Fabrication of innovative charkha for Linen spinning and its impact

Er. Pileshwar Dewangan, Dr. Umesh Kumar Dhruw, Dr. Tirath Das Sahu
Technical Executives of Project "Linen From Linseed Stalks" under ICAR NAHEP-W2W at RSV College of Agriculture and Research Station, Bemetara, IGKV Raipur (CG)

ABSTRACT: Linseed is an important oilseed crops grown in rabi season. Linseed is produced 15 to 20 quintals of stem waste of linseed is produced per hectare which can yield 15 to 20 % good quality fiber. These wastes can be used for extraction of good quality fiber (Linen) for making high valued clothes, canvas, suiting's, shirting's and various indispensable products for defense purposes. In this way environment can be made eco-friendly at the same time enhancing the rural economy through small scale industries. Taking these in to account the present proposal is prepared with the objectives to refine developed technology of linen products from linseed stalks and to scale up the technology to promote cloth making from linseed fiber among weavers. Linen yarn is spun from the long fibers found just behind the bark in the multi-layer stem of the Linseed plant (Linum usitatissimum). In order to retrieve the fibers from the plant, the woody stem and the inner pith (called pectin), which holds the fibers together in a clump, must be rotted away. The cellulose fiber from the stem is spinnable and is used in the production of linen thread, cordage, and twine. From linen thread or yarn, fine toweling and dress fabrics may be woven. Linen fabric is a popular choice for warm-weather clothing. It feels cool in the summer but appears crisp and fresh even in hot weather. Household linens truly made of linen become more supple and soft to the touch with use; thus, linen was once the bedsheet of choice.

While the Linseed plant is not difficult to grow, it flourishes best in cool, humid climates and within moist, well-plowed soil. The process for separating the Linseed fibers from the plant's woody stock is laborious and painstaking and must be done in an area where labor is plentiful and relatively inexpensive. It is remarkable that while there is some mechanization to parts of the fiber preparation, some fiber preparation is still done by hand as it has been for centuries. This may be due to the care that must be taken with the fragile Linseed fibers inside the woody stalk, which might be adversely affected by mechanized processing.

Key words: Linseed fibre, Linen, Charkha, Motorized Charkha, employments, cloth.

INTRODUCTION:

Chhattisgarh is fortunate to have required climatic diversity for our traditional crop i.e. linseed. Chhattisgarh is one of the important linseed growing states of India, which account 27.10 thousand hectares area and 7.90 thousand metric tones production. Linseed has been cultivated in the state from very earlier times. Chhattisgarh region is divided into 3 agro-climatic zones viz., Chhattisgarh plains, Northern Hill region and Bastar Plateau. Linseed is grown in many districts of the state but major linseed growing districts are Rajnandgaon, Durg, Bilaspur, Kabirdham, Raipur, Dhamtari, Sarguja, Kanker and Raigarh. In Chhattisgarh linseed is grown as a winter crop mostly in sub-marginal land under rainfed (63%) and utera (25%) i.e. para cropping conditions.

Indira Gandhi KrishiVishwavidyalaya, Raipur has been working since 1967-68 relentlessly for enhanced production and value addition of linseed. 16 varieties of linseed have been released out of which RLC 133, RLC 143. RLC 148, RLC 153. RLC 161, RLC 164 & RLC 167 these seven are recent (released after 2012). These varieties have different characteristics and have been released from CVRC for different environmental conditions like rainfed, utera, irrigated and different zones of India with resistance to various biotic stresses.

In Chhattisgarh IGKV holds around 2025 linseed germplasm accessions till date. These accessions having variability for all the important traits like seed colour, plant height, seed yield, oil yield, values addition traits, resistance to diseases and pest etc. We have also yellow seeded accessions as well, which is known for its golden yellow seed colour and buttery taste and is demanded for edible & confectionary market. On the other hand flax type germplasm accessions with plant height more than 90 cm are being utilized for fiber extraction and spinning to boost linseed in textile and handloom market of the state. These accessions are being explored to enhance linseed properties for different objectives.

Flax type linseed varieties are generally of tall stature when compared to seed type linseed varieties (>90 cm). Also, the branching habit of flax type linseed is different as it has fewer secondary branches and erects plant type. Flax fiber is extracted from the bast or skin of the stem of flax plant. Flax fibers are arranged in the form of thin filaments, grouped in longitudinal slender bundles distributed circularly around a central wooden cylinder. Due to the combination of high mechanical performances and plant-based origin, flax fibers are interesting reinforcement

for environmentally friendly composite materials. Flax fibers have been used as textile raw material, composing cords and weaving yarn and later on more fashionable garments or high-quality fabric upholstery.

Objectives:

- To refine developed technology of linen products from linseed stalks.
- Scale up the technology to promote yarn making from linseed fibers among weavers.

Raw Materials

All that is needed to turn Linseed fiber into linen, and then spin and weave the linen fibers into linen fabric is the cellulose Linseed fiber from the stem of the Linseed plant. The process for separating the fibers from the woody stalk can use either water or chemicals, but these are ultimately washed away and are not part of the finished material.

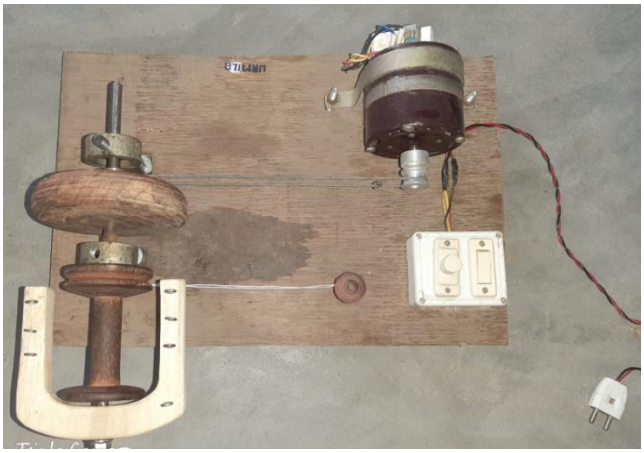
Method

A modified, highly productive Bageshwari wool charkha is helping Linen spinners in earn more than traditional charkhas. But we are offering the modified charkha with the aim of helping rural groups upgrade to existing technologies.

Bhageshwari Charkha used to spin Linseed fibre into linen thread.

Based on feedbacks received from the spinners, it was reported that a spinner normally spins on an average 120-150 grams per person per day through spinning on traditional charkha. But after the introduction of modified charkha, a spinner can spins upto 250-350 grams per day resulting

in 2.5 times more earning by the spinner. It was also found by the spinners that yarn produced by motorised charkha is stronger than the yarn produced using the manually operated charkha and is more uniform also.



Modified Motorized fly wheel Charkha used to spin Linseed fibre into linen thread.

Furthermore, it was observed that the charkha is eco-friendly as it does not require any fossil fuel and sort combustion, so there is no risk of explosions and operation of charkha does not harm the environment. It ensures safety of the people and has no human drudgery as well as is easy to operate. Further, R&D for reducing the cost and integrating with sources of renewable energy is underway.

Once given to the manufacturer, it is easier to manufacture the charkha as almost all the parts are available in the local market, while the gearbox and speed controller may be procured from nearby markets. As far as the operating cost of the charkha, it is almost nil if it is operated manually but will be about towards electricity charges if operated by electrical motor in 8 hour shift in a day.

RESULT AND DISCUSSION

The traditional Bagheshwari charkha spinning wheel was originally designed as a domestic tool for less privileged women to increase their income by selling homemade clothes. This design converts the traditional charkha into a modern tool for empowerment and clean energy. The charkha is a device for spinning yarn that was propagated for the economic empowerment of the

rural poor by Mahatma Gandhi Ji, the father of our nation, India. This charkha now sees a new form as the e-charkha, which produces both yarn and electricity."

"In order to eliminate the limitations of traditional charkha, an attempt was made to modify the Bageshwari charkha by introducing foot operated electrical motor, speed controller, modified flyer and a crank for lateral motion of bobbin and light weight steel pipe instead of wooden frame. The charkha was developed after it underwent 4 stages of modification.

CONCLUSION

In this way environment can be made eco friendly at the same time enhancing the rural economy through small scale industries. Study revealed that the innovative charkha resulted in reduction of physical drudgery to the artisans and increased remuneration by approximately 2.5 times when compared with traditional one with improvement the yarn quality

Nowadays, linen is one of the most preferred materials for bed sheets due to its durability and hypoallergenic properties. Linen can be up to three times stronger than cotton. This is because the cellulose fibers in linen yarn are slightly longer and wrapped tighter than those found in cotton yarn. This gives it great durability and allows linen products to be long-lasting. Currently researchers are working on a cotton/flax blend to create new yarns which will improve the feel of denim during hot and humid weather.

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