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अनुक्रमणिका

RECENT TRENDS IN LIBRARIES IN NETWORKED ENVIRONMENT

Challenges and Opportunities for Librarianship in 21st Century

Editor in Chief
ADITYA TRIPATHI

Editors
MOHD SHOAIB ANSARI
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An Introduction to Academic Library Consortia in India

Pankaj Kumar
Librarian, Govt. Shahid Venkat Rao Degree College, Bijapur, C.G.

ABSTRACT

UGC-INFONET is the most motivated project for academic intuitions and it is supported by the University Grants Commission, Government of India. It delivers various types published electronic resources in various academic disciplines for the research community. This consortium is a joint effort of UGC, INFLIBNET and ERNET to interlink all academic universities and colleges of the country and facilitates them with a subscription of scholarly electronic journals. UGC – INFONET digital library consortium is a boon for the academic development. It is not only helping to more than 350 universities and about 14,000 colleges affiliated with these universities and approximately 10 million students to access the e-journals.

Keywords : UGC Infonet, Library consortia, E-resources, Scholarly communication, Acamedic library consortia

INTRODUCTION

It is not possible for one library or information centres to hold the full stock of information resources or to procure

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Prof. Ranbir Chander Sobti
Vice Chancellor

No. : VC/ / 17
Date : 27-07-2017

MESSAGE

I am glad to know that the National Conference on **"Releavance of Ranganathan Philosophy in Digital India"** is being organized by Department of Library and Information Science of the University and Society for promotion of Libraries (SPL) Uttar Pradesh during 12-13th August 2017 involving professionals from all over India to celebrate the 125th birth anniversary of Dr. S.R. Ranganathan, Father of Library Science in India.

Dr. Ranganathan was one of the most well krown library scientist of India to play a vital role in the development of the library profession which is an essential ingredient for progress and development of society. I am happy to note that a conference on this theme, which is very essential for the progress of modern Society, is being organized at such a magnitude.

I am happy to know that a proceeding is being brought out on this occasion.

I wish the Conference a grand success.

(R.C. Sobti)

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Copyright Important and Other Types of Intellectual Property Rights in Digital Environment

Pankaj Kumar*
Anuradha Kanoujiya**

Abstract

An intellectual property right is the collective name for new and unique ideas, products and creations resulting from human creativity and innovation. Copyright Trademarks, Patents, geographical indications, integrated circuit, industrial design etc. Are most important rights .The copyright law is protected creative effort or innovation like property, the related rights can be sold, donated and licensed. The digital information can be disseminate one country to another country and access across the globe. Libraries Museums and archives are responsibility to take necessary action for preventing unauthorized uses of the work.

Keywords: -copyright law, digital information, intellectual property, innovation etc.

Introduction:

Today it is an era of knowledge explosion .Information and communication technology is very fast growing with knowledge and ICT tool with have fast sharable information without any barrier. With the rise of new concept Intellectual Property its represent mind ideas is capital. Intellectual capital cannot measurable any products and standard. It show thing form with inventions technologies like

Multidisciplinary National Conference

on

"Impact Of Emerging Science and Technology on Society: Opportunities and Challenges"

(IESTS-OC)

January 29th - 30th , 2019

Organized By- Department of Biotechnology, Botany and Chemistry

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CERTIFICATE

This is to certify that Dr./Mr./Mrs./Ms .....BALRAM SAHU.....Research Scholar.....

of.....Seed Biology Lab, School of Life Science, Pt. R.S.U., Raipur.....

has participated as a resource person/chaired a session/delivered lecture/presented paper (oral/poster)

entitled....."Oxidative stress induced Loss of desciation tolerance in.....

.....germinated Lisum sativum seed".....

MR. MANMOHAN AGRAWAL
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DR. SURENDRA GAUTAM

POSTER-17

From SARS to SARS-CoV-2: insights on structure and pathogenicity aspects of pandemic human coronaviruses

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School of Life and Allied Science, ITM University, Raipur, Chhattisgarh, INDIA

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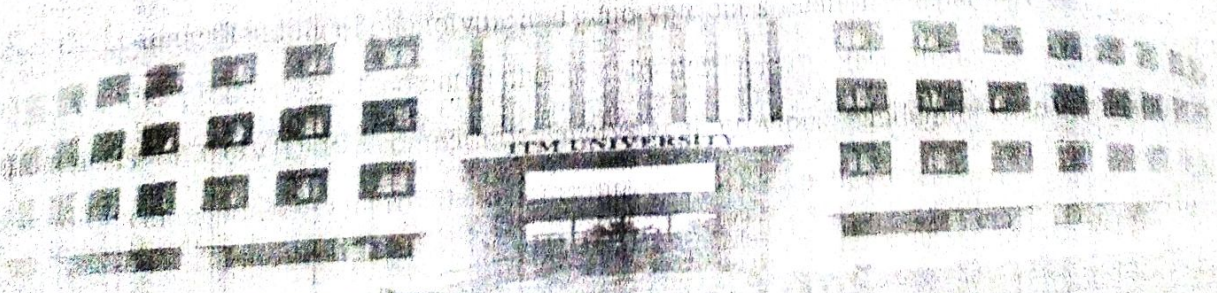
Abstract

Human Coronaviruses (HCoV), periodically emerging across the world, are a potential threat to humans such as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) – diseases termed as COVID-19. Current SARSCoV-2 outbreaks have fueled ongoing efforts to exploit various viral target proteins for therapy, but strategies aimed at blocking the viral proteins as in drug and vaccine development have largely failed. In fact, evidence has now shown that coronaviruses undergo rapid recombination to generate new strains of altered virulence. This demands the understanding of phenotypic and genotypic classification and pathogenesis of SARS-CoV-2 for the production of potential therapy. In the lack of clear clinical evidence for the pathogenesis of COVID-19, comparative analysis of previous pandemic HCoVs associated immunological responses can provide insights into COVID-19 pathogenesis.

Keywords

Streptococcus mutans, biofilm, dental caries.



POSTER-07

Study of storability of beetroot based herbal candy stored at different temperature

Ambika Choudhary[1,2] and Balram Sahu[1]

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Abstract

The beetroot candies were prepared with Jaggery and Stevia separately and flavoured with herbs *like* cinnamon, ginger, cardamom, fennel seeds, tulsi, giloy and cloves. The Jaggery and Stevia based candy were stored for 60 days at room temperature (RT; 23°C to 27°C) and at the refrigerator (4°C) to monitor the life span and effect of temperature on storability. The storability of candy was evaluated by measuring the level of moisture content (MC), solid content, reducing sugar and total sugar at 0, 30 and 60 days of storage. A gradual decrease in the MC of candies was observed during storage at both RT and refrigerator. The decrease in MC was relatively slow when the candies were stored at refrigerated (4°C) than the RT. There was a gradual increase in the total sugar content was reported during storage. This increase in the total sugar content of candies may be the indirect effect of a decrease in moisture content during storage. A reducing trend in the level of reducing sugars content was observed in both storage conditions which may be due to the breakdown of polysaccharides. The increase in total solid content was relatively slow when candies were stored in the refrigerator than RT indicating more increase in total solid content at higher storage temperature due to loss in moisture content. Thus, our study indicated that candies stored at low temperature (refrigerator) for up to 60 days showed better storability without adverse effects on their quality.

Keywords

Beetroot, Storability, Moisture content, Total sugar content, Polysaccharides.

ORIGINAL ARTICLE

Stress and development phenotyping of Hsp101 and diverse other Hsp mutants of *Arabidopsis thaliana*

Lalit Dev Tiwari[1] · Ritesh Kumar[1] · Vijyesh Sharma[1] · Alok Kumar Sahu[2] · Balram Sahu[2] · Subhash Chandra Naithani[2] · Anil Grover[1]

Received: 25 May 2021 / Accepted: 3 September 2021

Abstract

Heat shock proteins or Hsps are critical in mounting plant resistance against heat stress. The complex Hsp spectrum of *Arabidopsis thaliana* plant contains over two hundred proteins belonging to six different families namely Hsp20, Hsp40, Hsp60, Hsp70, Hsp90 and Hsp100. Importantly, the cellular function(s) of most Hsps remains to be established. We aimed at phenotyping of stress and development response of the selected, homozygous *hsp* mutant lines produced by T-DNA insertional mutagenesis method. The heat stress phenotype was assessed for basal and acquired heat stress response at seed and seedling stages. Distinct phenotype was noted for the *hot1-3* mutant (knockout mutant of *Hsp101* gene) showing higher heat sensitivity and for the *salk_087844* mutant (knockout mutant of *Hsc70-2* gene) showing higher heat tolerance than the wild type seedlings. The homozygous *cs808162* mutant (mutant of *ClpB-p* gene encoding for the chloroplast-localized form of Hsp101) did not survive even under unstressed, control condition. *salk_064887C* mutant (mutant of *cpn60β4* gene) showed accelerated development cycling. The *hot1-3* mutant apart from showing different heat response, exhibited development lesions like bigger size of seeds, buds, siliques, and pollen compared to the wild type plants. In response to controlled deterioration treatment of seeds, *hot1-3* seeds showed higher accumulation of reactive oxygen species molecules, higher rates of protein and lipid oxidation and a faster decline in germination rate as compared to wild type seeds. Our findings show that Hsps perform diverse metabolic functions in plant response to stress, growth, and development.

Keywords *Arabidopsis thaliana* · Development · *Hsp101* gene · Heat stress · *Hsp* mutant · T-DNA

Abbreviations

APX	Ascorbate peroxidase
AT	Acquired tolerance
BT	Basal tolerance
CD	Controlled deterioration
Clp	Caseinolytic proteases
DPS	Days post stress
GI	Germination index
HS	Heat stress
Hsf	Heat shock factor
Hsp	Heat shock protein
HSR	Heat stress response
KD	Knockdown
KO	Knockout
MDG	Multiplying mean daily germination
PCR	Polymerase chain reaction
PQC	Protein quality control
PV	Peak value
ROS	Reactive oxygen species
SOD	Superoxide dismutase
TAIR	The Arabidopsis information resource
UTR	Untranslated region
WT	Wild type

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Introduction

For performing the uphill task to survive, grow, and reproduce under heat stress (HS) conditions, plants adopt diverse strategies to minimize the damage and ensure protection of cellular homeostasis during the stress and

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Gene expression of late embryogenesis abundant proteins, small heat shock proteins and peroxiredoxin and oxidation of lipid and protein during loss and re-establishment of desiccation tolerance in *Pisum sativum* seeds

B. Sahu, A.K. Sahu, A. Sahu, S.C. Naithani *

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ABSTRACT

The aim of the present work was to investigate the mechanism of loss and re-establishment of desiccation tolerance (DT) in germinated *Pisum sativum* seeds (seedlings). Dehydration of pea seedlings of 2 mm radicle length was accompanied by concomitant loss of DT from 100 to 60 and 20% when dehydrated to initial water content (IWC) and below IWC, respectively. Desiccation of seedlings was associated with accumulation of malondialdehyde (MDA) and carbonyls (oxidized product of lipid and protein, respectively) with increased solute leakage and decreased seedling viability. Also, the transcripts of all the protective proteins like late embryogenesis abundant proteins (*LEA; PsDHN2, PsDHN3* and *PsSBP65*), small heat shock proteins (*sHSP; PsHSP17.7, PsHSP18.1, PsHSP18.2* and *PsHSP22.7*) and peroxiredoxin (*Prx; 2-Cys Prx*) increased in seedlings desiccated to IWC but massive loss (5- to 9-folds) was discernible when desiccated below IWC. The PEG pre-treatment re-established the DT from 20 to 70% in seedlings dehydrated below IWC. The re-induction of DT in PEG-treated seedlings was accompanied with enhanced seedling viability and gene expression (5- to 10-folds) of all the protective proteins (*LEA, sHSP* and *2-Cys Prx*) with substantial reduction in the levels of MDA, carbonyls and electrolyte leakage. The role of genes encoding the protective proteins, MDA, carbonyls, TTC reduction and solute leakage was discussed during loss and re-establishment of DT in pea seedlings.

1. Introduction

The storability of dry orthodox seeds, a foremost attribute in the conservation of phytodiversity (Rajjou and Debeaujon 2008), is based upon its exceptional ability of desiccation tolerance (DT). The DT in an organism corresponds to its capacity to withstand almost complete protoplasmic dehydration (approximately −300 MPa) (Boudet et al. 2006) and resume normal growth and metabolism after re-hydration without accumulation of lethal or irreversible damage (Berjak and Pammenter 2008; Dekkers et al. 2015; Silva et al. 2017; Lang et al. 2017). The ability of DT is widespread among the plant kingdom, including ferns, mosses, pollen and seeds of higher plants (Boudet et al. 2006).

Dehydration/desiccation of metabolically active desiccation sensitive seedlings which are similar to recalcitrant seeds results in an uncontrolled oxidative stress due to excessive accumulation of reactive oxygen species (ROS) and is a prime cause for oxidative stress-induced loss of seedling viability and vigor (Soares et al. 2015; Castro et al. 2017). Excessive accumulation of ROS mediated oxidized products of all biologically important molecules such as lipid, protein and DNA is one of the widely acknowledged pathways triggered during drying below critical water content in desiccation sensitive seeds (Oracz et al. 2007; Varghese and Naithani 2008; Parkhey et al. 2012). Various mechanisms such as nitration of tyrosine, formation of glycoxidation adducts and disulfide cross-links and carbonylation of specific amino acid residues have been proposed during protein oxidation (Davies 2005). Oxidative attack on protein affects the functionality of the enzymes and protective proteins, late embryogenesis abundant (LEA) proteins and heat shock proteins (HSPs) (Job et al. 2005), or changes the sensitivity of modified proteins prone to proteolytic attack (Dunlop et al. 2002; Davies 2005). Desiccation induces ROS-mediated accumulation of carbonylated proteins (oxidized product of protein) in seeds (Oracz et al. 2007; Rajjou and Debeaujon 2008). Similar to proteins, the peroxidation of lipid has often been discussed to explain the oxidative stress induced cellular damage in seeds as well as seedlings (Varghese and Naithani 2008; Garg et al. 2012; Sahu et al. 2017, 2017a). Dehydration-induced accumulation of malondialdehyde (MDA; oxidized product of lipid) is positively associated with the membrane perturbation (Parkhey et al. 2012; Sahu et al. 2017). Membrane damage contributes to increased solute leakage in desiccation sensitive seeds (Leprince et al. 2000; Pukacka

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ORIGINAL ARTICLE

Active oxygen species metabolism in neem (*Azadirachta indica*) seeds exposed to natural ageing and controlled deterioration

Alok Kumar Sahu[1] · Balram Sahu[1] · Avinash Soni[1] · Subhash Chandra Naithani[1]

Received: 18 October 2016 / Revised: 26 July 2017 / Accepted: 26 July 2017

Abstract Success of ex situ storage of germplasm for trade and conservation essentially depends upon the precision of the protocol employed for the assessment of germination potential. Active oxygen species and antioxidative enzymes during natural ageing (NA) and controlled deterioration (CD) was monitored during the loss of seed vigour and germination potential in neem seeds showing intermediate seed storage behaviour. Higher levels of SOD, CAT and APX were strongly and positively associated with germination and vigour. The loss of CAT and APX activity estimated quantitatively and number of isoenzymes were closely accompanied with the simultaneous increase in the amounts of H_2O_2 and OH-radical. The decline in germination and vigour was negatively related with the levels of H_2O_2 and OH-radical and enhanced electrolyte leakage. The amounts of OH-radical were positively correlated with the decline in DNA content and DNA damage. The levels of SOD isoenzymes initially increased as the germination index of seeds declined from 5250 to 762 and 882 under NA and CD conditions, respectively. Increasing activity of SOD in the ageing seeds were associated with the accumulation of H_2O_2. The role of antioxidative enzymes in maintaining signalling and damaging amounts of AOS as well as revelations of different pathways of ageing during NA and CD in the ageing neem seeds were discussed.

Keywords Antioxidative enzymes · Active oxygen species · *Azadirachta indica* · Ageing · Controlled deterioration

Introduction

Seed germination is compromised inevitably in spite of the best storage conditions (Rajjou et al. 2008). Therefore, from the research and commerce point of view, understanding the seed deterioration during prolonged storage is of foremost concern in most of the seed banks engaged in germplasm conservation. The expression of seed longevity depends upon its genetic and physiological quality and their interaction with the storage conditions (Arc et al. 2011).

Prolonged seed storage that accounts for seed ageing has long been associated with non-reversible metabolic and cellular alterations including oxidation of lipid, protein and nucleic acids, enzyme inactivation, membrane perturbations and impairment of RNA and protein biosynthesis (Kibinza et al. 2006; El-Maarouf-Bouteau et al. 2011; Hu et al. 2012). Although the precise mechanism of seed deterioration is still unclear, the excess accumulation of AOS (active oxygen species) including superoxide, hydroxyl radical (OH-radical) and hydrogen peroxide (H_2O_2) are closely related with the reduced seed vigour and viability (Kibinza et al. 2006; El-Maarouf-Bouteau et al. 2011; Richards et al. 2015). In ageing seeds, oxidative stress induced unregulated metabolism disturbs the balance between AOS production and AOS scavenging enzymes that eventually permits accumulation of AOS (Rajjou et al.

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Reactive oxygen species, lipid peroxidation, protein oxidation and antioxidative enzymes in dehydrating Karanj (*Pongamia pinnata*) seeds during storage

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ABSTRACT

We investigated the storage behaviour of karanj (*Pongamia pinnata* L. Pierre), a very popular tree valued for medicinal and biodiesel use, seeds at ambient conditions (27–30 °C and RH 45%). Fresh karanj seeds, showing 100% germination were shed with water content of 0.22 $gH_2O\ g^{-1}$ DM. The karanj seeds exhibited intermediate storage behaviour as the percent germination dropped from 100 to 80% when the seeds desiccated below critical water content i.e. 0.11 $gH_2O\ g^{-1}$ DM. The loss of germination index (GI) and viability, and increase in solute leakage preceded the loss of germinability. Dehydration mediated decline in seed viability and vigour was negatively associated with accumulation of reactive oxygen species (ROS, like superoxide radical and H_2O_2). In dehydrating seeds, excess amounts of ROS mediated cellular damage by oxidizing biomolecules like lipids and proteins. The activities of antioxidant enzymes like superoxide dismutase (SOD), catalase (CAT) and ascorbate peroxidase (APX) were higher in the 100% viable seeds, and reduced with dehydration induced viability and vigour loss. The expression of specific isoenzymes of SOD (band 1) and CAT (band 2) detected only in seeds exhibiting higher germination, may be considered as markers for seed quality.

1. Introduction

Seed longevity, an important trait from ecological and agricultural perspectives, has been studied in considerable detail (Rajjou et al., 2008; Nonogaki et al., 2010). Seeds after harvest, undoubtedly deteriorate gradually and lose quality during extended storage (Rajjou et al., 2008). The seed storage behaviour has been categorized as orthodox and recalcitrant on the basis of desiccation tolerance and sensitivity, respectively. Orthodox seeds can be stored for longer periods if their moisture contents are reduced to 1–5% (Ellis et al., 1991a), whereas the recalcitrant seeds are killed when dehydrated below relatively high moisture content (30–50%) (Varghese and Naithani, 2008). Several seeds like *Carica papaya*, *Coffea arabica*, *Elaeis guineensis* (Ellis et al., 1991a,b) once categorized as recalcitrant have now been reclassified as intermediate in storage behaviour.

During ageing, loss of seed vigour and viability precedes the loss in germinability (Eksi and Demir, 2011). Membrane deterioration associated enhanced solute leakage, a measure of seed vigour (Eksi and Demir, 2011), has been reported in several recalcitrant seeds during ageing (Pukacka and Ratajczak, 2007; Varghese and Naithani, 2008). Similarly, the ageing related loss of viability was reported in seeds using TTC (triphenyl tetrazolium chloride), a quick and precise test (ISTA, 2003). In dry and viable seeds, leakage of reactive oxygen species (ROS) from electron transport chain of mitochondria during seed desiccation is inevitably enhanced that in turn promotes oxidative damage of nucleic acids, proteins and lipids. Active metabolism in the hydrated pockets, reported in restricted cellular areas of dry seeds, is one of the potential sources of ROS formation (Leubner-Metzger, 2005). Additionally, non-enzymatic ROS production in anhydrate sites of dry seeds also contributes to ageing associated cellular damage (Job et al., 2005). Excessive accumulation of ROS (superoxide radical and H_2O_2) in orthodox, recalcitrant and intermediate seeds (Bailly, 2004; Pukacka and Ratajczak, 2007; Varghese and Naithani, 2008; Sahu et al., 2017) has been discussed as a potential cause of viability loss. ROS induced oxidative damage of proteins and lipids (Balesevic-Tubic et al., 2007; Oracz et al., 2007; Varghese and Naithani, 2008; Parkhey et al., 2012) leads to severe cellular damage that eventually results in loss of viability (Halliwell and Gutteridge, 2007). Membrane damage and generation of toxic by-products are common features of lipid peroxidation (Parkhey et al., 2012). Many proteins are specific as they are regulatory and associated with particular stages of seed development (Tunnacliffe et al., 2010; Sahu et al., 2017), dormancy (Oracz et al., 2007), germination (Nonogaki et al., 2010; Tunnacliffe et al., 2010) and longevity/

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Insights on germinability and desiccation tolerance in developing neem seeds (*Azadirachta indica*): Role of AOS, antioxidative enzymes and dehydrin-like protein

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Germination

ABSTRACT

The germinability and desiccation tolerance (DT) in developing seed are regulated by cellular metabolism involving active oxygen species (AOS) and protective proteins during maturation drying. The aim of the present investigation was to unravel the functions of AOS (superoxide, H_2O_2 and OH-radical), antioxidative enzymes (SOD, CAT and APX) and dehydrin-like proteins in regulating the germinability and DT in undried and artificially desiccated developing neem seeds. Germination was first observed in seeds of 8 weeks after anthesis (waa) whereas DT was noticed from 9 waa. High levels of superoxide in undried and artificially desiccated seeds of 9 waa were rapidly declined up to 15 waa with simultaneous increase in levels of SOD (quantitative and isoenzymes) that dismutates superoxide with corresponding formation and accumulation of H_2O_2. Activities and isoenzymes of APX and CAT were promoted in seeds from 9 to 12 waa. Intensity of dehydrin-like proteins increased as development progressed in seeds with higher intensities in slow dried (SD) seeds. Desiccation modulated the metabolism for the acquisition of germinability and DT in the developing neem seeds from 8 to 15 waa by altering the levels of superoxide, H_2O_2 and OH-radical those possibly act as signalling molecules for reprogramming protective proteins. Desiccation mediated the expression of new bands of SOD and APX in undried as well as SD seeds during 9–12 waa but the bands were more intense in SD seeds. The superoxide and H_2O_2-regulated intensity of dehydrin-like protein in SD seeds further validated our conclusion.

1. Introduction

The remarkable ability of desiccation tolerance (DT) in seeds is the prime basis of seed longevity and storability during *ex-situ* storage (Berjak et al., 2007; Walters, 2015). The DT acquired during maturation drying phase of seed development, is associated with the metabolic changes that are necessarily required for transition from development to germination phase and for providing protection to dry seeds from environmental stress (Kermode and Finch-Savage, 2002). Understanding the mechanism of DT in seeds is essential to reverse the depletion of plant diversity through conservation of germplasm, that are otherwise non-storable with the conventional storage protocols due to poor desiccation tolerance (Walters, 2015). The reduced desiccation tolerance in the recalcitrant seeds is far from clear although the changes in the cell constituents (Walters, 2015), role of late embryogenesis abundant (LEA) proteins (Tunnacliffe and Wise, 2007), oligosaccharides (Bailly et al., 2001) and promotion of AOS-detoxification systems have been discussed to quantify and explain the desiccation tolerance in orthodox seeds (Berjak et al., 2007; Berjak and Pammenter, 2008; Spanò et al., 2011; Walters, 2015).

The role of active oxygen species (AOS) has recently been documented in modulating various aspects of seed physiology like dormancy, germination and ageing (Bailly et al., 2008). Biologically active AOS are superoxide, hydrogen peroxide (H_2O_2), and hydroxyl radical (OH-radical). The mitochondrial superoxide is readily converted enzymatically or spontaneously at low pH to H_2O_2 that can

Abbreviations: DT, desiccation tolerance; AOS, active oxygen species; SOD, superoxide dismutase; CAT, catalase; APX, ascorbate peroxidase; waa, weeks after anthesis; RD, rapid drying; SD, slow drying; MC, moisture content; DM, dry mass; GI, germination index.

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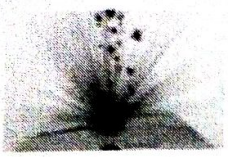

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Synthesis and Characterization of Mn_3O_4 Nanoparticle: A Catalyst for Synthesis of Tetrahydro-1H-pyrano[2,3-d]pyrimidine Derivatives

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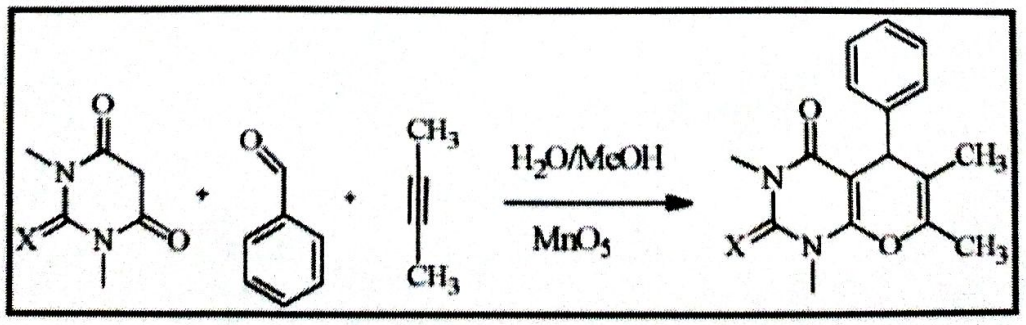
ABSTRACT

A mild and low temperature route has been developed for the synthesis of Mn_3O_4 nanoparticles by mixing aqueous solution of $Mn(CH_3CO_2)_2$ and KOH as an oxidizing agent in a simple hydrothermal reaction system in the absence of any templates, catalysts, or organic reagents. The synthesized nanoparticle of metal oxide were characterized by means of X-ray diffraction, UV-Visible spectrometry, Scanning electron microscope (SEM) and Transmission electron microscope (TEM). The crystal size of the synthesized metal chemical compound nanoparticle was obtained from X-ray diffraction study and it was found to 50± 5nm Mn_3O_4 nanocrystaline. The synthesized catalyst (Mn_3O_4) were used for activation of organic reagents lead to biologically potent tetrahydro-1H-pyrano[2,3-d] pyrimidine derivatives. The current methodologies both for the synthesis of nanocatalyst and then its application for heterocyclic synthesis disclose unique way of novel research.

Graphical Abstract



Synthetic scheme of designing *tetrahydro-1H-pyrano[2,3-d] pyrimidine derivatives*

Keywords: Mn_3O_4, Nanoparticle, Hydrothermal synthesis, XRD, SEM, TEM, Crystal growth, Tetrahydro-1H-pyrano[2,3-d]pyrimidine.

Synthesis and Characterization of Four organoselenium (Selenides and diselenides) from element selenium

Toyaj Shukla, Shishir Malviya, Abhishek Kumar, Shekhar Srivastava

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For synthesis of some symmetrical selenide like dimethyl benzyl selenide, dicyclohexyl selenide and symmetrical diselenide like di-n- butyl diselenide, di1,1 ethylidene diselenide. under nitrogen atmosphere, a simple procedure has been developed by reaction of aryl or alkyl halide, element selenium (1equiv) and sodium borohydride react readily in water or ethanol to give either sodium hydrogen selenide or sodium selenide These sodium hydrogen selenide and sodium diselenide solution can be used as nucleophilic displacement reaction to formed different type of organoselenium product in high yields after which undergoes NMR. I.R. and