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Phan saw (Red potato): from farmer's lunch to urban delicacy

«Phan saw» a Khasi name for red potato has becoming a trending meal for families, friends' get-together and for some, a dinner. It is still an afternoon lunch for some farmers in villages. The article narrates on the positive transition of how the farmers' lunch turns into the urban delicacy amongst the Khasi.

The focal point of this article is about the recent positive transition in the food habit of the Khasi people in the urban space through phan saw which has already been the farmer's lunch in the hilly rural areas. The Khasis are one of the tribals of the diversity India. In a nutshell, the Khasis are one of the only three matrilineal tribes in India i.e. Khasis, Jaintias and Garos of the State Meghalaya, situated in the north-eastern region of India. The majority of the populations stay in rural areas and agriculture dominates majority of the occupation. However, in the last two decades i.e. from the year 2000 to 2020, there has been a major change in the livelihood of the masses as tourism and other allied economic activities have become important as a source of additional income. People are becoming more engaging in service sector businesses like transport, travelling, fashion and lifestyle.

The changes in fashions and lifestyles due to globalization also lead to the change in the food culture. When it comes to the food habit of the Khasi farmers, they usually have their lunch with the agricultural crops that they cultivate such as corn, potato, sweet potato, pumpkin and rice. As rice is a staple food in most of the Asian countries, it is also the staple food for the Khasi. Interestingly, this particular food habit of «Phan saw» have a positive impact as it has become so popular in the urban Shillong (State Capital) and the agglomeration that it is helping the protection of the local cultural food habit.

«Phan» means potato and «saw» means red. Phan saw has now becoming a household lucrative food for urban families. However, in rural areas it is widely consume by farmers since time immemorial. Traditionally, phan saw is either cook through boiling or burning until

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Evaluation of explants for *in vitro* propagation of *Citrus indica* Tanaka - An Endangered Species

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Key words: *Citrus indica*, Micropropagation, Callus induction, Shoot tip, Nodal segment

Abstract

Of the five explants *viz.*, shoot tip, nodal segment, leaf disc, cotyledon and root tip excised from exegenic seedlings of *Citrus indica* Tanaka shoot tip cultured in MS supplemented with 0.5 mg/l of BAP generated shoots within 4.74 days, exhibiting highest percentage of response (85.82%) with highest number of shoots (8.9) and shoot length (3.04 cm). On the other hand nodal segment cultured in MS supplemented with 1.0 mg/l BAP showed 80% response in 5.16 days with a shoot number of 5.41 and shoot length of 2.43 cm. Cotyledon explants inoculated on MS supplemented with1.0 mg/l of TDZ produced shoots in 20 days with the highest response of 69.88%, with 3.77 shoots per cotyledon and shoot length of 2.03cm. Viable callus was obtained from leaf disc cultured on half strength MS medium with less Ca^{++} with 2, 4-D 0.5 mg/l + Kn 0.25 mg/l. This callus when inoculated on half strength MS medium with Kn 1.5 mg/l showed highest shoot bud proliferation of 66.66% with 10.06 shoots per callus. Root tip explant failed to produce any shoots. *In vitro* raised shoots of *Citrus indica* when cultured on half strength MS medium supplemented with NAA (1.0 mg/l) showed 80 % rooting in 5.66 days, with highest number of roots (6.16 per shoot) and longest root (3.78cm). Ninety per cent of *in vitro* rooted plantlets of *Citrus indica* survived in open conditions.

Introduction

Citrus indica commonly known as wild indian orange is the most primitive and perhaps the progenitor of all cultivated *Citrus* (Singh 1981). The presence of this species in the buffer zone of Nokrek Biosphere Reserve spreading in the east, west and south Garo Hills of Meghalaya was reported by Malik et al. (2006) and in the core zone of Nokrek

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STANDARDIZATION OF PROTOCOL FOR *IN VITRO* SEED GERMINATION OF *CITRUS MACROPTERA* MONT.

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Abstract

Citrus macroptera Mont. is a fruit tree growing in semi-wild conditions in West Garo Hills and South Garo Hills districts of Meghalaya, locally known as 'Chambil'. The embryos of *Citrus macroptera* are mostly under developed, thereby resulting in rare and poor natural germination. Moreover, the seeds are recalcitrant in nature and cannot be preserved for long. A complete protocol for *in vitro* seed germination could be an alternative for natural seed germination, thus facilitating the conservation and utilization of this species. An experiment was conducted to standardize a protocol for *in vitro* seed germination of *Citrus macroptera* by using different concentrations and combinations of auxins and cytokinins in full strength and half strength Murashige and Skoog's (MS) medium. It was observed that full strength MS medium supplemented with BAP 0.5 mg/l showed earlier shoot initiation (4.66 days) with 88.11% seed germination, highest shoot length of 3.36 cm and highest root length of 2.60 cm.

Key words : *Citrus macroptera*, *in vitro* seed germination, protocol, conservation, Garo Hills, Meghalaya.

Introduction

The North- Eastern region of India, being the integral part of the biodiversity hot spots of the globe, has varied climatic conditions that influence a variety of plants and richness of diversity. A variety of Citrus species are found in the North -eastern region in general and a significant number of species of Citrus grow in wild natural conditions particularly in Nokrek Biosphere Reserve of Meghalaya. Citrus macroptera Mont. locally known as 'Chambil' in Garo language grows in semi-wild conditions in West Garo Hills and South Garo Hills districts of Meghalaya. It is also found in the vicinity of Shella and Dawki areas near Cherrapunji. The thick rind as well as juice of the fruit is used in preparing appetizing Garo cuisines and for making pickles. The fruit has great potential for use as commercial refreshing drink. *Citrus macroptera* Mont. is one among the seven endangered Citrus species from India as reported by Singh and Singh (2003). *Citrus macroptera* is in need of special and immediate attention for conservation due to its endemism and high degree of threat perception (Malik, *et al.*, 2006).

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The slow natural regeneration of this species and increasing human intervention around the Biosphere Reserve by clearing of forests for jhuming and human habitation, have become a severe threat to this species. The recalcitrant nature of seeds makes it difficult to store for longer duration. Natural seed germination of *Citrus macroptera* is a rare phenomenon owing to rudimentary embryos. *In-vitro* seed germination has been carried out successfully in many rare and endangered species as an alternative for natural seed germination. Considering the above facts, an experiment was conducted to standardize a protocol for in vitro seed germination of *Citrus macroptera*.

Materials and Methods

Fruits of *Citrus macroptera* were collected from nearby villages of Tura in West Garo Hills district of Meghalaya. The seeds were separated from fruits and washed with Teepol and rinsed with tap water by keeping under running water for about half an hour. Seeds were then washed with double distilled water five times. Healthy seeds were isolated from the lot and surface sterilized with 70% absolute alcohol for 2 minutes. Seeds were

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New records of amphibian fauna from Tura Peak reserve forest, West Garo Hills district, Meghalaya, Northeast India

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ABSTRACT

Intensive survey has been carried out from January 2012 to December 2013. The data of amphibians were collected using Active Searching Methods during dark hours, but some amphibians were diurnal and also seen during day hours. Thus, the survey activity was performed from morning 06.00hrs to 21.00hrs. Most of the specimens were collected using handpicked methods and live photographs were also taken using Digital SLR Camera, Canon EOS 1100D model. All the specimens were measured and morphological characters were studied for identification. Observed amphibians species were released back to their natural habitat after identification, photographic records and necessary measurements. Only representative amphibian specimens were collected whenever necessary and preserved it into 10% formaldehyde. Altogether six different species of amphibian fauna have been newly recorded from Tura Peak Reserve Forest of West Garo Hills District, Meghalaya of Northeast India. Those were such as *Xenophrys boetgerri, Xenophrys major, Xenophrys zunhebotoensis, Xenophrys glandulosa, Amolops monticola* and *Theloderma asperum.*

Key Words: New records, Amphibians, Tura Peak reserve Forest, West Garo Hills, Meghalaya, Northeast, Active searching method.

INTRODUCTION

India is incredibly rich in species diversity. About 138 species of amphibians are endemic to India (Maiti & Maiti, 2011). The amphibians in India are largely confined to highly diversified habitats of the Western Ghats and North-East region (Inger & Dutta, 1986). From North-East India 105 amphibian species have been reported (Ahmed *et al.*, 2009). The richest expression in diversity and abundance of amphibians of the Northeast India is met with in the state Meghalaya as evidence from the accounts of amphibian by Boulenger (1890, 1920), Kripalani (1961), Yazdani & Chanda (1971), Pillai & Yazdani (1973, 1977, 1979, 1980) and Sahu & Khare (1983). In Meghalaya alone there are 33 species of amphibia under six families and eleven genera (ZSI, 1995). So, the present survey for amphibian species in Tura Peak Reserve Forest of West Garo Hills might even help to record more of different amphibian species of Meghalaya.

STUDY AREA

Meghalaya or "Home of Cloud" is one of the important states of Northeastern region of India and a part of the mega biodiversity area of the world. It has actual forest cover 15,657 km^2 69.8% of the total geographical area) but the recorded forest area is about 9496 km^2 (42.34% (FSI, 1997). Garo Hills is situated on the Western part of Meghalaya and

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Research Paper

CHECKLIST OF AMPHIBIANS INVENTORIED FROM TURA PEAK OF WEST GARO HILLS, MEGHALAYA, INDIA

TURA GOVT. COLLEGE TURA * WEST GARO HILLS *

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Abstract

Intensive survey has been carried out from January 2012 to December 2013 and whatever amphibian species have been uncovered from Tura Peak were photographed, identified and its measurement were taken. Data of amphibians were collected by Active Searching Methods (ASM) and most of the amphibian surveys are done after dark (18.00 hrs) but some amphibians are diurnal which can be found during the day time so practically 15 hrs (6 am-6 pm & 7 pm-10 pm) searched was carried out. Night time search light have been used with an input DC 7.5v 500mA. Most of the specimen collected are handpicked and photographed in EOS 1100D with Cannon camera. It was measured and its morphological characters are studied and identified.

INTRODUCTION

India is incredibly rich in species diversity. About 138 species of amphibians are endemic to India (Maiti & Maiti, 2011). The amphibians in India are largely confined to highly diversified habitats of the Western Ghats and North-Eastern region (Inger & Dutta, 1986). From North-East India 119 amphibian species have been described (Mathew & Sen, 2010) by Zoological Survey of India. The richest expression in diversity and abundance of amphibians of the Northeast India is met with in the state of Meghalaya as evidence from the accounts of amphibians by Boulenger (1890, 1920), Annandale (1912), Kripalani (1961), Yazdani & Chanda (1971), Pillai & Yazdani (1973, 1977, 1979, 1980), Sahu & Khare (1983). Various Paper on amphibians were published by Ahmed & Dutta (2000,2001), Ahmed & Goswami (1999), Ao et al (2003), Bhahadur & Saha (1980), Borah & Bordoloi (2001), Bordoloi & Borah(1999), Borthakur et al (2007), Chanda (1986, 1990 - 1993, 1995, 2002, 2006, 2007); Choudury et al (1999, 2001), Das et al (2000), Deuti & Dutta (2002), Dey & Ramanujan (2003), Ghosh & Sarkar (2000), Grosslet et al (2004), Hooroo et al (2002), Kiyasetuo & Khare (1986 & 1987), Mallick (1997), Mansukhani & Sarkar, 1981),Mathew & Sen(2003, 2003a, 2005, 2005a, 2006, 2006a, 2007, 2008, 2008a, 2009), Nigombam & Bordoloi (2007), Pathak et al (2001), Saikia et al(2000), Sarkar et al (2002), Sen Gupta et al (2000, 2001, 2008) and Talukdar et al (2007). The North-East is an important part of Eastern Himalayas as well as Indo-Myanmar Bio-diversity Hotspots and supports some of the unique amphibian species. In Meghalaya alone there are 33 species of amphibian under six