the fabrics name, but now many manufacturers make their own versions. It was initially imported from Czech Republic, Slovakia, Hungary and Germany; but now for Indian market, it is catered to by Lenzing, Austria, which has tied up with Rajasthan Textile Mills.

Qualities of Modal

- Modal fabric (registered trademark) is a man made 100% cellulose fibre, made out of pure wooden chips from the beech tree.
- Modal ideal for high-quality apparel.
- Made from the European Schneider zelkovaa tree.
- Combined with modern microforms.
- The fibre is processed by creating a wood pulp, then spinning, then processing the reconstituted beech tree into cellulose fibre.
- High breaking strength
- Fabric made from modal fibres are shrinkage resistance
- Modal fabrics may be fading at one stage but flat to stretching and pilling.
- Modal are very soft, shiny nature and silky feel than mercerized cotton.
- Stone deposits from firm water never set down on the fabric surface.
- Modal fabrics should be washed at slighter temperatures

only.
- Modal fabrics can be often ironed after washing, like cotton.
- Modal is used single or blend with other fibers like cotton or Elasthan in Domestic items such as towels, bathrobes, underwear and bedsheets, bedspreads..,

Properties of Modal

Similar to cotton fibers, Modal fibers are both cellulose. The majority of Modal has circular cross section during drawing on filament. The Modal is long and straight fiber structure and it consists of 25-35% crystalline region within fiber. The average degree of polymerization of glucose unit in cellulose chains is 200-700.

Environmental Impact of Modal

Modal is one of the softest, most luxuriously comfortable fibers known. Modal fabric is also sustainable. The beech trees are cultivated without chemicals and the pulp and fiber are produced to the highest environmental standards, including the spinning process which uses a non-toxic solvent. No toxic effluent is discharged from the mill and minimal water is used in the production. As technology moves forward and all realize a greater need to preserve our planet, fiber-processing companies are doing their part in the effort. Conscientious companies are creating new fibers that not only possess important health attributes comparable to natural fibers, but also are manufactured using the principles of sustainable management and high environmental standards.

Under that comes the Modal is currently called the new "wonder" fabric. It is a processed, bio-based textile made from the reconstituted cellulose of beech trees. This fabric combines the benefits of natural. It is the newest sibling in the family of eco-friendly fabrics. It is an extremely light fabric and soft to the touch. Great for babies! "More eco-friendly fibers, organic as well as synthetic, are being used to weave cloth today than ever before.

Uses of modal

Modal is one type of viscose fiber and widely used in clothing. Modal is extremely smooth and soft, it is blended with cotton to help the yarn for enhancing good comfort properties. It maintains smooth characteristics after several repeated in washing. Beech wood is an excellent firewood and easily split and burning for many hours with bright but calm flames.

Chips of beech wood are used in the brewing of Budweiser beer as a fining agent. Beech logs are burned to dry the malts used in some German smoked beers, giving the beers their typical flavor. Beech is also used to smoke some cheeses. Some drums are made from beech, which has a tone generally considered to be between maple and birch, the two most popular drum woods. Also, beech pulp is used as the basis for manufacturing a textile fibre known as Modal. The wood is also used to make the pigment known as bistre.

The fruit of the beech, also called "Beechnuts" and "mast", are found in the small burrs that drop from tree in autumn. They are small, triangular, and edible, with a bitter, astringent taste. Beech was a common writing material in Germanic societies before the development of paper. The Old English and Old Norse bók have the primary sense of beech, but a secondary sense of book and it is from bōc that the modern word derives.

In modern day German and Swedish, this connection is even more apparent, with the word for 'book' being 'das Buch' and 'Buche' for beech tree in German, and in Swedish, the words are the same - 'bok' is both beech tree and book.

Modal fabrics can benefit by acquiring a desirable clean, soft touch finish on the surface of finish. Thus it is cleared that Modal fiber is replacing the bamboo from its current dominant market. Its' eco-friendly, 100% biodegradable characteristics has made it accepted globally within a short period of time. Modal is a generic name for a modified viscose rayon fibre which has more stubbornness and moisture modulus. Modal was at first introduced by Lenzing AG Company of Austria who trade named the fabrics identity.

Modal Fibres prefers to the second invention of viscose fibres and are made by a customized viscose procedure with an advanced scale of polymerization and adapted precipitating baths which guides to fibres with improved belongings such as enhanced dress in, higher dry and wet strengths and recovered dimensional stability.

Review of Literature

Natural fibers are those that are in fiber form as they grow or develop and come from animal, plant, or mineral sources. Manufactured (or man-made) fibers are made into fiber form from chemical compounds produced in manufacturing facilities. The demands from fabrics have changed with the developments in technology and the rising living standards. Now the requirement is not only style and durability, but also clothing comfort which includes psychological, sensorial and thermo-physiological comfort. It is evident that fiber type, yarn properties, fabric structure, finishing treatments and clothing conditions are the main factors affecting clothing comfort says, (Mahish *et al.,* 2012).

Health and hygiene are the primary requirements for human beings to live comfortably and work with maximum efficiency. To protect the mankind from pathogens and to avoid cross infection, a special finish like antimicrobial finish has become necessary. As consumers have become more aware of hygiene and potentially harmful effects of microorganisms, the demand for antimicrobial finished clothing is increasing says (Thilagavathi *et al.,* 2012).

The properties of blended yarn cannot be explained merely in terms of the proportion of the different constituent fibres in the blends. The combination of bamboo and cotton proved as a supreme blend components for modern and luxurious life style. However, the tensile strength of the yarn produced by the bamboo fibres is lower than viscose rayon as reported by Shanmuga sundaram, & Gowda, (2010).

Increasing global completion in textiles has created many challenges for textile researches and industrialists. In recent years considerable attention is being given to the development and the utilization of the natural fibers. Increasing concern for ecological preservation has also led to the quest for resources that are safe, bio-degradable and recyclable. Global trends towards sustainable development have brought natural,

renewable, biodegradable raw materials into focus says (Nilesh & Adivarekar, 2009).

Findings of the study

- The results of ends per inch and picks per inch were obtained for bamboo/ modal 30's count and bamboo/modal 40's count fabric.
- The sample for bamboo/ modal 30's count and bamboo/modal 40's count fabric has the same picks per inch when compared, while bamboo/ modal 30's count has greater ends per inch.
- The samples bamboo/ modal 30's count and bamboo/modal 40's count is not significant, because the p value is greater than the level of significance i.e. (0.07).So the samples bamboo/ modal 30's count and bamboo/modal 40's count is not significant.
- The following results of Thickness gauge were obtained for bamboo/ modal 30's count and bamboo/modal 40's count fabric.
- The samples for bamboo/ modal 30's count and bamboo/modal 40's count fabrics showed different values. The sample bamboo/modal 40's count has greater thickness for grey and finished fabric when it is compared to that of bamboo/ modal 30's count and bamboo/modal 40's count fabric.
- The samples bamboo/ modal 30's count and bamboo/modal 40's count is not significant, because the p value is greater than the level of significance i.e. (0.05).So the samples bamboo/ modal 30's count and bamboo/modal 40's count is not significant.
- The following results of GSM were obtained for bamboo/ modal 30's count and bamboo/modal 40's count fabric.
- The samples for bamboo/ modal 30's count and bamboo/modal 40's count fabrics showed different values. The samples bamboo/modal 30's count Gsm has been greater for both grey fabrics while bamboo/modal 30's count Gsm is greater for finished.
- The following results of Abrasion resistance were obtained for bamboo/ modal 30's count and bamboo/modal 40's count fabric. The samples bamboo/ modal 30's count has greater value for grey and finished fabric when it compared to that of for bamboo /modal 40's count fabric.
- When the bamboo/modal 40's count fabric is compared to bamboo/ modal 30's count and bamboo/modal 40's count fabric is statistically significant because p – value is less than the level of significance while bamboo/modal 40's count is statistically not significant because p – value greater than the level of significance.
- When modal fabric is compared to bamboo/modal 40's count and bamboo/ modal 30's count both the fabric is statistically significant because p – value is less than the level of significance.
- When bamboo/modal 40's count fabric is compared to bamboo/ modal 30's count is statistically not significant because p – value is greater than the level of significance. While bamboo/ modal 30's count is statistically significant because p – value less than the level of significance.
- The following results of wick ability were obtained for bamboo/ modal 30's count and bamboo/modal 40's count fabric.
- The samples for bamboo/ modal 30's count and bamboo/modal 40's count fabrics showed different values. The samples bamboo/modal 30's count wick ability has been greater for both grey fabrics while bamboo/modal 30's count wick ability is greater for finished.
- The following results of water drop absorption were obtained for bamboo/ modal 30's count and bamboo/modal 40's count fabric.
- The samples for bamboo/ modal 30's count and bamboo/modal 40's count fabrics showed different values. The samples bamboo/modal 30's count water drop absorption has been greater for both grey fabrics while bamboo/modal 30's count water drop absorption is greater for finished.

Conclusion

From the Research it could be concluded, that bamboo/ modal 30's count and bamboo/ modal 40's count possess all the desired properties that are required for apparel. The above fabrics are treated with fragrance finish increases the awareness about the herb and also effective utilization of the same.

While comparing the all the above fabrics it is concluded that blended (50:50) bamboo/ modal 30's count and bamboo/ modal 40's count has much more properties and excellent results.

Thus the end product woven kurthi from bamboo/ modal 30's count and bamboo/modal 40's count will face the demand of green consumers with welcoming hands. The search of innovative blended natural regenerated with various finishes for textile and fashion industries can be fulfilled with theses fabrics.

The further recommendations relating to this research study:

- These studies can also be carried out with different ratios like (60:40), (70:30), (75:35).
- It can also be carried out by using 60 s count of bamboo/modal and bamboo/ modal 40 s count yarn.
- And also by imparting anti – microbial finish by using turmeric, aloe Vera or thulsi, neam leaves.

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