Best Ginning Practices

M.K. Sharma, Bajaj Steel Industries Ltd;, Nagpur, India
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Abstract

The market share of cotton fibre is decreasing progressively as compared to man-made fibres mainly due to a surge in the production of the cheaper synthetic alternatives. Reducing the cost of cotton production and processing can be an effective way to compete with man-made fibres. Scientific ginning practices can help to minimise costs, preserve cotton-fibre parameters, and reduce both energy consumption and manpower in the processing of cotton. Ginning can be made more efficient by adopting up-to-date handling and cleaning systems and allied machineries and also by selecting the most appropriate processing technologies in ginning and pressing factories for different varieties and types of cottons. Development of improved universal standards for trash content in the baled cotton and harmonization of a universal bale size of common weight would optimise global machineries, thereby greatly reducing costs across the globe. This paper discusses the best ginning practices to enhance efficiency, preserve quality and increase cotton fibre output so that the value realization of the cotton can be improved to achieve competitiveness.

Introduction

Cotton is the purest form of cellulose, which is what makes it a great product. Its softness and breathability make it the world's most comfortable fibre to wear. However, in the present era, cotton is facing unrelenting competition from man-made fibres. Despite the fact that cotton consumption has increased from 18.5 to 25.5 million tons over the last 25 years, the market share of cotton in textile fibre consumption has decreased from 45% to 27% during the same period. In contrast, man-made fibre consumption has continued to expand at a higher rate than cotton consumption. According to the latest data available, man-made fibre consumption rose from 19 million tons in 1993 to 67 million tons in 2017. As a result, the market share of man-made fibres has increased by more than 23 percentage points, from 48.4% to 72%, during the same period. This is mainly due to the rapid surge in the production and use of cheaper chemical fibres compared to the ever-increasing costs of cotton production and processing. The best textile mills in the world lose 3% to 8% of a cotton bale due to short fibres and other defects, whereas every single fibre in a bale of man-made fibre is used with zero (or negligible) waste. Further, man-made fibres provide retailers and brands with higher profit margins.

The competitiveness of cotton can be enhanced if higher fibre yields can be obtained with lower costs for production and processing. While efforts are being made across the globe to reduce the cost of production and increase yields, ginning and pressing technologies need to be improved to reduce costs, enhance fibre recovery, and preserve quality. Finding new applications for cotton fibre also would strengthen its competitiveness.

The discussions presented in this paper are restricted to the best practices recommended for ginning factories. The main objectives of best practices are to:

- reduce the cost of processing per unit,
- enhance efficiency,
- preserve quality, and
- increase fibre output from the extant varieties of cotton in different parts of the world, so as to ensure sustainable and profitable growth for the cotton-processing sector.

Nature of Ginning Gactories that Influences Costs and Fibre Quality Parameters

The majority of the ginning factories worldwide can be categorized into three primary groups:

1) **Ginning factories in private/co-operative sector operating on a 'job-work' basis:** These ginners seek a higher volume of ginning per hour so they can charge more money for conversion of seed cotton into bales. When cotton is ginned on a job-work basis, the client owns the seed cotton and the ginner is seldom concerned about conserving the fibre quality parameters or preventing fibre waste.

2) **Ginning factories in the government sector:** The governments of many countries have adopted monopolistic cotton-purchase schemes and have set up ginning factories with government funds or term loans from international financial institutions. These

ginning factories have the advantage of purchasing seed-cotton from farmers in large quantities, generally at lower price that might be fixed by government officials. Government employees or political appointees often run these types of ginning factories. The employees, in most cases, aren't particularly concerned about fibre quality or ginning efficiency. Further, it is quite likely that ginning machinery is not really suited for the varieties grown in that region, which could be either due to lack of scientific knowledge or because they simply don't want to pay more to procure the proper machinery.

3) **Owner/trader ginners in the private sector:** In this case, the ginner purchases seed cotton from farmers or middlemen, gins it and sells the lint to traders or spinners. Normally this type of ginner tends to select proper ginning technologies that are suitable for the cotton fibre grown in the area. However, ginners in the private sector often are guided by the existing ginning technologies prevalent in the area mainly due to operational reasons or national standards/grades fixed for the cotton sale and trade practices in that region.

Factors that Significantly Influence Fibre Quality and Trash Levels

National standards for cotton trash

Most countries do not have well-defined standards for trash percentage and cotton. In these countries, cotton is traded based on outdated practices that were established before cleaning systems were upgraded. In some cases, the authorities involved in drafting national standards for cotton trash and other fibre parameters could be influenced by what is done in other countries, where the cotton parameters may be very different. For example, in India, the authorities drafting the standards for cotton parameters as per Bureau of Indian Standards may have been influenced by the standards prevailing in United States of America. The problem is that US cotton is machine picked, while in India it is handpicked. In the USA, machine-picked cotton might have 15% trash, while in India, the trash levels could be less than 2% due to handpicking. Thus, the trash percentage mentioned in the standards for various grades of cotton might be the same in both countries — for example, 3% final trash in lint for grade-1 cotton, while for grade 6 it could be 12%. Spinning mills follow these standards for arbitration and reference; therefore, if they allow up to 3% trash in grade-1 cotton — and the ginner has access to clean-cotton with 1% to 2% trash — the ginner might be inclined to allow up to 3% trash content to make more money. In many countries where spinning mills accept cotton with up to 8% trash as normal, ginners tend to maintain trash levels of 8% because they don't earn a premium for providing clean cotton.

An argument is being advanced that these standards are optional rather than mandatory. However, if spinning mills do not reference standards in their regular documentation, resolving disputes could become difficult. Further, these standards are also used as benchmark standards for importing cotton from overseas. Ideally, however, it would be appropriate to prepare different standards for machine-picked and handpicked cotton.

If the national or international standard for grade-1 cotton is fixed at 1% and the number of grades could be increased — such as grade-2 for 2% trash, grade-3 for 3% trash, and so on — the prices in the market would be fixed for such grades. At present, grades start at 3% trash. With such revised standards in operation, spinning mills could get cotton with a low trash cotton at a better price through brokers or centralized sales organizations. These standards could then be strictly enforced for all similar types of cotton. In the case of clean, handpicked cotton, if trash percentage were fixed as 1%, ginners would have to clean the cotton to that standard. It's not a common occurrence but at present, special prices are fixed for cotton with low trash only when the spinners and ginners deal directly with, and trust, each other. Interestingly, there is hardly any standard in the world that starts from, even or specifies, cotton trash at rates of 1% or less. In the absence of such high standards, there is no incentive to produce clean cotton even when it is very much possible.

Trading pattern of cotton bales

In many countries, cotton is sold through sales organizations or brokers who are not ready to make any extra effort in cleaning, due to the lack of any incentives for doing so. They do not get any additional revenue for higher-quality clean cotton, especially when a uniform price is offered across the board for cotton bales of a specific fibre quality in a region, irrespective of the trash levels. Such practices prompt ginners to maintain their trash percentage at higher levels, thus contributing to the deterioration of the fibre parameters. The broker or parent sales organization offers a common price for an entire lot based on a particular standard, such as grade-1 cotton up to 3% trash, but do not offer any premium if a ginner offers lower the percentage to 2% or less. As mentioned earlier, this provides no incentive for ginners to adopt practices to reduce the trash content below 3%. If other ginners have already established a price for cotton with 3% trash, no one would work harder to deliver cotton lint with less than 3% trash.

Sampling of cotton bales

In most countries, lint samples are only taken from random bales, not each one. This lowers the level of trust, thereby reducing prices. In the USA, samples are drawn from every bale and sent to testing centres established by the USDA, which greatly enhances accuracy and improves trust, resulting in better prices.

Unskilled manpower for operation of ginneries

The settings and maintenance of ginning machinery have a significant effect on efficiency, energy consumption and processing costs, in addition to affecting the quality of the fibre. Gin setting is an art that can be perfected through practice under the supervision of skilled trainers. The skill of the operators influences the quality of bales produced by a ginnery. However, the availability of trained gin workers is low. Many ginneries operate with unskilled manpower, resulting in deterioration of fibre quality parameters and increasing the likelihood of trash and contamination in bales. Hence, it is essential that facilities should be established for the training of ginning operators, and the resulting trained workers should be employed to maintain fibre quality.

The Impact on Costs and Fibre Parameters When the Wrong Ginning Technology is Used

The selection of a ginning technology should depend upon factors such as harvesting practices, trash content, moisture content, fibre length, fuzziness, strength, etc. — not primarily on capital costs, the funding institution or sponsoring country. Generally, ignorance of the appropriate ginning technologies for specific types of cotton varieties in the region of a ginning factory greatly affects the quality of bales. It is important to understand the four main ginning technologies and their influence on fibre quality parameters.

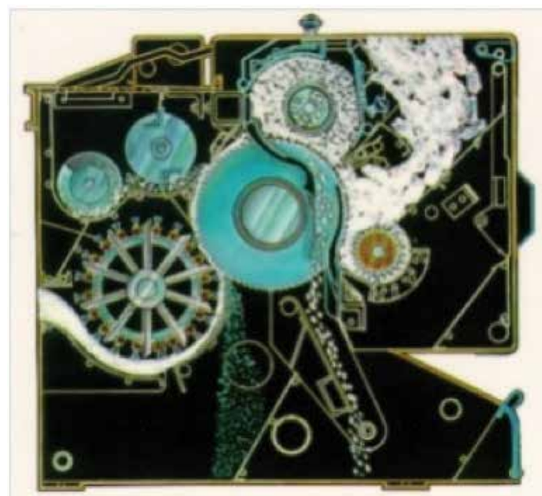
Figure 1. Saw gin machine

Saw ginning

Two types of saw ginning are used: (i) brush doffing and (ii) air blast. Further, some saw gins use 16-inch saws while others use 12-inch saws, which have different economics. Saw ginning is more suitable for upland cotton fibres (<29

Figure 2. Working principle of air blast type saw gin

Figure 3. Working principle of brush type saw gin



mm), which adhere strongly to the seed and require higher force to detach them. Saw ginning constitutes about 50% of the world cotton ginning industry. The productivity per unit of electrical consumption is higher in brush-type saw gins than in air-blast type saw gins. In the past, there was more space between the two saws than there is in today's gins, in which the saws are closer to obtain the highest capacities.

Several studies have shown that saw-ginned lint is shorter (0.5 mm to 1 mm), less uniform and contains more neps than roller-ginned lint. Saw-ginning technology is suitable for high-strength and high-maturity cotton varieties with length of up to 29 mm. If longer (>29 mm) fibres are ginned on saw gins, the fibre length is reduced and has less value. Residual lint on the seed is higher as well, making delinting necessary and adding to costs.

Double-roller ginning

This ginning technology is suitable for clean cotton — with length >28 mm, medium strength and micronaire in the range of 2.2 to 4.2 — and preserves fibre parameters near to their maximum. The method can be used either for fuzzy long-staple varieties or Sea Island black/naked seeded varieties. Seeds obtained from double-roller gins have lower fuzz on the seed, which can be directly crushed for oil milling without the need for delinting. Studies show that the oil-to-seed ratio is high. Further, the fibre obtained has fewer neps. Double-roller ginning technology is extensively used in India and East Africa and has about a 35% share in the global ginning sector.

Figure 4. Double roller gin with auto feeder

Figure 5. Working principle of double roller gin

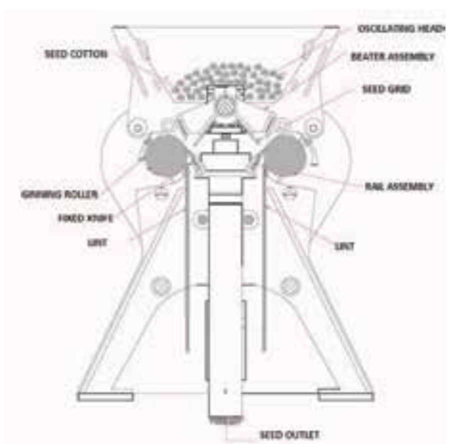


Figure 6. View of a double roller gin plant

Rotobar rotary-knife roller ginning

This technology is suitable for Sea Island or long-staple cotton in which the fibre does not strictly adhere to the seed and the lint can be pulled off, leaving the seed naked. The production rate of lint is much higher (400 kg to 800 kg per hour for extra-long staple cotton) than other roller-ginning machines, which have a production rate of about 50 kg to 150 kg of lint per hour. However, if rotobar ginning is used for fuzzy seed cotton, the production rate is almost cut in half. The production rate per unit of power consumption for fuzzy seed cotton is lower for rotary-knife roller gins, which use a 15 HP electrical motor, than for double-roller and single-roller gins, which utilise a 5 HP electrical motor. Further, seed fragments get mixed with ginned seeds and raw seed cotton, which makes the technology less preferred for fuzzy seed cotton.

Figure 7. Rotobar gin

Figure 8. Working principle of rotobar gin

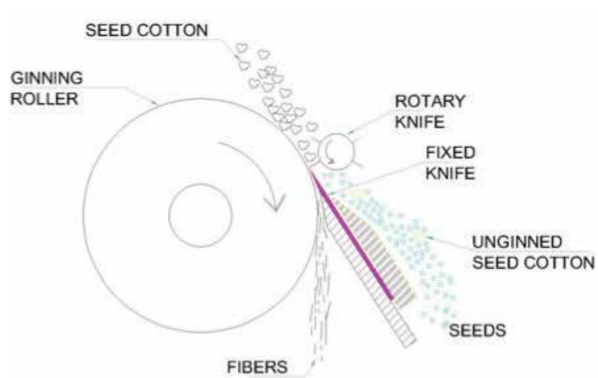


Figure 9. View of a rotobar ginning plant

Figure 10. Working principle of single roller gin

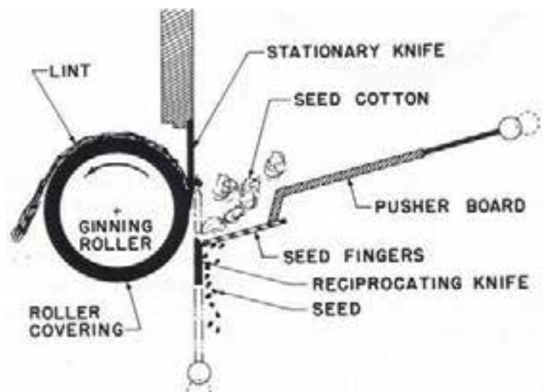


Figure 11. A single roller gin

Single roller McCarthy ginning

Single-roller ginning is one of the oldest technologies wherein rollers separate fibres from the seed by pulling them gently. This technology has long been the preferred method for ginning extra-fine, extra-long-staple fibres such as Sea Island, Egyptian and Pima cottons (Bennett 1956). While it is possible to gin all types of cotton on single-

Figure 12. View of a single roller ginning plant

roller gins, the technology is better suited for long and extra-long cotton varieties because it retains maximum natural fibre parameters. Single-roller gins can handle higher trash levels and also gin both fuzzy seed or sleek/black seed varieties. However, one major disadvantage of the single-roller gin is its lower ginning capacity — about 25 kg to 40 kg of lint per hour — despite the use of a 5 HP electrical motor, the same kind used in double-roller gins. Lint production (as determined by unit of electricity consumption per square meter of space) is low and operating and maintenance costs are high compared to other technologies.

Major Cost Factors in the Conventional Ginning Factories

Capital cost for ginning and pressing factories

Capital cost differences are mainly due to the different needs and layouts of various ginning factories.

Seed-cotton unloading and storage section

Unloading of seed cotton can be done using installations such as telescope, tractor attachments and automated

Figure 13. Unloading of seed-cotton by tractor attachment

Figure 14. Unloading of seed-cotton by telescope

Figure 15. Vertical flow dryer

Figure 16. Open spreading of cotton in storage area

unloading by the hydraulic movable base of cotton-carrying vehicles. The need for such installations depends largely on the availability of manpower and the comparative cost-effectiveness of the unloading methods.

Seed-cotton drying section

Seed cotton is dried either by spreading the lots in open areas under sunlight or by blowing hot air over it. Cotton

Figure 17. Desired cleaning setup for handpicked seed cotton

Figure 18. Cleaning & conveying setup for machine picked seed-cotton

drying in ginneries is largely ignored even when moisture levels being higher than recommended. This reduces gin productivity and the quality of fibres, since cleaning and ginning machines operate optimally at 6% to 8% moisture content.

Seed-cotton conveying and cleaning section

Handpicked cotton has low trash levels and is generally clean. Such cotton rarely requires conveying and cleaning. Machine-picked cotton, on the other hand, contains trash and needs to be conveyed and cleaned before it is ginned. The selection of seed-cotton conveying and cleaning equipment should be determined by the harvesting method. In many countries (especially in West Africa, where cotton is handpicked and has low trash levels), full sets of cleaning and conveying machines — which are otherwise used for mechanically picked cotton — have been installed improperly. These systems not only waste capital and increase maintenance costs, but also damage fibres to some extent.

Figure 19. Seed-cotton feed control

Figure 20. Seed-cotton feeding through central distribution conveyor

Uniform seed-cotton feeding systems

Manual feeding of seed cotton in ginneries raises manpower requirements and processing costs, in addition to leaving more trash in the fibre than automated feeders. Additionally, manual feeding of seed cotton onto belt conveyors and suction systems results in heterogeneous feeding to ginning machines, reducing gin productivity by about 20% and increasing processing costs. A cotton-dispenser-cum-cotton-feed-control system has recently been introduced in ginneries across the world to provide uniform feeding of cotton. This feeding system reduces manpower requirements and reduces power consumption by about 25%. It also filters out foreign matter from seed-cotton lots. The cotton-dispenser-cum-cotton-feed control system could be employed in ginneries to improve cotton quality and to reduce power requirements, manpower and capital investment.

Figure 21. Seed-cotton feeding through trolley system

Figure 22. Seed-cotton dispenser with stone remover

Seed-cotton cleaning system

Seed-cotton cleaning is a very important aspect in maintaining the quality of cotton processed in gins. There are a number of machines available for cleaning seed cotton, including cylinder-type cleaners, stick machines, impact cleaners, and extractor cleaners, among others. The selection of cleaners for a gin is determined by the amount of trash present in seed cotton. Normally, handpicked cotton has about 1% to 3% trash content, which can be easily cleaned using a line of cylinder-type cleaners with 4 to 6 spiked cylinders.

Cleaning of semi-closed bolls

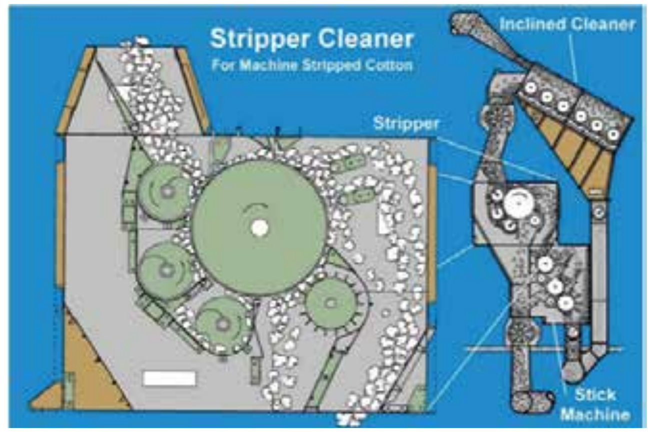
Some cotton varieties in India, such as V797, CJ73, Wagad, Kalagin, produce bolls that do not open fully so the cotton cannot be easily picked. Similar cottons are also produced in Pakistan and Turkey. Bolls along with burrs are separated from plants and routed to special cleaning machines, which break the pods and sift the material to separate relatively clean fibres.

Figure 23. Pre-cleaner for handpicked cotton

Figure 24. Impact cleaner for leaf trash

Figure 25. Stick machine for cleaning machine picked seed-cotton

Figure 26. Stripper cleaner for cleaning machine picked seed-cotton



Figures 27. Pod & leafy trash cleaning machines for semi-open boll seed-cotton

Figure 28. Rotobar gin

Figure 29. Brush type saw gins

Seed-cotton ginning machinery section

Different types of ginning machines are suitable for different types of fibres. Therefore, proper selection of ginning machines is extremely important to ensure good-quality fibres and to minimise processing costs. Choosing the wrong machines can result in negative consequences. For example, if a single-roller or rotobar gin is chosen for fuzzy seed, it may consume more electrical power and reduce efficiency, causing a substantial spike in costs. Similarly, if a saw-ginning machine is used for long- and extra-long-staple cotton, it may cause damage to fibres and reduce yields. If roller ginning is selected for seed cotton with extra-strong fibre and a length below 28 mm, it will result in higher processing costs.

Conveying from the gin to the lint-cleaning section

There are several different methods for conveying lint from the gin to cleaners, such as the continuous individual gin lint suction system, the intermittent lint suction system, belt conveyors, etc. Proper selection of conveying systems can preserve fibre quality, reduce power consumption and minimise costs.

Figure 30. Air-blast type saw gin

Figure 31. Individual gin lint suction system

Figure 32. intermittent lint suction system (ILSS)

Lint-cleaning section

Different methods of lint cleaning are available across the world. Some of the common lint-cleaning methods include spiked cylinder, saw type, and air jet. The degree of cleaning differs depending upon the fibre, trash and moisture content. Proper selection of lint-cleaning equipment can save significant wastage of energy, reduce fibre damage and optimize processing costs.

Figure 33. Lint conveying from each gin through belt

Figure 34. Spiked cylinder lint cleaner for handpicked cotton

Figure 35. Saw type lint cleaner for machine picked cotton

Figure 36. Centrifugal (Air-jet type) lint cleaner

Figure 37. Hot air humidification system used for restoration of lint moisture

Cotton lint moisturizing and conditioning section

Moisture content of 8% to 9% in lint is ideal for the formation of bales in proper shape and size, with minimal energy consumption. Pressing cotton that has less than 8% moisture content increases energy consumption and reduces the density of pressed bales that increases transportation cost. Nevertheless, there are instances in ginneries where cold atomised water is sprinkled over lint to increase its moisture content. However, cotton's natural wax layer prevents water from penetrating into fibres. This results in an accumulation of water on the surface of cotton fibres, leading to formation of fibre lumps in bales, yellowing and degradation of fibre, and other problems. As a result, spraying cold water totally defeats the purpose of enhancing moisture content and actually results in losses. The best practice for increasing moisture in cotton is by induction of hot, humid air over lint, reducing surface tension and enabling moisture to penetrate the cotton fibres as air passes through the lint.

The hot-air humidification system improves cotton's moisture content, strength and grade, enabling the ginner to get a higher price for higher-quality lint. Thus, hot-air humidification systems should be installed in ginneries to reduce energy consumption during bale pressing, decrease transportation costs, improve bale quality, and get better prices.

Cotton lint baling section

Modern up-packing/down-packing oil hydraulic, door-less, double-box and single-stage presses are used in ginneries for bale formation. Modern baling presses are commonly employed with online bale handling, weighing and bagging systems that reduce manpower requirements in ginneries. When there are more cotton bale presses than the gin can use, there is a waste of power and higher capital costs. Therefore, it is important that the baling press capacity matches that of the ginning capacity. Different countries have different sizes and different weights for cotton bales, whereas the uniform standard bales (as per ISO 8115) could be used worldwide to reduce packing costs as well as enable bale-opening machinery to be standardised across the world. A bales size of 42 inches by 21 inches complies with the principle that length and width should be in proportion to 2:1 for best space utilization. Proper compression — about 500 kg/m^3 and uniform weight of 227 kg (500 pound) — will save on shipping costs. The production of uniform bale-presses worldwide would reduce the capital cost of setting up of bale-presses as well.

Manual loading of cotton bales and non-standard sizes of bales

The weight of cotton bales in different countries appears to have been standardized considering the strength of manpower to load them on vehicles, since many persons are required for loading and unloading. For example, the weight of a bale is 80 kg in China, which can be lifted by two persons; the weight is 165 kg to 175 kg in India, which is lifted by four persons whereas the weight of a bale in Africa ranges from 150 kg to 300 kg, also to be lifted only by 4 persons. The alternative mechanical methods such as forklifts and tractor attachments have now been introduced and can greatly reduce manpower. Further, if a common standard size and weight of cotton bale is adopted worldwide, it would be easy to develop cost-effective handling devices.

Figure 38. Down packing baling press

Figure 39. Up packing baling press

Figure 40. Manual packing bale press

Figure 41. Bales press with bale bagging arrangement

Figure 42. Bale loading by forklift

Conveying of cotton seed from gins to the storage and packing section

There are different kinds of seed-conveying and packing methods, including:

- bucket elevators,
- screw conveyors,
- root blowers,
- seed blowers,
- manual bagging at multiple points,
- manual weight adjustment, and
- online weighing and bagging.

A careful selection of cost-effective methods will simplify the operation and provide substantial savings on manpower costs.

Fire-detection and diversion systems

Ginneries are prone to catch fire, which results in significant financial losses. The risk of fire hazard is further aggravated due to increased automation and the use of large volumes of air for material-handling systems. Recently, sensor-based fire-detection and diversion systems have been introduced to mitigate the risk of fires. This system also significantly reduces the manpower needed to douse a fire and to clean the premises after an accident.

Figure 43. Cotton seed conveying

Figure 44. Cotton seed conveying root blower

Figure 45. Cotton manual seed bagging

Figure 46. Cotton seed bagger

Electricity consumption per unit of production

Higher electricity consumption per unit of production is also one of the major contributors in increasing the cost of cotton processing. The recent adoption of new methods has resulted in substantial power savings. Fox example, until 2012, a double-roller gin plant for handpicked cotton that operates at about 15 bales per hour *BPH) used to have a connected load of about 600 HP, but it has now

Figure 47. Fire detection and diversion system for ginneries

Figure 48. Seed-cotton suction

been reduced to 400 HP for the same capacity. Some of the recent developments that have taken place in the recent past include:

Seed-cotton suction systems have been replaced with seed-cotton dispenser systems with tractor attachments

This has resulted in a reduction of electrical motor power, from more than 50 HP to about 20 HP, for the entire system in 15 BPH per plant.

Individual double-roller gin feeding distribution conveyors have been replaced with central distribution conveyor systems

This has resulted in a substantial savings of about 20 HP in installed electrical power required.

Figure 49. Seed cotton dispenser cum stone removing system

Figure 50. Seed cotton feeding by tractor attachment

Figure 51. Individual lane distribution screw conveyor

Lint-suction systems have been replaced by intermittent lint-suction systems

This has reduced the installed electrical power requirements from 30 HP to 10 HP for a 15 BPH plant.

Belt conveyors have replaced conveying of seed cotton by suction

This has resulted in reduction of about 50 HP electric power for a normal 15 BPH factory.

Figure 52. Central screw conveyor & seed-cotton feeding system

Figure 53. Conventional cotton lint suction system

Figure 54. Intermittent lint suction system

Conveying of lint by suction has been replaced with belt conveyors system

The electricity costs for conveying lint from one point to the other by suction are high because the systems require high air volume. For example, a plant with a 15 BPH capacity requires about 100 HP for two suction systems. With belts, the same task can be accomplished using only 6 HP.

Figure 55. Seed cotton suction system

Companies that manufacture ginning machinery are conducting further research to minimise power consumption in the ginneries.

Manpower cost per unit of production

Manpower is a significant contributor to the final cost of cotton. Operating a conventional ginning factory with a capacity of 15 BPH might require 100 or more people. New developments from ginning equipment manufacturers have resulted in substantial reduction of manpower requirements. These significant changes include:

Tractor-mounted buckets feeding through dispenser units have replaced seed-cotton suction systems

Previously, it took about 10 people to handle each suction system feeding the average 15 BPH ginning factory. Now, due to the introduction of a dispenser system, only 2 people are needed.

Online bagging and weighing of cotton bales is replacing manual weighing

Previously, four people were required to handle manual bagging and weighing of each bale; now only one person is needed.

Online bagging and weighing of ‘cotton seeds’ is replacing manual bagging and weighing

Earlier, a large number of people were required to fill bags and weigh ‘cotton seeds’. However, online bagging is now available, substantially reducing manpower requirements.

Waste of lint and damage to fibre quality

Cotton conveying, cleaning, ginning and pressing machinery should be carefully selected based on all of the parameters to obtain the best results. An incorrect selection affects most of the spinning parameters as fibre rupture in blow room increases, blow room waste

Figure 56. Lint conveying by belt

increases, count strength product (CSP) goes down, and the average speed of ring frame has to be kept low. A lot of lint is wasted when there is excessive conveying and cleaning, and when saw-ginning machinery is used inappropriately for 'hand-picked', clean-cotton. In such cases, the appropriate roller ginning technology should be used. Otherwise, 'hand-picked' clean cotton can suffer damage to fibre quality parameters, including excessive nep formation, length cut and brittleness due to higher speed.

Over capacity installation for ginning & pressing plant

Most of the ginners try to install more bale-pressing equipment than they really need. For example, if ginners currently need a capacity of 10 PBH, they tend to install equipment that can handle 20 BPH, leaving space in the ginning area empty with the intent of future expansion. In many cases, this results in higher capital costs and higher recurring charges due to idle power utilization. It has also been observed that, in many cases, future expansion never happens, and ginning and pressing factories continue to pay extra electricity charges, and additional interest charges on capital spent to create that excess capacity. The planning of ginning and pressing factories should be done based on current needs, without making superfluous arrangements for future expansion. A fresh plant should be considered when necessary.

Ginning different varieties on the same equipment, even when it's not suitable

In areas where short-staple and long-staple varieties are grown, and cotton is machine picked as well as handpicked, careful consideration should be given to the selection of proper ginning technologies for different types of cotton. It might actually be more profitable to build a separate plant for each type of cotton, considering that the price of cotton lost over a period of time may be much higher than the cost of setting up separate ginning facilities.

Underutilisation of by-products and mill waste

The majority of ginners do not properly use the gin's by-products, including cottonseed, linters and comber-noil. They can generate additional revenue and make a gin more competitive.

Recommendations

Best practices to be considered by ginning and pressing factories

- **Purchase of correct machinery**: Machinery for cotton loading and unloading, conveying, drying, cleaning, ginning, humidification, baling and handling should be selected based on a variety of parameters such as practical capacity requirements, level of drying and cleaning required, the suitability of ginning technology for the fibre parameters, the lowest electrical power consumption per unit of production, the lowest capital costs, and the lowest manpower requirements.
- **Future expansion provision**: Expansion in a plant should be avoided until the need is clear and immediate.
- **Adoption of new technologies**: Gin owners should use the latest methods, equipment for handling, conveying, drying, and cleaning, and other fibre-friendly technologies.
- **Skilled manpower**: Skilled manpower for operation of the ginning and pressing machinery should be appointed or trained if necessary.
- **Upgrading machinery**: Existing ginneries should replace their old equipment that is less efficient for cotton handling, drying, conveying, cleaning, ginning, humidification, etc. Advanced, cost-effective, fibre-friendly machinery is available and must be deployed.
- **Increased interaction between ginners, spinning mills and buyers:** Ginners and cotton associations throughout the world should regularly interact with spinning mills and other buyers to understand their requirements and consider their feedback. This would encourage spinning mills to offer better prices for fibre that meets their exact requirements, which in turn will enhance their efficiency.
- **Optimised utilization of by-products:** Ginners should also concentrate on proper utilisation of by-

products such as cottonseed, comber noil and linters, which can add significant revenue.

Best practices by government authorities and market

- **Preparation of trash standards**: Trash standards of baled cotton grades should be established so that trash for grade-1 cotton should be specified as maximum permissible limit of 1% — and consecutive grades for 2% and 3% and so on, up to a maximum permissible trash percentage — so that premium options are available for clean cotton. For example, at present, the Indian Standard for bales BIS 12171 specifies permissible trash as 3% for extra-long staple (32.5 mm and above), 5% for long and medium staple, 6% for medium and short staple, and 10% for closed boll cottons.
- **Standardisation of cotton bale sizes and weight**: There should be an international consensus between all the cotton-producing countries to adopt uniform bale sizes and bale weights over a period of 10 years. A suitable size and weight should be selected, such as a bale size of 42 inches by 21 inches and bale weight 227 kg (500 lb). Governments should establish regulations to ensure adoption of the uniform bale size and weight. Cotton associations worldwide should promote this, so that uniformity is achieved over a period of time, which will benefit the entire cotton value chain.
- **Sampling of each bale:** Governments should establish testing centres in each reasonable catchment area for cotton ginning and make it mandatory that samples are drawn from each bale and tested at centralised laboratory, as is being done in the United States. Cotton bales should be traded based on test reports from these independent testing centres. This should be done as soon as possible.

Conclusion

This article emphasizes that the competitiveness of cotton can be enhanced by implementing appropriate and suitable ginning and bale-pressing technologies. The recommendations and best practices listed in this article could be adopted to:

- reduce capital costs, power usage and manpower expenses,
- preserve fibre parameters,
- utilise by-products,
- harmonise bale weights,
- develop international standards for trash percentage, and
- test individual bale samples to ensure sustainability and profitability of cotton processing.

These practices, in conjunction with new uses for cotton, will help to improve its competitiveness dramatically.

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