

# A REVIEW PAPER ON—CORN FIBER NEED AND APPLICATION IN APPAREL INDUSTRY

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## Abstract

World is suffering from highly contagious diseases, which are taking place of pandemic like Covid19, other viruses/infections, skin disease like Eczema, headaches, breathing problem, nausea, itching, skin rashes and many more spreading rapidly in the environment. Its high time asking to take strong action to save our universe from the harmful effects of chemicals and gases, which are used in textiles industries in huge quantity. Using of dangerous chemicals in the textiles industries, polluting the fresh water resources day by day causes one child death per second. Auxiliary and other chemicals used in the textile printing process evaporating and emerging in the air we breathe. These precarious tradition giving life threat to human as well as to the nature. In today's time phrase eco-friendly is very much in vogue but the awareness of its advantages is less, must be spread widely to every people effectively for the sake of future generation. Increasing rate of global warming making people to use garment made of eco-friendly fabrics. Corn fabric is one of them, it is called Ingeo. Seeing lying residuals of cornhusk in large area of land or burning in a major scale causes lots of air pollution in nearby cities, resulting in breathlessness, asthma, infection in eyes and many more health related issues, to dump this corn bagasse is a big question now? Making eco-friendly fiber out of this residual is a great revolutionary idea towards rebalancing the ecosystem, no investment is needed as such, saving area to dump too. Most important we are contributing in restoring the effect of global warming on Earth. If we say corn fiber is a great substitute of eco-friendly would be fair enough for Ingeo fiber.

**Finding and Future Scope-**Consumption of rayon fabric in fast and slow fashion is effecting foresting because rayon fabric is made out of wood pulp, for that the tree has to be cut hence leading global warming day by day. By using eco-friendly fabrics like corn, we can contribute in deforestation, and balancing ecosystem due to its non-chemical usage and fully biodegradability. Review emphasizes on consequences of burning corn husk on environment, human beings and animals, attributes of corn fiber for textile purposes, properties comparison of fibers, ecological reason of using left over cornhusk in textile utility and clothing, processing and manufacturing stages of corn fiber.

Now many natural fibers and fabrics are in the market labeled as eco-friendly however acceptability in masses is very limited due to its high price fact, having remarkable properties, Ingeo fabric can be used in different field and replace many fabric which already in the market and its manufacturing contributing in water and air pollution. The main purpose of this debate is an effort to spread more awareness for utilization of corn fabric in garment as well as in home furnishing sector because there is no chemical used in manufacturing and it is fully biodegradable. Application of Ingeo fiber in textile and fashion industry and suggestion for using corn fabric for improvement more work and awareness are required in textile and fashion sector for adaptation of corn fabric is a requirement now to save our universe from harmful effects of chemicals used in textiles factory in making synthetic and other fabric manufactured by harmful chemicals and causing deforestation.

**Keywords-** #Apparel industry, #corn fiber #eco-friendly #corn husk, global warming #green fiber, # health problems from textiles pollution, #Ingeofabric, #textile industries, # corn fiber #textile chemicals.

## Literature review

- >. M.G and Antony(2016) done on need and importance of environmental friendly fibers.The major finding of the study suggested that textile industry and synthetic fibers are not friendly to the environment due to chemical content. These harmful chemicals are threats for human being and environment .The study also suggested that there is a need to create awareness among consumer to use and adopt eco-friendly fabric. There are numerous options available for eco-friendly apparel development such as bamboo, soya silk, banana, hemp, corn and ayurveda.
- >.Dharma (2017) explored the properties of corn fiber and explained the quality of corn fiber and its usefulness .Apparel made of corn fiber are more comfortable to wear, cheap, require less maintenance stain resistant and also resistant to U.V. Author also emphasized the manufacturing Ingeo fiber .Which is extracted from plant and break into sugar then fermented for yarn process. The major useful properties friendly require less care, shrinkage, equivalent to spf-60.
- >. Knur et al (2016) analyzed on development of corn husk fabric using DREF spun yarn: a green effort. Major finding of the study is, when corn husk blended with bamboo has more strength and high elongation than blended with cotton. Cornhusk and bamboo blend has more upf properties, better moisture.
- >. Jain et al (2017) studied on extraction of cornhusk and different stages of process for textile usages. Major findings revealed that the treatment given to the cornhusk like alkali, enzyme and bleach to get the actual result for processing in textile. After analyzing study concluded that corn fiber is not suitable for apparel due to its coarse and rough nature. More research and experiment can take this to the normal usage in garment industry.
- >. Rastogi et al (2018) studied on utilization of cornhusk by textile development of product. Experiment done on physical and chemical analysis of extraction. Study is about blending in different ratio with other fiber like cotton, polyester to get result for usage. Author suggested making sanitary napkin with blending with wood pulp due to its water retention property.
- >. Official blog Swadesh by Unnati: In this educational blog Author wanted to draw the attention on corn fiber's quality and its benefits. The innovation is the joint efforts of Cargill Inc. and The Dow chemicals through the Cargill Dow polymers LLC.Major findings of this study is fiber made of corn equivalent to manmade polyester fiber like cleaning and blending,carding,combing,,roving,spinning are main.
- >. Dharma (2021) studied the properties, manufacturing and benefits and uses of corn fiber in textile industry .She explained the cornhusk extraction and breakdown into sugars and fermented, performance advantages related with synthetic materials and complementing properties of natural products such as cotton and wool.

## INTRODUCTION

Synthetic textiles are contributing severe mental pain through their toxicity in our environment as well as an organism drastically by mixing the waste chemical in the fresh water and poisonous gas generated by mixing color and uses of auxiliary causing One child death per minute, that badly ruining our economy and society. Textile industry consumes 79 billion cubic meters water annually.

Figure a ; How Textile Industry polluting the water



figure- 1 <https://www.pinterest.fr/amp/pin/>

Fabric for personal use or home furnishing should be eco-friendly for the sake of our habitat and well-being. Burning of Stubble (local name Parali) causing dangerous health problems for people as well as animals too. Farmers continue to burn residues every season in Panjab, Haryana and Western Uttar Pradesh. Nowadays it's spreading more frequently in other parts of country. According to the report more than 500 million tons of parali (crop residues) is produced annually in the country. study estimates that crop residues burning released 149.24 million tons of carbon dioxide (CO<sub>2</sub>). These donate directly to environmental pollution, and also answerable for smog and health problems in Delhi as well as many cities which are nearby. Health problems like asthma, acute bronchitis, skin disease etc. Our glaciers are melting fast, causing imbalance in Ecosystem. The purpose of this study is to make people aware of harmful and dangerous effects of using synthetic fabrics, need to pay attention on adaptation in mass public due to its environmentally friendly properties. In older time's fabrics are made of natural derived from natural resources like wool, cotton, khadi, jute and silk. Fabrics made of this fiber were traditional, non-toxic and

ecofriendly. That time very less people used to visit doctors for skin infection, itching and other allergies. Word eco is small but its significance is large in today's global situation. Term 'Green' can be used for ecofriendly is a concern for everyone. The Textile attention is continuously accentuating on regular sources for production of textile. Use of eco-friendly fibers in the textiles can reduce glaciers depletion, less carbon dioxide and emission of poisonous gases pollution the environment in large amount and can control waste going to landfills. In this study the qualities of Ingeo known as corn fiber are explained, which is one of the most beneficial for coming time as for as the environmental worry is concern, if we do not push ourselves towards adaptation of ecofriendly garments Ingeo is a fresh brand concept foothold on the precept of ecofriendly, it represents world's first man-made fiber derived from 100 percent annually renewable mean.

Corn fiber is made of lactic acid, which is generated by transforming corn dextrose into glucose and then fermenting it to get lactate. learning reveals the proficiency of why corn fabric adaptation in the textile industry in essential keeping the global warning threatening feature due to its biodegradability and no chemical use in manufacturing .Fabric made of corn is very comfortable than others due to its 100 percent organic attribute and curb many quality in itself like good dye ability. Quality that Ingeo contains are sheen like silk, anti-wrinkle, great draping fall, low maintenance, it can be washed at home. It has the character of excellent anti - to - fade in color and unaffected by UV light. The demand of this magnificent fabric has risen up by the rich society only due to its price factor, more strong efforts must require jointly and genuinely to make it affordable by mass people and valuable awareness globally.

Table 1.1 different names of corn,

General name	Local names	Botanical name
corn	Makki, (Punjabi) Bhutta (Hindi) Maize, (English)	Zea mays

**>- characteristics of Ingeo Fiber**

- >Ingeoispolylactide (PLA) fiber is unique biodegradable material derived from corn.
- >Fantastic drape and slippery.
- > It is made out of waste of corn husk.
- > No investment of machine or any other special set up is required to make these yarns.
- > U V resistant and Heat proof, which is most required and unique quality in the fabric.
- Corn fiber also uses no chemical additives or surface treatment, and is naturally flame retardant.
- > Good crease recovery does not need ironing.
- >Air permeability and it has luster like silk .good to have substitute of silk at cheaper price.
- > Good strength, good for Army person who deals in rough condition outdoor. Uniform out of this Ingeo fabric will provide comfort and moisture absorption and many other important features to honorable force person.
- > Bacteria resistant and mildew proof.

Table 1.2 Properties comparison of Corn Fiber with other fibers

Fiber properties	Fiber		
	Cornhusk	cotton	bamboo
Moisture regain ,%,IS 199	10.5	6.8	12.8
Elongation at break,%ASTMD-3822	22.3	7.84	21.0
Fiber Denier (ASTMD-1577)	78	1.64	1.30
Tenacity (g/denier)ASTMD -3822	1.38	2.55	2.61
Fiber strength(mm)(ASTMD 5867)	30-40	29.5	40.75

**-Ecological Reason of Using Corn in Textiles and Clothing –**

>Biodegradable – As a natural product derived from corn husk bagasse's commercially viable man- made product with large quantities of starch is 100 percent annually renewable resources .It is extracted from the pant fiber and break down into sugar that are then fermented and separated in polymers, this biodegradable in soil by microorganism and sunlight .Garment made out of corn fiber can be composted and disposed of an organic and eco –friendly manner.

Figureb -How the Ecofriendly fiber is friendly to Environment



figure - 2https://amberoot.com

Harvesting -Corn, perennial that are sown once and grow many times through many seasons thus saving time and money. They have long roots that add organic matter to the soil and keep the soil healthy. They are harvested twice in a year and all different states at different time depending on the climate structure for corn.

>Water requirement-Crop need water to grow. In case of corn cultivation, high yielding corn needs approximately 20 to 30 inches of water annually depending on sowing date, location, and weather condition of that area and maturity group. Corn requires the most water at early stage compare to the rest of its growing stage, which are also the most delicate and sensitive time to water stress.

>Greenhouse gasses and global warming- Corn has tremendous potential to remove carbon dioxide (CO<sub>2</sub>), a one of the major greenhouse gas, from the atmosphere, carbon is eventually returned to the environment as the corn crop residue decomposes of the grain is consumed as feed or burned as biofuel.

>Surprising growth-After Karnataka and Madhya Pradesh Bihar is the highest maize producer. Corn production of 28.98 million tons, up from tones on higher planting and record yield of 3.12 tons per hectare. USA is the largest corn productive county.

>Corn Fiber - No need for capital investment in making of this yarn from corn husk. Corn fiber is available in both filament and staple form. This makes it available for both lightest fabrics to the most robust of uses.

Fabric made out of it can be comparable with polyester; both fabric have the same dyeing and finishing. They both melt spun weaving and knitting in particular conditions, fabric can be treated to give dimensional stability and they are both dyed in disperse dyes.

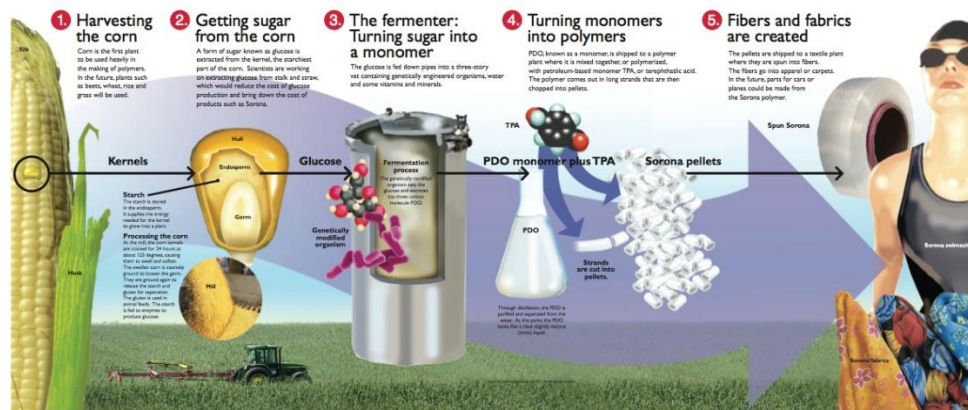


Figure- 3 http://mollycornfiber.blogspot.com

**Manufacturing stages of Eco-friendly corn fiber**

Spreading awareness of global warming environmental concerns has followed the creation of product which is natural and biodegradable. These products do not harmful emission during production, service life and after disposal. From many years textiles industries trying to find new sources to natural fiber like cotton and linen. This can reduce the dependence on land and other resources required to make fiber at reasonable costs.

Cornhusk- Alingnocellulosic fiber generally dumped as waste, for that they need space, has potential of being utilized as a textile fiber. Corn or maize is the second-largest agricultural crop in the world.

Opening, Cleaning & Blending - When the staple fiber arrives in the form of large bales at the yarn making unit, then most important to separate or untangle the fiber mass to single fiber close as much as it can be.

Carding- It is the process of knot opening of fiber and reforming into single fiber forms. It is very important to convert them in individual,

Combing - Machine which has many card sliver attached, this provide smoothness when it pulls out the fiber into layer and reform a new sliver called as a comb sliver. this gives smoothness, evenness and fineness.

Drawing-This section is dual, drafted and blended to parallel all the fibers and to control and even sliver for production of high-quality yarn.

Roving- Main aim for this procedure of roving is to prepare a better input package for the ring frame. The roving is done on compact small packages called bobbins, which are easier to transport and less chances of damage as compared to sliver cans. Roving is important in ring spun yarn.

Spinning- The last step of process is the spinning operation. In the spinning process, roving is lessened to desired diameter called the final draft and the desired amount of twist is inserted.

This fabric can be used in different field like apparel, home textile like curtain, bed sheet because it has benefit to skin, upholstery, draperies, carpet due to its rough texture, blanket and mattresses .It can be used in industrial uses like plastic form, for packaging, for construction civil engg.it is already in use as two non-woven application like diaper and cosmetics because of its unique feature which "end – to –life.

After dyeing, many small holes can be found on the side surface, which has the same effect as wool, such as absorbing moisture, quick dry and breathing freely. The clothing made it with graceful drape ability, wash and wear, dirt resistant and the climate; it is a new generation of green fiber. Ingeo can decrease the climatic consequences. Ingeo fiber in the way towards producing a wide range of material from renewable resources to meet the world's need today without compromising the earth's ability to meet the needs of tomorrow. The fiber is an environmentally preferable opinion to petroleum based synthetic materials. Production of this fiber uses 68 percent less fossils fuel resources than resins for traditional synthetic fiber. Some fabric made out of Ingeo - Avelana, Belmaille, Everwin, Fountain set, Gipitex, Louisudon, tintex etc.

#### **-Care Instruction –**

Wash in cold water using a mild detergent .Corn fiber is wrinkle free, so it does not need ironing again and again, that makes it great easy care fabric for travelers or those with an active lifestyle.

Durability of Corn fabric-Corn fabrics has the same durability as any other materials.

What makes the Ingeo more versatile is availability in both filament and staple spun forms, it can make a wide variety to textile styles from dress to sportswear, furnishings to drape and soft nonwoven baby wipes to tough landscape textiles.Eco -friendly fibers and their remarkable contribution saving the universe from the enemies.

#### **CONCLUSION**

Ingeo fiber is a novel product which needs to be experimented and must be introduced in different field of textile for the betterment of future generation keeping in mind, all the bad effects of toxic. The wastage with corn husk which occurs annually, it should utilize for rebalancing the eco-system from hazardous condition which exists and spreading their hands to destroy our living and our beautiful world. Above justification about selecting the Ingeo as a topic of my Research is a small effort to make all understand the importance of eco-Ingeo be the best option for eco-friendly textiles, efforts for the acceptability and awareness due to its tremendous healthy properties can be beneficial for different field like sports, Army, people work in bad climate like humidity .Organic clothing should be chosen for the garments which remain closest the skin most of the time including underwear's, sleep wear and camisole .Corn fiber is the best option of raw material for home furnishing like curtains, rugs, sofa covers. Mattresses made out of corn fabric are presently in use by hotels in large numbers due its quality of crease recovery and stain resistant.

#### **SUGGESTION**

we have suffered a lot rather suffering from most dangerous virus COVID19. Our future is uncertain, which made us to take serious precaution while going out in public, this follows by the medical line rather every field, we have seen ourselves using various types of mask and ppt kit to protect ourselves from this lethal unseen enemy. Major complaints have been noticed by the doctors, nurses and other people in ppt kit and mask was Suffocation, this can be minimize by making these out of corn fiber. It will be more healthy too for patient's uniform and mattress used by them made of corn fiber ,which will be minimize the suffering of patients due to its medicinal property like soothing to body and comfortable and required low maintenance because Corn fiber has anti-wrinkle ,anti-stain ,anti-fungal, U.V protection and many more properties.

Corn fabric can replace many fabrics like rayon, art silk and other; it is a best replacement of rayon fabric, which is in use from past 3 years in a large amount by every fast fashion markets. Making of rayon fabric need the wood pulp, for that deforestation is taking place rapidly, resulted turbulence in eco-system and encouraging global warming. We must put some genuine steps for the consuming corn fiber in textile jointly, government must initiate in giving subsidy in making garments and mills which make corn fabric.

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