OPEN ACCESS
Saudi Journal of Pathology and Microbiology
Abbreviated Key Title: Saudi J Pathol Microbiol
ISSN 2518-3362 (Print) |ISSN 2518-3370 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Review Article

A Review on Cotton with Novel Approaches for Biological Factors on Crop Cultivation, Agricultural Yield and Recent Applications in Different Agriculture Sectors and Industries

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DOI: 10.36348/sjpm.2021.v06i08.002 | **Received:** 27.06.2021 | **Accepted:** 01.08.2021 | **Published:** 12.08.2021

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Abstract

Cotton is the most important crop that growing all around the world due to its immense applications for the synthesis of agricultural based products, textile and branded products. Genome of cotton arises have been sequenced but some varieties are in process of completion of genome under the genome sequencing technology. The first sequence of the D-genome wild relative of cultivated cotton of *G. raimondii* has been sequenced that laid foundation the sequencing for other varieties. Cotton demand increased all around the world as compared to other fibers and polyester based fibers. Low or high temperature affected the crops rotation cycles. Soil and water has to be our number one limiting factor and our greatest challenge to improve the yield of all crops so that economy of agricultural farming can be improved. When cotton seeds are crushed by cotton then three distinct compounds are produced: oil, meal and hull that can be used in fertilizers to enrich agricultural soil. Diseases in cotton can be controlled under the splicing and modification through molecular techniques.

Keywords: Cotton, Agricultural Applications, genetic varieties, market demand, gene splicing.

INTRODUCTION

Cotton is the most important crop that growing all around the world due to its immense applications for the synthesis of agricultural based products, textile and branded products. Under natural conditions, the cotton bolls will increase the dispersal of the seeds that helpful to increase the food supply the organisms involved in food chain [1, 2]. It also leads to overall increase production of agricultural crops that could be used as staple food. Cotton mainly comprised of fiber balls that are softy in nature due to cellulose that is the component of the plant cell wall. Cellulase is absent in animals so, animals cannot digest the cellulose for direct utilization as food in their body. The fiber consists of long, fine, flattened and convoluted hairs called 'lint', which can be detached easily from the seed. Cotton as compared to the other crops has great value due to its diverse use for human beneficial [3-5].

Genome of cotton arises have been sequenced but some varieties are in process of completion of genome under the genome sequencing technology. This will helpful to understand the attack of different diseases in cotton. The quality of cotton depend the nature of fibers and their characteristics[6,7]. Different factors affecting the cotton cultivation under different growing conditions such as temperature, humidity and climate changes. Cotton are used in different industrial because of there immense applications in textile, medical and diagnostic fields to investigate the different diseases in plants. It is made up of cellulose that made up chains of glucose to cross linked with each other [8, 9].

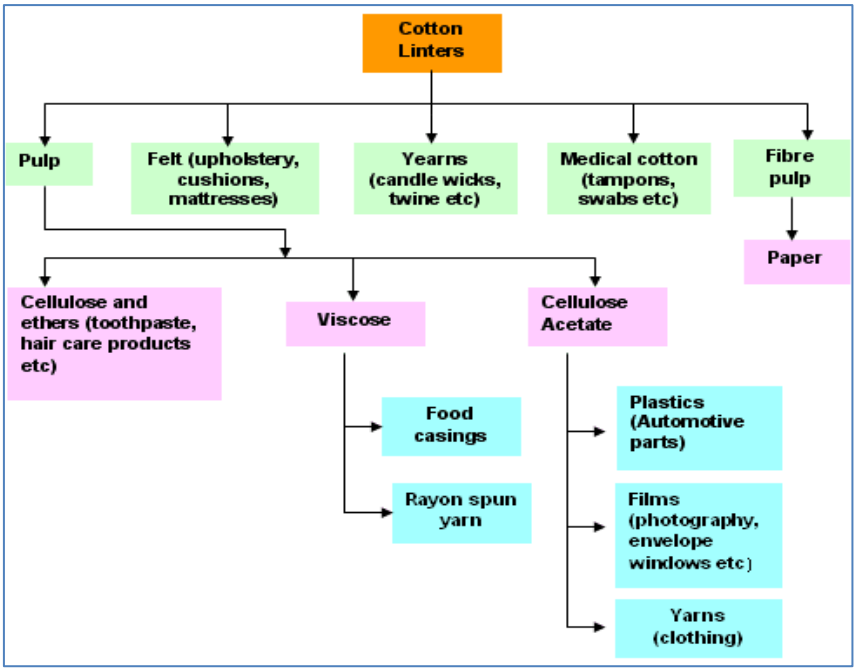

Fig-1: Shows the different applications of cotton and its characteristics

Novel Approach for Genome Sequence of Cotton varieties

There is different information available about the cotton genome due to its diverse varieties all around the world [10]. It deepens upon on genetic material that stored information about all transferring characteristics. The first sequence of the D-genome wild relative of cultivated cotton of G. raimondii has been sequenced that laid foundation the sequencing for other varieties. Genome of G. arboreum would be sequenced and passes through different molecular biology approaches for their complete sequencing. Its genome is roughly twice that of G. raimondii. It is due to difference in size is due to the amplification of retrotransposons. Different genes are also involved for casing the mutations in cotton as well [11].

Quality of Cotton

Quality of cotton depends the fibers and balls that lead to increase the good economy of agricultural market [12]. Cotton demand increased all around the world as compared to other fibers and polyester based fibers. It can be stored for long periods of time as it possesses the softness and excellent characteristics. Cotton is a soft, fluffy staple fiber that grows in a boll, or protective case, around the seeds of the cotton plants of the genus Gossypium in the mallow family Malvaceae[13,14].

Different factors affected the quality of cotton fibers, softness and thickness. It also depends upon quality of the cotton variety depends on the fineness of the fiber as well as its length [15, 16]. Smaller balls of cotton give poor quality products and hence less significant value as compared to the longer balls with excellent softness. The longer and finer the staple the better its quality, since it can be used to produce thinner and lighter textiles without knots or uneven surfaces. The size of cotton fibers depends upon the farming, cultivations and overall environmental factors for final yield. A single fiber is a little less in diameter than a human hair, and is measured in micronaires [17, 18].

Declination of Cotton formation

There are different factors affecting the cultivating and production of cotton. Environmental factors leads to decrease the yield of crops every year. When crops are over-irrigated, water, energy, labour, and fertiliser are wasted and crop production can decrease. There is need to design strategies as environment changes day by day and major of the crops being exposed to wasted due to pests attack under unpleasant conditions [19, 20].

Precipitation

Water is most important at solvent for all crops that dissolve all kind of essential minerals in plants [21]. Without the water that makes significant proration in total yield of crops affected due to more of the precipitation. Total precipitation in amount and distribution greatly affects the choice of a cultivated species in a place. Precipitation in plants due to leaching of vitamins and minerals that may causing the toxic effects to agricultural crops even in excess loss due to nutritional requirements of each crop[22-24].

Temperature

Temperature also affected the crop cultivation, growth and overall farming system. The range of temperature for maximum growth of most of the agricultural plants is between 15 and 40ºC. Low or high temperature affected the crops rotation cycles in two

ways. High temperature causes the damage to the plants by accumulation of toxic compounds. Low temperature leads to improper growth of the plants due to low level of heat transfer under the temperature maintenance system. Germination, growth and development of crops are highly influenced by temperature [25-27].

Water Resources

Resources of water are limited due to which low yield of agricultural crop affected. Excess of water causes metal leaching in plants that affected the human health. Soil and irrigation potential can dramatically impact on crop yield [28, 29]. Soil and water has to be our number one limiting factor and our greatest challenge to improve the yield of all crops so that economy of agricultural farming can be improved. Water resources also affect the cultivation of the crops in two ways. Low water concentrations in different parts of the plant leads to poor growth of aerial parts while on the other hand, High water concentrations in plant leads to stunted growth that yielding insipient products. Only the optimum concentrations of water useful for plants and agricultural farming system [30, 31].

Biological Factors	Influence in Yield	Crop Productivity	Reference
Precipitation	Without the water that makes significant proration in total yield of crops affected due to more of the precipitation.	More of the precipitation lead to decrease the crop Productivity also influence of species in cultivating place.	[21,22]
Temperature	Temperature also affected the crop cultivation, growth and overall farming system.	High temperature causes the damage to the plants by accumulation of toxic compounds.	[25-27]
Water Resources	Resources of water are limited due to which low yield of agricultural crop affected.	Excess of water causes metal leaching in plants.	[28,29]
Other Factors	Technical Errors also reduce the crop yield.	Pests also decreased the crop production.	[2,6]

Applications of Cotton as Crop in Agricultural Felds

There are different applications of cotton for industrial processes and making useful products. Industrial based products are main hurdles in past for synthesis of fibers based textiles. Cotton's strength and absorbency makes it an ideal fabric to make clothes and homewares, and industrial products like tarpaulins, tents, hotel sheets, army uniforms, and even astronauts' clothing choices when inside a space shuttle [32-34]. Due to excellent characteristics make it ideal source as compared to the other crops with low cost, high quality, compatibly to other fibers, easy industrial operations. Sometimes, fibers of cotton discarded as a part of environmental pollution that affected the marine species and other livestock organisms. There is need to design the strategies for controlling the pollution caused by fibers of cotton [35, 36].

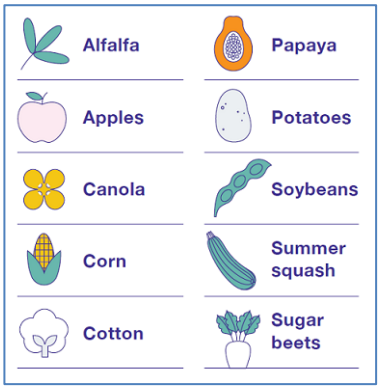

Fig-2: Shows the GMOs of different varieties in plants via genetic engineering approach

Other Applications in Agricultural Sectors

Cotton oil when passes through industrial processes, oil obtained that can be used for household, textile and other battery consumption purposes [37, 38]. It has two advantages as compared to the other oils as it does not decomposed easily into simpler sugar due to larger chains of cellulose molecules while on the other hand, it cannot digest in human body as lacking metabolism enzyme When cotton seeds are crushed by cotton then three distinct compounds are produced: oil, meal and hull that can be used in fertilizers to enrich agricultural soil. Cottonseed oils are in high demand nowadays as they are cheaper than vegetable oil and add flavor to the food. Medical and automobile industries rely on cotton in the production [39]. GMOs crops are most advanced in which genes can be inserted as foreign UN order to transfer the genetic material to the particular cells. Through the advances in genetic engineering, large number of plants has been genetically modified and showing resistant to variety of diseases such as cotton leaf curl virus [40].

CONCLUSION

As cotton is the most commonly used crop all around the world, its genetically modified varieties needed to more editing and modification order to show the strong resistance against the different plant based diseases. Its different varieties can be discovered through the genome editing that can be used for industrial processes for the production of large scale textiles materials as economy of the world based of cotton production and cultivations. Diseases in cotton can be controlled under the splicing and modification through molecular techniques.

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