COTTON MECHANIZATION IN INDIA

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ABSTRACT

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. India is the largest producer of cotton, second largest exporter and second largest consumer of cotton. Demand for cotton is expected to remain robust in India and in future there is a clear need to improve the productivity to meet this increasing demand. Indian cotton production is mired by low productivity driven by rainfed cultivation, small farm size, increasing pest & disease and labour intensive method of cultivation. Labour cost in India is rapidly increasing and therefore Mechanization in Cotton cultivation will play a key role in keeping the cost under control. Additionally, there will be productivity increase driven by high density planting. However to bring high density planting coupled with mechanization requires development of Sympodial cotton hybrids with complete transformation in agronomy practices. John Deere, Bayer and Bajaj steel are working in collaborative project to bring this change in India. Under collaborative project aim of the project partners is to demonstrate the mechanized method of cotton cultivation and its benefits to the farmer. The ultimate aim is to increase the productivity and overcome the challenge of labour cost increase through mechanization. The objective of this paper is to share the learnings from collaborative cotton mechanization project.

COTTON PRODUCTION IN INDIA

Cotton is an important cash crop for Indian farmers. It is third in total acreage planted among all crops in India after rice and wheat. In last 5 years Cotton acres have increase from 11.1 mio ha to 11.6 mio ha and productivity is almost stagnant. The productivity of India is ~500 kg lint/ha which is much below global average of ~750 kg lint/ha. The low yields of cotton in India are attributed to inadequate inputs usage, rainfed cultivation, untimely operations on field and inefficient crop production technologies. In many parts of India, the farmers still use human labour for many of the operations like planting, weeding and picking and use inefficient farm implements/machinery for these operations. The adoption of machinery in farm operations is

lagging because of various factors like unavailability of credit to purchase expensive machinery, small size holdings of farmers and lack of technical knowledge and skills to operate complex farm machinery. Looking at the productivity data it is clear that a lot has to be done to improve productivity in India. Apart from Bt-technology, hybrid seeds we now need to look at mechanization coupled with high density planting to further increase the productivity.

LABOUR ECONOMICS IN COTTON CULTIVATION

The entire cotton production in India is hand-picked by man labour and picks 5 kg seed Cotton per hour and costing almost 10 times than irrigation and two times the weeding costs. It is reported that the labour availability has dropped from 70.3% of the population in 1961 to 48.9% in 2010 and cost of picking cotton from the farm has increased to Rs 10-12 a kg now from Rs 4 a kg in 2007. Therefore mechanization is clearly the need of the hour and will play important role to sustain the cotton production in future in India. Currently India is lagging behind many other large producers of cotton in mechanization of harvesting. In the USA, machines harvest the entire cotton crop, whereas in some regions of China, it is estimated that by 2020, about 20-30% of cotton will be mechanically picked. It is expected that India will soon have to mechanize its cotton harvesting operations as it is facing labour shortages and rising farm wages.

COLLABORATIVE COTTON MECHANIZATION PROJECT

The collaborative cotton mechanization is joint efforts of the John Deere India Pvt. Ltd, Bayer Cropscience Limited and Bajaj Steel Industries Limited to develop cotton mechanization in India. The project started in 2009 with the import of 2 row cotton picker from Turkey. But this 2 row cotton picker was found to unsuitable and then John Deere started working on single row picker machine and simultaneously started to collaborate with Bayer and Bajaj steel to build the complete ecosystem for cotton mechanization in India. Currently cotton mechanization project is being operated in 3 cotton growing states such as Punjab, Maharashtra and Telangana. In Punjab project is being run under public private partnership and is also supported by Department of Agriculture, Punjab. Department of Agriculture Punjab provide the seed subsidies to the farmers who adopt cotton mechanization. It is an integrated approach and the objective of this project is to showcase cotton mechanization technologies. In the project all the players demonstrate their respective technologies towards cotton mechanization. John Deere plays the role of machine provider. Bayer has responsibilities of providing the machine suitable hybrids seeds, agrochemicals & agronomy and Bajaj steel's role is to provide the pre-cleaner technology for seed cotton. John Deere a leading farm mechanization company has successfully developed a single row patented tractor drawn picking machine (Model name CP 20) which is now available for Indian farmer. Machine picking requires use of harvest aids like growth regulator, defoliants and boll openers to enable machine to pick cotton easily. Bayer is a global leader in providing

harvest aid products and is currently testing few of these products for use in India and very soon these products will be available to Indian farmers to facilitate easy picking through machines.

A farmer who is adopting machine picking needs to overcome the issue of high trash % (compared to hand picking) which is common in all countries that have adopted machine picking. Therefore, after machine picking the seed cotton has to pass through high impact pre-cleaners before ginning. High impact pre-cleaner is already developed in India by Bajaj steel Industries. The need of the hour is that ginning mills needs to install these pre-cleaners so that the machine picked cotton can be ginned and baled with high quality cotton without any trash and contaminants.

Since, all the modern technologies required for the high density planting system are available in India (planting & picking by machines) now the need is to demonstrate the same to Indian cotton farmer. Ecosystem is now ready and field demonstration have been started with support from central and state department of agriculture from 2013 onwards in states of Punjab, Telangana and Maharashtra. The first year results are encouraging and the plan is to do development work for next 2-3 years before large scale commercialization. Besides, addressing the issue of availability and increasing cost of labour for manual picking machine picking of cotton can significantly help in reducing contamination due to possibility of direct transfer of machine picked seed cotton to the ginner without the involvement of human labour. We expect all the concerned stake holders come together to encourage the large scale adoption of mechanization and enable India to emerge as leading producer of best quality cotton in the world.

BENEFITS OF COTTON MECHANIZATION AND FARMER ECONOMICS

We have observed under high density planting system supported by cotton mechanization provides 25-40% yield increase compared to farmer practice. Yield increase is attributed to higher plant density per acre compared to conventional practice. This yield increase provides a strong basis for adoption of cotton mechanization. Farmers who adopt mechanised method of cultivation spend additional costs of Rs. 75 Euro per acre towards increased seed rate and use of agrochemicals. There is no incremental cost of picking via machine because of as of today the cost of picking by machine is equal to average cost of picking by labour. In future, the labour cost is expected to increase at a fast pace compared to cost of picking by machine and more and more farmers will see this as a benefit and shift towards mechanical picking. This additional cost can be easily covered with incremental revenue of Rs. 137 Euro per acre on account of 25-40% yield increase. Therefore overall farmer tends to get benefited if he decides to adopt mechanical cotton cultivation.

KEY DRIVERS OF COTTON MECHANIZATION & ADOPTION TREND

There are 3 major drivers of cotton mechanization in the world cost of labour, agronomy and Government policy. These 3 factors played a role in different cotton growing countries around the world. In USA it took 30 years to achieve 100% mechanization, Brazil took 45 years to achieve 100% mechanization, Turkey reached 75% of mechanization in 15 years and China took 20 years to reach 15% mechanization. India has started its journey with mechanization with collaborative cotton mechanization project from 2012 onwards but still in development phase. In future we expect many more companies will come forwards to promote the cotton mechanization and Indian farmers will eventually adopt mechanization in big way. Apart from increase in labour rate, support from government of India will play a key role for cotton mechanization. Most of the seed companies in India has realized that the mechanical cotton picking is the future requirement of the Indian farmers and have started to breed hybrids that are suitable for mechanical cotton picking. Therefore we assume that by 2020 these hybrids will get launched resulting in better picking efficiencies by machines. This will lead to large scale adoption by farmers. In next 10 years we can expect 2-3% of the planted area to get mechanized in India. First large scale adoption will start from the north cotton regions of the country followed by central and south India.

IMPACT OF COTTON MECHANIZATION ON FIBRE QUALITY

Mechanical cotton picking involved higher trash content compared to manual picking. The higher trash content is then removed using the Bajaj steel pre-cleaners. Since the cotton pass through the machines the fibre quality get marginally impacted compared to hand picked cotton. We see that cotton length is more or less remaining same but we observed increase of short fibre content and neps. With the improvement in machines and technology India will come at part with the standards in USA and Brazil in terms of fibre quality.

KEY CONCLUSIONS & SUMMARY

Labor is fast becoming a bottleneck and important cost factor, therefore manual picking will soon become unviable in Indian cotton production. Collaborative efforts by John Deere, Bayer & Bajaj steel has successfully demonstrated machine picking is viable in India. Project farmers have experience 30 to 40% yield increase. Mechanization adoption rate will be driven by development of machine suitable hybrids and continuous support from the government

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