Now banana for making greaseproof paper

Banana is well known as a fruit crop cultivated in about 186,000 ha of land in India. It also grows in the wild. A team of researchers from the North East Institute of Science and Technology (NEIST), CSIR, Jorhat has recently discovered a new use of banana in making greaseproof paper[1]. Greaseproof paper is a non-absorbent paper impermeable to oil or grease. It finds use in the kitchen, hotels, packaging of foods such as butter, cheese, etc. It is made from highly hydrated wood pulp[1] called 'pulpwood' obtained from trees such as spruce, pine, fir, eucalyptus, etc. However, owing to deforestation there has been a shortage of pulpwood as a raw material for making greaseproof paper. Hence, there is demand for an alternative.

The study done by researchers at NEIST offers banana (*Musa paradisica* L.) as a potential alternative resource to the fibre industry. Banana is a fast-growing and high biomass-yielding plant. The study has revealed that banana pulp obtained from its pseudostem shows greaseproof properties at 80° SR freeness. *M. paradisica* L. was selected among banana species because of its chemical composition, containing 59.13% cellulose, 17.5% hemicellulose along with high content of gum and mucilage inside the sheaths.

The study of chemical and physical properties of banana pulp and the morphological properties of pulp fibre showed that banana pulp is suitable for making good quality greaseproof paper. The paper made from the hydrated banana pulp shows all the required properties of greaseproof paper such as tensile index 51.20 N mg^{-1}, burst index 6.21 kg $pam^2\,g^{-1}$, tear index 7.00 $mNm^2\,g^{-1}$, and good blister and oil resistability[1]. The researchers also observed that by adding 20% bamboo pulp to the banana pulp, greaseproof paper with improved properties (tensile index 53.20 N mg^{-1}, burst index 6.42 kg $pam^2\,g^{-1}$, tear index 4.40 $mNm^2\,g^{-1}$) was obtained. Exploiting this research practically may offer a better use of the agricultural waste from banana cultivation and may also help reduce the demand for 'pulpwood'.

1. Goswami, T., Kalita, D. and Rao, P. G., *Indian J. Chem. Technol.*, 2008, **15**, 457–461.

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New 'waterproof' rice developed

Farmers in India and Bangladesh who suffered major crop losses because of flooding, can breathe a sigh of relief as researchers from the International Rice Research Institute (IRRI, Philippines) have been successful in developing a waterproof version of popular varieties of rice, which can withstand two weeks of complete submergence[1].

Rice forms the staple food for over 3 billion people across the globe. One-fourth of the global rice-growing areas are prone to seasonal flash floods that can destroy vast areas of cultivated land. Although rice can withstand submergence, most rice varieties die if fully submerged for long periods.

India, the world's second most populous country, has agriculture as the backbone of its economy. Rice is the primary food for over half of the Indian population[2]. India has the largest rice cultivable area in the world and the production of rice is strongly dependent on distribution of rainfall. Uneven distribution of rainfall with intermittent episodes of flash floods causes damage to rice crops.

David MacKill (Head of the Division of Plant Breeding, Genetics and Biotechnology, IRRI) mentions that for over half a century researchers have tried to introduce submergence tolerant rice into common rice varieties through conventional plant breeding.

Using genetic mapping techniques the researchers identified a cluster of three genes linked to biological process that make rice crop vulnerable to flooding. Among these genes identified, when the *Sub 1A* gene is over-expressed or hyper-activated, the rice crop that is intolerant to submergence becomes tolerant[3] and allows rice to survive complete submergence for up to 17 days. The *Sub 1A* gene affects the way the plant responds to hormones such as ethylene and giberellic acid that help the plant to survive when totally submerged[3].

According to Julia-Bailey-Serres (University of California), the *Sub 1A* gene effectively makes the plant dormant during submergence and hence allows it to conserve energy until the floodwater recedes[1].

This study has proved to be a boon to countries whose rice fields are flood-prone, as in Bangladesh, where 20% of rice land is flood-prone and each year the country suffers destructive floods[1].

The IRRI motive is to officially release the *Sub 1* variety within the next two years and disseminate the technology to small farmers in flood-prone areas. The *Sub1* gene has been introduced into a rice variety that is suited for conditions in India. This may be beneficial to Indian farmers.

1. www.Sciencedaily.com, 24 November 2008.
2. www.irri.org, retrieved on 24 November 2008.
3. www.Sciencedaily.com, 24 November 2008.

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