

COTTON COLLECTION USING VACCUM PUMP

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Abstract: Cotton is a significant crop as having a vast production in India as well as in overall world. Cotton has a historical significances also as it had created changes in industrialization. Now India has a significant export valuation in agricultural export. But still in India there is a lack of mechanism in farming and also in cotton production also. Some innovations has made out in seeds that increased the production of cotton sector. But still in cotton farming operation or works like picking execution is still has traditional approach. Hence only option is now to establish a particular picking method. We have gone through variations and then we selected a pneumatic cotton picker. The cost of cotton production is excessively high, reducing the profit margin available to the farmer. Picking is one of the major labour intensive operations in cotton cultivation consuming the lion's share of the expenditure. Hence the only option available is the mechanical picking method. The development of cotton picker will be the first step into the mechanization of cotton cultivation. Cotton harvesters are of two basic types, viz, picker and stripper.

Cotton bolls is generally picked by two methods i.e. hand picking (manual) method and picked by mechanical pickers. In hand picking method, due to non-availability of labors during peak season results in various losses and also affects the subsequent farm operations. On other side mechanical pickers reduce the drudgery involved in cotton picking and helps in achieving timeliness of operation. Now a day's mechanical cotton pickers are commonly used for cotton harvesting in developed countries.

Keywords: Cotton fibre, cotton harvesting, cotton fibre properties, suction type cotton picking machine.

I INTRODUCTION

Cotton finds its significance presence in the modern biotechnology applications. India has emerged as a major player in cotton production as well as cotton products. Cotton is generally planted in the month of June in India and first picking can be done by October end and picking goes on till February. Cotton is grown in black clayey soil. The rainfall requirement is about 75-100 cm for cotton. Most of the cotton in India is planted in rain fed areas while very few are in irrigated land. India is second largest producer, consumer & exporter of cotton. Many people directly or indirectly depend on cotton for their livelihood, cotton is grown Central, West, North & South India. Major Cotton producing states are Maharashtra, Gujarat, Telangana,

Andhra Pradesh, Punjab. Cotton of all types can be grown in India (i.e. Asian, American, Egyptian and African). The main use of cotton is for making clothes and industrial products, cotton seed is high source of protein and used as animal fodder, and also the seeds can be used as fertilizer for plants. The linters on the cotton seed contain cellulose and can be used for automobile cushion, plastics and explosives. Cotton is either picked manually or by machine.

Cotton picking machine already exist in market. But due to mechanical cotton harvesting it loses the quality of fiber strength. In earlier days cotton picking is done by hand that was giving a good quality of cotton with good fiber strength but it requires more time. In general cotton harvesting

required -5KPa breaking off force to lift a cotton locks from burr. To overcome to this problem, analyze the design of cotton-picking machine and made the modification to improve the quality of product. Spindle - type cotton picking machine, is one of the cotton-picking machines which remove the cotton from open bolls. The spindles, which rotate on their axes at a high speed, are attached to a drum that also turns, causing the spindles to enter the plant. The cotton fibre is wrapped around the moistened spindles and then taken off by a special device called the doffer, from which the cotton is delivered to a large basket carried above the machine. During wrapping of cotton fibre around the spindles bars, fibre was stretched will result in increased short fibre content and trash and hence loses fibre quality and strength. Many people are trying their hand at growing crops that are traditionally grown by commercial farmers.

One such crop is cotton. While commercial cotton crops are harvested by mechanical harvesters, harvesting cotton by hand is the more logical and economical course of action for the small home grower. Of course, you need to know not only about picking ornamental cotton but when to harvest your homegrown cotton. Read on to find out about cotton harvest time. Cotton harvesting starts in July in the southern states and may extend into November in the north and will be ready to harvest over time for about 6 weeks. You will know when the cotton is ready to be picked when the bolls crack open and the fluffy white cotton is exposed. Before you begin to harvest your homegrown cotton, arm yourself appropriately with a thick pair of gloves. The cotton bolls are sharp and likely to shred tender skin. To pick the cotton from the bolls, simply grasp the cotton ball at the base and twist it out of the boll. As you pick, crop the cotton into a bag as you go. Cotton isn't ready to harvest all at one time, so leave any cotton that isn't ready to harvest for another day. Once you have harvested all the mature cotton, spread it out in a cool, dark area with plenty of air circulation to dry. Once the cotton is dry, separate the cotton seeds from the cotton by hand. Now you're ready to use your cotton. It can be used to stuff pillows or toys, or dyed and carded and spun into fiber ready to weave. You can also replant the seeds for another harvest.

In the US the two predominant ways to harvest cotton on farms is either using 1) mechanical cotton pickers or 2) using a mechanical cotton stripper. A cotton picker pulling the lint from the plants bracts that hold it on and leaves the rest of the plant as is. This is what is used in the Southeast, Mid-South and Far West (CA & AZ). Some areas of Texas and Oklahoma use pickers but on the High Plains (Lubbock & Amarillo, Texas are two of the bigger cities in that area) cotton strippers are commonly used. Strippers pull more of the plant into the equipment which means there will be additional cleaning or ginning needed. It's interesting to note that within the cotton picker segment there are some differences in machinery and labor requirements. The latest state of the art pickers includes the ability to compact cotton on-board, pressing it into a module as it rolls through the field. These pickers can pick six rows of cotton at a time and are rapidly becoming the market standard in the US as they eliminate the need to a separate module builder and other equipment and people to run those. Most of the more developed or advanced agricultural systems in cotton producing nations use pickers so its similar in Australia. Hand-harvesting is still the standard in many other countries and you can see that done in many areas of Turkey, India, China, Africa, etc. In these places, the people who harvest are still picking cotton the way it was done in the US many decades ago. Usually people are paid per pound or kilo of cotton harvested. Cotton in these countries may be brought to the gin in trucks, still in bags or in wagons pulled by tractors.

The textile industry in India traditionally, after agriculture, is the only industry that has generated huge employment for both skilled and unskilled labour in textiles. Most of the more developed or advanced agricultural systems in cotton producing nations use pickers so it's similar in Australia. Hand-harvesting is still the standard in many other countries and you can see that done in many areas of Turkey, India, China, Africa, etc. In these places, the people who harvest are still picking cotton the way it was done in the US many decades ago. Usually people are paid per pound or kilo of cotton harvested. Cotton in these countries may be brought to the gin in trucks, still in bags or in wagons pulled by tractors.

The textile industry in India traditionally, after agriculture, is the only industry that has generated huge employment for both skilled and unskilled labour in textiles. Textiles in total exports was 11.04% during April–July 2010, as per the Ministry of Textiles. During 2009–2010, the Indian textile industry was pegged at US\$55 billion, 64% of which services domestic demand. In 2010, there were 2,500 textile weaving factories and 4,135 textile finishing factories in all of India.[2] According to AT Kearney's 'Retail Apparel Index', India was ranked as the fourth most promising market for apparel retailers in 2009.

India is first in global jute production and shares 63% of the global textile and garment market. India is second in global textile manufacturing and also second in silk and cotton production. 100% FDI is allowed via automatic route in textile sector. Rieter, Trutzschler, Saurer, Soktas, Zambiat, Bilsar, Monti, CMT, Eland, Nisshinbo, MarksSpencer, Zara, Promod, Benetton, and Levi's are some of the foreign textile companies invested or working in India.

India is the second largest producer of fibre in the world and the major fibre produced is [cotton]. Other fibres produced in India include [silk], [jute], [wool], and [man-made fibers]. 60% of the Indian textile industry is cotton based. The strong domestic demand and the revival of the Economic markets by 2009 has led to huge growth of the Indian textiles industry. In December 2010, the domestic cotton price was up by 50% as compared to the December 2009 prices. The causes behind high cotton price are due to the floods in Pakistan and China. India projected a high production of textile (325 lakh bales for 2010 - 11). There has been increase in India's share of global textile trading to seven percent in five years. The rising prices are the major concern of the domestic producers of the country.

- **Man Made Fibres:** This includes manufacturing of clothes using fibre or filament synthetic yarns. It is produced in the large power loom factories. They account for the largest sector of the textile production in India. This sector has a share of 62% of the India's total production and provides employment to about 4.8 million people.
- **The Cotton Sector:** It is the second most developed sector in the Indian Textile industries. It provides employment to a huge number of people but its productions and employment is

seasonal depending upon the seasonal nature of the production.

- **The Handloom Sector:** It is well developed and is mainly dependent on the SHGs for their funds. Its market share is 13% of the total cloth produced in India.
- **The Woolen Sector:** India is the 7th largest producer of the wool in the world. India also produces 1.8% of the world's total wool.

II LITERATURE REVIEW

Design & Analysis of Cotton-Picking Machine in View of Cotton Fibre Strength by Nikhil Gedam; Prof. A.K. Mahalle.

This research work will give a new technology in the field of cotton boll picking mechanism and to develop machine which is low weight ergonomically which could be used to pick cotton bolls. In India entire cotton is handpick by labor, internationally available machine for cotton boll picking is costlier and its shows that due to spindle type cotton picking machine, percentage of short fibre content increases result in poor quality of cotton fibre strength. Suction type cotton boll picking machine will give new technology in the field of agriculture, which is helpful for Indian farmer, it is not costly and easy to handle. Farmer can easily use suction type cotton-picking machine. Cotton picking machine already exist in market. But due to mechanical cotton harvesting it loses the quality of fiber strength. In earlier days cotton picking is done by hand that was giving a good quality of cotton with good fiber strength but it requires more time. In general cotton harvesting required -5KPa breaking off force to lift a cotton locks from burr. To overcome to this problem, analyze the design of cotton-picking machine and made the modification to improve the quality of product. Spindle - type cotton picking machine, is one of the cotton-picking machines which remove the cotton from open bolls. The spindles, which rotate on their axes at a high speed, are attached to a drum that also turns, causing the spindles to enter the plant. The cotton fibre is wrapped around the moistened spindles and then taken off by a special device called the doffer, from which the cotton is delivered to a large basket carried above the machine. During wrapping of cotton fibre around the spindles bars, fibre was

stretched will result in increased short fibre content and trash and hence loses fibre quality and strength.

COTTON MECHANISATION IN INDIA AND ACROSS GLOBE: A REVIEW by Aniket S Deshmukh, Dr. Akash Mohanty.

Cotton Harvesters has proven to be a promising approach for cotton harvesting in India and developing countries. However, challenges still remain in its implementation in India though considerable progress has been made in recent years. Developed countries have 100% mechanized cotton picking. With increasing labor charges and its unavailability, mechanization has gained pace in Indian agriculture sector. This review paper provides an overview of cotton harvesters and its various types. It also covers the anatomy of cotton plant, production, and its importance in Indian economy. Indian cropping pattern are studied in detail and various mechanism discussed and their pros and cons are evaluated in this paper. Cotton commonly called 'The white gold' is a soft, fluffy staple fiber that grows in a boll, or protective capsule, around the seeds of cotton plants of the genus *Gossypium*. It is one of the most important commercial crops playing a key role in the economic, political and social affairs of the country. The plant is a shrub native to tropical and subtropical regions around the world, including the America, Africa, and India. The fiber is most often spun into yarn or thread and used to make a soft, breathable textile. Current estimates for world production are about 25 Million tones or 110 million bales annually, accounting for 2.5% of the world's arable land. China is the world's largest producer of cotton. The United States has been the largest exporter for many years. In the United States, cotton is usually measured in bales, which measure approximately 0.48 cubic meters (17 cubic feet) and weight 226.8 kilograms (500 pounds). India today is the third largest producer of cotton in the world. About one third of total crop is irrigated and rest is rain fed. The yield of crop is 307 kg/ha as compared to 783 kg/ha in USA, 659 kg/ha in China and 988 kg/ha in Egypt. The current yields tend to linger on lower averages, which has been a matter of concern and a national challenge. The low yields of cotton are attributed to inadequate inputs, untimely field operation, lack of irrigation (70 % area under rain

fed conditions) and inefficient crop production technologies.

A STUDY OF MECHANIZATION OF COTTON HARVESTING IN INDIA by Srinivasa Konduru, Department of Agricultural Business; Fumiko Yamazaki & Mechel Paggi Center for Agribusiness; Jordan College of Agricultural Sciences and Technology; California State University, Fresno, CA. Cotton is a very important commodity in Indian Agriculture. Recent technological advances and trade liberalization have made India a major player in international cotton markets. In the year 2010-11, India was the world's second largest producer and third largest exporter of cotton (FAOSTAT). The increasing role of the Indian cotton sector in international markets is a direct challenge to the US cotton exports, especially in markets like China which account for 40 percent of the total mill use of cotton in the world. Within this context, a better understanding of the Indian cotton sector and the impact of mechanization on cotton cultivation is needed to assess India's competitive position in international markets. The overall objective of this paper is to assess the competitiveness of Indian cotton producers and potential implications for India as a competitor in the world cotton market if it mechanizes some of the operations like harvesting. The results demonstrate that the net income of the cotton farmers will increase considerably with the mechanization of cotton harvesting. But, the adoption of mechanical cotton harvesting practice is possible only if efforts from many private and public agencies come together. In that scenario, the cotton production in India can increase considerably which can impact the international markets. The cotton plants that are going to be mechanically harvested also need to be sprayed with defoliant chemicals in order to make the harvesting process clean and efficient. The harvested cotton also needs to be pre-cleaned before sending it to the cotton gin as cotton pickers gather more debris than by manual picking. All the above changes in cultivation practices are going to increase the expenditure, but it is expected that the yields under this process will be up to 35 percent more than the conventional method of cotton cultivation.

Mechanical Picking of Cotton in India, by Dr. Brijendarmohanvitthal. In India, normally farmers go for two to five pickings of cotton till the final stage of crop harvesting. It is expected that 85 percent of the seed cotton (kapas) is picked during the initial three pickings and the subsequent pickings sometimes may not be economical even by manual labour. Cotton picking is tedious hard work and ten times costlier than irrigation and twice of weeding operation. The cost of picking accounts for 30 to 35 % of the total cost of cultivation. During the peak season, the availability of labour for cotton picking becomes even more scarce. Cotton is completely machine-picked in Australia, Israel and U.S.A. Over 90 % is machine picked in Greece, Mexico and Spain. Problems associated with the hand-picking of cotton are as follows: - Manual picking is not only tedious but also costlier than other agricultural operations. Manual picking of cotton requires around 465 labour-hours per hectare. Due to non-availability of labourers when required, cotton picking gets delayed causing yield loss which may be up to 15 per cent and also affecting the overall quality of lint. The change in weather conditions forces the farmers to harvest cotton quickly and no availability of labor and less available time for total pickings, makes it expensive and complex. Area under cotton in India is increasing during recent years. Farmers are finding difficulties to complete picking operation in time even after spending more money. Cotton yields have also increased with the near universal use of Bt cotton in India, since its approval for commercial cultivation since 2002. Consequently, there is more cotton to be picked. Children, being deft, used to be engaged. Farmers also have to compete with alternative sources of employment, like on construction sites which pay more, or MGNREGA, the rural jobs scheme, where the work is less demanding. The shortage of labour in some areas of India, which are fast industrializing, is also impacting the profitability of the cotton crop. R & D activities are also needed to find out ways and means to reduce expenses incurred on above activities and to increase productivity by increasing plant population per ha. This yield increase may compensate additional expenses to be incurred for mechanical picking. — Apart from hybrid seeds and Bt-technology, we also need to look at mechanization coupled with high

density planting, to further increase the productivity. Economists may have to find out the economic viability of using mechanical pickers for harvesting cotton over the existing method of hand-picking in India.

A Study of Mechanization of Cotton Harvesting in India and Its Implications SrinivasaKonduru, Fumiko Yamazaki and MechelPaggi. Department of Agricultural Business, California State University, Fresno 93740, California, USA. Cotton is one of the most important crops throughout the history of India and it also plays an important role in social and economic aspects of the Indian society in the present age. Recent technological advances and trade liberalization have made India a major player in international cotton markets. In the year 2011-2012, India was the world's second largest producer, consumer and exporter of cotton. The increasing role of the Indian cotton sector in international markets is a direct challenge to other major players like the US. Within this context, a better understanding of the Indian cotton sector and the impact of mechanization on cotton cultivation are needed. The overall objective of this paper is to assess the competitiveness of Indian cotton producers and potential implications for India as a competitor in the world cotton market if it mechanizes harvesting of cotton. The results demonstrate that the net income of the Indian cotton farmers will increase considerably with the mechanization of cotton harvesting. But the adoption of the practice of harvesting cotton by mechanical means is possible only if efforts from many private and public agencies come together. In that scenario, the cotton production in India can increase considerably which can impact the international markets.

Analysis of Design of Cotton-Picking Machine in view of Cotton Fiber Strength

The mechanical cotton picker is a machine that automates cotton harvesting in a way that reduces harvest time and maximizes efficiency. To develop a mechanical cotton picker with the intent on replacing manual labor. The first pickers were only capable of harvesting one row of cotton at a time, but were still able to replace up to forty hand laborers. The current

cotton picker is a self-propelled machine that removes cotton lint and seed (seed-cotton) user's rows of barbed spindles that rotate at high speed and remove the seed-cotton from the plant. The seed-cotton is then removed from the spindles by a counter-rotating doffer and is then blown up into the basket the plant at up to six rows at a time. The picker or spindle type machine was designed to pick the open cotton from the bolls using spindles, fingers, or prongs, without injuring the plant's foliage and unopened bolls. In this cotton picking by spindle type machine will result in short fiber content, micron air and fiber length will indirectly lose the fiber strength quality as compare to hand picking machine. Overcome to these problems make a cotton-picking machine by suction will made a pressure equal to the hand picking (100gm). Cotton is primarily grown for its fiber and its reputation and attraction are the natural feel and light weight of cotton fabrics. Heavy competition from synthetic fibers dictates that continued improvement is needed in cotton fiber properties.

Problem Identified

- The main problem identified through this traditional process was the process was time consuming and was of headache to farmers with scarcity of labors.
- The high and massive output machines mainly clear the farm along with the weed and the cotton.
- This adversely affects the quality of cotton and the strength of cotton fibers.

Aims and Objectives

- To reduce the proper time of collecting of the cotton.
- To know the efficient harvesting method of cotton.
- To reduce labour cost for cotton collection.

III DESIGN

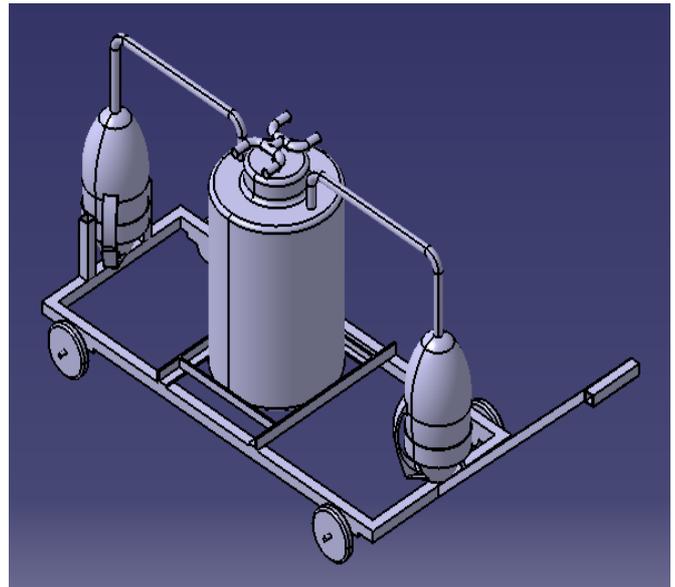


Figure1. Isometric view

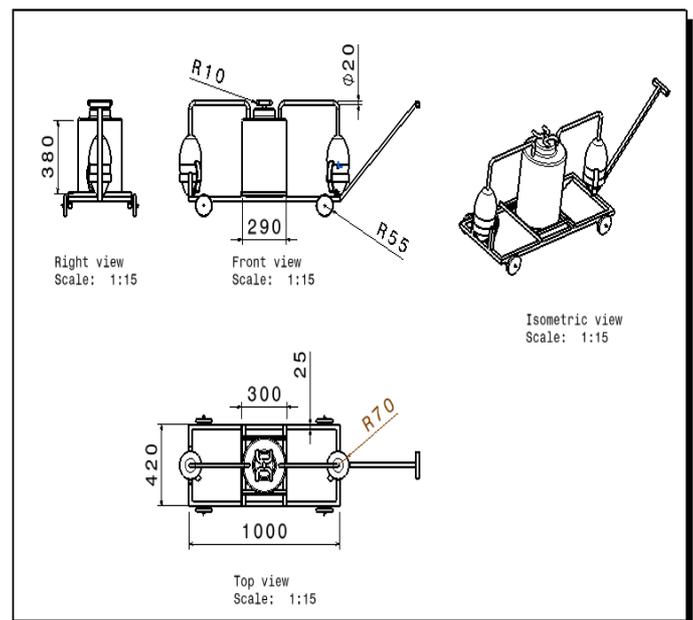


Figure 2. CAD Drawing

Advantages:-

- Producers will experience more efficiency on the field, while reducing the risks of finding labor.
- Cotton Picker provides weather protection so that producers don't have to sacrifice the quality of their fiber.
- Reduces physical stress unlike traditional picking.

- Reducing cost of labor involved in manual picking.

Disadvantages:

- Requires power supply.
- Maintenance is required.
- It is robust in construction.

IV CONCLUSION

The proposed idea consists of collection of cotton balls with the help of vacuum pump. The collection is done in the collecting tank. The cotton is collected more efficiently as compared to the manual collection. The time required in manual method is eliminated with the help of the proposed model.

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