

Liquid formulation of CRIJAF SONA:

A new beginning in jute retting

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CRIJAF SONA, a talc-based microbial formulation has already been popularized among farming communities for faster retting and fibre quality improvement of jute. The endospores based liquid formulation of CRIJAF SONA is developed to increase its shelf life to overcome the comparatively shorter shelf life of its talc based formulation. The liquid formulation of CRIJAF SONA proved to be more resistant to environmental stress, with higher shelf life and very efficient in faster retting of jute resulting in fibre quality improvement. This would be very beneficial for the jute farming community since they would not need to worry about the availability of huge quantity of water for retting and would be quite sure about the quality of retted jute fibre. Hence, would help increase farmer's income.

Keywords: CRIJAF SONA, Jute retting, Liquid formulation

THE controlled decomposition of non-fibrous materials (pectin, hemicelluloses etc.) of jute plants with the help of enzymes secreted by aquatic microbes is called jute retting. More than 90% jute farmers of India ret their harvest in stagnant water bodies like lakes, ditches and ponds. Use of microbial inoculants, especially pectinolytic microbial inoculants to hasten the jute retting process in stagnant water has been reported by several researchers. Generally, these microbial inoculants are supplied as different carrier-based (talc, charcoal etc.) formulations for use by the farming community. The carrier-based microbial inoculants have a major drawback, which is their short shelf life, as the microbial cells cannot withstand environmental stress for prolonged periods. The shelf life of solid carrier based microbial inoculants is about six months (180 days). Further, carrier-based microbial formulation is needed in bulk as required in case of biofertilizer, biopesticide etc. ICAR-CRIJAF has developed a talc-based microbial formulation which is popularly known as CRIJAF

SONA for faster retting and quality improvement of jute and mesta. The shelf life of talc-based microbial formulation CRIJAF SONA is six months from the date of its manufacture.

Use of talc-based pectinolytic microbial formulation i.e. CRIJAF SONA was successfully demonstrated for faster retting of jute and fibre quality improvement across the jute and mesta growing states, viz. West Bengal, Assam, Bihar, Odisha, Meghalaya and Andhra Pradesh. The talc-based microbial formulation consisted of three strains of *Bacillus* spp, viz. *Bacillus safensis*, *Bacillus velezensis* and

Bacillus altitudinis identified through whole genome sequencing which are having very high pectinolytic and xylanolytic activities without any cellulolytic activities. To surmount the drawbacks of using talc-based formulation of CRIJAF SONA, an attempt was made to increase the shelf life of microbial consortium by using their endospores as liquid formulation for accelerating the jute retting process and fibre quality improvement. Endospores of various *Bacillus* species are formed by sporulation technique using sporulation media. Sporulation generates a non-reproductive, dormant structure which can survive



Use of liquid formulation of CRIJAF SONA for jute retting under farmers' field condition

for extended periods with little or no nutrients. Bacterial growth was monitored during the sporulation process of CRIJAF SONA via optical density measurements at 600 nm, using UV-visible spectrophotometer and sporulation was checked by a phase contrast microscope. Endospores were harvested when they accounted for at least 90% of total population (generally on the 4th day), and stored at 4°C in sterile distilled water. The endospores of three strains of *Bacillus* spp. maintained their CFU (colony forming unit) number at 108/ml after 18 months of storage at 4°C compared to their initial CFU of 109/ml. On the other hand, the CFU count of the vegetative forms of *Bacillus* spp. in talc-based formulation decreased drastically from initial CFU of 1010/ml to 104/ml after 18 months of storage. The endospores of CRIJAF SONA also showed higher resistance to temperature fluctuations, pH, UV irradiation and antibiotics than their vegetative forms.

High colony forming unit and higher release of pectinolytic and xylanolytic enzymes during retting of jute by 18 months old endospores i.e. liquid formulation of CRIJAF SONA resulted in completion of jute retting in just 10 days under controlled conditions with better quality jute fibre as compared to the fibre obtained from talc-based formulation (21 days). It clearly indicates that endospores remained highly efficient in rejuvenating higher CFU and quantitatively larger pool of enzymes to accelerate the retting of jute even after prolonged preservation.

The liquid formulation of CRIJAF SONA has already been demonstrated for the last three



Jute fibre production using liquid CRIJAF SONA

years (2019–21) under farmers' field conditions in different jute growing districts of West Bengal. The liquid CRIJAF SONA is mixed with the retting water and sprayed on each layer of jute bundles during jak preparation. The jak is then immersed properly in the water by placing old cement bags filled with sand, soil or mud over the jak. The retted jute plants are extracted for fibre after complete retting within 10–15 days. The results of various retting demonstrations with liquid CRIJAF SONA were very encouraging (Table 1) and good quality jute fibre production was possible in a shorter duration (10–15 days) with a mean value of 12 days of retting duration.

Advantages of using liquid CRIJAF SONA

- The liquid CRIJAF SONA is more resistant to temperature fluctuations, pH, UV irradiation and antibiotics than its talc-based formulation.
- It has a shelf life of about 18

months i.e. 3 times higher than its talc-based formulation.

- Its efficiency is higher than the talc-based formulation.
- It is required in small quantity (750–1000 ml) for one ha area jute retting compared to 30 kg talc-based formulation/ha.
- The use of liquid formulation also reduces the fibre production cost.
- It facilitates the use of left out formulation in the succeeding years for faster retting.

SUMMARY

CRIJAF SONA is a microbial formulation developed by ICAR-CRIJAF which has been popularized among farming communities for faster retting and quality improvement of jute and mesta. Endospores based liquid formulation of CRIJAF SONA has 3 times higher shelf life than its talc-based formulation besides having more resistance to environmental stress. The liquid formulation results in completion of jute retting in 10 days under controlled condition with good quality jute fibre. The liquid CRIJAF SONA is cost-effective with higher shelf life and faster retting and better fibre quality of jute. This will be a boon for the jute farming community.

Table 1. Retting duration, fibre quality parameters of retted jute fibre samples (3 years pooled data)

Fibre quality parameter	With liquid CRIJAF SONA	Without liquid CRIJAF SONA	CD (P=0.05)
Retting duration (days)	12	19.60	2.20
Fibre strength (g/tex)	25.60	19.85	2.35
Fibre fineness (tex)	2.72	3.12	0.32
Colour	Light creamy	Grey	-
Root content (%)	03	12	2.85

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