CHAPTER – III

REVIEW OF LITERATURE

3.1 Introduction

The researcher in this chapter has discussed the latest developments made in the research field on the cotton spinning mill process wastes and their relevant benefits to the mills for marketing of process wastes. Basically the spinning mill process wastes have today become more valuable products for domestic as well as industrial purposes.

The recent research papers have shown that the process wastes can be utilized by the spinning industry especially the open end spinning industry, the agriculture sector in the form of manure, the construction industry in the form of light bricks, domestic purposes in the form of bio-gas, mattresses, garments and for the workshops in the form of hard waste.

The researcher having gone through various research papers which supported his concept for establishing marketing techniques by the spinning management will now be discussing the concepts of marketing techniques and marketing management and also importance of eco-friendly environment for spinning mills. Later he has reviewed various research papers to show the importance of spinning mill process wastes.

3.2 Concept of marketing

- Marketing is concerned with the problem of profitability disposing what is produced.
- Marketing is the total system of interacting business activities designed to plan, promote and distribute need satisfying products and services to existing and potential consumers.
- Marketing is a phenomenon brought about by the pressures of mass production and increased spending power.
Marketing is the performance of business activities that direct the flow of goods and services from the producer to the consumer.

Marketing is the economic process by which goods and services are exchanged between the maker and the user and their values determined in terms of money prices.

Marketing is designed to bring about desired exchanges with target audiences for the purpose of mutual gain.

Marketing is the function that adjusts and organization’s offering to the changing needs of the market place.

Marketing activities are concerned with the demand – stimulating and demand – fulfilling efforts of the enterprise.

Marketing is so basic that it cannot be considered a separate function. It is really the whole business seen from the point of view of the final result, i.e. from the point of view of the customer.

Marketing is the delivery of a standard of living to society.

The foregoing discussions on the difference between selling and marketing, lead us to the marketing concept. The marketing concept, the marketing concept was born out of the awareness that business should start with the determination of consumer wants and end with the satisfaction of those wants. The concept puts the consumer at both the beginning and the end of the business cycle. It stipulates that any business should be organized around the marketing function and its task should be one of anticipating, stimulating and meeting customers’ requirements. The customer, not the corporation, has to be the centre of the business universe. Business cannot be succeeded by supplying products and services that are not designed to serve the needs of the customers. As Drucker says, ‘the essence here is that the entire business has to be seen from the point of view of the customer.’ In a company practicing this concept, all departments will recognize that their actions have a profound impact on the company’s ability to create and retain a customer. Every department and every worker and manager will think customer and act customer.
3.3 Research Papers

3.3.1 “Cotton and limestone powder wastes as brick material” by Halil Murat Algin, Paki Turgut, Harran University, Engineering Faculty, Civil Engineering Department, Osmanbey Campus, 63300 Sanliurfa, Turkey

Abstract

Large amounts of cotton and limestone wastes are accumulated from the countries all over the world. The majority of cotton wastes (CW) and limestone powder wastes (LPW) is abandoned, and causes certain serious environmental problems and health hazards. This paper presents a parametric experimental study, which investigates the potential use of CW–LPW combination for producing new low cost and lightweight composite as a building material. The physical and mechanical properties of concrete mixes having high level of CW and LPW are investigated. The obtained compressive strength, flexural strength, ultrasonic pulse velocity (UPV), unit weight and water absorption values satisfy the relevant international standards.

The results show that the effect of high level replacement of CW with LPW does not exhibit a sudden brittle fracture even beyond the failure loads, indicates high energy absorption capacity, reduces the unit weight dramatically and introduces smoother surface compared to the current concrete bricks in the market. The process undertaken can easily be applied in the current brick plants. It results a sturdy lighter weight composite having potential to be used for walls, wooden board substitute, economically alternative to the concrete blocks, ceiling panels, sound barrier panels, etc. Paper presents the results and draws conclusions.

Keywords: Cotton; Limestone; Cement; Waste; Brick; Masonry
Review of the paper

The paper concentrates on light weight of bricks that are useful for constructers, Cotton wastes such as broken seed particles and leaf materials when combined with limestone wastes give binding properties to the basic material to form light weight bricks. The research paper suggests that more percentage of cotton wastes would bring down the brittleness in bricks, the very essential property of bricks. The paper also emphasizes on other properties of cotton wastes such as high energy absorption capacity, reduces the unit weight dramatically and introduces smother surface compared to the current concrete bricks in the market. The obtained compressive strength, flexural strength, ultrasonic pulse velocity (UPV), unit weight and water absorption values satisfy the relevant international standards.

The results show that the effect of high level replacement of CW with LPW does not exhibit a sudden brittle fracture even beyond the failure loads, indicates high energy absorption capacity, reduces the unit weight dramatically and introduces smother surface compared to the current concrete bricks in the market. This is because the cotton wastes that is obtained from ginning and spinning mills has a raw cellulose which when combined with lime stone waste and the soil for preparing the bricks reduces or absorbs the water percentage in the combination which enables the bricks to become lighter in weight. The other properties such as high energy absorption, compressiveness, flexible strength and ultrasonic pulse velocity (UPV) are developed in the bricks due to the combination of the elements present in the cotton wastes.

This paper is a useful focus on the utilization of cotton wastes as an industrial waste for producing modern required products such as light weight bricks for masonry purposes in construction works. Today, the brick manufacturing industry has a new and useful product in the form of cotton waste to produce high technological, purposeful products for constructions.
3.3.2 “Multi Scenario Pellet Fuel Manufacturing Operation Utilizing Cotton Waste”
J. Simonton, G. Holt, M. Beruvides, L. A. Barroso

Abstract

The low capital investment of scenario 3, as compared to scenarios 1 and 2, coupled with 2-12 hour work shifts was the option chosen to be most profitable. The target production of 13,608 Mg a year produced the best overall results but did not fall within the mandated 100 days of operation requirement. At 9,072 Mg per year scenario three required 100 days of operation with a 30.25% return, and 2.35 years to payback. Scenario three, at 13,608 Mg of production per year, produced a return on investment of 79.74% with a payback period of 1.09 years.

It can be easily surmised that with larger raw material quantities being available it would be more cost effective to treat the pellet fuel operation as a separate entity and process a larger production volume. The analysis revealed that each scenario was sensitive to raw material cost and the transportation cost related to getting the material from the gin to the manufacturing facility. This highlights the importance of locating the manufacturing facility in an area where ample amounts of raw material will be available in close proximity even in poor harvest years.

Review of the paper

The above research paper written by J. Simonton, G. Holt, M. Beruvides, L. A. Barroso, emphasizes on the importance of availability of ginned cotton wastes for preparing Pellet Fuel. This paper concentrates on the availability of raw material rather than how the raw material is processed to manufacture pellet fuel. Pellet fuel is one of important fuels which can be used for long time when compared to cow dung and wood. Pellet fuel shows a property of slow ignition and burning, but keeps burning for a long time saving the consumption of fuels for heat
energy. Another advantage of pellet fuels is that they emit minimum amount of smoke when compared to other fuels.

Cotton wastes of ginning and spinning mills are very beneficial industrial products which can be marketed effectively to get best returns on sales. This paper is one of the best examples to prove that cotton waste when available in large quantity can be a most useful industrial product for various purposes ranging from petroleum products to agricultural input and to domestic appliances such as mattresses, dolls, pillows, cushions and so on.

3.3.3 “Crude Oil Sorption by Raw Cotton”


Abstract

Since the recent Deepwater Horizon Gulf of Mexico oil spill, the need for environmentally friendly oil sorbents has intensified. This study deals with the sorption of crude oil by raw cotton, a biodegradable sorbent. To our best knowledge, the data related to crude oil sorption by unprocessed raw cotton and correlation with cotton characteristics such as micronaire, fineness, and maturity are unavailable. More importantly, our work quantifies the oil sorption (g/g) of low micronaire (immature) cotton. Results showed at the minimum level, low micronaire raw cotton has 30.5 g/g crude oil sorption capacity.

Furthermore, the crude oil sorption capacity of low micronaire cotton was significantly higher than the sorption capacity of high micronaire cotton. Brunauer–Emmett–Teller (BET) surface area and environmental scanning electron microscopy analyses support the correlation between the quality characteristics of
raw cotton and its oil sorption capacity. In contrast to synthetic sorbents, raw cotton with its high crude oil sorption capacity and positive environmental footprint make it an ecologically friendly sorbent for oil spill cleanups.

**Review of the paper**

The article “Crude Oil Sorption by Raw Cotton” written by Vinikumar Singh, Ronald J. Kendall, Kater Hake, and Seshadri Ramkumar, is another good example to show how the raw cotton waste that is extracted from ginning and spinning mills is an useful industrial product for producing materials that are eco-friendly and useful fuel absorbents on large scales. The authors have tested low – micronaire and high – micronaire raw cotton by Brunauer–Emmett–Teller (BET) surface area and environmental scanning electron microscopy analyses which shows that low-micronaire cotton is a better fuel absorbent than high - micronaire cotton. The difference between the low-micronaire and high – micronaire cotton is the fineness of the fibers in the cotton lint that enhance the property of oil or water absorbency.

According to the researchers the low – micronaire cotton has better fuel absorbency characteristics when compared to high – micronaire cotton. This may be due to the high – micronaire cotton has rough and thickness in its diameter which prohibits easy absorbing capabilities in the fibers while low – micronaire cotton is thin and smooth in its diameter which enables easy absorption of fuel or water. Another notable use of this paper is for spinners who can use raw cotton of low – micronaire for producing terry – towel and knitted fabrics for good absorption.

The above paper is a useful feed – back for spinner to identify their requirements for spinning various counts of yarns based on the demand for a particular fabric. The technicians in a spinning mill apply the ginned cotton mixing techniques based on the end products (Yarn) to be spun in the mill. The mixing technique is basically a technique of mixing high – micronaire and low – micronaire cottons to obtain better spinnable results on yarn.
Review of the paper

Analysis on objectives, hypothesis and research methodology

The objective of the research was to find an alternative to petroleum based fuels in the form of bioethanol product to save energy. This bioethanol can be extracted from cotton waste from spinning mills. Main objectives to make use of volume of waste cotton for the production of alcohol.

Hypothesis; To produce alternative energy in the form of bioethanol by processing cotton spinning wastes.

Research Methodology; The researcher has taken different types of cotton wastes for the study directly procured from Shri Kannapiran Mills Pvt Ltd, Coimbatore, India. All the waste were pooled together, processed mechanically to reduce the length of fibers and remove the debrised material contained in it. The fibers were then boiled in water at 100°C for 30 mins. After removal from boiling water, the fibers were rinsed with de-ionized water and air dried.

Descriptive review about different headings of the paper:

The paper has different headings starting from introduction. In the introduction chapter the researcher says that Ethanol can be used as a gasoline fuel additive and transportation fuel. Bio-ethanol used as a source of energy is a more welcoming alternative fuel. The researcher says that the study was focused on the following main objectives to make use of volume of waste cotton for the production of alcohol.
In the materials and the methods the researcher has given detailed process of treatment of spinning wastes, compositional analysis of the cotton waste, pre treatment of cotton waste, compositional analysis of pre treated cotton waste, cellulose Enzyme Production and extraction, determination of kinetic parameters, fermentation of released sugars bio-ethanol production.

In results and discussion the researcher discusses compositional analysis of the cotton waste through a table and then the effect of pre treatment on the cotton wastes and methods of determining kinetic parameters and how fermentation of released sugar to produce bio-ethanol. In the conclusions the researcher says the idea of recovering energy from cotton waste has been around several decades and in the present study different cotton wastes were pooled and their ability to release fermentable sugars for bio-ethanol production was studied and the researcher says that the batch fermentation produced more alcohol compared to fed-batch process.

**General observations:**

The research paper by Mahalakshmi. M, Angayarkanni, R. Rajesh R. Rajendran, is a useful research paper which focuses on many sources of energy which exists in a variety of interchangeable forms, one of which is producing alcohol (Ethanol) from the cotton wastes of spinning mills. The cotton mill spinning waste were one time considered as useful for some end products, but spinning wastes are more useful when treated chemically and resourcefully in generating alternative energy resource other than petroleum fuels.

**Strengths and weaknesses of the paper:**

**Strengths:** The strengths of research paper are that its utilization of cotton wastes from textile mills to convert the wastes into bio-ethanol by microbial saccharification and fermentation. In this paper the researcher says the amount of sugar released from pretreated substrates of cotton wastes increases with a increasing concentration of acid or alkali. The sugars which were released were then fermented with Saccharomyces cerevisae to obtain alcohol. The results of the
present work clearly revealed that the cellulosic cotton waste could be converted into bio-ethanol with enzymatic hydrolysis followed by fermentation.

**Weaknesses**: The research paper concentrates on all spinning wastes like, sweeping waste, dropping waste, comber noil, gutter waste, gin waste, hard waste. But the paper does not deal with waste fabrics from the looms (weaving process). The paper has a lengthy process with a different processing nature of pretreatment, post treatment and fermentation along with determination kinetic parameters which are all chemical processes in nature and biotech in approach. The sensitivity of the research is that the process is laboratorial and sensitive to readings. The wastes of spinning mills can be marketed to venders without any scientific approach, but not to reprocessing in chemical way. When considered about the research study of researcher the paper has above mentioned weaknesses.

**How above paper is useful with study (explanation):**

The paper is very useful with the study in the direction of thinking as to reprocessing the cotton spinning mill wastes chemically and biotically to produce fuel (Bio-ethanol) which is useful for energy. The paper discusses how all the wastes such as sweeping waste, dropping waste, comber noil, gutter waste, gin waste, hard waste can be utilized for reprocessing purposes. From the research point of view this research paper gives an important and useful knowledge for the spinning mill owners in marketing their process wastes.

**Opinion / Conclusion by researcher**

The researcher views the above research paper as an useful resource to substantialize his concepts of research work. As the researcher aims to market the cotton spinning mill wastes to generate financial viability, this research paper is an useful tablet for the researcher to emphasize his marketing activity to generate more value to cotton spinning mill wastes.
3.3.5 “Bio Gas from Textile Cotton Waste - An Alternate Fuel for Diesel Engines”

C. Sundar Raj, S. Arul, S. Sendilvelan and C.G. Saravanan
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Abstract

Methane was generated from cotton waste, while considering its pollution in textile industries. Cotton waste includes solid content and is rich in cellulose having a moisture content of 8.8%. It is difficult to form slurry as the waste float on water and hence an experimental set up has been made like a batch type digester and experiments were conducted with a different proposition of water with or without addition of seeding materials. It was found that cotton waste with 5 to 7.5% seeding material like cow dung or pig dung at temperatures of 30 to 350°C generated bio gas continuously, with a reasonably high yield from the tenth day after feeding. The gas contained rich methane and was tested in a single cylinder diesel engine as a dual fuel had the tendency to save 60% of diesel.

Keywords: Cotton waste, anaerobic digestion, biogas, methane, alternate fuel.

Review of the paper

The paper “Bio Gas from Textile Cotton Waste - An Alternate Fuel for Diesel Engines” by C. Sundar Raj, S. Arul, S. Sendilvelan and C.G. Saravanan is another useful research paper on the utility of cotton waste from ginning and spinning mills. The wastes like blow-room droppings in spinning mill and seed coatings and wastages from seeds of ginning mill can be re-cycled to form bio-gas.
The waste cotton is rich in its cellulose which helps in generating methane, when subjected to high temperatures along with other ingredients. The researchers having found that cotton wastes being light float on water, so, they slurried the cotton wastes with cow dung and pig dung and dumped in the bio-gas chamber. The surprised results gave rise to bio-gas which was more effective for the domestic and industrial use.

The researchers claimed that nearly 90% to 95% of cotton waste with 5% to 7.5% of cow dung and other green vegetarian wastes when slurried give rise to biogas. This re-cycling of cotton waste not only reduces the pollution in the industry but also saves environmental pollution. The cotton wastes were earlier used as manures for the agricultural purposes with no or minimum return prices for the wastes.

This research emphasizes on the industrial importance of cotton wastes when utilized on large scale to produce another useful industrial product.

From this paper it is again understood that spinning and ginning wastes can be marketed for better prices when proper storage, packing and labeling is done as part of marketing technique to promote the products for better prices.

3.3.6 “Novel treatment of selected post industrial textile waste into a sustainable product for agriculture” by S. Aishwariya and Dr. S. Amsamani The authors are Ph. D scholar and Associate professor from the Department of Textiles and Clothing, Avinashilingam University for Women, Mettupalayam road, Coimbatore – 641 043, India. VOL. 2, Special Issue, ICESR 2012 ISSN 2225-7217

Abstract

A statistical survey reports the fact that the total amount of willow dust generated, is about 80,000 - 85,000 tons per annum. This willow waste is too short a fiber to be used for any textile application and is just disposed off as
landfills. A better alternative for this waste was designed and thus the research aims in bio-managing this cotton textile waste by using three tier system of enzyme-earthworm-microbe interaction. Pretreatment and enzymatic treatment of the cotton textile waste enhanced good growth of earthworms with an additional benefit of reducing the toxicity of the wastes. The resultant vermin-compost was a very good substitute for chemical fertilizer with a good source of carbon and appreciable amount of NPK. On addition of cellulose degraders, nitrogen fixers and phosphate stabilizers the compost can be converted into rich source of bio-fertilizer also. The efficacy of the prepared compost was analyzed using a pot culture study and the results were compared with control pot.

**Key words:** willow waste, decomposing, composting, bio-compost, vermin-composting, textile recycling.

**Review of the paper**

The research paper “Novel treatment of selected post industrial textile waste into a sustainable product for agriculture” by S. Aishwariya and Dr. S. Amsamani is another useful paper presenting the use of willow wastes of cotton fibers of spinning and ginning mills. The authors have clearly mentioned about the magnitude of waste produced in cotton textile industry. The willow dust is a product of blow – room in a spinning mill. In the earlier days this willow dust was collected by sweeping and was thrown out as not usable or salable product. But this paper gives willow dust certain value in terms of re-cycling product to be used for agricultural purposes.

The researchers designed a better alternative for this waste and thus the research aims in bio-managing this cotton textile waste by using three tier system of enzyme-earthworm-microbe interaction. Pretreatment and enzymatic treatment of the cotton textile waste enhanced good growth of earthworms with an additional benefit of reducing the toxicity of the wastes. The resultant vermin-compost was a very good substitute for chemical fertilizer with a good source of carbon and appreciable amount of NPK. On addition of cellulose degraders, nitrogen fixers
and phosphate stabilizers the compost can be converted into rich source of bio-fertilizer also. The efficacy of the prepared compost was analyzed using a pot culture study and the results were compared with control pot.

From the above research paper it is clearly understood that, most of the spinning mill wastes have become commercial and industrial products for developing or re-cycling into new useful products.

3.3.7 “Production of cellulase by different co-culture of Aspergillus niger and Penicillium chrysogenum from waste paper, cotton waste and bagasse”

M. Jayant, J. Rashmi, M. Shailendra and Y. Deepesh
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College S.I.T.M. Lucknow, India. Accepted 21 February 2011

Abstract

Cellulases are a group of hydrolytic enzymes capable of degrading cellulose to the smaller glucose units. These enzymes are produced by fungi and bacteria. The solid waste of sugar, paper and industry using baggase, paper waste and cotton waste was fermented by Aspergillus niger and Penicillium chrysogenum in solid state fermentation. There is attempts to transfer the various industrial carbon waste to veterinary proteins depend on microorganisms by using of chemical process. The study indicates that the cellulases obtained from compatible mixed cultures simultaneous mixing of both fungi have more enzyme activity as compared to their pure cultures and other combinations. The fermentation experiments were performed in solid state fermentation (SSF). Incubation time, carbon sources and initial pH of fermentation medium was optimized with simultaneous mixed culture. It was revealed that the newspaper at pH = 5 and 40°C
was the best source of carbon for the enhanced production of cellulase in the compatible mixed culture experiments after 8 days of incubation. Based on the reported results, it may be concluded that industrial carbon waste can be a potential substrate for production of cellulase, incorporation of co-culturing A. niger and P. chrysogenum. The aim of this work is to produce cellulase from waste paper and reduce the pollution.  

Key words: Aspergillus niger, Penicillium chrysogenum, cellulase, culture.

Review of the paper

The research paper “Production of cellulase by different co-culture of Aspergillus niger and Penicillium chrysogenum from waste paper, cotton waste and baggase” by M. Jayant, J. Rashmi, M. Shailendra and Y. Deepesh is another useful paper presenting the use of cotton waste along with paper waste for fermentation process with waste baggage of sugar or other decaying products to produce cellulose. Cellulases are a group of hydrolytic enzymes capable of degrading cellulose to the smaller glucose units. These enzymes are produced by fungi and bacteria.

The researchers have attempted to transfer the various industrial carbon wastes to veterinary proteins depending on microorganisms by using of chemical process.

The research study indicates that the cellulases obtained from compatible mixed cultures simultaneous mixing of both fungi have more enzyme activity as compared to their pure cultures and other combinations. The fermentation experiments were performed in solid state fermentation (SSF). Incubation time, carbon sources and initial pH of fermentation medium was optimized with simultaneous mixed culture. It was revealed that the newspaper at pH = 5 and 40°C was the best source of carbon for the enhanced production of cellulase in the compatible mixed culture experiments after 8 days of incubation. Based on the reported results, it may be concluded that industrial carbon waste can be a potential substrate for production of cellulase, incorporation of co-culturing A. niger and P.
Chrysogenum. The aim of this work is to produce cellulase from waste paper and reduce the pollution.

Even though this research paper mentions less of cotton waste in their experiment, there is substantial importance in usage of cotton waste in their experiment for better results and rich cellulase. The cotton wastes contain high amount of cellulose which directly is contributed to the formation of cellulose.

This contribution again emphasizes that the cotton wastes are useful industrial products which can be utilized even in the laboratories for chemical purposes.


Abstract

Spinning is the process of conversion of fibre into yarn. The spinning process includes various operations such as cotton mixing, carding, combing, drawing, winding. Winding is the final process in spinning mill where the yarn of small quantity is wound into a big package known as cones. The important aspect in winding is removal of defects or faults in yarn produced. In manual winding when there is discontinuity of thread, during removal of faults, the knot is made by a human. This reduces the quality of yarn.

To overcome this disadvantage, autoconer is used. Autoconer is an advanced machine used in winding process to get a high quality yarn with low man power. Here, threads are spliced automatically. Splicing means the process of
opening of broken ends and re-twisting the ends after the removal of faults. Here the joined yarn looks like parent yarn. Thus, the quality of yarn is enhanced. The drawback of autoconer is, waste collected by suction motor gets deposited on the suction panel and it should be disposed manually for a periodic time interval. If the waste is not removed it reduces the operating efficiency of the suction motor. This leads to reduction in quality of yarn. The aim of the proposed work is to design an automatic waste removal system using PLC (Programmable Logic Controller) which helps us to further increase the efficiency of the suction motor and thus the quality of yarn.

Keywords: Winding, Autoconer, Suction motor, Quality control

Review of the paper

The research paper “Quality Improvement of Yarn by Automatic Waste Removal in Autoconer” by K.Srinivasan, P.Jeevapriyadharshini, A.Karpagam, S.Pavithra is a different kind of paper which emphasizes on improving the quality of yarn by automatic waste removal in autoconer machines. The autoconer machines are the automatic winding machines which employs robotic system of piecing the broken yarn with minimum thickness and effectiveness to maintain the same evenness in the yarn.

In this paper the researchers have indicated the important aspect of winding in removal of defects or faults in yarn produced. The researchers say that in manual winding when there is discontinuity of thread, during removal of faults, the knot is made by a human. This reduces the quality of yarn. To overcome this disadvantage, autoconer is used. Autoconer is an advanced machine used in winding process to get a high quality yarn with low man power. Here, threads are spliced automatically. Splicing means the process of opening of broken ends and re-twisting the ends after the removal of faults. Here the joined yarn looks like parent yarn. Thus, the quality of yarn is enhanced. The drawback of autoconer is, waste collected by suction motor gets deposited on the suction panel and it should be disposed manually for a periodic time interval. If the waste is not removed it reduces the operating efficiency of the suction motor. This leads to reduction in
quality of yarn. The aim of the proposed work is to design an automatic waste removal system using PLC (Programmable Logic Controller) which helps us to further increase the efficiency of the suction motor and thus the quality of yarn.

So, this paper is an useful paper which emphasizes not only on the quality of yarn but also quality of hard waste extracted from suction motors of autoconers. This hard waste can be easily re-processed and sold to industrial units for cleaning purposes. Today, when cotton spinning mill wastes have gained lot of importance they also help in commanding useful returns on their sale.


Abstract

For the purpose of recycling of cotton waste cuttings and exploring the prospect of preparation for super absorbent polymer (SAP), the high viscosity carboxymethyl cellulose (CMC) was made from cotton waste first and then the SAP was synthesized by grafting acrylic acid (AA) onto the CMC with the potassium persulfate being as initiator, N, N'-methylene bis acrylamide as cross linker. The impact of polymerization temperature, time, initiator dosage, AA concentration, crosslinker dosage, and neutralization degree on water absorbency of SAP was studied. The optimum conditions are mass ratio of AA and CMC 7.11 g/g, initiator dosage 0.03 g/g CMC, cross linker dosage 0.2 g/100g AA, neutralization degree 80% and polymerization time 1.5 h at 70°C of the polymerization temperature. The water retention of the polymer is good and the water absorbency reaches up to 702.5 g/g.

Keywords: Carboxymethyl Cellulose, Cotton Waste, Grafting, Copolymerization, Super Absorbent Polymer.
Review of the paper

The above research paper is based on experimental works by Lei Tan, Zheng Qin Liu, Yang Yang Liu. These researchers have successfully used cotton wastes to produce super absorbent polymer which are useful in preparing polymers for suction and water absorbing purposes. The researchers have taken the advantage of Carboxymethyl Cellulose present in cotton for preparing water absorbent polymer. The high viscosity carboxymethyl cellulose (CMC) was made from cotton waste first and then the SAP was synthesized by grafting acrylic acid (AA) onto the CMC with the potassium persulfate being as initiator, N, N'-methylene bis acrylamide as cross linker. The impact of polymerization temperature, time, initiator dosage, AA concentration, crosslinker dosage, and neutralization degree on water absorbency of SAP was studied.

The optimum conditions are mass ratio of AA and CMC 7.11 g/g, initiator dosage 0.03 g/g CMC, cross linker dosage 0.2 g/100g AA, neutralization degree 80% and polymerization time 1.5 h at 70°C of the polymerization temperature. So, this shows that the cotton waste is useful industrial product that can be marketed in the industrial sectors. Even though amount of application is limited to research but the application which is aimed to re-cycle the wastes and make it useful product should be appreciated.

3.3.10 Greening a Cotton-textile Supply Chain

Author: Kogg, Beatrice
Source: Greener Management International, Volume 2003, Number 43, September 2003 , pp. 52-64(13)

Abstract

This paper reports on a case study of a supply chain for textiles made from organically grown cotton. All actors in the supply chain, from the cotton farmers in Peru through to the Swedish trading company that markets the product, have been interviewed about the changes that occurred as a result of the greening process,
their motivation for taking part in that process and what this participation has brought them. The focal company is Verner Frang AB, a small Swedish trading company specializing in sourcing high-quality cotton yarn from Peru and selling it to weavers on the European market.

During the late 1980s the company saw its European market diminishing. This development coincided with an increasing demand for eco-fashion and with an increasing interest in initiatives for green public procurement in Sweden. In light of these developments Verner Frang AB saw the potential of environmental excellence as a way of differentiating its product targeting what appeared at the time as a growing niche market for green textiles. This triggered a decision to focus exclusively on trading type I eco-labeled products made from certified organic cotton. Initially, however, the company was faced with two serious hurdles.

1. There were no suppliers in Peru that could supply cotton yarn made from organically grown cotton; indeed the company could not even find any farmers that could supply it with certified organically grown raw cotton. 2. Although it had a long history of working with Peruvian suppliers, Verner Frang AB was a small customer with very little power to impose any change on them. The case study in this paper highlights the hurdles Verner Frang AB had to overcome when it started working with organic cotton and reports on how the implemented changes have influenced the various actors in the chain over the ten years since the greening of the supply chain was initiated.

Keywords: Case study; Eco-labelling; Environmental chain management; Organisation; Supply chain structure; Textile industry

Review of the paper

This is one of the interesting case study which aims to develop an eco-friendly environment in trading textile goods over the world market. Kogg, Beatrice has taken up the case study in Peru one of the leading cotton producer in
the world. In the beginning of 20\textsuperscript{th} century the people in the Western Europe were very conscious about their clothing, food and other factors which they found essential for leading healthy life. Growth of organic cotton took place only in the 1900’s in the Latin American countries like Brazil, Peru, Argentina and Uruguay. So, according to author the trading company Verner Frang AB, a small trading company from Sweden found difficulties in trading the cotton yarn produced from non-organic cotton. According to author Verner Frang AB did not have that powerful capacity to impose or force the farmers of Peru to cultivate organic cotton.

The author says that the farmers of Peru understood the importance of organic cotton and its impact on health of consumers of cotton fabrics. The trends slowly started changing and eco-friendly textile supply chain developed all over the world. This case study is an useful outlook on the importance of cotton fabrics and the textiles produced from cotton yarns in developing eco-friendly trading systems.

### 3.3.11 Conclusions

The researcher has reviewed various research papers related to the applications of cotton wastes, cotton and cotton yarns that can be re-cycled to useful industrial products ranging from ethnol (a useful bio-gas) to bricks and water absorbent polymer. The researcher found this literature useful for review because this literature emphasizes on the importance of cotton process wastes as a useful by product for re-cycling.

After having reviewed various research works in this chapter the researcher will now discuss the profile of Khandesh and the co-operative spinning mills of Khandesh in next chapter.

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